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FFG Europe & Americas unite major players from the German, Italian, Swiss and American machine tool industry with a broad range of milling, turning, grinding, and gear manufacturing technology, and the knowhow of the renowned machine tool brands VDF Boehringer, Hessapp, IMAS, Jobs, MAG, Meccanodora, Modul, Morara, Pfiffner, Rambaudi, Sachman, Sigma, SMS, Tacchella and Witzig & Frank. Since 1798, these brands have substantially contributed to the progress in industrial manufacturing and are well known as reliable and innovative equipment and systems solutions suppliers for the automotive and truck, aerospace, machine building, general machining, railway industry, energy and heavy engineering industries. While being an independent group, these entities benefit from the strengths and opportunities of the global Fair Friend Group. They stand for premium technology within FFG.







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Simultaneous 5-Axis Vertical Machining Centers



Simultaneous 5-Axis Vertical Machining Centers

An Innovative Product at the Top of Technology

- The new vertical machining centers Flexi, with movable worktable and 5 simultaneous axes, have a universal application, being designed to machine complex workpieces on 5 sides in one single positioning, for small and large serial production, in precision mechanics, automotive, medical, aerospace, molds and dies fields.
- The versatility of Flexi machining centers allows to satisfy all customers' production needs thanks to the machining capacities of its ±110°continuous tilting head (B-axis) and 660-mm diameter continuous rotary table, (C-axis) embedded in the moving worktable.
- Several configurations and optional equipment available enable to produce "custom-made" machinery to suit the manufacturing needs of each customer.

- Flexi line is equipped with last generation Heidenhain, Siemens and 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 new guards conceived according to the 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 cast iron bed of Flexi machining centers is designed to assure stability and accuracy.
- Large-size ball recirculating screws combined with motors and direct digital drives offer high dynamics and rapid traverses up to 50 m/min.
- The headstock (Z axis) consists of a rigid structure sliding on the column guideways.
- 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 rotary axes.

Speed

- Tilting head (B axis) and rotary table (C axis) with feedrate 60 rpm and acceleration 30 rad/s²
- ► X, Y, Z-axis feedrate up to 50 m/min
- ► X, Y, Z-axis 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 motorspindles assure the best continous machining conditions.



Application markets

The new vertical machining centers Flexi have a universal application being 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.



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







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



Structure

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





inspection and direct replacement

of the tools on the tool chain, in

total safety, without stopping the

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 highperformance powerful torque motors to grant high accuracy, dynamics, rotation speed and torque.



working cycle.



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



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.



3 Motorspindle

High-performance motorspindles: max. power 30 Kw, max. torque 171 Nm, max. rotation speed 18 000 rpm.



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.



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.



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.



Automation

Process automation is assured by modular management systems for piece-holding pallets that can be easily integrated with machines in stand-alone configuration or in cells or with flexible manufacturing islands.

Motorspindles

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



Power/torque diagram







Machine overall dimensions



Simultaneous E ovio vertical machining contara	t			
Working area	type	FLEXI 33	FLEXI SIVI	FLEXI 5L
		1050	1600	0100
		1230	1800	2100
Y-AXIS LIAVEISE	mm	800	800	800
		950	950	950
X - Y - Z axes leedrate	m/a2	50 - 50 - 50	50 - 50 - 50	40 - 50 - 50
	m/s²	3.5	3.5	3.5
Distance between spindle nose - table	mm	608	200	608
Distance between norizontal spindle - table	mm	250 - 1200	250 - 1200	250 - 1200
Linear axes slideways	туре			
	туре	Dan recircuiation screws		
		700 1450	700 - 1000	700 0000
lable surface	mm	700 x 1450	700 x 1800	700 x 2300
Max. load on fixed worktable	kg	1500	2000	2500
Distance between table - 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	60	60	60
Linear axes accuracy				
Measuring system X - Y - Z axes	type	absol	lute 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	m	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
Spindle taper	type	SK40* / HSK-A-63 / BT40	HSK-A-63	HSK-A-63
Max. power S1/S6	kW	23 / 30	23 / 30	23 / 30
Max. torque S1/S6	Nm	128 / 171	85 / 120	85 / 120
Costant power from spindle speed S6	rpm	1720	1720	1720
Motor	type	motorspindle	motorspindle	motorspindle
Tool magazine		·	·	
Tool magazine capacity	Nr	50	50	50
Max. tool dimension (adjacent tools)	mm	75	75	75
Max. tool dimension (no adjacent tools)	mm	150	150	150
Max. tool length	mm	300	300	300
Max tool weight	ka	7	7	7
Tool changing time (chip-to-chip)	S	5 арргох	5 approx	5 approx.
Tool magazine type	type	0 uppi 0/i	bidirectional chain	
Tool selection	type		random	
Tool changer	type		double gripper arm	
Tool magazine accessibility	type	indor	nendent load / unload station	
Tool magazine control	type	اا النظر « Siama Tr	ool Check » electronic control pan	4
	upe	« oigitta to	on oneon " electronic control parte	21

* standard

Subject to change without notice