

CPC**COOPERATIVE PATENT CLASSIFICATION****F05D****INDEXING SCHEME FOR ASPECTS RELATING TO NON-POSITIVE-DISPLACEMENT MACHINES OR ENGINES, GAS-TURBINES OR JET-PROPULSION PLANTS****F05D 2200/00****Mathematical features**

- F05D 2200/10 . Basic functions
- F05D 2200/11 . . Sum
- F05D 2200/12 . . Subtraction
- F05D 2200/13 . . Product
- F05D 2200/14 . . Division
- F05D 2200/15 . . Inverse
- F05D 2200/20 . Special functions
- F05D 2200/21 . . Root
- F05D 2200/211 . . . Square root
- F05D 2200/212 . . . Cubic root
- F05D 2200/22 . . Power
- F05D 2200/221 . . . Square power
- F05D 2200/222 . . . Cubic power
- F05D 2200/23 . . Logarithm
- F05D 2200/24 . . exponential
- F05D 2200/25 . . Hyperbolic trigonometric, e.g. sinh, cosh, tanh
- F05D 2200/26 . . trigonometric
- F05D 2200/261 . . . Sine
- F05D 2200/262 . . . Cosine
- F05D 2200/263 . . . Tangent
- F05D 2200/264 . . . Cotangent
- F05D 2200/30 . miscellaneous
- F05D 2200/31 . . odd
- F05D 2200/32 . . even
- F05D 2200/33 . . bigger or smaller
- F05D 2200/34 . . biggest or smallest
- F05D 2200/35 . . first
- F05D 2200/36 . . last

F05D 2210/00**Working fluids**

- F05D 2210/10 . Kind or type
- F05D 2210/11 . . liquid, i.e. incompressible
- F05D 2210/12 . . gaseous, i.e. compressible
- F05D 2210/13 . . mixed, e.g. two-phase fluid

- F05D 2210/132 . . . Pumps with means for separating and evacuating the gaseous phase
- F05D 2210/14 . . Refrigerants with particular properties, e.g. HFC
- F05D 2210/20 . Properties
- F05D 2210/30 . Flow characteristics
- F05D 2210/31 . . with Mach-number kept constant along the flow
- F05D 2210/32 . . Pressure kept constant along the flow
- F05D 2210/33 . . Turbulent flow
- F05D 2210/34 . . Laminar flow
- F05D 2210/40 . Flow geometry or direction
- F05D 2210/41 . . upwards due to the buoyancy of compressed air
- F05D 2210/42 . . Axial inlet and radial outlet
- F05D 2210/43 . . Radial inlet and axial outlet
- F05D 2210/44 . . bidirectional, i.e. in opposite, alternating directions

F05D 2220/00**Application**

- F05D 2220/10 . in ram-jet engines or ram-jet driven vehicles
- F05D 2220/20 . within closed fluid conduits, e.g. pipes
- F05D 2220/30 . in turbines
- F05D 2220/31 . . in steam turbines
- F05D 2220/32 . . in gas turbines
- F05D 2220/321 . . . for a special turbine stage
- F05D 2220/3212 the first stage of a turbine
- F05D 2220/3213 an intermediate stage of the turbine
- F05D 2220/3215 the last stage of the turbine
- F05D 2220/3216 for a special compressor stage
- F05D 2220/3217 for the first stage of a compressor or a low pressure compressor
- F05D 2220/3218 for an intermediate stage of a compressor
- F05D 2220/3219 for the last stage of a compressor or a high pressure compressor
- F05D 2220/323 . . . for aircraft propulsion, e.g. jet engines
- F05D 2220/324 . . . to drive unshrouded, low solidity propeller
- F05D 2220/325 . . . to drive unshrouded, high solidity propeller
- F05D 2220/326 . . . to drive shrouded, low solidity propeller
- F05D 2220/327 . . . to drive shrouded, high solidity propeller
- F05D 2220/328 . . . providing direct vertical lift
- F05D 2220/329 . . . in helicopters
- F05D 2220/34 . . in ram-air turbines ("RATS")
- F05D 2220/36 . . specially adapted for the fan of turbofan engines
- F05D 2220/40 . in turbochargers
- F05D 2220/50 . for auxiliary power units (APU's)
- F05D 2220/60 . making use of surplus or waste energy

- F05D 2220/62 . . with energy recovery turbines
- F05D 2220/64 . . for domestic central heating or production of electricity
- F05D 2220/70 . in combination with
- F05D 2220/72 . . a steam turbine
- F05D 2220/722 . . . as part of an integrated gasification combined cycle
- F05D 2220/74 . . a gas turbine
- F05D 2220/75 . . equipment using fuel having a low calorific value, e.g. low BTU fuel, waste end, syngas, biomass fuel or flare gas
- F05D 2220/76 . . an electrical generator
- F05D 2220/762 . . . of the direct current (D.C.) type
- F05D 2220/764 . . . of the alternating current (A.C.) type
- F05D 2220/7642 of the synchronous type
- F05D 2220/7644 of the asynchronous type, i.e. induction type
- F05D 2220/7646 Double fed induction generators (DFIGs)
- F05D 2220/766 . . . via a direct connection, i.e. a gearless transmission
- F05D 2220/768 . . . equipped with permanent magnets
- F05D 2220/77 . . . of the linear type
- F05D 2220/80 . in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
- F05D 2220/90 . in vehicles adapted for vertical or short take off and landing (v/stol vehicles)

F05D 2230/00**Manufacture**

- F05D 2230/10 . by removing material
- F05D 2230/11 . . by electrochemical methods
- F05D 2230/12 . . by spark erosion methods
- F05D 2230/13 . . using lasers
- F05D 2230/14 . . Micromachining
- F05D 2230/18 . . Manufacturing tolerances
- F05D 2230/20 . essentially without removing material
- F05D 2230/21 . . by casting
- F05D 2230/211 . . . by precision casting, e.g. microfusing or investment casting
- F05D 2230/22 . . by sintering
- F05D 2230/23 . . by permanently joining parts together
- F05D 2230/232 . . . by welding
- F05D 2230/233 Electron beam welding
- F05D 2230/234 Laser welding
- F05D 2230/235 TIG or MIG welding
- F05D 2230/236 Diffusion bonding
- F05D 2230/237 Brazing
- F05D 2230/238 Soldering
- F05D 2230/239 Inertia or friction welding

- F05D 2230/24 . . by extrusion
- F05D 2230/25 . . by forging
- F05D 2230/26 . . by rolling
- F05D 2230/30 . with deposition of material
- F05D 2230/31 . . Layer deposition
- F05D 2230/311 . . . by torch or flame spraying
- F05D 2230/312 . . . by plasma spraying
- F05D 2230/313 . . . by physical vapour deposition
- F05D 2230/314 . . . by chemical vapour deposition
- F05D 2230/40 . Heat treatment
- F05D 2230/41 . . Hardening; Annealing
- F05D 2230/411 . . . Precipitation hardening
- F05D 2230/42 . . by hot isostatic pressing
- F05D 2230/50 . Building or constructing in particular ways
- F05D 2230/51 . . in a modular way, e.g. using several identical or complementary parts or features
- F05D 2230/52 . . using existing or "off the shelf" parts, e.g. using standardized turbocharger elements
- F05D 2230/53 . . by integrally manufacturing a component, e.g. by milling from a billet or one piece construction
- F05D 2230/54 . . by sheet metal manufacturing
- F05D 2230/60 . Assembly methods
- F05D 2230/61 . . using limited numbers of standard modules which can be adapted by machining
- F05D 2230/64 . . using positioning or alignment devices for aligning or centring, e.g. pins
- F05D 2230/642 . . . using maintaining alignment while permitting differential dilatation
- F05D 2230/644 . . . for adjusting the position or the alignment, e.g. wedges or eccenters
- F05D 2230/68 . . using auxiliary equipment for lifting or holding
- F05D 2230/70 . Disassembly methods
- F05D 2230/72 . Maintenance
- F05D 2230/80 . Repairing, retrofitting or upgrading methods
- F05D 2230/90 . Coating; Surface treatment ([manufacture with deposition of material F05D 2230/30](#))

F05D 2240/00**Components****NOTE**

Components are the basic elements of construction

- F05D 2240/10 . Stators
- F05D 2240/11 . . Shroud seal segments
- F05D 2240/12 . . Fluid guiding means, e.g. vanes
- F05D 2240/121 . . . related to the leading edge of a stator vane
- F05D 2240/122 . . . related to the trailing edge of a stator vane

F05D 2240/123	. . . related to the pressure side of a stator vane
F05D 2240/124	. . . related to the suction side of a stator vane
F05D 2240/125	. . . related to the tip of a stator vane
F05D 2240/126	. . . Baffles or ribs
F05D 2240/127	. . . Vortex generators, turbulators, or the like, for mixing (by creating turbulence F05D 2260/2212)
F05D 2240/128	. . . Nozzles
F05D 2240/1281	. . . . Plug nozzles
F05D 2240/129	. . . Cascades, i.e. assemblies of similar profiles acting in parallel
F05D 2240/14	. . Casings or housings protecting or supporting assemblies within
F05D 2240/15	. . Heat shield
F05D 2240/20	. Rotors
F05D 2240/24	. . for turbines
F05D 2240/241	. . . of impulse type
F05D 2240/242	. . . of reaction type
F05D 2240/243	. . . of the Archimedes screw type
F05D 2240/30	. . Characteristics of rotor blades, i.e. of any element transforming dynamic fluid energy to or from rotational energy and being attached to a rotor
F05D 2240/301	. . . Cross-sectional characteristics
F05D 2240/302	. . . characteristics related to shock waves, transonic or supersonic flow
F05D 2240/303	. . . related to the leading edge of a rotor blade
F05D 2240/304	. . . related to the trailing edge of a rotor blade
F05D 2240/305	. . . related to the pressure side of a rotor blade
F05D 2240/306	. . . related to the suction side of a rotor blade
F05D 2240/307	. . . related to the tip of a rotor blade
F05D 2240/31	. . . with roughened surfaces
F05D 2240/35	. Combustors or associated equipment
F05D 2240/36	. . Fuel vaporizer
F05D 2240/40	. Use of a multiplicity of similar components
F05D 2240/50	. Bearings
F05D 2240/51	. . Magnetic
F05D 2240/511	. . . with permanent magnets
F05D 2240/515	. . . Electromagnetic
F05D 2240/52	. . Axial thrust bearings
F05D 2240/53	. . Hydrodynamic or hydrostatic bearings
F05D 2240/54	. . Radial bearings
F05D 2240/55	. Seals
F05D 2240/56	. . Brush seals
F05D 2240/57	. . Leaf seals
F05D 2240/58	. . Piston ring seals

F05D 2240/581	. . . Double or plural piston ring arrangements, i.e. two or more piston rings
F05D 2240/59	. . Lamellar seals
F05D 2240/60	. Shafts
F05D 2240/61	. . Hollow
F05D 2240/62	. . Flexible
F05D 2240/63	. . Glands for admission or removal of fluids from shafts
F05D 2240/70	. Slinger plates or washers
F05D 2240/80	. Platforms for stationary or moving blades
F05D 2240/81	. . Cooled platforms
F05D 2240/90	. Mounting on supporting structures or systems
F05D 2240/91	. . on a stationary structure

F05D 2250/00**Geometry****NOTE**

Geometry indicates the shape or form of a component or the configuration or arrangement of components in a machine or in a plant

F05D 2250/10	. Two-dimensional
F05D 2250/11	. . triangular
F05D 2250/12	. . rectangular
F05D 2250/121	. . . square
F05D 2250/13	. . trapezoidal
F05D 2250/131	. . . polygonal
F05D 2250/132	. . . hexagonal
F05D 2250/14	. . elliptical
F05D 2250/141	. . . circular
F05D 2250/15	. . spiral
F05D 2250/16	. . parabolic
F05D 2250/17	. . hyperbolic
F05D 2250/18	. . patterned
F05D 2250/181	. . . ridged
F05D 2250/182	. . . crenellated, notched
F05D 2250/183	. . . zigzag
F05D 2250/184	. . . sinusoidal
F05D 2250/185	. . . serpentine-like
F05D 2250/19	. . machined; miscellaneous
F05D 2250/191	. . . perforated
F05D 2250/192	. . . bevelled
F05D 2250/193	. . . milled
F05D 2250/20	. Three-dimensional

F05D 2250/21	. . pyramidal
F05D 2250/22	. . parallelepipedal
F05D 2250/221	. . . cubic
F05D 2250/23	. . prismatic
F05D 2250/231	. . . cylindrical
F05D 2250/232	. . . conical
F05D 2250/24	. . ellipsoidal
F05D 2250/241	. . . spherical
F05D 2250/25	. . helical
F05D 2250/26	. . paraboloid
F05D 2250/27	. . hyperboloid
F05D 2250/28	. . patterned
F05D 2250/281	. . . threaded
F05D 2250/282	. . . cubic pattern
F05D 2250/283	. . . honeycomb
F05D 2250/29	. . machined; miscellaneous
F05D 2250/291	. . . hollowed
F05D 2250/292	. . . tapered
F05D 2250/293	. . . lathed, e.g. rotation symmetrical
F05D 2250/294	. . . grooved
F05D 2250/30	. Arrangement of components
F05D 2250/31	. . according to the direction of their main axis or their axis of rotation
F05D 2250/311	. . . the axes being in line
F05D 2250/312	. . . the axes being parallel to each other
F05D 2250/313	. . . the axes being perpendicular to each other
F05D 2250/314	. . . the axes being inclined in relation to each other
F05D 2250/315	. . . the main axis being substantially vertical
F05D 2250/32	. . according to their shape
F05D 2250/321	. . . asymptotic
F05D 2250/322	. . . tangential
F05D 2250/323	. . . convergent
F05D 2250/324	. . . divergent
F05D 2250/33	. . symmetrical
F05D 2250/34	. . translated
F05D 2250/35	. . rotated
F05D 2250/36	. . in inner-outer relationship, e.g. shaft-bearing arrangements
F05D 2250/37	. . circumferential
F05D 2250/38	. . angled, e.g. sweep angle
F05D 2250/40	. Movement of components
F05D 2250/41	. . with one degree of freedom

F05D 2250/411	. . . in rotation
F05D 2250/42	. . with two degrees of freedom
F05D 2250/43	. . with three degrees of freedom
F05D 2250/44	. . by counter rotation
F05D 2250/50	. Inlet or outlet
F05D 2250/51	. . Inlet
F05D 2250/511	. . . augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
F05D 2250/512	. . . concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
F05D 2250/52	. . Outlet
F05D 2250/53	. . of regenerative pumps
F05D 2250/60	. Structure; Surface texture
F05D 2250/61	. . corrugated
F05D 2250/611	. . . undulated
F05D 2250/62	. . smooth or fine
F05D 2250/621	. . . polished
F05D 2250/63	. . coarse
F05D 2250/70	. Shape
F05D 2250/71	. . curved
F05D 2250/711	. . . convex
F05D 2250/712	. . . concave
F05D 2250/713	. . . inflexed
F05D 2250/72	. . symmetric
F05D 2250/73	. . asymmetric
F05D 2250/74	. . given by a set or table of xyz-coordinates
F05D 2250/75	. . given by its similarity to a letter, e.g. T-shaped
F05D 2250/80	. Size or power range of the machines
F05D 2250/82	. . Micromachines
F05D 2250/84	. . Nanomachines
F05D 2250/90	. Variable geometry

F05D 2260/00**Function**

F05D 2260/02	. Transport and handling during maintenance and repair
F05D 2260/10	. Particular cycles
F05D 2260/12	. Testing on a test bench
F05D 2260/14	. Preswirling
F05D 2260/15	. Load balancing
F05D 2260/16	. Fluid modulation at a certain frequency
F05D 2260/20	. Heat transfer, e.g. cooling
F05D 2260/201	. . by impingement of a fluid

- F05D 2260/202 . . by film cooling
- F05D 2260/203 . . by transpiration cooling
- F05D 2260/204 . . by the use of microcircuits
- F05D 2260/205 . . Cooling fluid recirculation, i.e. after cooling one or more components is the cooling fluid recovered and used elsewhere for other purposes
- F05D 2260/207 . . using a phase changing mass, e.g. heat absorbing by melting or boiling
- F05D 2260/208 . . using heat pipes
- F05D 2260/209 . . using vortex tubes
- F05D 2260/211 . . by intercooling, e.g. during a compression cycle
- F05D 2260/212 . . by water injection
- F05D 2260/213 . . by the provision of a heat exchanger within the cooling circuit
- F05D 2260/221 . . Improvement of heat transfer
- F05D 2260/2212 . . . by creating turbulence ([vortex generators, turbulators or the like for mixing F05D 2240/127](#))
- F05D 2260/2214 . . . by increasing the heat transfer surface
- F05D 2260/22141 using fins or ribs
- F05D 2260/231 . . Preventing heat transfer
- F05D 2260/232 . . characterized by the cooling medium
- F05D 2260/2322 . . . steam
- F05D 2260/234 . . of the generator by compressor inlet air
- F05D 2260/24 . . for draft enhancement in chimneys, using solar or other heat sources
- F05D 2260/30 . Retaining components in desired mutual position
- F05D 2260/31 . Retaining bolts or nuts
- F05D 2260/311 . of the frangible or shear type
- F05D 2260/32 . . by means of magnetic or electromagnetic forces
- F05D 2260/33 . . with a bayonet coupling
- F05D 2260/34 . . Balancing of radial or axial forces on regenerative rotors
- F05D 2260/35 . . Reducing friction between regenerative impeller discs and casing walls
- F05D 2260/36 . . by a form fit connection, e.g. by interlocking
- F05D 2260/37 . . by a press fit connection
- F05D 2260/38 . . by a spring, i.e. spring loaded or biased towards a certain position
- F05D 2260/39 . . by a V-shaped ring to join the flanges of two cylindrical sections, e.g. casing sections of a turbocharger
- F05D 2260/40 . Transmission of power
- F05D 2260/402 . . through friction drives
- F05D 2260/4021 . . . through belt drives
- F05D 2260/4022 . . . through endless chains
- F05D 2260/4023 . . . through a friction clutch
- F05D 2260/403 . . through the shape of the drive components
- F05D 2260/4031 . . . as in toothed gearing
- F05D 2260/40311 of the epicyclical, planetary or differential type

- F05D 2260/404 . . through magnetic drive coupling
- F05D 2260/4041 . . . the driven magnets encircling the driver magnets
- F05D 2260/406 . . through hydraulic systems
- F05D 2260/407 . . through piezoelectric conversion
- F05D 2260/408 . . through magnetohydrodynamic conversion
- F05D 2260/42 . Storage of energy
- F05D 2260/43 . . in the form of rotational kinetic energy, e.g. in flywheels
- F05D 2260/50 . Kinematic linkage, i.e. transmission of position
- F05D 2260/52 . . involving springs
- F05D 2260/53 . . using gears
- F05D 2260/532 . . . of the bevelled or angled type
- F05D 2260/54 . . using flat or V-belts and pulleys
- F05D 2260/55 . . using chains and sprockets; using toothed belts
- F05D 2260/56 . . using cams or eccentrics
- F05D 2260/57 . . using servos, independent actuators, etc.
- F05D 2260/60 . Fluid transfer
- F05D 2260/601 . . using an ejector or a jet pump
- F05D 2260/602 . . Drainage
- F05D 2260/6022 . . . of leakage having past a seal ([seals F05D 2240/57](#); [glands F05D 2240/63](#))
- F05D 2260/604 . . Vortex non-clogging type pumps
- F05D 2260/605 . . Venting into the ambient atmosphere or the like
- F05D 2260/606 . . Bypassing the fluid
- F05D 2260/607 . . Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
- F05D 2260/608 . . Aeration, ventilation, dehumidification or moisture removal of closed spaces
- F05D 2260/609 . . Deoiling or demisting
- F05D 2260/61 . . Removal of CO₂ ([removal of CO₂ from waste gases B01D 53/62](#))
- F05D 2260/611 . . Sequestration of CO₂
- F05D 2260/70 . Adjusting of angle of incidence or attack of rotating blades
- F05D 2260/71 . . as a function of flow velocity
- F05D 2260/72 . . by turning around an axis parallel to the rotor centre line
- F05D 2260/74 . . by turning around an axis perpendicular the rotor centre line
- F05D 2260/75 . . the adjusting mechanism not using auxiliary power sources, e.g. by "servos"
- F05D 2260/76 . . the adjusting mechanism using auxiliary power sources
- F05D 2260/77 . . the adjusting mechanism driven or triggered by centrifugal forces
- F05D 2260/78 . . the adjusting mechanism driven or triggered by aerodynamic forces
- F05D 2260/79 . . Bearing, support or actuation arrangements therefor
- F05D 2260/80 . Diagnostics
- F05D 2260/81 . Modelling or simulation
- F05D 2260/82 . Forecasts
- F05D 2260/821 . . Parameter estimation or prediction

- F05D 2260/83 . Testing, e.g. methods, components or tools therefor
- F05D 2260/84 . Redundancy
- F05D 2260/85 . Starting
- F05D 2260/90 . Braking
- F05D 2260/901 . . using aerodynamic forces, i.e. lift or drag
- F05D 2260/902 . . using frictional mechanical forces
- F05D 2260/903 . . using electrical or magnetic forces
- F05D 2260/904 . . using hydrodynamic forces
- F05D 2260/94 . Functionality given by mechanical stress related aspects such as low cycle fatigue [LCF] of high cycle fatigue [HCF]
- F05D 2260/941 . . particularly aimed at mechanical or thermal stress reduction
- F05D 2260/95 . Preventing corrosion ([coating or surface treatment F05D 2230/90](#))
- F05D 2260/96 . Preventing, counteracting or reducing vibration or noise
- F05D 2260/961 . . by mistuning rotor blades or stator vanes with irregular interblade spacing, airfoil shape
- F05D 2260/962 . . by means of "anti-noise"
- F05D 2260/963 . . by Helmholtz resonators
- F05D 2260/964 . . counteracting thermoacoustic noise
- F05D 2260/97 . Reducing windage losses
- F05D 2260/972 . . in radial flow machines
- F05D 2260/98 . Lubrication
- F05D 2260/99 . Ignition, e.g. ignition by warming up of fuel or oxidizer in a resonant acoustic cavity

F05D 2270/00**Control**

- F05D 2270/01 . Purpose of the control system
- F05D 2270/02 . . to control rotational speed (n)
- F05D 2270/021 . . . to prevent overspeed
- F05D 2270/022 . . . to prevent underspeed
- F05D 2270/023 . . . of different spools or shafts
- F05D 2270/024 . . . to keep rotational speed constant
- F05D 2270/03 . . in variable speed operation
- F05D 2270/04 . . to control acceleration (u)
- F05D 2270/042 . . . by keeping it below damagingly high values
- F05D 2270/044 . . . by making it as high as possible
- F05D 2270/05 . . to affect the output of the engine
- F05D 2270/051 . . . Thrust
- F05D 2270/052 . . . Torque
- F05D 2270/053 . . . Explicitly mentioned power
- F05D 2270/06 . . to match engine to driven device
- F05D 2270/061 . . . in particular the electrical frequency of driven generator
- F05D 2270/07 . . to improve fuel economy

F05D 2270/071	. . . in particular at idling speed
F05D 2270/08	. . to produce clean exhaust gases
F05D 2270/081	. . . with as little smoke as possible
F05D 2270/082	. . . with as little NOx as possible
F05D 2270/083	. . . by monitoring combustion conditions
F05D 2270/0831	. . . . indirectly, at the exhaust
F05D 2270/09	. . to cope with emergencies
F05D 2270/091	. . . in particular sudden load loss
F05D 2270/092	. . . in particular blow-out and relight
F05D 2270/093	. . . of one engine in a multi-engine system
F05D 2270/094	. . . by using back-up controls
F05D 2270/095	. . . by temporary overriding set control limits
F05D 2270/096	. . . caused by water or hail ingestion
F05D 2270/10	. . to cope with, or avoid, compressor flow instabilities
F05D 2270/101	. . . Compressor surge or stall
F05D 2270/102	. . . . caused by working fluid flow velocity profile distortion
F05D 2270/1022	. . . . . due to high angle of attack of aircraft
F05D 2270/1024	. . . . . due to compressor degradation
F05D 2270/11	. . to prolong engine life
F05D 2270/112	. . . by limiting temperatures
F05D 2270/114	. . . by limiting mechanical stresses
F05D 2270/116	. . . by preventing reverse rotation
F05D 2270/12	. . to maintain desired vehicle trajectory parameters
F05D 2270/121	. . . Altitude
F05D 2270/122	. . . Speed or Mach number
F05D 2270/13	. . to control two or more engines simultaneously
F05D 2270/14	. . to control thermoacoustic behaviour in the combustion chambers (counteracting noise or vibration F05D 2260/96)
F05D 2270/16	. . to control water or steam injection
F05D 2270/17	. . to control boundary layer
F05D 2270/172	. . . by a plasma generator, e.g. control of ignition
F05D 2270/173	. . . by the Coanda effect
F05D 2270/18	. . using fluidic amplifiers or actuators
F05D 2270/20	. . to optimize the performance of a machine
F05D 2270/30	. Control parameters, e.g. input parameters
F05D 2270/301	. . Pressure
F05D 2270/3011	. . . Inlet pressure
F05D 2270/3013	. . . Outlet pressure
F05D 2270/3015	. . . differential pressure
F05D 2270/303	. . Temperature

F05D 2270/3032	. . . excessive temperatures, e.g. caused by overheating
F05D 2270/304	. . Spool rotational speed
F05D 2270/305	. . Tolerances
F05D 2270/306	. . Mass flow
F05D 2270/3061	. . . of the working fluid
F05D 2270/3062	. . . of the auxiliary fluid for heating or cooling purposes
F05D 2270/309	. . Rate of change of parameters
F05D 2270/31	. . Fuel schedule for stage combustors
F05D 2270/311	. . Air humidity
F05D 2270/312	. . Air pressure
F05D 2270/313	. . Air temperature
F05D 2270/331	. . Mechanical loads
F05D 2270/332	. . Maximum loads or fatigue criteria
F05D 2270/333	. . Noise or sound levels
F05D 2270/334	. . Vibration measurements
F05D 2270/335	. . Output power or torque
F05D 2270/336	. . Blade lift measurements
F05D 2270/40	. Type of control system
F05D 2270/42	. . passive or reactive, e.g. using large wind vanes
F05D 2270/44	. . active, predictive, or anticipative
F05D 2270/46	. . redundant, i.e. failsafe operation
F05D 2270/50	. Control logic embodiments
F05D 2270/52	. . by electrical means, e.g. relays or switches
F05D 2270/54	. . by electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit
F05D 2270/56	. . by hydraulic means, e.g. hydraulic valves within a hydraulic circuit
F05D 2270/58	. . by mechanical means, e.g. levers, gears or cams
F05D 2270/60	. Control system actuates means
F05D 2270/62	. . Electrical actuators
F05D 2270/64	. . Hydraulic actuators
F05D 2270/65	. . Pneumatic actuators
F05D 2270/66	. . Mechanical actuators (F05D 2270/62 takes precedence)
F05D 2270/70	. Type of control algorithm
F05D 2270/701	. . proportional
F05D 2270/702	. . differential
F05D 2270/703	. . integral
F05D 2270/704	. . proportional-differential
F05D 2270/705	. . proportional-integral
F05D 2270/706	. . proportional-integral-differential
F05D 2270/707	. . fuzzy logic

F05D 2270/708	. . with comparison tables
F05D 2270/709	. . with neural networks
F05D 2270/71	. . synthesized, i.e. parameter computed by a mathematical model
F05D 2270/80	. Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
F05D 2270/802	. . Calibration thereof
F05D 2270/803	. . Sampling thereof
F05D 2270/804	. . Optical devices
F05D 2270/8041	. . . Cameras
F05D 2270/805	. . Radars
F05D 2270/806	. . Sonars
F05D 2270/807	. . Accelerometers
F05D 2270/808	. . Strain gauges; Load cells
F05D 2270/809	. . Encoders
F05D 2270/81	. . Microphones
F05D 2270/821	. . Displacement measuring means, e.g. inductive

F05D 2300/00**Materials; Properties thereof**

F05D 2300/10	. Metals, alloys or intermetallic compounds
F05D 2300/11	. . Iron
F05D 2300/111	. . . Cast iron
F05D 2300/12	. . Light metals
F05D 2300/121	. . . Aluminium
F05D 2300/122	. . . Beryllium
F05D 2300/123	. . . Boron
F05D 2300/124	. . . Lithium
F05D 2300/125	. . . Magnesium
F05D 2300/13	. . Refractory metals, i.e. Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W
F05D 2300/131	. . . Molybdenum
F05D 2300/132	. . . Chromium
F05D 2300/133	. . . Titanium
F05D 2300/134	. . . Zirconium
F05D 2300/135	. . . Hafnium
F05D 2300/14	. . Noble metals, i.e. Ag, Au, platinum group metals
F05D 2300/141	. . . Silver
F05D 2300/142	. . . Gold
F05D 2300/143	. . . Platinum group metals, i.e. Os, Ir, Pt, Ru, Rh, Pd
F05D 2300/1431	. . . . Palladium
F05D 2300/1432	. . . . Ruthenium
F05D 2300/1433	. . . . Osmium
F05D 2300/1434	. . . . Iridium

F05D 2300/1435	. . . . Rhodium
F05D 2300/15	. . Rare earth metals, i.e. Sc, Y, lanthanides
F05D 2300/16	. . Other metals not provided for in groups F05D 2300/11 to F05D 2300/15
F05D 2300/1602	. . . Arsenic
F05D 2300/1604	. . . Antimony
F05D 2300/1606	. . . Bismuth
F05D 2300/1608	. . . Barium
F05D 2300/161	. . . Manganese
F05D 2300/1612	. . . Lead
F05D 2300/1614	. . . Tin
F05D 2300/1616	. . . Zinc
F05D 2300/1618	. . . Mercury
F05D 2300/17	. . Alloys
F05D 2300/171	. . . Steel alloys
F05D 2300/172	. . . Copper alloys
F05D 2300/1721	. . . . Bronze
F05D 2300/1722	. . . . Phosphor-bronze alloy
F05D 2300/1723	. . . . Nickel-Copper alloy, e.g. Monel
F05D 2300/173	. . . Aluminium alloys, e.g. AlCuMgPb
F05D 2300/174	. . . Titanium alloys, e.g. TiAl
F05D 2300/175	. . . Superalloys
F05D 2300/176	. . . Heat-stable alloys
F05D 2300/177	. . . Ni - Si alloys
F05D 2300/18	. . Intermetallic compounds
F05D 2300/182	. . . Metal-aluminide intermetallic compounds
F05D 2300/20	. . Oxide or non-oxide ceramics
F05D 2300/21	. . Oxide ceramics
F05D 2300/2102	. . . Glass
F05D 2300/2104	. . . MIBA
F05D 2300/2106	. . . Quartz
F05D 2300/2108	. . . Phosphor
F05D 2300/211	. . . Silica
F05D 2300/2112	. . . Aluminium oxides
F05D 2300/2114	. . . Sapphire
F05D 2300/2116	. . . Zinc oxide
F05D 2300/2118	. . . Zirconium oxides
F05D 2300/212	. . . Aluminium titanate
F05D 2300/22	. . Non-oxide ceramics
F05D 2300/222	. . . Silicon
F05D 2300/224	. . . Carbon, e.g. graphite

F05D 2300/226	. . . Carbides
F05D 2300/2261	. . . . of silicon
F05D 2300/2262	. . . . of titanium, e.g. TiC
F05D 2300/2263	. . . . of tungsten, e.g. WC
F05D 2300/228	. . . Nitrides
F05D 2300/2281	. . . . of aluminium
F05D 2300/2282	. . . . of boron
F05D 2300/2283	. . . . of silicon
F05D 2300/2284	. . . . of titanium
F05D 2300/2285	. . . . of zirconium
F05D 2300/229	. . . Sulfides
F05D 2300/2291	. . . . of molybdenum
F05D 2300/30	. Inorganic materials other than provided for in groups F05D 2300/10 to F05D 2300/2291
F05D 2300/40	. Organic materials
F05D 2300/41	. . Leather
F05D 2300/42	. . Cellulosic materials, e.g. wood
F05D 2300/43	. . Synthetic polymers, e.g. plastics; Rubber
F05D 2300/431	. . . Rubber
F05D 2300/432	. . . PTFE [PolyTetraFluorEthylene]
F05D 2300/433	. . . Polyamides, e.g. NYLON
F05D 2300/434	. . . Polyimides, e.g. AURUM
F05D 2300/436	. . . Polyetherketones, e.g. PEEK
F05D 2300/437	. . . Silicon polymers
F05D 2300/44	. . Resins
F05D 2300/48	. . other organic materials
F05D 2300/50	. Intrinsic material properties or characteristics
F05D 2300/501	. . Elasticity
F05D 2300/502	. . Thermal properties
F05D 2300/5021	. . . Expansivity
F05D 2300/50211	. . . . similar
F05D 2300/50212	. . . . dissimilar
F05D 2300/5023	. . . Thermal capacity
F05D 2300/5024	. . . Heat conductivity
F05D 2300/504	. . Reflective properties
F05D 2300/505	. . Shape memory behaviour
F05D 2300/506	. . Hardness
F05D 2300/507	. . Magnetic properties
F05D 2300/509	. . Self lubricating materials; Solid lubricants
F05D 2300/51	. . Hydrophilic, i.e. being or having wettable properties

F05D 2300/512	. . Hydrophobic, i.e. being or having non-wettable properties
F05D 2300/514	. . Porosity
F05D 2300/516	. . Surface roughness
F05D 2300/518	. . Ductility
F05D 2300/52	. . Translucence
F05D 2300/522	. . Density
F05D 2300/60	. Properties or characteristics given to material by treatment or manufacturing
F05D 2300/601	. . Fabrics
F05D 2300/6012	. . . Woven fabrics
F05D 2300/603	. . Composites; e.g. fibre-reinforced
F05D 2300/6031	. . . Functionally graded composites
F05D 2300/6032	. . . Metal matrix composites [MMC]
F05D 2300/6033	. . . Ceramic matrix composites [CMC]
F05D 2300/6034	. . . Orientation of fibres, weaving, ply angle
F05D 2300/604	. . Amorphous
F05D 2300/605	. . Crystalline
F05D 2300/606	. . Directionally-solidified crystalline structures
F05D 2300/607	. . Monocrystallinity
F05D 2300/608	. . Microstructure
F05D 2300/609	. . Grain size
F05D 2300/61	. . Syntactic materials, i.e. hollow spheres embedded in a matrix
F05D 2300/611	. . Coating
F05D 2300/6111	. . functionally graded coating
F05D 2300/612	. . Foam
F05D 2300/613	. . Felt
F05D 2300/614	. . Fibres or filaments
F05D 2300/615	. . Filler
F05D 2300/70	. Treatment or modification of materials
F05D 2300/701	. . Heat treatment
F05D 2300/702	. . Reinforcement