CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS
(NOTES omitted)

INSTRUMENTS

G05 CONTROLLING; REGULATING
(NOTES omitted)

G05B CONTROL OR REGULATING SYSTEMS IN GENERAL; FUNCTIONAL ELEMENTS OF SUCH SYSTEMS; MONITORING OR TESTING ARRANGEMENTS FOR SUCH SYSTEMS OR ELEMENTS (systems for controlling or regulating non-electric variables G05D; systems for regulating electric or magnetic variables G05F; control devices or systems insofar as characterised by mechanical features only G05G)

NOTES

1. This subclass covers features of control systems or elements for regulating specific variables, which are clearly more generally applicable.
2. This subclass does not cover:
   a. systems for controlling or regulating nonelectric variables in general, which are covered by subclass G05D;
   b. systems for regulating electric or magnetic variables in general, which are covered by subclass G05F;
   c. systems specially adapted for the control of particular machines or apparatus provided for in a single other subclass, which are classified in the relevant subclass for such machines or apparatus, provided that there is specific provision for control or regulation relevant to the special adaptation. Otherwise, classification is made in the most appropriate place in this subclass.
3. In this subclass, the following terms or expressions are used with the meanings indicated:
   - "automatic controller" means a system, circuit, or device in which a signal from the detecting element is compared with a signal representing the desired value and which operates in such a way as to reduce the deviation. The automatic controller generally does not include the sensitive element, i.e. that element which measures the value of the condition to be corrected, or the correcting element, i.e. that element which adjusts the condition to be corrected;
   - "electric" includes "electromechanical", "electrohydraulic" or "electropneumatic".
4. In this subclass, details of specific control systems are classified in the group relevant to the system, if not otherwise provided for.

1/00 **Comparing elements, i.e. elements for effecting comparison directly or indirectly between a desired value and existing or anticipated values**
1/01 . electric
1/02 . . for comparing analogue signals (circuits for comparing the phase or frequency of two mutually-independent oscillations H03D 13/00)
1/022 . . . {using discharge tubes}
1/025 . . . {using inductance means}
1/027 . . . {using impedance bridges}
1/03 . . for comparing digital signals
1/04 . . with sensing of the position of the pointer of a measuring instrument
1/06 . . . continuous sensing
1/08 . . . stepwise sensing
1/11 . fluidic

5/00 **Anti-hunting arrangements**
5/01 . electric
5/04 . fluidic

6/00 **Internal feedback arrangements for obtaining particular characteristics, e.g. proportional, integral or differential**
6/02 . electric
6/05 . fluidic

7/00 **Arrangements for obtaining smooth engagement or disengagement of automatic control**
7/02 . electric
7/04 . fluidic

9/00 **Safety arrangements** (G05B 7/00 takes precedence; safety arrangements in programme-control systems G05B 19/048, G05B 19/406)
9/02 . electric
9/03 . . with multiple-channel loop, i.e. redundant control systems
9/05 . fluidic

11/00 **Automatic controllers** (G05B 13/00 takes precedence)
11/01 . electric
11/011 . . {details of the correcting means}
11/012 . . {details of the transmission means}
11/013 . . . {using discharge tubes}
11/015 . . . {using rotating amplifiers}
11/016 . . . {using inductance means}
11/017 . . . {using photo-electric means}
11/018 . . . {using thermal amplifiers}

11/06 . . in which the output signal represents a continuous function of the deviation from the desired value, i.e. continuous controllers (G05B 11/26 takes precedence)
11/10 . . . the signal transmitted being DC
11/12 . . . the signal transmitted being modulated on an AC carrier
11/14 . . in which the output signal represents a discontinuous function of the deviation from the desired value, i.e. discontinuous controllers (G05B 11/26 takes precedence)
11/16 . . . Two-step controllers, e.g. with on/off action
11/18 . . . Multi-step controllers
11/26 . . in which the output signal is a pulse-train
11/28 . . . using pulse-height modulation; using pulse-width modulation
11/30 . . . using pulse-frequency modulation
11/32 . . with inputs from more than one sensing element; with outputs to more than one correcting element
11/36 . . with provision for obtaining particular characteristics, e.g. proportional, integral, differential
11/38 . . . for obtaining a proportional characteristic
11/40 . . . for obtaining an integral characteristic
11/42 . . . for obtaining a characteristic which is both proportional and time-dependent, e.g. P. I., P. I. D.
11/44 . pneumatic only
11/46 . . without auxiliary power
11/48 . . with auxiliary power
11/50 . . . in which the output signal represents a continuous function of the deviation from the desired value, i.e. continuous controllers
11/52 . . . in which the output signal represents a discontinuous function of the deviation from the desired value, i.e. discontinuous controllers
11/54 . . . . Two-step controllers, e.g. with on/off action
11/56 . . . . Multi-step controllers
11/58 . . with inputs from more than one sensing element; with outputs to more than one correcting element
11/60 . hydraulic only

13/00 Adaptive control systems, i.e. systems automatically adjusting themselves to have a performance which is optimum according to some preassigned criterion (G05B 19/00 takes precedence)

13/02 . electric
13/0205 . . {not using a model or a simulator of the controlled system}
13/021 . . . {in which a variable is automatically adjusted to optimise the performance}
13/0215 . . . . {using trial and error method, including "peak-holding"}
13/022 . . . . {using a perturbation of the variable}
13/0225 . . . . . {being a periodic perturbation}
13/023 . . . . . {being a random or a self-induced perturbation}
13/0235 . . . . {using steepest descent or ascent method}
13/024 . . . {in which a parameter or coefficient is automatically adjusted to optimise the performance}
13/0245 . . . . {not using a perturbation signal}
13/025 . . . . {using a perturbation signal}
13/0255 . . . {the criterion being a time-optimal performance criterion}
13/026 . . . {using a predictor}
13/0265 . . {the criterion being a learning criterion}
13/027 . . . {using neural networks only}
13/0275 . . . {using fuzzy logic only}
13/028 . . . {using expert systems only}
13/0285 . . . {using neural networks and fuzzy logic}
13/029 . . . {using neural networks and expert systems}
13/0295 . . . {using fuzzy logic and expert systems}
13/04 . . involving the use of models or simulators
13/041 . . . {in which a variable is automatically adjusted to optimise the performance}
13/042 . . . {in which a parameter or coefficient is automatically adjusted to optimise the performance}
13/044 . . . . {not using a perturbation signal}
13/045 . . . . {using a perturbation signal}
13/047 . . . {the criterion being a time optimal performance criterion}
13/048 . . . {using a predictor}

15/00 Systems controlled by a computer (G05B 13/00, G05B 19/00 take precedence; automatic controllers with particular characteristics G05B 11/00)

15/02 . electric

17/00 Systems involving the use of models or simulators of said systems (G05B 13/00, G05B 15/00, G05B 19/00 take precedence)

17/02 . electric

19/00 Programme-control systems

19/02 . electric
19/04 . . Programme control other than numerical control, i.e. in sequence controllers or logic controllers (G05B 19/418 takes precedence)
19/0405 . . . {Programme-control specially adapted for machine tool control and not otherwise provided for}
19/041 . . . {Function-oriented details}
19/0415 . . . . {adapting phase duration according to measured parameters}
19/042 . . . using digital processors (G05B 19/05 takes precedence)
19/0421 . . . . {Multiprocessor system}
19/0423 . . . . {Input/output}
19/0425 . . . . . {Safety, monitoring}
19/0426 . . . . {Programming the control sequence}
19/0428 . . . . {Safety, monitoring (G05B 19/0423 takes precedence)}
19/045 . . . using logic state machines, consisting only of a memory or a programmable logic device containing the logic for the controlled machine and in which the state of its outputs is dependent on the state of its inputs or part of its own output states, e.g. binary decision controllers, finite state controllers
19/048 . . . Monitoring; Safety
19/05 . . . Programmable logic controllers, e.g. simulating logic interconnections of signals according to ladder diagrams or function charts
19/052 . . . . {Linking several PLC's}
19/054 . . . . {Input/output}
19/056 . . . . {Programming the PLC}

19/058 . . . . {Safety, monitoring}
19/06 . . . using cams, discs, rods, drums or the like
19/063 . . . . {for sequential programme-control without delivering a reference value}
19/066 . . . . {for delivering "step function", a slope function or a continuous function}
19/07 . . . where the programme is defined in the fixed connection of electrical elements, e.g. potentiometers, counters, transistors
19/075 . . . . {for delivering a step function, a slope or a continuous function (G05B 19/06 takes precedence)}
19/08 . . . using plugboards, cross-bar distributors, matrix switches, or the like
19/10 . . . using selector switches
19/102 . . . . {for input of programme steps, i.e. setting up sequence}
19/104 . . . . . {characterised by physical layout of switches; switches co-operating with display; use of switches in a special way}
19/106 . . . . {for selecting a programme, variable or parameter}
19/108 . . . . . {characterised by physical layout of switches; switches co-operating with display; use of switches in a special way}
19/12 . . . using record carriers
19/122 . . . . {using cards, tapes or discs having conductive paths (G05B 19/128 takes precedence)}
19/124 . . . . {using tapes, cards or discs with optically sensed marks or codes (G05B 19/128, G05B 19/14 take precedence)}
19/126 . . . . {using cards, tapes or discs having protuberances (G05B 19/128 takes precedence)}
19/128 . . . . {the workpiece itself serves as a record carrier, e.g. by its form, by marks or codes on it}
19/14 . . . . using punched cards or tapes {(G05B 19/128 takes precedence)}
19/16 . . . . using magnetic record carriers {(G05B 19/128 takes precedence)}
19/18 . . Numerical control [NC], i.e. automatically operating machines, in particular machine tools, e.g. in a manufacturing environment, so as to execute positioning, movement or co-ordinated operations by means of programme data in numerical form (G05B 19/418 takes precedence)
19/182 . . . {characterised by the machine tool function, e.g. thread cutting, cam making, tool direction control (G05B 19/21 - G05B 19/40 take precedence)}
19/184 . . . . {Generation of cam-like surfaces}
19/186 . . . . {Generation of screw- or gearlike surfaces}
19/188 . . . {characterised by special applications and not provided for in the relevant subclasses, (e.g. making dies, filament winding)}
19/19 . . . characterised by positioning or contouring control systems, e.g. to control position from one programmed point to another or to control movement along a programmed continuous path

NOTE

In this group, the measuring system for an axis is used to measure the displacement along that axis. This measurement is used as position-feedback in the servo-control system.

19/195 . . . . {Controlling the position of several slides on one axis}
19/21 . . . . using an incremental digital measuring device
19/23 . . . . . for point-to-point control
19/231 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
19/232 . . . . . {with speed feedback only}
19/234 . . . . . {with current or torque feedback only}
19/235 . . . . . {with force or acceleration feedback only}
19/237 . . . . . {with a combination of feedback covered by G05B 19/232 - G05B 19/235}
19/238 . . . . . {the positional error is only used to control speed in steps according to distance left, or to give a stop signal when error reaches zero}
19/25 . . . . . for continuous-path control
19/251 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
19/253 . . . . . {with speed feedback only}
19/255 . . . . . {with current or torque feedback only}
19/256 . . . . . {with force or acceleration feedback only}
19/258 . . . . . {with a combination of feedback covered by G05B 19/253 - G05B 19/256}
19/27 . . . . using an absolute digital measuring device
19/29 . . . . . for point-to-point control
19/291 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
19/293 . . . . . {with speed feedback only}
19/295 . . . . . {with current or torque feedback only}
19/296 . . . . . {with force or acceleration feedback only}
19/298 . . . . . {with a combination of feedback covered by G05B 19/293 - G05B 19/296}
19/31 . . . . . for continuous-path control
19/311 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
19/313 . . . . . {with speed feedback only}
19/315 . . . . . {with current or torque feedback only}

19/316 . . . . . {with force or acceleration feedback only}
19/318 . . . . . {with a combination of feedback covered by G05B 19/313 - G05B 19/316}
19/33 . . . . using an analogue measuring device
19/35 . . . . . for point-to-point control
19/351 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
19/353 . . . . . {with speed feedback only}
19/355 . . . . . {with current or torque feedback only}
19/356 . . . . . {with force or acceleration feedback only}
19/358 . . . . . {with a combination of feedback covered by G05B 19/353 - G05B 19/356}
19/37 . . . . . for continuous-path control
19/371 . . . . . {the positional error is used to control continuously the servomotor according to its magnitude}
19/373 . . . . . {with speed feedback only}
19/375 . . . . . {with current or torque feedback only}
19/376 . . . . . {with force or acceleration feedback only}
19/378 . . . . . {with a combination of feedback covered by G05B 19/373 - G05B 19/376}
19/39 . . . . using a combination of the means covered by at least two of the preceding groups G05B 19/21, G05B 19/27 and G05B 19/33
19/40 . . . . Open loop systems, e.g. using stepping motor
19/401 . . . characterised by control arrangements for measuring, e.g. calibration and initialisation, measuring workpiece for machining purposes (G05B 19/19 takes precedence)
19/4015 . . . . {going to a reference at the beginning of machine cycle, e.g. for calibration}
19/402 . . . characterised by control arrangements for positioning, e.g. centring a tool relative to a hole in the workpiece, additional detection means to correct position (G05B 19/19 takes precedence)
19/404 . . . characterised by control arrangements for compensation, e.g. for backlash, overshoot, tool offset, tool wear, temperature, machine construction errors, load, inertia (G05B 19/19, G05B 19/41 take precedence)
19/406 . . . characterised by monitoring or safety (G05B 19/19 takes precedence)
19/4061 . . . . Avoiding collision or forbidden zones
19/4062 . . . . Monitoring servoloop, e.g. overload of servomotor, loss of feedback or reference
19/4063 . . . . Monitoring general control system (G05B 19/4062 takes precedence)
19/4065 . . . . Monitoring tool breakage, life or condition
19/4067 . . . . Restoring data or position after power failure or other interruption
19/4068 . . . . Verifying part programme on screen, by drawing or other means
19/4069 . . . . Simulating machining process on screen (G05B 19/4068 takes precedence)
19/408 . . . characterised by data handling or data format, e.g. reading, buffering or conversion of data
19/4083 . . . . {Adapting programme, configuration}
19/4086 . . . . {Coordinate conversions; Other special calculations}
19/409 . . . characterised by using manual data input [MDI] or by using control panel, e.g. controlling functions with the panel; characterised by control panel details or by setting parameters (G05B 19/408, G05B 19/4093 take precedence)
19/4093 . . . characterised by part programming, e.g. entry of geometrical information as taken from a technical drawing, combining this with machining and material information to obtain control information, named part programme, for the NC machine
19/40931 . . . . {concerning programming of geometry}
19/40932 . . . . . {Shape input}
19/40933 . . . . . {Selecting figure elements from a menu table}
19/40935 . . . . . {Selection of predetermined shapes and defining the dimensions with parameter input}
19/40936 . . . . . {Defining geometry with a high level language}
19/40937 . . . . {concerning programming of machining or material parameters, pocket machining}
19/40938 . . . . . {Tool management}
19/4097 . . . characterised by using design data to control NC machines, e.g. CAD/CAM (G05B 19/4093 takes precedence)
19/4099 . . . . Surface or curve machining, making 3D objects, e.g. desktop manufacturing
19/41 . . . characterised by interpolation, e.g. the computation of intermediate points between programmed end points to define the path to be followed and the rate of travel along that path (G05B 19/25, G05B 19/31, G05B 19/37, G05B 19/39, G05B 19/40 take precedence)
19/4103 . . . . Digital interpolation
19/4105 . . . . Analog interpolation
19/414 . . . Structure of the control system, e.g. common controller or multiprocessor systems, interface to servo, programmable interface controller
19/4141 . . . . {characterised by a controller or microprocessor per axis}
19/4142 . . . . {characterised by the use of a microprocessor (G05B 19/4141 takes precedence)}
19/4144 . . . . {characterised by using multiplexing for control system}
19/4145 . . . . {characterised by using same processor to execute programmable controller and numerical controller function [CNC] and PC controlled NC [PCNC]}
19/4147 . . . . {characterised by using a programmable interface controller [PIC]}
19/4148 . . . . {characterised by using several processors for different functions, distributed (real-time) systems (G05B 19/4141 takes precedence)}
19/4155 . . . characterised by programme execution, i.e. part programme or machine function execution, e.g. selection of a programme

19/416 . . . characterised by control of velocity, acceleration or deceleration (G05B 19/19 takes precedence)
19/4163 . . . . {Adaptive control of feed or cutting velocity (without NC B23Q 15/12)}
19/4166 . . . . {Controlling feed or in-feed (G05B 19/4163 takes precedence)}
19/418 . . Total factory control, i.e. centrally controlling a plurality of machines, e.g. direct or distributed numerical control [DNC], flexible manufacturing systems [FMS], integrated manufacturing systems [IMS] or computer integrated manufacturing [CIM]
19/41805 . . . {characterised by assembly}
19/4181 . . . {characterised by direct numerical control [DNC]}
19/41815 . . . {characterised by the cooperation between machine tools, manipulators and conveyor or other workpiece supply system, workcell}
19/4182 . . . . {manipulators and conveyor only}
19/41825 . . . . {machine tools and manipulators only, machining centre}
19/4183 . . . {characterised by data acquisition, e.g. workpiece identification}
19/41835 . . . {characterised by programme execution}
19/4184 . . . {characterised by fault tolerance, reliability of production system}
19/41845 . . . {characterised by system universality, reconfigurability, modularity}
19/4185 . . . {characterised by the network communication}
19/41855 . . . . {by local area network [LAN], network structure}
19/4186 . . . . {by protocol, e.g. MAP, TOP}
19/41865 . . . {characterised by job scheduling, process planning, material flow}
19/4187 . . . . {by tool management}
19/41875 . . . {characterised by quality surveillance of production}
19/4188 . . . {characterised by CIM planning or realisation}
19/41885 . . . {characterised by modeling, simulation of the manufacturing system}
19/4189 . . . {characterised by the transport system}
19/41895 . . . . {using automatic guided vehicles [AGV] (control of position or course of AGV's G05D 1/00)}
19/42 . . Recording and playback systems, i.e. in which the programme is recorded from a cycle of operations, e.g. the cycle of operations being manually controlled, after which this record is played back on the same machine
19/4202 . . . {preparation of the programme medium using a drawing, a model}
19/4205 . . . . {in which a drawing is traced or scanned and corresponding data recorded}
19/4207 . . . . {in which a model is traced or scanned and corresponding data recorded}
19/421 . . . Teaching successive positions by mechanical means, e.g. by mechanically-coupled handwheels to position tool head or end effector (G05B 19/423 takes precedence)
19/423 . . . Teaching successive positions by walk-through, i.e. the tool head or end effector being grasped and guided directly, with or without servo-assistance, to follow a path
19/425 . . . Teaching successive positions by numerical control, i.e. commands being entered to control the positioning servo of the tool head or end effector
19/427 . . . Teaching successive positions by tracking the position of a joystick or handle to control the positioning servo of the tool head, leader-follower control (G05B 19/423 takes precedence)
19/43 . fluidic
19/44 . . pneumatic
19/46 . . hydraulic

21/00 **Systems involving sampling of the variable controlled** (G05B 13/00 - G05B 19/00 take precedence)
21/02 . electric

23/00 **Testing or monitoring of control systems or parts thereof** (monitoring of programme-control systems G05B 19/048, G05B 19/406)
23/02 . Electric testing or monitoring
23/0205 . . {by means of a monitoring system capable of detecting and responding to faults}
23/0208 . . . {characterized by the configuration of the monitoring system}
23/021 . . . . {adopting a different treatment of each operating region or a different mode of the monitored system, e.g. transient modes; different operating configurations of monitored system}
23/0213 . . . . {Modular or universal configuration of the monitoring system, e.g. monitoring system having modules that may be combined to build monitoring program; monitoring system that can be applied to legacy systems; adaptable monitoring system; using different communication protocols}
23/0216 . . . . {Human interface functionality, e.g. monitoring system providing help to the user in the selection of tests or in its configuration}
23/0218 . . . {characterised by the fault detection method dealing with either existing or incipient faults}
23/0221 . . . . {Preprocessing measurements, e.g. data collection rate adjustment; Standardization of measurements; Time series or signal analysis, e.g. frequency analysis or wavelets; Trustworthiness of measurements; Indexes therefor; Measurements using easily measured parameters to estimate parameters difficult to measure; Virtual sensor creation; De-noising; Sensor fusion; Unconventional preprocessing inherently present in specific fault detection methods like PCA-based methods}
23/0224 . . . . {Process history based detection method, e.g. whereby history implies the availability of large amounts of data}
23/0227 . . . . . {Qualitative history assessment, whereby the type of data acted upon, e.g. waveforms, images or patterns, is not relevant, e.g. rule based assessment; if-then decisions}
23/0229 . . . . . {knowledge based, e.g. expert systems; genetic algorithms}

23/0232 . . . . . {based on qualitative trend analysis, e.g. system evolution}
23/0235 . . . . . {based on a comparison with predetermined threshold or range, e.g. "classical methods", carried out during normal operation; threshold adaptation or choice; when or how to compare with the threshold}
23/0237 . . . . . {based on parallel systems, e.g. comparing signals produced at the same time by same type systems and detect faulty ones by noticing differences among their responses}
23/024 . . . . . {Quantitative history assessment, e.g. mathematical relationships between available data; Functions therefor; Principal component analysis [PCA]; Partial least square [PLS]; Statistical classifiers, e.g. Bayesian networks, linear regression or correlation analysis; Neural networks}
23/0243 . . . . {model based detection method, e.g. first-principles knowledge model}
23/0245 . . . . . {based on a qualitative model, e.g. rule based; if-then decisions}
23/0248 . . . . . {Causal models, e.g. fault tree; digraphs; qualitative physics}
23/0251 . . . . . {Abstraction hierarchy, e.g. "complex systems", i.e. system is divided in subsystems, subsystems are monitored and results are combined to decide on status of whole system}
23/0254 . . . . . {based on a quantitative model, e.g. mathematical relationships between inputs and outputs; functions: observer, Kalman filter, residual calculation, Neural Networks}
23/0256 . . . . {injecting test signals and analyzing monitored process response, e.g. injecting the test signal while interrupting the normal operation of the monitored system; superimposing the test signal onto a control signal during normal operation of the monitored system}
23/0259 . . . {characterized by the response to fault detection}
23/0262 . . . . {Confirmation of fault detection, e.g. extra checks to confirm that a failure has indeed occurred}
23/0264 . . . . {Control of logging system, e.g. decision on which data to store; time-stamping measurements}
23/0267 . . . . {Fault communication, e.g. human machine interface [HMI]}
23/027 . . . . . {Alarm generation, e.g. communication protocol; Forms of alarm}
23/0272 . . . . . {Presentation of monitored results, e.g. selection of status reports to be displayed; Filtering information to the user}
23/0275 . . . . {Fault isolation and identification, e.g. classify fault; estimate cause or root of failure}
23/0278 . . . . . {Qualitative, e.g. if-then rules; Fuzzy logic; Lookup tables; Symptomatic search; FMEA}
23/0281 . . . . . {Quantitative, e.g. mathematical distance; Clustering; Neural networks; Statistical analysis}
23/0283 . . . . {Predictive maintenance, e.g. involving the monitoring of a system and, based on the monitoring results, taking decisions on the maintenance schedule of the monitored system; Estimating remaining useful life [RUL] (preventive maintenance, i.e. planning maintenance according to the available resources without monitoring the system G06Q 10/06)}
23/0286 . . . . {Modifications to the monitored process, e.g. stopping operation or adapting control}
23/0289 . . . . . {Reconfiguration to prevent failure, e.g. usually as a reaction to incipient failure detection}
23/0291 . . . . . {Switching into safety or degraded mode, e.g. protection and supervision after failure}
23/0294 . . . . . {Optimizing process, e.g. process efficiency, product quality}
23/0297 . . . . {Reconfiguration of monitoring system, e.g. use of virtual sensors; change monitoring method as a response to monitoring results}

24/00 Open-loop automatic control systems not otherwise provided for

24/02 . electric
24/04 . fluidic

99/00 Subject matter not provided for in other groups of this subclass

2219/00 Program-control systems

2219/10 . Plc systems
2219/11 . . Plc I-O input output
2219/1101 . . . Remote I-O
2219/1102 . . . Speed up I-O manipulation
2219/1103 . . . Special, intelligent I-O processor, also plc can only access via processor
2219/1104 . . . Display state of connection of I-O
2219/1105 . . . I-O
2219/1106 . . . Pneumatic, hydraulic output module connected to plc module
2219/1107 . . . Hardware expansion of function of plc, programmable, connected in output line
2219/1108 . . . Relay module
2219/1109 . . . Expansion, extension of I-O
2219/11101 . . . Verifying ram data correct, validity, reload faulty data with correct data
2219/1111 . . . I-o grouped on one board
2219/1112 . . . Bit addressing, handling
2219/1113 . . . Address setting
2219/1114 . . . Address by module name
2219/1115 . . . Avoid to give two different addresses to same I-O, no duplicate
2219/1116 . . . Position of module in loop, ring determines address of module
2219/1117 . . . Parallel input addressed as memory
2219/1118 . . . Peripherals have a key to determine kind of peripheral
2219/1119 . . . Key is 8-resistors connected to either 0-or-1 to form a byte key

2219/1121 . . . Read key multiplexed, 16-bit wide, connect some resistors to reversed potential
2219/1122 . . . Program address module after installation, connect programmer into module
2219/1123 . . . Poll and detect connected I-O addresses, not connected means high address
2219/1124 . . . Transfer address to module, decrement, send this as address for next module
2219/1125 . . . I-O addressing
2219/1126 . . . Conversion table between original defined module address and actual physical address
2219/1127 . . . Selector for I-O, multiplex for I-O
2219/1128 . . . Several networks linked to host computer
2219/1129 . . . Serial addressed modules on bus
2219/1131 . . . I-O connected to a bus
2219/1132 . . . High speed bus between plc and plc or programming device
2219/1133 . . . Sensor actuator, asi, bus, network
2219/1134 . . . Fieldbus
2219/1135 . . . Profibus
2219/1136 . . . Canbus
2219/1137 . . . Peer to peer communication
2219/1138 . . . Configuration of I-O
2219/1139 . . . By using software configurable circuit, integrated, pga between cpu and I-O
2219/1141 . . . Modify manually, using keyboard configuration of module
2219/1142 . . . Load in replacement I-O stored configuration
2219/1143 . . . Base configuration contains all I-O modules, deselect not present modules
2219/1144 . . . Program, program I-O module
2219/1145 . . . Normal scan of I-O and direct acces of some I-O independent from normal scan
2219/1146 . . . Scanning sequence as function of previous logic expression
2219/1147 . . . Variable rate of scan
2219/1148 . . . If I-O module cannot be scanned in time, report to controller
2219/1149 . . . I-o in groups, serviced according to critical inputs, tasks matched to I-O
2219/1151 . . . Fast scanning of I-O to put I-O status in image table
2219/1152 . . . I-O module delivers interrupt on event, store port and 10ms timestamp in buffer
2219/1153 . . . Scan only some I-O registers, use flags
2219/1154 . . . Reading repeatedly input state, try again
2219/1155 . . . Switching over from one input to another one
2219/1156 . . . Special latches release all simultaneously
2219/1157 . . . I-O used either as input or as output
2219/1158 . . . Control of output current
2219/1159 . . . Image table, memory
2219/1161 . . . Signal processing, detect or deliver analog signals
2219/1162 . . . Forcing I-O
2219/1163 . . . Multiplexer for analog signals
2219/1164 . . . Latch for output or input
2219/1165 . . . Disable I-O card by preventing current flow
2219/1166 . . . Create optimum data blocks for transmission
2219/1167 . . . Pulse wave output
2219/1168 . . . Peak amplitude for input, nul amplitude for activating output
2219/1169 . . . Activating output if input changes, transition input and output not yet on
2219/1171 . . . Detect only input variation, changing, transition state of variable
2219/1172 . . . Direct negation, inversion of inputsignal
2219/1173 . . . Activating output only if powersupply is sufficient
2219/1174 . . . Input activates directly output and vice versa
2219/1175 . . . Activating output repeatedly for guaranteed turning on of output
2219/1176 . . . I-O signal processing, adaption, conditioning, conversion of signal levels
2219/1177 . . . Insertion mistake
2219/1178 . . . Display states of I-O in time
2219/1179 . . . Safety, on error, fault, block, inhibit output
2219/1181 . . . Detection of I-O faults, shut down of I-O
2219/1182 . . . I-O isolation, optical
2219/1183 . . . On error shut off output by independent system, not normal I-O
2219/1184 . . . Test ability of input for on, off capability
2219/1185 . . . Feedback of output status to input module and compare with command
2219/1186 . . . Redundant inputs parallel, outputs series, load safe switch off, AND condition
2219/1187 . . . Test input value with stored limits, permissable range, plausibility
2219/1188 . . . Detection of inserted boards, inserting extra memory, availability of boards
2219/1189 . . . Duplicated I-O also triple
2219/1191 . . . I-O voter
2219/1192 . . . Output of interfaces parallel, for safe load switch on, OR condition
2219/1193 . . . I-O ram as buffer for signals and self test for I-O bus
2219/1194 . . . Send dummy, check data to I-O to check correct I-O connection
2219/1195 . . . Critical I-O monitored by safety module connected to plc, other I-Os by plc self
2219/1196 . . . Intelligent, smart I-O can function independently, monitoring limit values
2219/1197 . . . Each interface, module has simulation module which takes over control
2219/1198 . . . Activate output only if power of the output signal is sufficient
2219/1199 . . . Inserting or taking out of boards during power on, hot plug in
2219/12 . . Plc mp multi processor system
2219/1201 . . . Each plc can act as master, flying master
2219/1202 . . . Modules with same hardware and software
2219/1203 . . . Expand logical expression over multiple controllers
2219/1204 . . . Multiprocessing, several plc's, distributed logic control
2219/1205 . . . Memory access for different processors, memory arbitration, mailbox
2219/1206 . . . All processors are loaded with same program, only part of program is loaded
2219/1207 . . . Download programcode to node, I-O and execute programcode
2219/1208 . . . Communication, exchange of control, I-O data between different plc,
2219/1209 . . . Exchange control, I-O data to other plc, individually, without host
2219/1211 . . . Exchange control, I-O data to other plc, using separate synchronizing,

2219/1212 . . . Exchange control data between plc's only when other plc's are inactive
2219/1213 . . . All plc send their input to a common image memory, output directly send out
2219/1214 . . . Real-time communication between plc, Ethernet for configuration, monitor
2219/1215 . . . Master slave system
2219/1216 . . . Interlock problem, avoid sending data to slave when slave processes data
2219/13 . . Plc programming
2219/13001 . . . Interrupt handling
2219/13002 . . . Transfer rom content to ram, load ram from non volatile memory
2219/13003 . . . Initial program load, host to controller
2219/13004 . . . Programming the plc
2219/13005 . . . Subroutine
2219/13006 . . . Prom burning
2219/13007 . . . Program hardwired logic, pld, fpga when out of machine, or inactive
2219/13008 . . . Quicker execution of jumps when repeating same kind of operation
2219/13009 . . . State machine instructions
2219/13011 . . . Batch control
2219/13012 . . . Using other programs, adapting program to machine, exchanging or rom
2219/13013 . . . Transferring ram to eprom see also prom burning
2219/13014 . . . Expanding functions of display by modular hardware
2219/13015 . . . Semi automatic, manual automatic
2219/13016 . . . Jump while output is disabled, or disabling output when running test instruction
2219/13017 . . . Macro instructions
2219/13018 . . . Conversion ladder diagram to decision system, machine code, language
2219/13019 . . . Translate program in order to be used on different plc
2219/13021 . . . Convert Petri net to ladder diagram
2219/13022 . . . Convert source program to intermediate program
2219/13023 . . . Convert natural language, graphic to coded states, input
2219/13024 . . . Convert digital logic of hardware circuit into plc software
2219/13025 . . . Convert batch recipe into plc program
2219/13026 . . . Convert ladder to event chaining, internal state for fpga or similar
2219/13027 . . . Convert time chart to relation vector to calculate plc I-O state as function of time
2219/13028 . . . Convert plc type program in pc type program for running in pc environment
2219/13029 . . . Enter values with incremental keys
2219/13031 . . . Use of touch screen
2219/13032 . . . Different menus on screen, softkeys
2219/13033 . . . Code wheel to enter data, push button to accept
2219/13034 . . . Operator interface derived from comment label in program
2219/13035 . . . Name, address duplication detection for program components, symbols
2219/13036 . . . Tracing, use of dummy ladder to collect signals together in one
2219/13037 . . . Tracing
2219/13038 . . . Comment, message data displayed with program instructions
2219/13039 . . . Print out of program, printer for program
2219/13041 . . . Display ladder or logic diagram, mnemonics, switch between two display
2219/13042 . . . Display logic diagram, LOP
2219/13043 . . . Display statement, instruction list, IL, BL, AWL
2219/13044 . . . Display as flow chart, SFC, FUP
2219/13045 . . . Additional data to restore ladder diagram from machine instructions
2219/13046 . . . Display status of edited program segments: inserted, deleted, replaced
2219/13047 . . . Display data on chart with comment, message about type of data
2219/13048 . . . Display of ladder, RLD, RLL, KOP
2219/13049 . . . Display progress of program, state, highlight, colour
2219/13051 . . . Display status of I-O in intelligible, easy to understand language
2219/13052 . . . Display of ladder diagram
2219/13053 . . . Edit by use of a ladder mask, raster, enter a symbol and select place in mask
2219/13054 . . . Enter a symbol and number of times symbol to be used in ladder diagram
2219/13055 . . . Place cursor, enter symbol, move cursor
2219/13056 . . . Edit conversion, jump table interactively
2219/13057 . . . Automatic search for unused, available address; assign to symbol
2219/13058 . . . One instruction of plc generates a whole independent sequence, relay
2219/13059 . . . If not able to execute instruction block, skip and execute next
2219/13061 . . . Selection between sequential and conditional program
2219/13062 . . . Booting
2219/13063 . . . Synchronization between modules
2219/13064 . . . Execute reverse sequence
2219/13065 . . . Tasks for executing several programs asynchronously
2219/13066 . . . Execute next step if state, control zone changes
2219/13067 . . . Use of variables, symbols in instructions, to indicate mechanisms, interfaces
2219/13068 . . . Program divided in operation blocks, groups, tasks each executed
2219/13069 . . . Execute bit operation during instruction fetch cycle for word operation
2219/13071 . . . Non time critical program by processor, time critical program by hardware
2219/13072 . . . Super scalar computing
2219/13073 . . . Several interacting programs, each for a separate machine, exchange of start, stop
2219/13074 . . . Result of bit operation can modify or stop instruction execution
2219/13075 . . . User program, then interlock program to override certain conditions
2219/13076 . . . Interprete in pc a ladder diagram, use of sequence engine
2219/13077 . . . Interlock conditions stored in tables
2219/13078 . . . Sequence operation and interlock set programs are separated
2219/13079 . . . Solving stored logic function if value is equal target value

2219/13081 . . . Select between initialisation and normal control instructions sequence plc
2219/13082 . . . Parallel execution of bit operations
2219/13083 . . . Jumps
2219/13084 . . . Rom or eprom with conditional instructions
2219/13085 . . . Plc controls several machines in sequence
2219/13086 . . . Priority interrupt
2219/13087 . . . Separate interrupt controller for modules
2219/13088 . . . Analyzing only relevant rows of ladder diagram
2219/13089 . . . Skip part of expression evalutation if no influence on end result
2219/13091 . . . Use of precalculated and stored values to speed up calculations
2219/13092 . . . Speed up, evaluation of expressions between brackets
2219/13093 . . . Using functions like arithmetic timers in program
2219/13094 . . . Using a-d convertor as function
2219/13095 . . . Pid regulator
2219/13096 . . . Fuzzy control function
2219/13097 . . . Function is true macro program, not subroutine, conversion to machine
2219/13098 . . . Nc function to control axis, written in C or not
2219/13099 . . . Function block, OOP, various functions grouped, called by name as servo
2219/13101 . . . Function block instance, only one function block exists, several instances
2219/13102 . . . Function is a user written program, separate from rest
2219/13103 . . . Adaptive selftuning regulator
2219/13104 . . . Assembly, machine code, instruction list, AWL, IL, BL
2219/13105 . . . Two or more languages, ladder diagram or progression, basic program
2219/13106 . . . Natural language, use simple words like move, rotate,
2219/13107 . . . Logic symbols, plan LOP, functional block symbols FBS, functional programming FUP
2219/13108 . . . Flow diagram, sequential function chart with transitions and states SFC Grafcet
2219/13109 . . . Pld programmable logic device software for plc
2219/13111 . . . Expert system
2219/13112 . . . Petri net
2219/13113 . . . Read image of sequence ladder diagram, flow chart drawing, translate into code
2219/13114 . . . Use of relative addresses for program
2219/13115 . . . Optimize ladder diagram block by rearrangement of serial and parallel
2219/13116 . . . Machine code, instruction for processor
2219/13117 . . . Two languages, ladder diagram and machine code for processor
2219/13118 . . . Decompiler, translate machine code to hll, reverse processing, easy modification
2219/13119 . . . Compiler
2219/13121 . . . DDE direct data exchange, DLL dynamic library linking
2219/13122 . . . Flow chart program activates several ladder diagrams, each controls one machine
2219/13123 . . . C language
2219/13124 . . . Step language
2219/13125 . . . Use of virtual, logical connections
2219/13126 . . . Csl computer simulation language
2219/13127 . . . Hybrid sfc for description of sequence, ladder diagram for conditions, interlock
2219/13128 . . . Relay ladder diagram, RLL RLD KOP
2219/13129 . . . Automatic documentation of program
2219/13131 . . . Select out several languages: FBD, SFC, RLL or RLD
2219/13132 . . . Select out several languages: FBD and SFC
2219/13133 . . . Select control languages out of FB RLL or RLD, SFC, ST
2219/13134 . . . Two or more languages mixed, RLD, SFC, FBD, IL, ST, relay ladder, function block, sequential function, instruction list, structured text mixed to form logic control program
2219/13135 . . . Using audio and-or video playback
2219/13136 . . . Translate spreadsheet into code
2219/13137 . . . Interpreter considers hierarchy of plc in system structure for programming it
2219/13138 . . . High level language HLL, structured text ST, resembles pascal
2219/13139 . . . CAD, design plc system by inputting desired failure, fault behaviour
2219/13141 . . . Derive sequence program from design, cad data of machine
2219/13142 . . . Debugging, tracing
2219/13143 . . . Manual testing
2219/13144 . . . GUI graphical user interface, icon, function bloc editor, OI operator interface
2219/13145 . . . Graphical input of network of symbols, simulation on screen, translate to machine
2219/13146 . . . Process image blocks have a relation to software function blocks
2219/13147 . . . Program using time charts
2219/13148 . . . Object oriented programming
2219/13149 . . . Encapsulated actuator model with standardized interface: state, action, interlock
2219/13151 . . . Correction of program using grammatical error detection
2219/13152 . . . Modification of program
2219/13153 . . . Modification, change of program in real time
2219/13154 . . . Patching rom to correct program
2219/13155 . . . Inserting instructions in program
2219/13156 . . . IC-memory card
2219/13157 . . . Tape
2219/13158 . . . Non volatile memory, no battery
2219/13159 . . . Cassette
2219/13161 . . . Easily exchangable rom, eprom cassette, earom
2219/13162 . . . Core memory
2219/13163 . . . Light pen
2219/13164 . . . Remote and local programming unit, control panel
2219/13165 . . . Program plc by independent build in processor
2219/13166 . . . Program intelligent I-O separate from main plc
2219/13167 . . . Personal computer pc
2219/13168 . . . With contact pins
2219/13169 . . . Voice, oral, vocal, speech announcement
2219/13171 . . . Portable, detachable programming unit
2219/13172 . . . Remote programming from computer
2219/13173 . . . Selection out of all possible programs with switch
2219/13174 . . . Pc, computer connected to plc to simulate machine
2219/13175 . . . For each input corresponding delay time for output response

2219/13176 . . . Functionality of a complex controlled systems, composed of sub-systems
2219/13177 . . . Select next stimuli as function of input state of previous step, so useless stimuli skipped
2219/13178 . . . Reiterate simulation till minimum delay stimuli, original contact stat
2219/13179 . . . Reiterate simulation for different conditions or subsystems
2219/13181 . . . Selection of limited stimuli, inputs for simulation
2219/13182 . . . With petrinets
2219/13183 . . . Connect simulation card with overlay into control system, to learn programming
2219/13184 . . . Pc, computer connected to plc to simulate only part of machine
2219/13185 . . . Software function module for simulation
2219/13186 . . . Simulation, also of test inputs
2219/13187 . . . Checking validity of data
2219/13188 . . . Checking program data, parity, key
2219/13189 . . . On error, look in table for alternative allowed next instruction
2219/13191 . . . Inhibit next step if signature fails, response different from stored response
2219/13192 . . . Eeprom and software interlock, user cannot change ram data
2219/13193 . . . Examine needed I-O, detect connected I-O, execute program only if proper I-O
2219/13194 . . . Build in measurement processing time and input time, input time must be smaller
2219/13195 . . . Protected programs, running these programs
2219/13196 . . . Check if instruction for special module is valid for that module
2219/13197 . . . Host and remote version of ladder program, avoid different versions
2219/13198 . . . Safety, forbid dangerous instruction, instruction order while programming
2219/13199 . . . On error choose another program
2219/14 . . Plc safety
2219/14001 . . . Detect direction, sign of change of signal
2219/14002 . . . Independent processor, coprocessor monitors plc
2219/14003 . . . Pc, personal computer monitors contact data of several plc's
2219/14004 . . . On error I-O control state is substituted by actual state to continue
2219/14005 . . . Alarm
2219/14006 . . . Safety, monitoring in general
2219/14007 . . . Plc as standalone for safety control of machine
2219/14008 . . . Pc monitors plc
2219/14009 . . . Manual overide control, digital or analog, between plc and machine
2219/14011 . . . Explosion free control, intrinsically safe
2219/14012 . . . Safety integrity level, safety integrated systems, SIL, SIS
2219/14013 . . . IN, dual plc worker coworker, switch, OUT persistency
2219/14014 . . . Redundant processors and I-O
2219/14015 . . . Dual plc's, processors and dual I-O
2219/14016 . . . Triple plc's, processors and dual I-O, triple modular redundant
2219/14017 . . . Triple plc's, processors and triple I-O
2219/14018 . . . IN, plc and comparator, error detector, backup, standby plc, switch, update OUT
2219/14019 . . . Dual IN, crosscoupled relay, dual AND, dual OUT
2219/14021 . . . IN, direct link parallel to plc, AND, OUT
2219/14022 . . . Dual IN, dual plc with dual OUT comparator, dual AND, dual OUT
2219/14023 . . . IN, three plc and 2-out-of-3 processor voter, 2-out-of-3 output voter, OUT
2219/14024 . . . Dual IN, three plc with comparator, dual 2-out-of-3 output voter, dual OUT
2219/14025 . . . Dual IN, relay parallel to plc with comparator, dual AND, feedback OUT, dual OUT
2219/14026 . . . IN, relay, direct link parallel to plc, AND, OUT
2219/14027 . . . IN, plc and comparator, feedback OUT, OUT
2219/14028 . . . Dual IN, plc and comparator, feedback OUT, AND, OUT
2219/14029 . . . Dual IN, plc and comparator, feedback OUT, dual AND, OUT
2219/14031 . . . Dual plc, dual I-O, single actuator, crosscoupling IN and OUT
2219/14032 . . . Dual plc, dual I-O, crosscoupling analog IN of first plc to OUT of second plc
2219/14033 . . . Dual plc, dual I-O bus, dual I-O amplifier
2219/14034 . . . Quad system, dual worker coworker, output voter, switch
2219/14035 . . . Single analog I-O IN, dual signal processing, dual plc
2219/14036 . . . Detection of fault in processor
2219/14037 . . . Fault in I-O communication
2219/14038 . . . Fault in I-O racks, point level
2219/14039 . . . Fault in sensor, actuator
2219/14041 . . . Influence of execution of interrupts
2219/14042 . . . Process time
2219/14043 . . . Detection of abnormal temperature
2219/14044 . . . Operating time test for over or under conditions
2219/14045 . . . Parameter, over or under condition detection
2219/14046 . . . Current flow
2219/14047 . . . Open circuit, broken line, cable
2219/14048 . . . Short circuit
2219/14049 . . . Broken led, signalling device
2219/14051 . . . Correct polarity of supply
2219/14052 . . . Detect missing module
2219/14053 . . . Power failure, loss, abnormal battery
2219/14054 . . . Self test
2219/14055 . . . Make log, journal, history file of state changes
2219/14056 . . . Monitor only particular devices which are required for execution of process
2219/14057 . . . Compare response time, time interval with reference response time, interval
2219/14058 . . . Diagnostic, using expert, knowledge based system
2219/14059 . . . Selftest of voting, switching unit
2219/14061 . . . On-off-line diagnostic
2219/14062 . . . Diagnostic of dead state, machine does not function anymore
2219/14063 . . . Diagnostic of degrading performance
2219/14064 . . . Portable diagnostic unit, offline
2219/14065 . . . Checking step, diagnostic routine at end of each scan
2219/14066 . . . Look up table to determine particular fault conditions
2219/14067 . . . Log, history of key, input information before last fault occurred

2219/14068 . . . Compare operation time of each independent block, group with stored
2219/14069 . . . Dual watch dog, one for operating system, other for user program
2219/14071 . . . Test of equipment, system without using actual system
2219/14072 . . . Test of I-O scanner
2219/14073 . . . Real time modeling of plc behaviour, display pictogram of system
2219/14074 . . . Signature analysis, recorded states, zones are compared to actual
2219/14075 . . . Test of interface
2219/14076 . . . Test of sensor
2219/14077 . . . Detect difference in signal between identical channels, if plausible
2219/14078 . . . If fault in next cycle persists, declare channel faulty
2219/14079 . . . If signal out of range, use for next cycle previous detected signal
2219/14081 . . . Take average, mean of two valid signals of same input
2219/14082 . . . Sample input signal again to verify if signal is correct
2219/14083 . . . Derive diagnostic program from model needed for sequence program
2219/14084 . . . Remote diagnostic
2219/14085 . . . Memory testing
2219/14086 . . . Watch dog
2219/14087 . . . Selecting parameters or states to be displayed on panel, displaying states
2219/14088 . . . Display result of computation, calculation
2219/14089 . . . Display of control states on cards, by leds
2219/14091 . . . Message generation, composer from variables and states, zones
2219/14092 . . . Display menu and its code, sense code, compare with registered code
2219/14093 . . . Display matrix of relay, contact symbols, select and show time
2219/14094 . . . Display instruction with corresponding states, markers
2219/14095 . . . Library of pictures to display process, pictogram
2219/14096 . . . Voice, vocal, speech alarm
2219/14097 . . . Display of error messages
2219/14098 . . . Displaying instructions for monitoring state of machine
2219/14099 . . . What kind of fault, first fault latch indication
2219/14101 . . . Indication of status in a ready, off, running of fault state
2219/14102 . . . Fault stages, confinement, logical segregation of I-O, separate modules
2219/14103 . . . Detection on or off-line, latency from failure occurrence to fault recognition
2219/14104 . . . Fault masking, redundant module is selected, fault will not propagate
2219/14105 . . . Retry, reacquire input data and start fault sequence again
2219/14106 . . . Reconfiguration of components or graceful degradation, degrade
2219/14107 . . . Recovery, after detection or reconfiguration, effect an error eliminati
2219/14108 . . . Restart of processing
2219/14109 . . . Repair on or off-line
2219/14111 . . . Reintegration, after correction of fault, failed module reinserted
2219/14112 . . . Diagnostic, troubleshooting
2219/14113 . . . Fault tolerant objectives for equipment, controller
2219/14114 . . . Integrity, error detector, switch off controller, fail safe
2219/14115 . . . Rapid recovery after fault detection
2219/14116 . . . Safe, emergency shutdown, esd of system
2219/14117 . . . Emergency shut down of control processor, power down
2219/14118 . . . Interlock of control switches
2219/14119 . . . Inhibit remote control
2219/14121 . . . Dual hand control
2219/14122 . . . Prevent conflicting writing of data; use lock flags
2219/14123 . . . Majority voting, dynamic redundant, persistency and integrity
2219/14124 . . . Redundant network, client server nodes
2219/14125 . . . Redundant I-O racks, interfaces to points
2219/14126 . . . Redundant I-O points, two sensors, actuators for same point
2219/14127 . . . Redundant communication between processor and I-O
2219/14128 . . . Redundant I-O rack has spare slots, hot repair feature, spare blocks f
2219/14129 . . . Primary, worker and backup, coworker plc for testing I-O
2219/14131 . . . Workby plc, all plc function in parallel, synchronous data exchange
2219/14132 . . . Dual plc, each monitors other
2219/14133 . . . Each plc is different from others
2219/14134 . . . Each plc is programmed by different person
2219/14135 . . . Single plc, load between two I-O to plus and two I-O to ground
2219/14136 . . . Redundancy, masking redundancy, avoid failure but no fault detection
2219/14137 . . . Restart, power up of processor, outputs are off, disabled or hold last state
2219/14138 . . . Each independent operation block, group has own restart, home position
2219/14139 . . . On the fly software replacement in case of error
2219/14141 . . . Restart
2219/14142 . . . Low impedance bus
2219/14143 . . . Structure, low pass filter, debouncing input, output driver with ramp
2219/14144 . . . Galvanic isolation
2219/14145 . . . Serial feedback of several states of output
2219/15 . . Plc structure of the system
2219/15001 . . . Local remote switch control
2219/15002 . . . Image table in I-O expansion module
2219/15003 . . . Interbus-s
2219/15004 . . . Identity kind of module, control unit connected
2219/15005 . . . Set switches defining control function
2219/15006 . . . Set configuration from master control station
2219/15007 . . . On reinsertion board, power up, program setting, configuration automatically set
2219/15008 . . . Identify connected I-O and store in address table
2219/15009 . . . Object oriented configuring, graphical display of plant
2219/15011 . . . Configuration of operating system
2219/15012 . . . Configuration software for networks

2219/15013 . . . Set configuration, address of connected module from fixed non volatile
2219/15014 . . . Configure priorities of different tasks
2219/15015 . . . Assign functions to group of complete or partial cells, modules
2219/15016 . . . Intialize amount of memory space needed in module
2219/15017 . . . Optical fiber
2219/15018 . . . Communication, serial data transmission, modem
2219/15019 . . . RS232 serial
2219/15021 . . . Convertor between plc and pc built into serial communication line
2219/15022 . . . Synchronus serial datatransmission
2219/15023 . . . Data packet, each module reads input stream and replaces with output
2219/15024 . . . RS422, balanced lines, xor, only one transmitter, receiver, RS485
2219/15025 . . . Before starting communication between modules, initialize modules
2219/15026 . . . Detection of data transmission faults
2219/15027 . . . RS485, MPI multipoint interface, multiple transmitters, receivers connected
2219/15028 . . . Controller and device have several formats and protocols, select common one
2219/15029 . . . I-O communicates with local bus at one end and with fieldbus at other end
2219/15031 . . . RS485 for service connection to module
2219/15032 . . . Exchange objects having I-O, configuration, status, parameters, functions attributes
2219/15033 . . . Exchange objects between cpu and intelligent I-O, stored in their memory
2219/15034 . . . Serial transmission using one line for data and one line for clock
2219/15035 . . . Select between simplex, only reading I-O data or duplex, also writing to interface
2219/15036 . . . Control words for interface itself and for connected I-O
2219/15037 . . . Fail safe communication
2219/15038 . . . Internet, tcp-ip, web server see under **S05B219-40**
2219/15039 . . . Display of reference, set value, of measured, feedback value
2219/15041 . . . Sense area of screen, compare if corresponds with correct area
2219/15042 . . . Synoptic display of process, mimic diagram
2219/15043 . . . Lcd, 7-segment displays ten different states
2219/15044 . . . Multiple lcd, alphanumerical display
2219/15045 . . . Portable display unit
2219/15046 . . . Low-high intensity display, flashing
2219/15047 . . . Colour display
2219/15048 . . . Microprocessor
2219/15049 . . . Timer, counter, clock-calendar, flip-flop as peripheral
2219/15051 . . . Dual port memory
2219/15052 . . . Communication processor, link interface
2219/15053 . . . Microcontroller
2219/15054 . . . LIFO for storing intermediate results
2219/15055 . . . FIFO
2219/15056 . . . DMA
2219/15057 . . . FPGA field programmable gate array
2219/15058 . . . Tristate interface
2219/15059 . . . Floating point coprocessor
2219/15061 . . . RISC processor for plc
2219/15062 . . . Battery backup
2219/15063 . . . Real time clock
2219/15064 . . . MMU, memory management unit
2219/15065 . . . Optimize program memory space
2219/15066 . . . Use of external memory
2219/15067 . . . Using a mixture of memories
2219/15068 . . . SBC single board computer, UCM universal control module
2219/15069 . . . Use of function modules with timer, counter, relay functions and I-O
2219/15071 . . . Circuit in module connected to bus over two contacts, closed in operat
2219/15072 . . . Modules in daisy chain, connected by parallel cable
2219/15073 . . . Interface card, module has own power supply independent from pc
2219/15074 . . . Modules on bus and direct connection between them for additional logic
2219/15075 . . . Each connected module has own power suppl
2219/15076 . . . Stackthrough modules, modules are stacked, no need for backplane
2219/15077 . . . Modular structure, memory tables hold data about type of connected apparatus and data format
2219/15078 . . . Modules, construction of system
2219/15079 . . . Multitasking, real time multitasking
2219/15081 . . . Period length ratio between application and communication task is settable
2219/15082 . . . Dos operating plc system
2219/15083 . . . Operating system, microsoft windows
2219/15084 . . . MSDOS
2219/15085 . . . Windows NT
2219/15086 . . . Windows-95
2219/15087 . . . Open control system
2219/15088 . . . Prestabilized power supply followed by another stabilized power supply
2219/15089 . . . Double, parallel power supply, double, two rails for power supply
2219/15091 . . . Power and data bus
2219/15092 . . . Power supply with extended range inputs
2219/15093 . . . For each module a power supply
2219/15094 . . . Clock for power converters also for microprocessor and I-O
2219/15095 . . . Power supply for input, output derived from microprocessor pin
2219/15096 . . . Cpu controls power supply on I-O modules
2219/15097 . . . Power supply
2219/15098 . . . Switching power on only when system needs control, stand by
2219/15099 . . . Bus arbitration
2219/15101 . . . Personal computer pc and plc, slot plc, same kernel
2219/15102 . . . Programmer simulates, behaves like a programming drum
2219/15103 . . . Microprogram stored in rom or ram
2219/15104 . . . Microprogram rom is externally attached
2219/15105 . . . Hardwired logic to accelerate, speed up execution of instructions
2219/15106 . . . High speed limited function sub plc together with slow speed general
2219/15107 . . . Linesolver, columnsolver

2219/15108 . . . Intelligent I-O is a plc itself, with limited interface
2219/15109 . . . Intelligent interface is much faster than main plc
2219/15111 . . . Intelligent interface behaves like a plc, by special communucation pro
2219/15112 . . . Two cpu control plc, select cpu, video switch, with special key
2219/15113 . . . Common display, monitor for two controlling cpu
2219/15114 . . . Coprocessor connected to main via bus and separate channel
2219/15115 . . . Pc serves as plc, programming panel, monitoring panel
2219/15116 . . . Pc implements plc, in application program, plc instruction register
2219/15117 . . . Radio link, wireless
2219/15118 . . . Shared memory
2219/15119 . . . Backplane controller
2219/15121 . . . Plc build into application, like power invertor
2219/15122 . . . Less frequent used subroutines arranged at high addresses
2219/15123 . . . Plc with build in console, I-O and communication
2219/15124 . . . Plc integrated in plug, connector
2219/15125 . . . Multiple kernels
2219/15126 . . . Calculate duration of cycle
2219/15127 . . . Bit and word, byte oriented instructions, boolean and arithmetic operations
2219/15128 . . . Ternary logic instead of binary
2219/15129 . . . Separating address and databus
2219/15131 . . . Pipeline registers
2219/15132 . . . Bank switching
2219/15133 . . . Opto isolation, optical separation
2219/16 . . Plc to applications
2219/161 . . . Nuclear plant
2219/162 . . . Transfer line
2219/163 . . . Domotique, domestic, home control, automation, smart, intelligent house
2219/20 . Pc systems
2219/21 . . Pc I-O input output
2219/21001 . . . Analog input
2219/21002 . . . Neural classifier for inputs, groups inputs into classes
2219/21003 . . . Proximity switch as input
2219/21004 . . . Microprocessor plus electromechanical, cam control for output
2219/21005 . . . Several slave modules connected to same I-O of master, multiplexed by master
2219/21006 . . . Detect position switches, connect resistances, analog value gives position
2219/21007 . . . A processor to evaluate signals of detector only, I-O processor
2219/21008 . . . Read in analog values by microprocessor, potentiometer, resistor taps
2219/21009 . . . Display states of I-O
2219/21011 . . . Forcing I-O
2219/21012 . . . Configurable I-O
2219/21013 . . . Microcontroller and power output switches integrated on same chip
2219/21014 . . . Interface, module with relays
2219/21015 . . . Easy expansion, extension of I-O
2219/21016 . . . I-O has own power supply
2219/21017 . . . Use of stack memory between processor and machine
2219/21018 . . . Connect sensors to a concentrator, concentrators to bus
2219/21019 . . . Split, separate urgent from non urgent, interrupt from status inputs, store in two register
2219/21021 . . . Intelligent I-O, executes tasks independently from main cpu
2219/21022 . . . Telephone ring interface, detect ring sequence to control devices
2219/21023 . . . Midi interface
2219/21024 . . . Analog output
2219/21025 . . . To address single module, assign a group with only that single module
2219/21026 . . . Indirect adressing of I-O through a control register
2219/21027 . . . Address extension, module with several I-O, command has subaddress for each I-O
2219/21028 . . . Address of module determined by position
2219/21029 . . . Address of module determined by function of module
2219/21031 . . . Address of module determined by signature : type, value of measured, controlled data of module
2219/21032 . . . Controlled module in a ring, each module detects its own address
2219/21033 . . . Serial transfer address to each module, decrement, if zero module found
2219/21034 . . . Address I-O
2219/21035 . . . Identification with serial header
2219/21036 . . . Each connected module has own address and address of originator of message
2219/21037 . . . Serial time multiplex bus, programming each module with one delayed line TDM
2219/21038 . . . Special clock line, module counts clock until equal to its address
2219/21039 . . . Slaves, modules in daisy chain, each handles control data, transmits to next
2219/21041 . . . Detect length of packet of pulses to recognise address
2219/21042 . . . Address a group, a zone
2219/21043 . . . Device address and subdevice address and function address
2219/21044 . . . Modules with same address are each selected by different transmission speed
2219/21045 . . . Modules with same address are each selected by different modulation
2219/21046 . . . Address a single module out of a group
2219/21047 . . . Select module if address of module equals required address, compare addresses
2219/21048 . . . Compare fixed address of module to required address
2219/21049 . . . Poll and detect connected I-O modules, address terminator, address line high
2219/21051 . . . Modules able to communicate to other modules are connected to arbiter
2219/21052 . . . Modules having a common function are allocated ascending number to address
2219/21053 . . . Each unit, module has unique identification code, set during manufacturing, fMAC address
2219/21054 . . . Connector on bus has two rows of contacts, if one contact is connected, other not
2219/21055 . . . Number of halfwaves equals number of I-O, send block of halfwaves, synchro gap

2219/21056 . . . Decoding on module, module can be inserted anywhere, fixed address in bus connector
2219/21057 . . . Buslines connecting modules are offset by one line from module to module
2219/21058 . . . Find address by activating power and detect which address gives feedback
2219/21059 . . . I-O in address space
2219/21061 . . . Adapter bus connected to centronics
2219/21062 . . . Pc and I-O bus manager and network nodes linked to I-O clusters
2219/21063 . . . Bus, I-O connected to a bus
2219/21064 . . . Calibration: automatic of a-d convertor, store null and maximum in eeprom
2219/21065 . . . Module calibrates connected sensor
2219/21066 . . . Disconnect data line from module before, reconnect after configuration
2219/21067 . . . Set group of module by hardware for each module, no program protocol
2219/21068 . . . Configure input signals either as interrupt or status signals
2219/21069 . . . At start up check I-O and store addresses in secure device
2219/21071 . . . Configuration, each module has a settable address, code wheel, encoder
2219/21072 . . . Write, modify address into module by optical means, laser
2219/21073 . . . Each module has push button, trigger circuit to initialise address setting
2219/21074 . . . Master has keyboard to enter address of called slave
2219/21075 . . . Initialise each module random, count down, if zero master sets address
2219/21076 . . . Plug, connector with build in decoding, encoding for module
2219/21077 . . . Module address fixed, defined by fixed identification lines on motherboard
2219/21078 . . . Fixed address of slot on motherboard changed, using address convertor, decoder
2219/21079 . . . Allocate at start up also to each controlled device a code for the master
2219/21081 . . . At start up, check I-O configuration and store addresses in ram
2219/21082 . . . At start, send first address to all modules, manually trigger first module and so on
2219/21083 . . . At start up detect if connected devices are input or output devices
2219/21084 . . . Actuate module, seek response by counting up address, store address on response
2219/21085 . . . Define type of I-O, analog, digital, pulse
2219/21086 . . . Configuration menu program for I-O
2219/21087 . . . Define sensor type, resistance, thermocouple, thermistor, voltage, current
2219/21088 . . . Define name and address of I-O
2219/21089 . . . Detect configuration of I-O regulary
2219/21091 . . . First module initializes its address, then signals next to do same, serial
2219/21092 . . . At start up, autoconfigure module for proper I-O execution, bootstrap
2219/21093 . . . Module has a configuration part for own logic and one for application logic
2219/21094 . . . Different connectors for serial transmission as function of machine or connected sensor
2219/21095 . . . Screen, display connected directed to control system via optical fibre
2219/21096 . . . Connection of machine to pc via centronics, parallel port
2219/21097 . . . DMA
2219/21098 . . . Connect pc to machine, controller, module via serial port
2219/21099 . . . Two independent interfaces, one for pc, other for remote monitoring
2219/21101 . . . Connect I-O interface to joystick port
2219/21102 . . . Pc control of device over normal remote control connected between them
2219/21103 . . . Connect pc to machine, controller, module via PCMCIA
2219/21104 . . . Wire pc connector to output of controlled module, for printer, modem, other module
2219/21105 . . . Read in data only if value changes, transition to save processor time
2219/21106 . . . If specific I-O not updated in memory, priority access of I-O, data directly to microprocessor
2219/21107 . . . Change sensivity of detection if input value is very low
2219/21108 . . . Module, I-O module consisting of counters and comparators
2219/21109 . . . Field programmable gate array, fpga as I-O module
2219/21111 . . . Each module has a push button to bypass control and switch module on
2219/21112 . . . Each module has push button to turn module off
2219/21113 . . . Bus interface has multiplexer, control register, data shift register
2219/21114 . . . Universal input, AC or DC
2219/21115 . . . Same connector can represent either input or output
2219/21116 . . . Universal cabling; control interface between processor and devices
2219/21117 . . . Universal I-O, same pin is input or output, bidirectional
2219/21118 . . . Two sensors on same line, superpose pulsed digital on analog signal
2219/21119 . . . Circuit for signal adaption, voltage level shift, filter noise
2219/21121 . . . Output only enabled during a short period of positive going power supply
2219/21122 . . . Programmable signal discrimination, input can be used for several functions
2219/21123 . . . Impedance matching
2219/21124 . . . A-d conversion if input signal is analog, no a-d conversion if input signal is digital
2219/21125 . . . Digital value of analog signals depends on range between signal and threshold
2219/21126 . . . Signal processing, filter input
2219/21127 . . . Signal adaption I-O
2219/21128 . . . Change control signal, first max or min signal, then normal desired signal
2219/21129 . . . Low pass filter for input
2219/21131 . . . Sample two input values, one in positive wave, other in negative wave, average
2219/21132 . . . Window for signal
2219/21133 . . . Module to adapt connection of signals to general connector
2219/21134 . . . Signal adaption circuit build into connector
2219/21135 . . . On closing contact, clean contact with large current, then normal signal current

2219/21136 . . . Detection of zero crossing for command and maximum for reading value
2219/21137 . . . Analog to digital conversion, ADC, DAC
2219/21138 . . . Variable filtering as function of kind of sensor signal
2219/21139 . . . Input activates directly output and vice versa
2219/21141 . . . Latched I-O
2219/21142 . . . Read input signal when switching power supply is not switched
2219/21143 . . . Sample analog signal between superposed digital signal
2219/21144 . . . Link between input and output, output only activated if corresponding input on
2219/21145 . . . Fuse in case of overcurrent
2219/21146 . . . If real status is different from controlled status stop motor
2219/21147 . . . Time critical I-O shut off by I-O module, otherwise by processor
2219/21148 . . . Over current protection on clock line
2219/21149 . . . If read write error, keep last I-O status for next cycle
2219/21151 . . . Activate output only if power sufficient
2219/21152 . . . If output defect, switch it off
2219/21153 . . . In order to follow higher data input rate, shut off non essential peripherals
2219/21154 . . . Over current protection
2219/21155 . . . Over voltage protection
2219/21156 . . . Over temperature protection
2219/21157 . . . Broken, open line, cable, circuit, faulty connection
2219/21158 . . . Activate I-O only after system stabilises from start up
2219/21159 . . . If I-O defect, warning light, operator pushes buttom, cpu disconnects I-O
2219/21161 . . . Send dummy, check data to I-O to check correct I-O connection
2219/21162 . . . Detect short circuit of cable
2219/21163 . . . Test I-O if functional or safe value
2219/21164 . . . Resistors between transmitter and receiver, against disturbances
2219/21165 . . . Zenerdiodes for protection of output of transmitter, input of receiver
2219/21166 . . . Output state, over resistance, coupled back to input to monitor output
2219/21167 . . . Intelligent I-O monitors also local load, controlled object
2219/21168 . . . Couple, feedback each output to corresponding input to verify output
2219/21169 . . . Low voltage protection
2219/22 . . Pc multi processor system
2219/2202 . . . Controller calculates a control parameter from values sent by other controllers
2219/2203 . . . Grid, array of controllers
2219/2204 . . . Use default values if communication with other controllers not available
2219/2205 . . . Multicore
2219/2206 . . . Microprocessor for display and parameter input, link to control microprocessor
2219/2207 . . . Microcontroller combined with state sequencer
2219/2208 . . . Each processor controls a different function of the machine
2219/2209 . . . Only one processor is permitted to execute a common function at a time
2219/2211 . . . Active controllers are allocated more time if request rate is low
2219/2212 . . . All processors are loaded with same program, only part of program is used
2219/2213 . . . Local processor uses data from own local store and data from other stations
2219/2214 . . . Multicontrollers, multimicrocomputers, multiprocessing
2219/2215 . . . Process directly process signals without interrupt or polling
2219/2216 . . . Define module independent and module specific element, interconnection, capability
2219/2217 . . . First cluster runs normal program, second cluster runs different program
2219/2218 . . . Join two clusters of processors together
2219/2219 . . . Processor starts application program only if it receives predetermined data
2219/2221 . . . Only common memory in host, master, no local memory in slave, local controller
2219/2222 . . . Use of priority levels for gaining access to resources
2219/2223 . . . Use a different frequency to address each processor
2219/2224 . . . Processor sends data to next, downstream processor
2219/2225 . . . Communication, CPU accesses own I-O and next CPU over dual port memory
2219/2226 . . . Processor accesses own I-O and I-O of all processors connected on his right
2219/2227 . . . Common memory as well as local memory
2219/2228 . . . Master detects and configures slaves
2219/2229 . . . Multiprocessing, change over from master slave to peer to peer, no master
2219/2231 . . . Master slave
2219/2232 . . . Master executes modified program on slave demand
2219/2233 . . . Each slave can control several other slaves
2219/2234 . . . Each slave can function in stand alone if master fails
2219/2235 . . . Each slave has library of states during which operation is permitted to start
2219/2236 . . . Master determines critical time when each of slaves must be controlled
2219/2237 . . . Selection of master or slave
2219/2238 . . . Several masters at same time
2219/2239 . . . Reallocate, reschedule execution of controlled functions if one processor fails
2219/2241 . . . Real time database, each processor stores in local memory used variables
2219/2242 . . . Program references to variable by absolute address, update of absolute address
2219/2243 . . . Detect incompatibilites between control devices
2219/23 . . Pc programming
2219/23001 . . . Expansion of control words, code of standard language to increase functionality
2219/23002 . . . Petrinet
2219/23003 . . . Bumpless control transfer, map corresponding operation states to operation tables
2219/23004 . . . Build up program so that safety conditions are met, select most stable states
2219/23005 . . . Expert design system, uses modeling, simulation, to control design process
2219/23006 . . . Finite state modeling

2219/23007 . . . CAD to develop sequential control system, use data also to test
2219/23008 . . . Computer aided software engineering, program generation, case tools, CASE
2219/23009 . . . Automatic documentation of program
2219/23011 . . . Sequence control design using pc, cad of control system CADCS
2219/23012 . . . Derive sequence program from design, cad data of machine CADCS
2219/23013 . . . Build up program by selecting function modules as function of amount paid for it, charging, payment
2219/23014 . . . Conversion of ASCII scripting language to machine code
2219/23015 . . . Convert input signals to universal machine control signals represented by music
2219/23016 . . . Accelerate input, exponent as function of pressure, time, turning speed, keys for 10-to-1
2219/23017 . . . Page, scroll key
2219/23018 . . . Enter parameters by combinations of keys and duration of actuation of keys
2219/23019 . . . Joystick delivers reference function as function of speed of its movement, except about null
2219/23021 . . . Gesture programming, camera sees hand, displays it on screen, grasp buttons
2219/23022 . . . Production design metaphore, tool, operation like input system
2219/23023 . . . Control knobs, levers integrated into display, display parameters near knobs
2219/23024 . . . Delivers reference when in neutral position, otherwise delivers desired value
2219/23025 . . . Overlay, template for keys with different meaning
2219/23026 . . . Recognise user input pattern and present possible intended program
2219/23027 . . . Database with information on how to control or test different appliances
2219/23028 . . . Switch function of panel, detect this and execute other orders
2219/23029 . . . Up down, increment decrement keys, jog, sequentially show functions or values
2219/23031 . . . Simulate control panel to give remote instructions
2219/23032 . . . Input of data from second control unit if first fails
2219/23033 . . . Variable pressure on key gives input value
2219/23034 . . . Press once on key to raise signal, twice to lower signal
2219/23035 . . . Same knob, different functions, turn for pulses, push to enter value
2219/23036 . . . Same knob, different function, normal for parameter, value, pushed to enter value
2219/23037 . . . Touch key integrated in display
2219/23038 . . . Select function by amplitude of analog value, potentiometer, resistor taps
2219/23039 . . . Remote programmer
2219/23041 . . . Enter analog value
2219/23042 . . . Only increment key
2219/23043 . . . Remote and local control panel, programming unit, switch
2219/23044 . . . Transparent overlay with touch sensors, put over display panel, select function
2219/23045 . . . Function key changes function as function of program, associated pictogram
2219/23046 . . . Selection out of menu by function keys
2219/23047 . . . Operating, repair manual stored in memory
2219/23048 . . . Knob to select program serves also as indicator for progress of program
2219/23049 . . . Control panel serial, RS232 connected to controller
2219/23051 . . . Remote control, enter program remote, detachable programmer
2219/23052 . . . Matrix, plugboard like control panel with modules for display, switches
2219/23053 . . . Knob with tactile feedback, representing clicks, detents programmed
2219/23054 . . . Simulate response on entered parameters and display, quicker response
2219/23055 . . . Cursor keys to select cells of a spreadsheat with control parameter, enter value
2219/23056 . . . Foot pedal, control, operated
2219/23057 . . . Position of knob, pedal detected by encoder, addresses memory for functions
2219/23058 . . . Knob, pedal selects ranges, functions and controls in each range as function of position
2219/23059 . . . Configuration of pedal, knob with code card, adapt pedal to person
2219/23061 . . . Variable range of knob, pedal for each function, adapt to person
2219/23062 . . . Position of knob, pedal detected by bundle of optical fibres
2219/23063 . . . Double, two foot pedal
2219/23064 . . . Entry of function or parameter during manipulation of tool, operation
2219/23065 . . . Manual override of program
2219/23066 . . . Same knob starts two different functions
2219/23067 . . . Control, human or man machine interface, interactive, HMI, MMI
2219/23068 . . . Give instructions, messages to operator
2219/23069 . . . Illuminated, lighting up keys, build in led, display, show sequence data entry
2219/23071 . . . If up, down key is selected, linear display of values appears, pops up
2219/23072 . . . Telephone, dial as control panel
2219/23073 . . . Keyboard decoding by microprocessor
2219/23074 . . . Each control unit can control own associated load or as central control
2219/23075 . . . Control unit can switch load on off or can also go into program mode
2219/23076 . . . Pushbuttons to manually up or down control of motor also for entry of program
2219/23077 . . . Reconfigurable remote programmer, learn control signals for different devices
2219/23078 . . . Input a code representing a sequence of operations
2219/23079 . . . Local programmer can switch to remote to use same capabilities as remote
2219/23081 . . . MMI design, operator workplace design
2219/23082 . . . Enter parameters with two hands, dead man knob, switch, pedal
2219/23083 . . . Joystick with buttons for menu and function selection, scrolling, +sign and -sign
2219/23084 . . . Synoptic display of available, selectable control modules with their functions
2219/23085 . . . Several users can enter data simultaneously to same processor
2219/23086 . . . Menu is sequentially selected and read from cd disk and guides operator

2219/23087 . . . Programmable selector switch, can be programmed by connected apparatus
2219/23088 . . . Same switch to power control and to set references of several devices
2219/23089 . . . Key cap label rewritten, changed to indicate changed or alternate functions
2219/23091 . . . Multiple consoles, panels to issue concurrent commands to different groups I-O
2219/23092 . . . Soft up down keys, simulated on screen
2219/23093 . . . Input a code representing a device function
2219/23094 . . . Debounce key
2219/23095 . . . If knob pushed during power up, knob can be used afterwards as data input
2219/23096 . . . Use single button, knob to enter code number, equals number of pushes
2219/23097 . . . Messages to operator in mother tongue, selection out of different languages
2219/23098 . . . Manual control, via microprocessor instead of direct connection to actuators
2219/23099 . . . Switches on panel, connected to serial port
2219/23101 . . . Enter quality parameters to select control parameters
2219/23102 . . . Quality parameter is low energy consumption of machine
2219/23103 . . . Quality parameter is high production rate
2219/23104 . . . Change display of window to another as function of settable active display time of window
2219/23105 . . . Window, drop, pull down menus
2219/23106 . . . Cockpit metaphore, condensed representation, urgent things better shown
2219/23107 . . . Push on flashing alarm indicator, corresponding window pops up on whole screen
2219/23108 . . . Floorplan, room metaphore, dedicated windows, unchangeable but can be selectable
2219/23109 . . . Configuration of display device, operator panel
2219/23111 . . . Adapt control signal logarithmic
2219/23112 . . . Ramp, slope connection between two reference values
2219/23113 . . . Reread, retransmit several times data for valid data, redundant command
2219/23114 . . . Maintain parameter setting for a while to avoid changes due to noise
2219/23115 . . . Buffer
2219/23116 . . . Input signal can be sent simultaneously to several processors
2219/23117 . . . Lookup table, interpolation between points
2219/23118 . . . Column and line select in memory to access address data in second memory, tree
2219/23119 . . . Display state, variable only when needed, energy saving
2219/23121 . . . Display graphics with corresponding text
2219/23122 . . . Display on off time chart for different events
2219/23123 . . . Production report
2219/23124 . . . Notepad, message from other operator
2219/23125 . . . Switch display to show different things, test or normal state
2219/23126 . . . Display tree structure of whole system or relevant info after function selection
2219/23127 . . . Switch from one kind of display to other, selected by duration discrimination
2219/23128 . . . Switch from one kind of display to other when parameter is changed
2219/23129 . . . Animated display, changes as function of parameters
2219/23131 . . . Select on large display part of pictogram to show on display of used workstation
2219/23132 . . . Multifunction display
2219/23133 . . . Animated, rotating fan indicates speed, flashing bulb for intensity
2219/23134 . . . Display history of used, selected programs, their frequency
2219/23135 . . . Display to console, panel which sends parameters, commands
2219/23136 . . . Display all subsystems, select one and display screen corresponding to subsystem
2219/23137 . . . Display program step, instruction number
2219/23138 . . . Linear, bar display of variables
2219/23139 . . . Segment display
2219/23141 . . . Flat panel, thin film electro luminescent
2219/23142 . . . Colour display
2219/23143 . . . Adjustable display
2219/23144 . . . Kind of display, matrix like display, large surface
2219/23145 . . . Blinking, flickering display
2219/23146 . . . Programmable, reconfigurable via microprocessor or coding switches
2219/23147 . . . LCD liquid crystal display
2219/23148 . . . Helmet display, mounted on head of operator
2219/23149 . . . Dual, two displays
2219/23151 . . . Highlight
2219/23152 . . . Large and several smaller displays for each workstation, each own cursor on large display
2219/23153 . . . Controlled load, lightbulb, roller blind itself acts as display to acknowledge command
2219/23154 . . . Line of light diodes LED
2219/23155 . . . Display on screen reference value and sequence steps
2219/23156 . . . Show upper, lower value, position with upper, lower segment of 7-segment display
2219/23157 . . . Display process, synoptic, legend, pictogram, mimic
2219/23158 . . . Display of evaluated and selectable program
2219/23159 . . . Display plurality of parameters simultaneously
2219/23161 . . . Hand held terminal PDA displays machine control program when user is near that machine
2219/23162 . . . Display real time or time already elapsed or rest time for program
2219/23163 . . . Display enlarged, zoomed detail and small overall schematic, plan
2219/23164 . . . Display data on a scrolling line, ticker display
2219/23165 . . . Display of parameter plus permissable, allowable range
2219/23166 . . . Display program in fast, quick, speed mode
2219/23167 . . . Display of selected sequence, permissable sequence
2219/23168 . . . Display progress of program
2219/23169 . . . Operation field together with control parameters
2219/23171 . . . Display dynamic change of process, animation
2219/23172 . . . Different states with one LED, blinking, on and off or different colours
2219/23173 . . . Display modified program together with original program to see differences

2219/23174 . . . Display of parameter and several suggested values for that parameter
2219/23175 . . . What to display: program channels, running of program
2219/23176 . . . Display entered data for each controlled station
2219/23177 . . . Indicate all selected devices operating currently
2219/23178 . . . Display status of currently selected controlled devices
2219/23179 . . . Warning display if heavy energy consuming programsteps are selected
2219/23181 . . . Use of sound, acoustic, voice
2219/23182 . . . 3D display of controlled system
2219/23183 . . . Display effects of high level commands
2219/23184 . . . Display different states by using two leds, first blinks, then second, then both
2219/23185 . . . Setting of internal dipswitches, jumpers
2219/23186 . . . Visual display of workpiece with actions to execute on
2219/23187 . . . Display number of each program
2219/23188 . . . Software independent and dependent of hardware
2219/23189 . . . Information is code
2219/23191 . . . Command to control simultaneously several machines
2219/23192 . . . A limited number of programs to be used by plurality of machines, multiplex
2219/23193 . . . Memory stores lifetime, different settings, configurations of controlled device
2219/23194 . . . Check validity data by writing in sector control data and check data
2219/23195 . . . Memory stores available, allowable, possible options, variations, alternatives of program or modules
2219/23196 . . . From lookup table and real time clock, select actual daylight period
2219/23197 . . . Curve entered with pen on touchscreen
2219/23198 . . . Disk with segments connected to separate input of microprocessor, represents different values
2219/23199 . . . Reference value, setpoint for regulator
2219/23201 . . . Value is analog signal
2219/23202 . . . Curve, surface represents analog value, line, surface follower
2219/23203 . . . Curve represents analog value, tv scan
2219/23204 . . . Reference in coded form
2219/23205 . . . Reference together with sequence commands
2219/23206 . . . Set reference as function of position, for compensations
2219/23207 . . . Capacitive detection of line
2219/23208 . . . Potentiometer
2219/23209 . . . Linear potentiometers with multiple sliders
2219/23211 . . . Limit value to tolerances, ranges, plausibility
2219/23212 . . . Store entered data, program status, reread regularly, against data loss
2219/23213 . . . Check validity of entered data
2219/23214 . . . Checksum CRC
2219/23215 . . . Check data validity in ram, keep correct validity, compare rom ram
2219/23216 . . . Extend processing time by extending enable signal with special output signal
2219/23217 . . . Parallel processing
2219/23218 . . . Interrupt queued requests only at the end of each segment of each of requests
2219/23219 . . . Different tasks in different memory, called as function of priority of tasks
2219/23221 . . . Each event can have two sub events, device can be activated twice in cycle
2219/23222 . . . On off time tables, as function of angle, each linked to groups for device selection, pointer
2219/23223 . . . During each cycle, different on off sequences can be used
2219/23224 . . . Offset on off signals for different sections
2219/23225 . . . Program system from more than one source
2219/23226 . . . Table with data on how to execute the same function in different modules
2219/23227 . . . Environment conditions affect execution of program
2219/23228 . . . Program execution, if external programs exist, execute them instead of internal
2219/23229 . . . Execute first current program, then select new program
2219/23231 . . . Mark objects, execute sequence according to mark
2219/23232 . . . Execute program from added, expansion rom, memory
2219/23233 . . . Input state executes immediately corresponding block program
2219/23234 . . . In real time loop do one of the control modules and a safety module program
2219/23235 . . . Set address code in register to switch between program in ram and in eprom, flash
2219/23236 . . . Table lookup driven system
2219/23237 . . . Program execution by message passing
2219/23238 . . . TV microprocessor executes also home control, monitoring of appliances
2219/23239 . . . Execute other program during idle time of main program, or between interrupts
2219/23241 . . . Idle, during idle time of main program, a game can be played
2219/23242 . . . Synthesize time logic circuits
2219/23243 . . . Specification language
2219/23244 . . . Ascii script: one line is read each time, each letter controls a device
2219/23245 . . . Block, buffer the inputs when executing critical process, read them when finished, for a finite state machine
2219/23246 . . . Create control program by demonstrating behaviours using widget and inferencing them
2219/23247 . . . Widget have states, properties, events associated, demonstrate control behaviour
2219/23248 . . . Integrate function blocks from different machines; CORBA, RMI protocols
2219/23249 . . . Using audio and or video playback
2219/23251 . . . Use two or more different programming languages in same program
2219/23252 . . . High level language HLL, basic, control language
2219/23253 . . . Expert system
2219/23254 . . . Interactive programming, sentence on screen filled in by operator
2219/23255 . . . Object oriented programming, OOP
2219/23256 . . . Hybrid programming, part sequence, part continuous
2219/23257 . . . Grafcet
2219/23258 . . . GUI graphical user interface, icon, function bloc editor, labview
2219/23259 . . . Synchronous language

2219/23261 . . . Use control template library
2219/23262 . . . DDE direct data exchange, DLL dynamic library linking
2219/23263 . . . C++
2219/23264 . . . Assembly language, pass parameters by registers instead of stack
2219/23265 . . . Select device driver for actuator, sensor
2219/23266 . . . Compiler
2219/23267 . . . Program derived from sequence time diagram and stored in table
2219/23268 . . . Forth
2219/23269 . . . Program provides for communication protocol with device, equipment
2219/23271 . . . Decompiler, translate machine code to HLL, reverse processing, easy modification
2219/23272 . . . Natural language, use simple words like move, rotate
2219/23273 . . . Select, associate the real hardware to be used in the program
2219/23274 . . . Link graphical data for display automatically into program
2219/23275 . . . Use of parser
2219/23276 . . . Use of virtual, logical connections
2219/23277 . . . Use of separate interface software, main program calls functions from it
2219/23278 . . . Program by data flow
2219/23279 . . . Enter simple words: start motor, pc translates boolean equations into orders
2219/23281 . . . PEARL process experimental automation real time language
2219/23282 . . . Detect erroneous instructions in asic systems
2219/23283 . . . Debugging, breakpoint
2219/23284 . . . Eliminate redundant states in finite state machine
2219/23285 . . . Enable, disable hardware logic to implement finite state machines
2219/23286 . . . Graphical representation of finite machine states to help operator
2219/23287 . . . Executing sequential program concurrently with state machine instructions
2219/23288 . . . Adaptive states; learning transitions
2219/23289 . . . State logic control, finite state, tasks, machine, fsm
2219/23291 . . . Process, graphic programming of a process, text and images
2219/23292 . . . Use of model of process, divided in part models with IN, OUT and actuator
2219/23293 . . . Automated assembly of machine control software, reusable software components
2219/23294 . . . Whole program to first processor, transfer to next processor if not for 1st
2219/23295 . . . Load program and data for multiple processors
2219/23296 . . . Load, update new program without test program, save memory space
2219/23297 . . . Remote load of program with cellular, wireless, satellite connection
2219/23298 . . . Remote load of program, through internet
2219/23299 . . . Remote load of program, through fieldbus
2219/23301 . . . Load program from file system of a controller
2219/23302 . . . Load program in data blocks
2219/23303 . . . Load program, optical connection between programmer and eprom
2219/23304 . . . Download program from host
2219/23305 . . . Transfer program into prom with passwords
2219/23306 . . . Load program from host, remote load, non volatile card to volatile, ram
2219/23307 . . . Initial program loader, ipl, bootstrap loader
2219/23308 . . . Transfer program from ram to eprom, flash, card
2219/23309 . . . System boot only allowed after inputting user identification, password
2219/23311 . . . Load new program together with test program
2219/23312 . . . Load program from attached device to control that device
2219/23313 . . . Load program to initial configure machine, then erase and install userprogram
2219/23314 . . . Switch between initialisation, program, test, end of programming, erase mode
2219/23315 . . . Normal and emulated, pass through for disabled persons modes
2219/23316 . . . Standby, inactive, sleep or active, operation mode
2219/23317 . . . Safe mode, secure program, environment in case of error, intrusion
2219/23318 . . . Mode, two mode, directly from console or download from host
2219/23319 . . . Microprocessor control or manual control
2219/23321 . . . Switch between manual, automatic, inching or step by step mode, select mode
2219/23322 . . . Hand, manual or automatic
2219/23323 . . . Select between entry and execution of program
2219/23324 . . . Separate update program onboard
2219/23325 . . . Transfer modified data from ram to eprom, flash after system have run several cycles
2219/23326 . . . Clone, duplicate hardware functions of another device
2219/23327 . . . Modification of program in real time
2219/23328 . . . Modification program
2219/23329 . . . Modification, correction entered values
2219/23331 . . . Patch program during non execution, tables to load modified program
2219/23332 . . . Overide stored parameters
2219/23333 . . . Modify program and store it
2219/23334 . . . Use of table with addresses for different modules, write new table if modified
2219/23335 . . . History, log of program modifications
2219/23336 . . . Identification of program, application, device to be controlled
2219/23337 . . . Modify if history of program coincides with history of modifying data
2219/23338 . . . Transfer modified program from ram to eprom, flash
2219/23339 . . . Update diskette, cassette initiates bootstrap program to load eeprom, flash
2219/23341 . . . Only new module in high level language, combine with existing modules
2219/23342 . . . Pluggable rom, smart card
2219/23343 . . . Earom, alterable eeprom, erasable
2219/23344 . . . Changeable memory, program
2219/23345 . . . Memory is eeprom
2219/23346 . . . Permeability of pin sets frequency of oscillator, record carrier
2219/23347 . . . Eprom
2219/23348 . . . Programmed parameter values in memory, rom, function selection and entry, no cpu

2219/23349 . . . Pluggable pin module, fits in corresponding female receptacle, coded plug
2219/23351 . . . Film
2219/23352 . . . Ram rom memory
2219/23353 . . . Endless tape, loop
2219/23354 . . . Hard disk
2219/23355 . . . Magnetic card
2219/23356 . . . Programmable, pluggable module, logic set up on front of module
2219/23357 . . . Grammophone record, disk
2219/23358 . . . Program card with integrated control panel, flexible circuit
2219/23359 . . . Screw like form of record carrier
2219/23361 . . . Ram card with write protection switch
2219/23362 . . . Floppy diskette
2219/23363 . . . Barcode
2219/23364 . . . Bubble memory
2219/23365 . . . Ferrite memory
2219/23366 . . . Temperature induced on tape, sensors read temperature as program data
2219/23367 . . . Card with picture of work to be done, together with selectable codes
2219/23368 . . . VRAM videoram
2219/23369 . . . Memory in controlled device is ram, rom
2219/23371 . . . Fixed and variable memory for parameters or user program
2219/23372 . . . XY matrix, switching controlled by pc
2219/23373 . . . Interactive guidance by voice message
2219/23374 . . . Set potentiometer automatically
2219/23375 . . . Function switch, knob with piezo, strain gauge
2219/23376 . . . Template for program, set values to template
2219/23377 . . . Touch screen, with representation of buttons, machine on screen
2219/23378 . . . Touch sensitive key
2219/23379 . . . Knob, delivering pulses, digipot, electronic potentiometer
2219/23381 . . . Balls with different properties circulate and form the sequence
2219/23382 . . . Knobs with build in illumination, legend
2219/23383 . . . Lightpen
2219/23384 . . . Tape, card with magnetic, luminescent, iron particles for sequence
2219/23385 . . . Programming pencil, touch probe
2219/23386 . . . Voice, vocal command or message
2219/23387 . . . Trackball
2219/23388 . . . Mixture of different means, joystick, keys, pedals, fader, potentiometer
2219/23389 . . . Modular program, each process has corresponding program module
2219/23391 . . . Each module can transfer data to I-O or other module and has parameter memory
2219/23392 . . . Change execution time ratio of several programs
2219/23393 . . . Set finish, end time and total program time to calculate, derive begin, start time
2219/23394 . . . Set time constant
2219/23395 . . . Set value of limit switches, high low value
2219/23396 . . . Enter start and end of selected program
2219/23397 . . . Set day, week
2219/23398 . . . Set start time and duration
2219/23399 . . . Adapt set parameter as function of measured conditions
2219/23401 . . . Programmer has connection with pc to enter parameters into system directly by pc
2219/23402 . . . Edit reference value on screen by lightpen
2219/23403 . . . Store edited program also in detachable programmer, can be used elsewhere
2219/23404 . . . If data error detected, switch automatically to program mode
2219/23405 . . . Change settings of events for a whole group of related events
2219/23406 . . . Programmer device, portable, handheld detachable programmer
2219/23407 . . . Program machine during execution of other program in real time
2219/23408 . . . Handheld programmer has cover to protect operator from environment
2219/23409 . . . Portable, detachable programmer has emulation for fixed control panel
2219/23411 . . . Voltage supply or allow, not inhibit signal to memory on connection of programmer
2219/23412 . . . Discriminate with id code the module to be programmed
2219/23413 . . . Remote programmer can only program a device if nearby, narrow beam communication
2219/23414 . . . Pc as detachable program, debug, monitor device for control system
2219/23415 . . . Program each station with specific data, all, global with general, common data
2219/23416 . . . Enter application program into I-O module, like motion program, servo program
2219/23417 . . . Read program from pluggable memory card
2219/23418 . . . Read tape, card forward, backward, in two directions
2219/23419 . . . Automatic passage of tape to reader
2219/23421 . . . Record program on tape, disk, memory
2219/23422 . . . Learn parameters by producing a small number of objects
2219/23423 . . . Record playback
2219/23424 . . . Select construction element from function library
2219/23425 . . . Selection of program, adaptive to process
2219/23426 . . . Layout of program choice around knob according to used intensity
2219/23427 . . . Selection out of several programs, parameters
2219/23428 . . . Select program from look up tables as function of detector states, pointer, index to program
2219/23429 . . . Selection as function of connected machine
2219/23431 . . . Change program on detection of deviations
2219/23432 . . . Select as function of different connected tools, each tool has its parameters
2219/23433 . . . Selection of program as function of connected keyboard, panel
2219/23434 . . . Select automatically prefered program data, ordered to most used program
2219/23435 . . . Select a program per zone to be controlled
2219/23436 . . . Select by dipswitches on power on
2219/23437 . . . Each operator can select his own program, data entry
2219/23438 . . . Select application program as well as connected control device
2219/23439 . . . Select additional programfunctions by pushing two different keys
2219/23441 . . . Select between user program selection or service program selection

2219/23442 . . . As function of colour or number code on object to be treated
2219/23443 . . . Upon detected function changes of remote device, activate proper local program
2219/23444 . . . Select as function of surface property, characteristic of object handled by machine
2219/23445 . . . Real time simulation
2219/23446 . . . HIL hardware in the loop, simulates equipment to which a control module is fixed
2219/23447 . . . Uses process simulator to develop, simulate faults, fault tree
2219/23448 . . . Find optimum solution by simulating process with constraints on inputs
2219/23449 . . . Use of an additional dedicated processor for emulating sensor output
2219/23451 . . . Software in the loop, bypass function, execute new program parts on external device
2219/23452 . . . Simulate sequence on display to control program, test functions
2219/23453 . . . Pc simulates equipment and is connected to sequencer to test program
2219/23454 . . . Execute program in fast mode, real system has no time to respond
2219/23455 . . . Determine capability of machine by simulating model of capability of its parts
2219/23456 . . . Model machine for simulation
2219/23457 . . . Programmer magnetically attachable to machine
2219/23458 . . . Remote controller pluggable, attachable to pc
2219/23459 . . . Keyboard attachable, pluggable into household apparatus
2219/23461 . . . Module has coded cams darking optical detectors
2219/23462 . . . No local entry panel, only central remote programmer for all appliances
2219/23463 . . . Before controlling module execute monitoring of module and its resources
2219/23464 . . . Use signatures to know module is not corrupt, cfc, control flow checking
2219/23465 . . . Master processor blocks input of data to slaves
2219/23466 . . . Block, latch entry keys once program launched
2219/23467 . . . Code and program on two objects to be assembled, compared for compatibility
2219/23468 . . . Before switch to execution of second, non failsafe program, inhibit I-O for it
2219/23469 . . . Execute alternatively a failsafe, proven program and a non failsafe program
2219/23471 . . . Interrupt after set time non failsafe program, switch to failsafe program
2219/23472 . . . Confirmation of user for the selection of a program setting
2219/23473 . . . Program stopped if consumed current to high
2219/24 . . Pc safety
2219/24001 . . . Maintenance, repair
2219/24002 . . . Clock failing, adaptive to clock
2219/24003 . . . Emergency stop
2219/24004 . . . If control lever, joystick, handle is released, spring return to neutral
2219/24005 . . . Inhibit update control program if default values has been changed by program during processing
2219/24006 . . . Code coverage memory:contains data about addressed addresses during program run
2219/24007 . . . Backup data if microprocessor not responding
2219/24008 . . . Safety integrity level, safety integrated systems SIL SIS
2219/24009 . . . If board, card is retrieved, then disconnect first power, then block machine
2219/24011 . . . Transmit warning, error message to all devices in a list
2219/24012 . . . Use camera of handheld device, head mounted display
2219/24013 . . . Unlatch all relays in common with micorprocessor
2219/24014 . . . Protection to extract, insert circuit board
2219/24015 . . . Monitoring
2219/24016 . . . Unlatch for reparation
2219/24017 . . . Powering up, starting machine supervised by microprocessor
2219/24018 . . . Computer assisted repair, diagnostic
2219/24019 . . . Computer assisted maintenance
2219/24021 . . . Separate processor for monitoring system
2219/24022 . . . Stop error message after a number of repeated error events
2219/24023 . . . Stop error message after permission operator, acknowledgement
2219/24024 . . . Safety, surveillance
2219/24025 . . . Remove board with system on power, hot plug in, swap, docking, life insertion
2219/24026 . . . Latch, block unlatch, unblock
2219/24027 . . . Circuit, independent from microprocessor, detects contact switch to allow power to actuator
2219/24028 . . . Explosion free control, intrinsically safe
2219/24029 . . . Alarm if wrong device, apparatus is connected to control module
2219/24031 . . . Fpga takes over control if emergency or programmed stop, to shut down sequence
2219/24032 . . . Power on reset, powering up
2219/24033 . . . Failure, fault detection and isolation
2219/24034 . . . Model checker, to verify and debug control software
2219/24035 . . . Superpose testsignal on normal I-O lines, through transfo and rectifier
2219/24036 . . . Test signal generated by microprocessor, for all I-O tests
2219/24037 . . . Switch on pin of microprocessor for test
2219/24038 . . . Several test signals stored in memory and used as input signals
2219/24039 . . . Test sequence time and sequence profile
2219/24041 . . . Pc as detachable debug, monitor device for control system
2219/24042 . . . Signature analysis, compare recorded with current data, if error then alarm
2219/24043 . . . Test memory comparing with known stored valid memory states
2219/24044 . . . Second controller monitors diagnostics system of first controller
2219/24045 . . . Test if memory card is inserted, present
2219/24046 . . . Test if controller has enough memory available
2219/24047 . . . Count certain number of errors, faults before delivering alarm, stop
2219/24048 . . . Remote test, monitoring, diagnostic
2219/24049 . . . Use of control bits
2219/24051 . . . Two test pins, one for input and one for output
2219/24052 . . . Set switch on for diagnostic
2219/24053 . . . Diagnostic of controlled machine

2219/24054 . . . Self diagnostic
2219/24055 . . . Trace, store a working, operation history
2219/24056 . . . Portable, detachable module to input test signals, read test results
2219/24057 . . . Set jumper on board to change user mode to diagnostic mode
2219/24058 . . . Remote testing, monitoring independent from normal control by pc
2219/24059 . . . Diagnostic programmed in state logic
2219/24061 . . . Simulator, generates input signals, shows output signals of logic
2219/24062 . . . During simulation, test inhibit output to actuators
2219/24063 . . . Select signals as function of priority, importance for diagnostic
2219/24064 . . . Sample rate variable as function of importance of alarm signals
2219/24065 . . . Real time diagnostics
2219/24066 . . . Monitor only devices essential to current process
2219/24067 . . . Processor stores variables, events and date in eeprom, for external monitor
2219/24068 . . . Find intermittent errors
2219/24069 . . . Diagnostic
2219/24071 . . . Online service documentation
2219/24072 . . . Detect faulty circuit, display on screen and replace it
2219/24073 . . . Avoid propagation of fault
2219/24074 . . . Probability of defect, seriosity or severity of defect, fault
2219/24075 . . . Predict control element state changes, event changes
2219/24076 . . . Markov model for safety analysis
2219/24077 . . . Module detects wear, changes of controlled device, statistical evaluation
2219/24078 . . . Debounce, correct periodicity of command
2219/24079 . . . Detect correct command wave form
2219/24081 . . . Detect valid sequence of commands
2219/24082 . . . Detect if driver, actuation circuit is correct
2219/24083 . . . Detect if actuators are correct, react
2219/24084 . . . Remote and local monitoring, local result to remote, remote takes action
2219/24085 . . . Analyze, trace fault signals according to tree, table
2219/24086 . . . Expert system, guidance operator, locate fault and indicate how to repair
2219/24087 . . . After correct repair, update fault tree
2219/24088 . . . Simulate process graphically using feedback from real, to prevent or repair
2219/24089 . . . Change colour of message after reading message
2219/24091 . . . Display indication out of order, alarm indication
2219/24092 . . . Warning display lights, lamps, leds on module
2219/24093 . . . Display, show place of error, fault
2219/24094 . . . Voice alarm
2219/24095 . . . Show timely order of errors
2219/24096 . . . Show number of error event
2219/24097 . . . Camera monitors controlled machine
2219/24098 . . . Scan and display states of all actuators if controller fails
2219/24099 . . . On error, send error over lightdiode to external pc, display
2219/24101 . . . Stop error message after a certain time
2219/24102 . . . Display status of controller
2219/24103 . . . Graphical display of proces as function of detected alarm signals
2219/24104 . . . Operator can select a graphical screen at his will as help diagnostic
2219/24105 . . . Perform an initial display process to check displays
2219/24106 . . . Display instructions, program statements together with monitored parameter value
2219/24107 . . . Display centrally detected user, function changes of remote device
2219/24108 . . . Correct fault so that microprocessor functions correctly, without reset
2219/24109 . . . Execute first diagnostic, service program before normal control program
2219/24111 . . . Inhibit control until control lever is first set to neutral position
2219/24112 . . . Delay software reset until critical operations are finished
2219/24113 . . . No transmission of errors to central during intervention of maintenance operator
2219/24114 . . . Continue program if crashed microprocessor, program module is not crucial
2219/24115 . . . Continue critical operation only if detector, operator input is satisfied
2219/24116 . . . Reprogram inserted module, reread parameters to enable operation machine
2219/24117 . . . If error detected, shut down
2219/24118 . . . Inhibit, disable control if program module not inserted or wrong module addressed
2219/24119 . . . Compare control states to allowed and forbidden combination of states
2219/24121 . . . On fault, detect bit pattern to indicate kind of fault and stop program
2219/24122 . . . Inhibit automatic control if in manual control
2219/24123 . . . Alarm filtering, level and direct precursor, required action, blocking condition
2219/24124 . . . Identification of program, if not assigned for machine, reject, stop
2219/24125 . . . Watchdog, check at timed intervals
2219/24126 . . . Program stopped if instruction not executed or if output module is missing
2219/24127 . . . Disable, inhibit control signal in I-O interface if alarm status set
2219/24128 . . . Command and intermediate error feedback used to verify correct execution
2219/24129 . . . means for safety such as resettable fuse, PPTC
2219/24131 . . . Noise rejection, shielding board, bus, lines
2219/24132 . . . Over voltage protection
2219/24133 . . . Ground each module and total system
2219/24134 . . . Use of high voltage 28-Volt logic level
2219/24135 . . . Use of infra red for optical limit switch against day light
2219/24136 . . . Monitor load state of battery
2219/24137 . . . Non volatile memory to store program on power loss
2219/24138 . . . Battery backup
2219/24139 . . . Recovery from power loss, failure
2219/24141 . . . Capacitor backup
2219/24142 . . . Program has a protected, independent part and a free programmable part

2219/24143 . . . Inhibit control if device does not answer a start signal within time interval
2219/24144 . . . Load new program, overwrite old program only if machine is halted
2219/24145 . . . Test for collision of actuated devices, articles, if interference inihibit entry
2219/24146 . . . Configure actuators to be switched off in case of emergency stop
2219/24147 . . . Program entry, inhibit manual control if in automatic mode
2219/24148 . . . Inhibit local control if in remote
2219/24149 . . . Inhibit program entry if an essential sensor of apparatus is missing, broken
2219/24151 . . . Inhibit programming if physical resources are missing, no gas for heating
2219/24152 . . . Normal and emergency program are integrated
2219/24153 . . . System controller can control independent from host
2219/24154 . . . Password with time limited access to system, protect protocol
2219/24155 . . . Load, enter program if device acknowledges received password, security signal
2219/24156 . . . Inhibit program entry, keyboard by entering sequence of certain keys
2219/24157 . . . Block, inhibit certain inputs by entering certain keycode
2219/24158 . . . Access only for service, hide, forbidden tamperfree keys, program
2219/24159 . . . Several levels of security, passwords
2219/24161 . . . Use of key, in key is stored access level
2219/24162 . . . Biometric sensor, fingerprint as user access password
2219/24163 . . . Authentication tag in configuration file
2219/24164 . . . Parts of program accesible only during execution, no access with programming tool
2219/24165 . . . Use codes to activate features of controller
2219/24166 . . . Permit from several operators to allow access
2219/24167 . . . Encryption, password, user access privileges
2219/24168 . . . Identify connected programmer to allow control, program entry
2219/24169 . . . Identification of last person who changed program
2219/24171 . . . Supervisor code to change passwords
2219/24172 . . . Use of second password, different from first
2219/24173 . . . One sensor, two I-O channels each for different processor
2219/24174 . . . One channel is used for communication while other is tested, in redundant I-O
2219/24175 . . . Redundant communication channel, if one fails use the other
2219/24176 . . . Central controller may override redundant controller
2219/24177 . . . State machine arbitrates which redundant controller is active
2219/24178 . . . Controlled device decides which redundant controller will be active
2219/24179 . . . Redundant storage of control parameters
2219/24181 . . . Fail silent nodes, replicated nodes grouped into fault tolerant units
2219/24182 . . . Redundancy
2219/24183 . . . If error, spare unit takes over, message to master, confirm new configuration
2219/24184 . . . Redundant I-O, software comparison of both channels
2219/24185 . . . After repair, update redundant system during non critical periods
2219/24186 . . . Redundant processors are synchronised
2219/24187 . . . Redundant processors run identical programs
2219/24188 . . . Redundant processors run different programs
2219/24189 . . . Redundant processors monitor same point, common parameters
2219/24191 . . . Redundant processors are different in structure
2219/24192 . . . Configurable redundancy
2219/24193 . . . Two transducers for same parameter
2219/24194 . . . One channel monitors correct programcode execution, other correct process state
2219/24195 . . . Compare data in channels at timed intervals, for equality
2219/24196 . . . Plausibility check in channels for correct sequence or result
2219/24197 . . . Dual analog output ports, second takes over if first fails
2219/24198 . . . Restart, reinitialize, boot system after fault detection, hanging up, stalling
2219/24199 . . . Recover from fault, malfunction, go to safe state, correct and set new sequence
2219/24201 . . . Inhibit restart program if start switch fails in normal run mode
2219/24202 . . . After failure and stop of program, special switch to restart
2219/24203 . . . Restart, recover from error only if detected states equal stored states
2219/24204 . . . Select restore procedure corresponding to matched abnormal condition, table
2219/24205 . . . Slow down processor activity if temperature rises above limit
2219/24206 . . . Identification by portable memory in a key
2219/24207 . . . If processor overloaded, reduce messages sent by other systems to it
2219/24208 . . . Go into safety mode if communications are interrupted
2219/24209 . . . Create film in case of error
2219/24211 . . . Override normal program, execute urgency program so machine operates safe
2219/24212 . . . Set off alarm state manually, acknowledge to restart normal control
2219/24213 . . . No shut down if after emergency detection, all control parameters are safe
2219/24214 . . . Detect if analog output signal is within range
2219/24215 . . . Scada supervisory control and data acquisition
2219/24216 . . . Supervision of system
2219/25 . . Pc structure of the system
2219/25001 . . . CEBUS consumers electronics bus
2219/25002 . . . Interbus-S, output serial out, input serial in, as one shift register
2219/25003 . . . M3S bus with six lines, two power, two canbus, one to initialize, one as dead man switch
2219/25004 . . . Power and data bus
2219/25005 . . . Fluid bus for communication in process system with several fluidic control modules
2219/25006 . . . Interface connected to fieldbus
2219/25007 . . . UMS bus
2219/25008 . . . Different buses, protocols on same line, also dsl
2219/25009 . . . Profinet-I-O, producer-consumer mode

2219/25011 . . . Domotique, I-O bus, home automation, building automation
2219/25012 . . . Two different bus systems
2219/25013 . . . G64-bus
2219/25014 . . . Fieldbus general name of bus connected to machines, detectors, actuators
2219/25015 . . . Gpib-488, ieee-488, hp bus, parallel instrumentation bus
2219/25016 . . . Eiba bus, european installation bus association, ib installation bus
2219/25017 . . . ASI actuator sensor interface, bus, network
2219/25018 . . . Only actuator bus, network
2219/25019 . . . Parallel processors coupled to bus by configurable interface card
2219/25021 . . . Profibus
2219/25022 . . . LAN local area network for controllers
2219/25023 . . . Sercos serial real time communications system between servo and cpu
2219/25024 . . . Bitbus from intel
2219/25025 . . . Only sensor bus
2219/25026 . . . Lon local operating network, uses neuron chip with three microprocessors
2219/25027 . . . GSC general serial channel
2219/25028 . . . Power, data and clock bus
2219/25029 . . . Additional logic to mirror certain signals, permits node to adapt to bitrate
2219/25031 . . . TTCAN bus, time triggered can bus
2219/25032 . . . CAN, canbus, controller area network bus
2219/25033 . . . structure, control, syncronization, data, alarm, connect I-O line to interface
2219/25034 . . . Connect module to data, monitor, control lines, extra I-O and power to connector
2219/25035 . . . Star network
2219/25036 . . . Two clocks, high frequency for normal and low frequency for battery low, sleep
2219/25037 . . . Clock line and data line loop in a contrary sense, for data stability, settling
2219/25038 . . . During negative cycle of power supply, processor is set to active, else inactive
2219/25039 . . . Clock
2219/25041 . . . Select between several clock signals
2219/25042 . . . Clock derived from power supply
2219/25043 . . . Superposition time and other pulses
2219/25044 . . . Radio controlled clock
2219/25045 . . . Electronic cam, encoder for sequence control as function of position, programmable switch pls
2219/25046 . . . Real time clock to sample I-O states and store them in memory
2219/25047 . . . Common clock for redundant processors
2219/25048 . . . Master clock and several frequency dividers, for motion and sequence control
2219/25049 . . . Master processor gives timing information to slaves
2219/25051 . . . For serial communication a separate clock and data line
2219/25052 . . . VCO voltage controlled oscillator
2219/25053 . . . Frequency pulses as function of speed
2219/25054 . . . Calibration timer, compare 1st, number of pulses during calibration with second counter
2219/25055 . . . During calibration adapt vco, counter to deliver wanted frequency, pulses
2219/25056 . . . Automatic configuration of monitoring, control system as function of operator input, events
2219/25057 . . . Configuration stored in distributed database for real time use
2219/25058 . . . Job setup, use also library to select job setup
2219/25059 . . . Iterative configuration of identical modules, only config first one, copy to other
2219/25061 . . . Configuration stored in central database
2219/25062 . . . Detect physical location of field device
2219/25063 . . . Force node into an inactive state when required
2219/25064 . . . Update component configuration to optimize program execution
2219/25065 . . . Configure attributes of parameters
2219/25066 . . . Configuration stored in each unit
2219/25067 . . . Graphic configuration control system
2219/25068 . . . Check correct configuration of device
2219/25069 . . . Pseudo redundance, eliminate failing element and reconfigure system
2219/25071 . . . Synoptique display of system configuration, layout, evolution
2219/25072 . . . Initialise each module during start up
2219/25073 . . . Configuration of keys and related display, shown on keys
2219/25074 . . . Check system, change failing element, compare with stored configuration
2219/25075 . . . Select interconnection of a combination of processor links to form network
2219/25076 . . . Configure connected module only if allowed, registered module
2219/25077 . . . Each module can be programmed for number of input and output
2219/25078 . . . Store in ram a second program adapted to local conditions
2219/25079 . . . Function module makes bus termination, creates local bus on ok from central
2219/25081 . . . Clone, copy configuration from first device, in teach mode, to second identical device
2219/25082 . . . Display name of configuration, to recognise how device has been set, programmed
2219/25083 . . . For each subsystem a configuration
2219/25084 . . . Select configuration as function of operator
2219/25085 . . . Several function expansion units for master, main unit, universal system
2219/25086 . . . Assign functions to group of complete or partial cells, modules
2219/25087 . . . Selector switch to set function of each module
2219/25088 . . . Define scale value of analog signal, min and max value
2219/25089 . . . Define state of digital signal, open, closed, maintained, momentary
2219/25091 . . . Of alternative and parallel parts of program into synchronised tasks
2219/25092 . . . Customized control features, configuration
2219/25093 . . . During start, integration into machine, send module functionality to scheduler
2219/25094 . . . At start, I-O modules receive functionality and check with its own functionality
2219/25095 . . . Detect kind of display to configure display routine
2219/25096 . . . Detect addresses of connected I-O, modules
2219/25097 . . . Detect control panel connected, select corresponding program and parameters
2219/25098 . . . Detect connected sensors, set parameters, gain automatically

2219/25099 . . . Detect configuration I-O and select needed program
2219/25101 . . . Detect connected module, load corresponding parameters, variables into module
2219/25102 . . . Detect connected actuator, by code, select compensation non linearity
2219/25103 . . . Detect during start, number of modules, groups, sub groups
2219/25104 . . . Detect transfer of control module, use mean default values instead of normal
2219/25105 . . . By cable integrated in controlled machine, fixed
2219/25106 . . . Pluggable card, magnetic, smart with configuration data, pulled out after loading
2219/25107 . . . Pluggable card, magnetic or smart with configuration data, staying in device
2219/25108 . . . Dipswitches combined with bcd switch instead of multiple dipswitches
2219/25109 . . . Eeprom loaded from external device with configuration data
2219/25111 . . . Using broadcast message
2219/25112 . . . Using firmware stored in processor
2219/25113 . . . Strapping diodes
2219/25114 . . . Jumpers
2219/25115 . . . Card, board with configuration switches
2219/25116 . . . Pluggable, detachable cassette loads configuration
2219/25117 . . . Resistors, value, combination defines a digital value
2219/25118 . . . Matrix to connect sensor to corresponding actuator
2219/25119 . . . Dipswitches dipschalter
2219/25121 . . . What, which input or output to be connected to key or display
2219/25122 . . . Stop angle and status of different on off states
2219/25123 . . . Change controller pin configuration
2219/25124 . . . Configure attributes of parameters
2219/25125 . . . Relationship between different functions of a controller
2219/25126 . . . Synchronize communication based on internal clock of microprocessor
2219/25127 . . . Bus for analog and digital communication
2219/25128 . . . Transmission with higher frequency than the processing frequency
2219/25129 . . . Programming a multitasking, virtual sensor network shared by various users
2219/25131 . . . Collect several parameters and transmit in block to control microprocessor
2219/25132 . . . Superposition data signals on power lines for actuators
2219/25133 . . . Serial parallel conversion
2219/25134 . . . All interfaces load their data in shift register, then serial read out
2219/25135 . . . On data line multiplex data and control words
2219/25136 . . . Transmission with variable frequency, set by operator
2219/25137 . . . Optical window for communication
2219/25138 . . . Transmit data from rotating devices
2219/25139 . . . Use of separate buscouple interface
2219/25141 . . . Normal display led used also for communication purposes
2219/25142 . . . Lan between host and main controller, other network between main and sub controllers
2219/25143 . . . Buffer for communication between two cpu
2219/25144 . . . Between microcomputers, processors
2219/25145 . . . I-O communicates with local bus at one end and with fieldbus at other end
2219/25146 . . . Communication between main and expansion unit, only clock and data
2219/25147 . . . Before communication, check if optical fiber is correctly attached
2219/25148 . . . Before communication, check if I-O is powered
2219/25149 . . . Receiver detects communication error and requests emitter to retransmit data
2219/25151 . . . Check appropriate protocol voltage levels
2219/25152 . . . Parity detection
2219/25153 . . . Checking communication
2219/25154 . . . Detect error, repeat transmission on error, retransmit
2219/25155 . . . Encoded transmission against noise
2219/25156 . . . Full echo communication check, echo back
2219/25157 . . . Checksum CRC
2219/25158 . . . Watchdog
2219/25159 . . . Respond to signal if initialisation and address are received within set interval
2219/25161 . . . Only receiving station, read several times message, select correct one or reject
2219/25162 . . . Contention, if several transmitters avoid collision, by separate transmittor code
2219/25163 . . . Transmit twice, redundant, same data on different channels, check each channel
2219/25164 . . . Loopback
2219/25165 . . . Token ring network
2219/25166 . . . USB, firewire, ieee-1394
2219/25167 . . . Receive commands through mobile telephone
2219/25168 . . . Domotique, access through internet protocols
2219/25169 . . . Half duplex, repeater
2219/25171 . . . Serial, RS232
2219/25172 . . . Duplex
2219/25173 . . . SCSI
2219/25174 . . . Ethernet
2219/25175 . . . Modem, codec coder decoder
2219/25176 . . . RS485, differential data signals, xor
2219/25177 . . . Using fm frequency modulation, fsk, biphase code
2219/25178 . . . Serial communication, data, also repeater
2219/25179 . . . Parallel
2219/25181 . . . Repeater
2219/25182 . . . Serial between host and modules, nodes, parallel in node to microcontroller
2219/25183 . . . Serial AND-OR parallel interface in one circuit
2219/25184 . . . Number of modules interfaces optimized in relation to applications with which to link
2219/25185 . . . Single serial line, virtual second line is earth
2219/25186 . . . Bluetooth
2219/25187 . . . Transmission of signals, medium, ultrasonic, radio
2219/25188 . . . Superposition high frequency data signal on power lines, current carrier
2219/25189 . . . Current mode sensor I-O, current loop, 40-mA loop instead of voltage
2219/25191 . . . Current loop
2219/25192 . . . Infrared
2219/25193 . . . Coaxial cable
2219/25194 . . . Twin core, twisted cable
2219/25195 . . . Multiwire cable, parallel

2219/25196 . . . Radio link, transponder
2219/25197 . . . Optical, glass fiber
2219/25198 . . . Brouter: transfers data from wireless to wired networks, router: wired to wired
2219/25199 . . . Router brouter broadcast configuration data periodically to update control units
2219/25201 . . . Program commmunication between remote I-O and controller via remote connection program object
2219/25202 . . . Internet, tcp-ip, web server : see under **S05B219-40**
2219/25203 . . . Keep correct order of messages sent, of messages sequence
2219/25204 . . . Translate between different communication protocols
2219/25205 . . . Encrypt communication
2219/25206 . . . Protocol: only devices with changed states communicate their states, event
2219/25207 . . . Only devices with changed states can receive control signals for actuator
2219/25208 . . . Control message, address and command portion
2219/25209 . . . Device status answer, response, acknowledge
2219/25211 . . . Broadcast mode, length message, command, address of originator and destination
2219/25212 . . . Master address node, node answers ready, master sends command, node executes it
2219/25213 . . . Synchronisation, address and data
2219/25214 . . . Wait, delay after message
2219/25215 . . . Time triggered protocol for fault tolerant real time application
2219/25216 . . . Packet switching
2219/25217 . . . Configure communication protocol, select between several
2219/25218 . . . Broadcast mode, originator, destinator address, command, check data
2219/25219 . . . Probe packet to determine best route for messages
2219/25221 . . . Identification of messages and their relative priority
2219/25222 . . . Mailbox, email, mail system
2219/25223 . . . Slave has registers to indicate master, acknowledge, transfer address, read write
2219/25224 . . . Fieldbus messages services fms
2219/25225 . . . Peripheral messages services pms, for sensor actuator
2219/25226 . . . Combine CSMA-CD and TDM time multiplexed for rapid status exchange
2219/25227 . . . Polling time is variable for each node, as function of time needed for each node
2219/25228 . . . Scheduling communication on bus
2219/25229 . . . Partition control software among distributed controllers
2219/25231 . . . Command, task has deadline, time limit to be executed
2219/25232 . . . DCS, distributed control system, decentralised control unit
2219/25233 . . . Avoid communication delay by sending command and event, if event present, execute command
2219/25234 . . . Direct communication between two modules instead of normal network
2219/25235 . . . Associate a sequence function to each control element, event signature
2219/25236 . . . Detail, detect presence of operator to wake up system
2219/25237 . . . Drive record carrier
2219/25238 . . . Personalize message
2219/25239 . . . Relay assisted triac, in series for safety
2219/25241 . . . Serial bus controller
2219/25242 . . . Relay
2219/25243 . . . Digital filter
2219/25244 . . . State matrix connected to controller
2219/25245 . . . Keyboard encoder chip used as sequence controller
2219/25246 . . . Habituation, rehabituation and recovery chip, responds only to critical information
2219/25247 . . . Program drum and reverse drum driven by timer motor
2219/25248 . . . Microcontroller as time switch
2219/25249 . . . Counter, timer plus microprocessor for real time, jitter
2219/25251 . . . Real time clock
2219/25252 . . . Microprocessor
2219/25253 . . . Transputer
2219/25254 . . . DSP digital signal processor
2219/25255 . . . Neural network
2219/25256 . . . Module is timer with variable time delay
2219/25257 . . . Microcontroller
2219/25258 . . . ASIC
2219/25259 . . . Bus arbiter
2219/25261 . . . Hand calculator as time switch
2219/25262 . . . Oscillator to multiply pulses to counter
2219/25263 . . . Solid state simulating relay logic
2219/25264 . . . Synchronizer for pulses
2219/25265 . . . Flash memory
2219/25266 . . . Microcontroller combined with plc
2219/25267 . . . Shift register
2219/25268 . . . PLD programmable logic device
2219/25269 . . . Lifo
2219/25271 . . . Neuron controller, for lan
2219/25272 . . . Hall sensor, switch
2219/25273 . . . Fuzzy logic combined with delay element
2219/25274 . . . Communication processor, link interface
2219/25275 . . . Analog switch
2219/25276 . . . Fifo
2219/25277 . . . Tristate
2219/25278 . . . Timer plus microprocessor
2219/25279 . . . Switch on power, awake device from standby if detects action on device
2219/25281 . . . Detect usage of machine, adapt sleep mode timer
2219/25282 . . . Alternative energy for fieldbus devices
2219/25283 . . . Evaluate available energy prior to wireless transmitter-receiver activation
2219/25284 . . . Standby only for memory, prom
2219/25285 . . . Standby only for real time clock
2219/25286 . . . Switch on power, awake controlled machine from standby if command signal
2219/25287 . . . Power for display leds I-O only when case is open
2219/25288 . . . Detector to standby state if signal below certain level
2219/25289 . . . Energy saving, brown out, standby, sleep, powerdown modus for microcomputer

2219/25291 . . . Set module, component to sleep if no event or no other module needs it
2219/25292 . . . Standby for display, switch on if operator wants to use it
2219/25293 . . . Identify control parameters for several workpieces, control, both in parallel
2219/25294 . . . Part, workpiece, code, tool identification
2219/25295 . . . Identification has information on relationship with other controllers
2219/25296 . . . Identification module, type connected I-O, device
2219/25297 . . . Identify controlled element, valve, and read characteristics
2219/25298 . . . System identification
2219/25299 . . . Address memory with variable frequency
2219/25301 . . . Expansion of system, memory
2219/25302 . . . Program and data in separate memory
2219/25303 . . . Decode processor status bits to switch, select between memories
2219/25304 . . . Memory subdivided in separate blocks, high, low addressable with same address
2219/25305 . . . MMA, memory management, set ram and eprom part for flash memory, store state also
2219/25306 . . . Modules with hardwired logic
2219/25307 . . . Each module has file with all components in module and the available components
2219/25308 . . . Ecu, standard processor connects to asic connected to specific application
2219/25309 . . . Module in ring for power supply and ring for command signals
2219/25311 . . . Each module near controlled machine
2219/25312 . . . Pneumatic, hydraulic modules, controlled valves
2219/25313 . . . Clamp module on controlled system by magnet
2219/25314 . . . Modular structure, modules
2219/25315 . . . Module, sequence from module to module, structure
2219/25316 . . . Control unit and actuator in one unit, module
2219/25317 . . . Control unit, sensor and actuator in one unit, module
2219/25318 . . . Power supply module in common for all modules
2219/25319 . . . Standard connector between modules
2219/25321 . . . Connection modules by flexible printed circuit, printed cable, multiway, ribbon
2219/25322 . . . Stackthrough modules, modules are stacked, no need for backplane
2219/25323 . . . Intelligent modules
2219/25324 . . . Modules connected to serial bus
2219/25325 . . . Each connected module has own power supply
2219/25326 . . . Module with low maintenance connected to removable module with high maintenance
2219/25327 . . . Single channel module
2219/25328 . . . Module connected to parallel bus
2219/25329 . . . Each module, segment has only either a sensor or an actuator
2219/25331 . . . Module connected to canbus and to controlled device
2219/25332 . . . Module capability concerns allowable I-O and required sequence of operations
2219/25333 . . . Modules on bus and direct connection between them for additional logic functions
2219/25334 . . . Each module contains several channels, each with an input and an output
2219/25335 . . . Each module has connections to actuator, sensor and to a fieldbus for expansion
2219/25336 . . . Cascaded modules, one module connects to other, I-O, computing expansion
2219/25337 . . . Sbc single board computer, stand alone
2219/25338 . . . Microprocessor
2219/25339 . . . Supervisory plus control computer
2219/25341 . . . Single chip programmable controller
2219/25342 . . . Real time controller
2219/25343 . . . Real time multitasking
2219/25344 . . . In one cycle, application task is executed, if time is left, communication or user interface task is executed
2219/25345 . . . Linux, preemption, low-latency patches for real time linux
2219/25346 . . . Several operating systems in one device
2219/25347 . . . Multitasking machine control
2219/25348 . . . Windows expansion for real time control under windows
2219/25349 . . . Operating system, Microsoft Windows
2219/25351 . . . MSDOS
2219/25352 . . . Preemptive for critical tasks combined with non preemptive, selected by attribute
2219/25353 . . . Inductive coupling of power, transformer
2219/25354 . . . Power or secondary control signal derived from received signal
2219/25355 . . . Motor winding used as power transformator
2219/25356 . . . Inductive coupling of power and signal
2219/25357 . . . Regulation of energy coupling
2219/25358 . . . During detection of input, switch over to DC power
2219/25359 . . . Special power supply
2219/25361 . . . DC-DC convertor on board
2219/25362 . . . UPS, no break
2219/25363 . . . Dual power supply, for digital circuit and for analog signals
2219/25364 . . . For each module a powersupply
2219/25365 . . . Initialize parameters
2219/25366 . . . Detect code, kind connected machine, device before execution of program
2219/25367 . . . Control of periodic, synchronous and asynchronous, event driven tasks together
2219/25368 . . . Start group of motors, machines in sequence, power up, down sequence
2219/25369 . . . Control of states, real time
2219/25371 . . . Recharge apparatus with material, only when needed or during specific time
2219/25372 . . . Sequence command, next step if reference equals ramp signal level
2219/25373 . . . Detection position of program drum
2219/25374 . . . Home selection
2219/25375 . . . If error, execute subroutine for alternative command, no shut down
2219/25376 . . . Repeat part of program, kind of subroutine
2219/25377 . . . New sequence as function of deviation from predicted result, state
2219/25378 . . . Stop machine after execution of some instructions on tape, marked by code
2219/25379 . . . Operation on rotating table provided with a plurality of cases

2219/25381 . . . Restart program at predetermined position, crash recovery after power loss
2219/25382 . . . Skip sequences
2219/25383 . . . Jump
2219/25384 . . . Analog I-O to microprocessor to set switch moment for next step
2219/25385 . . . Control speed of conveyor as function of missing objects, to speed up
2219/25386 . . . Program execution as function of direction, forward or backward
2219/25387 . . . Control sequences so as to optimize energy use by controlled machine
2219/25388 . . . Race conditions
2219/25389 . . . Macro's, subroutines
2219/25391 . . . Start, stop sequence of different parts of machine, copier, textile, glass
2219/25392 . . . Convert control signal to deliver pulse modified in time and width
2219/25393 . . . Speed, delay, stand still of record carrier controlled, more commands possible
2219/25394 . . . Execute next step on feedback of result of previous step
2219/25395 . . . Clock dependant, select next cyclus, step as function of parameter
2219/25396 . . . Add pulses or stop pulses as function of changing clock, speed to compensate
2219/25397 . . . Compare real date with programmed date, if equal execute next command
2219/25398 . . . Sampling period is a product of integer number and scheduler interrupt period
2219/25399 . . . Variable, settable clock or cycle, phase duration
2219/25401 . . . Compensation of control signals as function of changing supply voltage
2219/25402 . . . Detect occurrence of signal by higher sampling when parameter value within range
2219/25403 . . . Compare real clock time with programmed time, if equal execute next command
2219/25404 . . . Command order is delayed as function of expected and real delay
2219/25405 . . . Command order is delayed, corrected as function of speed
2219/25406 . . . Delay as function of detected characteristics of controlled element
2219/25407 . . . Delay between operations
2219/25408 . . . Given order is latched for a certain delay in order te execute order surely
2219/25409 . . . Feedforward of control signal to compensate for delay in execution
2219/25411 . . . Priority interrupt
2219/25412 . . . Separate interrupt for, from each interface
2219/25413 . . . Interrupt, event, state change triggered
2219/25414 . . . Interrupt without saving register states
2219/25415 . . . Between processors using a single line and a switch
2219/25416 . . . Interrupt
2219/25417 . . . Identify capabilities necessary to produce article
2219/25418 . . . Enter description of capabilities of each module
2219/25419 . . . Scheduling
2219/25421 . . . Using resource data relative to each component, module of control system
2219/25422 . . . Aperiodic scheduling, executed only on certain condition
2219/25423 . . . Verification of controlled value by comparing with recorded value, signature
2219/25424 . . . Mixture of wall connectors, some with fixed address others no address
2219/25425 . . . Personal computer
2219/25426 . . . Microcontroller in smart card directly controls machine, runs control program
2219/25427 . . . Controller inside socket, wall connector, distributor, junction box
2219/25428 . . . Field device
2219/25429 . . . Microprocessor mounted near controlled machine, cheaper line connection
2219/25431 . . . Dual Port memory
2219/25432 . . . Multiplex
2219/25433 . . . Dataflow processor
2219/25434 . . . Microprocessor and control logic integrated on same circuit board
2219/25435 . . . Multiplex for analog signals
2219/25436 . . . Main board connected to bundle of analog input lines
2219/25437 . . . Main board coupled to bundle of digital and analog input lines
2219/25438 . . . Counter controls device, machine directly or via decoder
2219/25439 . . . Use of flexible printed circuit
2219/25441 . . . Piggy back mounting
2219/25442 . . . Europa card
2219/25443 . . . Connect pc card to industrial bus, additional timing and adapting logic
2219/25444 . . . Stick label over opening for card, to seal opening and indicate program status
2219/25445 . . . Electric wiring inside pneumatic, hydraulic path
2219/25446 . . . Serial port has power connected to pin for external device
2219/25447 . . . Detachable program unit can be replaced by supplementary display
2219/25448 . . . Control module is pluggable into wall connector
2219/25449 . . . Constructive details
2219/25451 . . . Connect module to bus using interface with adaptive logic
2219/25452 . . . Bootstrap logic and ram integrated in serial connector
2219/25453 . . . Encoder, control knob connected to same microprocessor pins as keyboard matrix
2219/25454 . . . Retrofitting
2219/25455 . . . Buscouple interface can be integrated in actuator
2219/25456 . . . Piggy back controller, old controller functions as before, new functions by new
2219/25457 . . . Replace old processor by more powerful processor on additional card
2219/25458 . . . Opto isolation, optical separation
2219/25459 . . . Reed relay separation
2219/25461 . . . Transformer separation
2219/25462 . . . Galvanic separation, galvanic isolation
2219/25463 . . . Optical separation for signals, transformer separation for power
2219/25464 . . . MBO motherboard, backplane special layout

2219/25465 . . . Output of one module connected to input next module by lines on motherboard
2219/25466 . . . Motherboard has data, address, power and module identification lines
2219/25467 . . . Detect if expansion board is connected
2219/25468 . . . Deconnect automatically high voltage supply when taking out a module
2219/25469 . . . Inserting or taking out circuit boards during power on
2219/25471 . . . Replace existing control system with new different system in real time
2219/25472 . . . Synchronise controllers, sensors, measurement with data bus
2219/25473 . . . Compensation variable cycle time, synchronized processes
2219/25474 . . . Synchronize microprocessor with process or I-O
2219/25475 . . . Sequence synchronized with machine axis, like knitting machine
2219/25476 . . . Synchronous state change by clock as function of allowed states to skip certain states
2219/25477 . . . Master waits for signal from slave, slave active thereafter, during limited time
2219/25478 . . . Synchronize several controllers using syncline
2219/25479 . . . Synchronize controllers using messages, add transmission time afterwards
2219/25481 . . . Broadcast to each controller an address of part of program to be used
2219/25482 . . . Synchronize several sequential processes, adjust
2219/25483 . . . Synchronize several controllers using messages over data bus
2219/25484 . . . Synchronize microprocessor and connected, controlled state machine
2219/26 . . Pc applications
2219/2601 . . . Dispense machine glue, paste, flow
2219/2602 . . . Wafer processing
2219/2603 . . . Steering car
2219/2604 . . . Test of external equipment
2219/2605 . . . Wastewater treatment
2219/2606 . . . Tape transport, take up, rewind, play
2219/2607 . . . Infusion controller
2219/2608 . . . Hospital bed
2219/2609 . . . Process control
2219/2611 . . . Microprocessor driven caliper, to measure length distances
2219/2612 . . . Data acquisition interface
2219/2613 . . . Household appliance in general
2219/2614 . . . HVAC, heating, ventillation, climate control
2219/2615 . . . Audio, video, tv, consumer electronics device
2219/2616 . . . Earth moving, work machine
2219/2617 . . . Eye, ophthalmic, surgery system
2219/2618 . . . Lubrication, greasing
2219/2619 . . . Wind turbines
2219/2621 . . . Conveyor, transfert line
2219/2622 . . . Press
2219/2623 . . . Combustion motor
2219/2624 . . . Injection molding
2219/2625 . . . Sprinkler, irrigation, watering
2219/2626 . . . Sewing
2219/2627 . . . Grinding machine
2219/2628 . . . Door, window
2219/2629 . . . Assembly line
2219/2631 . . . Blasting, explosion
2219/2632 . . . Hemodialysis
2219/2633 . . . Washing, laundry
2219/2634 . . . Loom, weaving
2219/2635 . . . Glass forming
2219/2636 . . . Reproduction, image copying machine
2219/2637 . . . Vehicle, car, auto, wheelchair
2219/2638 . . . Airconditioning
2219/2639 . . . Energy management, use maximum of cheap power, keep peak load low
2219/2641 . . . Fork lift, material handling vehicle
2219/2642 . . . Domotique, domestic, home control, automation, smart house
2219/2643 . . . Oven, cooking
2219/2644 . . . Sterilizer
2219/2645 . . . Vending, distribute drinks
2219/2646 . . . Printing
2219/2647 . . . Dentist
2219/2648 . . . Central heating
2219/2649 . . . Burner
2219/2651 . . . Camera, photo
2219/2652 . . . Medical scanner
2219/2653 . . . Roller blind, shutter, sunshade
2219/2654 . . . Fridge, refrigerator
2219/2655 . . . Cd player
2219/2656 . . . Instrumentation
2219/2657 . . . Blood, urine analyzer
2219/2658 . . . Heat pump
2219/2659 . . . Elevator
2219/2661 . . . Milking robot
2219/2662 . . . Photocopier
2219/2663 . . . Tractor
2219/2664 . . . Audio light, animation, stage, theatre light
2219/2665 . . . Detonator, fuze
2219/2666 . . . Toy
2219/2667 . . . Crane
2219/2668 . . . Fuel cells
2219/2669 . . . Handling batches
2219/2671 . . . Mail processing system
2219/30 . Nc systems
2219/31 . . From computer integrated manufacturing till monitoring
2219/31001 . . . CIM, total factory control
2219/31002 . . . Computer controlled agv conveys workpieces between buffer and cell
2219/31003 . . . Supervise route, reserve route and allocate route to vehicle, avoid collision
2219/31004 . . . Move vehicle to battery charge or maintenance area
2219/31005 . . . Detect obstacles on path of vehicle
2219/31006 . . . Monitoring of vehicle
2219/31007 . . . Floor plan, map stored in on-board computer of vehicle
2219/31008 . . . Cooperation mobile robots, carrying common pallet, object or pushing together
2219/31009 . . . Connector between AGV and station
2219/31011 . . . Communication network identical to transport network
2219/31012 . . . Optimize number of vehicles
2219/31013 . . . Second AGV with wafers already underway before processing first finished

2219/31014 . . . Synchronization between AGV movement and workpiece treatment chambers
2219/31015 . . . Host, model group and workstation computer deliver each proper control data
2219/31016 . . . General NC system executes tasks not present in specialised machine tools
2219/31017 . . . Architecture, host controls several CNC, each acting as a server to a pmc
2219/31018 . . . Virtual factory, modules in network, can be selected and combined at will
2219/31019 . . . Each station along transferline is independent
2219/31021 . . . Between lan and machine, communication adapter which serves also sensors
2219/31022 . . . Planner and coordinator, decision and direct control level
2219/31023 . . . Master production scheduler and microprocessor and schedule analysis and shop control
2219/31024 . . . Superior controller and internal, external resources controller modules
2219/31025 . . . PAC production activity controller
2219/31026 . . . Diagnostic controller coupled to field and to redundant process controllers
2219/31027 . . . Computer assisted manual assembly CAA, display operation, tool, result
2219/31028 . . . Selecting workpieces from one or more containers by robot with vision
2219/31029 . . . Program for assembly, show exploded article
2219/31031 . . . Assembly, manipulator cell
2219/31032 . . . Two workstations alternatively, one assembles, other is prepared for next
2219/31033 . . . Record on site dimensions of pipe, tube configuration, to install pipe
2219/31034 . . . Component identifier and location indicator corresponding to component
2219/31035 . . . Disable assembly if one of component compartments lacks
2219/31036 . . . Load component into corresponding compartment, bin, storage before assembly
2219/31037 . . . Compartment, bin, storage vessel sensor to verify correct bin is loaded
2219/31038 . . . Watchdog, timer to alert if operator does not executes operation within time
2219/31039 . . . Count assembled parts, change program during assembly if number reached
2219/31041 . . . Machine balancing, distribute articles evenly over machines
2219/31042 . . . Enter pallet configuration, geometry, number of parts
2219/31043 . . . Bin, storage identifier and workstation identifier
2219/31044 . . . Assembly of modular products, variant configurability
2219/31045 . . . Show bin, compartment and number of parts to be pick up
2219/31046 . . . Aid for assembly, show display on screen next workpiece, task, position to be assembled, executed
2219/31047 . . . Display image of finished workpiece on screen, show how, where to mount next part
2219/31048 . . . Project on workpiece, image of finished workpiece, info or a spot
2219/31049 . . . Minimize assembly time, by grouping part types into pallet groups
2219/31051 . . . Hybrid system, combine expert system with traveling salesman problem TSP
2219/31052 . . . Find feasable assembly sequences
2219/31053 . . . Planning, generate assembly plans
2219/31054 . . . Planning, layout of assembly system
2219/31055 . . . Interpretation of assembly design data
2219/31056 . . . Selection of assembly processes, preferred assembly sequences
2219/31057 . . . Selection of assembly equipment, system
2219/31058 . . . Determination of assembly tooling, fixture
2219/31059 . . . Selection of inspection devices
2219/31061 . . . Selection of assembly process parameters
2219/31062 . . . Calculation of assembly times
2219/31063 . . . Integrate assembly and task planning
2219/31064 . . . Minimal precedence constraint for components, link between components
2219/31065 . . . Disassembly evaluation
2219/31066 . . . Virtual assembly disassembly planning
2219/31067 . . . Assembly partitioning, find sub assembly removable without disturbing plan
2219/31068 . . . Relative positioning of assembled parts with small geometric deviations
2219/31069 . . . Cell controller, setup machine of cell during operation of other machines
2219/31071 . . . Prevent order interference, no order to machine not setup for that order
2219/31072 . . . Prevent batch breakup, no mix up of output of different machines
2219/31073 . . . Decide when to create or reconfigure a cell
2219/31074 . . . Decide which machines are to be used in a cell
2219/31075 . . . Modular cell elements
2219/31076 . . . Controller for cell, for robot motion, for supervision
2219/31077 . . . Laser cutting table and handling and gripping and attachment robot and layup table
2219/31078 . . . Several machines and several buffers, storages, conveyors, robots
2219/31079 . . . Two workstations and two manipulators working together or independent
2219/31081 . . . Detect position robot, agv relative to machine to start communication
2219/31082 . . . NDDS network data delivery service, producers and consumers model
2219/31083 . . . In server store virtual nodes for controlled machines, with states for map
2219/31084 . . . Part of module exchanges high level messages, other part proprietary messages
2219/31085 . . . Application scripts; in web server, not sent to client
2219/31086 . . . Communication of carriage, agv data, workpiece data at each station
2219/31087 . . . Transmission device between workcell and central control
2219/31088 . . . Network communication between supervisor and cell, machine group
2219/31089 . . . Direct communication between cooperating parts of a cell, not over server
2219/31091 . . . One client handled by several servers
2219/31092 . . . Network server for communication between plc's, using server
2219/31093 . . . Communication between sensors, actuators and gateway

2219/31094 . . . Data exchange between modules, cells, devices, processors
2219/31095 . . . Read write intelligent chip on workpiece, pallet, tool for data exchange
2219/31096 . . . Data carrier, communication by exchange of floppy disk
2219/31097 . . . Display travels with workpiece, package, order, special orders can be inserted
2219/31098 . . . Configuration editor for networking interconnection
2219/31099 . . . Configuration of transfer control between several subsystems
2219/31101 . . . Configuration file with format of relevant messages for different equipment
2219/31102 . . . Program network controller, connected devices
2219/31103 . . . Configure parameters of controlled devices
2219/31104 . . . Remote configuration of parameters of controlled devices
2219/31105 . . . Remote control of network controller
2219/31106 . . . Auto configuration, each module responsable for own configuration
2219/31107 . . . Start up of object manager module
2219/31108 . . . Can controller in full can, detects if message is for controller
2219/31109 . . . Can controller in basic can, microcontroller detects if message is for controller
2219/31111 . . . Can controller and microcontroller integrated
2219/31112 . . . Interface, SIOMS standard I-O for mechatronic systems, device drivers
2219/31113 . . . General, vendor indenpendant display and control interface for sensor actuator
2219/31114 . . . Sensor on off switch level can be set and displayed by detachable module
2219/31115 . . . Network controller
2219/31116 . . . A-D interface between asi and fieldbus
2219/31117 . . . Each node has several, three channels, for control, for data, for addressing
2219/31118 . . . Universal interface between asi and fieldbus, for any fielddevice
2219/31119 . . . Fielddevice comprises also controller and pneumatic actuator and sensor
2219/31121 . . . Fielddevice, field controller, interface connected to fieldbus
2219/31122 . . . Bridge between networks
2219/31123 . . . Multi mode network controller, monitor, control, configuration, maintenance
2219/31124 . . . Interface between communication network and process control, store, exchange data
2219/31125 . . . Signal, sensor adapted interfaces build into fielddevice
2219/31126 . . . Transmitter coupled to fieldbus and to sensor, a-d conversion
2219/31127 . . . Repeater between two networks
2219/31128 . . . No repeater, split into several analog segments and common digital, can, expansion
2219/31129 . . . Universal interface for different fieldbus protocols
2219/31131 . . . Field device with gateway functions for communication with pc and other field devices
2219/31132 . . . FDT interfacing profibus field device drivers DTM with engineering tool
2219/31133 . . . Contactless connector, identify module wirelessly, short distance like less than twenty cm
2219/31134 . . . PCD profinet component description, field device description module
2219/31135 . . . Fieldbus
2219/31136 . . . Name of bus, canbus, controller area network
2219/31137 . . . Sercos serial real time communications system between servo and cpu
2219/31138 . . . Profibus process fieldbus
2219/31139 . . . Lon local operating network, using neuron chip
2219/31141 . . . Eiba european installation bus association
2219/31142 . . . Devicenet, can based net
2219/31143 . . . Sds smart distributed system, can based
2219/31144 . . . Interbus-S
2219/31145 . . . Ethernet
2219/31146 . . . Bati bus, for home habitation building automation
2219/31147 . . . Simatic S5-bus
2219/31148 . . . Imbus
2219/31149 . . . P-net
2219/31151 . . . Lan local area network
2219/31152 . . . Separate lan for sensors, detectors
2219/31153 . . . Serial bus for plug in modules, each connection has own supply
2219/31154 . . . Actuator sensor bus, asi, intelligent actuator, motor, sensor
2219/31155 . . . Ringbus
2219/31156 . . . Network structure, internet
2219/31157 . . . Star network, hub
2219/31158 . . . Wan wide area network
2219/31159 . . . Intranet
2219/31161 . . . Java programcode or simular active agents, programs, applets
2219/31162 . . . Wireless lan
2219/31163 . . . Neutral bus with intelligent coupler for all kind of fieldbuses
2219/31164 . . . Bus for analog and digital communication
2219/31165 . . . Control handover in wireless automation networks
2219/31166 . . . Access data by name, object, stored in list, database
2219/31167 . . . Object, data object as network variable
2219/31168 . . . Use of node, sensor, actuator and control object
2219/31169 . . . Object manager contains client, control and communication and start and planning server
2219/31171 . . . Each data object has corresponding identification for object manager, associative
2219/31172 . . . All object managers use same algorithm to search server
2219/31173 . . . Start different object manager as function of priority list
2219/31174 . . . Load, use different protocols, formats, emulators for different systems
2219/31175 . . . Message comprises identification of sender, receiver, command and parameter
2219/31176 . . . Universal, same protocol to control all kind of drives, DC, AC, step motor
2219/31177 . . . Protocol, sdlc serial data link control
2219/31178 . . . Hdlc high level data link control
2219/31179 . . . Master sends message with address of slave to all slaves, slave answers, interrupt
2219/31181 . . . Controller and device have several formats and protocols, select common one
2219/31182 . . . Address by pulse sequence, control by pulse width, module filters out own control

2219/31183 . . . Token ring
2219/31184 . . . Fip fieldbus instrumentation protocol
2219/31185 . . . Mapi message application interface for windows
2219/31186 . . . TCP-IP internet protocol
2219/31187 . . . Csma-cd csma-cd-w carrier sense multiple access collision detection wireless
2219/31188 . . . Combine csma-cd and tdm time multiplexed for rapid status exchange
2219/31189 . . . Time multiplex
2219/31191 . . . Shorten header, message can be sent with less bytes, short form PDU
2219/31192 . . . Token passing protocol, priority token passing
2219/31193 . . . Midi communication standard
2219/31194 . . . Multimedia integration into fieldbus
2219/31195 . . . WAP wireless application protocol, wireless web application
2219/31196 . . . SOAP, describes available services and how to call them remotely
2219/31197 . . . Near field communication nfc
2219/31198 . . . VPN virtual private networks
2219/31199 . . . UDP-IP
2219/31201 . . . Frequency shift keying modulation, fsk
2219/31202 . . . Semiconductor equipment communication standard SECS
2219/31203 . . . Purpose, identification of messages, programs, variables
2219/31204 . . . Blind node, executes control, data acquisition without having operator interfaces
2219/31205 . . . Remote transmission of measured values from site, local to host
2219/31206 . . . Exchange of parameters, data, programs between two station, station and central or host or remote
2219/31207 . . . Master sends global files to autonomous controllers, feedback of process status
2219/31208 . . . Server node to watch, store message, variable, data between lon, network
2219/31209 . . . Master actuator sensor interface has priority over host, build into host
2219/31211 . . . Communicate diagnostic data from intelligent field device controller to central
2219/31212 . . . Intelligent local node can handle emergency without communication over net
2219/31213 . . . Synchronization of servers in network
2219/31214 . . . Discontinuous communication controlled by server
2219/31215 . . . Upon modification of data in one database, automatic update of mirror databases
2219/31216 . . . Handshake between machine and agv; readiness to load, unload workpiece
2219/31217 . . . Merge, synchronize process data and network data for trend analysis
2219/31218 . . . Scheduling communication on bus
2219/31219 . . . Fixed deadline monotonic scheduling dm, set each message id to unique priority
2219/31221 . . . Non preemptive earliest deadline ed, message id contains deadline
2219/31222 . . . Mixed traffic scheduler, ed for high speed and dm for low speed messages
2219/31223 . . . Main controller with three levels of serial networks
2219/31224 . . . Supervisor, cell controllers in parallel bus, machine controllers in serial bus
2219/31225 . . . System structure, plc's and pc's communicate over lan
2219/31226 . . . Multitasking server connected to general network and to nc machines
2219/31227 . . . External network for proces data, internal network for transport, handling only
2219/31228 . . . Host, gateways and parallel backbone, multiprocessor computer node, fieldbus
2219/31229 . . . Supervisor, master, workstation controller, automation, machine control
2219/31231 . . . Lan and stations and fieldbus, each station controls own I-O
2219/31232 . . . Lan and station, each station has plc controlling own I-O over bus
2219/31233 . . . Map network and server in node and server controlled ethernet with machine nodes
2219/31234 . . . Host, router and backplane bus, communication with host or backplane
2219/31235 . . . St network, each module of first controls second similar network etc., tree
2219/31236 . . . Plc exclusive network connected to map
2219/31237 . . . Host and rs232, rs485 to network controller and rs232 to controlled devices
2219/31238 . . . First network connected by repeater to second, second connected by repeater to third
2219/31239 . . . Cache for server to fast support client
2219/31241 . . . Remote control by a proxy or echo server, internet - intranet
2219/31242 . . . Device priority levels on same bus, net, devices processes data of exactly lower priority device
2219/31243 . . . Add serial number to message from station to check missing messages in host
2219/31244 . . . Safety, reconnect network automatically if broken
2219/31245 . . . Redundant bus, interbus, with two masters
2219/31246 . . . Firewall
2219/31247 . . . Reconnect network if connection was broken
2219/31248 . . . Multiple data link layer masters, if one fails, other takes over
2219/31249 . . . Display name of communication line and number of errors detected and corrected
2219/31251 . . . Redundant access, wireless and hardware access to fielddevices
2219/31252 . . . Watchdog, client sends regulary message to server, server must answer
2219/31253 . . . Redundant object manager
2219/31254 . . . Request from client waits until corresponding server functions again
2219/31255 . . . Verify communication parameters, if wrong, refuse communication
2219/31256 . . . Object managers arranged in logical ring for monitoring purposes
2219/31257 . . . Redundant wireless links
2219/31258 . . . Compensate control in case of missing message
2219/31259 . . . Communication inhibited during certain process steps
2219/31261 . . . Coordination control
2219/31262 . . . Dcca dynamic coordinated concurrent activities
2219/31263 . . . Imbedded learning for planner, executor, monitor, controller and evaluator
2219/31264 . . . Control, autonomous self learn knowledge, rearrange task, reallocate resources

2219/31265 . . . Control process by combining history and real time data
2219/31266 . . . Convey, transport tool to workcenter, central tool storage
2219/31267 . . . Central tool storage, convey a whole tool drum, magazine to workcenter
2219/31268 . . . Central workpiece storage, convey workpiece, work pallet, holder to workcell
2219/31269 . . . Convey tool and workpiece to workcenter
2219/31271 . . . Priority workpiece pallet selected instead of routine workpiece pallet
2219/31272 . . . Avoid piling up, queue of workpieces, accommodate surges
2219/31273 . . . Buffer conveyor along main conveyor
2219/31274 . . . Convey products, move equipment according to production plan in memory
2219/31275 . . . Vehicle to convey workpieces is manually operable
2219/31276 . . . Transport a lot to stations, each with different types of manufacturing equipment
2219/31277 . . . Dispatching rules, shortest travel time or bidding based to reduce empty travel
2219/31278 . . . Store optimum number of workpiece, between max min, in bins, compartment, save travel time
2219/31279 . . . Prevent introduction of two pallets in same cell
2219/31281 . . . Calculate optimum path for conveying workpieces
2219/31282 . . . Data acquisition, BDE MDE
2219/31283 . . . Communication memory, storage, ram, eprom on workpiece or pallet
2219/31284 . . . Set begin and end of collection time for concerned machines, parameters
2219/31285 . . . Send required data to computer as function of specified condition
2219/31286 . . . Detect position of articles and equipment by receivers, identify objects by code
2219/31287 . . . Indicate output for data, screen or printer or database
2219/31288 . . . Archive collected data into history file
2219/31289 . . . Read card with operator and another card with process, product, work order info
2219/31291 . . . Store value detected signal and machine name and name of part of machine, mask
2219/31292 . . . Data in categories, each with a priority factor
2219/31293 . . . Enter size measurements, store in data base, analyze and identify in size data group
2219/31294 . . . Compare measurements from sensors to detect defective sensors
2219/31295 . . . Use integrated controller, processor during product, car assembly for ide, display, test
2219/31296 . . . Identification, pallet object data and program code for station
2219/31297 . . . Read only that ide information which is needed for specific operation
2219/31298 . . . Store on actual pallets also id of several other upstream, following pallets
2219/31299 . . . If workpiece rejected, write in id and erase operation code
2219/31301 . . . Restore lost id by using entry number of preceding, following pallet
2219/31302 . . . Verify id data and reread, rewrite or alarm on fault
2219/31303 . . . If workpiece transferred to other pallet, transfer also id
2219/31304 . . . Identification of workpiece and data for control, inspection, safety, calibration
2219/31305 . . . Robot arm identifies object during movement
2219/31306 . . . Read identification only if object is present
2219/31307 . . . Identification structure is partly a copy of operating structure
2219/31308 . . . Capture image asynchronously with processing of analysis, identification
2219/31309 . . . Identification workpiece and time limit for processing of workpiece
2219/31311 . . . Data are id, destination, number of pieces, alternative destination, process data
2219/31312 . . . Identify pallet, bag, box code
2219/31313 . . . Measure weight, dimension and contents of box, tray
2219/31314 . . . Store in workpiece detected defects
2219/31315 . . . Use of data by host, send work order to operator after pallet detection
2219/31316 . . . Output test result report after testing, inspection
2219/31317 . . . Outputs delivery ordersheet, relating to finished products, to packing cell
2219/31318 . . . Data analysis, using different formats like table, chart
2219/31319 . . . Use data groups as inventory control value, adapt inventory need to new data
2219/31321 . . . Print, output finished product documentation, manual using id of all workpieces assembled, processed
2219/31322 . . . Work still to be done on workpiece
2219/31323 . . . Database for CIM
2219/31324 . . . Distributed real time knowledge, database
2219/31325 . . . Machine selection support, use of database
2219/31326 . . . Database to manage communication networks
2219/31327 . . . Directory service for database
2219/31328 . . . Objects report their location to directory service
2219/31329 . . . Distributed, among several servers, directory service
2219/31331 . . . Select manufacturing information by entering product number
2219/31332 . . . Back order management with back order, part maker delivery, production databases
2219/31333 . . . Database to backup and restore factory controllers
2219/31334 . . . Database with devices, configuration, of plant
2219/31335 . . . Database of address of devices registers in different networks, mapping
2219/31336 . . . Store machines performance; use it to control future machining
2219/31337 . . . Failure information database
2219/31338 . . . Design, flexible manufacturing cell design
2219/31339 . . . From parameters, build processes, select control elements and their connection
2219/31341 . . . Design of factory information system
2219/31342 . . . Design of process control system
2219/31343 . . . Design of factory, manufacturing system control
2219/31344 . . . Element, file server
2219/31345 . . . Map backbone bus
2219/31346 . . . Network manager

2219/31347 . . . Communication adaptors between network and each machine
2219/31348 . . . Gateway
2219/31349 . . . Server node as operator panel, with display for lon
2219/31351 . . . Expert system to select best suited machining centre
2219/31352 . . . Expert system integrates knowledges to control workshop
2219/31353 . . . Expert system to design cellular manufacturing systems
2219/31354 . . . Hybrid expert, knowledge based system combined with ann
2219/31355 . . . Fault, if one station defect, stop it, other stations take over
2219/31356 . . . Automatic fault detection and isolation
2219/31357 . . . Observer based fault detection, use model
2219/31358 . . . Markov model
2219/31359 . . . Object oriented model for fault, quality control
2219/31361 . . . Verify if right controllers are connected to carrier, conveyor controller
2219/31362 . . . Verify correct configuration of system
2219/31363 . . . Action, if one station defect, execute special program for other stations
2219/31364 . . . If one station defect, return other stations to original programmed modes
2219/31365 . . . Send message to most appropriate operator as function of kind of error
2219/31366 . . . Operate faulty tool in degraded mode
2219/31367 . . . MMS manufacturing message specification, rs511, iso9506
2219/31368 . . . MAP manufacturing automation protocol
2219/31369 . . . Translation, conversion of protocol between two layers, networks
2219/31371 . . . VMD virtual manufacturing device for robot task control, cell
2219/31372 . . . Mes manufacturing execution system
2219/31373 . . . Vou virtual operative organisational unit, extension of vmd
2219/31374 . . . FAL fieldbus application layer, application service elements ase and application relations ar
2219/31375 . . . LAS link active scheduler, distribute bandwidth between processing nodes
2219/31376 . . . MFL material flow
2219/31377 . . . From stored machine groups and relation machine workpiece, send workpiece to idle
2219/31378 . . . Queue control
2219/31379 . . . Master monitors controllers, updates production progress, allocates resources
2219/31381 . . . Matrix cluster, machines in cell according to parts, row is part, column is machines
2219/31382 . . . Find shortest way, route
2219/31383 . . . Compare ratio of running work with optimum, decrease number of idle machines
2219/31384 . . . Produce construction sequence, make parts, store, assemble equipment, ship
2219/31385 . . . Determine rate of MFL out of each process within each workstation
2219/31386 . . . Determine size of batch of material for each process to meet mfl rate
2219/31387 . . . If resources, material, pieces under tolerance level, renew them until upper level
2219/31388 . . . Just in time JIT, kanban is box to control flow of workpiece
2219/31389 . . . Pull type, client order decides manufacturing
2219/31391 . . . Administration tasks and factory control tasks
2219/31392 . . . Lims laboratory information and management system
2219/31393 . . . Object oriented engineering data management
2219/31394 . . . Field management, low level, instruments and controllers acting in real time
2219/31395 . . . Process management, specification, process and production data, middle level
2219/31396 . . . Business management, production, document, asset, regulatory management, high level
2219/31397 . . . Instrument information management, subset of process management
2219/31398 . . . Simultaneous, concurrent engineering
2219/31399 . . . Station corrects nc program, sends back modified program to program generator
2219/31401 . . . Keep notebook for keeping track of process, can be executed to make product
2219/31402 . . . Keep log book, for activities of a station, equipment
2219/31403 . . . EDI electronic data exchange
2219/31404 . . . Computer assisted complaint management, customer complaint
2219/31405 . . . EDM electronic data management
2219/31406 . . . Data management, shop management, memory management
2219/31407 . . . Machining, work, process finish time estimation, calculation
2219/31408 . . . Cost calculation of use of certain machine types
2219/31409 . . . Calculation approach time
2219/31411 . . . Down time, loss time estimation, calculation
2219/31412 . . . Calculate machining time, update as function of load, speed
2219/31413 . . . Estimate capacity of plant
2219/31414 . . . Calculate amount of production energy, waste and toxic release
2219/31415 . . . Cost calculation in real time for a product manufactured
2219/31416 . . . Calculate effect of different actuators on optimal path sequence
2219/31417 . . . Calculate capacity by back propagating capacity, constraint from last to first module
2219/31418 . . . NC program management, support, storage, distribution, version, update
2219/31419 . . . Select file from a list, directory
2219/31421 . . . File with parameters for station and identification of station
2219/31422 . . . Upload, download programs, parameters from, to station to, from server
2219/31423 . . . After cap, send resulting programs to different nc machines
2219/31424 . . . Print label of finished part, with info, history, attach to part, docket
2219/31425 . . . Plan availability of operator for cell as function of time and operation calendar
2219/31426 . . . Real time database management for production control
2219/31427 . . . Production, CAPM computer aided production management
2219/31428 . . . Production management for lot production and for individual components of lot

2219/31429 . . . Predict end of job execution, schedule new job beforehand
2219/31431 . . . Identify and classify excess raw material; reuse
2219/31432 . . . Keep track of conveyed workpiece, batch, tool, conditions of stations, cells
2219/31433 . . . Diagnostic unit per zone of manufacturing
2219/31434 . . . Zone supervisor, collects error signals from, and diagnoses different zone
2219/31435 . . . Paging support with display board, status monitoring and report compiling
2219/31436 . . . Host monitors plc, control processor without interrupting its program
2219/31437 . . . Monitoring, global and local alarms
2219/31438 . . . Priority, queue of alarms
2219/31439 . . . Alarms can be warning, alert or fault
2219/31441 . . . Simocode, overload protection, detection of trips, life time connected to fieldbus
2219/31442 . . . Detect if operation on object has been executed correctly in each station
2219/31443 . . . Keep track of nc program, recipe program
2219/31444 . . . Compare actual manufacturing sequence with simulated sequence, correct actual
2219/31445 . . . Detect changed working conditions, to correct machine load, balance
2219/31446 . . . Detect if workpiece, object present
2219/31447 . . . Process error event detection and continuous process image detection, storage
2219/31448 . . . Display at central computer, slave displays for each machine unit
2219/31449 . . . Monitor workflow, to optimize business, industrial processes
2219/31451 . . . Petrinet for monitoring process
2219/31452 . . . Send a warning message that an event has to be monitored before the event occurs
2219/31453 . . . Repeat sending warnings to operator until certain event is monitored
2219/31454 . . . Keep track of vehicles
2219/31455 . . . Monitor process status
2219/31456 . . . Product progress, taking into account products on vehicle
2219/31457 . . . Factory remote control, monitoring through internet
2219/31458 . . . Test workpiece during transport
2219/31459 . . . Library with metrology plan for different type of workpieces
2219/31461 . . . Use risk analysis to identify process parts that should be specially monitored
2219/31462 . . . Add time stamp to alarm message
2219/31463 . . . Status of whole system calculated from status of its components
2219/31464 . . . Select between different models corresponding to diff process control configurations
2219/31465 . . . Determine which variables of the system to be monitored
2219/31466 . . . Display position of different workpieces, tools in system
2219/31467 . . . Display of operating conditions of machines, workcells, selected programs
2219/31468 . . . Display jig, pallet number, status and clamp jig number
2219/31469 . . . Graphical display of process as function of detected alarm signals
2219/31471 . . . Operator can select a graphical screen at his will as help diagnostic
2219/31472 . . . Graphical display of process
2219/31473 . . . Fisheye view, sharp detailed view of main subject, rest much smaller, navigate
2219/31474 . . . Icon display for quick access of detailed information
2219/31475 . . . Zoom or pan display for flexible access to information
2219/31476 . . . Display of several transactions, sub-displays for other transactions
2219/31477 . . . Display correlated data so as to represent the degree of correlation
2219/31478 . . . Display all processes together or select only one
2219/31479 . . . Operator select part of process he wants to see, video image is displayed
2219/31481 . . . Safety monitoring system, redundant display, print systems for process data
2219/31482 . . . Verify working state of printers, displays, switch over if defect
2219/31483 . . . Verify monitored data if valid or not by comparing with reference value
2219/31484 . . . Operator confirms data if verified data is correct, otherwise amends data
2219/31485 . . . Verify and update all related data in relational database
2219/32 . . Operator till task planning
2219/32001 . . . Computer assisted machining, signals guide operator to manual machine object
2219/32002 . . . Operator interface, manual control at cell, if host fails or priority
2219/32003 . . . Manual control at central control to control workcell, select pallet
2219/32004 . . . Graphical, textual instructions, sheet for operator to resume process
2219/32005 . . . Graphical, text operator instructions synchronous with product distribution
2219/32006 . . . Operator addresses machines to give commands or retrieve data
2219/32007 . . . Operator is assisted by expert system for advice and delegation of tasks
2219/32008 . . . Operator changes schedule, workload in allowed range by graphical interface
2219/32009 . . . Optimal task allocation between operator and machine
2219/32011 . . . Operator adapts manufacturing as function of sensed values
2219/32012 . . . Operator must signify his continued attendance at the workstation
2219/32013 . . . Operator marks processes, scheduler detects marks, releases control to operator
2219/32014 . . . Augmented reality assists operator in maintenance, repair, programming, assembly, use of head mounted display with 2-D 3-D display and voice feedback, voice and gesture command
2219/32015 . . . Optimize, process management, optimize production line
2219/32016 . . . Minimize setup time of machines
2219/32017 . . . Adapt real process as function of changing simulation model, changing for better results
2219/32018 . . . Adapt process as function of results of quality measuring until maximum quality

2219/32019 . . . Dynamic reconfiguration to maintain optimal design, fabrication, assembly
2219/32021 . . . Energy management, balance and limit power to tools
2219/32022 . . . Ordering, remote ordering, enter article and operations needed, create jobfile
2219/32023 . . . Print label, instructions for operator and job code for machining parameters
2219/32024 . . . Remote ordering, electronic selection article and fitting to form of client
2219/32025 . . . Automatic marking of article
2219/32026 . . . Order code follows article through all operations
2219/32027 . . . Order, plan, execute, confirm end order, if unfeasible execute exception operation
2219/32028 . . . Electronic catalog, to select material, resources, make lists with prices
2219/32029 . . . Enter also delivery location, transport means, kind of truck
2219/32031 . . . Use item and structure information
2219/32032 . . . Salesman creates order, system answers back with price, estimated date
2219/32033 . . . Send article design, needed material, packaging and shipping info to manufacturer
2219/32034 . . . Electronic market, network broker
2219/32035 . . . Compose, configure article and order
2219/32036 . . . Enter data, values for custom made articles
2219/32037 . . . Order picking
2219/32038 . . . Client can develop programs, parts on remote server located by manufacturer
2219/32039 . . . Send also testing program
2219/32041 . . . Combine orders from different customers
2219/32042 . . . Halting, initiating or resuming production of a product on order
2219/32043 . . . Program, information flow
2219/32044 . . . Shift workpiece and agv, carriage data in memory on advance to next station
2219/32045 . . . Each machine knows sequence of pallets, each pallet knows sequence of operations
2219/32046 . . . On detection workpiece code load program for workpiece from central
2219/32047 . . . Workcell end instruction selects next workpiece with related program
2219/32048 . . . Wait state between two successive machining steps
2219/32049 . . . Store program data, manufacturing history on workpiece, shifts to next
2219/32051 . . . Central control, modify program slave computers as function of production demand from host
2219/32052 . . . Lookup table, identify job to be executed by master or slave
2219/32053 . . . Adjust work parameter as function of other cell
2219/32054 . . . Send request for object carry out to other cell
2219/32055 . . . Identify workpiece, read status centrally, machine, adapt status centrally
2219/32056 . . . Balance load of workstations by grouping tasks
2219/32057 . . . Control cell as function of correlation between stored and detected machine state
2219/32058 . . . Execute program as function of deviation from predicted state, result
2219/32059 . . . Send code, data for workpiece to each workstation to be used, update data
2219/32061 . . . Central controls modules grouped according to function
2219/32062 . . . Set machines to new lot work, send them operation schedule, nc and handling data
2219/32063 . . . Adapt speed of tool as function of deviation from target rate of workpieces
2219/32064 . . . Production change over
2219/32065 . . . Synchronise set points of processes
2219/32066 . . . Central stores operation code in id and in concerned station
2219/32067 . . . Change combinations of operation codes in station, id for flexibility
2219/32068 . . . Execution at station only permitted if operation code of station and id equal
2219/32069 . . . Use of multiple id to prepare program for station before pallet in station
2219/32071 . . . Adaptive fuzzy controller, tunes itself as function of machine parameter variation
2219/32072 . . . Distributed fuzzy controllers
2219/32073 . . . If inspection needed, stop machining, execute separate inspection program
2219/32074 . . . History of operation of each machine
2219/32075 . . . Predict workpiece measurements from measurements of previous workpieces
2219/32076 . . . Adjust feedback from previous processes as function of elapsed time
2219/32077 . . . Batch control system
2219/32078 . . . Calculate process end time, form batch of workpieces and transport to process
2219/32079 . . . Use of common resources
2219/32081 . . . Sub batch, machine, assemble only part of the whole batch
2219/32082 . . . Planing, material requiring planning MRP, request
2219/32083 . . . Alternative, variant operation planning, revision specification of product
2219/32084 . . . Planning of configuration of product, based on components
2219/32085 . . . Layout of factory, facility, cell, production system planning
2219/32086 . . . Integrate process planning and job shop scheduling
2219/32087 . . . Decentral planning, each plant involved takes part of global
2219/32088 . . . Master production planning, highest level
2219/32089 . . . Action and material and technology combined to manufacture product
2219/32091 . . . Algorithm, genetic algorithm, evolution strategy
2219/32092 . . . Heuristic algorithm, accept feasible solution and attempt to improve it
2219/32093 . . . Search, adaptive, after each iteration some search directions are forbidden
2219/32094 . . . Dedicated language for batch processing, enter number of workpieces
2219/32095 . . . Text, menu driven editor for batch programming, phase sequence, parameters
2219/32096 . . . Batch, recipe configuration for flexible batch control
2219/32097 . . . Recipe programming for flexible batch
2219/32098 . . . Batch programming using oop
2219/32099 . . . CAPP computer aided machining and process planning

2219/32101 . . . CASE based process planning, using older, known case
2219/32102 . . . Select machine type
2219/32103 . . . Select size of tool
2219/32104 . . . Data extraction from geometric models for process planning
2219/32105 . . . Calculate machining axis, best feasible orientation for machining
2219/32106 . . . Calculate machining volumes for turning operations
2219/32107 . . . Operative process planning
2219/32108 . . . From order, production time divide into special and normal operations
2219/32109 . . . Divide process into machining methods
2219/32111 . . . PPS production planning system
2219/32112 . . . PPS and MS Office integrated
2219/32113 . . . Machine load and characteristic curves
2219/32114 . . . Part type selection, for simultaneous processing
2219/32115 . . . Machine grouping, each machine in each group performs same operations
2219/32116 . . . Production ratio, proportion in which selected part types will be produced
2219/32117 . . . Resource allocation, of number of pallets, fixtures of each type to part type
2219/32118 . . . Loading, allocates operations and tools to selected part type
2219/32119 . . . Order handling and manufacturing module and offline monitoring
2219/32121 . . . Read identification of pallet, conveyor and enter data for manufacturing
2219/32122 . . . Documentation of programmable electronic system
2219/32123 . . . Use of ms windows for automation, connected to mms manufacturing message system
2219/32124 . . . Program hybrid system, part sequence, part continous
2219/32125 . . . Maple manufacturing application programming environment
2219/32126 . . . Hyperlink, access to program modules and to hardware modules in www, web server, browser
2219/32127 . . . Read identification of part and generate automatically manufacturing conditions
2219/32128 . . . Gui graphical user interface
2219/32129 . . . Select program for specified machine from library, file server
2219/32131 . . . Use job graph
2219/32132 . . . SFC shop floor control, to develop and build control system for factory
2219/32133 . . . Commands from program of other controller cause recompilation of local program
2219/32134 . . . Dynamic generation of web pages from program code
2219/32135 . . . APC advanced process control applications
2219/32136 . . . Web service oriented architecture for manufacturing and automation
2219/32137 . . . Configure, connect, combine different program modules
2219/32138 . . . Select hardware, devices at workstation, needed for, to be used at cell, node
2219/32139 . . . Select at workstation control parameters for cell, node
2219/32141 . . . Define type of I-O, analog, digital, pulse
2219/32142 . . . Define device, module description using xml format file
2219/32143 . . . Use css style sheets as control parameters
2219/32144 . . . Define device description using dd files
2219/32145 . . . Manual, enter identification, name workpiece and teach manufacturing data
2219/32146 . . . Display parts, manufacturing conditions to enter conditions for selected part
2219/32147 . . . Edit teached data to change operation parameters of workstations
2219/32148 . . . Enter correction data at a station, also transmitted to all downstream stations
2219/32149 . . . Display working condition data, real measured data and tolerance
2219/32151 . . . Prepare teach data by selecting data from two tables as function of type of work
2219/32152 . . . Inhibit further editing of entered parameters
2219/32153 . . . Exchange data between user, cad, caq, nc, capp
2219/32154 . . . Object, attribute for geometry, technology, function oop
2219/32155 . . . Editor and library for objects
2219/32156 . . . Each defined object has corresponding set of geometrical macros
2219/32157 . . . Create a new object by combining existing objects
2219/32158 . . . Object groups, for object replication, naming, messaging and retrieving
2219/32159 . . . Each hardware unit together with its software forms one object
2219/32161 . . . Object oriented control, programming
2219/32162 . . . Tasks or control icons are linked to form a job
2219/32163 . . . Indicate synchronisation tags on icons of tasks
2219/32164 . . . Petrinet and procedural language combined
2219/32165 . . . Petrinet
2219/32166 . . . Convert petrinet to sequence program for cell and to control program for machine
2219/32167 . . . Convert petrinet to ladder diagram
2219/32168 . . . Generation and analysis of synthesis rules for petrinet
2219/32169 . . . Stochastic pn, spn
2219/32171 . . . Transform, convert operator goals and information into petri nets
2219/32172 . . . Control petri net together with modeling petri net, cascaded
2219/32173 . . . Table, memory table with identification code for all parts to be used
2219/32174 . . . Memory table parts classification and working, manufacturing conditions
2219/32175 . . . Table with correlation between part codes and part classification
2219/32176 . . . Correspondance between manufacturing part list and design part list
2219/32177 . . . Computer assisted quality surveyance, caq
2219/32178 . . . Normal and correction transferline, transfer workpiece if fault
2219/32179 . . . Quality control, monitor production tool with multiple sensors
2219/32181 . . . Monitor production, assembly apparatus with multiple sensors
2219/32182 . . . If state of tool, product deviates from standard, adjust system, feedback
2219/32183 . . . Test cell

2219/32184 . . . Compare time, quality, state of operators with threshold value
2219/32185 . . . Calculate entropy, disorder
2219/32186 . . . Teaching inspection data, pictures and criteria and apply them for inspection
2219/32187 . . . Correlation between controlling parameters for influence on quality parameters
2219/32188 . . . Teaching relation between controlling parameters and quality parameters
2219/32189 . . . Compare between original solid model and measured manufactured object
2219/32191 . . . Real time statistical process monitoring
2219/32192 . . . After inspection create correction table with position, correction data
2219/32193 . . . Ann, neural base quality management
2219/32194 . . . Quality prediction
2219/32195 . . . Feedforward quality control
2219/32196 . . . Store audit, history of inspection, control and workpiece data into database
2219/32197 . . . Inspection at different locations, stages of manufacturing
2219/32198 . . . Feedforward inspection data for calibration, manufacturing next stage
2219/32199 . . . If number of errors grow, augment sampling rate for testing
2219/32201 . . . Build statistical model of past normal proces, compare with actual process
2219/32202 . . . Integration and cooperation between processes
2219/32203 . . . Effect of material constituents, components on product manufactured
2219/32204 . . . Performance assurance; assure certain level of non-defective products
2219/32205 . . . Use model error adapted to type of workpiece
2219/32206 . . . Selection from a lot of workpieces to be inspected
2219/32207 . . . Action upon failure value, send warning, caution message to terminal
2219/32208 . . . Rearrange production line
2219/32209 . . . Stop production line
2219/32211 . . . Outputs new workorders to operators
2219/32212 . . . If parameter out of tolerance reject product
2219/32213 . . . If parameter out of tolerance during limited time, accept product on condition
2219/32214 . . . Display on screen what fault and which tool and what order to repair fault
2219/32215 . . . If detected shape not correct, simulate new machine, tool and adapt path
2219/32216 . . . If machining not optimized, simulate new parameters and correct machining
2219/32217 . . . Finish defect surfaces on workpiece
2219/32218 . . . Sort workpieces as function of quality data
2219/32219 . . . Slow down production after failure
2219/32221 . . . Correlation between defect and measured parameters to find origin of defect
2219/32222 . . . Fault, defect detection of origin of fault, defect of product
2219/32223 . . . Fixture failure diagnosis, measure assembly, derive influence of fixture on error
2219/32224 . . . Identify parameters with highest probability of failure
2219/32225 . . . Randomize workpiece treatment order within lot to improve lot-to-lot comparisons
2219/32226 . . . Computer assisted repair, maintenance of system components
2219/32227 . . . On error detected by zone supervisor, maintenance of particular zone
2219/32228 . . . Repair, rework of manufactured article
2219/32229 . . . Repair fault product by replacing fault parts
2219/32231 . . . Inspection and correction, repair station in one unit, correction data in memory
2219/32232 . . . Inspection and correction, repair station are separate, transmit correction data
2219/32233 . . . Scheduling repair
2219/32234 . . . Maintenance planning
2219/32235 . . . Sharing of data between process control and maintenance management computers
2219/32236 . . . Automatic order of parts needed for maintenance schedule
2219/32237 . . . Repair and rework of defect, out of tolerance parts, reschedule
2219/32238 . . . Scheduler triggers generation of nc program for actual selected machine
2219/32239 . . . Avoid deadlock, lockup
2219/32241 . . . Resource editor
2219/32242 . . . Reschedule without propagation of interruptions to other cells
2219/32243 . . . Rerouting parts
2219/32244 . . . By using graphical display of array and selecting elements, rearrange them
2219/32245 . . . Reentrant scheduling, workpiece can return to same machine
2219/32246 . . . Virtual reality based interface scheduler
2219/32247 . . . Real time scheduler
2219/32248 . . . Create schedule from elementary operations from database
2219/32249 . . . Repair, rework of defect, out of tolerance part in next station by reconfiguring it
2219/32251 . . . Normal and special order production lines for different types of workpiece
2219/32252 . . . Scheduling production, machining, job shop
2219/32253 . . . As a function of, change of machine operation
2219/32254 . . . Work sequence, alternative sequence
2219/32255 . . . Required time for work temperature control
2219/32256 . . . Due dates, pieces must be ready, priority of dates, deadline
2219/32257 . . . Tool replacement minimization
2219/32258 . . . Resource, machine assignment preferences, actual and anticipated load
2219/32259 . . . Flexibility, polyvalent machine, large buffers, permutation operations, alternative
2219/32261 . . . Rearrange production line as function of operator rating
2219/32262 . . . Work manhours, number of operators and work place
2219/32263 . . . Afo products, their components to be manufactured, lot selective
2219/32264 . . . Setup time
2219/32265 . . . Waiting, queue time, buffer
2219/32266 . . . Priority orders
2219/32267 . . . Dynamic throughput maximization
2219/32268 . . . Available parts, available materials
2219/32269 . . . Decision, of job release, select job to be launched next in shop
2219/32271 . . . Decision of job dispatching, select job to process next on each machine

2219/32272 . . . Decision of next visiting machine selection, where job is to go
2219/32273 . . . Decision of job pulling, select job to put in input buffer of next machine if conflicts
2219/32274 . . . Event is triggered when first unit of first lot enters or last unit leaves processing
2219/32275 . . . Job, recipe cascading: no delay, next job is started immediatly when first is finished
2219/32276 . . . For tool feeding schedule
2219/32277 . . . Agv schedule integrated into cell schedule
2219/32278 . . . Schedule of overhead material handlers, robot gantry
2219/32279 . . . Operator scheduling for load, unload, walk and wait in a cell with plural machines
2219/32281 . . . Single machine scheduling, one machine, several jobs
2219/32282 . . . For a quick and slow production line
2219/32283 . . . Machine scheduling, several machines, several jobs
2219/32284 . . . Job shop, two, more operations may not occupy same machine simultaneously
2219/32285 . . . Multi manipulator assembly cell
2219/32286 . . . Monitoring items connected to certain different entities, activities
2219/32287 . . . Medical, chemical, biological laboratory
2219/32288 . . . Create daily or weekly production matrix
2219/32289 . . . Determine number of components, start of their production, allocate processor
2219/32291 . . . Task sequence optimization
2219/32292 . . . Large, medium and fine schedule, with feedback from fine to large
2219/32293 . . . Minimize work in progress, system at maximum productivity
2219/32294 . . . Maximize throughput of cell
2219/32295 . . . Production start time from order and production specification, satisfaction degree
2219/32296 . . . If error search in a repair library, trained by operator, to correct schedule
2219/32297 . . . Adaptive scheduling, feedback of actual proces progress to adapt schedule
2219/32298 . . . Designate at least two group of articles, first with priority, reschedule second
2219/32299 . . . Divide job shop into number of workcenters
2219/32301 . . . Simulate production, process stages, determine optimum scheduling rules
2219/32302 . . . Each pallet has working plan, information and machine selection data
2219/32303 . . . Convert program to fit rescheduled machine
2219/32304 . . . Minimize flow time, tact, shortest processing, machining time
2219/32305 . . . Fastest interrupt time, change jobs dynamically to fastest machine
2219/32306 . . . Rules to make scheduling decisions
2219/32307 . . . Last buffer first serve, lifo
2219/32308 . . . Shortest, narrowest non full queue
2219/32309 . . . Shortest remaining capacity
2219/32311 . . . Shortest queue next
2219/32312 . . . Largest imminent operation time
2219/32313 . . . Shortest remaining processing time
2219/32314 . . . Largest remaining processing time
2219/32315 . . . Machine with least work
2219/32316 . . . First buffer first serve, fifo
2219/32317 . . . Smallest ratio for imminent processing time divided by total processing time
2219/32318 . . . Smallest value of product of imminent processing time with total processing time
2219/32319 . . . Shortest imminent operation time, part of machining time
2219/32321 . . . Largest processing, machining time
2219/32322 . . . Machines with least frequency of errors
2219/32323 . . . Determine lot priority as function of sum of queue and processing time
2219/32324 . . . Quality data determines optimum machine sequence selection, queuing rules
2219/32325 . . . Object oriented scheduling, use machine, part, tool object and coordinator
2219/32326 . . . Local scheduler, each machine own scheduler, independent from defective machines
2219/32327 . . . Structure, fuzzy logic expert system scheduler
2219/32328 . . . Dynamic scheduling, resource allocation, multi agent negotiation
2219/32329 . . . Real time learning scheduler, uses ANN, fuzzy
2219/32331 . . . Network of coordinating planning systems for each cell, factory
2219/32332 . . . Expert scheduler
2219/32333 . . . Use of genetic algorithm
2219/32334 . . . Use of reinforcement learning, agent acts, receives reward
2219/32335 . . . Use of ann, neural network
2219/32336 . . . Normal, special order lines share some common machines, part of production line
2219/32337 . . . Simulation, statechart SC
2219/32338 . . . Use new conditions for model, check, calculate if model meets objectives
2219/32339 . . . Object oriented modeling, design, analysis, implementation, simulation language
2219/32341 . . . Grafcet model, graph based simulation
2219/32342 . . . Real time simulation
2219/32343 . . . Derive control behaviour, decisions from simulation, behaviour modelling
2219/32344 . . . Modular verification of real time systems
2219/32345 . . . Of interconnection of cells, subsystems, distributed simulation
2219/32346 . . . Using acd, activity cycle diagram
2219/32347 . . . Knowledge based simulation engine, use answers from user, database
2219/32348 . . . Process reengineering, rethink manufacturing process, continuous improve
2219/32349 . . . Simulate effect of stoppages of production facilities, operate as function of simulation
2219/32351 . . . Visual, graphical animation of process
2219/32352 . . . Modular modeling, decompose large system in smaller systems to simulate
2219/32353 . . . Use elementary control task, finite state machine and loop, inhibit, synchronisation connections
2219/32354 . . . Divide, analyse process into subprocesses, until elementary unit operations
2219/32355 . . . Simulate control process using virtual bus
2219/32356 . . . For diagnostics
2219/32357 . . . Simulation of material handling, flexible conveyor system fcs
2219/32358 . . . Strain, stress of manual work, operator strain
2219/32359 . . . Modeling, simulating assembly operations
2219/32361 . . . Master production scheduling

2219/32362 . . . Bulk manufacturing, handling dry or fluid products
2219/32363 . . . Batch job routing in operation overlapping
2219/32364 . . . Simulate batch processing
2219/32365 . . . For resource planning
2219/32366 . . . Line performance evaluation
2219/32367 . . . Parallel experimentation machines
2219/32368 . . . Quality control
2219/32369 . . . Cape-mode computer aided plant enterprise modeling environment for plant life cycle modelisation & management
2219/32371 . . . Predict failure time by analysing history fault logs of same machines in databases
2219/32372 . . . Petrinet, coloured, inhibitor arc, timed, object token Petrinet
2219/32373 . . . Timed petrinet, timed event graph
2219/32374 . . . Display of petrinet, graph editing
2219/32375 . . . Petrinet synthesis tool
2219/32376 . . . Coloured petrinet
2219/32377 . . . Cbpn controlled batches petrinet, model influence control part on physical part
2219/32378 . . . Fuzzy timed petrinet
2219/32379 . . . Object oriented petrinets
2219/32381 . . . Continuous petrinet, contrary of timed petrinet
2219/32382 . . . Hybrid petrinet, comprises continuous and timed petrinet
2219/32383 . . . Controlled speed continuous petrinet, considers delays in execution and transport time
2219/32384 . . . Fuzzy petrinet fpn
2219/32385 . . . What is simulated, manufacturing process and compare results with real process
2219/32386 . . . Arm accurate robot motion time model, needed in scheduling
2219/32387 . . . Effects of highspeed hardware operations on throughput, use scheduler
2219/32388 . . . Autonomous flexible system, cells and agv autonomous
2219/32389 . . . Reception, assembly, testing, management workorder, schedule, history, file, packing
2219/32391 . . . Machining center, pallet stocker, setup station, conveyor, control unit
2219/32392 . . . Warehouse and loading, unloading station and shop and machining centers and in out buffer
2219/32393 . . . Host and central distribution control between storage and cells
2219/32394 . . . Fractal manufacturing system with autonomous agents: observer, analyser, organiser, resolver, reporter
2219/32395 . . . Manufacturing structure is flow shop, mass production
2219/32396 . . . Job shop, batch production system
2219/32397 . . . Machining cells
2219/32398 . . . Operator controls setting, changing of setting, of different machines
2219/32399 . . . Select lan by switching bus connected to several lan
2219/32401 . . . Select displays by switching bus connected to several displays
2219/32402 . . . Select one lan to be connected to one display by central control
2219/32403 . . . Supervisory control, monitor and control system, by operator or automatic
2219/32404 . . . Scada supervisory control and data acquisition
2219/32405 . . . Hybrid supervisor control, des supervisor and diagnostic and alternate strategy route
2219/32406 . . . Distributed scada
2219/32407 . . . Real time processing of data
2219/32408 . . . Case based diagnosis to assist decision maker, operator
2219/32409 . . . Adaptive agent for diagnostic, helps operator to describe new cases
2219/32411 . . . Derive control data from displayed element, logic for it and feedback data
2219/32412 . . . One engineering, workstation can supervise several processes
2219/32413 . . . Pc generates control strategy, download in plc to monitor and react to events
2219/32414 . . . Workstation has two displays, for process control and for general applications
2219/32415 . . . Select tools in next workcell during transport workpiece
2219/32416 . . . Tool information for program to use and needed timing, adapt timing
2219/32417 . . . Minimize number of tools, only a specific machine can process certain operations
2219/32418 . . . Machine workload balance, same tools for pool of machines for same operations
2219/32419 . . . All tools available, each part can fully be processed on a single machine
2219/32421 . . . Tool management incorporated in kernel of nc control
2219/32422 . . . Tool management and database management
2219/32423 . . . Task planning
2219/32424 . . . Task flow editing
2219/33 . . Director till display
2219/33001 . . . Director is the nc controller, computer
2219/33002 . . . Artificial intelligence AI, expert, knowledge, rule based system KBS
2219/33003 . . . Algorithm, hashing algorithm
2219/33004 . . . Manual control of manipulator, machine
2219/33005 . . . Manually but assisted by using sensors
2219/33006 . . . Ama allocation manual automatic work between machine, manipulator and man
2219/33007 . . . Automatically control, manually limited, operator can override control
2219/33008 . . . Operate manually only in defined, limited zone area
2219/33009 . . . ART adaptive resonance theory, place input patterns in clusters during learning
2219/33011 . . . Link between hidden and input layer is sigmoid, and between output is linear
2219/33012 . . . Kohonen network, single layer with neurodes, associated with codebook vector
2219/33013 . . . Higher order multilayer artificial neural network ANN, input terms has square, cubic terms of input, output
2219/33014 . . . BAM bidirectional associative memory artificial neural network
2219/33015 . . . Time delay artificial neural network
2219/33016 . . . Pi sigma network, summing in hidden layers, product in output layer
2219/33017 . . . Local linear nested network, coarse at root, split up and build tree
2219/33018 . . . Adaline network, n inputs with n weights, sum, one output
2219/33019 . . . Lapart, two art with lateral priming connection between output and vigilance nodes

2219/33021 . . . Connect plural macrocircuits, neural network modules in a larger network
2219/33022 . . . One network for learned signal values, one network for unknown signal values
2219/33023 . . . Ann with single, only one output
2219/33024 . . . RAM artificial neural network, several lookup tables addressed by input section, output summed
2219/33025 . . . Recurrent artificial neural network
2219/33026 . . . Wavelet artificial neural network, wavelet orthogonal decomposition for artificial neural network approximation
2219/33027 . . . Artificial neural network controller
2219/33028 . . . Function, rbf radial basis function network, gaussian network
2219/33029 . . . ANNS artificial neural network with sigmoid function
2219/33031 . . . Spline membership function
2219/33032 . . . Learn by changing input weights as function of position error
2219/33033 . . . Identification neural controller copies weight to system neural controller
2219/33034 . . . Online learning, training
2219/33035 . . . Slow learning combined with fast learning artificial neural network, two time scale ann
2219/33036 . . . Error back propagation
2219/33037 . . . Learn parameters of network offline, not while controlling system
2219/33038 . . . Real time online learning, training, dynamic network
2219/33039 . . . Learn for different measurement types, create for each a neural net
2219/33041 . . . Structure optimization and learning of artificial neural network by genetic algorithm
2219/33042 . . . Non linear filtering, recursive least squares
2219/33043 . . . Extended kalman filter
2219/33044 . . . Supervised learning with second artificial neural network
2219/33045 . . . Selforganizing network
2219/33046 . . . Forward propagation error
2219/33047 . . . Dynamic node creation, increase internal nodes if error too large
2219/33048 . . . By using kd tree data structure and delaunay linear interpolation, triangulation
2219/33049 . . . Cooperative coaching, each controller has own minimum, switch to lowest
2219/33051 . . . BBC behavior based control, stand alone module, cognitive, independent agent
2219/33052 . . . Subsumption architecture, behavioral modules in layers, override older ones
2219/33053 . . . Modular hardware, software, easy modification, expansion, generic, oop
2219/33054 . . . Control agent, an active logical entity that can control logical objects
2219/33055 . . . Holon, agent executes task and cooperates with other, distributed control
2219/33056 . . . Reinforcement learning, agent acts, receives reward, emotion, action selective
2219/33057 . . . If no module available to execute task, adapt module and execute task
2219/33058 . . . Low level element designed for reliability, not for speed, only small task
2219/33059 . . . High level competence, system action module sam, configuration and task modules
2219/33061 . . . Behaviour fusion, each layer can influence other by suppression or amplification
2219/33062 . . . Self repair
2219/33063 . . . Generic coordination, master agent to data manager agent to tasks to active agent
2219/33064 . . . Manufacturing planning and control agent and domain blackboards
2219/33065 . . . Ontogenetic learning, agent learns and adapt its own behaviour
2219/33066 . . . Phylogenetic learning, group agents learn and adapts their behaviour
2219/33067 . . . HCP help based cooperation protocol, when to ask or give help from or to agent
2219/33068 . . . CCP coordination cooperation protocol, make optimal decisions with other agents
2219/33069 . . . Immune algorithm, agent distinguishes self and foreign, lymphocyte, antibody agent
2219/33071 . . . Self sufficient, agent responsible for own energy, tools
2219/33072 . . . Two layer agent for execution of tasks and for communication, coordination
2219/33073 . . . Ion control agent has communication, database, suggestion, decision, action, detect
2219/33074 . . . Calculation loop, first one slow changing value, then several quick varying values
2219/33075 . . . Calculate only necessary, critical values, to speed up calculation
2219/33076 . . . Optimize time by parallel execution of independent blocks by two processors
2219/33077 . . . Calculation iterative, recursive
2219/33078 . . . Error table, interpolate between two stored values to correct error
2219/33079 . . . Table with functional, weighting coefficients, function
2219/33081 . . . Parallel computing, pipeline
2219/33082 . . . Data parallelism, one administrative process and many worker process
2219/33083 . . . Clock for microprocessor synchronized with pulses from encoder
2219/33084 . . . Clock for microprocessor synchronized with multiplexer
2219/33085 . . . Real time calendar clock
2219/33086 . . . Interrupt frequency as function of rating of servomotor or desired control frequency
2219/33087 . . . Two clock, clock for software counter and calender clock, synchronized
2219/33088 . . . Clock
2219/33089 . . . Two clock, one for sequence control, one for motion control, pulses
2219/33091 . . . Two clock, one for controller and one for calibration
2219/33092 . . . Using several selectable and settable dividers
2219/33093 . . . Real time clock interface between serial I-O and processor
2219/33094 . . . Send clock from pc board, via extension bus to PLL circuit on nc boards, to servo
2219/33095 . . . External clock delivers interrupts for real time execution of programs
2219/33096 . . . Use clock to control main spindle rotational speed
2219/33097 . . . Variable ticks, align clocks, to synchronise cycles with other machine, robot
2219/33098 . . . Several nc machines, dnc, cnc

2219/33099 . . . Computer numerical control [CNC]; Software control [SWC]
2219/33101 . . . Dnc, direct numerical control
2219/33102 . . . Dnc and cnc combined
2219/33103 . . . Object manager handles objects having own procedures, messages oop
2219/33104 . . . Tasks, functions are distributed over different cpu
2219/33105 . . . Identification of type of connected module, motor, panel
2219/33106 . . . Configure I-O by using logical and physical address
2219/33107 . . . Designate each actuator by a name and corresponding operations
2219/33108 . . . Exchange of type of controller is easy, before operation, adapt control to type
2219/33109 . . . Select out of plurality of alternative control parameters
2219/33111 . . . Graphic configuration control, connect pictures, objects to each other
2219/33112 . . . Configuration software for network
2219/33113 . . . Initialise each drive during start, load data to drive and image to controller
2219/33114 . . . Configure motion controller to drive any kind of motor type connected
2219/33115 . . . Group functions
2219/33116 . . . Configuration of motion control
2219/33117 . . . Define function by user programmable basic operations
2219/33118 . . . Identify bus, interface select automatic adaption for bus, interface
2219/33119 . . . Servo parameters in memory, configuration of control parameters
2219/33121 . . . Host loads program from attached module to control that module
2219/33122 . . . Adapt nc control to type of machine, read machine and measuring parameters
2219/33123 . . . Identify kind of transducer, encoder used
2219/33124 . . . Configuration of different kind of tool magazines, tool changers and buffers
2219/33125 . . . System configuration, reconfiguration, customization, automatic
2219/33126 . . . Identification of address connected module, processor
2219/33127 . . . Display each control parameter by name and its value
2219/33128 . . . Different spindles, axis controlled by configured paths, channel
2219/33129 . . . Group spindles, axis into motion groups, nc channel structure
2219/33131 . . . Synthesize programmable axis, to simulate a non existing, virtual axis
2219/33132 . . . Configured function disabled if concerned axis not referenced
2219/33133 . . . For each action define function for compensation, enter parameters
2219/33134 . . . Enter parameters for relationship between axis
2219/33135 . . . Data compression before sending data to allow control of more axis, spindles
2219/33136 . . . Com: communication, inter processor communication, either local or network
2219/33137 . . . Time left during polling used for other communication, priority for polling
2219/33138 . . . Control program and communication are totally separated
2219/33139 . . . Design of industrial communication system with expert system
2219/33141 . . . Communication system software module independent from medium, protocol, address
2219/33142 . . . Address switches on each controller, peripheral are set by operator
2219/33143 . . . Position of module in ring, loop determines address of module
2219/33144 . . . Module clock, synchronised by controller message, to send message in time slice
2219/33145 . . . Count clock pulses to determine address of node, module
2219/33146 . . . Each node occupies in address space a length equal to number of bits to be exchanged
2219/33147 . . . Address peripheral, controller
2219/33148 . . . CLS client server architecture, client consumes, server provides services
2219/33149 . . . Publisher subscriber, publisher, master broadcasts data to slaves, subscriber
2219/33151 . . . Distributed client server
2219/33152 . . . Server has organisation, tree data to access user data, client sends also both
2219/33153 . . . AR application relationship, cooperation through logical links
2219/33154 . . . Data exchange between processors of different axis of same or different cnc
2219/33155 . . . Communication between motor current controller and position controller
2219/33156 . . . Communication between two processors over shared, dualport ram
2219/33157 . . . Between processor and sensor, encoder
2219/33158 . . . Remote procedure call to each other
2219/33159 . . . Communication between acyclic and cyclic, loop programs
2219/33161 . . . Data exchange between controller and processors
2219/33162 . . . Two bus, high speed and low speed bus, linked or not
2219/33163 . . . Multichannel master bus
2219/33164 . . . Bus timing adjustment by buffer with controller
2219/33165 . . . Gpsc gpsl general purpose serial channel, link
2219/33166 . . . Rs485 bus to control several modules, motors
2219/33167 . . . Bus arbitration, switch computer to different memory
2219/33168 . . . Two bus, master bus and local servo bus
2219/33169 . . . Name of bus, vme-bus
2219/33171 . . . Stdbus
2219/33172 . . . Multibus
2219/33173 . . . Bitbus
2219/33174 . . . Sds smart distributed system, honeywell
2219/33175 . . . Isa bus
2219/33176 . . . Rs485, mpi multipoint, multidrop interface
2219/33177 . . . Interface, scsi, parallel
2219/33178 . . . Centronics
2219/33179 . . . Pcmcia
2219/33181 . . . Isdn
2219/33182 . . . Uart, serial datatransmission, modem
2219/33183 . . . IEEE-488, hp interface, instrumentation
2219/33184 . . . Rs232c to rs485 converter
2219/33185 . . . Rs232c switch box, break out box, to connect different devices

2219/33186 . . . Circuit for signal adaption, voltage level shift, filter noise
2219/33187 . . . Serial transmission rs232c, rs422, rs485 communication link
2219/33188 . . . Twisted pair
2219/33189 . . . Optical, glass fiber
2219/33191 . . . Data exchange combined with inductively coupled power supply
2219/33192 . . . Radio link, wireless
2219/33193 . . . Inductive transmission of measured values
2219/33194 . . . Data and power supplied over optical fiber
2219/33195 . . . Wave guide, also used as rails for movable station
2219/33196 . . . Data and power each on a different line to all peripheral, bus
2219/33197 . . . Current loop 4-20-mA milliampere
2219/33198 . . . Laser, light link, infrared
2219/33199 . . . Transponder
2219/33201 . . . Twisted pair combined with optical fiber for critical emc zones
2219/33202 . . . Single serial line, virtual second line is earth
2219/33203 . . . Wireless transmission of power and data, inductively, rotary transformer
2219/33204 . . . Optocoupler, galvanic separation, isolation
2219/33205 . . . Coax or optical fiber or twisted pair
2219/33206 . . . Ultrasonic
2219/33207 . . . Physical means, radio, infra red, ultrasonic, inductive link
2219/33208 . . . Superposition of control signals on supply lines
2219/33209 . . . Protocol, mailbox, email, mail system
2219/33211 . . . Polling
2219/33212 . . . Processor for communication with, evaluation of signals form detector to pc
2219/33213 . . . Communication cpu to synchronize axis between different machines
2219/33214 . . . Bus between different axis controllers and cpu
2219/33215 . . . Synchronization pulses on bus for axis controllers
2219/33216 . . . Operational, real time for system, and service for configuration is non real time
2219/33217 . . . Continuity communication controlled by client
2219/33218 . . . Motor encoders, resolvers on common bus with drives, servo controllers
2219/33219 . . . Drives, servo units, main control on internal net, lan, ethernet, tcp-ip, wireless
2219/33221 . . . Drives, servo units, sensors, motors, on local network, ethernet, tcp-ip, wireless
2219/33222 . . . High speed serial link combined with medium speed serial link
2219/33223 . . . Serial ring, loop pam programmable axis manager
2219/33224 . . . Several serial channels, each provided with d-a to terminals of servomotor
2219/33225 . . . Interface nc machine to data server
2219/33226 . . . Daisy chain
2219/33227 . . . Safety, echo back to verify correctness message
2219/33228 . . . Detection of line failure, breakage of transmission, failure of receiver
2219/33229 . . . Differential amplifier, xor to cancel noise, balanced rs422
2219/33231 . . . Decoupling, to avoid noise, crosstalk between wires of bus
2219/33232 . . . Detect, respond to lost message
2219/33233 . . . If servo data corrupt, use previous value, no repeat
2219/33234 . . . Detect bad data transfer
2219/33235 . . . Redundant communication channels, processors and signal processing hardware
2219/33236 . . . Add check data to message to check faulty communication
2219/33237 . . . Detect short circuit of bus
2219/33238 . . . Switch from differential to single line communication if short between two wires
2219/33239 . . . Switch off, stop, halt transmission on detection of fault
2219/33241 . . . Compare results from two masters on two busses, if not equal shut down machines
2219/33242 . . . Watchdog for datacommunication, on error switch off supply to bus modules
2219/33243 . . . Detect quality of received data, message
2219/33244 . . . Packet information exchange
2219/33245 . . . Autosend, send information from cad station automatically to peripheral
2219/33246 . . . Timing of transmission data to peripheral
2219/33247 . . . Synchronize transfer, take over, change of parameters and reference values
2219/33248 . . . Time window for each controller or controlled function
2219/33249 . . . Compress, pack data before transmission
2219/33251 . . . Schedule periodic and aperiodic traffic, real time, time critical
2219/33252 . . . Real time synchronous transmission, model
2219/33253 . . . Correction data transmission errors, protection against noise, twisted pair
2219/33254 . . . Serial position feedback, serial to parallel conversion and reverse
2219/33255 . . . Transfer of data parallel
2219/33256 . . . Resolver to digital conversion
2219/33257 . . . Conversion of designed 3-D tolerance, allowance to real coordinates of machine
2219/33258 . . . Common coordinate conversion for multiple heads, spindles
2219/33259 . . . Conversion of measuring robot coordinates to workpiece coordinates
2219/33261 . . . Conversion of detected pulses to voltage, frequency to voltage convertor
2219/33262 . . . Current to voltage conversion
2219/33263 . . . Conversion, transformation of coordinates, cartesian or polar
2219/33264 . . . Conversion of angle between links to linear displacement of actuator
2219/33265 . . . Conversion of voltage, resistance to pulses
2219/33266 . . . Pulse to frequency conversion, frequency to pulse
2219/33267 . . . Pneumatic, air to hydraulic conversion
2219/33268 . . . D-A, A-D
2219/33269 . . . Convert cartesian to machine coordinates
2219/33271 . . . Convert workpiece to machine coordinates
2219/33272 . . . Conversion, transformation of data before and after interpolator
2219/33273 . . . DCS distributed, decentralised controlsystem, multiprocessor
2219/33274 . . . Integrated communication and control, transmission delay, sampling rate effect
2219/33275 . . . Distributed, decision made by negotiation among executive components, execute it

2219/33276 . . . Decentralized, each component makes own decision, executes only own decision
2219/33277 . . . Distributed system with host as leader, host with multiple of agents
2219/33278 . . . Cooperation between autonomous modules by receipts, messages, no synchronisation
2219/33279 . . . Expansion by using secondary access to each module, extension module
2219/33281 . . . Archictecture, nodes for communication and measuring on serial bus
2219/33282 . . . Node with communication, transducer, common core, application specific modules
2219/33283 . . . Customized nodes for desired functionality
2219/33284 . . . Remote diagnostic
2219/33285 . . . Diagnostic
2219/33286 . . . Test, simulation analysator
2219/33287 . . . Program panel to program, enter data for diagnostic
2219/33288 . . . Switch, select between normal and diagnostic control program
2219/33289 . . . During diagnostic of servocontroller, motor is isolated
2219/33291 . . . Logic analyser function of cnc
2219/33292 . . . Storage oscilloscope function of cnc to diagnose servo drive, axis oscilloscope
2219/33293 . . . For each actuated axis, set a bit in a word in memory, state of axis in word
2219/33294 . . . Nc in case of propagation error, search previous module, origin of error
2219/33295 . . . Fuzzy expert system for diagnostic, monitoring
2219/33296 . . . ANN for diagnostic, monitoring
2219/33297 . . . Diagnostic, test, debug
2219/33298 . . . Remote videoconferencing
2219/33299 . . . Real time, online diagnostic, integrated in normal control system
2219/33301 . . . Simulation during machining
2219/33302 . . . Different sets of monitoring parameters for each operation mode
2219/33303 . . . Expert system for diagnostic, monitoring use of tree and probability
2219/33304 . . . Display of diagnostic
2219/33305 . . . Display of relevant errors together with time mark
2219/33306 . . . Configuration file to set how data will be displayed
2219/33307 . . . On error, failure, fault automatically search and dial maintenance person
2219/33308 . . . If error message not clear, search help by index of message vocabulary
2219/33309 . . . Error recovery, automated error recovery
2219/33311 . . . System code for error recovery
2219/33312 . . . Operator selects action, system stores state, zero based error state
2219/33313 . . . Frames, database with environment and action, relate error to correction action
2219/33314 . . . Failure reason analysis, simple strategy or multiple outcome analysis
2219/33315 . . . Failure detection and reconfiguration
2219/33316 . . . On the fly software replacement on error
2219/33317 . . . Alternative strategy driver revises control behaviour
2219/33318 . . . Knowledge acquisition
2219/33319 . . . Interference justification network
2219/33321 . . . Observation learning
2219/33322 . . . Failure driven learning
2219/33323 . . . Self diagnostic of boards, own test program
2219/33324 . . . What to diagnose, whole system, test, simulate
2219/33325 . . . Diagnostic of only machining, operation
2219/33326 . . . Analyzer, diagnostic for servovalve
2219/33327 . . . Self diagnostic of control system, servo system
2219/33328 . . . Diagnostic for bus system of computer
2219/33329 . . . Measuring system, encoder
2219/33331 . . . Test, diagnostic of field device for correct device, correct parameters
2219/33332 . . . Each processor can execute all programs
2219/33333 . . . Network multiprocessing
2219/33334 . . . Load balancing, distribution between processors
2219/33335 . . . Microprocessor for max 3-D control otherwise host takes over for more axis
2219/33336 . . . first dsp calculates commands for each motor, second dsp regulates position
2219/33337 . . . For each axis a processor, microprocessor
2219/33338 . . . DNC distributed, decentralised nc, concurrent, multiprocessing
2219/33339 . . . Controller with lowest operation rate is selected as master
2219/33341 . . . Peer to peer, change master if overloaded
2219/33342 . . . Master slave, supervisor, front end and slave processor, hierarchical structure
2219/33343 . . . Each slave stores communication program to be used by master, exchangeability
2219/33344 . . . Each slave has several processors operating in parallel
2219/33345 . . . Several master modules, connection modules and slave modules
2219/33346 . . . Only memory of master module stores all position programs of slaves
2219/33347 . . . Master sends servo address, speed, kind of interpolation to slave
2219/33348 . . . Processor adapts signals to connected display
2219/34 . . Director, elements to supervisory
2219/34001 . . . PLL phase locked loop
2219/34002 . . . Analog multiplexer
2219/34003 . . . Tri state driver
2219/34004 . . . Shift register
2219/34005 . . . Motion control chip, contains digital filter as control compensator
2219/34006 . . . Fifo
2219/34007 . . . Neuromine, input pulse train, can be inhibited or excited, output TTL, neuron
2219/34008 . . . Asic application specific integrated circuit, single chip microcontroller
2219/34009 . . . Coprocessor
2219/34011 . . . MMU
2219/34012 . . . Smart, intelligent I-O coprocessor, programmable sensor interface
2219/34013 . . . Servocontroller
2219/34014 . . . Sample hold circuit
2219/34015 . . . Axis controller
2219/34016 . . . Pulse processor
2219/34017 . . . Vector processor
2219/34018 . . . Forth controller
2219/34019 . . . Array of processors, parallel computing
2219/34021 . . . Dssp digital sensor signal processor

2219/34022 . . . Dcasp digital controlled analog signal processor
2219/34023 . . . Risc processor
2219/34024 . . . Fpga fieldprogrammable gate arrays
2219/34025 . . . Polynomial analysis
2219/34026 . . . Pga programmable gate array
2219/34027 . . . Dual servo controller, for two motors
2219/34028 . . . Hold relay
2219/34029 . . . Pam programmable axis controller, to control large number of axis
2219/34031 . . . Synchronous detector
2219/34032 . . . Asic and microcontroller cooperate
2219/34033 . . . Control processor and signal processor cooperate
2219/34034 . . . Multiplier, prm, brm
2219/34035 . . . Time relay
2219/34036 . . . Saturable reactor
2219/34037 . . . Brm followed by postprocessor to smooth curve
2219/34038 . . . Web, http, ftp, internet, intranet server
2219/34039 . . . Access central database through internet
2219/34041 . . . Dda
2219/34042 . . . Filter
2219/34043 . . . Delay line
2219/34044 . . . Mathematical coprocessor - processor
2219/34045 . . . Timer
2219/34046 . . . Analog multiplier
2219/34047 . . . Dsp digital signal processor
2219/34048 . . . Fourier transformation, analysis, fft
2219/34049 . . . Adder
2219/34051 . . . Bcd
2219/34052 . . . Software counter
2219/34053 . . . Counters, tellers
2219/34054 . . . Half serial half parallel
2219/34055 . . . Correction 3-excesscode
2219/34056 . . . Nine complement
2219/34057 . . . Complement
2219/34058 . . . Up-down
2219/34059 . . . Preset counter
2219/34061 . . . One counter per axis to unload cpu
2219/34062 . . . Comparator
2219/34063 . . . Bcd
2219/34064 . . . N+1 comparator
2219/34065 . . . Fuzzy logic, controller
2219/34066 . . . Fuzzy neural, neuro fuzzy network
2219/34067 . . . Multilayer fuzzy controller, execution and supervisor layer
2219/34068 . . . Fuzzy neural petri controller
2219/34069 . . . Shared memory
2219/34071 . . . Content addressable memory
2219/34072 . . . Non volatile memory, core memory
2219/34073 . . . Backup battery
2219/34074 . . . Associative memory
2219/34075 . . . Cognitive memory
2219/34076 . . . Shared, common or dual port memory, ram
2219/34077 . . . Fuzzy, rules are function of material, tool used
2219/34078 . . . Membership functions as parameters for shape pattern
2219/34079 . . . Extract only rules needed to obtain result
2219/34081 . . . Fuzzy art map neural network, one art for input map, lookup table, other for output
2219/34082 . . . Learning, online reinforcement learning
2219/34083 . . . Interpolation general
2219/34084 . . . Software interpolator using microprocessor
2219/34085 . . . Software interpolator
2219/34086 . . . At fixed periods pulses from table drive plural axis in unison
2219/34087 . . . Enter at fixed periods distances in counter for each axis, pulse distribution
2219/34088 . . . Chamfer, corner shape calculation
2219/34089 . . . Parametric, polynomial representation of path per axis as function of time
2219/34091 . . . Interpolate backwards
2219/34092 . . . Polar interpolation
2219/34093 . . . Real time toolpath generation, no need for large memory to store values
2219/34094 . . . Library with different kind of interpolation curves
2219/34095 . . . Look ahead segment calculation
2219/34096 . . . Approximate, replace curve, surface with circle, linear segments, least error
2219/34097 . . . Calculate movement from part program offline, calculate axis references online
2219/34098 . . . Slope fitting, fairing contour, curve fitting, transition
2219/34099 . . . Extrapolation
2219/34101 . . . Data compression, look ahead segment calculation, max segment lenght
2219/34102 . . . OCI on line interpolation
2219/34103 . . . Taking planar slices from a 3-D shape
2219/34104 . . . Postprocessor coarse fine
2219/34105 . . . Area pocket machining, space filling curve, to cover whole surface
2219/34106 . . . Using spiral collapsed boundary, contour parallel machining
2219/34107 . . . Zigzag workpiece parallel sweeps, direction parallel machining
2219/34108 . . . Using zigzag isoparametric parallel sweeps
2219/34109 . . . Using spiral scaled boundary
2219/34111 . . . Using hilbert curves, fractals, only visible points of patches taken
2219/34112 . . . TSP traveling sales problem, SOM self organizing map for tool path
2219/34113 . . . Determine centerline, medial axis and branches in shape
2219/34114 . . . Construct concentric polygons
2219/34115 . . . Area, pocket machining for area with partially open boundary
2219/34116 . . . Machine workpiece along, parallel to smallest side, dimension
2219/34117 . . . Machine workpiece along, parallel to largest dimension
2219/34118 . . . Using a pseudo-random or random tool path
2219/34119 . . . Function generator, filter after interpolator to control position error
2219/34121 . . . Edge generator
2219/34122 . . . Function, profile generator
2219/34123 . . . Sine cosine generator
2219/34124 . . . Cordic processing
2219/34125 . . . Sum squares
2219/34126 . . . Overloop of counted axis pulses to servo
2219/34127 . . . Brm followed by postprocessor to smooth curve
2219/34128 . . . General surface replaced by sphere, cylinder, toroid, calculate quickly

2219/34129 . . . Approximation for calculation
2219/34131 . . . Split in approximation and accurate calculation
2219/34132 . . . Choosing largest, major coordinate axis
2219/34133 . . . Choosing slowest axis
2219/34134 . . . Choose optimal coordinate system
2219/34135 . . . Spline
2219/34136 . . . Ellipse, hyperbola
2219/34137 . . . Helicoidal
2219/34138 . . . Cubic interpolation
2219/34139 . . . Parabolic interpolation
2219/34141 . . . B-spline, NURBS non uniform rational b-spline
2219/34142 . . . Polynomial
2219/34143 . . . Approximate corner by polynomial
2219/34144 . . . Involute, evolute
2219/34145 . . . Bezier interpolation, spline
2219/34146 . . . Helical, spiral interpolation
2219/34147 . . . Epitrochoid
2219/34148 . . . Coons interpolation, patch
2219/34149 . . . Circular interpolation
2219/34151 . . . Analog
2219/34152 . . . Circular interpolation in space, on arbitrary planes
2219/34153 . . . Linear interpolation
2219/34154 . . . Analog
2219/34155 . . . Third degree
2219/34156 . . . Slope control, delta x, y proportional to x, y
2219/34157 . . . Synchronize interpolation of different axis boards, simultaneous start
2219/34158 . . . Tangents form curve
2219/34159 . . . Delta theta
2219/34161 . . . Superposition curves, combine xy slides with other xy or polar slides
2219/34162 . . . Linear in one axis, circular in other axis
2219/34163 . . . Rotate a segment
2219/34164 . . . Superposition manual control pulses on motion control pulses
2219/34165 . . . 4-D via 2-D+2-D
2219/34166 . . . Select between rectangular and polar controller, interpolator
2219/34167 . . . Coarse fine, macro microinterpolation, preprocessor
2219/34168 . . . External interpolation
2219/34169 . . . Coarse interpolator, path calculator delivers position, speed, acceleration blocks
2219/34171 . . . Generate polynomial fitting in tolerance zone around polygon
2219/34172 . . . Of the two or three axis, only one or two are controlled as function of tangent to other axis, plane
2219/34173 . . . Switch between involute, circular and linear interpolation
2219/34174 . . . Rotate segment over a certain angle
2219/34175 . . . Overlap, between two blocks, continuous, smooth speed change, movement
2219/34176 . . . Block segments, find next point on next segment by cross point circle and segment
2219/34177 . . . Calculate for different inclined segments stitch points evenly distributed
2219/34178 . . . Simulated pulse for better resolution
2219/34179 . . . Variable interpolation speed or resolution
2219/34181 . . . Adapt resolution as function of machining load, in corner, to keep constant surface speed
2219/34182 . . . Variable resolution
2219/34183 . . . Window path, contour of rectangle
2219/34184 . . . Straight cut
2219/34185 . . . Following line+circle
2219/34186 . . . Degree line
2219/34187 . . . Any angle, slope
2219/34188 . . . Safety, stop, slowdown interpolator if speed, position, torque error too large
2219/34189 . . . On each axis, for each block, a software limit switch, for safe slow down
2219/34191 . . . Pneumatic
2219/34192 . . . Memory management
2219/34193 . . . Memory refresh
2219/34194 . . . Bank switching, ping-pong memory for communication between processors
2219/34195 . . . Part program in consecutive memory blocks, each with spare space for corrections
2219/34196 . . . Memory management, dma direct memory access
2219/34197 . . . Search blank memory space to load program, storage, memory allocation
2219/34198 . . . Electric and fluidic modules integrated on one substrate
2219/34199 . . . Module with low maintenance connected to removable module with high maintenance
2219/34201 . . . Each module uses functions of a real time kernel
2219/34202 . . . Reusable software, generic resource model library
2219/34203 . . . Module has a general, high level and a specific, proprietary part
2219/34204 . . . Independent units, stackthrough in cabinet, no backplane
2219/34205 . . . Modular construction, plug-in module, lsi module
2219/34206 . . . Motion controller independent from nc, lmc local motor controller
2219/34207 . . . Array vlsi processor
2219/34208 . . . Motion controller
2219/34209 . . . Microprocessor only for display
2219/34211 . . . Microprocessor only for hand control
2219/34212 . . . Microprocessor only for mdi, control panel
2219/34213 . . . Same microprocessor for data input and for servocontrol
2219/34214 . . . I-apx-432 processor
2219/34215 . . . Microprocessor
2219/34216 . . . Programmable motion controller
2219/34217 . . . Microprocessor with build in pwm
2219/34218 . . . Transputer
2219/34219 . . . Special interface, peripheral to motor
2219/34221 . . . Computer delivers control pulses from table directly to motors
2219/34222 . . . Computer sends displacement and selected device to output register
2219/34223 . . . Combined input output module, single module
2219/34224 . . . Select appropriate interface, according to kind of tool or other detection
2219/34225 . . . Interface board for measuring system, for resolver, encoder or interferometer
2219/34226 . . . Select address of motor, control serial switches in power supply ring
2219/34227 . . . Alterable connector board between controller and machine

2219/34228 . . . Counter takes over measuring and pwm task from microprocessor
2219/34229 . . . SIU serial interface unit takes over communication task from microprocessor
2219/34231 . . . Interface controls either DC, AC or step motors
2219/34232 . . . Test with microcomputer self
2219/34233 . . . Multiplexed subsystem stores state of controlling microprocessor on switch off
2219/34234 . . . Each subsystem has own interrupt which is switched on during multiplex
2219/34235 . . . Control order of multiplexed axis
2219/34236 . . . Multiplex for servos, actuators
2219/34237 . . . Multiplexed d-a a-d
2219/34238 . . . Hydraulic multiplexer
2219/34239 . . . Multiplex for whole system
2219/34241 . . . For reading data only
2219/34242 . . . For measurement only
2219/34243 . . . Single feedback sensor, transducer for plurality, one at a time, driven tools
2219/34244 . . . Multiplex for control only
2219/34245 . . . Address several motors, each with its own identification
2219/34246 . . . OOC object oriented control
2219/34247 . . . Machining objects are hierarchically organised
2219/34248 . . . Machining object comprises a slide, a palet, workpieces, machining, a contour
2219/34249 . . . Sub divide machining object in machining groups, geometry, start point, special
2219/34251 . . . Cnc works with different operating systems, windows, os-2, vms in parallel
2219/34252 . . . OSY operating system
2219/34253 . . . Unix
2219/34254 . . . Operating system controls selection and execution of program modules
2219/34255 . . . Msdos
2219/34256 . . . Api application programming interface
2219/34257 . . . OS-2
2219/34258 . . . Real time system, qnx, works together with non real time system, windows nt
2219/34259 . . . Common language run time CLR, MS-NET, DOTNET, java run time environment
2219/34261 . . . Windows, microsoft windows
2219/34262 . . . DDE direct data exchange, DLL dynamic library linking
2219/34263 . . . OLE object linking and embedding, OPC ole for process control
2219/34264 . . . Odbc open database connectivity
2219/34265 . . . Windows nt, windows-2000
2219/34266 . . . Windows-95
2219/34267 . . . Windows nt and cooperating real time extension
2219/34268 . . . Cnc and pic controlled alternately by same processor, using timer
2219/34269 . . . Programmable computer controller, plc implemented with pc
2219/34271 . . . Nc integrated into pic, plc, combination of commands
2219/34272 . . . Communication pc and nc, pic over file system of pc, direct access pc to nc, pic
2219/34273 . . . Pc and plc and nc integrated, pcnc concept
2219/34274 . . . Connect pc card to industrial bus, with additional timing and adapting logic
2219/34275 . . . Windows file server to control pc hosted boards under ms windows
2219/34276 . . . Pc has priority over cnc controller
2219/34277 . . . Pc bypasses robot controller processor, access directly encoders, amplifiers
2219/34278 . . . Motion control board, card, in pc
2219/34279 . . . Pc, personal computer as controller
2219/34281 . . . Osaca open system architecture for control in automation, umc universal machine control
2219/34282 . . . Using special api's allowing user access to control machine, motion, servo
2219/34283 . . . Using windows nt for general control and real time unix for motion, plc control
2219/34284 . . . Using an operator console and a motion chassis connected by network
2219/34285 . . . Open system architecture, in general
2219/34286 . . . Intelligent positioning I-O
2219/34287 . . . Plc and motion controller combined
2219/34288 . . . Plc as main controller for cnc
2219/34289 . . . Plc as motion controller combined and plc for work type dependant data, parameter
2219/34291 . . . Programmable interface, pic, plc
2219/34292 . . . Filtering noise I-O
2219/34293 . . . Image table
2219/34294 . . . Diagnostic, locate failures
2219/34295 . . . System, logic analyser, simulation
2219/34296 . . . Level conversion
2219/34297 . . . Analog input, comparator delivers interrupt
2219/34298 . . . Custom window between pic, plc and nc, programmable adapter
2219/34299 . . . Memory with I-O and pointer, external I-O with map, edit map, pointer to adapt I-O
2219/34301 . . . Nc system has direct access to I-O of pic, plc
2219/34302 . . . Plc controls movement via nc, no direct interface to servo
2219/34303 . . . PNC is plc, pic and nc cooperation
2219/34304 . . . Pc as input, edit device for plc
2219/34305 . . . Connect, disconnect host computer by sleep command from local pc
2219/34306 . . . Power down, energy saving
2219/34307 . . . On nc power on or off, synchronize power on or off of displays with own supply
2219/34308 . . . Power supply sets relay switch, allows push button or automatic switch on off nc
2219/34309 . . . Dual power supply, for digital circuit and for analog signals
2219/34311 . . . Energy saving by recuperating braking, deceleration energy
2219/34312 . . . Power supply for servo delivered by, derived from 4-20-mA current loop
2219/34313 . . . Power supply for communication delivered by, derived from 4-20-mA current loop
2219/34314 . . . Slow down, limit speed for energy saving
2219/34315 . . . Power supply turning on or shutting off
2219/34316 . . . Install nc system, check voltages, power supply with incorporated a-d
2219/34317 . . . Execute same program on different machines by differently addressing axis
2219/34318 . . . Verify if workpiece is already machined, by its weight
2219/34319 . . . Sequence as function of nc controlled axis position, axis zone
2219/34321 . . . Database for control of a single machine

2219/34322 . . . Intitialize execution program at reference position on workpiece
2219/34323 . . . Commanding different axis in sequential order as function of direction of movement
2219/34324 . . . Switch some axis over to manual control, while other stay automatic
2219/34325 . . . Speed up, optimize execution by combining instructions belonging together
2219/34326 . . . Program controls two operations simultaneously in opposite directions
2219/34327 . . . Modify, adapt system response to signals from process
2219/34328 . . . Cueing commands table
2219/34329 . . . Generate extended plc program during machining, execution of nc program
2219/34331 . . . First processor filters instructions for indexing only, all other instructions for second controller
2219/34332 . . . Program execution as function of direction, forward or backward
2219/34333 . . . Multi threading
2219/34334 . . . Scalability
2219/34335 . . . First look ahead for acyclic execution, followed by cyclic execution
2219/34336 . . . Avoid deadlock, lock-up
2219/34337 . . . Manual to automatic, tracer
2219/34338 . . . Execute control tasks, programs as well as user, application programs
2219/34339 . . . Single step execution of program
2219/34341 . . . Choose between electronic cam or time-dependent as function of required machining accuracy
2219/34342 . . . Matching closest patterns stored in database with actual components
2219/34343 . . . Generation of electronic cam data from nc program
2219/34344 . . . Standby commands, let proces wait while program controls other process
2219/34345 . . . Database for sequential control of several machines by messages
2219/34346 . . . User program fetches part of system program when flags are set and detected
2219/34347 . . . Execute auxiliary function, tool change, while concurrent machining
2219/34348 . . . Coordination of operations, different machines, robots execute different tasks
2219/34349 . . . Proper allocation of control components to the required task
2219/34351 . . . Knowledge acquisition of environment
2219/34352 . . . Explore discrete event properties, reliability, parallelism, availability
2219/34353 . . . Independent positioning motor controlled by microprocessor only if event, limit, pulse passed
2219/34354 . . . DES discrete event system, deds discrete event dynamic system
2219/34355 . . . List of failure events, list of actions, events, trigger actions
2219/34356 . . . Compensation variable interrupt execution delay, interrupt jitter
2219/34357 . . . Interrupt driven message passing network
2219/34358 . . . Interrupt changed to uninterruptable interrupt
2219/34359 . . . Real time based interrupt to control axis, other function
2219/34361 . . . Mask for interrupts, inhibit during more important tasks
2219/34362 . . . Sampling interrupt is product of integer times scheduler interrupt
2219/34363 . . . Encoder generates interrupt to synchronize closed loop
2219/34364 . . . Delay interpolation interrupt as function of machining rates and feeds of machine groups
2219/34365 . . . After interrupt of operation, do other task and go on - resume operation
2219/34366 . . . Interpolation interrupt so as to avoid fractions of command pulses
2219/34367 . . . Interrupts, different tasks foreground, midground, background
2219/34368 . . . Priority
2219/34369 . . . Cause of interrupt is sensor and actuator failure
2219/34371 . . . Abrupt change in system dynamics
2219/34372 . . . Inability to process, execute assigned task within allocated time interval
2219/34373 . . . Actuator overloading
2219/34374 . . . False alarm states
2219/34375 . . . Generate interrupt after a certain number of position, counter pulses
2219/34376 . . . Management nc programs, files
2219/34377 . . . Selection out of several databases according to workpiece or conditions
2219/34378 . . . Erase plural programs in a single operation
2219/34379 . . . Job management
2219/34381 . . . Multitasking
2219/34382 . . . Preemptive multitasking, cpu decides upon priority scheme, which task to start
2219/34383 . . . Dynamic preemptive, special event register manages time slices for applications
2219/34384 . . . Execute next block after predetermined time
2219/34385 . . . Execute next block if largest axis distance is reached
2219/34386 . . . Advance program without M function completion signal
2219/34387 . . . Delay command as function of speed
2219/34388 . . . Detect correct moment, position, advanced, delayed, then next command
2219/34389 . . . After rough plunge grinding, initiate backoff grinding as function of delay wheel position
2219/34391 . . . Synchronize axis movement and tool action, delay action, simulation inertia
2219/34392 . . . Stop program on detection of undefined variable, symbol, enter definition, continue
2219/34393 . . . Stop program if needed workpiece, tool or data lacks, misses
2219/34394 . . . Execute a certain number of program blocks and stop
2219/34395 . . . Synchronize between panel and control
2219/34396 . . . Control different groups of functions, commands simultaneously, synchronized
2219/34397 . . . Synchronize manipulators and machine by using a reference clock for all
2219/34398 . . . Channel stops and waits for marker until other channel puts that marker
2219/34399 . . . Switch between synchronous and asynchronous mode of controllers
2219/34401 . . . Synchronize position controller drive with interpolator

2219/34402 . . . Synchronize programs for machines, processes, tasks, if one stops other also
2219/34403 . . . RTI real time, kernel, processing
2219/34404 . . . Allocate storage, memory in each processor for a copy of needed data
2219/34405 . . . Switch register banks, each storing process states, for quick real time execution
2219/34406 . . . Effect of computer, communication delay in real time control
2219/34407 . . . Calculate elapsed time, store in counter, start task when time elapsed
2219/34408 . . . Design real time control system
2219/34409 . . . RNOS real time networked operating system
2219/34411 . . . Handling time critical and time non critical program sequences
2219/34412 . . . Mark some sequences of time non critical sequences as locked, non interruptable
2219/34413 . . . Add time stamp to command message
2219/34414 . . . Maximize utilisation workstation
2219/34415 . . . Execute urgent jobs quickly
2219/34416 . . . Examine, analyse sensor data for co-exclusion sets, memorize, correlate actions
2219/34417 . . . Multiprocessor scheduling
2219/34418 . . . Scheduler for sequential control, task planning, control sequence
2219/34419 . . . Structure of control system
2219/34421 . . . Termination for each device, enables easy insertion, connection or disconnection
2219/34422 . . . SBC single board computer
2219/34423 . . . Optical isolation, galvanic isolation
2219/34424 . . . Data flow architecture
2219/34425 . . . Same microprocessor for programming and for machine control
2219/34426 . . . Same hardware, servo controller for different control modes
2219/34427 . . . Diagnostic, monitoring incorporated in controller
2219/34428 . . . LSI
2219/34429 . . . Servo controller near main cpu but remote from servomotor, integrated in cnc
2219/34431 . . . Main uninterruptable servo loop processor and interruptable servo event processor
2219/34432 . . . Speed and current control integrated into nc control system
2219/34433 . . . Multitask processor controls real time processor via communication memory
2219/34434 . . . Separate power controller for drive, servodrive, one per axis, connected to cnc
2219/34435 . . . Position encoder and motor connection in one interface between motor and microprocessor
2219/34436 . . . Interface circuit build into connector, dongle
2219/34437 . . . Parallel processing of functions, each layer has own sample rate
2219/34438 . . . Panel connected to nc by means of switch matrixes
2219/34439 . . . One cable between controller and amplifier, two between amplifier and motor
2219/34441 . . . Common communication interface for panel and remote I-O
2219/34442 . . . Control unit serves also to match drive motor to power supply
2219/34443 . . . Sensors and actuator integrated into tool
2219/34444 . . . Web control system, with intelligent control components each with web server
2219/34445 . . . Several power modules for same actuator, motor
2219/34446 . . . No change of operation mode when slave axis is out of synchronisation
2219/34447 . . . A microprocessor for programming and a microprocessor for control execution of program
2219/34448 . . . Integrated servo control circuit fixed to housing, remote from cpu
2219/34449 . . . Fault tolerant control, task from one microprocessor can be done by other
2219/34451 . . . False alarm states evaluation, threshold to verify correctness alarm
2219/34452 . . . Synchronize control with pulse, if loss, excess, error, then stop
2219/34453 . . . Stop spreading, propagation failure through system, inhibit drivers defect boards
2219/34454 . . . Check functioning controller, cpu or program
2219/34455 . . . Different parameters are evaluated to indicate different faults
2219/34456 . . . Authorize control of machine, robot if control panel has been connected
2219/34457 . . . Emit alarm signal
2219/34458 . . . Inhibit start or related control switches if path boundary is outside limits
2219/34459 . . . Plausibility check on connection of module, control unit to machine
2219/34461 . . . Inhibit access to area if dangerous, cover taken off
2219/34462 . . . Interlock, stop motor if microprocessor starts interrupt, because no watchdog pulse from microprocessor
2219/34463 . . . Alarm canceled automatically when program corrected
2219/34464 . . . Adaptive threshold, level for alarm, eliminate false alarm
2219/34465 . . . Safety, control of correct operation, abnormal states
2219/34466 . . . Bad circuits, watchdog, alarm, indication
2219/34467 . . . Try again program
2219/34468 . . . Check memory by storing beforehand complement of expected result
2219/34469 . . . Normally messages over network, if failure, messages from operator over I-O
2219/34471 . . . Program memory is inhibited, not accessible as long as power fails
2219/34472 . . . Configure alterable memory as read only, to avoid erasing
2219/34473 . . . Inhibit control until control lever is first set to neutral position
2219/34474 . . . Sense voltage drop of system, shut down servo
2219/34475 . . . Detect abnormality of control system without inverted model, using input command
2219/34476 . . . Local control predicts next command data from past stored data if host control fails
2219/34477 . . . Fault prediction, analyzing signal trends
2219/34478 . . . Urgent safety signals treated with hardware; others with software
2219/34479 . . . Flush enclosure of circuit with air, keep clean air over pressure
2219/34481 . . . EFC explosion free control, intrinsically safe

2219/34482 . . . Redundancy, processors watch each other for correctness
2219/34483 . . . Monitor absolute position independently by two processors, if out of range
2219/34484 . . . Use dual channels
2219/34485 . . . Same functioncode, program is fully used in normal and abnormal case
2219/34486 . . . Monitor axis movement, speed, independently by two processors, if out of range
2219/34487 . . . Redundant diagnostic controllers watch redundant process controllers
2219/34488 . . . One computer, controller replaces other, backup computer
2219/34489 . . . Watchdog with adaptive timeout as function of speed of motor
2219/34491 . . . Count certain number of faults before delivering alarm or stop
2219/34492 . . . Time out, decide only after a lapse, period of time
2219/34493 . . . Supervision, display diagnostic, use or select between different stored screen
2219/34494 . . . Display machining time and real time clock to control machining time
2219/35 . . Nc in input of data, input till input file format
2219/35001 . . . Data input, data handling, programming, monitoring of nc
2219/35002 . . . Parametric machine control, direct control from cad data, no nc data
2219/35003 . . . Kad kam knowledge aided design, knowledge aided manufacturing
2219/35004 . . . Mechanical design and electronic design integrated
2219/35005 . . . Sheet metal cad
2219/35006 . . . Object oriented design
2219/35007 . . . Cad makes template of tool as function of spindle, machine tool and set on spindle
2219/35008 . . . Www cad, world wide design and manufacturing
2219/35009 . . . Dynamic simulation
2219/35011 . . . Use of spreadsheet
2219/35012 . . . Cad cam
2219/35013 . . . Define workpiece, dimension from characteristics, strength, performance
2219/35014 . . . From design, calculate additional parameters, for strength
2219/35015 . . . Calculate production compensation, heat shrinkage, overetching
2219/35016 . . . Analyse model, decide on number of sections to take
2219/35017 . . . Finite elements analysis, finite elements method FEM
2219/35018 . . . Determining bending die radius from part data, estimated radius and calculation
2219/35019 . . . From product constraints select optimum process out of plurality of DTM means
2219/35021 . . . Identify object characteristics, elasticity, density, hardness and select material
2219/35022 . . . Calculate gear dimensions, tooth surfaces for optimum contact
2219/35023 . . . Constraint based modeling, keep relationships between elements
2219/35024 . . . Incremental constraint solving, constraints are handled in sequence
2219/35025 . . . Design and manufacture jig
2219/35026 . . . Design of machine tool, of cnc machine
2219/35027 . . . Design for assembly DFA, ease of object assembly
2219/35028 . . . Adapt design as function of manufacturing merits, features, for manufacturing, DFM
2219/35029 . . . Design of modular control system
2219/35031 . . . Redesign, use former design
2219/35032 . . . Check correctness, violation of design, rule check
2219/35033 . . . Reliability by design, error free object
2219/35034 . . . Adapt design to customer feedback
2219/35035 . . . Design gear, tooth surfaces
2219/35036 . . . Correct model by comparing 3-D measured data of modified workpiece with original model
2219/35037 . . . Use medial axis transformation to decompose a domain, limits combinations
2219/35038 . . . Combine, superpose model, foot data with style data
2219/35039 . . . Model for analysis of workpiece displacement due to clamping, fixture
2219/35041 . . . Genetic algorithm for selforganizing designs
2219/35042 . . . Add finishing allowances to a cutter path
2219/35043 . . . Tool, fixture design
2219/35044 . . . Tool, design of tool, mold, die tooling
2219/35045 . . . Design tool for minimal tool change
2219/35046 . . . Design tool to minimize manufacturing, machining time
2219/35047 . . . Design tools in pairs, to be used together
2219/35048 . . . Recognition of punch shapes provided in die component catalogue
2219/35049 . . . BCL binary cutter location, rs494 standard CL format
2219/35051 . . . Data exchange between cad systems, cad and cam
2219/35052 . . . High level language conversion program, DXF format to nc format
2219/35053 . . . IGES initial graphics exchange specification
2219/35054 . . . STEP or PDES, standard for exchange of product data, form or surface data
2219/35055 . . . Data modeling language
2219/35056 . . . Manual entry of source, destination, data, format to be used for transfer
2219/35057 . . . Create also operation data concerning operating device
2219/35058 . . . Block cyclus time, time to prepare a block of data to be sent to machine
2219/35059 . . . Convert pcb design data to control data for surface mounting machine
2219/35061 . . . From cad make drawing with text for dimensions, scan it and read dimensions
2219/35062 . . . Derive mating, complementary, mirror part from computer model data
2219/35063 . . . Geometrical transformation of image
2219/35064 . . . Transform sketch by replacing free curves with mathematical curves, two display
2219/35065 . . . Undo part of design
2219/35066 . . . Modify design, modify shape, stretch, scale, add, delete
2219/35067 . . . Parametric function, group of lines, curves, change one, all change
2219/35068 . . . Command files, subroutines for drawing
2219/35069 . . . Derive missing surface from mirror part of computer model

2219/35071 . . . Drawing function, rotate designed figure, rotation
2219/35072 . . . Scale, zoom a designed figure
2219/35073 . . . Copy, duplicate a designed figure
2219/35074 . . . Display object, recognition of geometric forms
2219/35075 . . . Display picture of scanned object together with picture of cad object, combine
2219/35076 . . . Display from bottom or top side, adjust drawing lines, visible or not
2219/35077 . . . Display part and patterns to be machined on part, make selection
2219/35078 . . . Do not load non necessary or obstructive parts of drawing, remove from screen
2219/35079 . . . Features, functions like special relationdship, assembly locations
2219/35081 . . . Product design and process machining planning concurrently, machining as function of design
2219/35082 . . . Product, feature based modeling, geometric and engineering info
2219/35083 . . . Parametric design, parameters for geometric design and for process planning
2219/35084 . . . Geometric feature extraction, concave and convex regions, object recognition
2219/35085 . . . Incremental feature recognition, extraction, changes are added as new features
2219/35086 . . . Machining feature extraction, geometry and machining parameters
2219/35087 . . . Hole extraction for sheet metal
2219/35088 . . . Using graph grammars to describe parts
2219/35089 . . . Feature definition language
2219/35091 . . . Feature conversion, from design to process features or else
2219/35092 . . . MBM modular boundary model, FFC face to face composition model
2219/35093 . . . Feature is stad single tool approach direction, or mtad multiple tool approach
2219/35094 . . . Object oriented feature finder
2219/35095 . . . Features library
2219/35096 . . . Kind of feature, rotational parts with machining features and relation
2219/35097 . . . Generation of cutter path, offset curve
2219/35098 . . . Automatic coarse, rough and finish cutting path generation
2219/35099 . . . Generation of cutter path for only a designated part of surface
2219/35101 . . . CC cutter contact path
2219/35102 . . . Isoparametric, contact points at intersection of parameter lines on surface
2219/35103 . . . Cl cartesian method, apt style, cutter tangent, parallel to drive planes
2219/35104 . . . Steepest directed tree approach intelligent cutter path planning
2219/35105 . . . Polyhedral machining, cutter moved between centroids of adjacent surface triangles
2219/35106 . . . Contour map, cutter moved along contour lines, terraces of part surface
2219/35107 . . . Generate planar section toolpath
2219/35108 . . . Generate offset tool moving path in restrained curved plane
2219/35109 . . . Clean up region, volume left uncut by too large tool pass after finishing
2219/35111 . . . Automatically search for clean up regions, generate clean up tool pass
2219/35112 . . . Define object with spline, convert to raster, mosaic of points to make object
2219/35113 . . . Generation of compound, composite surface
2219/35114 . . . Generation of connection between two or more surfaces
2219/35115 . . . Project 3-D surface on 2-D plane, define grid in plane
2219/35116 . . . RFS rotation free surfaces, needs c x y z axis, non axis symmetrical surfaces
2219/35117 . . . Define surface by elements, meshes
2219/35118 . . . Generate intersection of offset surfaces
2219/35119 . . . Combine different forms, shapes
2219/35121 . . . Generate connection between two paths
2219/35122 . . . Generate random paths along a raster path
2219/35123 . . . Calculate volume of object
2219/35124 . . . Calculate center of gravity of object
2219/35125 . . . Surface with changing cone angle, different upper and lower surface shape
2219/35126 . . . Bezier or Ferguson surface
2219/35127 . . . Visibility maps, tool sees all points of interest on workpiece
2219/35128 . . . Propeller blade
2219/35129 . . . Generate composite surface by a single polynomial calculation
2219/35131 . . . Generate polynomial surface
2219/35132 . . . Generate path as function of precision and surface finish of each portion
2219/35133 . . . B-spline surface fitting
2219/35134 . . . 3-D cad-cam
2219/35135 . . . Predict surface machining precision
2219/35136 . . . Determine offset using closed ball expansion, 2-D square, 3-D cubic approximation
2219/35137 . . . Create part generic, derive from known part or combination of parts
2219/35138 . . . Superpose part of 3-D model on a straight, curved wall
2219/35139 . . . Define surface by cyclides, circular sections with variable radius
2219/35141 . . . Specify side of zone, line, circle for allowed region
2219/35142 . . . Generate tile patterns, mosaic
2219/35143 . . . Reconstruct free form surfaces
2219/35144 . . . Egosphere: spherical shell 2-5-D around robot, objects are projected on it
2219/35145 . . . Voxel map, 3-D grid map
2219/35146 . . . Enter data, calculate 3-D curve or surface, sculptured surface, okisurf
2219/35147 . . . Generation of nice looking composite surface
2219/35148 . . . Geometric modeling for swept volume of moving solids
2219/35149 . . . Generate model with haptic interface, virtual sculpting
2219/35151 . . . Modeling geometric, generation or forming of curved surface
2219/35152 . . . Part coding, description from 3-D cad database
2219/35153 . . . Group and retrieve similar designs from cad data
2219/35154 . . . Convert 2-D workpiece in rectilinear polygon, simplified skeleton
2219/35155 . . . From parts catalog, database, define part relationships, product definitions, specifications
2219/35156 . . . Group technology, identify and group simular parts, tools and machines

2219/35157 . . . Machinability, producibility, reject nc program if tool motion not possible
2219/35158 . . . Calculation of contact point of tool on surface, curve
2219/35159 . . . With nominal blank and model in memory define tool path and machine workpiece
2219/35161 . . . Determine orientation of workpiece
2219/35162 . . . Determine workpiece placement, nesting in blank, optimize, minimize loss material
2219/35163 . . . Generation of inverse offset surface, tool center on surface, tip shows offset
2219/35164 . . . Reverse engineering, camera and probe to inspect workpiece and machine are the same ones
2219/35165 . . . Automatic cutter selection
2219/35166 . . . Virtual boundary method to plan coarse and then fine machining
2219/35167 . . . Automatic toolpath generation and tool selection
2219/35168 . . . Automatic selection of machining conditions, optimum cutting conditions
2219/35169 . . . Automatic generation of set up data as function of form to be machined, kind of operation
2219/35171 . . . Automatic selection of machining conditions as function of controlled machine
2219/35172 . . . Lookup tables for technology, machining parameters
2219/35173 . . . Automatic selection of machine type
2219/35174 . . . Decide if blank has to be measured beforehand
2219/35175 . . . Select machining parameters with fuzzy logic
2219/35176 . . . Constraint, machining constraint, process type like only milling possible
2219/35177 . . . Power constraint for horizontal and vertical cutting forces
2219/35178 . . . Machining parameter constraint, feed, speed, dimension of part
2219/35179 . . . Tolerance constraints as function of process capability and manufacturing costs
2219/35181 . . . Machining condition constraints, coolant, chip removal, previous forming
2219/35182 . . . Scallop hull generation and its offset, interference free offset
2219/35183 . . . Maximizing side step, constant CUSP, scallop height, smaller CL datafile for minimizing machining time
2219/35184 . . . Variable step over, from toolpath to toolpath
2219/35185 . . . Select optimum tool radius
2219/35186 . . . Variable step forward on same toolpath
2219/35187 . . . Surface ridges, cusps, scallops, distance of tool traverses as function of curvature
2219/35188 . . . Project workpiece and sheet on screen, position layout to be cut, store contour
2219/35189 . . . Manufacturing function, derive gripper position on workpiece from cad data
2219/35191 . . . Project workpiece and gripper, control relative movement, store result
2219/35192 . . . From design derive sequence of bending so that bending is possible
2219/35193 . . . Manufacturability
2219/35194 . . . From workpiece data derive tool data
2219/35195 . . . Design mosaic, cut tiles, paint tiles and pack mosaic
2219/35196 . . . From workpiece data derive assembly tool data
2219/35197 . . . Assemblability
2219/35198 . . . Combine component electronic catalog, cdrom with cad data to generate nc program
2219/35199 . . . Processability
2219/35201 . . . Use cad data to test function of designed part, design for test DFT
2219/35202 . . . Macroplanning, setup fixture cafp, library machine tables, sequence
2219/35203 . . . Parametric modelling, variant programming, process planning
2219/35204 . . . Planning, generic process planning
2219/35205 . . . Planning of toolstages, comprising selection tools, position and motion
2219/35206 . . . Microplanning, specific machining operations and parameters
2219/35207 . . . Design agent selects planning agent, which selects fabrication agent
2219/35208 . . . Object oriented planning
2219/35209 . . . Modifying, adding machining features to elementary cad-parts as function of their assembling
2219/35211 . . . Using a search tree
2219/35212 . . . Estimating a cost associated with each operation, amount of time, target cost
2219/35213 . . . Minimize number of setups
2219/35214 . . . Setup planning, number of them, machines needed, part orientation, order
2219/35215 . . . Generate optimal nc program variant as function of cost, time, surface, energy
2219/35216 . . . Program, generate nc program, code from cad data
2219/35217 . . . Cagd computer aided geometric design, sbgd scanning based geometric design
2219/35218 . . . From cad data derive fixture configuration and assembly program
2219/35219 . . . From cad data derive cutting, stacking, sorting program
2219/35221 . . . Generate cutter path as function of speed, acceleration condition selected by operator
2219/35222 . . . From cad derive data points for endball mill, grinder, then radius compensation
2219/35223 . . . Tolerance, consider tolerance in design, design for assembly
2219/35224 . . . Kinematic tolerance analysis, variation in kinematic function as function of tolerance
2219/35225 . . . Tolerance in setup planning
2219/35226 . . . Analysis of tolerance propagation
2219/35227 . . . Use FMEA failure modes and effects analysis in tolerance assignment design
2219/35228 . . . Automated tolerance chain generation
2219/35229 . . . Code
2219/35231 . . . Biquinary code, 2-of-7 symbols
2219/35232 . . . Bcd
2219/35233 . . . Octal
2219/35234 . . . First column has 1-2-4, second column has 8-16-32
2219/35235 . . . Decimal to binary
2219/35236 . . . Excess-code
2219/35237 . . . Under four is 0xxx, over four is 1xxx
2219/35238 . . . Gray-code
2219/35239 . . . Ternary code
2219/35241 . . . End, stop code of program
2219/35242 . . . To enable manual operation on detection of inserted code

2219/35243 . . . Inserted code calls parallel execution of another program, synchronize
2219/35244 . . . Select in corner different program according to inner, outer machining
2219/35245 . . . Expansion of control words, code of standard language to increase functionality
2219/35246 . . . Data handling for auxilliary functions as function of setting of switch, block delete
2219/35247 . . . Mode selection between two machining modes, laser beam and laser shutter control
2219/35248 . . . Pallet exchange code to get mating nc program
2219/35249 . . . In corner change cutting command to piercing command, to keep angle point intact
2219/35251 . . . Several M codes sent to several machines simultaneously
2219/35252 . . . Function, machine codes G, M
2219/35253 . . . To stop program until a cycle start key is pressed
2219/35254 . . . GPF, G preparatory functions, G111 indicate switch to polar, absolute to reference
2219/35255 . . . G112 switch to polar, relative to last polar coordinate
2219/35256 . . . Assign a macro to a key
2219/35257 . . . Macro, assign a name to macro
2219/35258 . . . A named macro can be called from a program, a key, a menu
2219/35259 . . . Divide program in machining division blocks, and name them
2219/35261 . . . Use of mathematical expression, functional equation
2219/35262 . . . Macro instruction, canned cycles, subroutines, subprogram
2219/35263 . . . Using variables, parameters in program, macro, parametrized instruction
2219/35264 . . . Reread same data
2219/35265 . . . Check time differences of command signals
2219/35266 . . . On error display code, message for recovery from fault
2219/35267 . . . Compare ram data to rom data, verify correctness, validity data, tolerance
2219/35268 . . . Detection of presence of rom cassette or similar, if coupled to internal memory
2219/35269 . . . Checking data, parity, diagnostic
2219/35271 . . . Checking electronics
2219/35272 . . . Watchdog, count or integrate number of data errors before alarm
2219/35273 . . . Sensor to detect functioning of signal conditioning elements
2219/35274 . . . Parity
2219/35275 . . . Excess in error
2219/35276 . . . Two identical tapes
2219/35277 . . . Double reader
2219/35278 . . . Checksum CRC
2219/35279 . . . Ignoring invalid program
2219/35281 . . . Detect overlap of program, if new data is entered before old is handled, stop
2219/35282 . . . Verify if loaded program into memory or stored into tape, cassette is correct
2219/35283 . . . Plausibility check for function, program, inhibit dangerous, unallowed program
2219/35284 . . . Programmed speed automatically limited to min and max transmission range speed
2219/35285 . . . Plausibility check for data, within permissible range
2219/35286 . . . Run tape without machining, tape proving, dry run, test run
2219/35287 . . . Verify, check program by drawing, display part, testpiece
2219/35288 . . . Verification of instructions on tape, direct or by comparing with reference
2219/35289 . . . Display machining state and corresponding control program
2219/35291 . . . Record history, log, journal, audit of machine operation
2219/35292 . . . By making, plotting a drawing
2219/35293 . . . Execute program and check block of data, on interrupt display block
2219/35294 . . . Display concentric circles
2219/35295 . . . Stop test run, correct instruction or block, restart test run
2219/35296 . . . Inhibit operation if part shape not compatible with raw material shape
2219/35297 . . . Convert program to voice output to check program
2219/35298 . . . Print screen display
2219/35299 . . . Verify if generalised data block has all words required
2219/35301 . . . On error, push button to reverse execution mode of block, stop, correct
2219/35302 . . . Set and store command code together with display colour, detected on execution
2219/35303 . . . Dry run, compare simulated output with desired finished profile, alarm, inhibit
2219/35304 . . . Real time analysis, check of program, just before machining
2219/35305 . . . Before machining, verify if all different machining start points are correct
2219/35306 . . . Interference of all tools of turret, or part of tool base with chuck, workpiece
2219/35307 . . . Print out of program on paper, on screen
2219/35308 . . . Update simulator with actual machine, control parameters before start simulation
2219/35309 . . . Actual execution times acquired during machining used in simulation
2219/35311 . . . Remote simulation of machining program
2219/35312 . . . Display working state, process
2219/35313 . . . Display, validate tool path for boundary, surface interference
2219/35314 . . . Display workpiece and machine, chuck, jig, clamp, tool
2219/35315 . . . Projection, two, three section views
2219/35316 . . . Interference checking between tool, machine, part, chuck, machining range
2219/35317 . . . Display tool shape, to select tool for program, or for interference
2219/35318 . . . 3-D display of workpiece, workspace, tool track
2219/35319 . . . Show alternatively static and dynamic locus, during static update of dynamic
2219/35321 . . . Display only tool locus, dynamic
2219/35322 . . . Display dynamic tool locus from entered start point to present position
2219/35323 . . . Point to two points on tool locus, calculate and display value
2219/35324 . . . Two, more pictures separated on screen, display

2219/35325 . . . Display of locus with possible correction of machining
2219/35326 . . . Scale image automatically to display whole tool locus or indicated area
2219/35327 . . . Display tool locus together with correlated machining parameter, load motor
2219/35328 . . . Shift view as function of shift of tool with respect to workpiece
2219/35329 . . . Display entire image within an enlarged image
2219/35331 . . . Display only machined part
2219/35332 . . . Use solid and wire frame plotting to display tool locus, workpiece
2219/35333 . . . Display raw material, blank, tool locus, workpiece, alarm if error
2219/35334 . . . Display entire part and zoom of detail
2219/35335 . . . Update display image only if tool advanced over a defined distance
2219/35336 . . . Display locus and corresponding actual block
2219/35337 . . . Program has instruction to display specific information
2219/35338 . . . Display virtual tool, locus, part to check possibility of execution next block
2219/35339 . . . A mark for present position of tool, a mark for end point of block, colour
2219/35341 . . . Display finishing, finishing margin, work, tool and chuck shape, different colours
2219/35342 . . . Set colour change for a block, display locus for that block in different colour
2219/35343 . . . Display path and coating thickness and painting time
2219/35344 . . . Display part, programmed locus and not yet machined, uncompleted portions of part
2219/35345 . . . Display entry of high level program together with corresponding nc program
2219/35346 . . . VMMC: virtual machining measuring cell simulate machining process with modeled errors, error prediction
2219/35347 . . . Replace tool by light emitter, operator checks light path on workpiece
2219/35348 . . . Different colour, texture as function of distance, direction between tool and workpiece
2219/35349 . . . Display part, programmed locus and tool path, traject, dynamic locus
2219/35351 . . . While machining probe model, sense drawing by same program, stop if deviation
2219/35352 . . . By making a testpiece
2219/35353 . . . While machining compare real path with simulated, command path, contour display
2219/35354 . . . Polar coordinates, turntable
2219/35355 . . . Generate at jump a fictive instruction equal to sum of previous instructions
2219/35356 . . . Data handling
2219/35357 . . . Setup data, includes scale, range, type, selected together with part program
2219/35358 . . . If a pattern contains another pattern, separate date to avoid overlap
2219/35359 . . . Discriminate between setup data and machining data
2219/35361 . . . Discriminate between data for servocontrol directly and nc processing data
2219/35362 . . . Group similar operations, to select correction, compensation values
2219/35363 . . . Generate data on component arrangement
2219/35364 . . . Merge normal nc program with manual entered monitoring, diagnostic criteria
2219/35365 . . . Configure buffer dynamically, store two 3-D blocks or one 6-D block
2219/35366 . . . Fill buffer dynamically, track read out and write in addresses, fifo
2219/35367 . . . Only read buffer, advance tape while machining with data from read buffer
2219/35368 . . . Read and work buffer, machine while read in, no switching between buffers
2219/35369 . . . Read and work buffer, machine while read in, buffers switched alternative
2219/35371 . . . Data from read instead of work buffer, load data directly to work buffer
2219/35372 . . . Store variable block, word length into memory
2219/35373 . . . Data storage, buffer
2219/35374 . . . First memory for independent axis, second memory for synchronized axis
2219/35375 . . . Store command data into latch, buffer synchronized to clock
2219/35376 . . . Input program, analyze, store to buffer ready to control nc, no further data handling
2219/35377 . . . Check for end of block
2219/35378 . . . Detect if reference data is not changing anymore to decide a still stand, stop
2219/35379 . . . Conversion, normalize
2219/35381 . . . Convert in real time input peripheral data to processor data, ouput data format
2219/35382 . . . Distribution
2219/35383 . . . Input serial or parallel
2219/35384 . . . Serial data handling
2219/35385 . . . Decode several blocks at the same time, as a single block, simultaneous, parallel
2219/35386 . . . Look ahead processing of plural block data from buffer
2219/35387 . . . Transfer measured data first to fastest controller, processor then to slower
2219/35388 . . . Processors in parallel, second, third handle rest old block while first starts new block
2219/35389 . . . Different block length to select between panel and remote I-O
2219/35391 . . . Sort, order entered data hierarchical
2219/35392 . . . Set switches, load, cancel data for different axis, spindles simultaneous
2219/35393 . . . Coordinate selection switch
2219/35394 . . . A separate processor for block, span
2219/35395 . . . Memory, ram table with waveform, no need to be loaded by nc program, quicker
2219/35396 . . . Table of contour for cyclic machining, only data for one cycle, derive other
2219/35397 . . . Cross bar switch
2219/35398 . . . Machining, change parameters as function of machining type
2219/35399 . . . Split part program in elementary machining steps, executable by a single tool
2219/35401 . . . Tool edge, tool shape, dead corner because of tool shape
2219/35402 . . . Calculate allowable machining capability from cutting conditions
2219/35403 . . . Calculate midline of tapelike contour, as reference line for stitching
2219/35404 . . . Divide scanned pattern in several closed area, store as intermediate data

2219/35405 . . . Prepare seam data for each pattern size as function of scale and intermediate data
2219/35406 . . . Decompose axis movement, group components, interpolate separately, superpose pulses
2219/35407 . . . Position data, calculate data to project characters along curve
2219/35408 . . . Calculate new position data from actual data to compensate for contour error
2219/35409 . . . DPC direct programming at the console
2219/35411 . . . Clamp detachable teaching box magnetically on housing
2219/35412 . . . Special interface for manual input to pc
2219/35413 . . . Manual device is automatically recognised and its interface selected
2219/35414 . . . Remote instruction to operate machine tool
2219/35415 . . . 3-D three dimension, space input, spaceball
2219/35416 . . . 3-D joystick
2219/35417 . . . Handle, joystick connected to n+1 wires for n degrees of freedom
2219/35418 . . . Bird, free flying hand controller, receives signals from transmittors in space
2219/35419 . . . Four and more-DOF hand controller, joystick, manipulandum
2219/35421 . . . 3-D matrix to input a 3-D surface, position displaced elements read by computer
2219/35422 . . . Unit freely movable in space, detect its position, orientation by triangulation
2219/35423 . . . 6-DOF force reflective hand controller frhc
2219/35424 . . . 16-DOF glove attached to 6-DOF hand controller, superposition
2219/35425 . . . 18-DOF glove with fifteen load detectors on each finger, eighty one in total
2219/35426 . . . Prepare, enter next program during execution of actual program, machining
2219/35427 . . . User controls machine with eye motion, activates icons on display
2219/35428 . . . Block selection, search
2219/35429 . . . Enter code number directly for function, no use of function keys
2219/35431 . . . Interactive
2219/35432 . . . Format guide to guide user during input of data
2219/35433 . . . During execution, display asks for parameters, operator answers, machine again
2219/35434 . . . Enter part geometry and manually control path free, directly, real time, cutting
2219/35435 . . . Display, if needed, tolerance memo data at place where real data must be input
2219/35436 . . . Means, manual input, input reference, hand wheel
2219/35437 . . . Decimal
2219/35438 . . . Joystick
2219/35439 . . . Keys or buttons
2219/35441 . . . Production design metaphore, tool, operation like input system
2219/35442 . . . Hand wheel turns resolver to control movement slide
2219/35443 . . . Portable drill, screw driver to set position of axis instead of handwheel
2219/35444 . . . Gesture interface, controlled machine observes operator, executes commands
2219/35445 . . . Joystick for coarse and handwheel for fine movement
2219/35446 . . . Earprotection, earphone
2219/35447 . . . Potentiometer
2219/35448 . . . Datasuit, arm sleeve, actor, operator wears datasuit and generates motion
2219/35449 . . . Joystick and buttons for menu and function selection, scrolling, +sign and -sign
2219/35451 . . . Mouse with additional wheel, switches for position control
2219/35452 . . . Two axis foot pedal
2219/35453 . . . Voice announcement, oral, speech input
2219/35454 . . . Switch between joystick and pedal control
2219/35455 . . . Foot pedal
2219/35456 . . . Disk segments connected to different inputs of microprocessor, represent different positions
2219/35457 . . . Joystick for coarse, rotary encoder for fine movement
2219/35458 . . . Control command embedded in video, audio stream, signal
2219/35459 . . . Knob, handle, handwheel delivers pulses, electronic handwheel, digipot
2219/35461 . . . Digitizing, menu tablet, pencil
2219/35462 . . . Mouse
2219/35463 . . . Trackball
2219/35464 . . . Glove, movement of fingers
2219/35465 . . . Hand wheel
2219/35466 . . . Select with mouse button coarse or fine movement control
2219/35467 . . . Select between control modes, jog, freeform, grid, corner, locate, contour, slot
2219/35468 . . . Select between teaching, regulate position and direct control of position
2219/35469 . . . Select with button specified picture, interrupt addresses selection table
2219/35471 . . . Select between run and step command mode, step forward, reverse
2219/35472 . . . Mode selection
2219/35473 . . . Input limit values of speed, position, acceleration or force
2219/35474 . . . Enter fuzzy command, instruction, like move closer
2219/35475 . . . Set tolerance values
2219/35476 . . . Switch from auto to manual if operator moves feedback detector, to set parameter
2219/35477 . . . Accelerate input data, exponent as function of pressure, time, turning speed
2219/35478 . . . Set flexibility of axis in working coordinates, to move real axis manually easily
2219/35479 . . . Set values, speed of machine as function of force, pressure, duration on key
2219/35481 . . . Display, panel
2219/35482 . . . Eyephone, head-mounted 2-D or 3-D display, also voice and other control
2219/35483 . . . Synoptic display for work shape during machining
2219/35484 . . . Use two image memories, update second memory while display first memory
2219/35485 . . . Library of images, pictures, select and modify each, compose them
2219/35486 . . . Use of two cursors on screen
2219/35487 . . . Display and voice output incorporated in safety helmet of operator
2219/35488 . . . Graphical user interface, labview

2219/35489 . . . Discriminate, different colour, highlight between two states
2219/35491 . . . Workpiece date display, position, height
2219/35492 . . . Display needed workpiece, tool or data to continue execution of program
2219/35493 . . . Display workpiece and tool data together
2219/35494 . . . Online documentation, manual, procedures, operator, user guidance, assistance
2219/35495 . . . Messages to operator in multimedia, voice and image and text
2219/35496 . . . Display cursor in changing colour to indicate that object can be selected
2219/35497 . . . Use colour tone, hue to indicate amount of processed quantity
2219/35498 . . . Synoptic display of available, selectable control modules with their functions
2219/35499 . . . Model of process, machine and parameters
2219/35501 . . . Colour display
2219/35502 . . . Display picture, image of place of error
2219/35503 . . . Eye tracking associated with head mounted display to detect eye position
2219/35504 . . . Multilingual communication, messages in different languages
2219/35505 . . . Display two windows, one with nc-data, other with general application data
2219/35506 . . . Camera images overlayed with graphics, model
2219/35507 . . . Spider, radar, parallel axes, multivariate plot
2219/35508 . . . Operator chooses among different GUI formats
2219/35509 . . . Double large character on screen
2219/35511 . . . Cursor on screen
2219/35512 . . . Display entered, measured values with bargraph
2219/35513 . . . Setting tool condition, tool set in tool exchanger, present or not
2219/35514 . . . Display tool data
2219/35515 . . . Workpiece set condition, workpiece present or not
2219/35516 . . . Three linear movements in a single plane for three actuators
2219/35517 . . . Use same data, program for workpieces with different length, but same profile
2219/35518 . . . Superposition data, three memories for 2-D projection and z profile and surface structure
2219/35519 . . . Machining data and tool data
2219/35521 . . . Machining and parts on workpiece arrangment data, machine each, then cut out
2219/35522 . . . Database for standard machining data and for personal machining data
2219/35523 . . . Data one bit better than measurement, rest accumulated in memory
2219/35524 . . . Approach data and machining data
2219/35525 . . . Use same data for different operations, coarse and fine, cutting and grinding
2219/35526 . . . Number of workpieces to be machined, cut
2219/35527 . . . Range of number of workpieces to be machined, cut
2219/35528 . . . Create machining conditions database by analyzing actual machining nc program
2219/35529 . . . Monitoring current machining, store information in database as a new working case
2219/35531 . . . Operator inputs manually evaluation of current machining
2219/35532 . . . Comment, work directive, message to operator and control signals together
2219/35533 . . . Use, input 2-D data, sectional profile to machine 3-D surface
2219/35534 . . . Conversion input data
2219/35535 . . . Decimal to binary
2219/35536 . . . Digital to analog
2219/35537 . . . Bcd to phase
2219/35538 . . . Bcd to decimal
2219/35539 . . . Gray to frequency
2219/35541 . . . Bcd to 5-2-1-1-code
2219/35542 . . . Bcd to binary
2219/35543 . . . Cartesian to polar and vice versa
2219/35544 . . . Convert male to female form, die to stamp form
2219/35545 . . . Serial to parallel conversion
2219/35546 . . . Convert input data to execution data
2219/35547 . . . 1-to-8-bit conversion
2219/35548 . . . 1-to-16-bit conversion
2219/35549 . . . Convert buffer content to executable data in case of short execution time
2219/35551 . . . Convert and select between EIA and ISO code
2219/35552 . . . ISO and EIA code detected by difference of parity bit
2219/35553 . . . Convert ISO or EIA code to internal or standard code
2219/35554 . . . Mirror, other conversions
2219/35555 . . . Turn figure over 90-degrees or 180-degrees, convert data for new state
2219/35556 . . . Conversion inch to metric
2219/35557 . . . Workpiece related data to axis related data
2219/35558 . . . Convert speed value into two signals sin, cos representing position
2219/35559 . . . Convert 15-bit image into 20-bit image
2219/35561 . . . Analog to digital
2219/35562 . . . Radius to diameter
2219/35563 . . . Use of conversion tables
2219/35564 . . . High speed data processor between host and nc for direct conversion of data
2219/35565 . . . Communications adapter converts program to machine or controls directly machine
2219/35566 . . . Use of only delta x values, no absolute values
2219/35567 . . . Each block contains connection, index to other blocks, to form patterns
2219/35568 . . . Array structure corresponding to display format
2219/35569 . . . Single block format indicates change of speed at start and end
2219/35571 . . . Table with constant speed and corresponding distance for each segment
2219/35572 . . . Data contains header and type of data
2219/35573 . . . Header has code to select proper load program
2219/35574 . . . Header with information for display position
2219/35575 . . . Part program contains movement and condition statements
2219/35576 . . . Data divided in blocks to be covered by small movement, to origin by large movement
2219/35577 . . . Delta x, delta v and delta t
2219/35578 . . . Gerber, hp format to drive plotter or similar xy device
2219/35579 . . . Store motion parameters as function of encoder position
2219/35581 . . . Position data for module and position data within module
2219/35582 . . . Control format in browser, use of xtml and xslt

2219/35583 . . . Difference between signals and sign of difference are the controlling signals
2219/35584 . . . Link geometry, workpiece data with machining data, select region
2219/35585 . . . Motion command profile
2219/35586 . . . Position, time and slope, tangent of curve
2219/35587 . . . Store curves with packed code, indicating bezier curve parameters
2219/35588 . . . Pack, compress data efficiently in memory
2219/36 . . Nc in input of data, input key till input tape
2219/36001 . . . File format, initital graphics exchange specification, iges standard
2219/36002 . . . Dimensional measurement interface specification dmis standard
2219/36003 . . . Start key, switch to start performing program
2219/36004 . . . Program mask depends on physical position of panel
2219/36005 . . . Same knob, different functions, turn for position, push and turn for speed
2219/36006 . . . A key delivers a series of key codes
2219/36007 . . . Special keys, automatic switch over x or y to numerical values
2219/36008 . . . Illuminated, lighting up keys, build in led, display, show sequence data entry
2219/36009 . . . Keys with variable control code, multifunction keys
2219/36011 . . . Page key, go to next or previous page
2219/36012 . . . Percentage keys, input percentage values
2219/36013 . . . Up-down keys for calling sequentially functions, parameters
2219/36014 . . . Overlay to indicate function of key
2219/36015 . . . Display areas, fields on screen correspond to position of keys on panel, matrix
2219/36016 . . . Unified language for machines and translation to each
2219/36017 . . . Graphic assisted robot programming, display projection of surface
2219/36018 . . . Language for dimensional measuring, inspection
2219/36019 . . . Using interpreted descriptive commands giving G-codes
2219/36021 . . . Switch high level and assembly, machinine language as function of capacity memory and speed
2219/36022 . . . Switch between machining language for execution and high level for editing
2219/36023 . . . Attribute programming
2219/36024 . . . State language
2219/36025 . . . Link, connect icons together to form program
2219/36026 . . . Combine general high level language and specialised plc language
2219/36027 . . . Decompiler, translate machine code to hll, reverse processing, easy modification
2219/36028 . . . C++
2219/36029 . . . Basic
2219/36031 . . . Programming in assembler, machine or high level language
2219/36032 . . . Script, interpreted language
2219/36033 . . . High level graphics language, gks
2219/36034 . . . APT
2219/36035 . . . Special language, task programming, oop object oriented programming
2219/36036 . . . Motion, graphical motion control language gmcl
2219/36037 . . . Application programming interface associates component code with driver function
2219/36038 . . . Ladder program for plc, using functions and motion data
2219/36039 . . . Learning task dynamics, process
2219/36041 . . . Edit program step by step
2219/36042 . . . Point to defect, faulty instruction or locus, call up corresponding command block
2219/36043 . . . Correction or modification of program
2219/36044 . . . Program modified after breakage, crash, jamming
2219/36045 . . . Skip of program blocks, jump over certain blocks
2219/36046 . . . Adapt, modify program as function of configuration of machine
2219/36047 . . . Edit program, change or not header, starting code, output new program with header
2219/36048 . . . Verify, probe workpiece, if position deviation edit, modify program
2219/36049 . . . Relational geometry, change one element, rest of part is adjusted according
2219/36051 . . . Store history of modified file, back-up, update, using different file extensions
2219/36052 . . . Tape tuning with expert system, correction of tape as function of measured parameters
2219/36053 . . . Adapt, modify program in real time as function of workpiece configuration
2219/36054 . . . Modify offset for whole sections collectively, different offsets for sections
2219/36055 . . . Separate, temporary memory or special storage region for corrections only
2219/36056 . . . Modify program, machining order in real time, during operation, dynamically
2219/36057 . . . Select center of pattern for placement of new scaled pattern
2219/36058 . . . Modify workpiece part program without changing approach program
2219/36059 . . . Modify approach program as function of changed part program
2219/36061 . . . Storage, memory area to store history data for previous corrections, editable
2219/36062 . . . Verify if editing, modifying program is suitable for connected controller
2219/36063 . . . During machining, compare simulated with detected profile, correct, modify program
2219/36064 . . . Modify data by using the four rules of arithmetic such as +sign, -sign, xsign, :sign
2219/36065 . . . Modify data by entering a compensation rate value
2219/36066 . . . Collectively modify data instead of each in particular
2219/36067 . . . Altering working order of program blocks
2219/36068 . . . Change program at allowed point of time or program step
2219/36069 . . . Display, on machining error, display error message and correct program
2219/36071 . . . Simulate on screen, if operation value out of limits, edit program
2219/36072 . . . Select pattern, input modification of tolerance
2219/36073 . . . Display original and modified part in different colour, highlight, shading, filling

2219/36074 . . . Display part, select, mark element and edit corresponding block
2219/36075 . . . Set certain command codes, discriminate codes and display in different colour
2219/36076 . . . Select icon and display corresponding instructions
2219/36077 . . . Display and select, modify shape, pattern on screen
2219/36078 . . . Insert, read in new command instruction to modify fixed program
2219/36079 . . . Replace faulty instructions and execute only that portion of the program
2219/36081 . . . Merge, mix original program with teached program
2219/36082 . . . Delete a block by overwriting block with delete control character
2219/36083 . . . Insert a block by using insert control character pointing to address in memory
2219/36084 . . . Amend, modify program by inserting wait and wait dismiss command
2219/36085 . . . Replace faulty instructions from rom, tape by instructions from ram, error setting
2219/36086 . . . Select, modify machining, cutting conditions
2219/36087 . . . Edit, modify program for position errors, moving path, use conversion matrix
2219/36088 . . . Machining parameters, overide
2219/36089 . . . Machining parameters, modification during operation
2219/36091 . . . Modification, override as function of conditions, distance
2219/36092 . . . Override limit contour
2219/36093 . . . Lookup table with override for each pattern, tool path
2219/36094 . . . Inhibit or permit override by separate manual switch
2219/36095 . . . Inhibit or permit override by program instruction
2219/36096 . . . Override program by selecting another font, size for letters
2219/36097 . . . Override program to scale workpiece
2219/36098 . . . Overide program to execute a certain number of same blocks, repeat pattern
2219/36099 . . . Stop machine and correct position manually
2219/36101 . . . During machining keep overide log, history, journal, kind of record playback
2219/36102 . . . Display overide log and nc instructions, select nc block to modify permenant
2219/36103 . . . Adapt, update machining parameters automatically as function of state of processing
2219/36104 . . . IC card
2219/36105 . . . Cd rom
2219/36106 . . . Cassette
2219/36107 . . . Bubble memory
2219/36108 . . . Eprom, earom, eerom
2219/36109 . . . Flash memory
2219/36111 . . . Local memory instead of tape, or combined
2219/36112 . . . Floppy disk, diskette
2219/36113 . . . Rom
2219/36114 . . . Eprom, prom
2219/36115 . . . Card
2219/36116 . . . Harddisk
2219/36117 . . . Magnetic tape cassette
2219/36118 . . . Adapt interactive dialog, help to experience, short cut menu
2219/36119 . . . Mouse with buttons to assist operator with selection of menu instead of pointing
2219/36121 . . . Tree oriented menu, go to root, scroll up down, select mode
2219/36122 . . . Operator menu with submenu for each item
2219/36123 . . . Store statistical history of selected menus, recall for quick data entry
2219/36124 . . . Screen with certain display menu called by pointer, number
2219/36125 . . . Select out of library, beforehand only functions needed for part program
2219/36126 . . . Programmable, configurable function keys, execute a programmed sequence
2219/36127 . . . Menu, help menu for operator, messages
2219/36128 . . . Function menu, switches, keys replaced by menu
2219/36129 . . . Menu keys, function of keys soft defined
2219/36131 . . . Cyclic selection of functions or values by pushing a single key
2219/36132 . . . Selection of menu with lightpen on screen, display
2219/36133 . . . MMI, HMI: man machine interface, communication
2219/36134 . . . Osf-motif standard
2219/36135 . . . Link between sequence, motion or process and diagnostic control
2219/36136 . . . User configurable graphics selected as function of kind of machining, display builder
2219/36137 . . . Configuration of display device, operator panel
2219/36138 . . . Configuration of operator panel, using os-2 modular programs, masks
2219/36139 . . . Edit templates for screen display, and use of keyboard
2219/36141 . . . Configuration with visual basic extension
2219/36142 . . . Using window display, selection of function calls in a window
2219/36143 . . . Use of icon to represent a function, part of program
2219/36144 . . . Display of not allowed function in a different way, light
2219/36145 . . . In case of alarm a window is maximised automatically
2219/36146 . . . Group windows into coherent sets to facilate a task
2219/36147 . . . Limit number of windows displayed simultaneously
2219/36148 . . . Main process, alarm window takes priority, always on top, safe view
2219/36149 . . . Window, X window
2219/36151 . . . Display is a TV
2219/36152 . . . Panel
2219/36153 . . . Two, several consoles, displays, panels, two different input, joystick
2219/36154 . . . Two displays, for part shape and for corresponding instructions, block
2219/36155 . . . Plc switches functions of panel when changing kind of machining
2219/36156 . . . Keyboard as a drawer
2219/36157 . . . Pendant control box for handwheel control, mounted on controlled axis
2219/36158 . . . Panel for disabled, scanned sequentially

2219/36159 . . . Detachable or portable programming unit, display, pc, pda
2219/36161 . . . Common program panel for nc, pic, switch display diagnostic or part
2219/36162 . . . Pendant control box
2219/36163 . . . Local as well as remote control panel
2219/36164 . . . Common CRT for two input devices
2219/36165 . . . Common program panel for host and cnc, at cnc place, for data from host, cnc
2219/36166 . . . Several panels can be selected by rotation, limited space needed
2219/36167 . . . Use camera of handheld device, pda, pendant, head mounted display
2219/36168 . . . Touchscreen
2219/36169 . . . Remote, host controlled, operated manual data input, keyboard
2219/36171 . . . Edit velocity, motion profile, graphic plot of speed as function of time, position
2219/36172 . . . Select block, item, highlight, colour this block with respect to rest
2219/36173 . . . Combine record play back, hand wheel with normal cnc programming, software
2219/36174 . . . Program divided into modules
2219/36175 . . . Capture image of part, create automatically geometry, sequence of machining
2219/36176 . . . Edit servo control parameters
2219/36177 . . . Select block and display graphic representation associated with block type
2219/36178 . . . Derive finishing allowance, tolerance from shape and work information
2219/36179 . . . Combine nc programming with cad and order system
2219/36181 . . . Input part data, dimensions, without graphical representation of part
2219/36182 . . . First block contour then parameter input
2219/36183 . . . Offline teaching is sound assisted
2219/36184 . . . Record actions of human expert, teach by showing
2219/36185 . . . Application, for cylindrical groove shape
2219/36186 . . . Programming languages for lathe, mill or general use mixed
2219/36187 . . . End shape data input for end surface configuration
2219/36188 . . . Deep drilling cycle
2219/36189 . . . Wheel dressing program
2219/36191 . . . Prepare rough, coarse machining program
2219/36192 . . . End facing
2219/36193 . . . Semi finish and finish machining
2219/36194 . . . Taper angle machining
2219/36195 . . . Assembly, mount of electronic parts onto board
2219/36196 . . . Grinding cycle
2219/36197 . . . Non circular workpiece, radius and angle input
2219/36198 . . . Gear, thread cutting
2219/36199 . . . Laser cutting
2219/36201 . . . Hole machining
2219/36202 . . . Freeform surfaces
2219/36203 . . . Bending of workpiece, also for long slender workpiece
2219/36204 . . . Lathe, turning
2219/36205 . . . For aspheric non symetrical mirrors
2219/36206 . . . Embroidery
2219/36207 . . . Involute curve, compressor
2219/36208 . . . Roll grinding
2219/36209 . . . Specify hole shape pattern for boring and store in hole file
2219/36211 . . . Using different cutter sizes, largest as possible for minimizing machining time
2219/36212 . . . Using generic virtual pocket, having virtual boundary, arbitrarily shaped
2219/36213 . . . Grouping of decomposed volumes with similar features
2219/36214 . . . Pocket machining, area clearance, contained cutting, axis milling
2219/36215 . . . Insert automatically program sequence, for corner execution, avoid machining error
2219/36216 . . . Replace entered position data with previous if difference less than tolerance
2219/36217 . . . Commands trigger programming functions
2219/36218 . . . Reuse stored data as programming data after confirmation
2219/36219 . . . Calculate machining information, like time, surface to be machined from program
2219/36221 . . . Entry of chamfer, beveling, rounding of corner shape
2219/36222 . . . Indicate entered element on top, next element below, after input, update top
2219/36223 . . . Enter machining conditions, determine automatically machining data
2219/36224 . . . Enter machining and positioning elements, derive order of execution in real time
2219/36225 . . . Select and insert program from library, select case, variant
2219/36226 . . . Global selection of grid or circle of points by number, distance, angle
2219/36227 . . . Assist operator to calculate unknown points, contours
2219/36228 . . . Combine two programs to obtain new shifted positions and new processing data
2219/36229 . . . Generate missed line when last end point is different from next start point
2219/36231 . . . Translate, convert machine independent to machine dependent program
2219/36232 . . . Before machining, convert, adapt program to specific possibilities of machine
2219/36233 . . . Convert program so that it can be executed in reverse order
2219/36234 . . . Convert program for a 2-axis machine into program for 4-axis machine
2219/36235 . . . Convert grinding machine oriented language to nc machine oriented
2219/36236 . . . Convert character, ascii, text code to internal code and vice versa
2219/36237 . . . Prepare nc program for selected, distinct nc machines
2219/36238 . . . Derive marking from punching program, secondary from principal program
2219/36239 . . . Determine automatic, manual machining of workpiece as function of specific possibilities of machine tool
2219/36241 . . . Convert, translate milling to laser machining program
2219/36242 . . . Convert program for different machines with different M-code, G-code, header
2219/36243 . . . Convert source, high level code to machine, object code
2219/36244 . . . Means, use of tables, correlating functions to instructions

2219/36245 . . . Use of tables to store order of execution of functions
2219/36246 . . . Comments, messages displayed with program instructions, explain process
2219/36247 . . . Remarks, comments as hierarchical structure, indented, corresponds to instructions
2219/36248 . . . Generate automatically machining, stitching points from scanned contour
2219/36249 . . . Generate automatically a balance program for workpiece, dynamic balance
2219/36251 . . . Superpose scanned or finished object image on workpiece model for best fitting
2219/36252 . . . Generate machining program based on a simulation to optimize a machine parameter
2219/36253 . . . Generate machining program from previous test run
2219/36254 . . . Generate machining program from history of similar tools
2219/36255 . . . Machining condition, parameter is workpiece conicity, inclination between surfaces
2219/36256 . . . Define upper lower limit of reciprocating machining, chopping
2219/36257 . . . Indicate region and kind of machining on shape of part
2219/36258 . . . Machining planning, indicate kind of operation
2219/36259 . . . Indicate primary and secondary operations on shape, deliver nc data for each
2219/36261 . . . Program with subroutines for machining process
2219/36262 . . . Input workpiece mounting position, setup
2219/36263 . . . Select cutting direction
2219/36264 . . . Program movement from first to second machining area
2219/36265 . . . Set machining start point from tool, machining data avoiding interference
2219/36266 . . . Tool path editor, for offset, multi-passes
2219/36267 . . . Process planning editor
2219/36268 . . . From blank and finished entered shape, derive machining features
2219/36269 . . . Separate machining data as function of dependance or independance of material
2219/36271 . . . Enter, edit workpiece data
2219/36272 . . . Enter start position, program number for each workpiece
2219/36273 . . . Use general and tool data to select available tool and machining operation
2219/36274 . . . Automatic calculation cutting conditions, but operator can enter them also
2219/36275 . . . Select automatically transmission ratio as function of programmed speed
2219/36276 . . . Program virtual, logical tools, select tool from tables
2219/36277 . . . Flexible fixturing, clamp workpiece, mark clamp regions and store them
2219/36278 . . . Topological classification of forming, machining process
2219/36279 . . . Machining parameter is strategy for making corners
2219/36281 . . . Machining parameter is technology: surface roughness, corner, contour tolerance
2219/36282 . . . Divide complex sculptured surface into smaller, easier to machine areas
2219/36283 . . . Select, enter machining, cutting conditions, material file, tool file
2219/36284 . . . Use of database for machining parameters, material, cutting method, tools
2219/36285 . . . Display symbol pattern for kind of machining performed
2219/36286 . . . Show shape of workpiece, point to coordinates to enter machining parameters
2219/36287 . . . Selection of speed as function of tool diameter
2219/36288 . . . Select machining method, parameters as function of dimensions of workpiece
2219/36289 . . . Cutting, machining conditions by optimisation of time, cost, accuracy
2219/36291 . . . Cutting, machining conditions by empirical equation, like tool life
2219/36292 . . . Method to drill, machine based on ratio bore depth, diameter, select tools
2219/36293 . . . Set feed and speed for specified tool, workpiece as function of ratio cutting force, speed
2219/36294 . . . Stored coefficients, standard cutting conditions, calculate for entered material
2219/36295 . . . Select optimum process for manufacturing articles with longer life
2219/36296 . . . Order, select, determine, change machining sequence, order
2219/36297 . . . Machining plan, indicate order of machining as function of presence of operator
2219/36298 . . . Enter, change order of different programs to be executed
2219/36299 . . . Generate sequences of operations starting from finished product, end with raw
2219/36301 . . . Optimisation of sequence of operations
2219/36302 . . . Determine several machining processes and order as function of available tools
2219/36303 . . . Determine several machining processes and order as function of number of mountable tools
2219/36304 . . . Divide into several machining processes, divide each also in several sub processes
2219/36305 . . . Table, correlation tool type and machining category, process
2219/36306 . . . Table correlation different turrets, slides and possible simultaneous operations
2219/36307 . . . Table with workpiece features and corresponding machining parameters, methods
2219/36308 . . . Table for cutting conditions
2219/36309 . . . Program has different modules, each with own load program
2219/36311 . . . Machining mode selection, pocket, grooving, raster, area, profile
2219/36312 . . . Enter shape with cursor, joystick directions up, down, left, right, slash
2219/36313 . . . If elements cannot be combined, show error
2219/36314 . . . Superpose and combine shapes
2219/36315 . . . Library for shapes of tool holders, fixtures, chucks
2219/36316 . . . Define profile from elements, show only selectable elements
2219/36317 . . . Input symbol for element, search in library and display
2219/36318 . . . Enter start, begin and stop, end point
2219/36319 . . . Simplify display, calculation of shapes by deleting holes, grooves
2219/36321 . . . Program only shape, add approach path and machining conditions automatically

2219/36322 . . . Program shape interactively and tool change position manually by teaching
2219/36323 . . . Shape is alphabetical character
2219/36324 . . . Scan drawing, sketch of part, enter on screen coordinates, lines, circles
2219/36325 . . . Enter shape with mouse, tablet, enter on screen coordinates, lines, circles
2219/36326 . . . Define blank, part, area
2219/36327 . . . Define shape of part
2219/36328 . . . Display closed shape
2219/36329 . . . Display path on cylinder by developing cylinder into a plane
2219/36331 . . . Display block with cursor or highlight actual contour element
2219/36332 . . . Display different faces of work in different colour
2219/36333 . . . Selection from standard forms, shapes, partprograms, enter value for variable
2219/36334 . . . Select a shape, select a point or line and enter data
2219/36335 . . . Select and show already defined lines, circles to define from them new element
2219/36336 . . . Select a shape and use it to create a similar shape
2219/36337 . . . Select similar shape and derive motion defining sentences from original shape
2219/36338 . . . Create program for parallel, simultaneous operated slides, timing
2219/36339 . . . Time necessary for one slide equals time for second slide
2219/36341 . . . Prepare program to control multiple slides at the same time
2219/36342 . . . Tool path processing, sequence to cut paths
2219/36343 . . . Select machining method as function of selected tool
2219/36344 . . . Display different tools in different colours
2219/36345 . . . Prepare program for minimal idle strokes with multitool turret
2219/36346 . . . Display feed quantity and cutting speed as function of material to help user
2219/36347 . . . Select tool if tool life duration is sufficient for operation
2219/36348 . . . Enter, edit tool, cutter data
2219/36349 . . . Compensation part program with form of tool, in memory
2219/36351 . . . Display tool shapes to select tool and enter tool dimensions
2219/36352 . . . Select tool as function of part shape, number of grooves and groove width
2219/36353 . . . Display different offset surfaces in different colours to select right tool
2219/36354 . . . Select from table with machining type and corresponding tools
2219/36355 . . . Select tool with fuzzy logic
2219/36356 . . . Select tool as function of collision avoidance
2219/36357 . . . Tool line up, select right order of tool, optimal tool order loading, tool file
2219/36358 . . . Use of cd rom with catalog of tools
2219/36359 . . . As function of tool location
2219/36361 . . . Tool change time, program for optimal tool change time
2219/36362 . . . Tool change time as function of location in tool magazine, index
2219/36363 . . . Tool change time as function of cutter trajectory, spindle and slide times
2219/36364 . . . Tool change time as function of tool switch time, to replace tool with another
2219/36365 . . . Program so that minimal tool changes are needed
2219/36366 . . . Data, read in, distribution
2219/36367 . . . A tape reader for each axis
2219/36368 . . . Tape reader
2219/36369 . . . Measuring object, spectacle glass, to derive position data
2219/36371 . . . Barcode reader
2219/36372 . . . Light, magnetic pen
2219/36373 . . . Common tape reader for two controllers
2219/36374 . . . Dual, multiple tape reader
2219/36375 . . . Combination of two devices, floppy disk and tape reader
2219/36376 . . . Read out of memory synchronized with machine driven axis
2219/36377 . . . Read of several jobs
2219/36378 . . . Either from tape or other source, using same electronics
2219/36379 . . . Read in
2219/36381 . . . Timing, synchronization, start of reader
2219/36382 . . . Speed of read in of data as function of available power for driving servo, safety
2219/36383 . . . Manual input combined with input from computer or tape
2219/36384 . . . Load machining program and workpiece delivery program together
2219/36385 . . . Transfer, load data from rom, bubble memory into ram
2219/36386 . . . Bootstrap loader
2219/36387 . . . Interface between reader and nc
2219/36388 . . . Simulate reader to input data direct to nc, behind tape reader BTR
2219/36389 . . . Switch between input from internal manual thumbwheel and external input
2219/36391 . . . Keep subsystem stopped while load of program
2219/36392 . . . Rewrite date if power loss, check flag area, marked at start, end of writing
2219/36393 . . . Variable read in speed, from max to zero, controls execution speed of program
2219/36394 . . . Read in data from connected pc instead of nc control panel
2219/36395 . . . Load local computer program from host, data transfer ram to rom, BTR
2219/36396 . . . Load also function code needed to execute part program, compact controller
2219/36397 . . . Read reference data only after certain delay, to be sure data will not change
2219/36398 . . . Read of handwritten text
2219/36399 . . . On excess error or on release joystick stop movement, dead man, shut off motors
2219/36401 . . . Record play back, teach position and record it then play back
2219/36402 . . . Use rope, wire, cable, chain to record position and for playback
2219/36403 . . . Incremental detector of position deviation attached to tool for correction
2219/36404 . . . Adapt teached position as function of deviation 3-D, 2-D position workpiece

2219/36405 . . . Adjust path by detecting path, line with a photosensor
2219/36406 . . . Use a spring or gas pressure to keep tool on desired path
2219/36407 . . . Follow path with probe, store deviations for correction during normal operation
2219/36408 . . . During machining, store begin and end of region not finished during first pass
2219/36409 . . . Geometric adaptation by sensing force on surface of workpiece, object
2219/36411 . . . By coarse model of robot to modify commands, learned by feedforward controller
2219/36412 . . . Fine, autonomous movement of end effector by using camera
2219/36413 . . . Adapt playback as function of hardness material, time comparison to reach start point
2219/36414 . . . Compare image detected path with stored reference, difference corrects position
2219/36415 . . . Adjust path and attitude tool by detecting path, line with a photosensor, laser
2219/36416 . . . Adapt teached position as function of deviation 3-D, 2-D position of end effector, tool
2219/36417 . . . Programmed coarse position, fine position by alignment, follow line, path adaptive
2219/36418 . . . Modify trajectory by operator gesture, gesture force sensed by end effector
2219/36419 . . . Compare modified, corrected path with stored reference, difference too large alarm
2219/36421 . . . Assist in correction of position to form a circle or line
2219/36422 . . . During teaching shut off, disable motor to move arm easy
2219/36423 . . . During teaching release brake or decouple clutch from motor
2219/36424 . . . Balance mechanically arm to be moved
2219/36425 . . . Move manually, touch surface, record position
2219/36426 . . . Pilot lamp on end effector to guide operator
2219/36427 . . . Jog feed to a command position, if close enough robot takes over positioning
2219/36428 . . . During teaching set torque instruction for motor to zero
2219/36429 . . . Power assisted positioning
2219/36431 . . . Tv camera in place of tool, on display operator marks points, crosshair
2219/36432 . . . By putting some constraints on some DOF, move within limited volumes, areas, planes, limits motion in x, y or z planes, virtual reality constraints
2219/36433 . . . Position assisted teaching
2219/36434 . . . During teaching direct control signal to power servo for quick response
2219/36435 . . . Electromyographical, myoelectric control signal
2219/36436 . . . Arm follows movement of handheld device, camera detects, analyses motion
2219/36437 . . . Follow coarse programmed surface, detect contact feeler or no force, record point
2219/36438 . . . Manually selection of points on surface to select area to scan automatically
2219/36439 . . . Guide arm in path by slaving arm to projected path, beam riding
2219/36441 . . . Follow contour, line with sensor and record points
2219/36442 . . . Automatically teaching, teach by showing
2219/36443 . . . Auto follow coarse contour, operator can correct contour before recording
2219/36444 . . . Contour, teach contour of sawblade
2219/36445 . . . Mode selection between large displacement and precision work
2219/36446 . . . Keep tool stationary, move workpiece
2219/36447 . . . Project light on path to be followed, keep also distance constant
2219/36448 . . . Teaching, consider workpoint on workpiece temporarily as tip of end effector
2219/36449 . . . During teaching use standard subroutines, assemble them to macro sequences
2219/36451 . . . Handheld toollike probe, work instructor, lightweigted, connected to recorder
2219/36452 . . . Touch points with handheld probe, camera detects position and orientation probe
2219/36453 . . . Handheld tool like probe
2219/36454 . . . Master slave, director agent, operator replication
2219/36455 . . . Sensor, tactile feedback, operator feels forces of tool on workpiece
2219/36456 . . . Learning tool holding dynamics
2219/36457 . . . During teaching, force set point is automatically adapted to circumstances
2219/36458 . . . Teach only some points, for playback interpolation between points
2219/36459 . . . offline program for plural robots, send data to corresponding robots
2219/36461 . . . Teach for each next similar fixture, piece only some reference points
2219/36462 . . . Minimize teach time, compress data, many points in curve, few in line
2219/36463 . . . Manual switch to drive motor to wanted position, store, memorize position
2219/36464 . . . Position, teach, store extreme, full open, closed positions
2219/36465 . . . Teach and store also intermediate, between full open and closed positions, areas
2219/36466 . . . Teach motion profile in both directions, between full closed and open position
2219/36467 . . . Teach and store time needed from open to closed and closed to open position
2219/36468 . . . Teach and store intermediate stop position in moving route to avoid collision
2219/36469 . . . Separate axis movement with higher acceleration replaces simultaneous movement
2219/36471 . . . Recording speed different from playback speed
2219/36472 . . . During teaching low servo power, during playback high servo power
2219/36473 . . . Prohibit teaching if force, speed, acceleration of end effector is out of safe range
2219/36474 . . . Prohibit normal manipulator control during teaching
2219/36475 . . . When operator near robot, local pendant is enabled otherwise select local remote
2219/36476 . . . Record points if sufficient difference with previous position exists
2219/36477 . . . Timing record position according to pulses coding wheel
2219/36478 . . . Record on predetermined time, read in position, measured data
2219/36479 . . . Record position on trigger of touch probe
2219/36481 . . . Record at predetermined distances, read in position, measured data

2219/36482 . . . Recording of position and of command instructions
2219/36483 . . . Recording mechanical properties, tonal quality by force detection
2219/36484 . . . Each teached point has a correlated amount of shift data, independently modified
2219/36485 . . . Memorize open and closed state, motion parameters at each start up
2219/36486 . . . Memorize workpiece deviations as function of angle, compensate, extra feed
2219/36487 . . . Record position, motion and sound
2219/36488 . . . Record motion and emotion, mimics
2219/36489 . . . Position and force
2219/36491 . . . Contour of workpiece where other workpiece is to be installed
2219/36492 . . . Record position and orientation, posture of probe, tool
2219/36493 . . . Position of stillstand if no reverse and acceleration only, data compression
2219/36494 . . . Record position and inclination of tool, wrist
2219/36495 . . . Recording position and other parameters, current, tool diameter, voltage
2219/36496 . . . Memorize open, closed state of hand and corresponding motion parameters such as open, close and move, no move
2219/36497 . . . Select program, main and secondary program
2219/36498 . . . Main and secondary program for repeating same operations
2219/36499 . . . Part program, workpiece, geometry and environment, machining dependant, combine
2219/36501 . . . For each contour a tape, a program
2219/36502 . . . Ram for variable servo data, rom for fixed servo routine
2219/36503 . . . Adapt program to real coordinates, software orientation
2219/36504 . . . Adapt program to real coordinates, shape, dimension of tool, offset path
2219/36505 . . . Compare stored conditions to actual, adapt program
2219/36506 . . . Store in Rom and Ram
2219/36507 . . . Select program or execute command, control instructions as function of axis position
2219/36508 . . . Each pallet, workpiece, tool holder, selects corresponding tape reader, program
2219/36509 . . . Select as function of shape, dimension of workpiece
2219/36511 . . . Select by a detector
2219/36512 . . . Select by a selector, dip switch
2219/36513 . . . Select out of a plurality of programs, patterns
2219/36514 . . . Select by force, height or other detection
2219/36515 . . . As function of material or pattern direction, nerves of wood for optimal cutting
2219/36516 . . . Select acceleration deceleration profile as function of kind of machine
2219/36517 . . . Selecting nc program points to mated manipulator, robot program
2219/36518 . . . Selection of calibration program as function of parameter to be calibrated
2219/36519 . . . After sporadic change of program, return to program in use before
2219/36521 . . . Select by combination of detected force, acceleration, speed, work rate
2219/36522 . . . Select program using a management, workpiece number
2219/36523 . . . Select with code on workpiece, fixture, clamp, object
2219/36524 . . . Selection of Rom and ram
2219/36525 . . . On bad data block, reverse motion, correct and execute block
2219/36526 . . . Regenerate, hold reference previous block for bad actual value, block
2219/36527 . . . Separate input for machine data from operator and for program from programmer
2219/36528 . . . Interlock, inhibit nc control while tranferring data from host
2219/36529 . . . Warn, alert, notify operator to confirm a preset override value, command
2219/36531 . . . Inhibit, ignore or postpone new command if previous is still in execution
2219/36532 . . . Detect overflow of buffer
2219/36533 . . . Writing critical contour data as a whole, inhibit read out during writing
2219/36534 . . . Manual input overrides automatic control
2219/36535 . . . Check if instruction is executable, if not message to operator
2219/36536 . . . Inhibit, forbid, prevent execution of program if no tool or worpiece data
2219/36537 . . . On error acoustic signal
2219/36538 . . . Different tunes, melodies, voice patterns for different error indication
2219/36539 . . . Different colours for program and machine error, failure display
2219/36541 . . . Operation command stored in register, on completion also in other register
2219/36542 . . . Cryptography, encrypt, access, authorize with key, code, password
2219/36543 . . . Input a standard value automatically on power up or after power loss
2219/36544 . . . Inhibiting manual control while under automatic, other control vice versa
2219/36545 . . . Safety, save data at power loss
2219/36546 . . . Memory protection, protected fields
2219/36547 . . . Use binary code to avoid program tampering
2219/36548 . . . Save data if trigger signal received
2219/36549 . . . Regenerate faulty program block from previous and next block
2219/36551 . . . Inhibiting control after detecting data error
2219/36552 . . . Inhibiting simultaneous input from local and remote keyboard
2219/36553 . . . Track, channel on tape for each direction of movement
2219/36554 . . . Copy modified, corrected program to another tape, keep original intact
2219/36555 . . . Two tapes, programs one for position data, one for commands
2219/36556 . . . Compare, check orignal tape with converted, copy tape
2219/36557 . . . Copy entered program in memory to tape
2219/36558 . . . Forward and backward reading of tape, reverse execution program
2219/36559 . . . Copy one tape to another, transfer program from tape to tape, back-up
2219/36561 . . . Tape, band
2219/36562 . . . One tape, copy feeler controls several machines
2219/36563 . . . Two tapes
2219/36564 . . . Position of hole in tape corresponds with position of hole on workpiece

2219/36565 . . . Cartesian and polar data mixed
2219/36566 . . . Mix polar data with cartesian data
2219/36567 . . . On tape also commands for equipment attached to machine
2219/36568 . . . Control data is sequence of position, axis indication, time delay for speed
2219/36569 . . . Enter, punch only different, changed data, same not repeated in next block
2219/36571 . . . Coarse and fine dimensions
2219/36572 . . . Macro data or coarse dimension on tape
2219/36573 . . . X, y, z and tooloffset values or direction values
2219/36574 . . . Absolute x or delta x values
2219/36575 . . . On tape reference and command signals
2219/36576 . . . Relative phase of signals is variable
2219/36577 . . . Signals have a position dependant frequency
2219/36578 . . . Tracks for x, two for delta x, one for sign, three for y
2219/36579 . . . Only true dimension is recorded, no tool offset
2219/36581 . . . X, Y, Vx, Vy
2219/36582 . . . Special order
2219/36583 . . . Each punched hole is one pulse, increment
2219/36584 . . . X, Y, Z and tool offset or corrections
2219/36585 . . . Speed and acceleration, rate of change of speed
2219/36586 . . . Word address format
2219/36587 . . . Binary format
2219/36588 . . . Endless loop
2219/36589 . . . Making control tape
2219/36591 . . . Tape moves synchronized with machine driven axis
2219/36592 . . . Each track controls an axis
2219/37 . . Measurements
2219/37001 . . . Measuring problems
2219/37002 . . . Absence, detect absence, presence or correct position of workpiece
2219/37003 . . . Detect if no workpiece in holder
2219/37004 . . . Detect absence of tool
2219/37005 . . . Absence of tool accessories, material, like nails, staples, glue
2219/37006 . . . Measuring bars
2219/37007 . . . Join bars or cilinders binary
2219/37008 . . . Calibration of measuring system, probe, sensor
2219/37009 . . . Calibration of vision system, camera, adapt light level
2219/37011 . . . Set absolute marks on disk as exact position or address to position memory
2219/37012 . . . Adjust angular position of transducer
2219/37013 . . . Faulty number of total scale increments corrected evenly over scale
2219/37014 . . . Use of calibration bar, bar with cams
2219/37015 . . . Adaptive online camera, vision calibration
2219/37016 . . . Calibrate DC offset, measure offset and maintain fixed level
2219/37017 . . . Calibration of vision system, set correct attidude of sensor to workpiece
2219/37018 . . . Make measuring scale machine tool
2219/37019 . . . Position detection integrated in actuator, lvdt integrated linear actuator
2219/37021 . . . Robot controls position of touch probe
2219/37022 . . . Detector, measuring device incorporated within workpiece holder
2219/37023 . . . Step motor used as measuring device and as drive motor
2219/37024 . . . Measure single value, parameter with two detectors
2219/37025 . . . Retract, swing out of the way, measuring device during normal machining for protection
2219/37026 . . . Adjust sensor radially
2219/37027 . . . Sensor integrated with tool or machine
2219/37028 . . . Detail, extended range, discrimination, switch from one range to other
2219/37029 . . . Power supply position detector in common with drive motor
2219/37031 . . . Lvdt for x and y in a plane, center lines intersect at locating point
2219/37032 . . . Generate vibrations, ultrasound
2219/37033 . . . Energy saving by powering feedback device, potentiometer only during measuring
2219/37034 . . . Actuator coil is also used as measuring coil
2219/37035 . . . Sensor in air gap of drive, detect directly speed or position
2219/37036 . . . Position normally, stop, measure position tool with second independent sensor
2219/37037 . . . Remeasure workpiece regularly for deformation
2219/37038 . . . Protection cover over measuring device, probe, feeler opened when measuring
2219/37039 . . . Digitize position with flexible feeler, correction of position as function of flexion
2219/37041 . . . Digitize, electric wires form grid on surface
2219/37042 . . . Photographic, picture on film, photogrammetry
2219/37043 . . . Touch probe, store position of touch point on surface
2219/37044 . . . Ultrasound transmittors on surface, touch probe detects ultrasound, triangulation
2219/37045 . . . Probe detects electromagnetic fields from grid, antenna like digitizing tablet
2219/37046 . . . Use simultaneous several pairs of stereo cameras, synchronized
2219/37047 . . . After digitizing, edit graphically data
2219/37048 . . . Split beam, stripe projection on object, lines detected with cameras
2219/37049 . . . First a rasterscan, then align workpiece as function of height average, scan again
2219/37051 . . . First coarse measurement, around each point a fine measurement of surface
2219/37052 . . . Sense surface, mean value used as reference surface
2219/37053 . . . Optical triangulation
2219/37054 . . . Digitize every grid point of a raster
2219/37055 . . . Project stripes having a regular sine wave
2219/37056 . . . Mark point to be digitized graphically on screen
2219/37057 . . . Several feelers, probes touch model in rasterpoints
2219/37058 . . . Digitize not only position but also colour
2219/37059 . . . Probe connected to three pair of wires of which the length is measured
2219/37061 . . . Use matrix of optical sensors to detect form, edges of object
2219/37062 . . . Regulated scanning, the head deflection is controlled by a regulation circuit
2219/37063 . . . Controlled scanning, the head is moved along a given path
2219/37064 . . . After digitizing, reconstruct surface by interpolating the initial mesh points

2219/37065 . . . Map of stiffness, compliance of object
2219/37066 . . . Image from object together with references on background
2219/37067 . . . Calibrate work surface, reference markings on object, work surface
2219/37068 . . . Setting reference coordinate frame
2219/37069 . . . Calibrate probe, imitated tool, repeated measurements for different orientations
2219/37071 . . . Measurement program is created, executed on object data, no real object, no CMM is present
2219/37072 . . . Surface covered with grid of electric wires, of coloured tape on object
2219/37073 . . . Workpiece surface covered with shielding coating, against disturbing fields
2219/37074 . . . Projection device, monitor, track tool, workpiece form, process on display
2219/37075 . . . Print out of document measured results or record on tape
2219/37076 . . . Display load on tool, motor graphically on screen
2219/37077 . . . Relative movement
2219/37078 . . . Display machining, processing parameters with curves, pictograms
2219/37079 . . . Display probing result on drawing taken from cad data
2219/37081 . . . Display machining parameters
2219/37082 . . . Indicate, point region on path, locus, display path and machining parameters
2219/37083 . . . Switch display from normal mode to inspection mode, to monitor conditions
2219/37084 . . . Display tool parameters
2219/37085 . . . Display in real time of state variables of control system
2219/37086 . . . Display real, measured machining load
2219/37087 . . . Cutting forces
2219/37088 . . . Indicate service condition, status
2219/37089 . . . Speed error
2219/37091 . . . Motion and force
2219/37092 . . . Display position actual and or target
2219/37093 . . . Display speed
2219/37094 . . . Hall sensor
2219/37095 . . . Digital handheld device with data interface
2219/37096 . . . Invar scale, low temperature coefficient
2219/37097 . . . Marker on workpiece to detect reference position
2219/37098 . . . X y scale plate instead of two ruler scale, two dimensional scale
2219/37099 . . . One detector for coarse and fine target location, variable resolution
2219/37101 . . . Vector gauge, telescopic ballbar
2219/37102 . . . Single detector for whole range, both x and y axis
2219/37103 . . . Limit, proximity switch
2219/37104 . . . Absolute encoder
2219/37105 . . . Soft limit, store limits in counters, use content of counters as limit
2219/37106 . . . Inductive, differential transformer, pins
2219/37107 . . . Acupin
2219/37108 . . . Rasters, grid on xy-plane
2219/37109 . . . Photoelectric scanned raster, rule and photocell, microscope
2219/37111 . . . Rule and photocell, microscope
2219/37112 . . . Several scales with one device
2219/37113 . . . Psd position sensitive detector, light spot on surface gives x, y position
2219/37114 . . . Precision screw
2219/37115 . . . Photogrammetric position detection
2219/37116 . . . Shape sensor leads tool, in front of tool
2219/37117 . . . Optical sensor, delivers analog signal as function of displacement
2219/37118 . . . Inductive, coil moves over conical, tapered core
2219/37119 . . . Atomic force probe
2219/37121 . . . Linear transducer
2219/37122 . . . Signal analyser
2219/37123 . . . Extensible ball bar with potentiometer, lvdt
2219/37124 . . . Magnetic sensor
2219/37125 . . . Photosensor, as contactless analog position sensor, signal as function of position
2219/37126 . . . Wire, tape around cylinder measures displacement, string encoder
2219/37127 . . . Spm scanning probe microscopy, stm scanning tunneling microscopy
2219/37128 . . . Tool itself emits vibrations to be detected to build an image of surface
2219/37129 . . . Mark, engrave workpiece at specific surface point for measurement, calibration
2219/37131 . . . Moire pattern, diffraction grating, fringe
2219/37132 . . . Polyhedral prism
2219/37133 . . . Linear, rotary variable differential transformer, lvdt, rvdt
2219/37134 . . . Gyroscope
2219/37135 . . . Two counters receiving pulses from two encoders, one for speed, one for position
2219/37136 . . . Control resolution of encoder
2219/37137 . . . Encoder combined with barcode label, reader
2219/37138 . . . Encoder and gear and absolute coder, give together absolute position of rotation
2219/37139 . . . Sampling output of encoder at precisely defined intervals
2219/37141 . . . Programmable divider for counter as buffer for microprocessor, read on interrupt
2219/37142 . . . Center position between two pulses, in the middle of a bit
2219/37143 . . . Divide feedback pulses to make feedback independent from resolution encoder
2219/37144 . . . Delay marker to synchronize motions
2219/37145 . . . Multiturn fine counter counts total pulses, index counter counts turns
2219/37146 . . . Second counter reset to zero on marker, to detect counting errors
2219/37147 . . . Sampling rate low during power loss
2219/37148 . . . Switch between rise, fall of pulses of one phase and of both phases, coarse fine
2219/37149 . . . Multiplexer to send encoder and rotor pole position to same output lines
2219/37151 . . . Handling encoder signal, compensation for light variation, stray light
2219/37152 . . . Combination 00-01-10-11, previous, actual pulses, or two series of pulses, and rom
2219/37153 . . . Encoder delivers only one channel of pulses, using only one detector
2219/37154 . . . Encoder and absolute position counter
2219/37155 . . . Encoder and delta position counter
2219/37156 . . . Pulse derived from belt driving drum

2219/37157 . . . Pulses derived from brake disk having north and south poles
2219/37158 . . . Pulse derived from perforated belt along track
2219/37159 . . . Source of pulse, pulse derived from gear, plate teeth
2219/37161 . . . Motor rotor has a normal magnetised ring and a second ring, magnetic decoder
2219/37162 . . . Marker, reflector mounted on chuck, workpiece holder
2219/37163 . . . Marker derived from phase of motor
2219/37164 . . . Pulse derived from encoder built into ball bearing
2219/37165 . . . Derive pulse from commution position, build into brushless motor
2219/37166 . . . Rotating magnets shunt motor over resistance, cause current variations
2219/37167 . . . Count number of periods of voltage supply
2219/37168 . . . Inductive sensor senses fluctuations, spikes in motor current
2219/37169 . . . Derive incremental pulse from motor current deviation
2219/37171 . . . Commutation brushes, sensors deliver increment
2219/37172 . . . Encoder with hall effect and reed relays, and decoder gives absolute position
2219/37173 . . . Encapsulate electronics of encoder in resin, electronics and encoder integrated
2219/37174 . . . Encoder with infrared
2219/37175 . . . Normal encoder, disk for pulses, incremental
2219/37176 . . . Disk emits phase shifted pulses, special convertor
2219/37177 . . . Linear encoder
2219/37178 . . . Magnetic marks on screw
2219/37179 . . . Coarse encoder combined with fine grid ccd detector
2219/37181 . . . Encoder delivers sinusoidal signals
2219/37182 . . . Slit plate encoder
2219/37183 . . . Marker or index or coded information as well as position pulses
2219/37184 . . . Hall generator cooperates with magnetic ring, gives signal with DC offset
2219/37185 . . . Magnetic ring and sensor
2219/37186 . . . Camera reads large number of marks, derive frequency of dark-light
2219/37187 . . . Disk with magnetic, inductive sensors
2219/37188 . . . Encoder pulses reset high resolution clock, get position from counting clock pulses
2219/37189 . . . Camera with image processing emulates encoder output
2219/37191 . . . General problems for standing waves, torque, surface inspection
2219/37192 . . . Problems
2219/37193 . . . Multicoordinate measuring system, machine, cmm
2219/37194 . . . Probe work, calculate shape independent of position, orientation, best fit
2219/37195 . . . Measuring dimension independent from accuracy of nc, machine tool
2219/37196 . . . Measuring station, flexible, integrated cmm
2219/37197 . . . From measured data derive form, roundness, orientation, parallel, straightness
2219/37198 . . . Machine as measuring station, use tool or probe, in process incycle
2219/37199 . . . Hole location
2219/37201 . . . Measuring several points at the same time
2219/37202 . . . Footprint, probe piece on machine, then on cmm to avoid errors of machine
2219/37203 . . . Compensate probed values as function of reference plane of fixture, clamp
2219/37204 . . . Move synchronously associated sensor elements independently at both sides
2219/37205 . . . Compare measured, vision data with computer model, cad data
2219/37206 . . . Inspection of surface
2219/37207 . . . Verify, probe, workpiece
2219/37208 . . . Vision, visual inspection of workpiece
2219/37209 . . . Estimate life of gear, drive
2219/37211 . . . Measure temperature, compensate cmm program for temperature
2219/37212 . . . Visual inspection of workpiece and tool
2219/37213 . . . Inhibit measuring if one of the joints is near endstop
2219/37214 . . . Detect failed machine component, machine performance degradation
2219/37215 . . . Inspect application of solder paste, glue to workpiece
2219/37216 . . . Inpect component placement
2219/37217 . . . Inspect solder joint, machined part, workpiece, welding result
2219/37218 . . . Compensate for offset due to probe diameter, detect exact contact point
2219/37219 . . . Predict next probed point from previous probed points
2219/37221 . . . Probe fixture to know datum points
2219/37222 . . . Probe workpiece for correct setup
2219/37223 . . . Identify minimum number of appropriate measuring points
2219/37224 . . . Inspect wafer
2219/37225 . . . Tool holder, measure forces in chuck, tool holder
2219/37226 . . . Monitor condition of spindle, tool holder, transmit to nc controller
2219/37227 . . . Probing tool for its geometry
2219/37228 . . . Tool inspection, condition, dull tool
2219/37229 . . . Test quality tool by measuring time needed for machining
2219/37231 . . . Tool used as touch probe, sensor
2219/37232 . . . Wear, breakage detection derived from tailstock, headstock or rest
2219/37233 . . . Breakage, wear of rotating tool with multident saw, mill, drill
2219/37234 . . . Monitor tool before, after and during machining
2219/37235 . . . Detect bad tool by relative movement of tool with respect to tool holder
2219/37236 . . . Tool serves, acts also as measuring device
2219/37237 . . . Tool collision, interference
2219/37238 . . . Missing tool
2219/37239 . . . Plastic deformation of tool
2219/37241 . . . Displacement of tool, miss inserted
2219/37242 . . . Tool signature, compare pattern with detected signal
2219/37243 . . . Tool breakage by comparing tool image, length before and after machining
2219/37244 . . . Detect tool breakage already in tool magazine
2219/37245 . . . Breakage tool, failure

2219/37246 . . . Compare estimated torques of different axis with reference for breakage
2219/37247 . . . By electrical contact, disappears when breakage
2219/37248 . . . By monitoring changes in capacitive circuit
2219/37249 . . . Correction coefficient of life time as function of kind of machining
2219/37251 . . . Selfcorrecting, counter for tool life adapts correction
2219/37252 . . . Life of tool, service life, decay, wear estimation
2219/37253 . . . Fail estimation as function of lapsed time of use
2219/37254 . . . Estimate wear of subsystem of machine with measures from other subsystems
2219/37255 . . . Using fuzzy logic techniques
2219/37256 . . . Wear, tool wear
2219/37257 . . . Crater wear of tool
2219/37258 . . . Calculate wear from workpiece and tool material, machining operations
2219/37259 . . . Resolver for coarse, photo cell for fine position on grid crossing
2219/37261 . . . Encoder and potentiometer to detect fault measurement
2219/37262 . . . Mixing pins and fine positioning
2219/37263 . . . Absolute and incremental encoder, detector combined
2219/37264 . . . Cam for absolute positions, encoder for incremental position
2219/37265 . . . Rotary potentiometer and incremental counter for each maximum
2219/37266 . . . Infrared
2219/37267 . . . Thermocouple
2219/37268 . . . Tool workpiece junction, thermoelectric interface
2219/37269 . . . Ultrasonic, ultrasound, sonar
2219/37271 . . . Using standing waves
2219/37272 . . . Capacitive
2219/37273 . . . Wheatstone bridge
2219/37274 . . . Strain gauge
2219/37275 . . . Laser, interferometer
2219/37276 . . . Position changes frequency
2219/37277 . . . Inductive proximity sensor
2219/37278 . . . Optical waveguide, fiberoptic sensor
2219/37279 . . . Fiber optic proximity sensor
2219/37281 . . . Laser range finder
2219/37282 . . . Current transformator
2219/37283 . . . Photoelectric sensor
2219/37284 . . . Capacitive 3-D proximity sensor
2219/37285 . . . Load, current taken by motor
2219/37286 . . . Photoelectric sensor with reflection, emits and receives modulated light
2219/37287 . . . Fiber optic interferometer
2219/37288 . . . Tracking lasers follow object, reflection gives 3-D position
2219/37289 . . . Inductive
2219/37291 . . . Electro acoustic
2219/37292 . . . Eddy current
2219/37293 . . . Magnetostrictive effect on ferrous rod, ultrasonic wave, time delay measured
2219/37294 . . . Coarse digitized position combined with fine digitized analog position signal
2219/37295 . . . Measure workpiece while machining other workpiece
2219/37296 . . . Electronic graduation, scale expansion, interpolation
2219/37297 . . . Two measurements, on driving motor and on slide or on both sides of motor
2219/37298 . . . Two measurements, position of slide and position of tool
2219/37299 . . . Measure same parameter from three different space directions
2219/37301 . . . Two measurements, speed with tachometer and speed with encoder
2219/37302 . . . Measure tool length, workpiece configuration without stopping movement
2219/37303 . . . Two measurements, speed of motor and speed of load
2219/37304 . . . Combined position measurement, encoder and separate laser, two different sensors
2219/37305 . . . Drive step motor with pulses, at stop with DC current to avoid emi when measuring
2219/37306 . . . Two sensors and two scales for same measurement of relative movement between x y
2219/37307 . . . Detector in line, in plane of tool to avoid parallax
2219/37308 . . . Measure workpiece relieved from stress, redrawn, disengaged tool
2219/37309 . . . Selecting a desired sensor structure
2219/37311 . . . Derive speed from current, use of lookup table
2219/37312 . . . Derive speed from motor current
2219/37313 . . . Derive speed from position
2219/37314 . . . Derive position from speed
2219/37315 . . . High speed and low speed signals are derived in a different way
2219/37316 . . . Derive speed from two phased position signals, with high range and resolution
2219/37317 . . . Derive position from current, voltage, back electromotive force bemf
2219/37318 . . . Derive speed from back electromotive force, bemf
2219/37319 . . . Derive acceleration, force, torque from current
2219/37321 . . . Derive acceleration from net driving force
2219/37322 . . . Derive position from frequency power supply
2219/37323 . . . Derive acceleration from position or speed
2219/37324 . . . Derive position, speed from acceleration
2219/37325 . . . Multisensor integration, fusion, redundant
2219/37326 . . . Automatic configuration of multisensor, adaptive, active sensing
2219/37327 . . . Select lookup table corresponding to sensor
2219/37328 . . . Decentralised data fusion
2219/37329 . . . Far away and near by sensor groups
2219/37331 . . . Sensor fusion using extended kalman filter
2219/37332 . . . Detect power of noise source using sound and visual sensors
2219/37333 . . . Position of control valve and position of controlled actuator
2219/37334 . . . Diameter of tool with teeth
2219/37335 . . . Diameter tool
2219/37336 . . . Cutting, machining time
2219/37337 . . . Noise, acoustic emission, sound
2219/37338 . . . Magnetic or electric property of tool to control feed
2219/37339 . . . Eccentricity, cylindricity, circularity
2219/37341 . . . Sectional distortion of machining face of workpiece

2219/37342 . . . Overload of motor, tool
2219/37343 . . . Load, vectorial components of load
2219/37344 . . . Torque, thrust, twist, machining force measurement
2219/37345 . . . Dimension of workpiece, diameter
2219/37346 . . . Cutting, chip quality
2219/37347 . . . Speed, velocity
2219/37348 . . . Power, wattmeter voltage times current
2219/37349 . . . Imbalance of tool or tool holder
2219/37351 . . . Detect vibration, ultrasound
2219/37352 . . . Frequency
2219/37353 . . . Amplitude
2219/37354 . . . Powerfactor, phase between voltage and current
2219/37355 . . . Cutting, milling, machining force
2219/37356 . . . Torsion, twist
2219/37357 . . . Force, pressure, weight or deflection
2219/37358 . . . Depth of cut
2219/37359 . . . Contour, to sense corners, edges of surface
2219/37361 . . . acoustic feedback, for speed, if speed very low hearing is better than seeing
2219/37362 . . . Hardness
2219/37363 . . . Texture
2219/37364 . . . Thermal conductivity
2219/37365 . . . Surface shape, gradient
2219/37366 . . . Colour, surface colour
2219/37367 . . . Grinding rate
2219/37368 . . . Displacement perpendicular to probe movement
2219/37369 . . . Measure tool lenght and diameter together with single sensor
2219/37371 . . . Flow
2219/37372 . . . Position and speed
2219/37373 . . . Friction
2219/37374 . . . Deflection
2219/37375 . . . Climate, temperature and humidity
2219/37376 . . . Inclination, gradient of machine base
2219/37377 . . . Roundness of workpiece
2219/37378 . . . Balance of workpiece from vibration sensor and angle sensor
2219/37379 . . . Profile, diameter along workpiece
2219/37381 . . . Force in steady rest
2219/37382 . . . Voltage over or short circuit between tool and workpiece
2219/37383 . . . Tool length
2219/37384 . . . Change of actuator current
2219/37385 . . . Peripheral speed
2219/37386 . . . Lateral movement of tool
2219/37387 . . . Nanometer position
2219/37388 . . . Acceleration or deceleration, inertial measurement
2219/37389 . . . Magnetic flux
2219/37391 . . . Null, initial load, no load torque detection or other parameter at no load
2219/37392 . . . Motion
2219/37393 . . . acoustic feedback varies as function of positional error
2219/37394 . . . Measuring diameter of workpieces with longitudinal grooves
2219/37395 . . . Detection sparks during machining
2219/37396 . . . Tactile feedback, operator feels reaction, force reflection
2219/37397 . . . Measuring gap between tool and workpiece
2219/37398 . . . Thickness
2219/37399 . . . Pressure
2219/37401 . . . Differential pressure
2219/37402 . . . Flatness, roughness of surface
2219/37403 . . . Bending, springback angle
2219/37404 . . . Orientation of workpiece or tool, surface sensor
2219/37405 . . . Contact detection between workpiece and tool, probe, feeler
2219/37406 . . . Detect position of detector contact point relative to reference on tool slide
2219/37407 . . . Detect position of detector contact point relative to reference on tool
2219/37408 . . . Combination of contact and contactless detection to avoid tool contact with workpiece
2219/37409 . . . Measure different pressure of fluid flow on contacting surface
2219/37411 . . . Measure contact from force and velocity detection
2219/37412 . . . acoustical detection of contact
2219/37413 . . . By conductivity, short circuit between tool, probe and metallic surface
2219/37414 . . . By microswitch
2219/37415 . . . By cutting light beam
2219/37416 . . . By measuring phase shift between voltage and current of feedmotor
2219/37417 . . . By linear varying electrical signal
2219/37418 . . . By capacitive means
2219/37419 . . . Measuring rotation of non driven axis after being touched by driven axis
2219/37421 . . . Measure braking, slower rotation of driven axis, tool upon contact
2219/37422 . . . Distance and attitude detector
2219/37423 . . . Distance, gap between tool and surface sensor
2219/37424 . . . Calculate distance from known inner diameter of coil, bobbin and detected image
2219/37425 . . . Distance, range
2219/37426 . . . Detected with infrared sensor
2219/37427 . . . Detected with thermocouple
2219/37428 . . . Temperature of tool
2219/37429 . . . Temperature of motor
2219/37431 . . . Temperature
2219/37432 . . . Detected by accelerometer, piezo electric
2219/37433 . . . Detected by acoustic emission, microphone
2219/37434 . . . Measuring vibration of machine or workpiece or tool
2219/37435 . . . Vibration of machine
2219/37436 . . . Prediction of displacement, relative or absolute, motion
2219/37437 . . . Prediction of cutting force with flexible ball end milling model
2219/37438 . . . Prediction of machining error with flexible ball end milling model
2219/37439 . . . Computer assisted inspection, cad interactive with manual commands
2219/37441 . . . Use nc machining program, cad data for measuring, inspection
2219/37442 . . . Cad and cap for cmm
2219/37443 . . . Program cmm, coordinate measuring machine, use cad data
2219/37444 . . . Program cmm by using a stylus to detect points on a real workpiece

2219/37445 . . . Load teaching program from file server, enter teaching data at pendant
2219/37446 . . . Select measuring program together with control parameters
2219/37447 . . . Path planning using ann, for measurement task pattern, optimal path, dummy points
2219/37448 . . . Inspection process planner
2219/37449 . . . Inspection path planner
2219/37451 . . . Plan sensor placement for optimal inspection
2219/37452 . . . Generate nc program from metrology program, defining cmm probe path
2219/37453 . . . Simulate measuring program, graphical interactive generation of program
2219/37454 . . . Interactive, enter also tolerance
2219/37455 . . . After entering one measuring cycle, display in separate window instruction list
2219/37456 . . . Program proposes measuring points
2219/37457 . . . On machine, on workpiece
2219/37458 . . . Reference on machine, on workpiece and on tool
2219/37459 . . . Reference on workpiece, moving workpiece moves reference point
2219/37461 . . . Two rotary potentiometers, only one used, switch over to other on ambiguity
2219/37462 . . . Resistor, potentiometers
2219/37463 . . . Tapped resistors, not continuous
2219/37464 . . . Potentiometer with dual wiper
2219/37465 . . . Magnetic resistor
2219/37466 . . . Dual potentiometers with sin and cos output
2219/37467 . . . Continuous rotary potentiometer, no end
2219/37468 . . . Magnetic resistor sensors used as incremental encoder
2219/37469 . . . Two, more slides use resolver with common secondary, different primary frequency
2219/37471 . . . Resolver, synchro
2219/37472 . . . Synchro
2219/37473 . . . Resolver
2219/37474 . . . Resolver with several phases
2219/37475 . . . Resolver emits two redundant signals for safety
2219/37476 . . . Single resolver for speed, rotor and absolute position, IMAS
2219/37477 . . . Inductosyn
2219/37478 . . . Excitation of resolver by pulses instead of continuous wave, to save energy
2219/37479 . . . Excitation as function of speed of rotor, to get always stable detection waves
2219/37481 . . . Sampling rate for output of resolver as function of pulse rate of excitation
2219/37482 . . . Control amplitude of excitation of resolver
2219/37483 . . . Synchronize resolver reference frequency with clock of position control
2219/37484 . . . Differential resolver
2219/37485 . . . Phaseshift to reference counted
2219/37486 . . . Resolver emits pulses at zerocrossings, counter
2219/37487 . . . Counter combined with angle to digital convertor
2219/37488 . . . Angle to digital conversion
2219/37489 . . . Emit binary code at quadrant 00+01+10+11, count pulse for 11-to-000 and 00-to-11
2219/37491 . . . Compensate non linearity of transducer by lookup table
2219/37492 . . . Store measured value in memory, to be used afterwards
2219/37493 . . . Use of different frequency band pass filters to separate different signals
2219/37494 . . . Intelligent sensor, data handling incorporated in sensor
2219/37495 . . . Correction of measured value as function of given, reference surface
2219/37496 . . . Root mean square
2219/37497 . . . Summing, integration of signal
2219/37498 . . . Variable amplification, gain for detected signal, select correct level range
2219/37499 . . . Determine cumulative deviation, difference
2219/37501 . . . Delay detected signal avoids transients, start up noise
2219/37502 . . . Input signal converted to logarithmic value
2219/37503 . . . Set integrator of acceleration detector to zero at velocity zero, avoids drift
2219/37504 . . . Differential use of sensors, to double precision
2219/37505 . . . Debounce contact signal from absolute reference position cam
2219/37506 . . . Correction of position error
2219/37507 . . . Spectral density analysis
2219/37508 . . . Cross correlation
2219/37509 . . . Intelligent sensor, incorporation temperature compensation
2219/37511 . . . Select and process only those detected signals needed for a certain purpose
2219/37512 . . . Correction for detection delay
2219/37513 . . . Convert time domain signal to frequency domain signal
2219/37514 . . . Detect normality, novelty in time series for online monitoring
2219/37515 . . . Error separation, eliminate eccentricity
2219/37516 . . . Combine results, opinions of multiple but same sensors, fuzzy logic
2219/37517 . . . Compensation of position for vibration of probe, calibration x-y lookup table
2219/37518 . . . Prediction, estimation of machining parameters from cutting data
2219/37519 . . . From machining parameters classify different fault cases
2219/37521 . . . Ann to map sensor signals to decision signals
2219/37522 . . . Determine validity of measured signals
2219/37523 . . . Reduce noise by combination of digital filter and estimator
2219/37524 . . . Sampling of forces and signal analysis are triggered as function of rotation angle
2219/37525 . . . Mean, average values, statistical derived values
2219/37526 . . . Determine time or position to take a measurement
2219/37527 . . . Frequency filtering and amplitude qualification
2219/37528 . . . Separate force signal into static and dynamic component
2219/37529 . . . Synchronous demodulation
2219/37531 . . . Superpose modulated measuring signal on servo command reference
2219/37532 . . . Synchronized data acquisition
2219/37533 . . . Real time processing of data acquisition, monitoring
2219/37534 . . . Frequency analysis
2219/37535 . . . Signal processing, ratio of signals against fluctuation of signals
2219/37536 . . . Rate of change, derivative
2219/37537 . . . Virtual sensor

2219/37538 . . . Window for signal, to detect signal at peak or zero values
2219/37539 . . . Read values twice, for correctness
2219/37541 . . . Switch off measuring, control system during test of encoder, resolver
2219/37542 . . . Curve fitting measured points, predict, extrapolate dimension in time
2219/37543 . . . Set, compare to maximum, peak, minimum value
2219/37544 . . . Compare detected signal to several references to derive several control actions
2219/37545 . . . References to be compared vary with evolution of measured signals, auto-calibrate
2219/37546 . . . Compare two positions measured with different methods, alarm if difference too high
2219/37547 . . . Ignore position information from detector during invalid intervals
2219/37548 . . . Avoid false motion condition, jitter, compare three recent values with possible values
2219/37549 . . . Limit switch protected against overload
2219/37551 . . . Select for each detector type corresponding signal processor
2219/37552 . . . Detect loss of correct excitation moment of step motor, correct excitation
2219/37553 . . . Two cameras one for coarse scanning, other for fine scanning
2219/37554 . . . Two camera, or tiltable camera to detect different surfaces of the object
2219/37555 . . . Camera detects orientation, position workpiece, points of workpiece
2219/37556 . . . Camera detects fictive contour of workpiece, by reflection
2219/37557 . . . Camera for coarse, acoustic array for fine vision
2219/37558 . . . Optical sensor, scanner
2219/37559 . . . Camera, vision of tool, compute tool center, detect tool wear
2219/37561 . . . Move camera until image corresponds to stored image of same workpiece
2219/37562 . . . Scan mark at certain angle, to avoid glare noise
2219/37563 . . . Ccd, tv camera
2219/37564 . . . Center of camera vision aligned with axis of drill
2219/37565 . . . Camera to detect precisely, crosshair, positions on workpiece by operator
2219/37566 . . . Explore autonomous, explore surface until useful measurement possible
2219/37567 . . . 3-D vision, stereo vision, with two cameras
2219/37568 . . . 3-D spectacles, glasses, left and right synchronised with images on screen
2219/37569 . . . Radiography in x and y, x-ray images
2219/37571 . . . Camera detecting reflected light from laser
2219/37572 . . . Camera, tv, vision
2219/37573 . . . In-cycle, insitu, during machining workpiece is measured continuously
2219/37574 . . . In-process, in cycle, machine part, measure part, machine same part
2219/37575 . . . Pre-process, measure workpiece before machining
2219/37576 . . . Post-process, measure worpiece after machining, use results for new or same
2219/37577 . . . In-process and post-process measurement combined
2219/37578 . . . Compare images of workpiece before and after machining
2219/37579 . . . Run away measured value by differentiating measured signal, rate of change
2219/37581 . . . Measuring errors
2219/37582 . . . Position, angle of workpiece surface
2219/37583 . . . Detect separation, cutting, penetration, piercing, break through material
2219/37584 . . . Deformation of machined material
2219/37585 . . . Start, begin and end, halt, stop of machining
2219/37586 . . . Detect, discriminate cutting or non cutting machining state
2219/37587 . . . Count number of machining cycles, frequency use of tool
2219/37588 . . . Detect swarf, building up of swarf
2219/37589 . . . Measure drift of servo during positioning, not disturbing actual position
2219/37591 . . . Plant characteristics
2219/37592 . . . Detect machine, workpiece noise by operator with headphone, directional
2219/37593 . . . Measure correct setting of workpiece
2219/37594 . . . Detect discharge state between electrode and workpiece
2219/37595 . . . Detect if drill bit is in peck cycle
2219/37596 . . . Surface layer to be machined away, lowest point, minimum material to be cut
2219/37597 . . . Spectrum analyser
2219/37598 . . . Chip length
2219/37599 . . . Presence of metal
2219/37601 . . . Count number of times tool is overloaded, derived from mean and limit
2219/37602 . . . Material removal rate
2219/37603 . . . System time constant
2219/37604 . . . Hysteresis of actuator, servo
2219/37605 . . . Accuracy, repeatability of machine, robot
2219/37606 . . . Thread form, parameters
2219/37607 . . . Circular form
2219/37608 . . . Center and diameter of hole, wafer, object
2219/37609 . . . Over-travel
2219/37611 . . . Relative movement between tool and workpiece carriage
2219/37612 . . . Transfer function, kinematic identification, parameter estimation, response
2219/37613 . . . Cutter axis tilt of end mill
2219/37614 . . . Number of workpieces, counter
2219/37615 . . . Dead time, between detecting finished workpieces and feedback measured value
2219/37616 . . . Use same monitoring tools to monitor tool and workpiece
2219/37617 . . . Tolerance of form, shape or position
2219/37618 . . . Observe, monitor position, posture of tool
2219/37619 . . . Characteristics of machine, deviation of movement, gauge,
2219/37621 . . . Inertia, mass of rotating, moving tool, workpiece, element
2219/37622 . . . Detect collision, blocking, stall by change, lag in position
2219/37623 . . . Detect collision, blocking by use of integrated load between two limits
2219/37624 . . . Detect collision, blocking by measuring change of velocity or torque
2219/37625 . . . By measuring changing forces in a time window

2219/37626 . . . By measuring changing forces in different position zones
2219/37627 . . . Measure elapsed time needed for positioning
2219/37628 . . . Use of special detector the output of which changes if object detected
2219/37629 . . . Detect sudden change of direction due to collision
2219/37631 . . . Means detecting object in forbidden zone
2219/37632 . . . By measuring current, load of motor
2219/37633 . . . Output modulated signal on detection of blocking instead of flat signal
2219/37634 . . . By measuring vibration
2219/39 . . Robotics, robotics to robotics hand
2219/39001 . . . Robot, manipulator control
2219/39002 . . . Move tip of arm on straight line
2219/39003 . . . Move end effector on ellipse, circle, sphere
2219/39004 . . . Assisted by automatic control system for certain functions
2219/39005 . . . Feedback for stability of manipulator, felt as force reflection
2219/39006 . . . Move end effector in a plane, describing a raster, meander
2219/39007 . . . Calibrate by switching links to mirror position, tip remains on reference point
2219/39008 . . . Fixed camera detects reference pattern held by end effector
2219/39009 . . . Using fixture with potentiometer, wire to end effector, estimate lenght of wire
2219/39011 . . . Fixed camera detects deviation end effector from reference on workpiece, object
2219/39012 . . . Calibrate arm during scanning operation for identification of object
2219/39013 . . . Locate movable manipulator relative to object, compare to stored gridpoints
2219/39014 . . . Match virtual world with real world
2219/39015 . . . With different manipulator configurations, contact known sphere, ballbar
2219/39016 . . . Simultaneous calibration of manipulator and camera
2219/39017 . . . Forward calibration, find actual pose world space for given joint configuration
2219/39018 . . . Inverse calibration, find exact joint angles for given location in world space
2219/39019 . . . Calibration by cmm coordinate measuring machine over a certain volume
2219/39021 . . . With probe, touch reference positions
2219/39022 . . . Transform between measuring and manipulator coordinate system
2219/39023 . . . Shut off, disable motor and rotate arm to reference pin
2219/39024 . . . Calibration of manipulator
2219/39025 . . . Spheric tool interrupts transmitted calibration beam, in different configurations
2219/39026 . . . Calibration of manipulator while tool is mounted
2219/39027 . . . Calibrate only some links, part of dofs, lock some links, ref pins on links
2219/39028 . . . Relative to base calibrated 6-DOF device, cmm connected between wrist and base
2219/39029 . . . Verify if calibration position is a correct, by comparing with range in rom
2219/39031 . . . Use of model for robot and for measuring device
2219/39032 . . . Touch probe senses constraint known plane, derive kinematic calibration
2219/39033 . . . Laser tracking of end effector, measure orientation of rotatable mirror
2219/39034 . . . Use of telescopic ballbar
2219/39035 . . . Screw axis measurement, each joint moved in circle, cpa circle point analysis
2219/39036 . . . Screw axis measurement, jacobian estimation from wrist and joint torques, no motion
2219/39037 . . . Screw axis measurement, jacobian estimation from end effector and joint speeds
2219/39038 . . . Determine position of two cameras by using a common reference grid
2219/39039 . . . Two cameras detect same reference on workpiece to define its position in space
2219/39041 . . . Calibrate only for end position
2219/39042 . . . Interchange robot and reference pattern, measure by camera at same location
2219/39043 . . . Self calibration using ANN to map robot poses to the commands, only distortions
2219/39044 . . . Estimate error model from error at different attitudes and points
2219/39045 . . . Camera on end effector detects reference pattern
2219/39046 . . . Compare image of plate on robot with reference, move till coincidence, camera
2219/39047 . . . Calibration plate mounted on robot, plate comprises sensors for measuring target
2219/39048 . . . Closed loop kinematic self calibration, grip part of robot with hand
2219/39049 . . . Calibration cooperating manipulators, closed kinematic chain by bolting
2219/39051 . . . Calibration cooperating manipulators, closed kinematic chain by alignment
2219/39052 . . . Self calibration of parallel manipulators
2219/39053 . . . Probe, camera on hand scans many points on own robot body, no extra jig
2219/39054 . . . From teached different attitudes for same point calculate tool tip position
2219/39055 . . . Correction of end effector attachment, calculated from model and real position
2219/39056 . . . On line relative position error and orientation error calibration
2219/39057 . . . Hand eye calibration, eye, camera on hand, end effector
2219/39058 . . . Sensor, calibration of sensor, potentiometer
2219/39059 . . . Sensor adaptation for robots by software
2219/39061 . . . Calculation direct dynamics
2219/39062 . . . Calculate, jacobian matrix estimator
2219/39063 . . . Quick calculation of coordinates by using precalculated, stored matrixes, inverses
2219/39064 . . . Learn kinematics by ann mapping, map spatial directions to joint rotations
2219/39065 . . . Calculate workspace for end effector, manipulator
2219/39066 . . . Two stage inverse kinematics algorithm, first inner joint variables, then outer
2219/39067 . . . Calculate max load a manipulator can repeatedly lift
2219/39068 . . . Time needed to execute an instruction
2219/39069 . . . Inverse kinematics by arm splitting, divide six link arm into two three link arms
2219/39071 . . . Solve inverse kinematics by ann learning nonlinear mappings, consider smoothness

2219/39072 . . . Solve inverse kinematics by linear hopfield network
2219/39073 . . . Solve inverse kinematics by fuzzy algorithm
2219/39074 . . . By formal substitution of two consecutive joints by a spherical joint
2219/39075 . . . Solve inverse kinematics by error back propagation ebp
2219/39076 . . . Learn by function division, change only one variable at a time, combine shapes
2219/39077 . . . Solve inverse geometric model by iteration, no matrixes inversion
2219/39078 . . . Divide workspace in sectors, lookup table for sector joint angle
2219/39079 . . . Solve inverse differential kinematics in closed, feedback loop, iterate
2219/39081 . . . Inexact solution for orientation or other DOF with relation to type of task
2219/39082 . . . Collision, real time collision avoidance
2219/39083 . . . Robot interference, between two robot arms
2219/39084 . . . Parts handling, during assembly
2219/39085 . . . Use of two dimensional maps and feedback of external and joint sensors
2219/39086 . . . Reduce impact effect by impact configuration of redundant manipulator
2219/39087 . . . Artificial field potential algorithm, force repulsion from obstacle
2219/39088 . . . Inhibit movement in one axis if collision danger
2219/39089 . . . On collision, lead arm around obstacle manually
2219/39091 . . . Avoid collision with moving obstacles
2219/39092 . . . Treat interference in hardware, circuit and also in software
2219/39093 . . . On collision, ann, bam, learns path on line, used next time for same command
2219/39094 . . . Interference checking between robot and fixture
2219/39095 . . . Use neural geometric modeler, overlapping spheres
2219/39096 . . . Self-collision, internal collison, collision between links of one robot
2219/39097 . . . Estimate own stop, brake time, then verify if in safe distance
2219/39098 . . . Estimate stop, brake distance in predef time, then verify if in safe distance
2219/39099 . . . Interlocks inserted in movement process if necessary to avoid collision
2219/39101 . . . Cooperation with one or more rotating workpiece holders, manipulators
2219/39102 . . . Manipulator cooperating with conveyor
2219/39103 . . . Multicooperating sensing modules
2219/39104 . . . Manipulator control orders conveyor to stop, to visualize, pick up
2219/39105 . . . Manipulator cooperates with moving machine, like press brake
2219/39106 . . . Conveyor, pick up article, object from conveyor, bring to test unit, place it
2219/39107 . . . Pick up article, object, measure, test it during motion path, place it
2219/39108 . . . Regrasp object as function of impact
2219/39109 . . . Dual arm, multiarm manipulation, object handled in cooperation
2219/39111 . . . Use of flexibility or free joint in manipulator to avoid large forces
2219/39112 . . . Force, load distribution
2219/39113 . . . Select grasp pattern based on motion oriented coordinability
2219/39114 . . . Hand eye cooperation, active camera on first arm follows movement of second arm
2219/39115 . . . Optimal hold and moving force, torque
2219/39116 . . . Constraint object handled in cooperation
2219/39117 . . . Task distribution between involved manipulators
2219/39118 . . . Cooperation between manipulator and vehicle with manipulator
2219/39119 . . . Path constraint handling of object
2219/39121 . . . Two manipulators operate on same object
2219/39122 . . . Follower, slave mirrors leader, master
2219/39123 . . . Manipulate, handle flexible object
2219/39124 . . . Grasp common rigid object, no movement end effectors relative to object
2219/39125 . . . Task is grasp object with movable parts, like pliers
2219/39126 . . . Manipulate very large objects, not possible to grasp, open palm and use of links
2219/39127 . . . Roll object on base by link control
2219/39128 . . . Grasp tool with two manipulators, rigidity, and use tool
2219/39129 . . . One manipulator holds one piece, other inserts, screws other piece, dexterity
2219/39131 . . . Each of the manipulators holds one of the pieces to be welded together
2219/39132 . . . Robot welds, operates on moving workpiece, moved by other robot
2219/39133 . . . Convert teached program for fixed workpiece to program for moving workpiece
2219/39134 . . . Teach point, move workpiece, follow point with tip, place tip on next point
2219/39135 . . . For multiple manipulators operating at same time, avoid collision
2219/39136 . . . Teach each manipulator independently or dependently from each other
2219/39137 . . . Manual teaching, set next point when tool touches other tool, workpiece
2219/39138 . . . Calculate path of robots from path of point on gripped object
2219/39139 . . . Produce program of slave from path of master and desired relative position
2219/39141 . . . Slave program has no taught positions, receives position from master, convert from master
2219/39142 . . . Moving time between positions in slave program coordinated online with master
2219/39143 . . . One program in robot controller for both robot and machine, press, mold
2219/39144 . . . Scale moving time of all robots, machines to match slowest, no waiting
2219/39145 . . . Slave path is the same as master path and superposed desired relative movement
2219/39146 . . . Swarm, multiagent, distributed multitask fusion, cooperation multi robots
2219/39147 . . . Group transport, transfer object, ant problem
2219/39148 . . . To push or pull on objects, boxes
2219/39149 . . . To assemble two objects, objects manipulation
2219/39151 . . . Use intention inference, observe behaviour of other robots for their intention
2219/39152 . . . Basic behaviour, avoid, follow, aggregate, disperse, home, wander, grasp, drop

2219/39153 . . . Human supervisory control of swarm
2219/39154 . . . Each robot can pick up an information carrier, read and write it, exchange it
2219/39155 . . . Motion skill, relate sensor data to certain situation and motion
2219/39156 . . . To machine together workpiece, desktop flexible manufacturing
2219/39157 . . . Collectively grasping object to be transported
2219/39158 . . . Configuration description language, to define behaviour of system
2219/39159 . . . Task modelling
2219/39161 . . . Search, grip object and bring to a home area, gather object, object placement
2219/39162 . . . Learn social rules, greedy robots become non-greedy, adapt to other robots
2219/39163 . . . Formation control, robots form a rigid formation, fixed relationship
2219/39164 . . . Embodied evolution, evolutionary robots with basic ann learn by interactions with each other
2219/39165 . . . Evolution, best performing control strategy is transmitted to other robots
2219/39166 . . . Coordinate activity by sending pheromone messages between robots, no central control
2219/39167 . . . Resources scheduling and balancing
2219/39168 . . . Multiple robots searching an object
2219/39169 . . . Redundant communication channels with central control
2219/39171 . . . Vehicle moves towards arm if streched arm, away from it if folded, singular point
2219/39172 . . . Vehicle, coordination between manipulator arm and its moving vehicle
2219/39173 . . . Dynamic interaction between vehicle and manipulator
2219/39174 . . . Add DOFs of mobility to DOFs of manipulator to add user defined tasks to motion
2219/39175 . . . Cooperation between fixed manipulator and manipulator on vehicle
2219/39176 . . . Compensation deflection arm
2219/39177 . . . Compensation position working point as function of inclination tool, hand
2219/39178 . . . Compensation inertia arms
2219/39179 . . . Of movement after lock stop by small movement against load, stop again
2219/39181 . . . Compensation of coulomb friction in joint
2219/39182 . . . Compensation for base, floor deformation
2219/39183 . . . Compliance compensation
2219/39184 . . . Forward compensation in robot world space, inverse in joint space
2219/39185 . . . ANN as compensator
2219/39186 . . . Flexible joint
2219/39187 . . . Coriolis and centripetal compensation
2219/39188 . . . Torque compensation
2219/39189 . . . Compensate for dead weight of tool as function of inclination tool
2219/39191 . . . Compensation for errors in mechanical components
2219/39192 . . . Compensate thermal effects, expansion of links
2219/39193 . . . Compensate movement before lock stop, by small movement against load, gravity
2219/39194 . . . Compensation gravity
2219/39195 . . . Control, avoid oscillation, vibration due to low rigidity
2219/39196 . . . Use of passive joint, no actuator but brake, brake on or off
2219/39197 . . . Passive compliance, no input of force reference, mechanical resilience, spring
2219/39198 . . . Manipulator used as workpiece handler and for machining operation
2219/39199 . . . Active vibration absorber
2219/39201 . . . Control of joint stiffness
2219/39202 . . . Invariant inertia, constant inertia matrix independent of joint positions
2219/39203 . . . Fuzzy petrinet controller
2219/39204 . . . Petrinet controller
2219/39205 . . . Markov model
2219/39206 . . . Joint space position control
2219/39207 . . . Manipulator is passive, gives operator only feedback of what is currently done
2219/39208 . . . Robot is active, realizes planned trajectory by itself
2219/39209 . . . Switch over from free space motion to constraint motion
2219/39211 . . . If operator on platform moves in certain direction, arm will follow
2219/39212 . . . Select between autonomous or teleoperation control
2219/39213 . . . Distributed tasks, space motion, contact, kinematic conditioning tasks
2219/39214 . . . Compensate tracking error by using model, polynomial network
2219/39215 . . . Adaptive control with stabilizing compensation
2219/39216 . . . Motion scaling
2219/39217 . . . Keep constant orientation of handled object while moving manipulator
2219/39218 . . . Force tracking
2219/39219 . . . Trajectory tracking
2219/39221 . . . Control angular position of joint by length of linear actuator
2219/39222 . . . Disturbance rejection, suppression
2219/39223 . . . Resonance ratio control, between arm and motor
2219/39224 . . . Jacobian transpose control of force vector in configuration and cartesian space
2219/39225 . . . Rmfc resolved motion force control, apply known acceleration to payload mass
2219/39226 . . . Operational space formulation, project model into cartesian coordinates
2219/39227 . . . Configuration control, generate end effector forces to compensate dynamics
2219/39228 . . . Computed torque method and H-compensation
2219/39229 . . . Linear parameterization of robot dynamics
2219/39231 . . . Parameterization of inertia, coriolis and centrifugal matrix
2219/39232 . . . Fuzzy adaptation of sliding mode controller
2219/39233 . . . Adaptive switching of multiple models, same model but different initial estimates, different robot model for different areas
2219/39234 . . . Constraint accelerated feedback, distance dependant sampling rate
2219/39235 . . . Track surface without knowing surface geometry
2219/39236 . . . Hybrid integrator back-stepping control, cascaded motor and manipulator subsystems
2219/39237 . . . Torque disturbance control

2219/39238 . . . Trajectory feedforward and feedback to input ann, output a control function
2219/39239 . . . Control additional actuator in each flexible link
2219/39241 . . . Force and vibration control
2219/39242 . . . Velocity blending, change in a certain time from first to second velocity
2219/39243 . . . Adaptive trajectory tracking
2219/39244 . . . Generic motion control operations, primitive skills each for special task
2219/39245 . . . Computed torque fuzzy controller
2219/39246 . . . Control position and orientation of handled object
2219/39247 . . . Control speed, acceleration as function of load and rate of fatigue
2219/39248 . . . Visual servoing combined with inertial measurements
2219/39249 . . . Computed torque controller combined with ann compensating switch type controller
2219/39251 . . . Autonomous distributed control, joint and link is a subsystem, communication intensive
2219/39252 . . . Autonomous distributed control, task distributed into each subsystem, task space
2219/39253 . . . Virtual arm, has end effector on any joint of real manipulator
2219/39254 . . . Behaviour controller, robot have feelings, learns behaviour
2219/39255 . . . Penalty invariance:distribute disturbance equally over all joints, nodes
2219/39256 . . . Task space controller
2219/39257 . . . Switch from task space to joint space controller when close to singularity
2219/39258 . . . Three objective attitude control
2219/39259 . . . GPS to control robotic arm
2219/39261 . . . Calculate driving torque from dynamic model, computed torque method variant
2219/39262 . . . Position joint to minimize energy in previous joints, equilibrium point, attractor
2219/39263 . . . Normal and overload operation modes, robot speed or torque higher than nominal
2219/39264 . . . Torque control using hardware designed for position control
2219/39265 . . . Cutting force disturbances compensated by accelerating a mass within tool head
2219/39266 . . . Algorithm for control
2219/39267 . . . Uncertainty estimation by the bounds
2219/39268 . . . Layer perceptron, drive torque from state variables
2219/39269 . . . Neural adaptation followed by fuzzy correction
2219/39271 . . . Ann artificial neural network, ffw-nn, feedforward neural network
2219/39272 . . . Course by expert rule based system to correct fine fuzzy system
2219/39273 . . . Neural oscillator
2219/39274 . . . CMAC cerebellar model articulation controller network
2219/39275 . . . Ann in parallel to known dynamics model to correct for unknown dynamics
2219/39276 . . . FFW and PD and ANN for compensation position error
2219/39277 . . . Segmented tree ANN
2219/39278 . . . Ann with pd in parallel, pd corrects response of ANN
2219/39279 . . . Ann parallel with p controller
2219/39281 . . . Ann for compensation torque
2219/39282 . . . FFW ann for torque command, adapt as function of speed and detected speed
2219/39283 . . . Ffw ann to compensate torque or speed
2219/39284 . . . NSC neural servo controller
2219/39285 . . . From database find strategy and select corresponding neural servo controller
2219/39286 . . . Forward inverse, dynamics model, relaxation neural network model firm
2219/39287 . . . Position and speed error to fuzzy input, output corrected by ann as function of position
2219/39288 . . . Track control with ann
2219/39289 . . . Adaptive ann controller
2219/39291 . . . Fuzzy neural for adaptive force control
2219/39292 . . . Neural brain based controller based on simplified model of vertebrate nervous system
2219/39293 . . . Ann parallel to pd, learn inverse dynamics and feedforward of torque signal
2219/39294 . . . Learn inverse dynamics, ffw decomposed ann adapted by pid
2219/39295 . . . Learn position correction values to be added to reference values
2219/39296 . . . Learn inverse and forward model together
2219/39297 . . . First learn inverse model, then fine tune with ffw error learning
2219/39298 . . . Trajectory learning
2219/39299 . . . Learn forward dynamics
2219/39301 . . . Learn feedforward control
2219/39302 . . . Backpropagation end effector location error through the link equations
2219/39303 . . . Feedback error learn inverse dynamics, felc use position reference and error
2219/39304 . . . Feedback error learn inverse dynamics, use actual position and error
2219/39305 . . . Learn, detect kinematic contraints in a plane from displacement and force
2219/39306 . . . Three networks, data to cartesian, cartesian to joint angle, joint angle to control
2219/39307 . . . Multiple ann, trajectory control net and force control net
2219/39308 . . . Position control net, pcn combined with velocity control net, vcn
2219/39309 . . . Inverse dynamic network combined with time scaling network for trajectory plan
2219/39311 . . . Multilayer, MNN, four layer perceptron, sigmoidal neural network
2219/39312 . . . Double neural network for tracking, slave microprocessor for servo control
2219/39313 . . . Ann for joint control, ann for trajectory optimization
2219/39314 . . . Ann for identification, ann for convergence, ann for tracking control
2219/39315 . . . Art ann classifier and input selector, bam ann to retrieve collision free path
2219/39316 . . . Two ann, second ann trained with calibration data to learn error first ann
2219/39317 . . . Adapt weights MNN online, MNN as feedforward, maps inputs to joint torques
2219/39318 . . . Position loop ann and velocity loop ann and force loop ann
2219/39319 . . . Force control, force as reference, active compliance
2219/39321 . . . Force control as function of position of tool

2219/39322 . . . Force and position control
2219/39323 . . . Force and motion control
2219/39324 . . . Force as function of distance from boundary, border of grinding area
2219/39325 . . . External force control, additional loop comparing forces corrects position
2219/39326 . . . Model compensates positions as function of position to compensate force deformations
2219/39327 . . . Fuzzy adaptive force control
2219/39328 . . . Fuzzy pi force control
2219/39329 . . . Adaptive force and position control
2219/39331 . . . Switch between position and force control by fuzzy logic
2219/39332 . . . Adaptive force control
2219/39333 . . . Fuzzy adaptive force and position control, hybrid
2219/39334 . . . Fuzzy reinforcement compliance control
2219/39335 . . . Independent joint control, decentralised
2219/39336 . . . Pd controller combined with disturbance rejection at joint
2219/39337 . . . Pd controller combined with joint energy based controller
2219/39338 . . . Impedance control, also mechanical
2219/39339 . . . Admittance control, admittance is tip speed-force
2219/39341 . . . Sliding mode based impedance control
2219/39342 . . . Adaptive impedance control
2219/39343 . . . Force based impedance control
2219/39344 . . . Cooperative impedance control, between fingers or arms
2219/39345 . . . Active compliance control, control tension of spring with DC motor
2219/39346 . . . Workspace impedance control
2219/39347 . . . Joint space impedance control
2219/39348 . . . Generalized impedance control
2219/39349 . . . RCC remote center compliance device inserted between wrist and gripper
2219/39351 . . . Compensation ann for uncertain trajectory in impedance control
2219/39352 . . . Feedback error learning, ffw ann compensates torque, feedback from pd to ann
2219/39353 . . . Joint space observer
2219/39354 . . . Operation, work space observer
2219/39355 . . . Observer, disturbance observer
2219/39356 . . . Fuzzy logic velocity observer, to estimate velocity in joints
2219/39357 . . . Execute motion of path in minimum of time
2219/39358 . . . Time optimal control along path for singular points, having veloctiy constraints
2219/39359 . . . Tracking path, priority control for component perpendicular to path
2219/39361 . . . Minimize time-energy cost
2219/39362 . . . Adapth path of gripping point as function of position of cooperating machine
2219/39363 . . . Track circular path on inclined surface
2219/39364 . . . Path, correction of path in function of load
2219/39365 . . . By using a cue, part of a stimulus to prompt an adapted reaction pattern
2219/39366 . . . SMC sensory motor coordination
2219/39367 . . . Using a motion map, association between visual position and joint position
2219/39368 . . . Sensorimotor command layer, between task space and sensor, motor space
2219/39369 . . . Host and robot controller and vision processing
2219/39371 . . . Host and robot controller
2219/39372 . . . Expert rule based system to correct parameters impedance controller
2219/39373 . . . Fuzzy for planning, fuzzy neural for adaptive force control
2219/39374 . . . Ffw and ann combined to compensate torque
2219/39375 . . . MMI to path planner to servo controller
2219/39376 . . . Hierarchical, learning, recognition and skill level and adaptation servo level
2219/39377 . . . Task level supervisor and planner, organizer and execution and path tracking
2219/39378 . . . Control panel separated from power control of articulations
2219/39379 . . . Open architecture such as nasrem, ngc, dicam, saridis, chimera, gisc, utap, nomad, robline
2219/39381 . . . Map task, application to behaviour, force tracking, singularity to motion to actuator
2219/39382 . . . Level, organization and coordination or distribution of tasks and execution level
2219/39383 . . . Supervisor communicates with several ion control agents
2219/39384 . . . Control unit near robot, control and teaching panel in safe zone
2219/39385 . . . Hybrid control system with neural brain based controller and classical ctrler
2219/39386 . . . Cell configuration, selection and connection of cell combinations
2219/39387 . . . Reflex control, follow movement, track face, work, hand, visual servoing
2219/39388 . . . Visual compliance, xy constraint is 2-D image, z position controlled
2219/39389 . . . Laparoscopic surgery, camera on center of operated part, view around, scale
2219/39391 . . . Visual servoing, track end effector with camera image feedback
2219/39392 . . . Dynamic pyramiding, change vision field to small area if high tracking speed, zoom
2219/39393 . . . Camera detects projected image, compare with reference image, position end effector
2219/39394 . . . Compensate hand position with camera detected deviation, new end effector attitude
2219/39395 . . . Expectation based visual servoing, use of model
2219/39396 . . . Manipulator action on screen depends from displayed position on screen
2219/39397 . . . Map image error directly to robot movement, position with relation to world, base not needed, image based visual servoing
2219/39398 . . . Convert hand to tool coordinates, derive transform matrix
2219/39399 . . . Convert position of old, teach to new, changed, actual tool by transform matrix
2219/39401 . . . Machine tool coordinates to manipulator coordinates
2219/39402 . . . Transfer matrix for moving object and robot to absolute space, motion independent
2219/39403 . . . Method, axial rotation of tool to make tool and base coordinates parallel
2219/39404 . . . Design of manipulator
2219/39405 . . . Develop inverse model of system with ann
2219/39406 . . . Obtain optimal parameters of model of system
2219/39407 . . . Power metrics, energy efficiency
2219/39408 . . . Integrated structure and control design

2219/39409 . . . Design of gripper, hand
2219/39411 . . . Effect of scaling drive arms
2219/39412 . . . Diagnostic of robot, estimation of parameters
2219/39413 . . . Robot self diagnostics
2219/39414 . . . 7-DOF
2219/39415 . . . Hyper redundant, infinite number of DOFs
2219/39416 . . . 12-DOF
2219/39417 . . . 6-DOF
2219/39418 . . . 3-DOF
2219/39419 . . . 4-DOF
2219/39421 . . . DOF is degree of freedom, 2-DOF
2219/39422 . . . 7-DOF for arm and 6-DOF for end effector
2219/39423 . . . 5-DOF
2219/39424 . . . 16-DOF
2219/39425 . . . 9-DOF
2219/39426 . . . 10-DOF
2219/39427 . . . Panel on arm, hand of robot, controlled axis
2219/39428 . . . Panel with special keys for robot programming, like gripper, hand, wrist
2219/39429 . . . Using graphic kinematic perspective entered and represented by keys
2219/39431 . . . Keys represent function of gripper, open, close
2219/39432 . . . Direct robot control, click on mouse on variety of display command buttons
2219/39433 . . . Enter a move file, robot will follow a series of instructions
2219/39434 . . . Each function key of pc corresponds to a motor, jog each motor
2219/39435 . . . Free movable unit has push buttons for other than position, orientation control
2219/39436 . . . Joystick mimics manipulator to provide spatial correspondance
2219/39437 . . . Joystick with additional handle for wrist and gripper control
2219/39438 . . . Direct programming at the console
2219/39439 . . . Joystick, handle, lever controls manipulator directly, manually by operator
2219/39441 . . . Voice command, camera detects object, grasp, move
2219/39442 . . . Set manual a coordinate system by jog feed operation
2219/39443 . . . Portable, adapted to handpalm, with joystick, function keys, display
2219/39444 . . . Display of position, of shape of robot and tool
2219/39445 . . . Select between jog modes, user, robot coordinates, tool, system feed, joint feed
2219/39446 . . . Display of manipulator and workpiece and jog directions
2219/39447 . . . Dead man switch
2219/39448 . . . Same teach pendant connects to many robot controllers over network
2219/39449 . . . Pendant, pda displaying camera images overlayed with graphics, augmented reality
2219/39451 . . . Augmented reality for robot programming
2219/39452 . . . Select with mouse button a coordinate plane for micromanipulation
2219/39453 . . . Select program as function of location of mobile manipulator
2219/39454 . . . Rubber actuator, two muscle drive, one for extension other for traction
2219/39455 . . . Flexible microactuator, fluidic controlled fibre reinforced rubber, three tubes
2219/39456 . . . Direct drive
2219/39457 . . . Tendon drive
2219/39458 . . . Vehicle levitated, arm pushes to position vehicle
2219/39459 . . . Finger actuator, AC motor and harmonic gear and encoder
2219/39461 . . . Rotate arm in one direction, forearm in other direction but double speed
2219/39462 . . . Pneumatic actuator, imitates human muscle
2219/39463 . . . Exercise treatment end effector, dexter cube with various switches for tasks
2219/39464 . . . Estimation of human hand impedance in multijoint arm movements
2219/39465 . . . Two fingers each with 2-DOF
2219/39466 . . . Hand, gripper, end effector of manipulator
2219/39467 . . . Select hand as function of geometric form of hand
2219/39468 . . . Changeable hand, tool, code carrier, detector
2219/39469 . . . Grip flexible, deformable plate, object and manipulate it
2219/39471 . . . Push workpiece in order to grip it correctly
2219/39472 . . . Braced manipulator, for fine positioning hand is resting on table
2219/39473 . . . Autonomous grasping, find, approach, grasp object, sensory motor coordination
2219/39474 . . . Coordination of reaching and grasping
2219/39475 . . . Grasp slightly, rotate object between two fingers by action of gravity
2219/39476 . . . Orient hand relative to object
2219/39477 . . . Finger tracks moving light spot on object
2219/39478 . . . Control force and posture of hand
2219/39479 . . . Grip, release again to put object in correct position in tray, regrip and move
2219/39481 . . . Control distance finger from center, radius
2219/39482 . . . Control position of center of grip
2219/39483 . . . Control angle of rotation
2219/39484 . . . Locate, reach and grasp, visual guided grasping
2219/39485 . . . Lift workpiece with two fingers, then grasp it with two additional fingers
2219/39486 . . . Fingered hand, multifingered hand
2219/39487 . . . Parallel jaws, two fingered hand
2219/39488 . . . Each finger gets 1-DOF, one more movement, translation or rotation
2219/39489 . . . Soft fingertip, electro rheological controlled fluid
2219/39491 . . . Each finger controlled by a controller
2219/39492 . . . Finger impedance control
2219/39493 . . . Passive compliant finger, array of resilient rods in tip
2219/39494 . . . Each finger has 4-DOF
2219/39495 . . . Active electromechanical compliance for each finger
2219/39496 . . . 3-Fingered hand
2219/39497 . . . Each finger can be controlled independently
2219/39498 . . . Each finger has force torque sensor in tip of finger
2219/39499 . . . 4-Fingers with each 6-DOF
2219/39501 . . . 5-Fingers with each 4-DOF
2219/39502 . . . 4-Fingers with each 3-DOF
2219/39503 . . . 4-Fingers with each 4-DOF
2219/39504 . . . Grip object in gravity center
2219/39505 . . . Control of gripping, grasping, contacting force, force distribution

2219/39506 . . . Grip flexible wire at fixed base, move gripper to top of wire and grip
2219/39507 . . . Control of slip motion
2219/39508 . . . Reorientation of object, orient, regrasp object
2219/39509 . . . Gripping, grasping, links embrace, encircle, envelop object to grasp
2219/39511 . . . Reorient, rotate object in hand between fingers by action of fingers
2219/39512 . . . Whole hand manipulation, use of fingertips and hand surface
2219/39513 . . . Tip prehension grasp, grasp with tip of fingers
2219/39514 . . . Stability of grasped objects
2219/39515 . . . Grapple object, grip in compliant mode, self alignment of fingers and object
2219/39516 . . . Push align object against wall, detect each time distance from grip point to wall
2219/39517 . . . Control orientation and position of object in hand, roll between plates
2219/39518 . . . Rolling contact between fingers, robot arms and object
2219/39519 . . . Concurrent grasp, all forces converge in one point
2219/39521 . . . Pencil grasp, forces act in two points, along line of intersection of two planes
2219/39522 . . . Regulus grasp, forces do not intersect at all
2219/39523 . . . Set holding force as function of dimension, weight, shape, hardness, surface
2219/39524 . . . Power grasp, between thumb and four fingers, acting as a virtual middle finger
2219/39525 . . . Lateral grasp, between thumb and four fingers, acting as virtual index finger
2219/39526 . . . Three fingers used, thumb, index, middle finger for lateral precision
2219/39527 . . . Workpiece detector, sensor mounted in, near hand, gripper
2219/39528 . . . Measuring, gripping force sensor build into hand
2219/39529 . . . Force, torque sensor in wrist, end effector
2219/39531 . . . Several different sensors integrated into hand
2219/39532 . . . Gripping force sensor build into finger
2219/39533 . . . Measure grasping posture and pressure distribution
2219/39534 . . . By positioning fingers, dimension of object can be measured
2219/39535 . . . Measuring, test unit build into hand, end effector
2219/39536 . . . Planning of hand motion, grasping
2219/39537 . . . First slide object on table in order to be able to grasp it, grasp it
2219/39538 . . . Rotate object with one or more fingers, while sliding on table
2219/39539 . . . Plan hand shape
2219/39541 . . . Place fingers to reorient object while grasping
2219/39542 . . . Plan grasp points, grip matrix and initial grasp force
2219/39543 . . . Recognize object and plan hand shapes in grasping movements
2219/39544 . . . Fuzzy dynamic programming, generate trajectory of finger during tracking
2219/39545 . . . Trajectory generation for smoothly grasping moving object
2219/39546 . . . Map human grasps to manipulator grasps
2219/39547 . . . Program, plan gripping force, range and speed
2219/39548 . . . Enter interactively parameter for gripper, then teach movement
2219/39549 . . . Structure, hand has connector for power supply and control signals
2219/39551 . . . Pivoting gripper, so part takes always vertical orientation
2219/39552 . . . Stewart platform hand, parallel structured hand
2219/39553 . . . Dual gripper, two heads to pick up different objects
2219/39554 . . . Gripper is formed by flexible tube, embraces object like a finger
2219/39555 . . . Revolver with several grippers, hands
2219/39556 . . . Control system build into hand itself
2219/39557 . . . Vacuum gripper using mask with pattern corresponding to workpiece to be lifted
2219/39558 . . . Vacuum hand has selective gripper area
2219/39559 . . . Polyvalent gripper, to grip, assemble, manipulate
2219/39561 . . . Gripper with build in positioning device to align handled object
2219/39562 . . . Dual end effector, one as tool, the other as workhandler, revolver
2219/39563 . . . Hand has a center pin to pick up coils
2219/39564 . . . Spoon and fork, fork slides back if food delivered in mouth
2219/39565 . . . Two fingered microhand, each finger is a parallel, stewart platform
2219/39566 . . . Transparent gripper, object can always be seen by camera
2219/39567 . . . Use electromagnetic attraction to bring robot hand in contact with workpiece
2219/39568 . . . Extract, insert objects by controlling fingers, dexterous
2219/39569 . . . Twirl baton, rotate cylinder through center perpendicular to length
2219/39571 . . . Grip, grasp non rigid material, piece of cloth
2219/39572 . . . Task, tool manipulation
2219/39573 . . . Tool guidance along path
2219/39574 . . . Passive compliant hand, wrist
2219/39575 . . . Wrist, flexible wrist
2219/39576 . . . Magnetically levitated wrist
2219/39577 . . . Active electromechanical compliance for wrist
2219/39578 . . . Axis wrist
2219/40 . . Robotics, robotics mapping to robotics vision
2219/40001 . . . Laser color indicates type of machining
2219/40002 . . . Camera, robot follows direction movement of operator head, helmet, headstick
2219/40003 . . . Move end effector so that image center is shifted to desired position
2219/40004 . . . Window function, only a specific region is analyzed
2219/40005 . . . Vision, analyse image at one station during manipulation at next station
2219/40006 . . . Placing, palletize, un palletize, paper roll placing, box stacking
2219/40007 . . . Optimize sequence of pick and place operations upon arrival of workpiece on conveyor
2219/40008 . . . Place a box, block in a corner
2219/40009 . . . Remove and replace machine part, module
2219/40011 . . . Lay down, laying non rigid material, handle flat textile material
2219/40012 . . . Pick and place by chain of three manipulators, handling part to each other

2219/40013 . . . Kitting, place parts from belt into tray, place tray on conveyor belt
2219/40014 . . . Gripping workpiece to place it in another place
2219/40015 . . . Soccer playing
2219/40016 . . . Kick a ball, leg and foot movement simulator
2219/40017 . . . Hockey playing, puck and paddle
2219/40018 . . . Ball in cup
2219/40019 . . . Placing and assembly, throw object correctly on table
2219/40021 . . . Batting, to redirect a projectile
2219/40022 . . . Snatching, dynamic pick, effector contacts object, moves with object
2219/40023 . . . Dynamic closure, remain contact by acceleration forces
2219/40024 . . . Catching
2219/40025 . . . Dynamic manipulation, throwing
2219/40026 . . . Juggling, tennis playing, throw and catch
2219/40027 . . . Preying, object capture, interception, mouse-buster
2219/40028 . . . Insert flexible rod, beam into hole
2219/40029 . . . Mount elastic ring on a cylinder
2219/40031 . . . Dual peg in hole
2219/40032 . . . Peg and hole insertion, mating and joining, remote center compliance
2219/40033 . . . Assembly, microassembly
2219/40034 . . . Disassembly, for recycling
2219/40035 . . . Shake grasped parts for dropping excess entangled parts back into pin
2219/40036 . . . Transport plates or sheets between two locations without motion inversion
2219/40037 . . . No incomplete containers allowed to exit on output conveyor
2219/40038 . . . Black list, exclude operation on workpiece when not possible, collision, error
2219/40039 . . . Robot mounted or sliding inside vehicle, on assembly line or for test, service
2219/40041 . . . Robot operates panel like car radio by pushing, turning buttons, knobs
2219/40042 . . . Control tilting angle of surface carried by robot
2219/40043 . . . Move object without swinging, no pendulum or swing motion at stop point
2219/40044 . . . Unfold flexible material
2219/40045 . . . Fill bucket, if hard rock, follow contour rock
2219/40046 . . . Fill bucket with sand, move horizontally, if resistance move up, move horizontally
2219/40047 . . . Machine overhanging sculptured surfaces
2219/40048 . . . Transport bar by two mobile robots on wavy road
2219/40049 . . . Cut material with scissors
2219/40051 . . . Manipulate flexible material fixed with one end to a wall
2219/40052 . . . Deform, bend flexible material
2219/40053 . . . Pick 3-D object from pile of objects
2219/40054 . . . Supply sheet to bending machine
2219/40055 . . . Wire stripping
2219/40056 . . . Slide an edge over an edge
2219/40057 . . . Contour tracking, edge following
2219/40058 . . . Align box, block with a surface
2219/40059 . . . Mount, couple and demount, decouple exchangeable mechanical modules
2219/40061 . . . Disconnect cable
2219/40062 . . . Door opening
2219/40063 . . . Transport dish pile and dispense material in each dish of pile
2219/40064 . . . Pierce, penetrate soft tissue
2219/40065 . . . Approach, touch and then push object
2219/40066 . . . Stack and align identical layers, laminates, electronic substrate layers
2219/40067 . . . Stack irregular packages
2219/40068 . . . Collective, group transport
2219/40069 . . . Flattening, sweeping non rigid material, take out wrinkles
2219/40071 . . . Relative positioning, grinding and polishing against rotating belt
2219/40072 . . . Exert a screwing motion
2219/40073 . . . Carry container with liquid, compensate liquid vibration, swinging effect
2219/40074 . . . Move tip of arm or carried object on surface, wall, constraint
2219/40075 . . . Turn crank, handle, link around fixed point
2219/40076 . . . Fold flexible plate, non rigid material
2219/40077 . . . Posicast, inverted pendulum, acrobat, balance rod
2219/40078 . . . Sort objects, workpieces
2219/40079 . . . Grasp parts from first bin, put them in reverse order in second bin
2219/40081 . . . Grasp part, object through hole in wall
2219/40082 . . . Docking, align object on end effector with target
2219/40083 . . . Pick up pen and robot hand writing
2219/40084 . . . Posicast, inverted pendulum, acrobat, balance rod, control unactuated joint, dof
2219/40085 . . . Point with tip always to same remote target point
2219/40086 . . . Slide, tumble, pivot object on surface with fingers of manipulator, graspless
2219/40087 . . . Align hand on workpiece to pick up workpiece, peg and hole
2219/40088 . . . Task is push, slide box
2219/40089 . . . Tele-programming, transmit task as a program, plus extra info needed by robot
2219/40091 . . . Tele-programming by graphical simulation
2219/40092 . . . Tele-programming by direct instruction on new object, using vision and force sensors
2219/40093 . . . Use known task for similar, like object, inform system of that likeness
2219/40094 . . . By changing knowledge base directly
2219/40095 . . . Modify tasks due to modular tooling, other fixture configuration, environment
2219/40096 . . . Modify tasks due to use of different manipulator
2219/40097 . . . Select stations with mouse to create process steps
2219/40098 . . . Show grid locations with symbols of workstations
2219/40099 . . . Graphical user interface for robotics, visual robot user interface
2219/40101 . . . Generate concurrent tasks
2219/40102 . . . Tasks are classified in types of unit motions
2219/40103 . . . Show object with laser pointer, give oral command for action on, with object
2219/40104 . . . Reactive planner, user is integral component of planner, interactive
2219/40105 . . . Oop task planning, use three knowledge bases, world-, domain- for vision, plan base

2219/40106 . . . Feedback of online failures to offline learned knowledge base
2219/40107 . . . Offline task learning knowledge base, static planner controls dynamic online
2219/40108 . . . Generating possible sequence of steps as function of timing and conflicts
2219/40109 . . . Consider each part to be assembled as an agent, behaving autonomously
2219/40111 . . . For assembly
2219/40112 . . . Using graph grammars and fuzzy logic
2219/40113 . . . Task planning
2219/40114 . . . From vision detected initial and user given final state, generate tasks
2219/40115 . . . Translate goal to task program, use of expert system
2219/40116 . . . Learn by operator observation, symbiosis, show, watch
2219/40117 . . . Virtual mecanism, like slider to constraint movement in task space
2219/40118 . . . Task oriented virtual tool, developed for task, assists operator in task
2219/40119 . . . Virtual internal model, derive from forces on object, motion of end effector
2219/40121 . . . Trajectory planning in virtual space
2219/40122 . . . Manipulate virtual object, for trajectory planning of real object, haptic display
2219/40123 . . . Indicate, select features on display, remote manipulator will execute
2219/40124 . . . During manipulator motion, sensor feedback to adapt model in memory
2219/40125 . . . Overlay real time stereo image of object on existing, stored memory image argos
2219/40126 . . . Virtual landmarks, reference points for operator
2219/40127 . . . Virtual tape measure, indicate distance between end effector and destination
2219/40128 . . . Virtual tether, line on display connects end effector to destination point
2219/40129 . . . Virtual graphic 3-D pointer, manipulator commands real manipulator
2219/40131 . . . Virtual reality control, programming of manipulator
2219/40132 . . . Haptic joystick with force feedback based on accelerometer included in joystick
2219/40133 . . . Force sensation of slave converted to movement of chair for operator
2219/40134 . . . Force sensation of slave converted to vibration for operator
2219/40135 . . . Slave force converted to shape display, actuated by fingers, surface is force image
2219/40136 . . . Stereo audio and vision
2219/40137 . . . Force sensation feedback from simulated tool
2219/40138 . . . Scaled feedback of forces from slave to master and master to slave
2219/40139 . . . Force from slave converted to a digital display like fingers and object
2219/40141 . . . Pain sensation feedback, impinge air on, squeeze, vibrate, stimulate fingers
2219/40142 . . . Temperature sensation, thermal feedback to operator fingers
2219/40143 . . . Slip, texture sensation feedback, by vibration stimulation of fingers
2219/40144 . . . Force sensation feedback from slave
2219/40145 . . . Force sensation of slave converted to audio signal for operator
2219/40146 . . . Telepresence, teletaction, sensor feedback from slave to operator
2219/40147 . . . Variable time delay, through internet
2219/40148 . . . Predict locally machining forces from model to control remote machine
2219/40149 . . . Local intelligence for global planning, remote intelligence for tuning
2219/40151 . . . Time delay, problems caused by time delay between local and remote
2219/40152 . . . Deictic, using a sign language, point finger to reach, close hand to grasp
2219/40153 . . . Teleassistance, operator assists, controls autonomous robot
2219/40154 . . . Moving of objects
2219/40155 . . . Purpose is grasping objects
2219/40156 . . . Input work program as well as timing schedule
2219/40157 . . . Planning, event based planning, operator changes plans during execution
2219/40158 . . . Correlate actual image at angle with image presented to operator without angle
2219/40159 . . . Between operator and sensor a world modeler, local intelligence
2219/40161 . . . Visual display of machining, operation, remote viewing
2219/40162 . . . Sound display of machining operation
2219/40163 . . . Measuring, predictive information feedback to operator
2219/40164 . . . Fault recovery from task execution errors
2219/40165 . . . Sensor data to display depends on robot status
2219/40166 . . . Surface display, virtual object translated into real surface, movable rods
2219/40167 . . . Switch between simulated display of remote site, and actual display
2219/40168 . . . Simulated display of remote site, driven by operator interaction
2219/40169 . . . Display of actual situation at the remote site
2219/40171 . . . Set a common coordinate system for all remotely controlled robots
2219/40172 . . . Stop command transmission if no feedback signal received at remote site
2219/40173 . . . Stop robot if no command received within interval
2219/40174 . . . Robot teleoperation through internet
2219/40175 . . . Inclination, tilt of operator seat, chair serves as control command, like handle
2219/40176 . . . Encode operator actions into symbolic commands for transmission to remote
2219/40177 . . . Nanomanipulation
2219/40178 . . . Distributed top, resource availability in network
2219/40179 . . . Design of controller
2219/40181 . . . Operator can fine position in small area, free, but if contact, force feedback
2219/40182 . . . Master has different configuration than slave manipulator
2219/40183 . . . Tele-machining
2219/40184 . . . Compliant teleoperation, operator controls motion, system controls contact, force
2219/40185 . . . Decoupled coarse fine motion coordination
2219/40186 . . . Reachability control, permits slave to reach commanded position
2219/40187 . . . Indexed position control, master controls only small part of slave space

2219/40188 . . . Position control with scaling, master small movement, slave large movement
2219/40189 . . . Modes, coarse by rate controller, fine by position controller
2219/40191 . . . Autonomous manipulation, computer assists operator during manipulation
2219/40192 . . . Control modes, velocity for coarse, position for fine, hand for gripper
2219/40193 . . . Micromanipulation
2219/40194 . . . Force reflective, impedance shaping tele operation
2219/40195 . . . Tele-operation, computer assisted manual operation
2219/40196 . . . Projecting light on floor to delimit danger zone around robot
2219/40197 . . . Suppress, execute command depending on physical position of control panel
2219/40198 . . . Contact with human allowed if under pain tolerance limit
2219/40199 . . . Soft material covers links, arms for shock and pain attenuation
2219/40201 . . . Detect contact, collision with human
2219/40202 . . . Human robot coexistence
2219/40203 . . . Detect position of operator, create non material barrier to protect operator
2219/40204 . . . Each fault condition has a different recovery procedure
2219/40205 . . . Multiple arm systems
2219/40206 . . . Redundant serial manipulators, kinematic fault tolerance
2219/40207 . . . Parallel structured modules, more joints than DOF
2219/40208 . . . Dual redundant actuators
2219/40209 . . . If speed is important processors execute each different code, otherwise same code
2219/40211 . . . Fault tolerant, if one joint, actuator fails, others take over, reconfiguration
2219/40212 . . . Two-way clutch for joint, prevents movement in unallowable direction
2219/40213 . . . Record history, log of instructions sent from task planner to path planner
2219/40214 . . . Command rejection module
2219/40215 . . . Limit link kinetic energy to amount another element can dissipate upon impact
2219/40216 . . . Record image of working robot; display to detect errors
2219/40217 . . . Individual emergency stop lines for each part of system
2219/40218 . . . Check conditions before allowing unlocking of joint brake
2219/40219 . . . Detect contact, proximity of other manipulators
2219/40221 . . . Individual and common power cutoff switch for several robots
2219/40222 . . . Lock arm if somebody is looking into the hand
2219/40223 . . . If insertion force to high, alarm, stop for operator assistance
2219/40224 . . . If robot gets a return signal, go to initial condition position
2219/40225 . . . During start up, control robot with low speed, after a while gradually higher
2219/40226 . . . Input control signals to control system and to model, compare their outputs
2219/40227 . . . If one access robot fails, other pushes it out of the way
2219/40228 . . . If deviation of compliant tool is too large, stop and alarm
2219/40229 . . . Analytical redundancy, use available funcional redundancy of model
2219/40231 . . . Safety, dual clutched freewheel for joint, if error no movement possible
2219/40232 . . . Lock mechanical arm if servo, cpu error, other arms remain free
2219/40233 . . . Portable robot
2219/40234 . . . Snake arm, flexi-digit robotic manipulator, a hand at each end
2219/40235 . . . Parallel robot, structure
2219/40236 . . . With opposing actuators on same joint, agonist, flexor, muscle
2219/40237 . . . Bus for communication with sensors
2219/40238 . . . Dual arm robot, one picks up one part from conveyor as other places other part in machine
2219/40239 . . . Common control box for several robot control boards and additional control boards
2219/40241 . . . Underactuated robot, has less actuators than number of DOF
2219/40242 . . . End effector with motor to provide a yaw, roll and pitch motion
2219/40243 . . . Global positioning robot
2219/40244 . . . Walking manipulator with integrated stewart, parallel arm
2219/40245 . . . Gripper on crawling device, smaller than two cm
2219/40246 . . . 6-DOF 3-ppsp parallel manipulator
2219/40247 . . . Series manipulator mounted on parallel manipulator
2219/40248 . . . Manipulator on slide
2219/40249 . . . Whole arm manipulator, grip object not with end effector but with all links
2219/40251 . . . Ghdrs generalized high dimensional robotic system, virtual decomposition
2219/40252 . . . Robot on track, rail moves only back and forth
2219/40253 . . . Soft arm robot, light, rubber, very compliant
2219/40254 . . . Serial to parallel, branching manipulator, one macro and several parallel arms
2219/40255 . . . End effector attached to cable for gravity balance suspension
2219/40256 . . . Large, heavy manipulator
2219/40257 . . . Flexible macro manipulator with rigid attached micromanipulator
2219/40258 . . . Robot can be fixed in orientation and height to ground, plurality of such points
2219/40259 . . . Set friction in each joint to optimal value
2219/40261 . . . Self reproducing, replicating fabrication machine, tools, structure, info for this
2219/40262 . . . Two link arm with a free, attached to base, and an active joint between links
2219/40263 . . . Dual use mobile detachable manipulator
2219/40264 . . . Human like, type robot arm
2219/40265 . . . Use of inflatable links, can easily be folded, compressed air for stiffness
2219/40266 . . . Resonant manipulator, springs cooperate with latches, motor only for lost energy
2219/40267 . . . Parallel manipulator, end effector connected to at least two independent links
2219/40268 . . . Master attached to tip of macro manipulator, controls slave micromanipulator
2219/40269 . . . Naturally compliant robot arm

2219/40271 . . . Underwater, submarine movable manipulator
2219/40272 . . . Manipulator on slide, track
2219/40273 . . . Wire manipulator, crane type manipulator with three wires
2219/40274 . . . Cebot segments are mobile manipulators, connected by manipulator arm self
2219/40275 . . . Manipulator mounted on satellite, space manipulator
2219/40276 . . . Aqua robot manipulator
2219/40277 . . . Hybrid, connect parallel manipulators in series, Stewart truss
2219/40278 . . . Compact, foldable manipulator
2219/40279 . . . Flexible arm, link
2219/40281 . . . Closed kinematic loop, chain mechanisms, closed linkage systems
2219/40282 . . . Vehicle supports manipulator and other controlled devices
2219/40283 . . . Reservoir with additional material on vehicle with manipulator
2219/40284 . . . Toolrack on vehicle with manipulator, toolchanger
2219/40285 . . . Variable geometry manipulator, camlock
2219/40286 . . . End effector with offset arm, to carry hose to feed material
2219/40287 . . . Workpiece manipulator and tool manipulator cooperate
2219/40288 . . . Integrate sensor, actuator units into a virtual manipulator
2219/40289 . . . Scara for coarse movement, xy table for fine movement
2219/40291 . . . Instead of two links, two eccentrically rotating disks for full circle working
2219/40292 . . . Manipulator is positioned by a crane to cover a large workpiece, extended range
2219/40293 . . . Gantry, portal
2219/40294 . . . Portable robot can be fixed, attached to different workplaces, stations
2219/40295 . . . Sensors at the elbow to detect obstacles
2219/40296 . . . Second arm can be attached to first arm, modular
2219/40297 . . . Macro manipulator and microhand, distributed positioning
2219/40298 . . . Manipulator on vehicle, wheels, mobile
2219/40299 . . . Holonic, made of similar modules, truss manipulator
2219/40301 . . . Scara, selective compliance assembly robot arm, links, arms in a plane
2219/40302 . . . Dynamically reconfigurable robot, adapt structure to tasks, cellular robot, cebot
2219/40303 . . . Arm somersaults over grid, place one hand on grid point, release other hand
2219/40304 . . . Modular structure
2219/40305 . . . Exoskeleton, human robot interaction, extenders
2219/40306 . . . Two or more independent robots
2219/40307 . . . Two, dual arm robot, arm used synchronously, or each separately, asynchronously
2219/40308 . . . Machine, conveyor model in library contains coop robot path
2219/40309 . . . Simulation of human hand motion
2219/40311 . . . Real time simulation
2219/40312 . . . OOP object oriented programming for simulation
2219/40313 . . . Graphic motion simulation for ergonomic analysis
2219/40314 . . . Simulation of program locally before remote operation
2219/40315 . . . Simulation with boundary graphs
2219/40316 . . . Simulation of human-like robot joint, restricted 3-D motion
2219/40317 . . . For collision avoidance and detection
2219/40318 . . . Simulation of reaction force and moment, force simulation
2219/40319 . . . Simulate contact of object and obstacle, reduce to pairs with only one contact
2219/40321 . . . Simulation of human arm trajectories
2219/40322 . . . Simulation with des, discrete event system
2219/40323 . . . Modeling robot environment for sensor based robot system
2219/40324 . . . Simulation, modeling of muscle, musculoskeletal dynamical system
2219/40325 . . . Learn inverse kinematic model by variation, perturbation
2219/40326 . . . Singular value decomposition
2219/40327 . . . Calculation, inverse kinematics solution using damped least squares method
2219/40328 . . . If joint near singularity, restore angle to start values, adapt other joints
2219/40329 . . . Semi-singularity, movement in one direction not possible, in opposite direction is possible
2219/40331 . . . Joint angle change constraint, singularity between elbow up and down
2219/40332 . . . Identify degenerated directions, eliminate velocity component in that direction
2219/40333 . . . Singularity, at least one movement not possible, kinematic redundancy
2219/40334 . . . By fuzzy logic supervisor
2219/40335 . . . By probability distribution functions pdf
2219/40336 . . . Optimize multiple constraints or subtasks
2219/40337 . . . Maximum distance criterium
2219/40338 . . . Task priority redundancy
2219/40339 . . . Avoid collision
2219/40341 . . . Minimize energy
2219/40342 . . . Minimize sum of gravitational torques of some joints
2219/40343 . . . Optimize local torque
2219/40344 . . . Configuration index, control, limits of joint movement
2219/40345 . . . Minor measure
2219/40346 . . . Compatibility index
2219/40347 . . . Optimize manipulator velocity ratio function
2219/40348 . . . Optimize condition number
2219/40349 . . . Optimize manipulability measure function
2219/40351 . . . Cooperation of hand arm, break down into two subsystems
2219/40352 . . . Combination of priority, basic task, tip position, and task for link movement
2219/40353 . . . Split robot into two virtual robot, origin of second equals tip of first
2219/40354 . . . Singularity detection
2219/40355 . . . Geometric, task independent
2219/40356 . . . Kinetic energy, content and distribution
2219/40357 . . . Compliance, design and operational issues
2219/40358 . . . Inertial, from dynamic models
2219/40359 . . . Constraint, physical limitations
2219/40361 . . . Category of performance criteria

2219/40362 . . . Elbow high or low, avoid obstacle collision with redundancy control
2219/40363 . . . Two independent paths planned, interpolations for same robot, e.g. wrist and TCP
2219/40364 . . . Position of robot platform as additional task
2219/40365 . . . Configuration control, select other tasks by configuration of link positions
2219/40366 . . . Elbow reaches its target position before the end effector
2219/40367 . . . Redundant manipulator
2219/40368 . . . Multipoint impedance control, redundant manipulator can touch several obstacles
2219/40369 . . . Generate all possible arm postures associated with end effector position
2219/40371 . . . Control trajectory to avoid joint limit as well as obstacle collision
2219/40372 . . . Control end effector impedance
2219/40373 . . . Control of trajectory in case of a limb, joint disturbation, failure
2219/40374 . . . Control trajectory in case of distortion of visual input
2219/40375 . . . Control trajectory in case of changed tool length
2219/40376 . . . Moving center of mass and end effector for dynamic task of lifting heavy weight
2219/40377 . . . Impact force on stationary end effector, move center of mass, no reaction to base
2219/40378 . . . Keep center of mass fixed, no counterweight, no reaction on base
2219/40379 . . . Manipulability
2219/40381 . . . Control trajectory in case of joint limit, clamping of joint
2219/40382 . . . Limit allowable area where robot can be teached
2219/40383 . . . Correction, modification program by detection type workpiece
2219/40384 . . . Optimize teached path by data acquisition followed by genetic algorithm
2219/40385 . . . Compare offline teached point with online teached point, modify rest as function of error
2219/40386 . . . Search around teached point until operation has succes, correct program
2219/40387 . . . Modify without repeating teaching operation
2219/40388 . . . Two channels between robot and teaching panel, rs232c and video
2219/40389 . . . Use robot control language also to write non robotic user, application programs
2219/40391 . . . Human to robot skill transfer
2219/40392 . . . Programming, visual robot programming language
2219/40393 . . . Learn natural high level command, associate its template with a plan, sequence
2219/40394 . . . Combine offline with online information to generate robot actions
2219/40395 . . . Compose movement with primitive movement segments from database
2219/40396 . . . Intermediate code for robots, bridge, conversion to controller
2219/40397 . . . Programming language for robots, universal, user oriented
2219/40398 . . . Opto-electronic follow-up of movement of head, eyelids, finger to control robot
2219/40399 . . . Selection of master-slave operation mode
2219/40401 . . . Convert workspace of master to workspace of slave
2219/40402 . . . Control button on master for quick movement, for fine slow movement
2219/40403 . . . Master for walk through, slave uses data for motion control and simulation
2219/40404 . . . Separate master controls macro and microslave manipulator
2219/40405 . . . Master slave position control
2219/40406 . . . Master slave rate control
2219/40407 . . . Master slave, master is replica of slave
2219/40408 . . . Intention learning
2219/40409 . . . Robot brings object near operator, operator places object in correct position
2219/40411 . . . Robot assists human in non-industrial environment like home or office
2219/40412 . . . Sensor knowledge command fusion network, data and feature and action and constraint
2219/40413 . . . Robot has multisensors surrounding operator, to understand intention of operator
2219/40414 . . . Man robot interface, exchange of information between operator and robot
2219/40415 . . . Semi active robot, cobot, guides surgeon, operator to planned trajectory, constraint
2219/40416 . . . Planning for variable length tool, laser beam as tool
2219/40417 . . . For cooperating manipulators
2219/40418 . . . Presurgical planning, on screen indicate regions to be operated on
2219/40419 . . . Task, motion planning of objects in contact, task level programming, not robot level
2219/40421 . . . Motion planning for manipulator handling sheet metal profiles
2219/40422 . . . Force controlled velocity motion planning, adaptive
2219/40423 . . . Map task space to sensor space
2219/40424 . . . Online motion planning, in real time, use vision to detect workspace changes
2219/40425 . . . Sensing, vision based motion planning
2219/40426 . . . Adaptive trajectory planning as function of force on end effector, bucket
2219/40427 . . . Integrate sensing and action in planning
2219/40428 . . . Using rapidly exploring random trees algorithm RRT-algorithm
2219/40429 . . . Stochastic, probabilistic generation of intermediate points
2219/40431 . . . Grid of preoptimised paths as function of target position, choose closest, fine adapt
2219/40432 . . . Pass states by weighted transitions
2219/40433 . . . Distributed, trajectory planning for each virtual arm
2219/40434 . . . Decompose in motion planning for swarm of robots and motion planning for object to be transported
2219/40435 . . . Extract minimum number of via points from a trajectory
2219/40436 . . . Distributed search of attainable positions, parallel computed
2219/40437 . . . Local, directly search robot workspace
2219/40438 . . . Global, compute free configuration space, connectivity graph is then searched
2219/40439 . . . Feasible map algorithm
2219/40441 . . . Probabilistic backprojection

2219/40442 . . . Voxel map, 3-D grid map
2219/40443 . . . Conditional and iterative planning
2219/40444 . . . Hierarchical planning, in levels
2219/40445 . . . Decompose n-dimension with n-links into smaller m-dimension with m-1-links
2219/40446 . . . Graph based
2219/40447 . . . Bitmap based
2219/40448 . . . Preprocess nodes with arm configurations, c-space and planning by connecting nodes
2219/40449 . . . Continuous, smooth robot motion
2219/40451 . . . Closest, nearest arm, robot executes task, minimum travel time
2219/40452 . . . Evaluation function derived from skilled, experimented operator data
2219/40453 . . . Maximum torque for each axis
2219/40454 . . . Max velocity, acceleration limit for workpiece and arm jerk rate as constraints
2219/40455 . . . Proximity of obstacles
2219/40456 . . . End effector orientation error
2219/40457 . . . End effector position error
2219/40458 . . . Grid adaptive optimization
2219/40459 . . . Minimum torque change model
2219/40461 . . . Plan for even distribution of motor load of joints
2219/40462 . . . Constant consumed energy, regenerate acceleration energy during deceleration
2219/40463 . . . Shortest distance in time, or metric, time optimal
2219/40464 . . . Minimum relative velocities
2219/40465 . . . Criteria is lowest cost function, minimum work path
2219/40466 . . . Plan for minimum time trajectory, at least one joint maximum torque
2219/40467 . . . Virtual springs, impedance method
2219/40468 . . . Using polytree intersection method
2219/40469 . . . Using fuzzy logic performance, distances are fuzzy, very close to very far
2219/40471 . . . Using gradient method
2219/40472 . . . Using exact cell decomposition
2219/40473 . . . Using genetic algorithm GA
2219/40474 . . . Using potential fields
2219/40475 . . . In presence of moving obstacles, dynamic environment
2219/40476 . . . Collision, planning for collision free path
2219/40477 . . . Plan path independent from obstacles, then correction for obstacles
2219/40478 . . . Graphic display of work area of robot, forbidden, permitted zone
2219/40479 . . . Use graphic display, layout of robot path, obstacles to indicate interference
2219/40481 . . . Search pattern according to type of assembly to be performed
2219/40482 . . . Before assembly arrange parts
2219/40483 . . . Find possible contacts
2219/40484 . . . Using several tethered motors, attached to powersupply cable, move over surface
2219/40485 . . . Generate goal regions in presence of uncertainty, interference
2219/40486 . . . If physical limitation, execute regrasping steps
2219/40487 . . . Sensing to task planning to assembly execution, integration, automatic
2219/40488 . . . Coarse and fine motion planning combined
2219/40489 . . . Assembly, polyhedra in contact
2219/40491 . . . Gravity stable assembly, upper part cannot fall apart
2219/40492 . . . Model manipulator by spheres for collision avoidance
2219/40493 . . . Task to parameter designer, adapts parameters of impedance model as function of sensors
2219/40494 . . . Neural network for object trajectory prediction, fuzzy for robot path
2219/40495 . . . Inverse kinematics model controls trajectory planning and servo system
2219/40496 . . . Hierarchical, learning, recognition level controls adaptation, servo level
2219/40497 . . . Collision monitor controls planner in real time to replan if collision
2219/40498 . . . Architecture, integration of planner and motion controller
2219/40499 . . . Reinforcement learning algorithm
2219/40501 . . . Using sub goal method of options for semi optimal path planning
2219/40502 . . . Configuration metrics
2219/40503 . . . Input design parameters of workpiece into path, trajectory planner
2219/40504 . . . Simultaneous trajectory and camera planning
2219/40505 . . . Adaptive posture planning as function of large forces
2219/40506 . . . Self motion topology knowledge, configuration mapping
2219/40507 . . . Distributed planning, offline trajectory, online motion, avoid collision
2219/40508 . . . Fuzzy identification of motion plans executed by operator
2219/40509 . . . Piano moving model
2219/40511 . . . Trajectory optimization, coarse for arm, medium for wrist, fine for finger
2219/40512 . . . Real time path planning, trajectory generation
2219/40513 . . . Planning of vehicle and of its manipulator arm
2219/40514 . . . Computed robot optimized configurations to train ann, output path in real time
2219/40515 . . . Integration of simulation and planning
2219/40516 . . . Replanning
2219/40517 . . . Constraint motion planning, variational dynamic programming
2219/40518 . . . Motion and task planning
2219/40519 . . . Motion, trajectory planning
2219/40521 . . . Alternative, allowable path substitution if arm movements not possible
2219/40522 . . . Display of workpiece, workspace, locus of robot tip in different planes, xy xz yz
2219/40523 . . . Path motion planning, path in space followed by tip of robot
2219/40524 . . . Replace link, joint, structure by stewart platform to model flexibility
2219/40525 . . . Modeling only part of links or modules
2219/40526 . . . Modeling of links for each possible error or only certain error
2219/40527 . . . Modeling, identification of link parameters
2219/40528 . . . Ann for learning robot contact surface shape
2219/40529 . . . Neural network based on distance between patterns
2219/40531 . . . Ann for voice recognition
2219/40532 . . . Ann for vision processing
2219/40533 . . . Generate derivative, change of vibration error
2219/40534 . . . Generate derivative, change of position error

2219/40535 . . . Selective perception, retain only information needed for special task
2219/40536 . . . Signal processing for sensors
2219/40537 . . . Detect if robot has picked up more than one piece from bin; interlocked parts
2219/40538 . . . Barcode reader to detect position
2219/40539 . . . Edge detection from tactile information
2219/40541 . . . Identification of contact formation, state from several force measurements
2219/40542 . . . Object dimension
2219/40543 . . . Identification and location, position of components, objects
2219/40544 . . . Detect proximity of object
2219/40545 . . . Relative position of wrist with respect to end effector spatial configuration
2219/40546 . . . Motion of object
2219/40547 . . . End effector position using accelerometers in tip
2219/40548 . . . Compare measured distances to obstacle with model of environment
2219/40549 . . . Acceleration of end effector
2219/40551 . . . Friction estimation for grasp
2219/40552 . . . Joint limit
2219/40553 . . . Haptic object recognition
2219/40554 . . . Object recognition to track object on conveyor
2219/40555 . . . Orientation and distance
2219/40556 . . . Multisensor to detect contact errors in assembly
2219/40557 . . . Tracking a tool, compute 3-D position relative to camera
2219/40558 . . . Derive hand position angle from sensed process variable, like waveform
2219/40559 . . . Collision between hand and workpiece, operator
2219/40561 . . . Contactpoint between sensor surface and the normal, geometric probing
2219/40562 . . . Position and orientation of end effector, teach probe, track them
2219/40563 . . . Object detection
2219/40564 . . . Recognize shape, contour of object, extract position and orientation
2219/40565 . . . Detect features of object, not position or orientation
2219/40566 . . . Measuring, determine axis of revolution surface by tactile sensing, orientation
2219/40567 . . . Purpose, workpiece slip sensing
2219/40568 . . . Position and force and skin acceleration and stress rate sensors
2219/40569 . . . Force and tactile and proximity sensor
2219/40571 . . . Camera, vision combined with force sensor
2219/40572 . . . Camera combined with position sensor
2219/40573 . . . Isee integrated sensor, end effector, camera, proximity, gas, temperature, force
2219/40574 . . . Laserscanner combined with tactile sensors
2219/40575 . . . Camera combined with tactile sensors, for 3-D
2219/40576 . . . Multisensory object recognition, surface reconstruction
2219/40577 . . . Multisensor object recognition
2219/40578 . . . Impedance, mechanical impedance measurement
2219/40579 . . . Mechanical impedance, from motor current and estimated velocity
2219/40581 . . . Touch sensing, arc sensing
2219/40582 . . . Force sensor in robot fixture, base
2219/40583 . . . Detect relative position or orientation between gripper and currently handled object
2219/40584 . . . Camera, non-contact sensor mounted on wrist, indep from gripper
2219/40585 . . . Chemical, biological sensors
2219/40586 . . . 6-DOF force sensor
2219/40587 . . . Measure force indirectly by using deviation in position
2219/40588 . . . Three laser scanners project beam on photodiodes on end effector
2219/40589 . . . Recognize shape, contour of tool
2219/40591 . . . At least three cameras, for tracking, general overview and underview
2219/40592 . . . Two virtual infrared range sensors
2219/40593 . . . Push object and hold, detect moved distance
2219/40594 . . . Two range sensors for recognizing 3-D objects
2219/40595 . . . Camera to monitor deviation of each joint, due to bending of link
2219/40596 . . . Encoder in each joint
2219/40597 . . . Measure, calculate angular momentum, gyro of rotating body at end effector
2219/40598 . . . Measure velocity, speed of end effector
2219/40599 . . . Force, torque sensor integrated in joint
2219/40601 . . . Reference sensors
2219/40602 . . . Robot control test platform
2219/40603 . . . Infrared stimulated ultrasonic button on end effector, two fixed receivers
2219/40604 . . . Two camera, global vision camera, end effector neighbourhood vision camera
2219/40605 . . . Two cameras, each on a different end effector to measure relative position
2219/40606 . . . Force, torque sensor in finger
2219/40607 . . . Fixed camera to observe workspace, object, workpiece, global
2219/40608 . . . Camera rotates around end effector, no calibration needed
2219/40609 . . . Camera to monitor end effector as well as object to be handled
2219/40611 . . . Camera to monitor endpoint, end effector position
2219/40612 . . . 6-DOF ultrasonic or infrared external measurement
2219/40613 . . . Camera, laser scanner on end effector, hand eye manipulator, local
2219/40614 . . . Whole arm proximity sensor WHAP
2219/40615 . . . Integrate sensor placement, configuration with vision tracking
2219/40616 . . . Sensor planning, sensor configuration, parameters as function of task
2219/40617 . . . Agile eye, control position of camera, active vision, pan-tilt camera, follow object
2219/40618 . . . Measure gripping force offline, calibrate gripper for gripping force
2219/40619 . . . Haptic, combination of tactile and proprioceptive sensing
2219/40621 . . . Triangulation sensor
2219/40622 . . . Detect orientation of workpiece during movement of end effector
2219/40623 . . . Track position of end effector by laser beam
2219/40624 . . . Optical beam area sensor
2219/40625 . . . Tactile sensor
2219/40626 . . . Proprioceptive, detect relative link position, form object from hand contact

2219/40627 . . . Tactile image sensor, matrix, array of tactile elements, tixels
2219/40628 . . . Progressive constraints
2219/40629 . . . Manipulation planning, consider manipulation task, path, grasping
2219/41 . . Servomotor, servo controller till figures
2219/41001 . . . Servo problems
2219/41002 . . . Servo amplifier
2219/41003 . . . Control power amplifier with data on data bus
2219/41004 . . . Selection gain according to selection of speed or positioning mode
2219/41005 . . . Update servo gain not for each microprocessor cycle, but after a certain displacement
2219/41006 . . . Change gain as function of speed and position
2219/41007 . . . Select gain as function of gear ratio
2219/41008 . . . Speed gain high, position gain low in speed mode and inverse in position mode
2219/41009 . . . Sum output of amplifiers with different gains
2219/41011 . . . Adapt gain as function of followup error, model can be used
2219/41012 . . . Adjust feedforward gain
2219/41013 . . . Lower gain in high frequency region
2219/41014 . . . Cubic raise of gain until friction overcome, then linear raise
2219/41015 . . . Adjust position and speed gain of different axis
2219/41016 . . . Adjust gain to maintain operating bandwith for guaranteed servo performance
2219/41017 . . . High gain in narrow band of frequencies centered around frequency of rotation
2219/41018 . . . High gain for motor control during acceleration, low during deceleration
2219/41019 . . . Measure time needed from first to second speed, to adapt gain to aging condition
2219/41021 . . . Variable gain
2219/41022 . . . Small gain for small movements, large gain for large movements
2219/41023 . . . Large pd gain initially switched to smaller pd gain afterwards
2219/41024 . . . High gain for low command speed, torque or position error equals or near zero
2219/41025 . . . Detect oscillation, unstability of servo and change gain to stabilize again
2219/41026 . . . Change gain as function of speed
2219/41027 . . . Control signal exponentially to error
2219/41028 . . . Select gain with memory, rom table
2219/41029 . . . Adjust gain as function of position error and position
2219/41031 . . . Raise gain at zero speed until position error or speed is zero, then normal gain
2219/41032 . . . Backlash
2219/41033 . . . Constant counter torque
2219/41034 . . . Two motors driven in opposite direction to take up backlash
2219/41035 . . . Voltage injection
2219/41036 . . . Position error in memory, lookup table for correction actual position
2219/41037 . . . With computer
2219/41038 . . . Compensation pulses
2219/41039 . . . Change compensation slowly, gradually, smooth error with filter
2219/41041 . . . Compensation pulses as function of direction movement
2219/41042 . . . Switch between rapid, quick feed and cut, slow workspeed feed backlash
2219/41043 . . . Memory table with motor current and corresponding correction for lost motion
2219/41044 . . . For several transducers a table, select table as function of transducer
2219/41045 . . . For several modes and feed speeds, a table, registers for several backlash
2219/41046 . . . Ffw compensation using adaptive inverse backlash model
2219/41047 . . . Recirculating ballnut, ballscrew, preloaded bearing
2219/41048 . . . Relieve backlash by stepping back a little and verify position
2219/41049 . . . Block position pulses until movement detected, automatic compensation
2219/41051 . . . Detect end of lost motion by detecting changing current
2219/41052 . . . By detecting change of velocity
2219/41053 . . . How to integrate position error, add to speed loop
2219/41054 . . . Using neural network techniques
2219/41055 . . . Kind of compensation such as pitch error compensation
2219/41056 . . . Compensation for changing stiffness, deformation of workpiece
2219/41057 . . . Stiffness, deformation of slide, drive
2219/41058 . . . For deformation of screw
2219/41059 . . . Play in gear, screw backlash, lost motion
2219/41061 . . . Backlash for linear deviations
2219/41062 . . . Compensation for two, three axis at the same time, crosscoupling
2219/41063 . . . Lineary distributing pitch error over interpolated distance, add pulses, smoothing
2219/41064 . . . Reference screw, simulation axis, electronic simulated axis
2219/41065 . . . Resolver or inductosyn correction
2219/41066 . . . Keep nut at constant distance from screw
2219/41067 . . . Correction screw
2219/41068 . . . Measuring and feedback
2219/41069 . . . With cam
2219/41071 . . . Backlash for non orthogonal axis
2219/41072 . . . Cam transmits movement to resolver
2219/41073 . . . Tuning potentiometers and programming them
2219/41074 . . . Learn, calibrate at start for indetermined position, drive until movement
2219/41075 . . . Calibrate at start if new screw or slide has been installed, new lookup table
2219/41076 . . . For each replacement of a movable part, reload pitch error correction
2219/41077 . . . Self tuning, test run, detect, compute optimal backlash, deformation compensation
2219/41078 . . . Backlash acceleration compensation when inversing, reversing direction
2219/41079 . . . Cross coupled backlash for two other axis on reversing third axis
2219/41081 . . . Approach position from same direction
2219/41082 . . . Timer, speed integration to control duration of backlash correction
2219/41083 . . . Upon reversing direction, lower, change gain
2219/41084 . . . Compensation speed axis with changing, reversing direction, quadrant circle

2219/41085 . . . Compensation pulses on inversion of direction of rotation, movement
2219/41086 . . . Bang bang control
2219/41087 . . . Determine switch point
2219/41088 . . . If error too large, switch over to signal identification and servo correction
2219/41089 . . . Align, calibrate control so that one pulse or signal represents certain movement
2219/41091 . . . Alignment, zeroing, nulling, set parallel to axis
2219/41092 . . . References, calibration positions for correction of value position counter
2219/41093 . . . By injection of sinusoidal signal, superposed on reference
2219/41094 . . . Removable interferometer, store exact position, needed drive current, temperature
2219/41095 . . . References, calibration positions to adapt gain of servo
2219/41096 . . . For several positions store dead zone in memory
2219/41097 . . . Align stepping motor with driven valve
2219/41098 . . . Automatic recalibration
2219/41099 . . . Calibration by going to two extremes, limits, counting pulses, storing values
2219/41101 . . . Stop, halt step, AC motor on certain excitation phase, after sensing a reference
2219/41102 . . . Analog comparator
2219/41103 . . . One comparator for both speed and position feedback
2219/41104 . . . Start fine position after coarse position stopped
2219/41105 . . . Coarse fine
2219/41106 . . . Coarse fine take over, transition, switch over
2219/41107 . . . Coarse by hydraulic cylinder, fine by step motor superposed on piston
2219/41108 . . . Controlled parameter such as gas mass flow rate
2219/41109 . . . Drilling rate, feed rate
2219/41111 . . . Vertical position and orientation with respect to vertical
2219/41112 . . . Control parameter such as motor controlled by a torque signal
2219/41113 . . . Compensation for path radius
2219/41114 . . . Compensation for gravity, counter balance gravity
2219/41115 . . . Compensation periodical disturbance, like chatter, non-circular workpiece
2219/41116 . . . Compensation for instability
2219/41117 . . . Cancel vibration during positioning of slide
2219/41118 . . . Drift-compensation for servo, anti-hunt
2219/41119 . . . Servo error compensation
2219/41121 . . . Eliminating oscillations, hunting motor, actuator
2219/41122 . . . Mechanical vibrations in servo, antihunt also safety, stray pulses, jitter
2219/41123 . . . Correction inertia of servo
2219/41124 . . . Nonlinear compensation
2219/41125 . . . Compensate position as function of phase lag of drive motor
2219/41126 . . . Compensation for current ripple of drive or transducer
2219/41127 . . . Compensation for temperature variations of servo
2219/41128 . . . Compensate vibration beam, gantry, feedback of speed of non driven end
2219/41129 . . . Force compensation for non linearity of system
2219/41131 . . . Enter manually a compensation, correction for a better positioning
2219/41132 . . . Motor ripple compensation
2219/41133 . . . Compensation non linear transfer function
2219/41134 . . . Ann compensates output of pd controller
2219/41135 . . . Avoid stray pulses, jitter, use two d-flipflops, or integrate pulse duration
2219/41136 . . . Compensation of position for slip of AC motor
2219/41137 . . . Torque compensation for levitation effect of motor
2219/41138 . . . Torque compensation
2219/41139 . . . Compensate dynamic deflection of slide, calculated with position, speed, torque deflection values
2219/41141 . . . Position error compensation as function of speed to compensate detection delay
2219/41142 . . . Compensation of servocontrol signals as function of changing supply voltage
2219/41143 . . . Compensation of dynamic characteristic of actuator
2219/41144 . . . Element used such as low pass filter to cut resonance at non needed regions
2219/41145 . . . Digital filter for compensation of servo loop
2219/41146 . . . Kalman filter
2219/41147 . . . Exponential filter
2219/41148 . . . Model, from position, speed, acceleration derive compensation
2219/41149 . . . Zero phase filter
2219/41151 . . . Finite impulse response filter
2219/41152 . . . Adaptive filter
2219/41153 . . . Infinite impulse response filter
2219/41154 . . . Friction, compensation for friction
2219/41155 . . . During reversing, inversing rotation, movement
2219/41156 . . . Injection of vibration anti-stick, against static friction, dither, stiction
2219/41157 . . . Compensation as function of speed and acceleration
2219/41158 . . . Use of pwm signal against friction
2219/41159 . . . Two step command, reference and dead zone value forward, then dead zone reverse
2219/41161 . . . Adaptive friction compensation
2219/41162 . . . Large gain at start to overcome friction, then low gain
2219/41163 . . . Adapt gain to friction, weight, inertia
2219/41164 . . . How to compensate, for example by injecting compensation signal in comparator of normal loop
2219/41165 . . . Compensation corrected by second servo independent from main servo
2219/41166 . . . Adaptive filter frequency as function of oscillation, rigidity, inertia load
2219/41167 . . . Control path independent of load
2219/41168 . . . Compensate position error by shifting projected image electronically
2219/41169 . . . Parallel compensation
2219/41171 . . . Different compensation for left and right movement
2219/41172 . . . Adapt coefficients of compensator to bring system into phase margin
2219/41173 . . . Delay of compensation output signal as function of sampling and computation time
2219/41174 . . . Compensator in feedback loop

2219/41175 . . . Derivative compensation for speed loop, added or substracted to speed reference
2219/41176 . . . Compensation control, position error with data from lookup memory
2219/41177 . . . Repetitive control, adaptive, previous error during actual positioning
2219/41178 . . . Serial precompensation
2219/41179 . . . PI precompensation for speed loop
2219/41181 . . . PID precompensation for position loop
2219/41182 . . . PI precompensation for position loop
2219/41183 . . . Compensation of lag during standstill
2219/41184 . . . Compensation of lag during constant speed movement
2219/41185 . . . Send reference data in inverse order to model, filter to get inverted phase
2219/41186 . . . Lag
2219/41187 . . . Inverse, reciprocal filter, transfer function, reduce lag in contouring
2219/41188 . . . Compensate position error between two different axis as function of type of transducer
2219/41189 . . . Several axis, compensation for load for several axis at the same time
2219/41191 . . . Cancel vibration by positioning two slides, opposite acceleration
2219/41192 . . . Compensation for different response times, delay of axis
2219/41193 . . . Active damping of tool vibrations by cross coupling
2219/41194 . . . Axis error, one axis is corrected on other axis
2219/41195 . . . Cross coupled feedback, position change one axis effects control of other
2219/41196 . . . Adaptive prefiltering
2219/41197 . . . Adaptive postfiltering
2219/41198 . . . Fuzzy precompensation of pid, pd
2219/41199 . . . Feedforward compensation of pid
2219/41201 . . . Fuzzy compensation of statecontroller
2219/41202 . . . Structure, compensation circuit after comparator in loop
2219/41203 . . . Lead-phase compensation, lag-phase compensation servo
2219/41204 . . . Compensation circuit for input, reference, before comparator
2219/41205 . . . Compensation circuit in speed feedback loop
2219/41206 . . . Lookup table, memory with certain relationships
2219/41207 . . . Lookup table with position command, deviation and correction value
2219/41208 . . . Lookup table for load, motor torque as function of actual position error
2219/41209 . . . Lookup table with compensation as function of reference and feedback value
2219/41211 . . . For surface deviations from reference surface
2219/41212 . . . Gains for pid compensator as function of xy position
2219/41213 . . . Lookup table for load, motor torque as function of actual position
2219/41214 . . . Lookup table for current as function of actual position
2219/41215 . . . Lookup table for speed as function of actual position error
2219/41216 . . . Two lookup tables, for forward and reverse movement
2219/41217 . . . Command preshape, guidance, reference for better dynamic response, forcing feedforward
2219/41218 . . . Posicast, break reference into two parts, better settling time
2219/41219 . . . To compensate path, track error, calculate, use compensated reference
2219/41221 . . . Fuzzy shaping
2219/41222 . . . Modified command filtering
2219/41223 . . . Ann shaping, objective position, trajectory is shaped by ann
2219/41224 . . . Shaping a bang-bang input
2219/41225 . . . Profile generator for reference and for feedforward torque
2219/41226 . . . Zero vibration and zero derivative input shaper ZVD
2219/41227 . . . Extra insensitive input shaper, some vibration allowed
2219/41228 . . . Frequency of commutation updates depends on motor speed
2219/41229 . . . Adding a vibration, noise signal to reference signal of position, speed or acceleration
2219/41231 . . . Using impulse shaping filter
2219/41232 . . . Notch filter
2219/41233 . . . Feedforward simulation filter, with model
2219/41234 . . . Design, modeling of position controller
2219/41235 . . . Design, modeling of motion controller
2219/41236 . . . Use of sfc sequential function charts for specification
2219/41237 . . . Use of petrinets for verification, simulation
2219/41238 . . . Design with control bandwidth beyond lowest natural frequency
2219/41239 . . . Lyapunov direct controller design
2219/41241 . . . Anti-coincidence, synchronizer
2219/41242 . . . Pulse height modulation PHM
2219/41243 . . . Prevent, detect overflow of counter
2219/41244 . . . Dead band, zone
2219/41245 . . . Discrimination of direction
2219/41246 . . . Modulate command according to hystereris so that ideal curve is followed
2219/41247 . . . Servo lock
2219/41248 . . . Adapting characteristics of servo
2219/41249 . . . Several slides along one axis
2219/41251 . . . Servo with spring, resilient, elastic element, twist
2219/41252 . . . Avoid housing vibration, slide and auxiliary slide controlled with opposite phase
2219/41253 . . . From measured signature, select in database corresponding servo valve type
2219/41254 . . . Avoid cumulative measuring, calculation errors, sum remainder
2219/41255 . . . Mode switch, select independent or dependent control of axis
2219/41256 . . . Chattering control
2219/41257 . . . Display of gain
2219/41258 . . . Single position detector for plural motors driving a single load
2219/41259 . . . Coupling, clutch
2219/41261 . . . Flexible coupling between carriage, slide and actuator, motor
2219/41262 . . . Binary summing of motions, by stacking or using levers
2219/41263 . . . Switch control mode of spindle drive as function of contouring, spindle orientation

2219/41264 . . . Driven by two motors
2219/41265 . . . To avoid backlash
2219/41266 . . . Coupling, clutch and brake unit
2219/41267 . . . Servo loop with stepping motor, see figure SE-twelve
2219/41268 . . . Two cascade slides controlled in opposite direction to avoid local wear
2219/41269 . . . Ballscrew and ball spline nut driven synchronously or independently
2219/41271 . . . Drive in two directions
2219/41272 . . . Driven by two stepmotors with different resonance frequency
2219/41273 . . . Hydraulic
2219/41274 . . . Flywheel as power buffer
2219/41275 . . . Two axis, x y motors controlled simultaneous, no contouring, quick move at 45-degrees
2219/41276 . . . Displacement as function of width, amplitude pulse to motor
2219/41277 . . . Separation of position drive controller and motor amplifiers
2219/41278 . . . Two current amplifiers, pumps for each direction of displacement, pushpull
2219/41279 . . . Brake
2219/41281 . . . Hydraulic actuated brake
2219/41282 . . . Magnetic brake
2219/41283 . . . Brake force does not load index axis, better positioning
2219/41284 . . . Brake by applying DC to AC motor
2219/41285 . . . Dynamic brake of AC, DC motor
2219/41286 . . . Brake motor before reversing motor
2219/41287 . . . Mechanical self braking
2219/41288 . . . Two brakes, one on motor axis, other on drive axis
2219/41289 . . . Motor direction controlled by relays
2219/41291 . . . Before switching relay, series semiconductor diminishes current to zero
2219/41292 . . . H-bridge, diagonal pairs of semiconductors
2219/41293 . . . Inverter, DC-to-AC
2219/41294 . . . DC-to-AC converter
2219/41295 . . . AC-to-AC converter frequency controlled
2219/41296 . . . Two data lines; one for drive controllers, other to communicate with central unit
2219/41297 . . . For cancelling magnetic field leakage generated by, e.g. voice coil motor
2219/41298 . . . Stepping motor and control valve and power cylinder and mechanical feedback
2219/41299 . . . Pneumatic drive, pressure controlled bellow extension
2219/41301 . . . Pilot valve, linear fluid control valve and power cylinder
2219/41302 . . . On off fluid valve and power cylinder
2219/41303 . . . Flow rate valve controls speed
2219/41304 . . . Pneumatic
2219/41305 . . . Bypass fluid flow, block it from motor
2219/41306 . . . Control valve with counteracting control pulses
2219/41307 . . . Motor drives hydraulic pump in direction needed for power cylinder
2219/41308 . . . Bellow formed by for linear actuators, each pressure controlled by motor
2219/41309 . . . Hydraulic or pneumatic drive
2219/41311 . . . Pilot valve with feedback of position
2219/41312 . . . Metering piston between switch to fluid supply and switch to power cylinder
2219/41313 . . . Electro rheological fluid actuator
2219/41314 . . . Electro rheological valve controls cylinder
2219/41315 . . . Feedback of position of pilot valve and of power cylinder
2219/41316 . . . Piezo valve
2219/41317 . . . Stepping motor and control valve and power cylinder
2219/41318 . . . Electro hydraulic drive, electric motor drives hydraulic actuator
2219/41319 . . . AC, induction motor
2219/41321 . . . Brushless DC motor
2219/41322 . . . Vector, field oriented controlled motor
2219/41323 . . . Permanent magnetic synchronous actuator, motor
2219/41324 . . . Modular servo drive, simo drive
2219/41325 . . . Linear electric actuator for position combined with pneumatic actuator for force
2219/41326 . . . Step motor
2219/41327 . . . Linear induction motor
2219/41328 . . . Direct motor drive
2219/41329 . . . DC motor
2219/41331 . . . Galvano driver
2219/41332 . . . Electromagnet driven core, position of core controlled
2219/41333 . . . Non linear solenoid actuator
2219/41334 . . . Electrostatic levitator
2219/41335 . . . Reluctance motor
2219/41336 . . . Voltage- and frequency-controlled AC motor
2219/41337 . . . Linear drive motor, voice coil
2219/41338 . . . High torque, low inertia motor, printed circuit motor
2219/41339 . . . Using, switch reluctance or asynchronous motor in, to stepping mode motor
2219/41341 . . . Ultrasonic motor
2219/41342 . . . Shape memory metal actuator
2219/41343 . . . Magnetostrictive motor
2219/41344 . . . Piezo, electrostrictive linear drive
2219/41345 . . . Micropositioner
2219/41346 . . . Micropositioner in x, y and theta
2219/41347 . . . Piezo cycloid motor
2219/41348 . . . Hydraulic pressure block
2219/41349 . . . 6-Dof combined magnetic fluidic floating motion stage 100-micrometer cube range
2219/41351 . . . Piezo impact force, rapid extension of small mass moves object a bit
2219/41352 . . . Alternative clamping dilation of piezo, caterpillar motion, inchworm
2219/41353 . . . Optical piezo electric element, light converted in movement
2219/41354 . . . Magnetic, thermal, bimetal peltier effect displacement, positioning
2219/41355 . . . Electro magnetic coil actuator, voice coil
2219/41356 . . . Variable speed transmission, Van Doorne, Reeves
2219/41357 . . . Belt
2219/41358 . . . Transmission, variable gear ratio
2219/41359 . . . Gearbox
2219/41361 . . . Differential
2219/41362 . . . Registration, display of servo error
2219/41363 . . . Excess in error, error too large, follow up error
2219/41364 . . . Excess in error for speed, follow up error for speed
2219/41365 . . . Servo error converted to frequency

2219/41366 . . . Linearization of embedded position signals
2219/41367 . . . Estimator, state observer, space state controller
2219/41368 . . . Disturbance observer, inject disturbance, adapt controller to resulting effect
2219/41369 . . . Two estimators
2219/41371 . . . Force estimation using velocity observer
2219/41372 . . . Force estimator using disturbance estimator observer
2219/41373 . . . Observe position and driving signal, estimate disturbance and speed
2219/41374 . . . Observe position and driving signal, predict, estimate disturbance signal
2219/41375 . . . Observe speed and select torque as function of position reference, to compensate torque
2219/41376 . . . Tool wear, flank and crater, estimation from cutting force
2219/41377 . . . Estimate cutting torque in real time
2219/41378 . . . Estimate torque as function of speed, voltage and current
2219/41379 . . . Estimate torque from command torque and measured speed
2219/41381 . . . Torque disturbance observer to estimate inertia
2219/41382 . . . Observe position from encoder, estimate speed with ann
2219/41383 . . . Observe current, voltage, derive position
2219/41384 . . . Force estimation using position observer
2219/41385 . . . Observe position from encoder, estimate speed, position with kalman filter
2219/41386 . . . System identifier adapts coefficients tables for state and observer controller
2219/41387 . . . Observe reference torque, position and feedback position, estimate contact force
2219/41388 . . . Observe input torque and feedback position, estimate reaction torque
2219/41389 . . . Estimate torque from command torque and feedback acceleration
2219/41391 . . . Flux observer, flux estimated from current and voltage
2219/41392 . . . Observer for each axis, link, freedom, gives greater speed
2219/41393 . . . Synchronize observer with pulse from encoder
2219/41394 . . . Estimate speed and position error from motor current, torque
2219/41395 . . . Observe actual position to estimate compensation torque
2219/41396 . . . Estimate acceleration from three phase current values
2219/41397 . . . Estimate voltage control signal as function of voltage control signal and position error
2219/41398 . . . Estimate twist between motor and load, observe motor position and speed
2219/41399 . . . Reduced order estimator
2219/41401 . . . Estimate position from max and min speeds in open loop
2219/41402 . . . Observe speed and driving signal, estimate speed
2219/41403 . . . Machine deformation estimator as function of commanded position
2219/41404 . . . Hysteresis, bang bang feedback of velocity
2219/41405 . . . Inverse kinematic, dynamic
2219/41406 . . . LQR linear quadratic regulator to calculate gain for several known variables
2219/41407 . . . Master changes resistor, slave restores value in order to follow master
2219/41408 . . . Control of jerk, change of acceleration
2219/41409 . . . Update position feedback during speed control
2219/41411 . . . Avoid integrator wind-up, saturation actuator by dead zone feedback for integral
2219/41412 . . . Bandwidth of velocity loop is just below natural frequency of drive support
2219/41413 . . . Forward kinematics
2219/41414 . . . Time delay control, estimate non linear dynamics, correct with time delayed input
2219/41415 . . . Lookup table for nonlinear function synthesis
2219/41416 . . . Feedback signal is doubled, reference signal is doubled plus one
2219/41417 . . . Correction signal is different as function of sign of error
2219/41418 . . . Select feedback signal between detected position of motor and of driven load
2219/41419 . . . Resolution of feedback of incremental position decreases with velocity speed
2219/41421 . . . Eliminate, diminish delay in feedback speed
2219/41422 . . . Correction stored position while motor, power off, drive - encoder not connected
2219/41423 . . . Noise filter as function of rate of displacement, speed, for stabilisation
2219/41424 . . . Select a controller as function of large or small error
2219/41425 . . . Feedforward of acceleration
2219/41426 . . . Feedforward of torque
2219/41427 . . . Feedforward of position
2219/41428 . . . Feedforward of position and speed
2219/41429 . . . Mean value of previous feedforward values
2219/41431 . . . Delay position command as function of calculation time for feedforward, or order of system
2219/41432 . . . Feedforward of current
2219/41433 . . . Advance feedforward as function of delay rising torque, for large acceleration changes
2219/41434 . . . Feedforward FFW
2219/41435 . . . Adapt coefficients, parameters of feedforward
2219/41436 . . . Feedforward of speed and acceleration
2219/41437 . . . Feedforward of speed
2219/41438 . . . Feedforward of speed only during deceleration
2219/41439 . . . Position error ffw for compensation of speed
2219/41441 . . . Position reference ffw for compensation speed reference and speed error
2219/41442 . . . Position reference ffw for compensation speed reference
2219/41443 . . . Position reference ffw for compensation of position
2219/41444 . . . Speed reference ffw for compensation of speed error
2219/41445 . . . Ffw of position and speed error to compensate torque
2219/41446 . . . Position reference acceleration ffw for torque compensation
2219/41447 . . . Position generates force ffw combined with position error
2219/41448 . . . Ffw friction compensation for speed error, derived from position reference
2219/41449 . . . Speed reference and derived position ffw to compensate delay of position control
2219/41451 . . . Ffw tracking controller

2219/41452 . . . Position reference ffw for speed error compensation
2219/41453 . . . Inverse, feedforward controller is inverse of closed loop system
2219/41454 . . . Zero phase error tracking controller zpec
2219/41455 . . . Servo loop with absolute digital comparator, see figure SE-one
2219/41456 . . . Servo loop with switch between difference of counter OR absolute digital comparator, see figure SE-two
2219/41457 . . . Superposition of movement
2219/41458 . . . Servo loop with phase counter and phase discriminator, see figure SE-four
2219/41459 . . . Time counter and phase discriminator
2219/41461 . . . Phase counter and phase discriminator, phase locked motion
2219/41462 . . . Servo loop with position and reference counter, see figure SE-seven
2219/41463 . . . Servo loop with angle comparator and angle comparator predictor, see figure SE-eight
2219/41464 . . . Servo loop with position decoder, see figure SE-nine
2219/41465 . . . Servo loop with phase comparator, see figure SE-ten
2219/41466 . . . Servo loop with oscillator, see figure SE-eleven
2219/41467 . . . Servo loop with coicindence detector, see figure SE-thirteen
2219/41468 . . . Servo loop with adder, see figure SE-fourteen
2219/41469 . . . Servo loop with counter, see figure SE-fifteen
2219/41471 . . . Servo loop with u-down counter, see figure SE-sixteen
2219/41472 . . . Servo loop with position error indicates speed step value
2219/41473 . . . Servo loop with position and speed loop, problems of speed loop
2219/41474 . . . Servo loop with absolute digital position sensor
2219/41475 . . . Servo loop with absolute digital position sensor for continuous path control
2219/41476 . . . Servo loop with analog position sensor
2219/41477 . . . Servo loop with analog position sensor for continuous path control
2219/41478 . . . Servo loop with combination of analog and digital sensor
2219/41479 . . . Servo loop with position loop
2219/41481 . . . Divide command, block in subcommands, subblocks
2219/42 . . Servomotor, servo controller kind till VSS
2219/42001 . . . Statistical process control spc
2219/42002 . . . Proportional
2219/42003 . . . Three point, hysteresis comparator, controller
2219/42004 . . . PD proportional derivative
2219/42005 . . . Disturbance decoupling, rejection, suppression
2219/42006 . . . Digital event dynamic system control
2219/42007 . . . Nonlinear PD
2219/42008 . . . P regulator for position loop
2219/42009 . . . I regulator for speed loop
2219/42011 . . . PI regulator for speed loop
2219/42012 . . . H-infinite controller
2219/42013 . . . Two pd controllers, one for coarse, one for fine motion
2219/42014 . . . Pseudo derivative control with feedforward of gain
2219/42015 . . . P integrator, look at past periodic errors, fading memory, repetitive controller
2219/42016 . . . Dynamic impedance control, load does not influence speed, force, position
2219/42017 . . . Mimo controller with many inputs and outputs
2219/42018 . . . Pid learning controller, gains adapted as function of previous error
2219/42019 . . . Pi for position controller
2219/42021 . . . Pi for current loop
2219/42022 . . . Three point, hysteresis controller with variable hysteresis as function of error
2219/42023 . . . Non linear pi
2219/42024 . . . Stage controller, zpec and fuzzy smc and compensation controller
2219/42025 . . . Pidaf, pid with acceleration and friction compensation
2219/42026 . . . Pi position controller and fuzzy logic speed controller
2219/42027 . . . Flsps frequency locked steeping position control servo
2219/42028 . . . Five point, hysteresis controller
2219/42029 . . . Crone controller, fractional or fractal or non integer order robust controller
2219/42031 . . . All denominator model, the model form is expanded in denominator taylor series
2219/42032 . . . Differential feedback pd
2219/42033 . . . Kind of servo controller
2219/42034 . . . Pi regulator
2219/42035 . . . I regulator
2219/42036 . . . Adaptive control, adaptive nonlinear control
2219/42037 . . . Adaptive pi
2219/42038 . . . Real time adaptive control
2219/42039 . . . Select servo parameter set from table for fixed linear working points
2219/42041 . . . Adaptive pd
2219/42042 . . . Adaptive robust controller
2219/42043 . . . Adapt regulator as function of its output
2219/42044 . . . Adapt model as function of difference between real and calculated position
2219/42045 . . . Ann, error to pd, output pd to plant and also sets weights in ann
2219/42046 . . . Fuzzy pd controller, with position and velocity inputs
2219/42047 . . . Pid like fuzzy controller with position and velocity inputs
2219/42048 . . . Fuzzy pi control
2219/42049 . . . Fuzzy p
2219/42051 . . . Fuzzy position controller
2219/42052 . . . Fuzzy pi and d control
2219/42053 . . . Dynamic fuzzy position controller
2219/42054 . . . Loop, p control for position loop
2219/42055 . . . Pi control for speed
2219/42056 . . . Pi current controller
2219/42057 . . . Predictive fuzzy controller
2219/42058 . . . General predictive controller GPC
2219/42059 . . . Delta gpc, using derivative in time, predict over finite horizon
2219/42061 . . . Stochastic predictive controller spc
2219/42062 . . . Position and speed and current
2219/42063 . . . Position and speed and current and force, moment, torque
2219/42064 . . . Position, speed and acceleration
2219/42065 . . . Feedforward combined with pid feedback

2219/42066 . . . Position and speed and acceleration and current feedback
2219/42067 . . . Position and current
2219/42068 . . . Quasi smc, smc combined with other regulators
2219/42069 . . . Observer combined with pd and zero phase error tracking ffw controller
2219/42071 . . . Two clocks for each of the two loops
2219/42072 . . . Position feedback and speed feedforward, speed from data of tape
2219/42073 . . . Position and speed feedback, speed derived from position reference
2219/42074 . . . Position feedback and speed feedback, speed measured with tacho
2219/42075 . . . Two position loops
2219/42076 . . . Hybrid, digital control sets reference, coefficients for quick analog, pid, control
2219/42077 . . . Position, speed or current, combined with vibration feedback
2219/42078 . . . Observer combined with pd
2219/42079 . . . P position loop, fuzzy speed loop
2219/42081 . . . Fuzzy position controller and smc for motor voltage control
2219/42082 . . . Force control in one axis, velocity control in other axis
2219/42083 . . . Position, speed and force feedback
2219/42084 . . . Hybrid, analog loop, reference compensated by digital loop
2219/42085 . . . Error between reference model and controller compensated with fuzzy controller
2219/42086 . . . Position, speed and deflection feedback
2219/42087 . . . Speed and force loop
2219/42088 . . . I parallel to non linear controller
2219/42089 . . . Quick but coarse loop and slow but fine loop, dexterity
2219/42091 . . . Loop combinations, add a second loop, cascade control
2219/42092 . . . Position and force control loop together
2219/42093 . . . Position and current, torque control loop
2219/42094 . . . Speed then pressure or force loop
2219/42095 . . . First closed loop, then open loop
2219/42096 . . . Add, substract i part of speed feedback as function of sign speed error
2219/42097 . . . Dual mode servo, slow and precise, quick and coarse movement
2219/42098 . . . First open, then closed loop to correct setpoint of open loop
2219/42099 . . . Slow coarse loop followed by fine quick loop
2219/42101 . . . Coarse position with microprocessor, fine with hardware centering, tracking
2219/42102 . . . Coarse 8-bit positioning in closed loop, fine 10-bit in open loop
2219/42103 . . . Switch from pi, if large error to disturbance mode control if small error
2219/42104 . . . Loop switch, speed loop then position loop, mode switch
2219/42105 . . . Switch from pid to bang-bang to energy dissipation as function of speed, error
2219/42106 . . . Speed regulation starts only in braking range, less processor time needed
2219/42107 . . . Always position loop, first open loop for speed, then also closed loop speed
2219/42108 . . . Open loop for positioning, closed loop for calibration
2219/42109 . . . Coarse is speed loop, fine is position loop
2219/42111 . . . Change from pd, if small error, to bangbang if large error
2219/42112 . . . Switch between motion and stall mode, if speed is below certain value
2219/42113 . . . Position closed loop or open loop pressure control
2219/42114 . . . Loop mode, dual mode incremental coarse, analog fine
2219/42115 . . . Switch from continuous drive to pwm, near stop or out of acceleration period
2219/42116 . . . Switch from pid to pd or pd to pid
2219/42117 . . . Speed mode then stepping mode
2219/42118 . . . Breaking of control loop, closing open control loop
2219/42119 . . . Switch between motion and stall mode if actuator voltage current below limit
2219/42121 . . . Switch from bang-bang control to dead beat, finite time settling control
2219/42122 . . . First open loop, then closed loop
2219/42123 . . . Position loop then force, current loop
2219/42124 . . . Change over between two controllers, transfer error signal
2219/42125 . . . Switch from pi to p or to pd-controller
2219/42126 . . . Bumpless, smooth transfer between two control modes
2219/42127 . . . Timing, switch over on detection of marker on spindle
2219/42128 . . . Servo characteristics, drive parameters, during test move
2219/42129 . . . Teach, learn position table, model, for each reference a motor control output
2219/42131 . . . Speed model created by entering estimated speed at references
2219/42132 . . . Correct, modify position table, model if detected error too large
2219/42133 . . . Position references as function of time, correlated speed, acceleration in memory, signature
2219/42134 . . . Fuzzy logic tuning of controller as function of error
2219/42135 . . . Fuzzy model reference learning controller, synthesis, tune rule base automatically
2219/42136 . . . Fuzzy feedback adapts parameters model
2219/42137 . . . Automatic tune fuzzy controller
2219/42138 . . . Network tunes controller
2219/42139 . . . Tune fuzzy controller by three attributes: rise time, overshoot, settling time
2219/42141 . . . Filter error learning
2219/42142 . . . Fuzzy control learning of starting friction coefficient
2219/42143 . . . offline optimization of fuzzy controller
2219/42144 . . . Online tuning of fuzzy controller by ann
2219/42145 . . . Coarse tune with genetic algorithm, fine with gradient descent, hill climbing
2219/42146 . . . In each position, upper, lower drive current needed to move more, less, store mean
2219/42147 . . . Tune with genetic algorithm
2219/42148 . . . Position references as function of time, correlated noise, temperature in memory
2219/42149 . . . During learning relation between control and controlled signal, open loop
2219/42151 . . . Learn dynamics of servomotor system by ann

2219/42152 . . . Learn, self, auto tuning, calibrating, environment adaptation, repetition
2219/42153 . . . Inverse dynamics model idm, computed torque method
2219/42154 . . . Model itself controlled by position and speed loop
2219/42155 . . . Model
2219/42156 . . . Forward dynamics model fdm
2219/42157 . . . Reference model uses only output and input measurements
2219/42158 . . . Fuzzy model of cutting process of milling machine
2219/42159 . . . ARMA, AR autoregressive for poles, MA moving average model for zeros, in combination
2219/42161 . . . One model for load, one model for motor inertia
2219/42162 . . . Model reference adaptive control MRAC, correction fictive-real error, position
2219/42163 . . . Simulator
2219/42164 . . . Compensation of integration time of model
2219/42165 . . . Compensation of gain of speed control circuit for model
2219/42166 . . . Criterium is minimum jerk
2219/42167 . . . Minimum torque change
2219/42168 . . . Measuring of needed force for servo
2219/42169 . . . Decoder
2219/42171 . . . Velocity profile, variable gain, multiplication factors, rom ram
2219/42172 . . . Special code
2219/42173 . . . Acceleration deceleration
2219/42174 . . . Memory with position profile and force limits
2219/42175 . . . Velocity, speed points, profile and corresponding acceleration, delta v
2219/42176 . . . Motion profile
2219/42177 . . . Configuration memory for step motor
2219/42178 . . . Reduce cable connection by pre-memorized positions
2219/42179 . . . Normalize velocity profile, calculate real velocity from additional parameters
2219/42181 . . . Rom contains sin and cos table to drive step motor
2219/42182 . . . Memory is Rom for servo control
2219/42183 . . . Memory is Ram
2219/42184 . . . Master slave with feedforward for compensation of contour error
2219/42185 . . . Master slave with contour controller
2219/42186 . . . Master slave, motion proportional to axis
2219/42187 . . . Position mirror, axis, display, back of seat as function of position of seat, other axis
2219/42188 . . . Slave controlled as function of reference and actual position and derived speed of master
2219/42189 . . . Motion look up table as function of cam angle
2219/42191 . . . Adjust proportionality factor to optimize slave axis movement
2219/42192 . . . Each axis drive has own queue of commands, executed in synchronism
2219/42193 . . . Select between limit switches as function of current position and destination
2219/42194 . . . Derive position from command speed, integrate speed
2219/42195 . . . Position a stop, move workpiece against stop to cut stock, bar
2219/42196 . . . Follow dynamically contour warped surface with tool
2219/42197 . . . Brake as function of machining load, to keep total load on tool constant, avoid oscillation
2219/42198 . . . Step motor driven by step size and step duration data
2219/42199 . . . Fine position with gauge, coarse with limit switch, transducer
2219/42201 . . . Deriving speed from commanded position
2219/42202 . . . Square of distance
2219/42203 . . . Using a counter and a limit switch
2219/42204 . . . Absolute positions
2219/42205 . . . With potentiometer
2219/42206 . . . Block, stop pulses in one axis, not in other axis
2219/42207 . . . Generate points between start and end position, linear interpolation
2219/42208 . . . Set position of proximity switch
2219/42209 . . . Two slides, fine and quick, coarse and slow, piggyback, multirate positioner
2219/42211 . . . Command position by time value, proportional to total displacement
2219/42212 . . . Rotation over, selection of smallest, shortest angle, distance
2219/42213 . . . Position overshoot, axis still moves after stop
2219/42214 . . . Near desired position, control actuator by pulse in each clock, otherwise continuously
2219/42215 . . . Stop machine in a predetermined position
2219/42216 . . . Changing position range, stroke, between closed and fully open
2219/42217 . . . Time optimal position control
2219/42218 . . . Coarse and fine position control combined, each by ann
2219/42219 . . . Slow positioning with low pass, concurrent quick with high pass part of command
2219/42221 . . . Control position by equilibrium between spring and actuator force
2219/42222 . . . Compare reflected image from object with reference image, adjust object
2219/42223 . . . Number and frequency of pwm signals define mean position in time
2219/42224 . . . Process received reference to adapt it to range of servo
2219/42225 . . . Coarse and fine position control combined, added, superposed
2219/42226 . . . If deviation, return to desired position after a delay if within position range
2219/42227 . . . Using incremental control actuator
2219/42228 . . . Stop motor where torque will be maximum
2219/42229 . . . Shut off control, system, power on detection of zero or neutral position
2219/42231 . . . Detent, stop lock, current through motor in stop, locked, hold, blocked position
2219/42232 . . . Select, switch between long, extended and short range to position
2219/42233 . . . Pwm signal to low pass filter, compared to feedback position, if equal stop motor
2219/42234 . . . Regression ann to map position error to pulse width
2219/42235 . . . Adaptive pulsing, augment time duration until movement detected
2219/42236 . . . Use of a certain number of AC periods
2219/42237 . . . Pwm pulse width modulation, pulse to position modulation ppm

2219/42238 . . . Control motor position with direction signal and pwm signal for position
2219/42239 . . . Adaptive pulsing, take into account next cycle, command
2219/42241 . . . Select minimum value of two reference values
2219/42242 . . . Reference generator for position
2219/42243 . . . Enter velocity in reference generator, delivers position signals
2219/42244 . . . Enter acceleration, jerk, generator outputs acceleration, speed, position by integration
2219/42245 . . . Reference generates upper and lower range value at both sides of reference
2219/42246 . . . Add compensation to reference value
2219/42247 . . . Remote reference transmitted to servo
2219/42248 . . . Command reference limited, clipped, only between upper and lower values
2219/42249 . . . Relative positioning
2219/42251 . . . Control position of beam in coordination with xy slide
2219/42252 . . . Position beam to keep centerline
2219/42253 . . . Double resolution for one pulse of computer
2219/42254 . . . Resolution one axis different from resolution other axis
2219/42255 . . . Acceleration, deceleration time is a multiple of sampling time
2219/42256 . . . Sampling the signal
2219/42257 . . . Sampling time in fixed relation to timer interrupt
2219/42258 . . . Two sampling frequencies, for online measurements, for offline calculations
2219/42259 . . . Variable sampling rate as function of thermal displacement
2219/42261 . . . Two sampling frequencies, one for motion, one for stillstand
2219/42262 . . . Variable sampling rate as function of position error
2219/42263 . . . Different sample rates, multiple sample rates for the different loops
2219/42264 . . . Slow down sampling if power down is detected
2219/42265 . . . Sampling rate for sending reference values equals interpolation rate
2219/42266 . . . Variable sampling rate, slow at low velocity
2219/42267 . . . Stability analysis
2219/42268 . . . Safety, excess in error
2219/42269 . . . Inject, superpose test signal on reference, monitor functionality servo
2219/42271 . . . Monitor parameters, conditions servo for maintenance, lubrication, repair purposes
2219/42272 . . . Total movement is divided in several zones with different protection parameters
2219/42273 . . . On restart, power up, overload replace reference with feedback signal, free rotate
2219/42274 . . . On power failure keep last servoposition by cutting off air supply
2219/42275 . . . Alarm if working cycle fraction with values exceeding nominal exceeds threshold
2219/42276 . . . Action, on power failure, close pilot valve entirely by return spring
2219/42277 . . . If no position command in a period, servo to rest position, shut off power
2219/42278 . . . If direction bad, change direction sign or phase sequence automatically
2219/42279 . . . Allow temporary motor overload if temperature still under maximum, heat inertia
2219/42281 . . . If estimated temperature rise of motor is too high, inhibit motor
2219/42282 . . . If displacement rate of actuator exceeds limit, lower it
2219/42283 . . . Motor only actuated if hardware and software permission and control signal together
2219/42284 . . . Stop and brake motor
2219/42285 . . . Stop axis contour controlled
2219/42286 . . . Speed, ramp controlled slow down of motor
2219/42287 . . . On feedback failure, use profile stored in memory during learning
2219/42288 . . . Limit, stop drive current if axis obstructed, blocked, force against stop
2219/42289 . . . Avoid overload servo motor, actuator limit servo torque
2219/42291 . . . Regenerate faulty feedback by last measurement after detection excess error
2219/42292 . . . If speed detection fails, regenerate speed from position signal
2219/42293 . . . Regenerate faulty feedback by using previous value, substitute
2219/42294 . . . Software monitoring of time delay of feedback pulses, feedback failure
2219/42295 . . . Detect augmenting torque of drive motor
2219/42296 . . . Detect diminishing torque of drive motor, below low limit
2219/42297 . . . Detect phase lag of driving motor
2219/42298 . . . Measure backlash, time difference between point A to point B and from B to A, if too large
2219/42299 . . . Measure current during first acceleration command
2219/42301 . . . Detect correct connection of servomotor to powersupply
2219/42302 . . . Detect insufficient acceleration, diminishing speed
2219/42303 . . . Detect no speeding up of motor
2219/42304 . . . Load, torque threshold as function of speed
2219/42305 . . . Detect loss of pulse step motor
2219/42306 . . . Excess in error, compare reference with feedback
2219/42307 . . . Compare actual feedback with predicted, simulated value to detect run away
2219/42308 . . . Watchdog or integrator to detect no change or excess in feedback
2219/42309 . . . Excess in speed
2219/42311 . . . Store working torque profiles as function of time, position, compare with real torque
2219/42312 . . . Compare feedback with upper and lower limit, store result as 0-1 if in tolerance
2219/42313 . . . Excess in error for speed and different sign of position and speed feedback
2219/42314 . . . Warning signals are send when excess in error for speed, acceleration, amplitude
2219/42315 . . . Two, double counter to check measurement
2219/42316 . . . Additional hardware to detect which part of feedback is defect, failed
2219/42317 . . . Redundant, two actuators
2219/42318 . . . Using two, more, redundant measurements or scales to detect bad function
2219/42319 . . . What kind of actuator failure

2219/42321 . . . Wrong direction or sign of measured value, eventually stop
2219/42322 . . . Emit dummy pulses, detect loss of pulses, feedback failure, wire brake, short
2219/42323 . . . Detect wire break, short circuit of feedback
2219/42324 . . . Axis breaking, between motor and slide, table
2219/42325 . . . Stalling of drive motor, overload
2219/42326 . . . Protection servo for saturation of amplifier
2219/42327 . . . Detect ballscrew wear
2219/42328 . . . Detect bearing, clamp wear
2219/42329 . . . Defective measurement, sensor failure
2219/42331 . . . Bad parameter configuration for spindle, gear ratio, encoder resolution
2219/42332 . . . Detect failure of servo controller
2219/42333 . . . Synchronization by opposite correction for both axis
2219/42334 . . . Synchronous tracking servo for biaxial positioning tables, contouring
2219/42335 . . . If one slave axis out of synchronisation, synchronise all other axes to that one
2219/42336 . . . To synchronize axis, adapt gain of each axis as function of max, min, average gain
2219/42337 . . . Tracking control
2219/42338 . . . Position tracking control
2219/42339 . . . Speed tracking control
2219/42341 . . . Force tracking control
2219/42342 . . . Path, trajectory tracking control
2219/42343 . . . Optimum, adaptive sliding mode controller
2219/42344 . . . Chattering alleviation control, chattering about switching surface
2219/42345 . . . VSTC variable structure tracking control
2219/42346 . . . Fuzzy sliding mode control fsmc
2219/42347 . . . Switch to a saturation control signal if deviation from switch line is too large
2219/42348 . . . Slimsoc sliding mode self organizing controller
2219/42349 . . . Sliding mode control with perturbation estimation smcpe
2219/42351 . . . PIVSC proportional integral compensated vsc
2219/42352 . . . Sliding mode controller SMC, select other gain
2219/42353 . . . Variable structure system, control VSS VSC
2219/43 . . Speed, acceleration, deceleration control ADC
2219/43001 . . . Speed, feed, infeed, acceleration, stopping problems
2219/43002 . . . Acceleration, deceleration for forward, backward reciprocating movement
2219/43003 . . . Acceleration deceleration in presence of backlash, dynamic backlash
2219/43004 . . . Decelerate to follow desired velocity
2219/43005 . . . Corner distance variables to keep path when programmed speed changes
2219/43006 . . . Acceleration, deceleration control
2219/43007 . . . Acceleration from rest
2219/43008 . . . Deceleration and stopping
2219/43009 . . . Acceleration deceleration for each block of data, segment
2219/43011 . . . Shorter time by adjusting corner speed, avoid zero speed when engage corner
2219/43012 . . . Profile is defined by series of bits, for each actuator, sensor
2219/43013 . . . Ramp signal from division of sum of registers
2219/43014 . . . Calculate inertia ratio from full acceleration and full deceleration trial
2219/43015 . . . Calculate square root x
2219/43016 . . . Acceleration, deceleration as function of feed rate override
2219/43017 . . . Acceleration is larger than deceleration to compensate for friction
2219/43018 . . . Compensation, correction of acceleration, deceleration time
2219/43019 . . . Compensate acceleration for sudden change in load, shockless
2219/43021 . . . At several positions detect acceleration error, compensate for it
2219/43022 . . . Compensate for friction as function of position
2219/43023 . . . Switch from acceleration to deceleration if mid stroke speed not reached
2219/43024 . . . Parabolic velocity profile, linear acceleration, keep energy dissipation minimal
2219/43025 . . . Acceleration, deceleration is polynomial, derivative is zero on stop position
2219/43026 . . . Predict deceleration start from measured characteristics and actual performance
2219/43027 . . . Parabolic acceleration, deceleration trajectory at start, stop
2219/43028 . . . Switching points for trapezoidal form are stored in memory
2219/43029 . . . Acceleration larger than deceleration for safe stopping at slow speed
2219/43031 . . . Feed speed reduction dependent on tool surface
2219/43032 . . . Non symmetric acceleration profile
2219/43033 . . . Sinusoidal acceleration profile
2219/43034 . . . Form of profile, ramp, trapezoid, S-curve, exponential
2219/43035 . . . Vertical start and stop phase
2219/43036 . . . Velocity profile with given starting and stopping speed vector
2219/43037 . . . Position, speed as function of position is trapezoid
2219/43038 . . . Parabolic acceleration, constant speed, parabolic deceleration as function of position
2219/43039 . . . Time, exponential acceleration, constant speed, exponential deceleration as function of time
2219/43041 . . . Prediction, look ahead deceleration control, calculate start deceleration
2219/43042 . . . Convolution of speed curve with torque curve
2219/43043 . . . Normal and maximum deceleration mode, switch as function of position deviation, error
2219/43044 . . . Drive and brake alternative to decelerate and stop
2219/43045 . . . Max torque, acceleration, then variable, then reverse, variable then max deceleration
2219/43046 . . . Determine time constant from command speed and needed max acceleration torque
2219/43047 . . . If speed below reference, small acceleration, if above, large deceleration
2219/43048 . . . Step change in reference, soft start, smoothing reference
2219/43049 . . . Digital convolution for velocity profile, also successive convolution
2219/43051 . . . Translate generic motion description into acceleration profiles
2219/43052 . . . Set for each block time constant and speed target
2219/43053 . . . Slow acceleration, rapid deceleration
2219/43054 . . . Take up gear backlash during deceleration
2219/43055 . . . Same acceleration deceleration pattern for position and velocity loop

2219/43056 . . . Asynchronous acceleration between slow, fast axes, rotational, linear axes
2219/43057 . . . Adjust acceleration, speed until maximum allowable moment for axis
2219/43058 . . . Limitation of acceleration, permissible, tolerable acceleration
2219/43059 . . . Accelerate, decelerate all axis as function of max, min, average speed axis
2219/43061 . . . Maximum acceleration deceleration lookup table as function of distance
2219/43062 . . . Maximum acceleration, limit
2219/43063 . . . Acceleration deceleration as function of maximum allowable speed
2219/43064 . . . Brake, decelerate at least one axis at maximum
2219/43065 . . . Limitation of jerk
2219/43066 . . . Max centrifugal acceleration, especially for cmm
2219/43067 . . . Reach maximum speed at zero acceleration
2219/43068 . . . Adapt acceleration as function of load, developed heat in motor
2219/43069 . . . Measure acceleration, derive limit torque, adapt acceleration
2219/43071 . . . Open closing acceleration deceleration control
2219/43072 . . . Position controlled opening profile
2219/43073 . . . Time controlled opening profile
2219/43074 . . . Control speed, acceleration so as to follow desired speed profile
2219/43075 . . . Two modes, one normal and one for obstruction by objects
2219/43076 . . . Switch from acceleration to constant speed as function of detected speed limit
2219/43077 . . . Limit switch starts braking, stop, no braking, low torque movement until end
2219/43078 . . . Near end position limit switch, brake by reversing, then slow until end limit
2219/43079 . . . Acceleration, deceleration controlled by switches along path
2219/43081 . . . Set parameters of profile generator, creep distance and speed, flight time
2219/43082 . . . Near end position limit switch, lower speed and brake
2219/43083 . . . Structure, step motor
2219/43084 . . . Acceleration deceleration circuit implemented in software, algorithm
2219/43085 . . . Acceleration-deceleration circuit before interpolator
2219/43086 . . . Acceleration-deceleration circuit after interpolator
2219/43087 . . . Stop valves to stop fluid flow of hydraulic drive cylinder
2219/43088 . . . Select out of plurality of acceleration profiles
2219/43089 . . . Rom, ram with speed and acceleration
2219/43091 . . . Ram with optimum motion curve
2219/43092 . . . Torque curve, wave stored in rom, ram
2219/43093 . . . Speed pattern, table together with timing data in ram
2219/43094 . . . Acceleration and deceleration together with their respective time
2219/43095 . . . Maximum speed and acceleration deceleration time constant as function of position
2219/43096 . . . Position, trajectory and speed stored in ram
2219/43097 . . . Table, rom, ram speed table
2219/43098 . . . Change ADC time constant during start and end of interpolation
2219/43099 . . . Select acceleration deceleration time constants as function of weight, load, position
2219/43101 . . . Change time constants acceleration, deceleration as function of feed rate override
2219/43102 . . . Time constant acceleration, deceleration as function of machining conditions
2219/43103 . . . Switch adc time constants as function of type of axis, spindle feed or position axis
2219/43104 . . . Minimize time constant based on operation program
2219/43105 . . . ADC time constants as function of type of axis rotational or linear
2219/43106 . . . Time constant acceleration, deceleration as function of temperature of motor
2219/43107 . . . Correction acceleration and deceleration as function of speed, time constants in rom
2219/43108 . . . Delay stop command as function of error between reference and multiple of increments
2219/43109 . . . Adaptive stopping with correction for both directions
2219/43111 . . . Measure time needed from first to second speed, to adapt position command
2219/43112 . . . Using feedforward prediction of position
2219/43113 . . . Give stop order a certain number of motor rotations before end stop
2219/43114 . . . Detect position, speed or time of object between begin and end, adapt motion
2219/43115 . . . Adaptive stopping
2219/43116 . . . Calculate overshoot from supply voltage change, adapt motion
2219/43117 . . . Torque compensation as function of position reference, feedback of speed and position
2219/43118 . . . Adjust position reference as function of position reference, feedback of speed and position
2219/43119 . . . Adapt robot motion to machine speed as function of error from programmed speed
2219/43121 . . . Axis speed as function of probing signal during probing of workpiece
2219/43122 . . . Adapt speed, feed as function of duration of transmission of instruction
2219/43123 . . . Speed of cutter as function of position of feeler, probe
2219/43124 . . . Adapt speed as function of material, thickness, depth, volume, width, uniform surface quality
2219/43125 . . . Speed as function of size of chuck, diameter tool
2219/43126 . . . Pivoting speed of workpiece as function of inverse of work, machining time needed
2219/43127 . . . As a function of, select reference velocity as function of gear ratio
2219/43128 . . . Feed as function of number of press operations
2219/43129 . . . Speed as function of curvature, in curves, corners smaller than in straight line
2219/43131 . . . Adapt speed as function of lag, follow up error
2219/43132 . . . Rotation speed as function of minimum wave energy, toolwear, first learn for different speeds
2219/43133 . . . Delay movement start as function of lag, follow up error
2219/43134 . . . Feed or speed as function of magnetic characteristic, code, form of tool
2219/43135 . . . Reduce path speed near centre of axis

2219/43136 . . . Lower speed of indexing motor if door to turret lathe is open
2219/43137 . . . Constant path speed for combined rotational and linear movement
2219/43138 . . . Set speed by controlling position of pulley of variable transmission
2219/43139 . . . VCO variable frequency oscillator or two oscilators with different frequency
2219/43141 . . . Surface, path, tangential speed
2219/43142 . . . Control relative speed between two spindles
2219/43143 . . . ADC ramp and velocities are set by potentiometers which control digital valve
2219/43144 . . . Accelerate one slide and decelerate other slide to keep speed constant
2219/43145 . . . Machine first with low spindle speed, then with high speed, avoid chatter
2219/43146 . . . Control of speed, velocity of movement of tool as function of power of tool
2219/43147 . . . Control power of tool as function of speed, velocity of movement
2219/43148 . . . Rapid return, retract stroke
2219/43149 . . . Rapid approach, then slow, then pressure for clamping, bonding
2219/43151 . . . Rapid feed in, slow workspeed during entering material, then high work speed
2219/43152 . . . Feed in, transfer line, rapid traverse to work, grip speed
2219/43153 . . . Control depth of feed in by timer
2219/43154 . . . Quick feed in to workpiece without gauging, then normal feed with gauging
2219/43155 . . . Rapid speed for approach then slow speed for working
2219/43156 . . . Feed rate
2219/43157 . . . Feed rate
2219/43158 . . . Feedrate override
2219/43159 . . . Feedrate override only for x y, not for z or only for z and not for x y
2219/43161 . . . Second, independent feedrate override
2219/43162 . . . Motion control, movement speed combined with position
2219/43163 . . . Based on unit motions, primitive b-spline motions, time shifted and weighted
2219/43164 . . . Independent, uncoordinated motion control of several motors to initialise
2219/43165 . . . Superposition of special effects motion on normal motion
2219/43166 . . . Simulation of mechanical gear
2219/43167 . . . Distributed motion control
2219/43168 . . . Motion profile planning for point to point control
2219/43169 . . . Motor drives a mechanical cam
2219/43171 . . . Correction servo and constant velocity motor as input to differential, sum motion
2219/43172 . . . Change velocities on the fly during a motion
2219/43173 . . . Synchronize motion with scenery, sound
2219/43174 . . . Simulating cam motion mechanism
2219/43175 . . . Motion in several blocks, for each part in open and part in closed loop
2219/43176 . . . Scale velocity profile
2219/43177 . . . Single cycle positioning, start, move, stop for single rotation
2219/43178 . . . Filter resonance frequency from acceleration pattern, derive new speed pattern
2219/43179 . . . Speed changes gradualy from constant value to zero
2219/43181 . . . Reaching reference position by spiraling speed reference
2219/43182 . . . Speed control with feedback and as reference the programmed value
2219/43183 . . . Speed control, input is the reference, but no feedback
2219/43184 . . . From desired speed, derive delta positions during equal intervals
2219/43185 . . . Speed invariant motions, path accuracy independent of speed
2219/43186 . . . Pulses from handle, knob, hand wheel control speed
2219/43187 . . . Vector speed, ratio between axis, without feedback
2219/43188 . . . Vector speed with feedback
2219/43189 . . . Sum of squares
2219/43191 . . . Approximation
2219/43192 . . . Brake while driving to obtain very low speed, step wise movement, then stop
2219/43193 . . . Variable slope speed steps as function of position, pulse pump controller
2219/43194 . . . Speed steps, switch over as function of position
2219/43195 . . . Using a tri-phase motor and a step motor
2219/43196 . . . Using two motors
2219/43197 . . . Two axis at the same time
2219/43198 . . . Coupling and step motor
2219/43199 . . . Safety, limitation of feedrate
2219/43201 . . . Limit speed to allowable speed for all axis
2219/43202 . . . If collision danger, speed is low, slow motion
2219/43203 . . . Limitation of speed, permissible, allowable, maximum speed
2219/43204 . . . Different, dynamic current limits as function of speed
2219/43205 . . . General tape speed controls speed of axis
2219/43206 . . . Tape speed controls speed of axis
2219/45 . . Nc applications
2219/45001 . . . Antenna orientation
2219/45002 . . . To application field of control
2219/45003 . . . Harvester
2219/45004 . . . Mining
2219/45005 . . . Registration machine, chart recorder
2219/45006 . . . Valves
2219/45007 . . . Toy
2219/45008 . . . Theatre
2219/45009 . . . Glassforming
2219/45011 . . . To be assigned
2219/45012 . . . Excavator
2219/45013 . . . Spraying, coating, painting
2219/45014 . . . Elevator, lift
2219/45015 . . . Roller blind, shutter
2219/45016 . . . Radar
2219/45017 . . . Agriculture machine, tractor
2219/45018 . . . Car, auto, vehicle
2219/45019 . . . Balancing wheels
2219/45021 . . . Wheel mounting
2219/45022 . . . Auto seat, dentist chair, roll wheel chair
2219/45023 . . . Align head lamps of car
2219/45024 . . . Simulation car ride
2219/45025 . . . Position, mount glass window, sunroof in car-body

2219/45026 . . . Circuit board, pcb
2219/45027 . . . Masking, project image on wafer semiconductor, photo tracer
2219/45028 . . . Lithography
2219/45029 . . . Mount and solder parts on board
2219/45031 . . . Manufacturing semiconductor wafers
2219/45032 . . . Wafer manufacture; interlock, load-lock module
2219/45033 . . . Wire bonding, wire wrap
2219/45034 . . . Adjusting, trimming circuits on printed boards
2219/45035 . . . Printed circuit boards, also holes to be drilled in a plate
2219/45036 . . . Waterjet cutting
2219/45037 . . . Veneer cutting
2219/45038 . . . Cutting plotter
2219/45039 . . . Slitter, scoring
2219/45041 . . . Laser cutting
2219/45042 . . . Hot wire cutting, use of polystyrene or similar material
2219/45043 . . . EDM machine, wire cutting
2219/45044 . . . Cutting
2219/45045 . . . Maintenance, automatic storage and retrieval system
2219/45046 . . . Crane
2219/45047 . . . Sorting
2219/45048 . . . Packaging
2219/45049 . . . Forklift
2219/45051 . . . Transfer line
2219/45052 . . . Filling vehicle with material
2219/45053 . . . Coil, bobbin handling
2219/45054 . . . Handling, conveyor
2219/45055 . . . Assembly
2219/45056 . . . Handling cases, boxes
2219/45057 . . . Storage handling for disks or material
2219/45058 . . . Grinding, polishing robot
2219/45059 . . . Drilling robot
2219/45061 . . . Measuring robot
2219/45062 . . . Surface finishing robot
2219/45063 . . . Pick and place manipulator
2219/45064 . . . Assembly robot
2219/45065 . . . Sealing, painting robot
2219/45066 . . . Inspection robot
2219/45067 . . . Assembly
2219/45068 . . . Cutting robot
2219/45069 . . . Computer controlled automata, doll
2219/45071 . . . Aircraft, airplane, ship cleaning manipulator, paint stripping
2219/45072 . . . Sewer cleaning manipulator
2219/45073 . . . Microrobot
2219/45074 . . . Edge treating robot, machine
2219/45075 . . . Sewer repair
2219/45076 . . . Gas, fuel refilling
2219/45077 . . . Sculpturing manipulator
2219/45078 . . . Window cleaning, end effector contains detection and cleaning means
2219/45079 . . . Stripping robot, strip pieces of garments from table
2219/45081 . . . Tuning robot for amplifiers
2219/45082 . . . Sanding robot, to clean surfaces
2219/45083 . . . Manipulators, robot
2219/45084 . . . Service robot
2219/45085 . . . Space robot
2219/45086 . . . Brick laying, masonry robot
2219/45087 . . . Gymnast robot, acrobat
2219/45088 . . . Riveting robot
2219/45089 . . . Testing robot
2219/45091 . . . Screwing robot, tighten or loose bolt
2219/45092 . . . Analysing or chemical synthesis robot, moving samples from station to station
2219/45093 . . . Tacker robot, to join panels with nails, staples
2219/45094 . . . Milling robot
2219/45095 . . . Office messenger
2219/45096 . . . Polishing manipulator
2219/45097 . . . Cable harnessing robot
2219/45098 . . . Vacuum cleaning robot
2219/45099 . . . Filament, tape winding robot
2219/45101 . . . Hot line work robot, to handle high voltage lines
2219/45102 . . . Concrete delivering manipulator with several links
2219/45103 . . . Security, surveillance applications
2219/45104 . . . Lasrobot, welding robot
2219/45105 . . . Fruit picker, pruner, end effector is a platform for an operator
2219/45106 . . . Used in agriculture, tree trimmer, pruner
2219/45107 . . . Weed robot
2219/45108 . . . Aid, robot for aid to, assist human disabled
2219/45109 . . . Excercise, coordination, therapy, rehabillitation robot for disabled patients
2219/45111 . . . Meal, food assistance
2219/45112 . . . Arm movement aid
2219/45113 . . . Animal handling, milking robot
2219/45114 . . . Fisher line robot
2219/45115 . . . Evisceration robot, remove intestines of animal
2219/45116 . . . Tapping human shoulder with hammer
2219/45117 . . . Medical, radio surgery manipulator
2219/45118 . . . Endoscopic, laparoscopic manipulator
2219/45119 . . . Telesurgery with local assistent, voice communication
2219/45121 . . . Operating microscope, mounted on manipulator arm
2219/45122 . . . Laser skin treatment
2219/45123 . . . Electrogoniometer, neuronavigator, medical robot used by surgeon to operate
2219/45124 . . . Two spindle lathe
2219/45125 . . . Four axis, spindle lathe
2219/45126 . . . Riveting machine
2219/45127 . . . Portable, hand drill
2219/45128 . . . Nibble machines
2219/45129 . . . Boring, drilling
2219/45131 . . . Turret punch press
2219/45132 . . . Forging press, combined with furnace
2219/45133 . . . Lapping
2219/45134 . . . Marking
2219/45135 . . . Welding
2219/45136 . . . Turning, lathe
2219/45137 . . . Punch, stamp, also with use die, mould
2219/45138 . . . Laser welding
2219/45139 . . . Laser drilling
2219/45141 . . . Turret lathe
2219/45142 . . . Press-line
2219/45143 . . . Press-brake, bending machine
2219/45144 . . . Saw
2219/45145 . . . Milling

2219/45146 . . . Inertia friction welding
2219/45147 . . . Machining blade, airfoil
2219/45148 . . . Boring
2219/45149 . . . Micromachining to micrometer precision
2219/45151 . . . Deburring
2219/45152 . . . Forming workpiece by pressing tool against metal on model
2219/45153 . . . Carton forming
2219/45154 . . . Forming workpiece by using thermal energy, laser forming
2219/45155 . . . Electroforming, original form is covered with metal
2219/45156 . . . Grind on lathe
2219/45157 . . . Grind optical lens
2219/45158 . . . Grind sawteeth
2219/45159 . . . Dressing, sharpening, trueing tool
2219/45161 . . . Grinding machine
2219/45162 . . . Chamfer grinding
2219/45163 . . . Laser erosion, take away layer of material by burning, use oxygen, engrave
2219/45164 . . . Laser refurbish with laser beam and metal powder
2219/45165 . . . Laser machining
2219/45166 . . . Tomography
2219/45167 . . . Dentist, dental manufacture
2219/45168 . . . Bone prosthesis
2219/45169 . . . Medical, rontgen, x ray
2219/45171 . . . Surgery drill
2219/45172 . . . Prosthesis
2219/45173 . . . Object making, golf ball
2219/45174 . . . Making panels
2219/45175 . . . Glasses, spectacles
2219/45176 . . . Animation for film scenes, show
2219/45177 . . . Data disk drive
2219/45178 . . . Zoom, focus lens
2219/45179 . . . Optical, telescope
2219/45181 . . . Optical multiplexer
2219/45182 . . . Microscope, micromanipulator for microscope
2219/45183 . . . Photocopying, image scanning
2219/45184 . . . Filming, photography, camera
2219/45185 . . . Auto mirror
2219/45186 . . . Print on workpieces
2219/45187 . . . Printer
2219/45188 . . . Laserjet printer
2219/45189 . . . Plotter
2219/45191 . . . Spinning, web spinning
2219/45192 . . . Weaving
2219/45193 . . . Yarn manufacturing
2219/45194 . . . Lace, braid, knitting
2219/45195 . . . Sewing machines
2219/45196 . . . Textile, embroidery, stitching machine
2219/45197 . . . Prepare and machine parts, assemble parts
2219/45198 . . . Coiling, making springs
2219/45199 . . . Polish
2219/45201 . . . Crowned roll machining
2219/45202 . . . Edge finishing
2219/45203 . . . Screwing
2219/45204 . . . Die, mould making
2219/45205 . . . Assembly of woodframe
2219/45206 . . . Ultrasonic drill, mill, machining
2219/45207 . . . Actuator to regulate position, flow, speed, process variable
2219/45208 . . . Long, deep drill, with drill, bore diameter small relative to length, in pipes
2219/45209 . . . Measuring, indicating device having a needle
2219/45211 . . . Making, assembling truss structures
2219/45212 . . . Etching, engraving, sculpturing, carving
2219/45213 . . . Integrated manufacturing system ims, transfer line, machining center
2219/45214 . . . Gear cutting
2219/45215 . . . Thread cutting
2219/45216 . . . Tapping
2219/45217 . . . Notching
2219/45218 . . . Making cams, cones
2219/45219 . . . Making intermeshing helical rotors, for pump, compressor
2219/45221 . . . Edm, electrical discharge machining, electroerosion, ecm, chemical
2219/45222 . . . Cloth making
2219/45223 . . . Making mirror, mirror segment
2219/45224 . . . Electrode making
2219/45225 . . . Making impellers, propellers
2219/45226 . . . Process control
2219/45227 . . . Stamp making
2219/45228 . . . Making spheres
2219/45229 . . . Woodworking
2219/45231 . . . Stoneworking
2219/45232 . . . CMP chemical mechanical polishing of wafer
2219/45233 . . . Repairing pipelines, tubes
2219/45234 . . . Thin flat workpiece, sheet metal machining
2219/45235 . . . Dispensing adhesive, solder paste, for pcb
2219/45236 . . . Facing, polygon working, polyhedron machining
2219/45237 . . . Honing machine
2219/45238 . . . Tape, fiber, glue, material dispensing in layers, beads, filling, sealing
2219/45239 . . . Filament, coil winding
2219/45241 . . . Coke oven
2219/45242 . . . Door, panel, window operation, opening, closing
2219/45243 . . . Shoe, footwear making
2219/45244 . . . Injection molding
2219/45245 . . . Making key
2219/45246 . . . Turn cylindrical workpiece, crowned
2219/45247 . . . Diamond turning, tool is diamond point
2219/45248 . . . Turning
2219/47 . . Tracing, tracking
2219/4701 . . . Edge detector, project line, inclined camera detects discontinuity
2219/4702 . . . Project several lines on surface, to detect discontinuity by camera
2219/4703 . . . View whole surface before edge detection, coarse scan then fine tracking
2219/4704 . . . Store actual edge, seam in memory before machining, compare with detected
2219/4705 . . . Detect edge during machining, welding, sewing
2219/4706 . . . Edge detector is incorparated into machine
2219/4707 . . . Trace groove always at bottom of groove
2219/4708 . . . Command codes, marks along line to control operation, velocity
2219/4709 . . . Command code in form of a sticker
2219/4711 . . . Using a pantograph
2219/4712 . . . Using photocell sensible to different colours

2219/4713 . . . Limit scanning surface by marks, stored limit, limit switches
2219/4714 . . . Use of help paths to go to different workpiece paths to be followed
2219/4715 . . . Second photocell in advance of first, to control speed or other operation
2219/4716 . . . Trace electric potential lines to control z motion
2219/4717 . . . Machine 3-D model by tracing two 2-D models
2219/4718 . . . Two mode switch over tracking as function of predetermined cmm probe angle
2219/4719 . . . Line detector with laser beam, adjustable optical axis
2219/49 . . Nc machine tool, till multiple
2219/49001 . . . Machine tool problems
2219/49002 . . . Map unfolded surface on flat surface to make dies, composite objects, free form
2219/49003 . . . Make two halves of tool, model at the same time
2219/49004 . . . Modeling, making, manufacturing model to control machine, cmm
2219/49005 . . . Map 2-D pattern on 3-D
2219/49006 . . . Nc machine makes cams, model to control, or make a copy, on other machines
2219/49007 . . . Making, forming 3-D object, model, surface
2219/49008 . . . Making 3-D object with model in computer memory
2219/49009 . . . Model stored in a memory of a prototype
2219/49011 . . . Machine 2-D slices, build 3-D model, laminated object manufacturing LOM
2219/49012 . . . Remove material by laser beam, air, water jet to form 3-D object
2219/49013 . . . Deposit layers, cured by scanning laser, stereo lithography SLA, prototyping
2219/49014 . . . Calculate number and form of 2-D slices automatically from volume on screen
2219/49015 . . . Wire, strang laying, deposit fluid, welding, adhesive, hardening, solidification, fuse
2219/49016 . . . Desktop manufacturing [DTM]; Solid freeform machining [SFM]; Solid freeform fabrication [SFF]
2219/49017 . . . DTM desktop manufacturing, prototyping
2219/49018 . . . Laser sintering of powder in layers, selective laser sintering SLS
2219/49019 . . . Machine 3-D slices, to build 3-D model, stratified object manufacturing SOM
2219/49021 . . . Deposit layer, machine, mill layer, then new layer, SDM solid deposit manufacting
2219/49022 . . . Photo masking, mask cures whole layer at one time, add wax, mill, new layer
2219/49023 . . . 3-D printing, layer of powder, add drops of binder in layer, new powder
2219/49024 . . . LEM laminated engineering materials, like lom but first cut, then stack
2219/49025 . . . By positioning plurality of rods, pins to form together a mold, maquette
2219/49026 . . . SDM shape deposition manufacturing for multimaterial layers
2219/49027 . . . SALD selective area laser deposition, vapor solidifies on surface
2219/49028 . . . Rapid freeze prototyping, selectively deposit and rapidly freeze water layer by layer
2219/49029 . . . Virtual rapid prototyping, create a virtual prototype, simulate rapid prototyping process
2219/49031 . . . Project particles, laser beam to point using two, more jets, beams, ballistic particle
2219/49032 . . . Bond layers with glue, solder, welding, brazing in LOM
2219/49033 . . . Blanks or taken from roll of metal sheet
2219/49034 . . . Changing design, use same prototype, add reinforcements where needed
2219/49035 . . . Reconstruct boundary volume from stack of layer contours, sections
2219/49036 . . . Use quality measures, build time, strength of material, surface approximation
2219/49037 . . . Electro rheological fluid to build support for overhanging parts, particle jet
2219/49038 . . . Support help, grid between support and prototype, separate easily
2219/49039 . . . Build layer of different, weaker material between support and prototype
2219/49041 . . . Workpiece is surrounded by softer support material during machining
2219/49042 . . . Remove chips from probe, tool by blowing them away
2219/49043 . . . Control of lubrication
2219/49044 . . . Control preload of spindle bearing
2219/49045 . . . Relieve stress of workpiece after machinining by vibration table
2219/49046 . . . Control flatness of deformable workpiece table
2219/49047 . . . Remove chips by tool up down movement, pecking
2219/49048 . . . Control of damping of vibration of machine base
2219/49049 . . . Coolant serves as lubrication and also to take away swarf, chips
2219/49051 . . . Heat treatment of workpiece, tempering
2219/49052 . . . Accessory, coolant
2219/49053 . . . Break chips, spiral chips, interrupt momentarily in feed during two or more rotations
2219/49054 . . . Active damping of tool vibration
2219/49055 . . . Remove chips from probe, tool by vibration
2219/49056 . . . Control of flow of fluid or temperature as function of speed for uniform coating
2219/49057 . . . Controlling temperature of workpiece, tool, probe holder
2219/49058 . . . Division algorithm, calculate inverse ratio of cutting process from parameters
2219/49059 . . . Machine with constant volume in time
2219/49061 . . . Calculate optimum operating, machining conditions and adjust, adapt them
2219/49062 . . . Adaptive control AC
2219/49063 . . . Adaptive control constraint ACC
2219/49064 . . . Fuzzy adaptive control
2219/49065 . . . Execute learning mode first for determining adaptive control parameters
2219/49066 . . . Geometric adaptive control
2219/49067 . . . Find optimum between production rate and quality, number of points and speed
2219/49068 . . . Minimum cost adaptive
2219/49069 . . . Adaptive control optimalisation ACO
2219/49071 . . . Cycle time reduction
2219/49072 . . . Action, withdraw, stop feed tool to prevent breakage or lower load
2219/49073 . . . Adapt machining parameters so as to keep temperature constant
2219/49074 . . . Control cutting speed

2219/49075 . . . Control depth of cut
2219/49076 . . . Reduce cutting speed if feed force below minimum level
2219/49077 . . . Control of feed and spindle, cutting speed
2219/49078 . . . Control of feed only
2219/49079 . . . Control cutting torque, force
2219/49081 . . . If obstruction, bad joint, move head aside and retry operation
2219/49082 . . . Maintain constant material removal rate
2219/49083 . . . If number of feed retractions exceeds a limit, repeat same instruction block
2219/49084 . . . Control roughness of surface
2219/49085 . . . CMP end point analysis, measure parameters on points to detect end of polishing process
2219/49086 . . . Adjust feeding speed or rotational speed of main spindle when load out of range
2219/49087 . . . Adjust parameter to compensate path deviation
2219/49088 . . . As a function of, regulate feed as function of material, tool
2219/49089 . . . Control feed as function of detected number of tools engaging simultaneously workpiece
2219/49091 . . . Control feed as function of detected diameter, cross section of workpiece
2219/49092 . . . Vary, change controlled parameter as function of detected power
2219/49093 . . . Adapt cutting speed as function of depth of cutting
2219/49094 . . . Feed as function of deviation of real from programmed position at fixed time intervals
2219/49095 . . . Of rigidity of workpiece
2219/49096 . . . Deviation of compliant mounted tool
2219/49097 . . . Material type of each layer to be drilled, to be joined
2219/49098 . . . As a function of machine operating speed and tool
2219/49099 . . . Cutting force, torque
2219/49101 . . . As function of tool speed
2219/49102 . . . Tool temperature
2219/49103 . . . Speed and feed
2219/49104 . . . Chip thickness
2219/49105 . . . Emitted noise of tool
2219/49106 . . . Feed as function of lateral movement of saw blade
2219/49107 . . . Optimize spindle speed as function of calculated motion error
2219/49108 . . . Spindle speed
2219/49109 . . . Control cutting speed as function of tool wire wear, measure diameter of wire
2219/49111 . . . Cutting speed as function of contour, path, curve
2219/49112 . . . Compensation alignment of cylindrical workpiece
2219/49113 . . . Align elements like hole and drill, centering tool, probe, workpiece
2219/49114 . . . Go to coarse programmed reference, detector for fine alignment
2219/49115 . . . Alignment by taking into account asymmetries in signal, for small offsets
2219/49116 . . . Align tool head with fixed line by actuating actuators along tool head slideways
2219/49117 . . . Alignment of surfaces to get them parallel
2219/49118 . . . Machine end face, control C-axis and X-axis
2219/49119 . . . Machine arc of circumference, as groove, cylindrical interpolation
2219/49121 . . . C-axis for turning, fifth axis for milling
2219/49122 . . . Multiclamping, to reduce dead times
2219/49123 . . . Simulation of clamping workpiece, modeling fixture and workpiece
2219/49124 . . . Determine clamping position from equipment specification and machining shape
2219/49125 . . . Open clamp if tool approaches clamp zone, close again afterwards
2219/49126 . . . Clamp piece to pallet using connectable power source
2219/49127 . . . Variable clamping force as function of movement, force on workpiece
2219/49128 . . . Determine maximum clamping force as function of allowable displacement workpiece
2219/49129 . . . Clamps are movable along rod to desired positions
2219/49131 . . . High force clamping along periphery
2219/49132 . . . Control fixed clamping force
2219/49133 . . . Variable chuck clamping force as function of spindle speed
2219/49134 . . . Clamp, keep positioned slide, workpiece stationary during machining
2219/49135 . . . Active clamping, use servo to keep in position
2219/49136 . . . Vacuum pads hold workpiece during machining
2219/49137 . . . Store working envelop, limit, allowed zone
2219/49138 . . . Adapt working envelop, limit, allowed zone to speed of tool
2219/49139 . . . Alarm if outside zone
2219/49141 . . . Detect near collision and slow, stop, inhibit movement tool
2219/49142 . . . Shut off power, stop if outside working zone
2219/49143 . . . Obstacle, collision avoiding control, move so that no collision occurs
2219/49144 . . . Limit movement on an axis by setting limits
2219/49145 . . . Spheres replace object, check first collision for large spheres, then small
2219/49146 . . . Tool changing registers geometry of tool to avoid collision
2219/49147 . . . Retract on collision with moving object, tool follows, yields to object
2219/49148 . . . Adapt working envelop, limit to size workpiece
2219/49149 . . . Ball end cutter interference, caused by tool shape, overcut part surface
2219/49151 . . . Axis related interference, remove hidden surfaces
2219/49152 . . . Feedhold, stop motion if machine door is open, if operator in forbidden zone
2219/49153 . . . Avoid collision, interference between tools moving along same axis
2219/49154 . . . Detect position of slide to change hover height of tool to avoid collision
2219/49155 . . . On collision, reverse motor over certain angle, then stop to avoid bending
2219/49156 . . . On collision, cut off motor, delay, again motor on, repeat to avoid bending
2219/49157 . . . Limitation, collision, interference, forbidden zones, avoid obstacles
2219/49158 . . . On near collision reduce speed
2219/49159 . . . Avoid pinching of persons between moving and fixed part

2219/49161 . . . Near end of position, lower power or speed of motor to safe value, at end normal
2219/49162 . . . On collision, obstruction reverse drive, accelerate, cancel inertia
2219/49163 . . . Stop, dwell in corner edge, allow for cooling, go on machining, better surface
2219/49164 . . . Corner, making corner
2219/49165 . . . Compensation relative movement between two commonly driven slides
2219/49166 . . . Compensation for measured deviation of tool path, as function of lenght of path
2219/49167 . . . Execute compensation only if workhead, module is connected
2219/49168 . . . Compensate feed as function of measured values and manual introduced values
2219/49169 . . . Compensation for temperature, bending of tool
2219/49171 . . . Compensate for dressing amount
2219/49172 . . . Compensate slide position as function of indexed workpiece spindle position error
2219/49173 . . . Compensation for sidewise deviation of machined workpiece
2219/49174 . . . Compensate position by use of separate cmm
2219/49175 . . . Compensate for errors in cmm, especially mirror errors, not flat enough
2219/49176 . . . Compensation of vibration of machine base due to slide movement
2219/49177 . . . Runout, eccentricity, imbalance of tool or workpiece
2219/49178 . . . Compensation of tool position as function of square of rotating speed of spindle
2219/49179 . . . Compensation for reluctance of axis motors causing surface ondulation
2219/49181 . . . Calculation, estimation, creation of error model using measured error values
2219/49182 . . . Tapping, overshoot after reversal, elasticity compensation
2219/49183 . . . Compensation height of tool as function of horizontal position of spindle head, bending
2219/49184 . . . Compensation for bending of workpiece, flexible workpiece
2219/49185 . . . Position error compensation as function of position of slide, control bearing pressure
2219/49186 . . . Deflection, bending of tool
2219/49187 . . . Control position of steady rest to compensate bending
2219/49188 . . . Proportional compensation from middle to end of elongated workpiece
2219/49189 . . . Bending of driven table, lag between real and commanded position
2219/49191 . . . Bending, tilt spindle in bearings to compensate for bending
2219/49192 . . . Create optical reference axis always kept parallel to reference optical block
2219/49193 . . . Orthogonality of axis, deviation from 90-degree correction
2219/49194 . . . Structure error, in slide or screw
2219/49195 . . . Slide, guideway, robot arm deviation
2219/49196 . . . Screw
2219/49197 . . . Gear
2219/49198 . . . Using lookup table, map, position and corresponding quasi static error
2219/49199 . . . For non linear interpolation movement
2219/49201 . . . Variable load, slide friction, irregular machine guides
2219/49202 . . . For point to point positioning
2219/49203 . . . For linear movement
2219/49204 . . . Control of heat to compensate for dilatation, thermal displacement
2219/49205 . . . Compensate with stored values as function of machining time
2219/49206 . . . Compensation temperature, thermal displacement, use measured temperature
2219/49207 . . . Compensate thermal displacement using measured distance
2219/49208 . . . Preheat spindle by powering polyphase motor with monophase
2219/49209 . . . Compensation by using temperature feelers on slide, base, workhead
2219/49211 . . . Compensation dilatation using calculated temperature from velocity
2219/49212 . . . Using lookup table, map, position error, temperature and position
2219/49213 . . . Active thermal preload regulation for spindle
2219/49214 . . . Estimate error from heat distribution model and drive current, correct error
2219/49215 . . . Regulate temperature of coolant
2219/49216 . . . Control of temperature of processor
2219/49217 . . . Compensation of temperature increase by the measurement
2219/49218 . . . Compensation of workpiece dilatation
2219/49219 . . . Compensation temperature, thermal displacement
2219/49221 . . . Control of scale
2219/49222 . . . Rough cut at high speed
2219/49223 . . . Remove workpiece portions left uncut, unmachined by tool with suitable shape
2219/49224 . . . Identify and calculate uncut portions
2219/49225 . . . Adapt machining conditions as function of workpiece cutting resistance
2219/49226 . . . Cut, up or down cutting, cutting direction right, left
2219/49227 . . . Cutting with trailing or leading edge of tool
2219/49228 . . . Unidirectional or multidirectional cutting
2219/49229 . . . Cutter, axis change over
2219/49231 . . . Keep tool, probe at constant distance from workpiece surface
2219/49232 . . . Limit penetration of drill into backup material, support
2219/49233 . . . Machining depth relative to surface, constant depth
2219/49234 . . . Keep constant distance even if hole present, avoid collision tool with hole
2219/49235 . . . Control depth as function of grey level of scanned object, map of thickness
2219/49236 . . . Translate thickness to be removed in dwell delay, then to corresponding speed
2219/49237 . . . Depth, tool depth control
2219/49238 . . . Surface tracking, following
2219/49239 . . . Dimensions
2219/49241 . . . 2-5-D lace cutting, work in xy and increment in z, repeat
2219/49242 . . . 4-D
2219/49243 . . . 5-D
2219/49244 . . . 6-D
2219/49245 . . . 2-5-D pocket machining
2219/49246 . . . 3-D printing, layer of powder, add drops of binder in layer, new powder

2219/49247 . . . Dressing started after number of workpieces machined
2219/49248 . . . Dressing started if sparking out time to get correct surface is too long
2219/49249 . . . Dressing as function of load of grinding wheel
2219/49251 . . . Dress by conductive fluid between conductive grindstone and electrode
2219/49252 . . . Two spindle drives for common workpiece
2219/49253 . . . Position in space by controlling length of two, more cables, wires
2219/49254 . . . High speed AC, induction spindle motor
2219/49255 . . . Gear meshing, synchronize both with relative phase, then shift
2219/49256 . . . Epicyclic movement of tool
2219/49257 . . . Six or more linear drives to position x y z table
2219/49258 . . . Two y axis to control also rotation
2219/49259 . . . Endless belt with coupling, position tools simultaneously in both directions
2219/49261 . . . Direct drive, without gear
2219/49262 . . . Two drives at both sides of long tool
2219/49263 . . . Separate, auxiliary indexing motor
2219/49264 . . . Several x-y slides on single surface
2219/49265 . . . X motor moves x and y axis, y motor only y axis
2219/49266 . . . Two xy tables, on top and below workpiece, in between a cutting wire
2219/49267 . . . Three linear actuators to position vertically and rotate horizontally
2219/49268 . . . Four bar mechanism
2219/49269 . . . Single motor for different drives, switch, change gears
2219/49271 . . . Air bearing slide, hydraulic, electromagnetic bearing
2219/49272 . . . Electromagnetic bearing also used as feed in one axis or positioning in two axis
2219/49273 . . . Switch between continuous drive and index or stop mode
2219/49274 . . . Four linear actuators to position x y table
2219/49275 . . . Linear actuators on x y to position x y table, ballscrew drive on y to rotate
2219/49276 . . . Floating, air, magnetic suspension xy table, sawyer motor, xenetics
2219/49277 . . . Oscillating, swinging feed drive, for grinding
2219/49278 . . . Parallel link mechanism
2219/49279 . . . Nanometric xy table
2219/49281 . . . X y table positioned by vibration
2219/49282 . . . Same control for double drive or slide
2219/49283 . . . Frictionless rolling element
2219/49284 . . . Two cascaded slides, large range sits on small range, piggyback
2219/49285 . . . Linear control rotating movement kept constant
2219/49286 . . . Two rotations gives cartesian coordinates, compact construction
2219/49287 . . . Motor drives cam for very fine linear displacement, movement
2219/49288 . . . Three linear actuators to position x y table
2219/49289 . . . Large transmission ratio
2219/49291 . . . Torque, moment, drive power amplifier, movement follower
2219/49292 . . . Harmonic gear, transmission, strain wave gear
2219/49293 . . . Switch between dual, double slide or double spindle mode
2219/49294 . . . Motor and brake actuated together
2219/49295 . . . Drive spindle motor at maximum, limit torque for rapid machining time
2219/49296 . . . Identification workpiece by dimension, height, resistance value, but no code
2219/49297 . . . Spindle identification in multispindle station
2219/49298 . . . Probe identification
2219/49299 . . . Identify workpiece and align, center workpiece at the same time
2219/49301 . . . Identify material to be used, select between several
2219/49302 . . . Part, workpiece, code, tool identification
2219/49303 . . . Tool identification and tool offset, compensation data together
2219/49304 . . . Tool identification, code
2219/49305 . . . Store, memory on tool with control and maintenance data
2219/49306 . . . Derive kind of cutter from null load
2219/49307 . . . Learn, learn operational zone, feed, speed to avoid tool breakage
2219/49308 . . . Fuzzy classification of tool wear states
2219/49309 . . . Main and secondary machining area, main spindle and satellite spindle
2219/49311 . . . Select machining portion of workpiece, pivoting workpiece as function of correction needed
2219/49312 . . . Fixture free machining
2219/49313 . . . Machining about eccentric center different from rotational center of workpiece
2219/49314 . . . Machine with oscillating workpiece, no full rotation
2219/49315 . . . Machine first contour slowly, then remaining surface quickly, fast
2219/49316 . . . Back-off grinding, during wheel retract, by deflection workpiece, after plunge
2219/49317 . . . Traverse grinding, move along workpiece
2219/49318 . . . Grind and simultaneous gauging, dwell, measure and final feed without gauging
2219/49319 . . . Centerless machining, grinding, cutting
2219/49321 . . . Reverse movement of tool to deburr
2219/49322 . . . Cool to solidify material before machining it
2219/49323 . . . Machine long, slender workpiece
2219/49324 . . . Different starting point for each machining pass, to prevent dent formation
2219/49325 . . . Combine punching and laser machining
2219/49326 . . . Drill on laser machine, transfer to edm for operation on hole, adjust position
2219/49327 . . . Combine punch and marker, engraving for workpiece
2219/49328 . . . Laser machining and milling combined
2219/49329 . . . Combine edm and milling
2219/49331 . . . Laser drilling followed by laser cutting
2219/49332 . . . First saw rough contours in workpiece then mill rest
2219/49333 . . . Drilling and thread cutting by same machine
2219/49334 . . . Combine turning, milling, grinding or other in one setup
2219/49335 . . . Part, workpiece, inner, internal outer, external machining
2219/49336 . . . Machine two mating, matching parts, at opposite ends of spindle, simultaneously
2219/49337 . . . Machine holes in spherical nodes
2219/49338 . . . Micromachining, workpieces small, around 1-mm or less

2219/49339 . . . Machine simultaneous left and right, mirror part
2219/49341 . . . Manual pocket machining, multipasses
2219/49342 . . . Select between concentric and eccentric regions of a workpiece
2219/49343 . . . Machining point symmetrical surfaces, revolving surfaces
2219/49344 . . . Surface, 5-axis surface machining
2219/49345 . . . Smooth and polish surface at the same time
2219/49346 . . . 3-Axis surface machining
2219/49347 . . . Machine cover, first scan surface on which cover is to be placed
2219/49348 . . . Mill surface from underneath workpiece, easy chips, cutout material evacuation
2219/49349 . . . Drill both sides of workpiece at the same time, under and over workpiece
2219/49351 . . . 4-Axis surface machining
2219/49352 . . . 7-Axis surface machining
2219/49353 . . . Control of output power of tool, laser beam
2219/49354 . . . High speed cutting
2219/49355 . . . Machine flat surface on rotating workpiece, rotate tool inverse direction
2219/49356 . . . Tool with constant force against workpiece during machining
2219/49357 . . . Tool perpendicular to surface with varying force
2219/49358 . . . Facing milling, tool perpendicular to surface
2219/49359 . . . Cylindrical or side milling, tool tangential to surface
2219/49361 . . . Workpiece and tool have each own rotation speed
2219/49362 . . . Tool, probe at constant height to surface during machining
2219/49363 . . . Minimalize time for tool movement between different positions, holes
2219/49364 . . . Minimize number of punch strokes
2219/49365 . . . Minimise noncutting area, tool travel, eliminate air cutting
2219/49366 . . . Machine several small pieces on one sheet, break off pieces
2219/49367 . . . Group machines into cells to minimise intercellular travel
2219/49368 . . . Vision calculates errors while table already moves, result corrects movement
2219/49369 . . . Minimize machining time by maximizing feed, speed
2219/49371 . . . Variable laser spot width, small for boundary, large for rest
2219/49372 . . . Optimize toolpath pattern for a given cutting layer, mounting sequence
2219/49373 . . . Flying operation, while tool and workpiece have same speed
2219/49374 . . . Speed up each conveyor between two stations, at stations synchronize in phase
2219/49375 . . . Minimalizing machine time, number of tool change
2219/49376 . . . Select two machining types, milling or turning, complete machining with one tool
2219/49377 . . . Eliminate double cutting
2219/49378 . . . Tool path finding, select minimal distance
2219/49379 . . . Key input path, move one axis manually, other axis slave controlled by program
2219/49381 . . . Raster, line servo, area machining, cutting, facing
2219/49382 . . . Movement reciprocating
2219/49383 . . . Using pick feed with non reciprocating machining direction
2219/49384 . . . Control of oscillatory movement like filling a weld, weaving
2219/49385 . . . Using pick feed when machining a surface
2219/49386 . . . Automatic seam, weld line, finding
2219/49387 . . . Limiting scanning region
2219/49388 . . . Computer controlled movement of plotter is transferred to tool by pantograph
2219/49389 . . . Machine alternative both sides of rib, net machining, against deformation
2219/49391 . . . Adapt number of passes as function of tool wear
2219/49392 . . . Multipasses, segmentation of cut, paraxial cutting
2219/49393 . . . Machining step, fixing smallest step nibble machine, planer
2219/49394 . . . Stop in one point, execute other operation and return back to first point
2219/49395 . . . Repeating same operations for other coordinates
2219/49396 . . . Stepwise milling, mill by advancing larger step then retract smaller step, repeat
2219/49397 . . . Control of dwell time
2219/49398 . . . Repeat same operations on machined part until machining reaches its finishing
2219/50 . . Machine tool, machine tool null till machine tool work handling
2219/50001 . . . Multislides, multispindles with multitool turret for each
2219/50002 . . . Drill more holes simultaneously, adapt distance tools as function of detected image
2219/50003 . . . Machine simultaneously two workpieces
2219/50004 . . . Multitool at the same time, priority for one tool as function of machining parameter
2219/50005 . . . Multiple chuck machining, chuck position change after each partial machining
2219/50006 . . . Two parallel spindles, bi-spindle and two tool blocks sliding on same axis
2219/50007 . . . Multiple polishing heads, oscillating and rotating
2219/50008 . . . Multiple, multi tool head, parallel machining
2219/50009 . . . Revolver head
2219/50011 . . . Two spindles drive single large tool, cooperation of spindles
2219/50012 . . . Multi slide and indexable multi workpiece spindles
2219/50013 . . . Two spindles on same line, one for workpiece, other for tool, second tool on slide
2219/50014 . . . Several, multi workpieces
2219/50015 . . . Multi cutting, twin tools contact at same time workpiece, balance cutting
2219/50016 . . . Turret with multiple workpiece holders, spindles, multiple fixed tools around it
2219/50017 . . . Two programs, two slides, data second slide related to moving origin of first
2219/50018 . . . Zero point floating
2219/50019 . . . Zero, null offset
2219/50021 . . . Configuration, null point on tool relative to null point on workpiece

2219/50022 . . . Null point on tool relative to null point of toolholder, rotationcenter
2219/50023 . . . Measure different null points, references of tool and store in memory
2219/50024 . . . Go to reference, switches and dog to decelerate and to detect origin
2219/50025 . . . Go to reference, switches and dog detect origin, combine with pulse from encoder
2219/50026 . . . Go to reference plane, cube
2219/50027 . . . Go to workpiece surface plane and store position
2219/50028 . . . Beam detects x, y deviation on surface, compensates beam of position scanner
2219/50029 . . . Go to pivotable, rotatable reference plane
2219/50031 . . . Zero setting, go to reference with gauge
2219/50032 . . . On one axis only, derive from inclined surface offsets for other axis
2219/50033 . . . Align tool, tip with a calibration mask
2219/50034 . . . Set search range about origin, select between different overlapping ranges
2219/50035 . . . Go to reference point and measure a preset force, pressure, store position
2219/50036 . . . Find center of circular mark, groove
2219/50037 . . . Use either upper or lower limit for home control
2219/50038 . . . Go to mechanical limit with low speed, until blocking of drive
2219/50039 . . . Two probe, one on turret, serves also to calibrate second probe on bed
2219/50041 . . . Measuring intensity of tool vibration
2219/50042 . . . Return to origin, reference point, zero point, homing
2219/50043 . . . Near zero detection
2219/50044 . . . For speed
2219/50045 . . . Combined axis jogging, following programmed shape instead of single axis
2219/50046 . . . Control of level, horizontal, inclination of workholder, slide
2219/50047 . . . Positioning, indexing
2219/50048 . . . Jogging
2219/50049 . . . Control machine as function of position, angle of workpiece
2219/50051 . . . Turn workpiece axis perpendicular to turn axis of lathe
2219/50052 . . . Orienting workpiece relative to tool
2219/50053 . . . Machine non circular, non-round cross section, hexagonal, rectangular
2219/50054 . . . Drill on skew surface
2219/50055 . . . Make hollow worpiece with uniform wall thickness
2219/50056 . . . Profile, for operation on I-, T-profiles or other elongated profiles
2219/50057 . . . Compensation error by probing test, machined piece, post or pre process
2219/50058 . . . During machining, measure previous part to compensate errors
2219/50059 . . . Record profile error, used for next machining pass
2219/50061 . . . Compensation of measuring errors due to machine with footprint
2219/50062 . . . Measure deviation of workpiece under working conditions, machine correction
2219/50063 . . . Probe, measure, verify workpiece, feedback measured values
2219/50064 . . . Camera inspects workpiece for errors, correction of workpiece at desired position
2219/50065 . . . Estimate trends from past measured values, correct before really out of tolerance
2219/50066 . . . Fit base pattern into detected geometrical workpiece data, create whole program
2219/50067 . . . Measure surface for thickness and store map in memory, machine surface
2219/50068 . . . Test valve, object, store parameters, machine object to get wanted performance
2219/50069 . . . Reject workpiece if not machinable, material to be machined too large
2219/50071 . . . Store actual surface in memory before machining, compare with reference surface
2219/50072 . . . Machine workpiece again to correct previous errors
2219/50073 . . . Signature analysis, store forces during test, compare with real ones during assemby
2219/50074 . . . Purpose, workpiece measurement to control, adapt feed of tool
2219/50075 . . . To adapt, control force level at which machining will be considered as finished
2219/50076 . . . To derive from state of surface, the need to change used, worn tool
2219/50077 . . . Keep position by switching over to auxiliary power supply for resolver, encoder
2219/50078 . . . Single battery backup for all axis, encoders, resolvers
2219/50079 . . . Battery backup supply switched over data, signal lines, to save cable
2219/50081 . . . On power loss, shut down axis using generated power from one braked axis
2219/50082 . . . UPS, no break to power actuator and move into safe condition
2219/50083 . . . Power loss, measures again loss of power
2219/50084 . . . Keep position, setup parameters in memory
2219/50085 . . . Realignment, search reference to restablish position
2219/50086 . . . Microprocessor
2219/50087 . . . Rough, coarse and finish, fine machining
2219/50088 . . . Rough and finish machining simultaneously
2219/50089 . . . Finish allowance equals offset rough finish tool and bending work under rough
2219/50091 . . . Rough machining
2219/50092 . . . Sculptured part rough machining with the offset approach
2219/50093 . . . Sculptured rough machining with the contour map approach, make slices
2219/50094 . . . Optimize number of layers to be cut for contour map approach
2219/50095 . . . On tool breakage return to a reference then follow already machined path
2219/50096 . . . After interrupt, use tool path display to bring tool back on path
2219/50097 . . . After repair, dry run program until block before restart is detected
2219/50098 . . . After interrupt, interpolate with suitable startpoint different from stoppoint
2219/50099 . . . Before restart change jig, fixture with workpieces
2219/50101 . . . For fine machining, select tool and offset, block and restart midway

2219/50102 . . . Store history of operation, after power failure, restart from history, journal
2219/50103 . . . Restart, reverse, return along machined path, stop
2219/50104 . . . Before restarting program, restore machine status existing at stop time
2219/50105 . . . Display instructions to operator on how to restart machine
2219/50106 . . . Before allowing restart, check that machine condition is optimal
2219/50107 . . . Retract tool if end of drilling is detected
2219/50108 . . . Retract tool stepwise, same path, until safe boundary reached, then quick retract
2219/50109 . . . Soft approach, engage, retract, escape, withdraw path for tool to workpiece
2219/50111 . . . Retract tool along path, reengage along same path
2219/50112 . . . Retract tool to a point
2219/50113 . . . Short stroke, retract tool, safe distance from workpiece surface, hover height
2219/50114 . . . Select approach path as function of zone for tool slide
2219/50115 . . . Select complicated, combined approach path
2219/50116 . . . Select approach path out of plurality
2219/50117 . . . Select approach path as function of machining time
2219/50118 . . . Select as function of position of tool during cycle, optimum path
2219/50119 . . . Select between set of paths as function of interrupt nature
2219/50121 . . . Machining several workpieces with one or more tools in one setup
2219/50122 . . . Workpiece holder, chuck jaws, fixture setup
2219/50123 . . . Setup, automatic setup
2219/50124 . . . Automatic new setup when new program selected
2219/50125 . . . Configurable fixture, jig
2219/50126 . . . Position clamp, fixture by machining head itself
2219/50127 . . . Modular fixture, use of clamps and locators, the latter also for positioning
2219/50128 . . . Reference free part encapsulation, fixture using molten filler and cube
2219/50129 . . . Setup machines as function of process model, control strategy for optimum use of machines
2219/50131 . . . Setup as function of tool position in manufacturing center
2219/50132 . . . Jig, fixture
2219/50133 . . . With optical beam, tool crosses beam
2219/50134 . . . Tool pushes reference plane, or vice versa, reverse motion until again zero
2219/50135 . . . Tool touches box, sensor to give a contact signal
2219/50136 . . . With sensor, potentiometer to measure relative displacement
2219/50137 . . . Contact in probe, touch probe to detect contact, touch trigger
2219/50138 . . . During setup display is red, after setup display is green colour
2219/50139 . . . Calibration, setting tool after measurement on tool
2219/50141 . . . Setup tool, preset
2219/50142 . . . Measure parallelism of tool with respect to plane and correct
2219/50143 . . . Tool set up integrated, automatically transferred into control system
2219/50144 . . . offline setup by simulation of process, during machining, forming of other piece
2219/50145 . . . Tool setup manual, preset of the machine
2219/50146 . . . Machine construction error compensation using ann
2219/50147 . . . Calibrate tool heads based on calibration of first tool head
2219/50148 . . . Workpiece, setup of component, workpiece
2219/50149 . . . Find orientation workpiece which maximizes number of faces machined in one setup
2219/50151 . . . Orient, translate, align workpiece to fit position assumed in program
2219/50152 . . . Align axis cylinder, tube with rotation axis machine
2219/50153 . . . Mount machining unit on workpiece, move unit on it
2219/50154 . . . Milling center
2219/50155 . . . Swivel spindle head horizontally
2219/50156 . . . Tiltable rotary table
2219/50157 . . . Universal swivel spindle head, swivel in all directions
2219/50158 . . . Modular structure
2219/50159 . . . Steady rest
2219/50161 . . . Reverse engineering, cloning
2219/50162 . . . Stewart platform, hexapod construction
2219/50163 . . . Machine stations and control modules build as a unity to be connected in line
2219/50164 . . . Select a structure to make programming of free curved surface easier
2219/50165 . . . Axis nc machine cooperates with two axis rotary table
2219/50166 . . . Extended range, machine a workpiece over a long distance
2219/50167 . . . Adapting to copying
2219/50168 . . . Retrofitting
2219/50169 . . . Double stewart platform
2219/50171 . . . Machine, machining centre, center
2219/50172 . . . Tool holder is transparent
2219/50173 . . . Machine tool hang and move on rail above workpiece
2219/50174 . . . Machine tool y-1, y-2, z, A-axis, table x, c-axis
2219/50175 . . . 6-Dof manipulator associated with 1-DOF workpiece holder
2219/50176 . . . Table, general, for machine tool
2219/50177 . . . Protection for operator during operation, machining
2219/50178 . . . Clamp, brake gravity axis on power loss to clamp tool in position
2219/50179 . . . Dynamic tolerance, limit values as function of speed, type of command
2219/50181 . . . After stopping apply additionally a brake
2219/50182 . . . Skip over pieces between machining and measuring station, on tool changing
2219/50183 . . . Detect correct clamping of workpiece, chucks grip properly workpiece
2219/50184 . . . Stop feed if relative movement between drive and tool
2219/50185 . . . Monitoring, detect failures, control of efficiency of machine, tool life
2219/50186 . . . Diagnostic of spindle bearing

2219/50187 . . . Stop drive motor if clutch refuses, remains active, if emergency
2219/50188 . . . If operation, feed movement not done after maximum allowable time, emergency stop
2219/50189 . . . Compare position of slide with positioning, tape data
2219/50191 . . . Against noise
2219/50192 . . . If braking fails due to controller or amplifier fault, separate delayed braking
2219/50193 . . . Safety in general
2219/50194 . . . Before restarting machine, enter allowable, maximum speed corresponding to tool
2219/50195 . . . Emergency stop stops drives and spindle, stored program remains in memory
2219/50196 . . . Monitor clutch or belt drive
2219/50197 . . . Signature analysis, store working conditions, compare with actual
2219/50198 . . . Emergency stop
2219/50199 . . . Tool, nozzle is covered for protection in home position, if needed also heated
2219/50201 . . . Tool looses contact with workpiece, alarm if no cut through operation
2219/50202 . . . During movement of tool towards workpiece, shut down rotation, welding gun
2219/50203 . . . Tool, monitor condition tool
2219/50204 . . . Tool replacement point, tool change position without damage, clearance plane
2219/50205 . . . On tool breakage stop machine
2219/50206 . . . Tool monitoring integrated in nc control
2219/50207 . . . Surface finish
2219/50208 . . . Retrace, remachine portion of path, locus to remove start discontinuities
2219/50209 . . . Surface treatment, roughing surface
2219/50211 . . . Finish machining, spark out, rough out
2219/50212 . . . Giving a texture, structure to surface, like leather, wood appearance
2219/50213 . . . Grooving of different forms or parallel to each other, grooving cycle
2219/50214 . . . Refurbish, refinish, reprofile, recondition, restore, rebuild profile
2219/50215 . . . Move synchrously tool and anvil at both sides of plate
2219/50216 . . . Synchronize speed and position of several axis, spindles
2219/50217 . . . Synchronize, control phase angle of two spindles by auxiliary index motor
2219/50218 . . . Synchronize groups of axis, spindles
2219/50219 . . . Slave spindle is driven at half the torque of main spindle for synchronism
2219/50221 . . . Switch speed reference from speed to position loop of both spindles to synchronize
2219/50222 . . . Stop machines, actuators until others reach common synchronization point
2219/50223 . . . Loose synchronisation, can shift within time interval
2219/50224 . . . Synchronize feed and spindle speed during slow down, stopping
2219/50225 . . . Synchronize feed and spindle speed as function of pitch of screw, thread
2219/50226 . . . Synchronize feed and spindle speed in forward and reverse feed
2219/50227 . . . Synchronize two axis by correcting for measured pitch errors
2219/50228 . . . Synchronize two slides, portal gantry, raising, moving
2219/50229 . . . Synchronize axis by simulating several virtual axis to control real axis
2219/50231 . . . Synchronize engage, disengage groups of axis as function of position of simulate
2219/50232 . . . Synchronize change of feed and spindle speed when overriding feed speed
2219/50233 . . . Synchonize time-dependent with electronic cam data
2219/50234 . . . Synchronize two spindles, axis, electronic transmission, line shafting
2219/50235 . . . Select tools, slides, spindles to work synchronized, independent
2219/50236 . . . Tool editor for actual used tools and needed next, missing, unused tools
2219/50237 . . . Detect wear by comparing coded value on tool with real value, grind tool
2219/50238 . . . Search empty place in changer to place tool
2219/50239 . . . Select tool manual from tool store, with permission from NC to deblock tool
2219/50241 . . . Chuck, gripper, spindle changer
2219/50242 . . . Tool changer and revolver fixed on spindle
2219/50243 . . . Small buffer tool magazine, ordered tools, filled from large magazine, change time
2219/50244 . . . Machine integrated tool cassette
2219/50245 . . . Change tools, like laser head and drill having different driving needs
2219/50246 . . . Workpiece exchange
2219/50247 . . . Change to finer, more adapted tools to machine complex surface
2219/50248 . . . Control position of coolant nozzle as function of selected tool
2219/50249 . . . Tool, probe, pen changer
2219/50251 . . . Mobile tool magazine to replace spare or rarely used tool
2219/50252 . . . Replace, change tool with tracer head, probe, feeler
2219/50253 . . . Selection tool
2219/50254 . . . Change feeler or tool on different curvature of workpiece, model
2219/50255 . . . Tool selection sets speed machining, kind of cooling, other parameter
2219/50256 . . . Orienting selected tool with respect to workpiece
2219/50257 . . . Kind of revolver magazine
2219/50258 . . . Chain magazine
2219/50259 . . . Flat bed magazine
2219/50261 . . . Two tool holders to eliminate tool change time, replace and search simultaneously
2219/50262 . . . Change tool at minimum distance from workpiece
2219/50263 . . . Standby tool, tool ready for next machining step, change tool while machining
2219/50264 . . . Change tool during positioning movement
2219/50265 . . . If tool life over, continue machining only actual block, workability, then stop
2219/50266 . . . During tool change, workpiece immobile, then execute backward operation sequence
2219/50267 . . . Change tool and workpiece simultaneously, except if collision possible
2219/50268 . . . Measure diameter only if new tool has been inserted

2219/50269 . . . Minimize tool change by selecting appropriate fixture
2219/50271 . . . Select second tool if first tool cannot machine workpiece without moving it
2219/50272 . . . Change spare, used tool during machining, minimize machining time
2219/50273 . . . Before motor start of spindle with new tool, detect if old tool back in storage
2219/50274 . . . Measure new tool inserted by operator, compare with diameter needed to accept
2219/50275 . . . Safety, verify correct code of chosen tool, probe
2219/50276 . . . Detect wear or defect tool, breakage and change tool
2219/50277 . . . Detection tool presence in tool holder, spindle before starting motor
2219/50278 . . . Send offset values from tool changer before machining
2219/50279 . . . Adjust displacement amount of tracer as function of rough, finish machining
2219/50281 . . . Adjust tool for tool offset by using an axis parallel to feed axis
2219/50282 . . . Tool offset as function of cutting depth
2219/50283 . . . Tool offset for two different diameters, smoothing
2219/50284 . . . Tool nose correction
2219/50285 . . . Tool geometry compensation, keep contact of tool on desired curve
2219/50286 . . . Fine adjustement tool head, adjustment with respect to toolholder
2219/50287 . . . Tool offset as function of diameter of saw, for begin and end point of path
2219/50288 . . . Compensate tool offset as function of speed, needed when tool is not mounted correctly in spindle
2219/50289 . . . Tool offset general
2219/50291 . . . Multi-tool, several tools
2219/50292 . . . Tool offset based on two cutter contact points, admitting some overcut
2219/50293 . . . Radial setting of tool
2219/50294 . . . Tool offset length by going to a reference and recording distance
2219/50295 . . . Tool offset by manual input by switches
2219/50296 . . . Tool offset by verifying piece and registrating errors
2219/50297 . . . Compensation of positioning error due to a-axis, b-axis tool rotation
2219/50298 . . . Trace with feelers of different diameter, from the two loci calculate offset
2219/50299 . . . Correction data stored in memory attached to tool or tool holder
2219/50301 . . . Correction stored on tape, together with tool identification
2219/50302 . . . Remachine same workpiece with same tool but diminished tool offset
2219/50303 . . . Resolver
2219/50304 . . . Correction from tape, file
2219/50305 . . . For every diameter a tape
2219/50306 . . . Tool height, axial displacement from center of circular workpiece, surface
2219/50307 . . . Correction by probing dimension of machined workpiece
2219/50308 . . . Estimate wear from machining data and conditions
2219/50309 . . . Correction of wear as function of dressing
2219/50311 . . . Compensate tool wear by grinding tool to a known position
2219/50312 . . . Compensation of tool wear by adapting program to profile of tool
2219/50313 . . . Tool offset, tool wear
2219/50314 . . . Search for reference, go to reference
2219/50315 . . . Selfcorrecting by measurement during machining
2219/50316 . . . Calculate as function of empirical calculated values from used tools
2219/50317 . . . As function of number of workpieces
2219/50318 . . . As function of number of cutting edges of saw, mill
2219/50319 . . . As function of tool geometry and machining data
2219/50321 . . . As function of machined volume per time unit
2219/50322 . . . As function of effective machining time
2219/50323 . . . As function of tool type
2219/50324 . . . As function of coolant
2219/50325 . . . As function of measured vibrations
2219/50326 . . . As function of feed forces
2219/50327 . . . As function of cutting forces
2219/50328 . . . As function of motor spindle load, current
2219/50329 . . . Tool offset for pockets, area machining avoiding interference with wall
2219/50331 . . . Electrode, wire gap compensation in edm, wire cutting
2219/50332 . . . Tool offset for 3-D surfaces normal to surface
2219/50333 . . . Temperature
2219/50334 . . . Tool offset, diameter correction
2219/50335 . . . Tool offset for straight lines
2219/50336 . . . Tool, probe offset for curves, surfaces, contouring
2219/50337 . . . Tool offset for point
2219/50338 . . . Tool with rom chip
2219/50339 . . . Select machining portion of tool according to surface of work
2219/50341 . . . Tool with right and left nose value, different radius
2219/50342 . . . Use two tools with different diameter
2219/50343 . . . Ball end tool, end is spherical
2219/50344 . . . Flat end tool, end is flat
2219/50345 . . . Bull nose tool, end is practical flat with rounded corners
2219/50346 . . . Ion ray
2219/50347 . . . Tool sends via electromagnetic waves actual working condition
2219/50348 . . . Deform tool to adapt to workpiece, bow tool with pressure
2219/50349 . . . Obtain normal vector of two points on surface, interpolate in between
2219/50351 . . . Rotate cutting tool to vary cutting tool geometry
2219/50352 . . . Inclination of tool as function of diameter of workpiece
2219/50353 . . . Tool, probe inclination, orientation to surface, posture, attitude
2219/50354 . . . If tool looses contact, change angle of tool with 90-degrees
2219/50355 . . . Tool perpendicular to a 2-D curve
2219/50356 . . . Tool perpendicular, normal to 3-D surface
2219/50357 . . . Tool tangential to path or surface

2219/50358 . . . Work handling, automatic load unload workpiece
2219/50359 . . . Rotate workpiece pallet, workpieces on it, machine and load simultaneous
2219/50361 . . . Translatory workpiece pallet, translate between two stations
2219/50362 . . . Load unload with robot
2219/50363 . . . Load unload with two robots, one to load, other to unload
2219/50364 . . . Buffer for workpieces, pallets, trays with articles
2219/50365 . . . Convey workpiece downwards on pallet, to machine rotate upwards
2219/50366 . . . Work handling with changeable hands
2219/50367 . . . Several workpiece holders in a single cell
2219/50368 . . . Pallet with autonomous control unit
2219/50369 . . . Display empty supply or discharge pallet
2219/50371 . . . Index table holds same number of load and unload cups, alternative
2219/50372 . . . Load pallets manually, with visual instruction assistance
2219/50373 . . . If pallet is not loaded conforming to instruction, warning
2219/50374 . . . Cylindrical workpiece holder, for each workpiece a separate tool slide
2219/50375 . . . Reject or reload workpiece if misaligned, excessive error in location
2219/50376 . . . Workholder receives also parts to be assembled with work
2219/50377 . . . Two robots with common workbase slides in unison along pallets
2219/50378 . . . Control height gripper as function of thickness of workpiece and height of pallet
2219/50379 . . . Workpiece detector, sensor
2219/50381 . . . Load, unload workpiece while machining other one, dual table machine
2219/50382 . . . Position claws of first chuck relative to second chuck, to grip small workpiece
2219/50383 . . . Bar feeder applies torque to compensate bending of workpiece during machining
2219/50384 . . . Modular, exchangable parts feeder
2219/50385 . . . Fast forward in idle time
2219/50386 . . . Feeder, feeding of workpiece, bar
2219/50387 . . . Two chucks, grippers, feeder bar, transfer workpiece from one to other
2219/50388 . . . Integrated loader, shuttle transfer
2219/50389 . . . Gantry loader
2219/50391 . . . Robot
2219/50392 . . . Overhead conveyor
2219/50393 . . . Floor conveyor, AGV automatic guided vehicle
2219/50394 . . . Bulk hopper
2219/50395 . . . Pallet magazines, transport dollies
2219/50396 . . . Gantry loader with two grippers, one always empty
2219/50397 . . . Two conveyors transporting together a workpiece to station
2219/50398 . . . For a single machine
2219/50399 . . . Between machines
2219/50401 . . . In line work storage system

2223/00 Indexing scheme associated with group G05B 23/00

2223/02 . Indirect monitoring, e.g. monitoring production to detect faults of a system
2223/04 . Detection of intermittent failure
2223/06 . Remote monitoring