



FLEXI 5



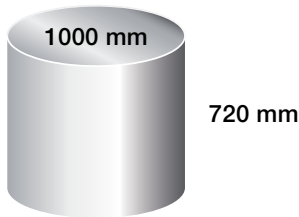
Simultaneous 5-Axis Vertical Machining Centers



Simultaneous 5-Axis Vertical Machining Centers

An Innovative Project at the Top of Technology

- ▶ New Flexi vertical machining centers, with movable worktable and 5 simultaneous axes, have an universal field of application and they are conceived for multi axis machining of small and large batches of complex 5-side workpieces, in one positioning, in precision mechanics, automotive, medical, aerospace industries and in moulds and dies production.
- ▶ The versatility of Flexi machining centers allows to satisfy all customers' production needs thanks to a $\pm 110^\circ$ tilting head and a built-in 660 mm diameter rotary table.
- ▶ Several configurations and optional equipment enable to produce "custom-made" machinery to suit the manufacturing needs of the individual user.
- ▶ Flexi line is equipped with last generation Heidenhain, Siemens e Fanuc CNCs boosting its accuracy and productivity qualities.
- ▶ The high ergonomics operator panel is positioned on a sliding front structure.
- ▶ Flexi machining centers are supplied with guards conceived according to most innovative industrial design criteria that sum up ergonomics, easy access to the work area, wide visibility during machining, comfort during workpiece loading/unloading operations, optimal fumes and swarf containment, easy use and maintenance.





Speed, versatility, accuracy in one solution

- ▶ The bed of Flexi machining centers is designed to assure stability and accuracy
- ▶ Large-size ball recirculating screws combined with motor and direct digital drives offer high dynamics and rapid traverses up to 50 m/min
- ▶ The headstock consists of a rigid structure sliding on the column (Z axis)
- ▶ All movements take place with roller recirculation sliding blocks
- ▶ Machine accuracy is assured by pressurized optical scales on X, Y and Z axes, and by high resolution encoders on B and C rotating axes

Speed

- ▶ Tilting head (B axis) and rotary table (C axis) with 60 rpm and 80 rpm federate respectively, acceleration 30 rad/s²
- ▶ X, Y, Z axes feedrate up to 50 m/min
- ▶ X, Y, Z axes acceleration 3.5 m/s²

Versatility

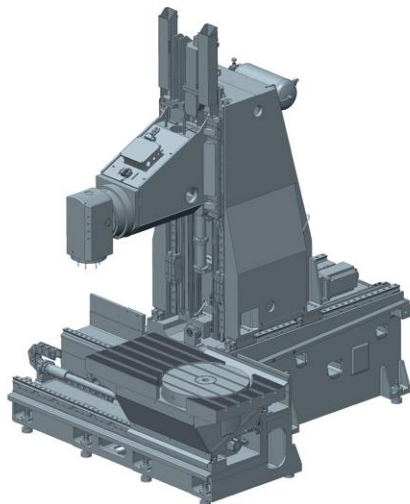
- ▶ Tilting head (B axis) ±110°
- ▶ Rotary table (C axis) diameter 660 mm
- ▶ Z axis traverse 950 mm
- ▶ Horizontal spindle nose/table min. distance 250 mm
- ▶ Vertical spindle nose/table max. distance 865 mm

Accuracy

- ▶ Optical scales on linear axes

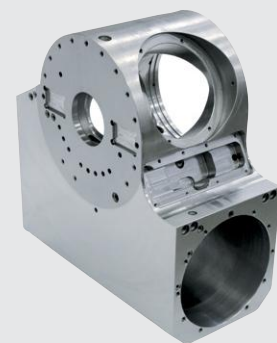
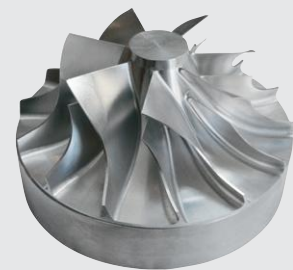
Power

- ▶ The available torque, power and speed of Sigma motorspindles assure the best continuous machining conditions



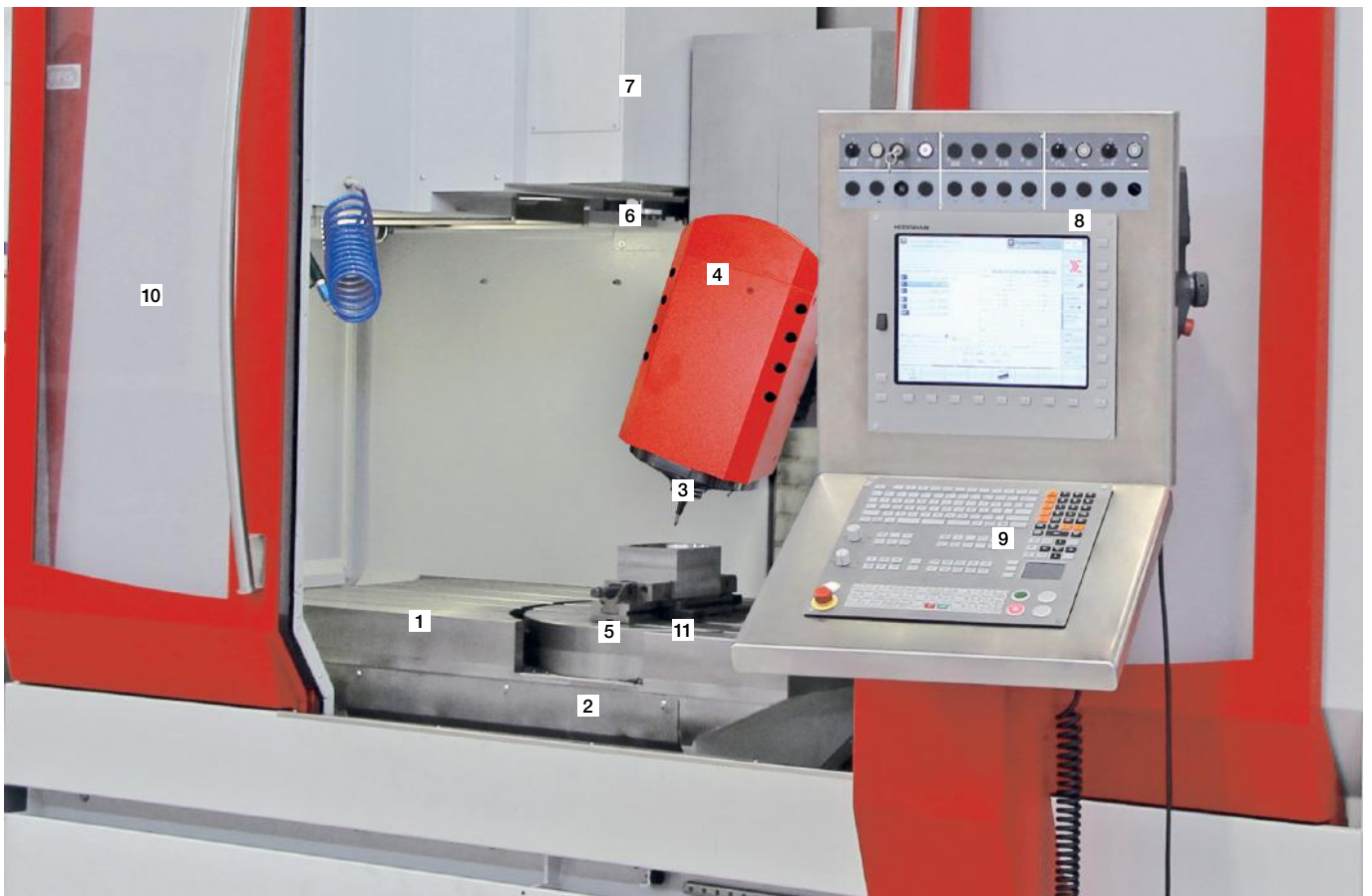
Application markets

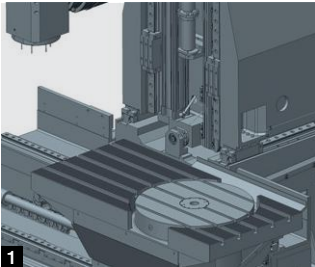
The new vertical machining centers Flexi have a universal application and have been designed to machine complex workpieces on 5 sides in one single positioning, for small and large serial production, in precision mechanics, automotive, medical, aerospace, moulds and dies fields.



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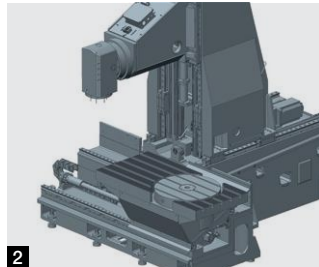
Sigma vertical machining centers and flexible milling cells incorporate excellence in performance deriving from the consolidated Sigma experience through its decades of history, applied to product development of all machine models.





1 Moving Table

The configuration with moving worktable on X-axis allows to enhance the accuracy values and final quality of the machined workpieces.



2 Structure

The structural concept allows to enhance the rigidity features of the machine in case of extreme exploitation of motorspindle power and torque.



3 Motorspindle

Motorspindles with features of high performances: max. power 30 Kw, max. torque 171 Nm, max. rotation speed 18 000 rpm.



4 Tilting milling head

Tilting milling heads (B-axis) for simultaneous 5 axes machining, developed and manufactured by Sigma, are driven by high performance powerful torque motors to ensure high accuracy, dynamics, rotation speed and torque.



5 Rotary table

Rotary tables (C-axis), embedded in the moving worktable, for continuous 5-axis machining with a diameter of 660 mm, are driven by high performance powerful torque motors to ensure high accuracy, dynamics, rotation speed and torque.



6 Tool magazine

Tool magazines are structurally disconnected from the machine axes movements. This allows for easy inspection and direct replacement of the tools on the tool chain, in total safety, without stopping the working cycle.



7 Sigma tool check

Electronic device dedicated to all operations related to "direct call" of tools, single tool management (assignment or modification of a tool code, display and modification of tool compensation data) and tool magazine instruction, for direct interface with the CNC, without stopping the working cycle.



8 Dynamic adjustment

The dynamic adjustment during milling allows to optimize the dynamic behavior of the machine in the various working conditions through 5 sophisticated customized CNC functions: standard machining, powerful roughing, accurate finishing, high precision, working speed of the machined workpiece.



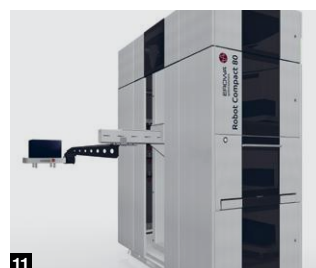
9 User panel

The highly ergonomic user panel, developed according to innovative industrial design, is positioned on a sliding front structure.



10 Machine guarding

Machine guarding is designed according to the most innovative industrial design criteria, by integrating the ergonomic functions such as: easy access to the working area, wide visibility of the operating area, easy loading/unloading of workpieces, containment of fumes and cutting waste, easy maintenance.



11 Automation

Process automation is assured by the modular systems for pallet workpiece management that can be easily integrated with machines in stand-alone configurations or in cells or with flexible manufacturing islands.

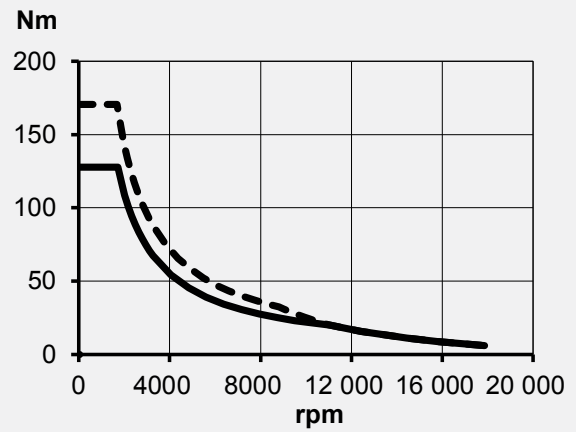
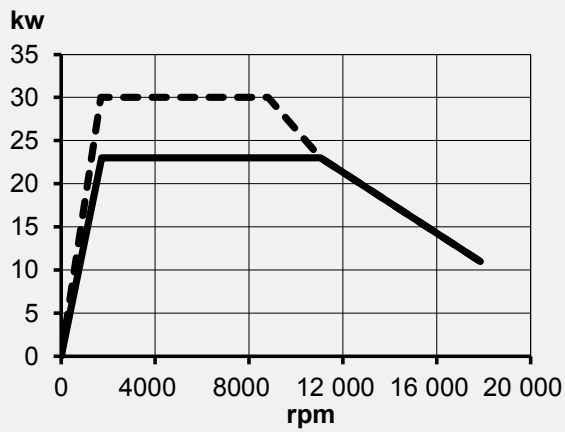
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Motorspindles

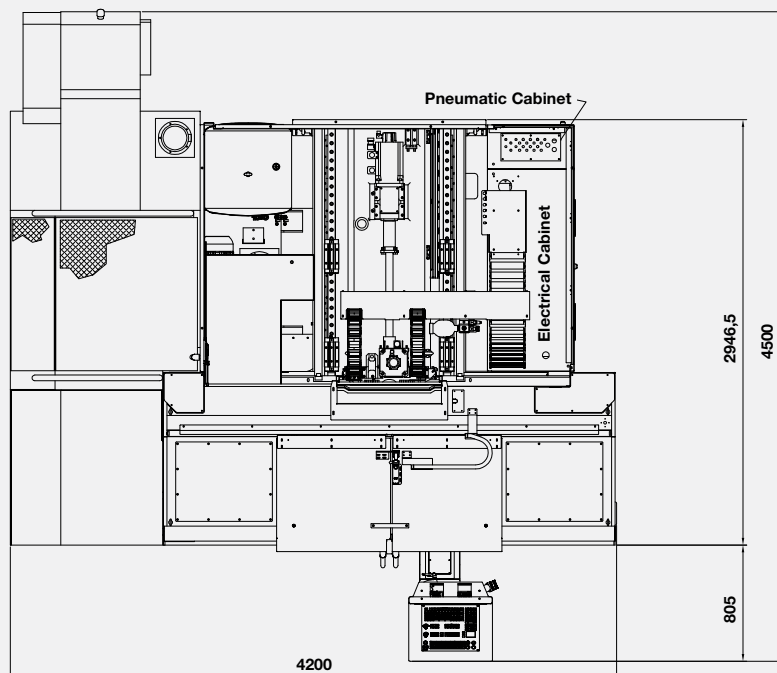
- ▶ The standard motorspindle is driven by a synchronous motor supplying 30 kW power, 171 Nm torque, 12 000 rpm speed.
- ▶ It is refrigerated by the circulation of a fluid.
- ▶ Its temperature is controlled by an external refrigerator.
- ▶ HSK-A-63 taper is available as option with 18 000 rpm.



Power/torque diagram



Machine overall dimensions



Technical Data

Simultaneous 5-axis vertical machining centers	type	FLEXI 5S	FLEXI 5M	FLEXI 5L
Working Area				
X-Axis traverse	mm	1250	1600	2100
Y-Axis traverse	mm	800	800	800
Z-Axis traverse	mm	950	950	950
X – Y – Z axes feedrate	m/min	50 – 50 – 50	50 – 50 – 50	40 – 50 – 50
X – Y – Z axes acceleration	m/s ²	3.5	3.5	3.5
Spindle nose – table surface distance	mm	865	865	865
Horizontal spindle – table surface distance	mm	250-1200	250-1200	250-1200
Linear axes slideways	type	with roller recirculation sliding blocks		
Axes motion system	type	ball recirculation screws		
Table				
Table surface	mm	700 x 1450	700 x 1800	700 x 2300
Max. load on fixed worktable	kg	1500	2000	2500
Distance btw table surface/floor	mm	930	930	930
Tilting head (B axis)				
Motor	type	torque	torque	torque
Traverse	degrees	±110	±110	±110
Torque (nominal/max./max. clamping)	Nm	900 / 1400 / 3470	900 / 1400 / 3470	900 / 1400 / 3470
Rapid traverse	rpm	60	60	60
Rotary table (C axis)				
Motor	type	torque	torque	torque
Traverse	degrees	360	360	360
Diameter	mm	660	660	660
Max. load	kg	1000	1000	1000
Torque (nominal/max./max. clamping)	Nm	930 / 1760 / 3400	930 / 1760 / 3400	930 / 1760 / 3400
Rapid traverse	rpm	80	80	80
Linear axes accuracy				
Measuring system X – Y – Z axes	type	absolute pressurized optical scales		
Positioning uncertainty P (VDI/DGQ 3441)	µm	6	6	6
Rotary axes accuracy (B-C)				
Positioning/Repeatability	arcsec	5" / 4"	5" / 4"	5" / 4"
Other data				
Weight	kg	11 000 approx.	12 500 approx.	14 000 approx.
Overall dimensions: width x depth x height	mm	4.2 x 4.5 x 3.9	4.7 x 4.5 x 3.9	5.5 x 4.5 x 3.9
Spindle unit				
Spindle speed	rpm	12 000	18 000	18 000
Tool holder taper	type	SK40* / HSK-A-63 / BT40	HSK-A-63	HSK-A-63
Max. available power S1/S6	kW	23 / 30	23 / 30	23 / 30
Max. available torque S1/S6	Nm	128 / 171	128 / 171	128 / 171
Constant power from spindle speed S6	rpm	1720	1720	1720
Motor	type	motorspindle	motorspindle	motorspindle
Tool magazine (ISO 40)				
Tool magazine capacity	Nr	40	50	60
Max. tool diameter (adjacent pockets)	mm	76	76	76
Max. tool diameter (with free side pockets)	mm	150	150	150
Max. tool length	mm	350	350	350
Max. tool weight	kg	7	7	7
Chip-to-chip change time	s	5 approx.	5 approx.	5 approx.
Magazine	type	bidirectional chain		
Tool selection	type	random		
Tool changer	type	double gripper arm		
Tool magazine accessibility	type	independent load / unload station		
Tool magazine control	type	« Sigma Tool Check » electronic control panel		

* standard

Subject to change without notice



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