

**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 ([F05B 2240/312 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 ([coating or surface treatment F05B 2230/90](#))
- 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

**F05B 2270/00****Control**

- 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 (counteracting noise or vibration <a href="#">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