

**CPC****COOPERATIVE PATENT CLASSIFICATION****F05B****INDEXING SCHEME RELATING TO MACHINES OR ENGINES  
OTHER THAN NON-POSITIVE-DISPLACEMENT MACHINES  
OR ENGINES, TO WIND MOTORS, TO NON-POSITIVE  
DISPLACEMENT PUMPS, AND TO GENERATING COMBUSTION  
PRODUCTS OF HIGH PRESSURE OR HIGH VELOCITY****NOTE**

This subclass constitutes an internal scheme for indexing only.

**F05B 2200/00****Mathematical features**

F05B 2200/10	. Basic functions
F05B 2200/11	.. Sum
F05B 2200/12	.. Substraction
F05B 2200/13	.. Product
F05B 2200/14	.. Division
F05B 2200/15	.. Inverse
F05B 2200/20	. Special functions
F05B 2200/21	.. Root
F05B 2200/211	... Square root
F05B 2200/212	... Cubic root
F05B 2200/22	.. Power
F05B 2200/221	... Square power
F05B 2200/222	... Cubic power
F05B 2200/23	.. Logarithm
F05B 2200/24	.. exponential
F05B 2200/25	.. Hyperbolic trigonometric, e.g. sinh, cosh, tanh
F05B 2200/26	.. trigonometric
F05B 2200/261	... Sine
F05B 2200/262	... Cosine
F05B 2200/263	... Tangent
F05B 2200/264	... Cotangent
F05B 2200/30	. miscellaneous
F05B 2200/31	.. odd
F05B 2200/32	.. even
F05B 2200/33	.. bigger/smaller
F05B 2200/34	.. biggest/smallest
F05B 2200/35	.. first
F05B 2200/36	.. last

**F05B 2210/00****Working fluid****NOTE**

Indexing codes of group [F05B 2210/00](#) can be followed by a name for a specific working fluid preceded by the "+" sign, e.g. [F05B 2210/11](#) +water.

- F05B 2210/10 . Kind or type
- F05B 2210/11 . . liquid, i.e. incompressible
- F05B 2210/12 . . gaseous, i.e. compressible
- F05B 2210/13 . . mixed, e.g. two-phase fluid
- F05B 2210/132 . . . Pumps with means for separating and evacuating the gaseous phase
- F05B 2210/14 . . Refrigerants with particular properties, e.g. HFC-134a
- F05B 2210/16 . Air or water being indistinctly used as working fluid, i.e. the machine can work equally with air or water without any modification
- F05B 2210/18 . Air and water being simultaneously used as working fluid
- F05B 2210/20 . Properties
- F05B 2210/30 . Flow characteristics
- F05B 2210/301 . . with Mach-number kept constant along the flow
- F05B 2210/302 . . Pressure kept constant along the flow
- F05B 2210/40 . Flow geometry or direction
- F05B 2210/401 . . upwards due to the buoyancy of compressed air
- F05B 2210/402 . . Axial inlet and radial outlet
- F05B 2210/403 . . Radial inlet and axial outlet
- F05B 2210/404 . . bidirectional, i.e. in opposite, alternating directions

**F05B 2220/00****Application**

- F05B 2220/10 . in ram-jet engines or ram-jet driven vehicles
- F05B 2220/20 . within closed fluid conduits, e.g. pipes
- F05B 2220/25 . as advertisement
- F05B 2220/30 . in turbines
- F05B 2220/301 . . in steam turbines
- F05B 2220/302 . . in gas turbines
- F05B 2220/3021 . . . for a special turbine stage
- F05B 2220/3022 . . . . the first stage of a turbine
- F05B 2220/3023 . . . . an intermediate stage of the turbine
- F05B 2220/3025 . . . . the last stage of the turbine
- F05B 2220/303 . . . for aircraft propulsion, e.g. jet engines
- F05B 2220/304 . . . to drive unshrouded, low solidity propeller
- F05B 2220/305 . . . to drive unshrouded, high solidity propeller
- F05B 2220/306 . . . to drive shrouded, low solidity propeller
- F05B 2220/307 . . . to drive shrouded, high solidity propeller

- F05B 2220/308 . . . providing direct vertical lift
- F05B 2220/309 . . . in a helicopter
- F05B 2220/31 . . in ram-air turbines ("RATS")
- F05B 2220/32 . . in water turbines
- F05B 2220/33 . . specially adapted for the fan of turbofan engines
- F05B 2220/40 . in turbochargers
- F05B 2220/50 . for auxiliary power units (APU's)
- F05B 2220/60 . making use of surplus or waste energy
- F05B 2220/602 . . with energy recovery turbines
- F05B 2220/604 . . for domestic central heating or production of electricity
- F05B 2220/61 . for hydrogen and/or oxygen production
- F05B 2220/62 . for desalination
- F05B 2220/64 . for aeration
- F05B 2220/70 . in combination with
- F05B 2220/702 . . a steam turbine
- F05B 2220/704 . . a gas turbine
- F05B 2220/706 . . an electrical generator
- F05B 2220/7062 . . . of the direct current (D.C.) type
- F05B 2220/7064 . . . of the alternating current (A.C.) type
- F05B 2220/70642 . . . . of the synchronous type
- F05B 2220/70644 . . . . of the asynchronous type, i.e. induction type
- F05B 2220/70646 . . . . . Double fed induction generators (DFIGs)
- F05B 2220/7066 . . . via a direct connection, i.e. a gearless transmission
- F05B 2220/7068 . . . equipped with permanent magnets
- F05B 2220/707 . . . of the linear type
- F05B 2220/708 . . Photoelectric means, i.e. photovoltaic or solar cells
- F05B 2220/709 . . Piezoelectric means
- F05B 2220/80 . in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
- F05B 2220/90 . in vehicles adapted for vertical or short take off and landing (v/stol vehicles), ([gas turbines providing direct vertical lift F05B 2220/308](#))

**F05B 2230/00****Manufacture****NOTE**

Manufacture comprises also treatment, assembly or disassembly methods, repairing, handling or the like.

- F05B 2230/10 . by removing material
- F05B 2230/101 . . by electrochemical methods
- F05B 2230/102 . . by spark erosion methods
- F05B 2230/103 . . using lasers

- F05B 2230/104 . Micromachining
- F05B 2230/20 . essentially without removing material
- F05B 2230/21 .. by casting
- F05B 2230/211 ... by precision casting, e.g. microfusing or investment casting
- F05B 2230/22 .. by sintering
- F05B 2230/23 .. by permanently joining parts together
- F05B 2230/232 ... by welding
- F05B 2230/233 .... Electron beam welding
- F05B 2230/234 .... Laser welding
- F05B 2230/235 .... Tig/Mig welding
- F05B 2230/236 .... Diffusion bonding
- F05B 2230/237 .... Brazing
- F05B 2230/238 .... Soldering
- F05B 2230/239 .... Inertia or friction welding
- F05B 2230/24 .. by extrusion
- F05B 2230/25 .. by forging
- F05B 2230/26 .. by rolling
- F05B 2230/30 . with deposition of material
- F05B 2230/31 .. Layer deposition
- F05B 2230/311 ... by torch or flame spray
- F05B 2230/312 ... by plasma spray
- F05B 2230/313 ... by physical vapour deposition
- F05B 2230/314 ... by chemical vapour deposition
- F05B 2230/40 . Heat treatment
- F05B 2230/41 .. Hardening; Annealing
- F05B 2230/50 . Building or constructing in particular ways
- F05B 2230/502 .. using existing or "off the shelf" parts, e.g. using standardised turbocharger elements
- F05B 2230/60 . Assembly methods
- F05B 2230/601 .. using limited numbers of standard modules which can be adapted by machining
- F05B 2230/604 .. using positioning or alignment devices for aligning or centering, e.g. pins
- F05B 2230/606 ... using maintaining alignment while permitting differential dilatation
- F05B 2230/608 ... for adjusting the position or the alignment, e.g. wedges or excenters
- F05B 2230/61 .. using auxiliary equipment for lifting or holding ([hoisting on to a stationary structure with provisions on the structure itself F05B 2240/916](#))
- F05B 2230/6102 ... carried on a floating platform
- F05B 2230/70 . Disassembly methods
- F05B 2230/80 . Repairing, retrofitting or upgrading methods
- F05B 2230/90 . Coating; Surface treatment ([manufacture with deposition of material F05B 2220/30](#))

**F05B 2240/00****Components****NOTE**

Components are the basic elements of construction.

- F05B 2240/10 . Stators
- F05B 2240/11 .. Shroud seal segments
- F05B 2240/12 .. Fluid guiding means, e.g. vanes
- F05B 2240/121 ... Baffles or ribs
- F05B 2240/122 ... Vortex generators, turbulators, or the like, for mixing (by creating turbulence [F05B 2260/222](#))
- F05B 2240/123 ... Nozzles
- F05B 2240/1231 .... Plug nozzles
- F05B 2240/124 ... Cascades, i.e. assemblies of similar profiles acting in parallel
- F05B 2240/13 .. to collect or cause flow towards or away from turbines
- F05B 2240/131 ... by means of vertical structures, i.e. chimneys
- F05B 2240/132 ... creating a vortex or tornado effect
- F05B 2240/133 ... with a convergent-divergent guiding structure, e.g. a Venturi conduit
- F05B 2240/14 .. Casings, housings, nacelles, gondels or the like, protecting or supporting assemblies within
- F05B 2240/142 ... in the form of a standard ISO container
- F05B 2240/20 . Rotors
- F05B 2240/201 .. using the Magnus-effect
- F05B 2240/202 .. with adjustable area of intercepted fluid
- F05B 2240/2021 ... by means of telescoping blades
- F05B 2240/2022 ... by means of tethering or coning blades
- F05B 2240/2023 ... by means of radially reefing blades
- F05B 2240/21 .. for wind turbines
- F05B 2240/211 ... with vertical axis
- F05B 2240/212 .... of the Darrieus type
- F05B 2240/213 .... of the Savonius type
- F05B 2240/214 .... of the Musgrove or "H"-type
- F05B 2240/215 .... of the panemone or "vehicle ventilator" type
- F05B 2240/216 .... of the anemometer type
- F05B 2240/217 .... of the crossflow- or "Banki"- or "double action" type
- F05B 2240/218 .... with horizontally hinged vanes
- F05B 2240/221 ... with horizontal axis
- F05B 2240/2211 .... of the multibladed, low speed, e.g. "American farm" type
- F05B 2240/2212 .... perpendicular to wind direction
- F05B 2240/2213 .... and with the rotor downwind from the yaw pivot axis

F05B 2240/231	...	driven by aerodynamic lift effects
F05B 2240/232	....	driven by drag
F05B 2240/24	..	for turbines
F05B 2240/241	...	of impulse type
F05B 2240/2411	....	Pelton type
F05B 2240/242	...	of reaction type
F05B 2240/243	...	of the Archimedes screw type
F05B 2240/244	...	of the cross-flow, e.g. Banki, Ossberger type
F05B 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
F05B 2240/301	...	Cross-section characteristics
F05B 2240/302	...	Segmented or sectional blades
F05B 2240/31	...	of changeable form or shape
F05B 2240/311	....	flexible or elastic
F05B 2240/312	....	capable of being reefed
F05B 2240/3121	.....	around an axis orthogonal to rotor rotational axis
F05B 2240/313	....	with adjustable flow intercepting area ( <a href="#">F05B 2240/312</a> takes precedence)
F05B 2240/32	...	with roughened surfaces
F05B 2240/33	..	Shrouds which are part of or which are rotating with the rotor
F05B 2240/34	..	with auxiliary or secondary rotors attached to blades of main rotor
F05B 2240/35	.	Combustors or associated equipment
F05B 2240/36	..	Fuel vaporizer
F05B 2240/40	.	Use of a multiplicity of similar components
F05B 2240/50	.	Bearings
F05B 2240/51	..	magnetic
F05B 2240/511	...	with permanent magnets
F05B 2240/515	...	electromagnetic
F05B 2240/52	..	Axial thrust bearings
F05B 2240/53	..	Hydrodynamic or hydrostatic bearings
F05B 2240/54	..	Radial bearings
F05B 2240/57	.	Seals
F05B 2240/571	..	Brush seals
F05B 2240/572	..	Leaf seals
F05B 2240/60	.	Shafts
F05B 2240/61	..	hollow
F05B 2240/62	..	flexible
F05B 2240/63	..	Glands for admission or removal of fluids from shafts
F05B 2240/70	.	Slinger plates or washers
F05B 2240/80	.	Platforms for stationary or moving blades
F05B 2240/801	..	cooled platforms

- F05B 2240/90 . Mounting on supporting structures or systems
- F05B 2240/91 .. on a stationary structure
- F05B 2240/911 ... already existing for a prior purpose
- F05B 2240/9111 .... which is a chimney
- F05B 2240/9112 .... which is a building
- F05B 2240/9113 .... which is a roadway, rail track, or the like for recovering energy from moving vehicles
- F05B 2240/912 ... on a tower
- F05B 2240/9121 .... on a lattice tower
- F05B 2240/913 ... on a mast
- F05B 2240/914 ... on an inflatable structure
- F05B 2240/915 ... which is vertically adjustable
- F05B 2240/9151 .... telescopically
- F05B 2240/9152 .... by being hinged
- F05B 2240/91521 ..... at ground level
- F05B 2240/916 ... with provision for hoisting onto the structure
- F05B 2240/917 ... attached to cables
- F05B 2240/92 .. on an airborne structure
- F05B 2240/921 ... kept aloft due to aerodynamic effects
- F05B 2240/922 ... kept aloft due to buoyancy effects
- F05B 2240/923 ... which is a vehicle
- F05B 2240/93 .. on a structure floating on a liquid surface
- F05B 2240/931 ... which is a vehicle
- F05B 2240/932 ... which is a catamaran-like structure
- F05B 2240/94 .. on a movable wheeled structure
- F05B 2240/941 ... which is a land vehicle
- F05B 2240/95 .. offshore
- F05B 2240/96 .. as part of a wind farm
- F05B 2240/97 .. on a submerged structure
- F05B 2240/98 .. which is inflatable
- F05B 2240/99 . characterised by colour or colour patterns

**F05B 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.

- F05B 2250/02 . variable
- F05B 2250/10 . two-dimensional
- F05B 2250/11 .. triangular

F05B 2250/12	..	rectangular
F05B 2250/121	...	square
F05B 2250/13	..	trapezial
F05B 2250/131	...	polygonal
F05B 2250/132	...	hexagonal
F05B 2250/14	..	elliptical
F05B 2250/141	...	circular
F05B 2250/15	..	spiral
F05B 2250/16	..	parabolic
F05B 2250/17	..	hyperbolic
F05B 2250/18	..	patterned
F05B 2250/181	...	ridged
F05B 2250/182	...	crenellated, notched
F05B 2250/183	...	zigzag
F05B 2250/184	...	sinusoidal
F05B 2250/19	..	machined; miscellaneous
F05B 2250/191	...	perforated
F05B 2250/192	...	beveled
F05B 2250/193	...	milled
F05B 2250/20	.	three-dimensional
F05B 2250/21	..	pyramidal
F05B 2250/22	..	parallelepipedic
F05B 2250/221	...	cubic
F05B 2250/23	..	prismatic
F05B 2250/231	...	cylindrical
F05B 2250/232	...	conical
F05B 2250/24	..	ellipsoidal
F05B 2250/241	...	spherical
F05B 2250/25	..	helical
F05B 2250/26	..	paraboloidal
F05B 2250/27	..	hyperboloidal
F05B 2250/28	..	patterned
F05B 2250/281	...	threaded
F05B 2250/282	...	Cubic pattern
F05B 2250/283	...	Honeycomb
F05B 2250/29	..	machined; miscellaneous
F05B 2250/291	...	hollowed
F05B 2250/292	...	tapered
F05B 2250/293	...	lathed, e.g. rotation symmetrical
F05B 2250/30	.	Arrangement of components



F05B 2250/31	..	according to the direction of their main axis or their axis of rotation
F05B 2250/311	...	the axes being in line
F05B 2250/312	...	the axes being parallel to each other
F05B 2250/313	...	the axes being perpendicular to each other
F05B 2250/314	...	the axes being inclined in relation to each other
F05B 2250/315	...	the main axis being substantially vertical
F05B 2250/32	..	according to their shape
F05B 2250/321	...	asymptotic
F05B 2250/322	...	tangential
F05B 2250/323	...	convergent
F05B 2250/324	...	divergent
F05B 2250/33	..	symmetrical
F05B 2250/34	..	translated
F05B 2250/35	..	rotated
F05B 2250/36	..	in inner-outer relationship, e.g. shaft-bearing arrangements
F05B 2250/40	.	Movement of component
F05B 2250/41	..	with one degree of freedom
F05B 2250/411	...	in rotation
F05B 2250/42	..	with two degrees of freedom
F05B 2250/43	..	with three degrees of freedom
F05B 2250/50	.	Inlet or outlet
F05B 2250/501	..	Inlet
F05B 2250/5011	...	augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
F05B 2250/5012	...	concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
F05B 2250/502	..	Outlet
F05B 2250/503	..	of regenerative pumps
F05B 2250/60	.	Structure; Surface texture
F05B 2250/61	..	corrugated
F05B 2250/611	...	undulated
F05B 2250/62	..	smooth
F05B 2250/621	...	polished
F05B 2250/70	.	Shape
F05B 2250/71	..	curved
F05B 2250/711	...	convex
F05B 2250/712	...	concave
F05B 2250/713	...	inflexed
F05B 2250/72	..	symmetric
F05B 2250/73	..	asymmetric

F05B 2250/80	. Size or power range of the machines
F05B 2250/82	.. Micromachines
F05B 2250/84	.. Nanomachines ( <a href="#">Nanotechnology for interacting, sensing or actuating B82Y 15/00</a> )
F05B 2250/86	.. Megamachines
<b>F05B 2260/00</b>	<b>Function</b>
F05B 2260/02	. Transport, e.g. specific adaptations or devices for conveyance ( <a href="#">transport of wind turbines or equipments therefore F03D 1/005</a> )
F05B 2260/10	. Particular cycles
F05B 2260/20	. Heat transfer, e.g. cooling
F05B 2260/201	.. by impingement of a fluid
F05B 2260/202	.. by film cooling
F05B 2260/203	.. by transpiration cooling
F05B 2260/205	.. Cooling fluid recirculation, i.e. after having cooled one or more components the cooling fluid is recovered and used elsewhere for other purposes
F05B 2260/207	.. using a phase changing mass, (e.g. heat absorbing by melting or boiling)
F05B 2260/208	.. using heat pipes
F05B 2260/209	.. using vortex tubes
F05B 2260/211	.. by intercooling, e.g. during a compression cycle
F05B 2260/212	... by water injection
F05B 2260/221	.. Improvement of heat transfer
F05B 2260/222	... by creating turbulence ( <a href="#">vortex generators, turbulators or the like for mixing F05B 2240/122</a> )
F05B 2260/224	... by increasing the heat transfer surface
F05B 2260/2241	.... using fins or ribs
F05B 2260/231	.. Preventing heat transfer
F05B 2260/232	.. characterised by the cooling medium
F05B 2260/233	... the medium being steam
F05B 2260/24	.. for draft enhancement in chimneys, using solar or other heat sources
F05B 2260/30	. Retaining components in desired mutual position
F05B 2260/301	.. Retaining bolts or nuts
F05B 2260/3011	... of the frangible or shear type
F05B 2260/302	.. by means of magnetic or electromagnetic forces
F05B 2260/303	.. with a bayonet coupling
F05B 2260/304	.. Balancing of radial or axial forces on regenerative rotors
F05B 2260/305	.. Reducing friction between regenerative impeller discs and casing walls
F05B 2260/40	. Transmission of power
F05B 2260/402	.. through friction drives
F05B 2260/4021	... through belt drives
F05B 2260/4022	... through endless chains
F05B 2260/4023	... through a friction clutch

- F05B 2260/403      ..      through the shape of the drive components
- F05B 2260/4031      ...      as in toothed gearing
- F05B 2260/40311      ....      of the epicyclic, planetary or differential type
- F05B 2260/404      ..      through magnetic drive coupling
- F05B 2260/4041      ...      the driven magnets encircling the driver magnets
- F05B 2260/406      ..      through hydraulic systems
- F05B 2260/407      ..      through piezoelectric conversion
- F05B 2260/408      ..      through magnetohydrodynamic conversion
- F05B 2260/42      .      Storage of energy
- F05B 2260/421      ..      in the form of rotational kinetic energy , e.g. in flywheels
- F05B 2260/50      .      Kinematic linkage, i.e. transmission of position
- F05B 2260/502      ..      involving springs
- F05B 2260/503      ..      using gears
- F05B 2260/5032      ...      of the bevel or angled type
- F05B 2260/504      ..      using flat or V-belts and pulleys
- F05B 2260/505      ..      using chains and sprockets; using toothed belts
- F05B 2260/506      ..      using cams or eccentrics
- F05B 2260/507      ..      using servos, independent actuators, etc.
- F05B 2260/60      .      Fluid transfer
- F05B 2260/601      ..      using an ejector or a jet pump
- F05B 2260/602      ..      Drainage
- F05B 2260/603      ...      of leakage having past a seal ([seals F05B 2240/57](#); [glands F05B 2240/63](#))
- F05B 2260/604      ..      Vortex non-clogging type pumps
- F05B 2260/63      ..      Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
- F05B 2260/64      ..      Aeration, ventilation, dehumidification or moisture removal of closed spaces
- F05B 2260/70      .      Adjusting of angle of incidence or attack of rotating blades
- F05B 2260/71      ..      as a function of flow velocity
- F05B 2260/72      ..      by turning around an axis parallel to the rotor centre line
- F05B 2260/74      ..      by turning around an axis perpendicular the rotor centre line
- F05B 2260/75      ..      the adjusting mechanism not using auxiliary power sources ("servos")
- F05B 2260/76      ..      the adjusting mechanism using auxiliary power sources
- F05B 2260/77      ..      the adjusting mechanism driven or triggered by centrifugal forces
- F05B 2260/78      ..      the adjusting mechanism driven or triggered by aerodynamic forces
- F05B 2260/79      ..      Bearing, support or actuation arrangements therefor
- F05B 2260/80      .      Diagnostics
- F05B 2260/82      .      Forecasts
- F05B 2260/821      ..      Parameter estimation or prediction
- F05B 2260/8211      ...      of the weather
- F05B 2260/83      .      Testing, e.g. methods, components or tools therefor
- F05B 2260/84      .      Modeling or simulation

F05B 2260/845	. Redundancy
F05B 2260/85	. Starting
F05B 2260/90	. Braking
F05B 2260/901	.. using aerodynamic forces, i.e. lift or drag
F05B 2260/9011	... of the tips of rotor blades
F05B 2260/902	.. using frictional mechanical forces
F05B 2260/903	.. using electrical or magnetic forces
F05B 2260/904	.. using hydrodynamic forces
F05B 2260/95	. Preventing corrosion ( <a href="#">coating or surface treatment F05B 2230/90</a> )
F05B 2260/96	. Preventing, counteracting or reducing vibration or noise
F05B 2260/962	.. my means creating "anti-noise"
F05B 2260/964	.. by damping means
F05B 2260/966	.. by correcting static or dynamic imbalance
F05B 2260/97	. Reducing windage losses
F05B 2260/972	.. in radial flow machines
F05B 2260/98	. Lubrication
F05B 2260/99	. Radar absorption
<b>F05B 2270/00</b>	<b>Control</b>
F05B 2270/10	. Purpose of the control system
F05B 2270/101	.. to control rotational speed (n)
F05B 2270/1011	... to prevent overspeed
F05B 2270/1012	... to prevent underspeed
F05B 2270/1013	... of different spools or shafts
F05B 2270/1014	... to keep rotational speed constant
F05B 2270/1016	.. in variable speed operation
F05B 2270/102	.. to control acceleration (u)
F05B 2270/1021	... by keeping it below damagingly high values
F05B 2270/1022	... by making it as high as possible
F05B 2270/103	.. to affect the output of the engine
F05B 2270/1031	... Thrust
F05B 2270/1032	... Torque
F05B 2270/1033	... Power (if explicitly mentioned)
F05B 2270/104	.. to match engine to driven device
F05B 2270/1041	... in particular the electrical frequency of driven generator
F05B 2270/105	.. to improve fuel economy
F05B 2270/1051	... in particular at idling speed
F05B 2270/106	.. to produce clean exhaust gases
F05B 2270/1061	... with as little smoke as possible
F05B 2270/1062	... with as little NOx's as possible

F05B 2270/1063	...	by monitoring combustion conditions
F05B 2270/1064	....	indirectly, at the exhaust
F05B 2270/107	..	to cope with emergencies
F05B 2270/1071	...	in particular sudden load loss
F05B 2270/10711	....	applying a low voltage ride through method
F05B 2270/1072	...	in particular blow-out and relight
F05B 2270/1073	...	of one engine in a multi-engine system
F05B 2270/1074	...	by using back-up controls
F05B 2270/1075	...	by temporary overriding set control limits
F05B 2270/1076	...	caused by water or hail ingestion
F05B 2270/108	..	to cope with, or avoid, compressor flow instabilities
F05B 2270/1081	...	Compressor surge or stall
F05B 2270/10812	....	caused by working fluid flow velocity profile distortion
F05B 2270/10815	.....	due to high angle of attack of aircraft
F05B 2270/10817	.....	due to compressor degradation
F05B 2270/109	..	to prolong engine life
F05B 2270/1091	...	by limiting temperatures
F05B 2270/1095	...	by limiting mechanical stresses
F05B 2270/1097	...	by preventing reverse rotation
F05B 2270/11	..	to maintain desired vehicle trajectory parameters
F05B 2270/1101	...	Altitude
F05B 2270/1102	...	Speed or Mach number
F05B 2270/111	..	to control two or more engines simultaneously
F05B 2270/15	..	to control thermoacoustic behaviour in the combustion chambers ( <a href="#">counteracting noise or vibration F05B 2260/96</a> )
F05B 2270/16	..	to control water or steam injection
F05B 2270/17	..	to avoid excessive deflection of the blades
F05B 2270/18	..	to control buoyancy
F05B 2270/19	..	to avoid stroboscopic flicker shadow on surroundings
F05B 2270/20	..	to optimise the performance of a machine
F05B 2270/30	.	Control parameters, e.g. input parameters
F05B 2270/301	..	Pressure
F05B 2270/3011	...	Inlet
F05B 2270/3013	...	Outlet
F05B 2270/3015	...	differential
F05B 2270/303	..	Temperature
F05B 2270/3032	...	excessive temperatures, e.g. caused by overheating
F05B 2270/304	..	Spool rotational speed
F05B 2270/305	..	Tolerances
F05B 2270/309	..	Rate of change of parameters

F05B 2270/31	..	Fuel schedule for stage combustors
F05B 2270/32	..	Wind speeds
F05B 2270/3201	...	"cut-off" or "shut-down" wind speed
F05B 2270/321	..	Wind directions
F05B 2270/322	..	the detection or prediction of a wind gust
F05B 2270/323	..	Air humidity
F05B 2270/324	..	Air pressure
F05B 2270/325	..	Air temperature
F05B 2270/326	..	Rotor angle
F05B 2270/327	..	Rotor or generator speeds
F05B 2270/328	..	Blade pitch angle
F05B 2270/329	..	Azimuth or yaw angle
F05B 2270/33	..	Proximity of blade to tower
F05B 2270/331	..	Mechanical loads
F05B 2270/332	..	Maximum loads or fatigue criteria
F05B 2270/333	..	Noise or sound levels
F05B 2270/334	..	Vibration measurements
F05B 2270/335	..	Output power or torque
F05B 2270/336	..	Blade lift measurements
F05B 2270/337	..	Electrical grid status parameters, e.g. voltage, frequency or power demand
F05B 2270/40	.	Type of control system
F05B 2270/402	..	passive or reactive, e.g. using large wind vanes
F05B 2270/404	..	active, predictive, or anticipative
F05B 2270/50	.	Control logic embodiment by
F05B 2270/502	..	electrical means, e.g. relays or switches
F05B 2270/504	..	electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit
F05B 2270/506	..	hydraulic means, e.g. hydraulic valves within a hydraulic circuit
F05B 2270/508	..	mechanical means, e.g. levers, gears or cams
F05B 2270/60	.	Control system actuates through
F05B 2270/602	..	electrical actuators
F05B 2270/604	..	hydraulic actuators
F05B 2270/605	..	Pneumatic actuators
F05B 2270/606	..	mechanical actuators ( <a href="#">F05B 2270/602</a> takes precedence)
F05B 2270/70	.	Type of control algorithm
F05B 2270/701	..	proportional
F05B 2270/702	..	differential
F05B 2270/703	..	integral
F05B 2270/704	..	proportional-differential
F05B 2270/705	..	proportional-integral

- F05B 2270/706 .. proportional-integral-differential
- F05B 2270/707 .. fuzzy logic
- F05B 2270/708 .. with comparison tables
- F05B 2270/709 .. with neural networks
- F05B 2270/80 . Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
- F05B 2270/802 .. Calibration thereof
- F05B 2270/803 .. Sampling thereof
- F05B 2270/804 .. Optical devices
- F05B 2270/8041 ... Cameras
- F05B 2270/8042 ... Lidar systems
- F05B 2270/805 .. Radars
- F05B 2270/806 .. Sonars
- F05B 2270/807 .. Accelerometers
- F05B 2270/808 .. Strain gauges; Load cells
- F05B 2270/809 .. Encoders
- F05B 2270/81 .. Microphones
- F05B 2270/821 .. Displacement measuring means, e.g. inductive

#### **F05B 2280/00      Materials; Properties thereof**

- F05B 2280/10 . Inorganic materials, e.g. metals
- F05B 2280/101 .. Iron
- F05B 2280/1011 .. Cast iron
- F05B 2280/102 .. Light metals
- F05B 2280/1021 ... Aluminium
- F05B 2280/1022 ... Beryllium
- F05B 2280/1023 ... Boron
- F05B 2280/1024 ... Lithium
- F05B 2280/1025 ... Magnesium
- F05B 2280/103 .. Heavy metals
- F05B 2280/10301 ... Refractory metals, e.g. V, W
- F05B 2280/10302 ... Chromium
- F05B 2280/10303 ... Molybdenum
- F05B 2280/10304 ... Titanium
- F05B 2280/10305 ... Zirconium
- F05B 2280/10306 ... Hafnium
- F05B 2280/10307 ... Manganese
- F05B 2280/10308 ... Lead
- F05B 2280/10309 ... Tin
- F05B 2280/1031 ... Zinc
- F05B 2280/10311 ... Mercury

F05B 2280/104	..	Noble metals
F05B 2280/1041	...	Silver
F05B 2280/1042	...	Gold
F05B 2280/1043	...	Platinum group, e.g. Pt, Ir
F05B 2280/1044	...	Palladium
F05B 2280/1045	...	Ruthenium
F05B 2280/1046	...	Osmium
F05B 2280/1047	...	Iridium
F05B 2280/1048	...	Rhodium
F05B 2280/105	..	Copper
F05B 2280/106	..	Rare earth metals, e.g. Sc, Y
F05B 2280/107	..	Alloys
F05B 2280/1071	...	Steel alloys
F05B 2280/1072	..	Copper alloys
F05B 2280/10721	...	Bronze
F05B 2280/10722	...	Phosphor-bronze alloy
F05B 2280/10723	...	Nickel-Copper alloy, e.g. monel
F05B 2280/1073	..	Aluminium alloy, e.g. AlCuMgPb
F05B 2280/1074	..	Alloys not otherwise provided for
F05B 2280/10741	...	Superalloys
F05B 2280/10742	...	Heat stable alloys
F05B 2280/10743	...	Ni - Si alloys
F05B 2280/10744	...	Metal-aluminide intermetallic compounds
F05B 2280/20	.	Inorganic materials, e.g. non-metallic materials
F05B 2280/2001	..	Glass
F05B 2280/20011	...	MIBA
F05B 2280/20012	...	Quartz
F05B 2280/2002	..	Phosphor
F05B 2280/2003	..	Silicon
F05B 2280/2004	..	Ceramics; Oxides
F05B 2280/20041	...	Aluminium oxides
F05B 2280/20042	...	Zinc oxides
F05B 2280/20043	...	Zirconium oxides
F05B 2280/2005	..	Non-oxide ceramics
F05B 2280/2006	..	Carbon, e.g. graphite
F05B 2280/2007	..	Carbides
F05B 2280/20071	...	of silicon
F05B 2280/20072	...	of titanium, e.g. TiB
F05B 2280/20073	...	of wolfram, e.g. tungsten carbide
F05B 2280/2008	..	Nitrides



F05B 2280/20081	...	of aluminium
F05B 2280/20082	...	of boron
F05B 2280/20083	...	of silicon
F05B 2280/20084	...	of titanium
F05B 2280/20085	...	of zirconium
F05B 2280/2009	..	Sulfides
F05B 2280/20091	...	of molybdenum
F05B 2280/201	..	Sapphire
F05B 2280/2011	..	Aluminium titanate
F05B 2280/2013	..	Silica
F05B 2280/2014	..	Arsenic
F05B 2280/2015	..	Antimony
F05B 2280/2016	..	Bismuth
F05B 2280/2017	..	Barium
F05B 2280/30	.	Inorganic materials not otherwise provided for
F05B 2280/40	.	Organic materials
F05B 2280/4001	..	Leather
F05B 2280/4002	..	Cellulosic materials, e.g. wood
F05B 2280/4003	..	Synthetic polymers, e.g. plastics; Rubber
F05B 2280/4004	..	Rubber
F05B 2280/4005	..	PTFE [PolyTetraFluorEthylene]
F05B 2280/4006	..	Polyamides, e.g. NYLON
F05B 2280/4007	..	Thermoplastics
F05B 2280/4008	..	Polyamides, e.g. Aurum
F05B 2280/4009	..	Polyetherketones, e.g. PEEK
F05B 2280/401	..	Silicon polymers
F05B 2280/4011	..	Organic materials not otherwise provided for
F05B 2280/50	.	Intrinsic material properties or characteristics
F05B 2280/5001	..	Elasticity
F05B 2280/5002	..	Thermal properties
F05B 2280/5003	..	Expansivity
F05B 2280/50031	...	similar
F05B 2280/50032	...	dissimilar
F05B 2280/5004	..	Heat transfer
F05B 2280/5005	..	Reflective properties
F05B 2280/5006	..	Shape memory
F05B 2280/5007	..	Hardness
F05B 2280/5008	..	Magnetic properties
F05B 2280/5009	..	non-magnetic
F05B 2280/501	..	Self lubricating materials; Solid lubricants

F05B 2280/5011	..	Surface roughness
F05B 2280/60	.	Properties or characteristics given to material by treatment or manufacturing
F05B 2280/6001	..	Fabrics
F05B 2280/6002	...	Woven fabrics
F05B 2280/6003	..	Composites; e.g. fibre-reinforced
F05B 2280/6004	..	amorphous
F05B 2280/6005	..	crystalline
F05B 2280/6006	..	Directionally-solidified crystalline structures
F05B 2280/6007	..	monocrystalline
F05B 2280/6008	..	Structures
F05B 2280/6009	..	Grain size
F05B 2280/601	..	Syntactic
F05B 2280/6011	..	Coating
F05B 2280/6012	..	Foam
F05B 2280/6013	..	Fibres
F05B 2280/6014	..	Filler
F05B 2280/6015	..	Resin
F05B 2280/70	.	Treatments or modification of materials
F05B 2280/701	..	Heat treatments
F05B 2280/702	..	Reinforcements