

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
 - .. using aerodynamic forces, i.e. lift or drag
 - .. using frictional mechanical forces
 - .. using electrical or magnetic forces
 - .. using hydrodynamic forces
- F05D 2260/94 . Functionality given by mechanical stress related aspects such as low cycle fatigue [LCF] of high cycle fatigue [HCF]
 - .. 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
 - .. by mistuning rotor blades or stator vanes with irregular interblade spacing, airfoil shape
 - .. by means of "anti-noise"
 - .. by Helmholtz resonators
 - .. counteracting thermoacoustic noise
- F05D 2260/97 . Reducing windage losses
 - .. 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
 - .. to control rotational speed (n)
 - ... to prevent overspeed
 - ... to prevent underspeed
 - ... of different spools or shafts
 - ... to keep rotational speed constant
 - .. in variable speed operation
 - .. to control acceleration (u)
 - ... by keeping it below damagingly high values
 - ... by making it as high as possible
 - .. to affect the output of the engine
 - ... Thrust
 - ... Torque
 - ... Explicitly mentioned power
 - .. to match engine to driven device
 - ... in particular the electrical frequency of driven generator
 - .. 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