

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.

Guidance heading:**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

Guidance heading:

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 . . trapezoidal
- 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 (Nanotechnology for interacting, sensing or actuating Y01N 8/00) |
| F05B 2250/86 | .. | Megamachines |
| F05B 2260/00 | Function | |
| F05B 2260/02 | . | Transport, e.g. specific adaptations or devices for conveyance (transport of wind turbines or equipments therefore F03D 1/005) |
| 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 ([vortex generators, turbulators or the like for mixing F05B 2240/122](#))
- 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

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| 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 F05B 2260/96) |
| 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 |

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| 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 (F05B 2270/602 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

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| 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 |

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|-----------------|-----|---|
| 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