

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

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

F05D 2210/00**Working fluids**

F05D 2210/10	. Kind or type
F05D 2210/11	.. liquid, i.e. incompressible
F05D 2210/12	.. gaseous, i.e. compressible
F05D 2210/13	.. mixed, e.g. two-phase fluid
F05D 2210/132	... Pumps with means for separating and evacuating the gaseous phase
F05D 2210/14	.. Refrigerants with particular properties, e.g. HFC
F05D 2210/20	. Properties
F05D 2210/30	. Flow characteristics
F05D 2210/31	.. with Mach-number kept constant along the flow
F05D 2210/32	.. Pressure kept constant along the flow
F05D 2210/33	.. Turbulent flow
F05D 2210/34	.. Laminar flow
F05D 2210/40	. Flow geometry or direction
F05D 2210/41	.. upwards due to the buoyancy of compressed air
F05D 2210/42	.. Axial inlet and radial outlet
F05D 2210/43	.. Radial inlet and axial outlet
F05D 2210/44	.. bidirectional, i.e. in opposite, alternating directions
F05D 2220/00	Application
F05D 2220/10	. in ram-jet engines or ram-jet driven vehicles
F05D 2220/20	. within closed fluid conduits, e.g. pipes
F05D 2220/30	. in turbines
F05D 2220/31	.. in steam turbines
F05D 2220/32	.. in gas turbines
F05D 2220/321	... for a special turbine stage
F05D 2220/3212	.... the first stage of a turbine
F05D 2220/3213	.... an intermediate stage of the turbine
F05D 2220/3215	.... the last stage of the turbine
F05D 2220/3216	.... for a special compressor stage
F05D 2220/3217	..... for the first stage of a compressor or a low pressure compressor
F05D 2220/3218	..... for an intermediate stage of a compressor
F05D 2220/3219	..... for the last stage of a compressor or a high pressure compressor
F05D 2220/323	... for aircraft propulsion, e.g. jet engines
F05D 2220/324	... to drive unshrouded, low solidity propeller
F05D 2220/325	... to drive unshrouded, high solidity propeller
F05D 2220/326	... to drive shrouded, low solidity propeller

F05D 2220/327	...	to drive shrouded, high solidity propeller
F05D 2220/328	...	providing direct vertical lift
F05D 2220/329	...	in helicopters
F05D 2220/34	..	in ram-air turbines ("RATS")
F05D 2220/36	..	specially adapted for the fan of turbofan engines
F05D 2220/40	.	in turbochargers
F05D 2220/50	.	for auxiliary power units (APU's)
F05D 2220/60	.	making use of surplus or waste energy
F05D 2220/62	..	with energy recovery turbines
F05D 2220/64	..	for domestic central heating or production of electricity
F05D 2220/70	.	in combination with
F05D 2220/72	..	a steam turbine
F05D 2220/722	...	as part of an integrated gasification combined cycle
F05D 2220/74	..	a gas turbine
F05D 2220/75	..	equipment using fuel having a low calorific value, e.g. low BTU fuel, waste end, syngas, biomass fuel or flare gas
F05D 2220/76	..	an electrical generator
F05D 2220/762	...	of the direct current (D.C.) type
F05D 2220/764	...	of the alternating current (A.C.) type
F05D 2220/7642	....	of the synchronous type
F05D 2220/7644	....	of the asynchronous type, i.e. induction type
F05D 2220/7646	.....	Double fed induction generators (DFIGs)
F05D 2220/766	...	via a direct connection, i.e. a gearless transmission
F05D 2220/768	...	equipped with permanent magnets
F05D 2220/77	...	of the linear type
F05D 2220/80	.	in supersonic vehicles excluding hypersonic vehicles or ram, scram or rocket propulsion
F05D 2220/90	.	in vehicles adapted for vertical or short take off and landing (v/stol vehicles)
F05D 2230/00	Manufacture	
F05D 2230/10	.	by removing material
F05D 2230/11	..	by electrochemical methods
F05D 2230/12	..	by spark erosion methods
F05D 2230/13	..	using lasers
F05D 2230/14	..	Micromachining
F05D 2230/18	..	Manufacturing tolerances

F05D 2230/20	. essentially without removing material
F05D 2230/21	.. by casting
F05D 2230/211	... by precision casting, e.g. microfusing or investment casting
F05D 2230/22	.. by sintering
F05D 2230/23	.. by permanently joining parts together
F05D 2230/232	... by welding
F05D 2230/233	.... Electron beam welding
F05D 2230/234	.... Laser welding
F05D 2230/235	.... TIG or MIG welding
F05D 2230/236	.... Diffusion bonding
F05D 2230/237	.... Brazing
F05D 2230/238	.... Soldering
F05D 2230/239	.... Inertia or friction welding
F05D 2230/24	.. by extrusion
F05D 2230/25	.. by forging
F05D 2230/26	.. by rolling
F05D 2230/30	. with deposition of material
F05D 2230/31	.. Layer deposition
F05D 2230/311	... by torch or flame spraying
F05D 2230/312	... by plasma spraying
F05D 2230/313	... by physical vapour deposition
F05D 2230/314	... by chemical vapour deposition
F05D 2230/40	. Heat treatment
F05D 2230/41	.. Hardening; Annealing
F05D 2230/411	... Precipitation hardening
F05D 2230/42	.. by hot isostatic pressing
F05D 2230/50	. Building or constructing in particular ways
F05D 2230/51	.. in a modular way, e.g. using several identical or complementary parts or features
F05D 2230/52	.. using existing or "off the shelf" parts, e.g. using standardized turbocharger elements
F05D 2230/53	.. by integrally manufacturing a component, e.g. by milling from a billet or one piece construction
F05D 2230/54	.. by sheet metal manufacturing
F05D 2230/60	. Assembly methods
F05D 2230/61	.. using limited numbers of standard modules which can be adapted by machining
F05D 2230/64	.. using positioning or alignment devices for aligning or centring, e.g. pins
F05D 2230/642	... using maintaining alignment while permitting differential dilatation

- F05D 2230/644 . . . for adjusting the position or the alignment, e.g. wedges or eccenters
- F05D 2230/68 . . using auxiliary equipment for lifting or holding
- F05D 2230/70 . Disassembly methods
- F05D 2230/72 . Maintenance
- F05D 2230/80 . Repairing, retrofitting or upgrading methods
- F05D 2230/90 . Coating; Surface treatment ([manufacture with deposition of material F05D 2230/30](#))

F05D 2240/00 Components

NOTE

Components are the basic elements of construction

- F05D 2240/10 . Stators
- F05D 2240/11 . . Shroud seal segments
- F05D 2240/12 . . Fluid guiding means, e.g. vanes
 - F05D 2240/121 . . . related to the leading edge of a stator vane
 - F05D 2240/122 . . . related to the trailing edge of a stator vane
 - F05D 2240/123 . . . related to the pressure side of a stator vane
 - F05D 2240/124 . . . related to the suction side of a stator vane
 - F05D 2240/125 . . . related to the tip of a stator vane
 - F05D 2240/126 . . . Baffles or ribs
 - F05D 2240/127 . . . Vortex generators, turbulators, or the like, for mixing ([by creating turbulence F05D 2260/2212](#))
- F05D 2240/128 . . . Nozzles
- F05D 2240/1281 Plug nozzles
- F05D 2240/129 . . . Cascades, i.e. assemblies of similar profiles acting in parallel
- F05D 2240/14 . . Casings or housings protecting or supporting assemblies within
- F05D 2240/15 . . Heat shield
- F05D 2240/20 . Rotors
 - F05D 2240/24 . . for turbines
 - F05D 2240/241 . . . of impulse type
 - F05D 2240/242 . . . of reaction type
 - F05D 2240/243 . . . of the Archimedes screw type
 - F05D 2240/30 . . Characteristics of rotor blades, i.e. of any element transforming dynamic fluid energy to or from rotational energy and being attached to a rotor
 - F05D 2240/301 . . . Cross-sectional characteristics
 - F05D 2240/302 . . . characteristics related to shock waves, transonic or supersonic flow

F05D 2240/303	...	related to the leading edge of a rotor blade
F05D 2240/304	...	related to the trailing edge of a rotor blade
F05D 2240/305	...	related to the pressure side of a rotor blade
F05D 2240/306	...	related to the suction side of a rotor blade
F05D 2240/307	...	related to the tip of a rotor blade
F05D 2240/31	...	with roughened surfaces
F05D 2240/35	.	Combustors or associated equipment
F05D 2240/36	..	Fuel vaporizer
F05D 2240/40	.	Use of a multiplicity of similar components
F05D 2240/50	.	Bearings
F05D 2240/51	..	Magnetic
F05D 2240/511	...	with permanent magnets
F05D 2240/515	...	Electromagnetic
F05D 2240/52	..	Axial thrust bearings
F05D 2240/53	..	Hydrodynamic or hydrostatic bearings
F05D 2240/54	..	Radial bearings
F05D 2240/55	.	Seals
F05D 2240/56	..	Brush seals
F05D 2240/57	..	Leaf seals
F05D 2240/58	..	Piston ring seals
F05D 2240/581	...	Double or plural piston ring arrangements, i.e. two or more piston rings
F05D 2240/59	..	Lamellar seals
F05D 2240/60	.	Shafts
F05D 2240/61	..	Hollow
F05D 2240/62	..	Flexible
F05D 2240/63	..	Glands for admission or removal of fluids from shafts
F05D 2240/70	.	Slinger plates or washers
F05D 2240/80	.	Platforms for stationary or moving blades
F05D 2240/81	..	Cooled platforms
F05D 2240/90	.	Mounting on supporting structures or systems
F05D 2240/91	..	on a stationary structure
F05D 2250/00	Geometry	

NOTE

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

F05D 2250/10	. Two-dimensional
F05D 2250/11	.. triangular
F05D 2250/12	.. rectangular
F05D 2250/121	... square
F05D 2250/13	.. trapezoidal
F05D 2250/131	... polygonal
F05D 2250/132	... hexagonal
F05D 2250/14	.. elliptical
F05D 2250/141	... circular
F05D 2250/15	.. spiral
F05D 2250/16	.. parabolic
F05D 2250/17	.. hyperbolic
F05D 2250/18	.. patterned
F05D 2250/181	... ridged
F05D 2250/182	... crenellated, notched
F05D 2250/183	... zigzag
F05D 2250/184	... sinusoidal
F05D 2250/185	... serpentine-like
F05D 2250/19	.. machined; miscellaneous
F05D 2250/191	... perforated
F05D 2250/192	... bevelled
F05D 2250/193	... milled
F05D 2250/20	. Three-dimensional
F05D 2250/21	.. pyramidal
F05D 2250/22	.. parallelepipedal
F05D 2250/221	... cubic
F05D 2250/23	.. prismatic
F05D 2250/231	... cylindrical
F05D 2250/232	... conical
F05D 2250/24	.. ellipsoidal
F05D 2250/241	... spherical
F05D 2250/25	.. helical
F05D 2250/26	.. paraboloid
F05D 2250/27	.. hyperboloid
F05D 2250/28	.. patterned
F05D 2250/281	... threaded

F05D 2250/282	...	cubic pattern
F05D 2250/283	...	honeycomb
F05D 2250/29	..	machined; miscellaneous
F05D 2250/291	...	hollowed
F05D 2250/292	...	tapered
F05D 2250/293	...	lathed, e.g. rotation symmetrical
F05D 2250/294	...	grooved
F05D 2250/30	.	Arrangement of components
F05D 2250/31	..	according to the direction of their main axis or their axis of rotation
F05D 2250/311	...	the axes being in line
F05D 2250/312	...	the axes being parallel to each other
F05D 2250/313	...	the axes being perpendicular to each other
F05D 2250/314	...	the axes being inclined in relation to each other
F05D 2250/315	...	the main axis being substantially vertical
F05D 2250/32	..	according to their shape
F05D 2250/321	...	asymptotic
F05D 2250/322	...	tangential
F05D 2250/323	...	convergent
F05D 2250/324	...	divergent
F05D 2250/33	..	symmetrical
F05D 2250/34	..	translated
F05D 2250/35	..	rotated
F05D 2250/36	..	in inner-outer relationship, e.g. shaft-bearing arrangements
F05D 2250/37	..	circumferential
F05D 2250/38	..	angled, e.g. sweep angle
F05D 2250/40	.	Movement of components
F05D 2250/41	..	with one degree of freedom
F05D 2250/411	...	in rotation
F05D 2250/42	..	with two degrees of freedom
F05D 2250/43	..	with three degrees of freedom
F05D 2250/44	..	by counter rotation
F05D 2250/50	.	Inlet or outlet
F05D 2250/51	..	Inlet
F05D 2250/511	...	augmenting, i.e. with intercepting fluid flow cross sectional area greater than the rest of the machine behind the inlet
F05D 2250/512	...	concentrating only, i.e. with intercepting fluid flow cross sectional area not greater than the rest of the machine behind the inlet
F05D 2250/52	..	Outlet
F05D 2250/53	..	of regenerative pumps

F05D 2250/60	. Structure; Surface texture
F05D 2250/61	.. corrugated
F05D 2250/611	... undulated
F05D 2250/62	.. smooth or fine
F05D 2250/621	... polished
F05D 2250/63	.. coarse
F05D 2250/70	. Shape
F05D 2250/71	.. curved
F05D 2250/711	... convex
F05D 2250/712	... concave
F05D 2250/713	... inflexed
F05D 2250/72	.. symmetric
F05D 2250/73	.. asymmetric
F05D 2250/74	.. given by a set or table of xyz-coordinates
F05D 2250/75	.. given by its similarity to a letter, e.g. T-shaped
F05D 2250/80	. Size or power range of the machines
F05D 2250/82	.. Micromachines
F05D 2250/84	.. Nanomachines
F05D 2250/90	. Variable geometry
F05D 2260/00	Function
F05D 2260/02	. Transport and handling during maintenance and repair
F05D 2260/10	. Particular cycles
F05D 2260/12	. Testing on a test bench
F05D 2260/14	. Preswirling
F05D 2260/15	. Load balancing
F05D 2260/16	. Fluid modulation at a certain frequency
F05D 2260/20	. Heat transfer, e.g. cooling
F05D 2260/201	.. by impingement of a fluid
F05D 2260/202	.. by film cooling
F05D 2260/203	.. by transpiration cooling
F05D 2260/204	.. by the use of microcircuits

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

- F05D 2260/404 . . through magnetic drive coupling
- F05D 2260/4041 . . . the driven magnets encircling the driver magnets
- F05D 2260/406 . . through hydraulic systems
- F05D 2260/407 . . through piezoelectric conversion
- F05D 2260/408 . . through magnetohydrodynamic conversion

- F05D 2260/42 . Storage of energy
- F05D 2260/43 . . in the form of rotational kinetic energy, e.g. in flywheels

- F05D 2260/50 . Kinematic linkage, i.e. transmission of position
- F05D 2260/52 . . involving springs
- F05D 2260/53 . . using gears
- F05D 2260/532 . . . of the bevelled or angled type
- F05D 2260/54 . . using flat or V-belts and pulleys
- F05D 2260/55 . . using chains and sprockets; using toothed belts
- F05D 2260/56 . . using cams or eccentrics
- F05D 2260/57 . . using servos, independent actuators, etc.

- F05D 2260/60 . Fluid transfer
- F05D 2260/601 . . using an ejector or a jet pump
- F05D 2260/602 . . Drainage
- F05D 2260/6022 . . . of leakage having past a seal ([seals F05D 2240/57](#); [glands F05D 2240/63](#))
- F05D 2260/604 . . Vortex non-clogging type pumps
- F05D 2260/605 . . Venting into the ambient atmosphere or the like
- F05D 2260/606 . . Bypassing the fluid
- F05D 2260/607 . . Preventing clogging or obstruction of flow paths by dirt, dust, or foreign particles
- F05D 2260/608 . . Aeration, ventilation, dehumidification or moisture removal of closed spaces
- F05D 2260/609 . . Deoiling or demisting
- F05D 2260/61 . . Removal of CO₂([removal of CO₂ from waste gases B01D 53/62](#))
- F05D 2260/611 . . Sequestration of CO₂

- F05D 2260/70 . Adjusting of angle of incidence or attack of rotating blades
- F05D 2260/71 . . as a function of flow velocity
- F05D 2260/72 . . by turning around an axis parallel to the rotor centre line
- F05D 2260/74 . . by turning around an axis perpendicular the rotor centre line
- F05D 2260/75 . . the adjusting mechanism not using auxiliary power sources, e.g. by "servos"
- F05D 2260/76 . . the adjusting mechanism using auxiliary power sources
- F05D 2260/77 . . the adjusting mechanism driven or triggered by centrifugal forces
- F05D 2260/78 . . the adjusting mechanism driven or triggered by aerodynamic forces
- F05D 2260/79 . . Bearing, support or actuation arrangements therefor

- F05D 2260/80 . Diagnostics

- F05D 2260/81 . Modelling or simulation
- F05D 2260/82 . Forecasts
- F05D 2260/821 . . Parameter estimation or prediction
- F05D 2260/83 . Testing, e.g. methods, components or tools therefor
- F05D 2260/84 . Redundancy
- F05D 2260/85 . Starting
- F05D 2260/90 . Braking
- F05D 2260/901 . . using aerodynamic forces, i.e. lift or drag
- F05D 2260/902 . . using frictional mechanical forces
- F05D 2260/903 . . using electrical or magnetic forces
- F05D 2260/904 . . using hydrodynamic forces
- F05D 2260/94 . Functionality given by mechanical stress related aspects such as low cycle fatigue (LCF) of high cycle fatigue (HCF)
- F05D 2260/941 . . particularly aimed at mechanical or thermal stress reduction
- F05D 2260/95 . Preventing corrosion ([coating or surface treatment F05D 2230/90](#))
- F05D 2260/96 . Preventing, counteracting or reducing vibration or noise
- F05D 2260/961 . . by mistuning rotor blades or stator vanes with irregular interblade spacing, airfoil shape
- F05D 2260/962 . . by means of "anti-noise"
- F05D 2260/963 . . by Helmholtz resonators
- F05D 2260/964 . . counteracting thermoacoustic noise
- F05D 2260/97 . Reducing windage losses
- F05D 2260/972 . . in radial flow machines
- F05D 2260/98 . Lubrication
- F05D 2260/99 . Ignition, e.g. ignition by warming up of fuel or oxidizer in a resonant acoustic cavity
- F05D 2270/00 Control**
- F05D 2270/01 . Purpose of the control system
- F05D 2270/02 . . to control rotational speed (n)
- F05D 2270/021 . . . to prevent overspeed
- F05D 2270/022 . . . to prevent underspeed
- F05D 2270/023 . . . of different spools or shafts
- F05D 2270/024 . . . to keep rotational speed constant

F05D 2270/03	..	in variable speed operation
F05D 2270/04	..	to control acceleration (u)
F05D 2270/042	...	by keeping it below damagingly high values
F05D 2270/044	...	by making it as high as possible
F05D 2270/05	..	to affect the output of the engine
F05D 2270/051	...	Thrust
F05D 2270/052	...	Torque
F05D 2270/053	...	Explicitly mentioned power
F05D 2270/06	..	to match engine to driven device
F05D 2270/061	...	in particular the electrical frequency of driven generator
F05D 2270/07	..	to improve fuel economy
F05D 2270/071	...	in particular at idling speed
F05D 2270/08	..	to produce clean exhaust gases
F05D 2270/081	...	with as little smoke as possible
F05D 2270/082	...	with as little NOx as possible
F05D 2270/083	...	by monitoring combustion conditions
F05D 2270/0831	....	indirectly, at the exhaust
F05D 2270/09	..	to cope with emergencies
F05D 2270/091	...	in particular sudden load loss
F05D 2270/092	...	in particular blow-out and relight
F05D 2270/093	...	of one engine in a multi-engine system
F05D 2270/094	...	by using back-up controls
F05D 2270/095	...	by temporary overriding set control limits
F05D 2270/096	...	caused by water or hail ingestion
F05D 2270/10	..	to cope with, or avoid, compressor flow instabilities
F05D 2270/101	...	Compressor surge or stall
F05D 2270/102	....	caused by working fluid flow velocity profile distortion
F05D 2270/1022	.....	due to high angle of attack of aircraft
F05D 2270/1024	.....	due to compressor degradation
F05D 2270/11	..	to prolong engine life
F05D 2270/112	...	by limiting temperatures
F05D 2270/114	...	by limiting mechanical stresses
F05D 2270/116	...	by preventing reverse rotation
F05D 2270/12	..	to maintain desired vehicle trajectory parameters
F05D 2270/121	...	Altitude
F05D 2270/122	...	Speed or Mach number
F05D 2270/13	..	to control two or more engines simultaneously
F05D 2270/14	..	to control thermoacoustic behaviour in the combustion chambers (counteracting noise or vibration F05D 2260/96)
F05D 2270/16	..	to control water or steam injection

- F05D 2270/17 .. to control boundary layer
- F05D 2270/172 ... by a plasma generator, e.g. control of ignition
- F05D 2270/173 ... by the Coanda effect
- F05D 2270/18 .. using fluidic amplifiers or actuators
- F05D 2270/20 .. to optimize the performance of a machine

- F05D 2270/30 . Control parameters, e.g. input parameters
- F05D 2270/301 .. Pressure
 - F05D 2270/3011 ... Inlet pressure
 - F05D 2270/3013 ... Outlet pressure
 - F05D 2270/3015 ... differential pressure
- F05D 2270/303 .. Temperature
 - F05D 2270/3032 ... excessive temperatures, e.g. caused by overheating
- F05D 2270/304 .. Spool rotational speed
- F05D 2270/305 .. Tolerances
- F05D 2270/306 .. Mass flow
 - F05D 2270/3061 ... of the working fluid
 - F05D 2270/3062 ... of the auxiliary fluid for heating or cooling purposes
- F05D 2270/309 .. Rate of change of parameters
- F05D 2270/31 .. Fuel schedule for stage combustors
- F05D 2270/311 .. Air humidity
- F05D 2270/312 .. Air pressure
- F05D 2270/313 .. Air temperature
- F05D 2270/331 .. Mechanical loads
- F05D 2270/332 .. Maximum loads or fatigue criteria
- F05D 2270/333 .. Noise or sound levels
- F05D 2270/334 .. Vibration measurements
- F05D 2270/335 .. Output power or torque
- F05D 2270/336 .. Blade lift measurements

- F05D 2270/40 . Type of control system
 - F05D 2270/42 .. passive or reactive, e.g. using large wind vanes
 - F05D 2270/44 .. active, predictive, or anticipative
 - F05D 2270/46 .. redundant, i.e. failsafe operation

- F05D 2270/50 . Control logic embodiments
 - F05D 2270/52 .. by electrical means, e.g. relays or switches
 - F05D 2270/54 .. by electronic means, e.g. electronic tubes, transistors or IC's within an electronic circuit
 - F05D 2270/56 .. by hydraulic means, e.g. hydraulic valves within a hydraulic circuit
 - F05D 2270/58 .. by mechanical means, e.g. levers, gears or cams

- F05D 2270/60 . Control system actuates means
- F05D 2270/62 .. Electrical actuators
- F05D 2270/64 .. Hydraulic actuators
- F05D 2270/65 .. Pneumatic actuators
- F05D 2270/66 .. Mechanical actuators ([F05D 2270/62](#) takes precedence)

- F05D 2270/70 . Type of control algorithm
- F05D 2270/701 .. proportional
- F05D 2270/702 .. differential
- F05D 2270/703 .. integral
- F05D 2270/704 .. proportional-differential
- F05D 2270/705 .. proportional-integral
- F05D 2270/706 .. proportional-integral-differential
- F05D 2270/707 .. fuzzy logic
- F05D 2270/708 .. with comparison tables
- F05D 2270/709 .. with neural networks
- F05D 2270/71 .. synthesized, i.e. parameter computed by a mathematical model

- F05D 2270/80 . Devices generating input signals, e.g. transducers, sensors, cameras or strain gauges
- F05D 2270/802 .. Calibration thereof
- F05D 2270/803 .. Sampling thereof
- F05D 2270/804 .. Optical devices
- F05D 2270/8041 ... Cameras
- F05D 2270/805 .. Radars
- F05D 2270/806 .. Sonars
- F05D 2270/807 .. Accelerometers
- F05D 2270/808 .. Strain gauges; Load cells
- F05D 2270/809 .. Encoders
- F05D 2270/81 .. Microphones
- F05D 2270/821 .. Displacement measuring means, e.g. inductive

- F05D 2280/00**

- F05D 2290/00**

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

- F05D 2300/10 . Metals, alloys or intermetallic compounds
- F05D 2300/11 .. Iron
- F05D 2300/111 ... Cast iron

F05D 2300/12	..	Light metals
F05D 2300/121	...	Aluminium
F05D 2300/122	...	Beryllium
F05D 2300/123	...	Boron
F05D 2300/124	...	Lithium
F05D 2300/125	...	Magnesium
F05D 2300/13	..	Refractory metals, i.e. Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W
F05D 2300/131	...	Molybdenum
F05D 2300/132	...	Chromium
F05D 2300/133	...	Titanium
F05D 2300/134	...	Zirconium
F05D 2300/135	...	Hafnium
F05D 2300/14	..	Noble metals, i.e. Ag, Au, platinum group metals
F05D 2300/141	...	Silver
F05D 2300/142	...	Gold
F05D 2300/143	...	Platinum group metals, i.e. Os, Ir, Pt, Ru, Rh, Pd
F05D 2300/1431	....	Palladium
F05D 2300/1432	....	Ruthenium
F05D 2300/1433	....	Osmium
F05D 2300/1434	....	Iridium
F05D 2300/1435	....	Rhodium
F05D 2300/15	..	Rare earth metals, i.e. Sc, Y, lanthanides
F05D 2300/16	..	Other metals not provided for in groups F05D 2300/11 to F05D 2300/15
F05D 2300/1602	...	Arsenic
F05D 2300/1604	...	Antimony
F05D 2300/1606	...	Bismuth
F05D 2300/1608	...	Barium
F05D 2300/161	...	Manganese
F05D 2300/1612	...	Lead
F05D 2300/1614	...	Tin
F05D 2300/1616	...	Zinc
F05D 2300/1618	...	Mercury
F05D 2300/17	..	Alloys
F05D 2300/171	...	Steel alloys
F05D 2300/172	...	Copper alloys
F05D 2300/1721	....	Bronze
F05D 2300/1722	....	Phosphor-bronze alloy
F05D 2300/1723	....	Nickel-Copper alloy, e.g. Monel
F05D 2300/173	...	Aluminium alloys, e.g. AlCuMgPb
F05D 2300/174	...	Titanium alloys, e.g. TiAl

F05D 2300/175	...	Superalloys
F05D 2300/176	...	Heat-stable alloys
F05D 2300/177	...	Ni - Si alloys
F05D 2300/18	..	Intermetallic compounds
F05D 2300/182	...	Metal-aluminide intermetallic compounds
F05D 2300/20	.	Oxide or non-oxide ceramics
F05D 2300/21	..	Oxide ceramics
F05D 2300/2102	...	Glass
F05D 2300/2104	...	MIBA
F05D 2300/2106	...	Quartz
F05D 2300/2108	...	Phosphor
F05D 2300/211	...	Silica
F05D 2300/2112	...	Aluminium oxides
F05D 2300/2114	...	Sapphire
F05D 2300/2116	...	Zinc oxide
F05D 2300/2118	...	Zirconium oxides
F05D 2300/212	...	Aluminium titanate
F05D 2300/22	..	Non-oxide ceramics
F05D 2300/222	...	Silicon
F05D 2300/224	...	Carbon, e.g. graphite
F05D 2300/226	...	Carbides
F05D 2300/2261	....	of silicon
F05D 2300/2262	....	of titanium, e.g. TiC
F05D 2300/2263	....	of tungsten, e.g. WC
F05D 2300/228	...	Nitrides
F05D 2300/2281	....	of aluminium
F05D 2300/2282	....	of boron
F05D 2300/2283	....	of silicon
F05D 2300/2284	....	of titanium
F05D 2300/2285	....	of zirconium
F05D 2300/229	...	Sulfides
F05D 2300/2291	....	of molybdenum
F05D 2300/30	.	Inorganic materials other than provided for in groups F05D 2300/10 to F05D 2300/2291
F05D 2300/40	.	Organic materials
F05D 2300/41	..	Leather
F05D 2300/42	..	Cellulosic materials, e.g. wood
F05D 2300/43	..	Synthetic polymers, e.g. plastics; Rubber

F05D 2300/431	...	Rubber
F05D 2300/432	...	PTFE (PolyTetraFluorEthylene)
F05D 2300/433	...	Polyamides, e.g. NYLON
F05D 2300/434	...	Polyimides, e.g. AURUM
F05D 2300/436	...	Polyetherketones, e.g. PEEK
F05D 2300/437	...	Silicon polymers
F05D 2300/44	..	Resins
F05D 2300/48	..	other organic materials
F05D 2300/50	.	Intrinsic material properties or characteristics
F05D 2300/501	..	Elasticity
F05D 2300/502	..	Thermal properties
F05D 2300/5021	...	Expansivity
F05D 2300/50211	....	similar
F05D 2300/50212	....	dissimilar
F05D 2300/5023	...	Thermal capacity
F05D 2300/5024	...	Heat conductivity
F05D 2300/504	..	Reflective properties
F05D 2300/505	..	Shape memory behaviour
F05D 2300/506	..	Hardness
F05D 2300/507	..	Magnetic properties
F05D 2300/509	..	Self lubricating materials; Solid lubricants
F05D 2300/51	..	Hydrophilic, i.e. being or having wettable properties
F05D 2300/512	..	Hydrophobic, i.e. being or having non-wettable properties
F05D 2300/514	..	Porosity
F05D 2300/516	..	Surface roughness
F05D 2300/518	..	Ductility
F05D 2300/52	..	Translucence
F05D 2300/522	..	Density
F05D 2300/60	.	Properties or characteristics given to material by treatment or manufacturing
F05D 2300/601	..	Fabrics
F05D 2300/6012	...	Woven fabrics
F05D 2300/603	..	Composites; e.g. fibre-reinforced
F05D 2300/6031	...	Functionally graded composites
F05D 2300/6032	...	Metal matrix composites (MMC)
F05D 2300/6033	...	Ceramic matrix composites (CMC)
F05D 2300/6034	...	Orientation of fibres, weaving, ply angle
F05D 2300/604	..	Amorphous
F05D 2300/605	..	Crystalline
F05D 2300/606	..	Directionally-solidified crystalline structures

F05D 2300/607	..	Monocrystallinity
F05D 2300/608	..	Microstructure
F05D 2300/609	..	Grain size
F05D 2300/61	..	Syntactic materials, i.e. hollow spheres embedded in a matrix
F05D 2300/611	..	Coating
F05D 2300/6111	..	functionally graded coating
F05D 2300/612	..	Foam
F05D 2300/613	..	Felt
F05D 2300/614	..	Fibres or filaments
F05D 2300/615	..	Filler
F05D 2300/70	.	Treatment or modification of materials
F05D 2300/701	..	Heat treatment
F05D 2300/702	..	Reinforcement