

K Range

High performance milling systems



FIDIA 
Giving shape to design

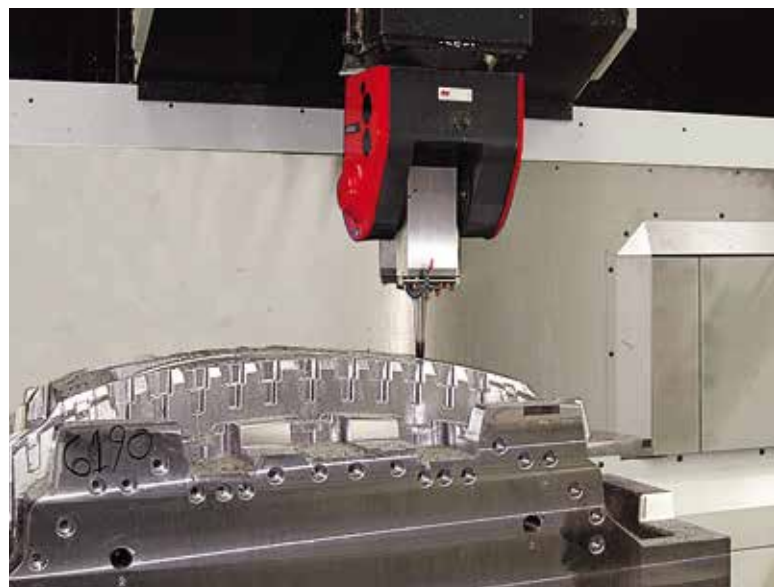


Years of investment in research and development have led to Fidia's success in the high-speed milling sector right from the early 90s.

A reduction in machining times and hand finishing is the most significant result, to which may be added the possibility of working with very hard materials, simplifying production cycles and producing parts just one set-up operation.

Only specifically designed machine tools can guarantee, at the same time, high feeds, accuracy and surface quality.

The K211 and K411, Fidia's high-speed milling centres, are used in the production of moulds and dies for the automotive industry (body parts and large plastic components, such as dashboards and bumpers); steel dies for tyres and light alloy moulds for prototypes; components for the aeronautical industry, turbines and compressors; complex resin models or for styling applications; ceramic or composite components for the aerospace industry.





The criteria used to determine kinematic chain are such as to grant excellent performance in terms of removal capacity, accuracy and speed.

Design attention was focused on achieving a compact bi-rotary head with high removal capacity, continuous movement of the axes and powerful hydraulically operated clamping systems.

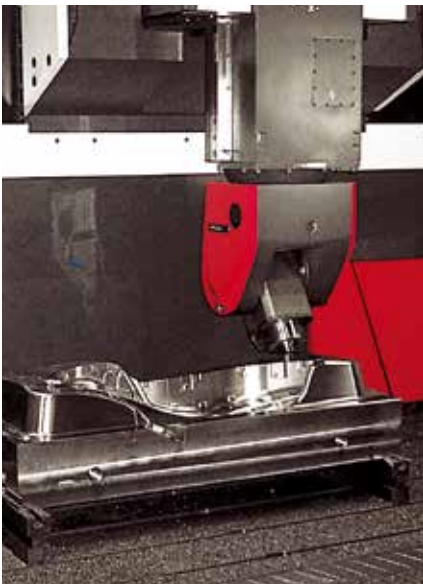
Axis morphology of the KR, and Y2K make these models particularly suitable for the machining of larger pieces.

A rotary table is used on the KR version integrated, as an alternative to the fixed table, with the axis of rotation positioned in the proximity of the external limit of the Y axis travel.

With Y2K version, different areas of the same part or different parts are machined by the use of two machine tools positioned opposite each other.



All models are equipped with the C20 Fidia NC.





Technical solutions

Fixed bed structure

The choice of a fixed bed structure was determined by the following criteria:

- constancy of the forces independently of the weight of the work-piece, allowing for optimum milling quality;
- optimum visibility of the part being machined;
- wide range of possibilities for customization.

The “high bed” version allows for a reduction in the moving masses giving superior dynamic performance.

The bed is made in cast iron, while the mobile parts of the equipment of the 3 axes are made of steel in order to obtain the best mass-rigidity ratio.

The fixed cast iron worktable is suitable to grant high loading capacities.



The components

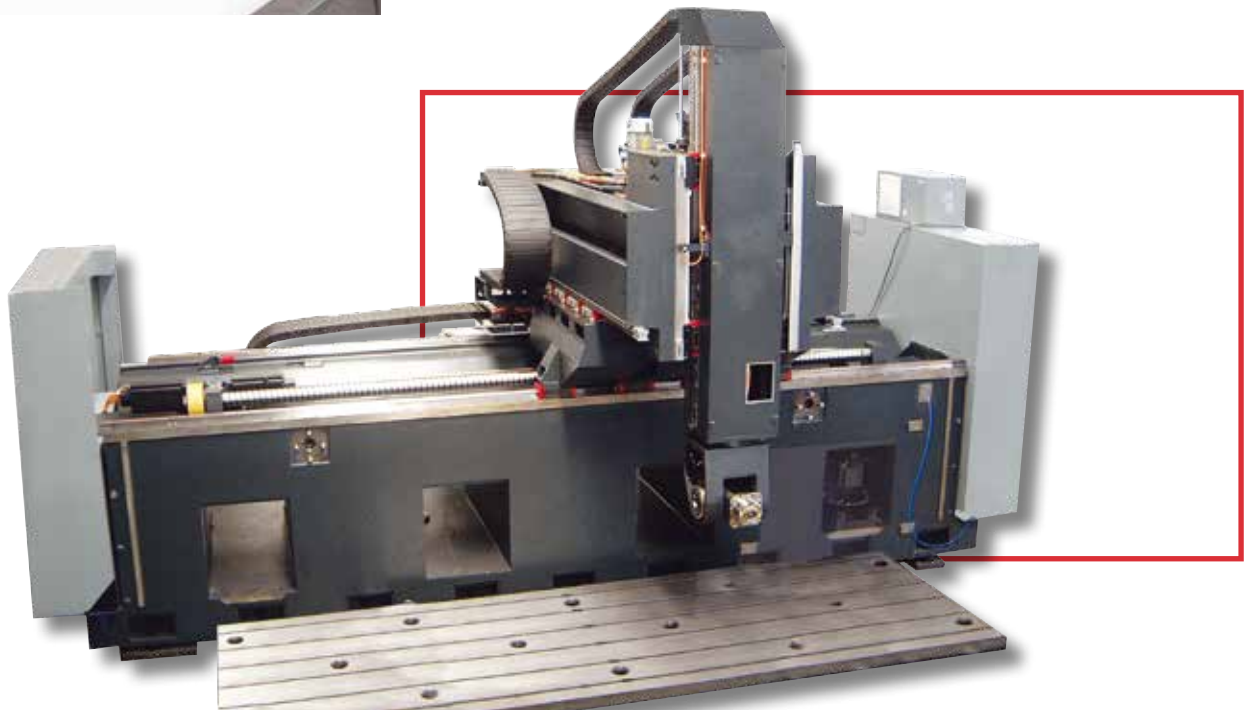
The generous dimensions of the guides and the high number of rolling shoes give the system a balanced rigidity.

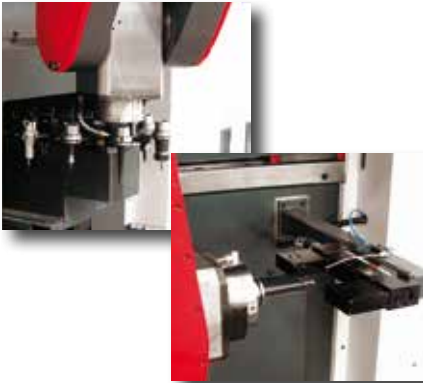
The digital technology used for the axis drives optimizes the machine dynamic behaviour, resolution and machining accuracy.

Maximum accuracy and its maintenance over time are guaranteed by the direct type transducers for both linear and rotary axes.

Thermal stabilization

The significant reduction in thermal drift, ensuring greater accuracy during long finishing and re-machining operations, is achieved thanks to a controlled temperature circuit acting on the machine’s most sensitive parts.





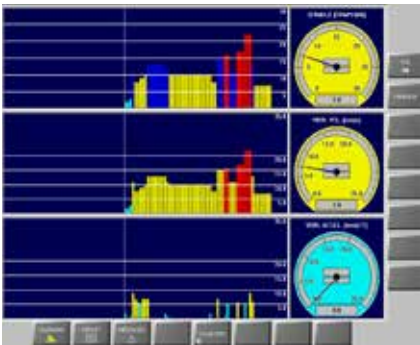
Tool magazine and tool presetting

Chain magazines coming in different tool numbers are housed in the machine bed, suitably protected from swarf and coolant.

Tool measurement, by means of a laser probe, is done while spindle is in rotation: length, diameter and tool shape are therefore checked under real operating conditions.

Also available, measure and verification of special tools:

- multiple cutting areas;
- angular heads;
- advanced ID Chips management.



Dust suction unit

An adequate cleaning system protects the machine components as well as its working area. The system efficiently captures and removes volatile substances. Specific covers and pressurized solutions allow for the machining of high abrasive materials such as ceramics and carbon fibres.



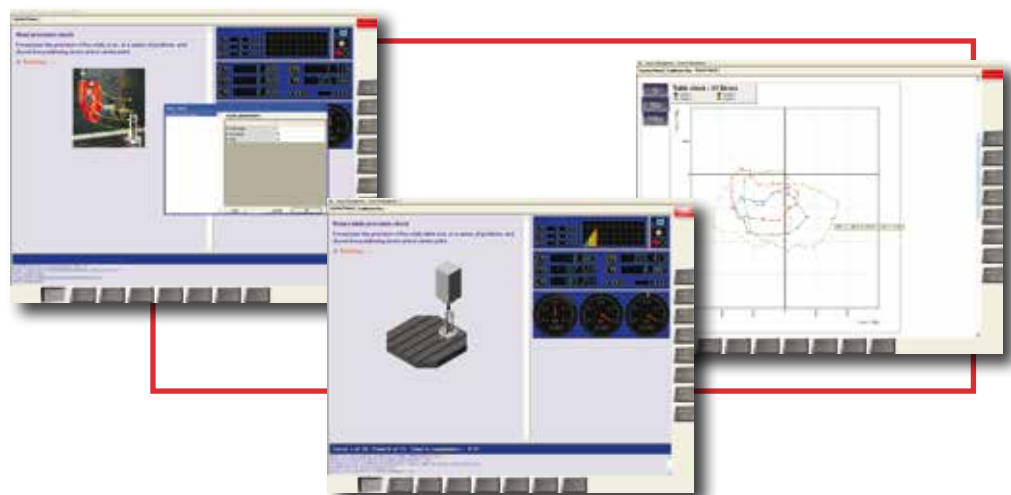
Vibration monitoring system

The spindle is equipped with an accelerometer to measure vibration, in order to check tool unbalancing or breakage. Two vibration speed thresholds are available: warning threshold and alarm threshold. The vibration value is monitored and displayed on the CNC video.

Head Measuring System

The HMS system is a device for measuring and adjusting bi-rotary heads. Fitted with three sensors connected to the NC, the device is able to check and automatically correct geometric errors, positioning accuracy and the RTCP bi-rotary head parameters.

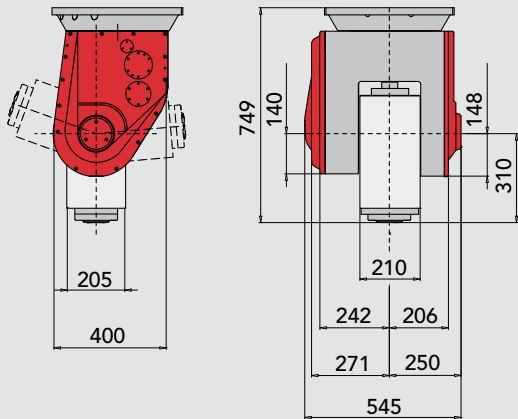
This enables checks on the head geometry to be carried out whenever required, avoiding costly, lengthy and often unnecessary service interventions.



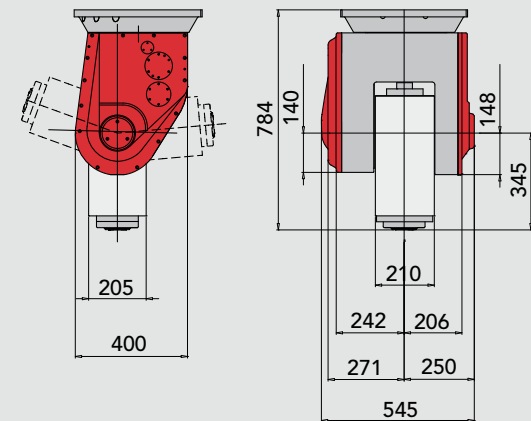


Continuous bi-rotary head

Series K machine tools are provided with continuous, powerful, compact birotary heads. A and C axes can machine both through-high-dynamics-continuous interpolation, and through the positioning mode, with the operator interactive command. In case of heavy duty removal operations, the axes can be stiffly clamped by means of powerful hydraulic brakes. Fidia head, equipped with a built-in spindle driven through a synchro motor, is provided with servomechanisms (automatic backlash recovery), and it is able to perform 0.001° resolution positionings for any type of machining: both 5-axis roughing and finishing operations. Its compact structure eases the tool access to the most critical surfaces.



HSK63A



HSK100A

A axis travel	+95° ÷ -110°	
C axis travel	± 200° (optional ± 360°)	
A, C max continuous speed	5400 °/min	
Accuracy/repeatability (VDI/DGQ 3441 - ISO 230-2)	6 / 4 arc sec	
Max spindle speed	24000 1/min	15000 1/min
Max spindle power	55 kW	65 kW
Max torque	88 Nm	124 Nm
Toolholder	HSK63A	HSK100A





The C20 numerical control

The Fidia C20 numerical control takes full advantage of the potential offered by combining the performance of the Intel Core i3 and the RISC Power PC processors. It is conceived to manage the most sophisticated high speed applications running at 5 axes with RTCP. It is equipped with Windows® 7 Ultimate operating system in multitasking mode.

Simple and reliable machining

The C20 is equipped with a 19" TFT video and thanks to its HI-MILL 3D CAM and ISOGRAPH 2½D CAD/CAM it directly imports CAD mathematical models in IGES, VDA-FS, DXF, DWG formats, enhancing but at the same time simplifying tool path management.

Mechanical machining such as slots, threads and pullers are programmed directly on board of the machine in total safety thanks to its soft keys and to the possibility to simulate in real time any kind of tool path.



High speed milling

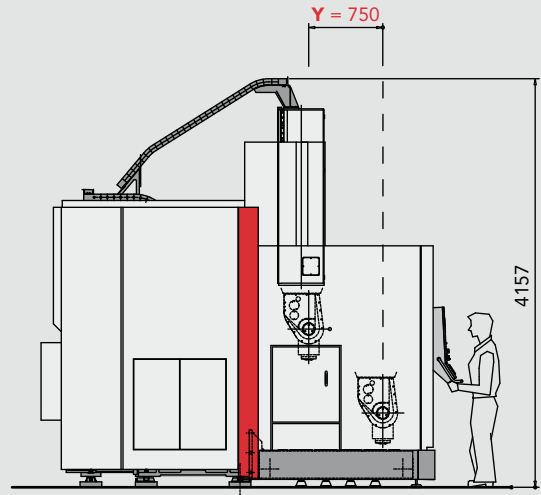
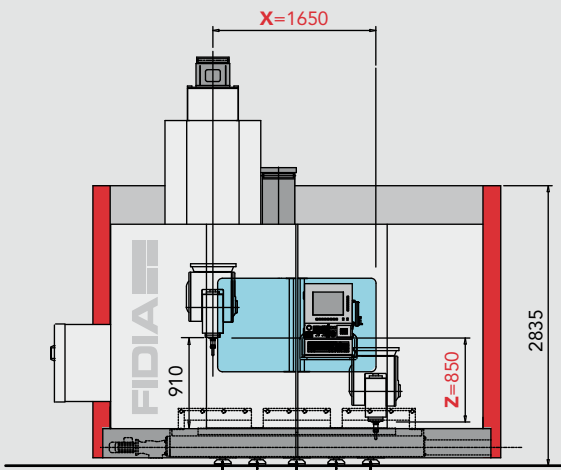
The parameters, adapted to the specific dynamic characteristics of the machine tool, are optimized by the following path control software functions:

- dynamic Look-Ahead with advanced feed control for curves;
- Active Tuning and Active Damping to optimize performance in terms of accuracy, surface quality and execution times;
- set of customized parameters for different machining conditions (roughing, semi-finishing, finishing and rest-machining) recalled by G functions;
- Jerk Control (control of variations in acceleration).

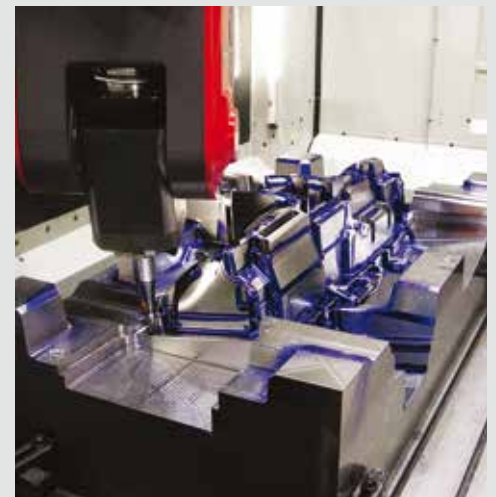
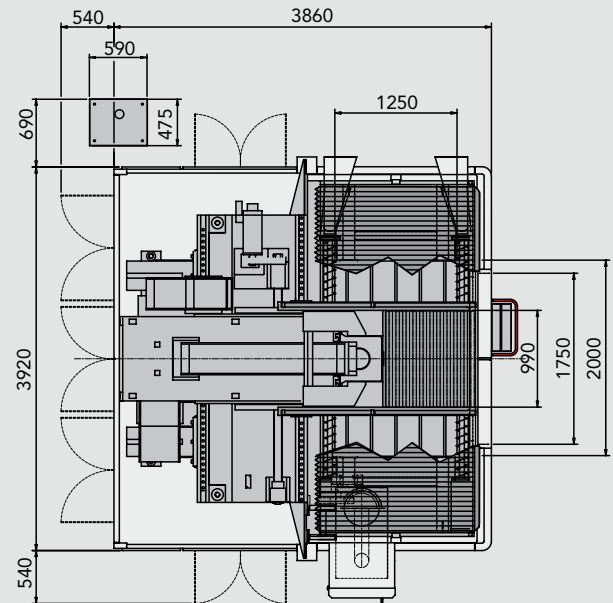




K199



Cinematic chains with refrigerated motors, ball-screws and bearings prevent from thermal drift anomalies.

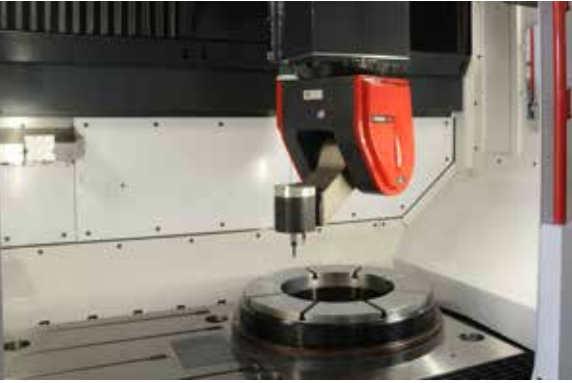




Technical data	K199
Linear axis travel	
X (*)	1650 mm (65")
Y (*)	750 mm (29.5")
Z	850 mm (33.5")
Linear axis speed	
X Y Z	30 m/min (1181 ipm)
Positioning accuracy	
X Y Z	$\pm 0,005 \pm 0,005 \pm 0,004$ mm ($\pm .0002'' \pm .0002'' \pm .00015''$)
Work-piece table:	
Dimensions	2000 x 1250 mm (79" x 49")
T-Slots	n° 5 - pitch 250 mm (10")
Loading capacity	12000 kg (26455 lbs)
Tool magazine	
No of positions	24 - 42 - 60
Weight	
	18300 kg (40344 lbs)

(*) +150 mm (6") rotating the C axis with vertical spindle



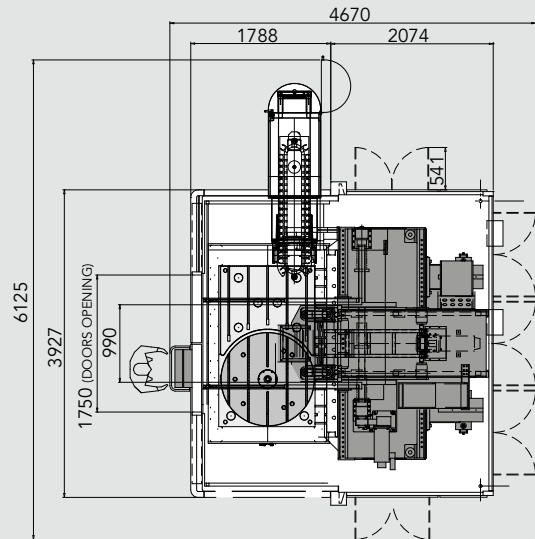
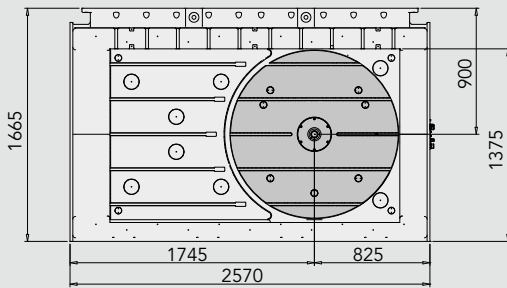
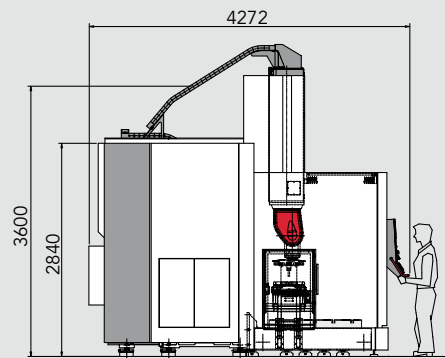
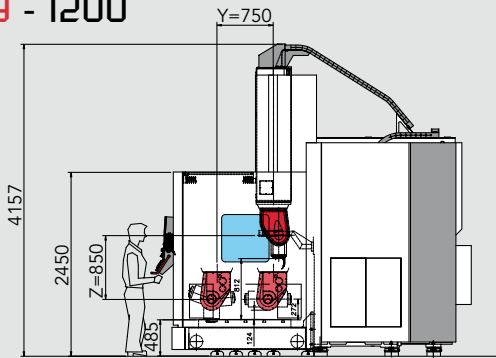


KR199

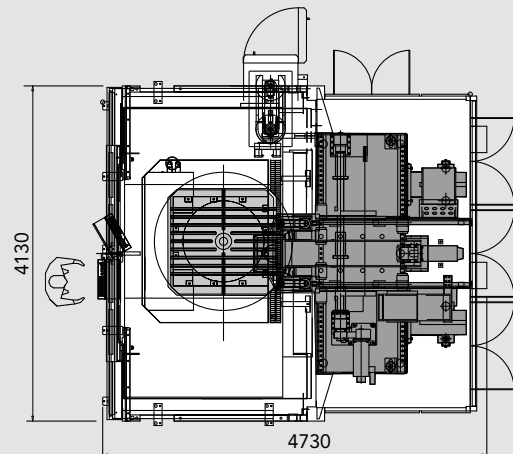
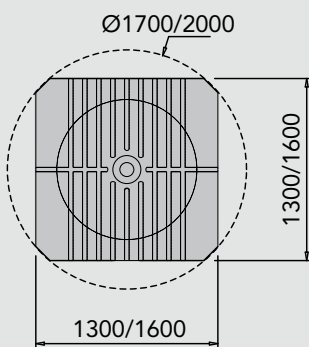
A remarkable increase of the operating volume is obtained by integrating rotary tables guided by a NC management of the 6th and 7th axis. The coordinate systems always refer to the piece being machined in any allowed position.

The 5-side access to the part to be machined, and the prearrangement for pallet systems are KR199 main advantages.

KR199 - 1200



KR199 - 1300/1600





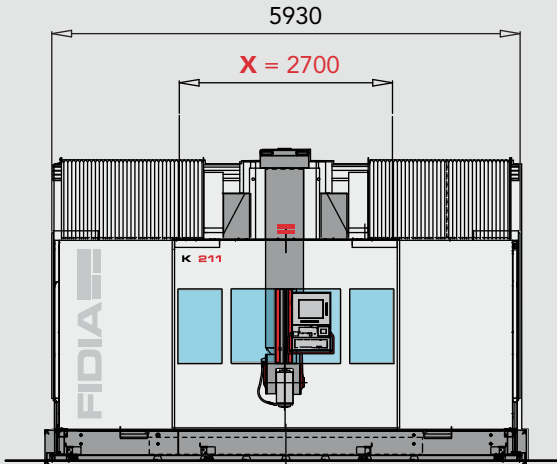
Technical data		KR199			
Linear axis travel					
X (*)	1650 mm (65")				
Y (*)	750 mm (29.5")				
Z	850 mm (33.5")				
Linear axis speed					
X Y Z	30 m/min (1181 ipm)				
Positioning accuracy					
X Y Z	± 0,005 ± 0,005 ± 0,004 mm (± .0002" ± .0002" ± .00015")				
Work-piece table: U axis	Ø 800 mm (31")	Ø 1200 mm (47")	1300 x 1300 mm (51"x 51")	1600 x 1600 mm (63"x 63")	
T-Slots	18 mm	18 mm	18 mm	22 mm	
Loading capacity	1000 kg (2200 lbs)	3500 kg (7700 lbs)	6000 kg (13300 lbs)	9000 kg (19900 lbs)	
Fixed part	1250 x 2000 mm (49"x 79")	1250 x 2000 mm (49"x 79")	-	-	
Tool magazine					
No of positions	24 - 42 - 60				

(*) +150 mm (6") rotating the C axis with vertical spindle

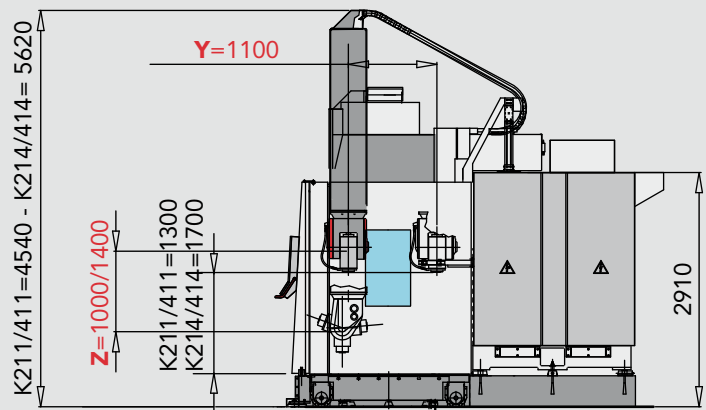
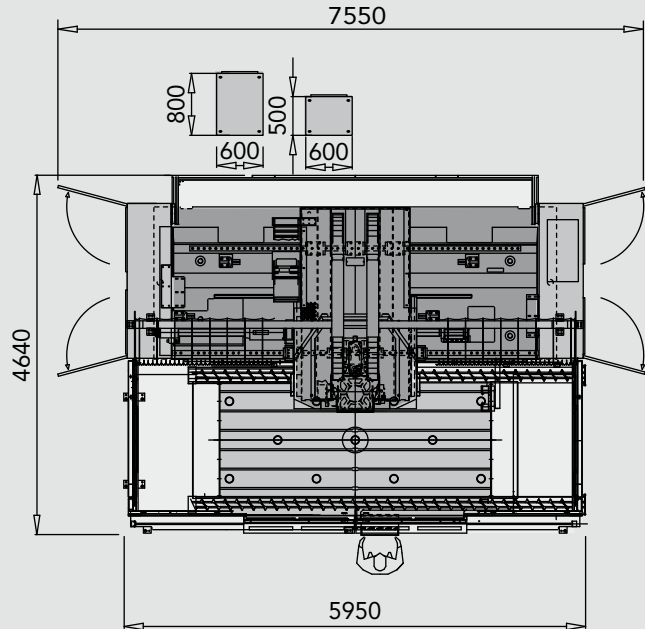




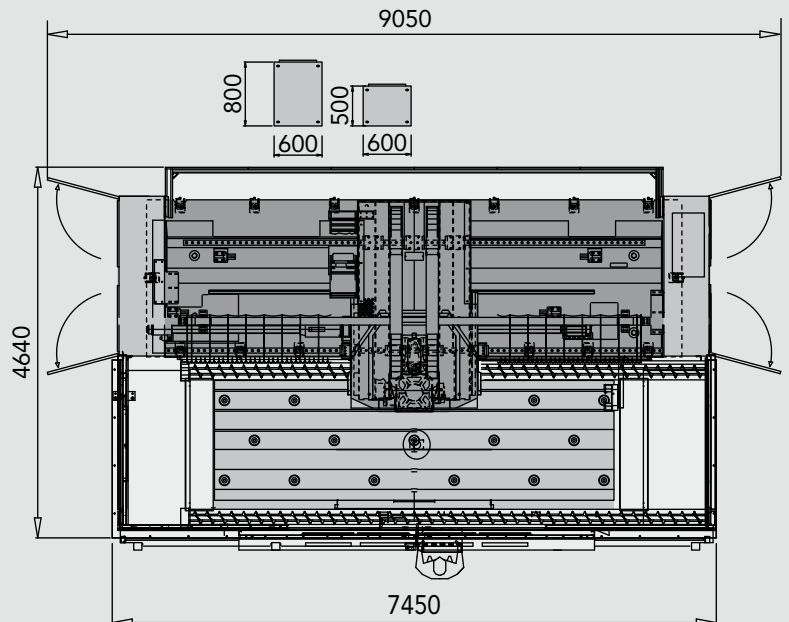
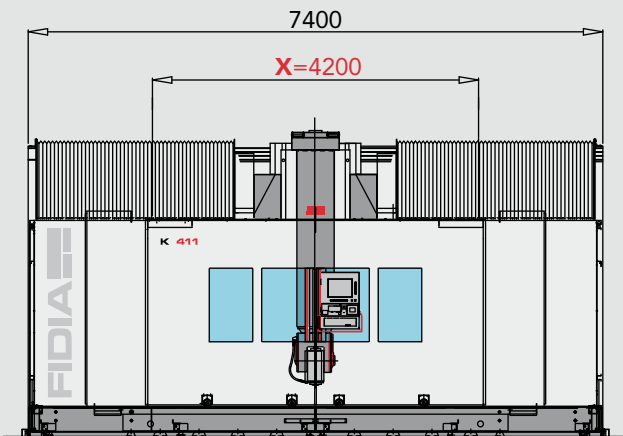
K211 K214



K series with X modular axis are equipped with Rack and Pinion, driven by two motors preload system.



K411 K414





Technical data	K211/214	K411/414	
Linear axis travel			
X (*)	2700 mm (106")	4200 mm (165")	
Y (*)	1100 + 150* mm (43")		
Z	1000/1400 mm (39"/55")		
Linear axis speed			
	X	Y	Z
	50 m/min (1968 ipm)	40 m/min (1575 ipm)	30 m/min (1181 ipm)
Positioning accuracy			
X Y Z	± 0,006 ± 0,005 ± 0,004 mm (± .00024" ± .0002" ± .00015")	± 0,0075 ± 0,005 ± 0,004 mm (±.0003" ±.0002" ±.00015")	
Work-piece table:			
Dimensions	3500 x 1500 mm (138"x 59")	5000 x 1500 mm (197"x 59")	
T-Slots	n° 6 - pitch 250 mm (10")		
Loading capacity	22000 kg (48501 lbs)	32000 kg (70547 lbs)	
Tool magazine			
No of positions	42 - 84		
Weight			
	26000 kg (57319 lbs)	32000 kg (70547 lbs)	

(*) +150 mm (6") rotating the C axis with vertical spindle



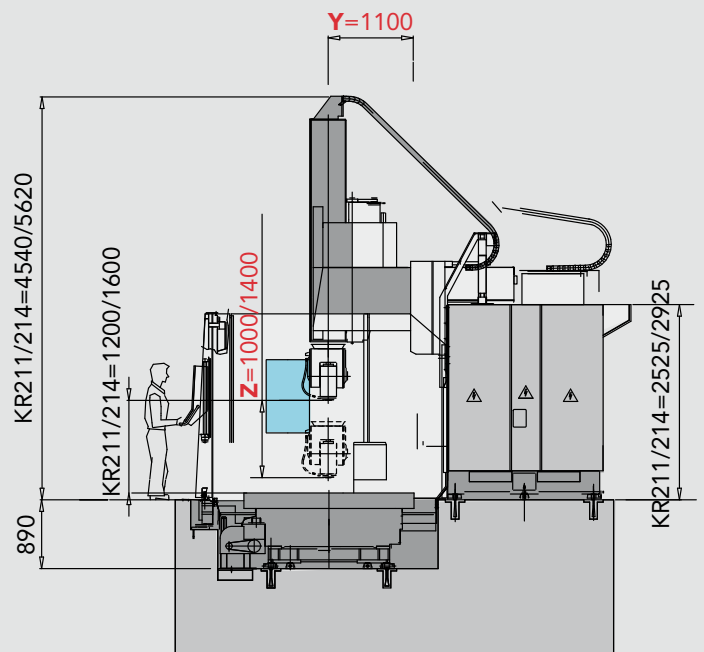
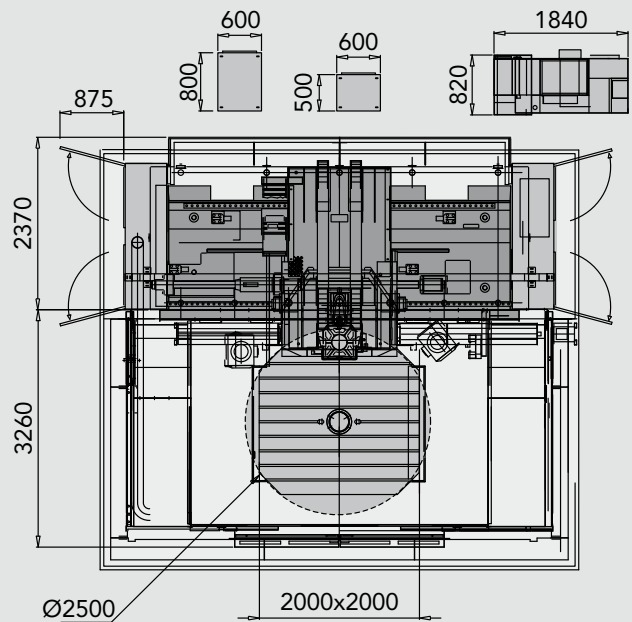
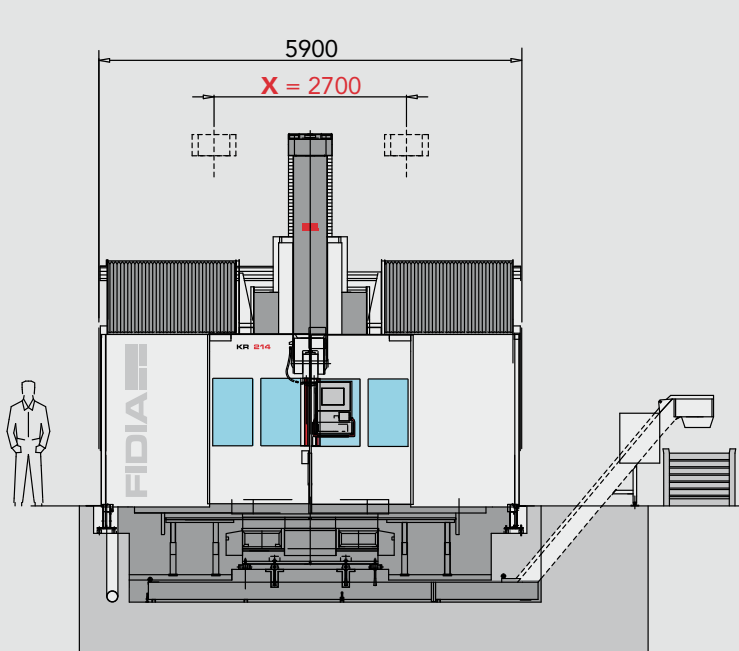


KR211 KR214

Machining of large dies and extra-dimensioned components are carried out efficiently by the KR configurations.

The use of the 6th axis as rotary workpiece table guarantees max accessibility from all sides. Head and table combined rotations are automatically handled by the NC by rotating the system coordinates.

In just one placement it is possible to operate on a such working area that is usually offered only by bigger gantry machines.

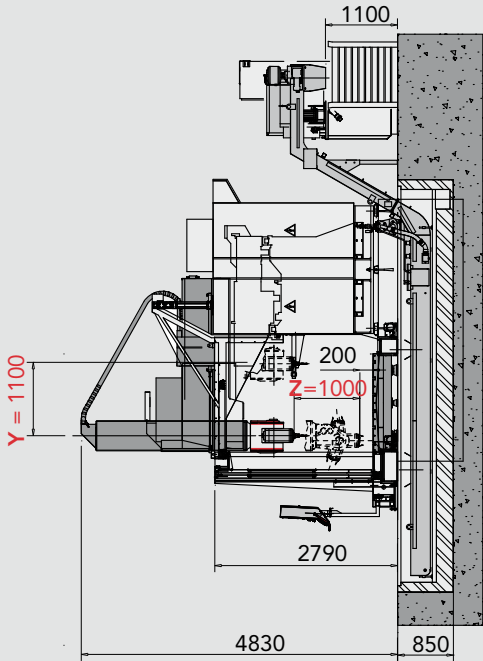




Technical data	KR211		KR214
Linear axis travel			
X (*)	2700 mm (106")		
Y (*)	1100 mm (43")		
Z	1000 mm (39")	1400 mm (55")	
Linear axis speed			
	X	Y	Z
	50 m/min (1968 ipm)	40 m/min (1575 ipm)	30 m/min (1181 ipm)
Positioning accuracy			
X Y Z	± 0,006 ± 0,005 ± 0,004 mm (± .00024" ± .0002" ± .00015")		
Rotary table: U axis			
Dimensions	2000 x 2000 mm (78.7" x 78.7")		
T slots	28 mm pitch 200 mm (8")		
Max load	12000 kg (26400 lbs)		
Clamping torque	35000 Nm		
Driving torque	21000 Nm		
Tool magazine			
No of positions	42 - 84		
Weight			
	38000 kg (83774 lbs)		38500 kg (84877 lbs)

(*) +150 mm (6") rotating the C axis with vertical spindle



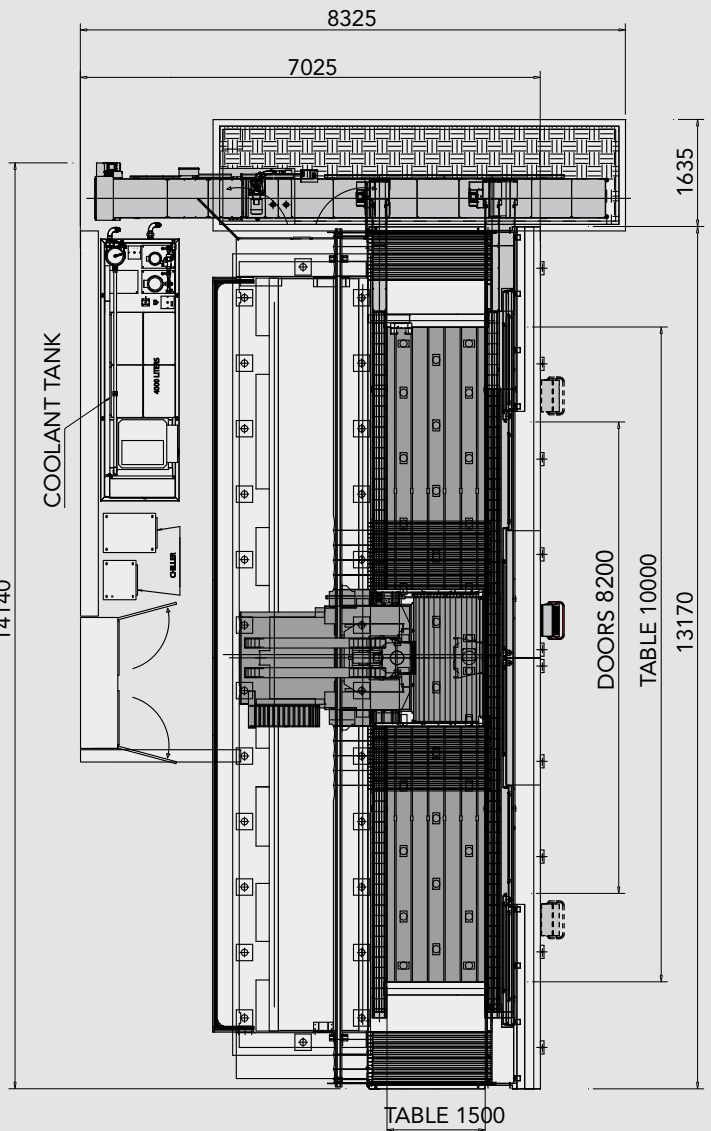
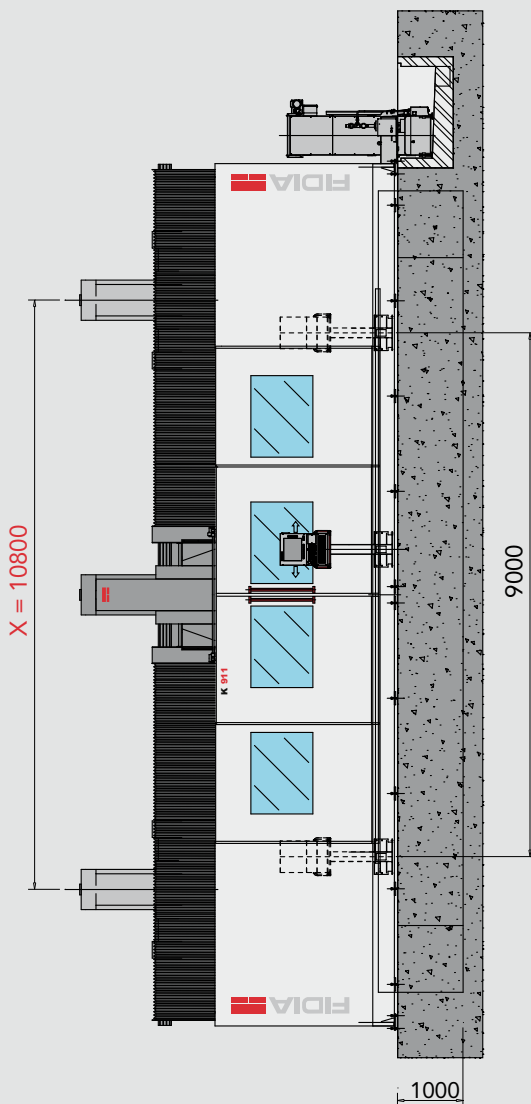


K711 K714 - K1011 K1014

The modular design of X axis bench allows for wide stroke extensions.

K series are ideal for the machining of narrow/long size, structural components, made of light alloy, typically requested by the aerospace sector.

The rack/pinion system guarantees an excellent dynamics for the X axis, whatever the length.

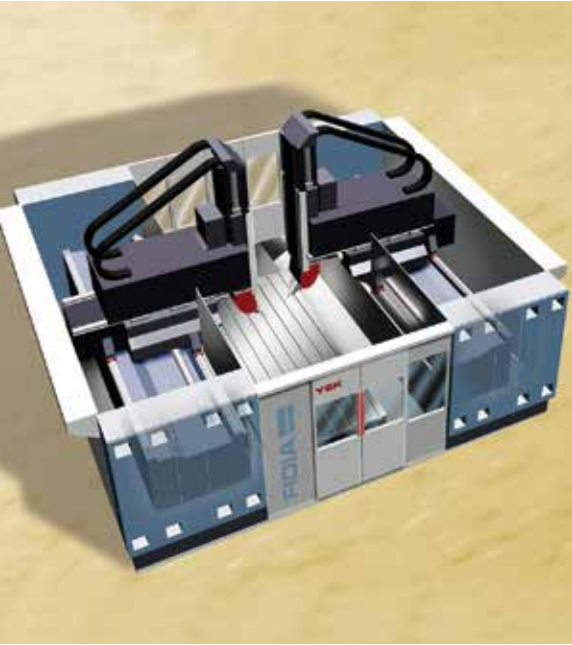




Technical data	K711/714	K1011/1014	
Linear axis travel			
X (*)	7500 mm (295")	10800 mm (425")	
Y (*)	1100 mm (43")		
Z	1000/1400 mm (39"/55")		
Linear axis speed			
	X	Y	Z
	50 m/min (1968 ipm)	40 m/min (1575 ipm)	30 m/min (1181 ipm)
Positioning accuracy			
X	± 0,010 mm (±.0004")	± 0,0125 mm (±.0005")	
Y Z	± 0,005 ± 0,004 mm (±.0002" ±.00015")		
Work-piece table:			
Dimensions	7500 x 1500 mm (295"x 59")	10000 x 1500 mm (394"x 59")	
T-Slots	n° 6 - pitch 250 mm (10")		
Loading capacity	22000 kg (48501 lbs)	37000 kg (81571 lbs)	
Tool magazine			
No of positions	42 - 60 - 84 - 120		
Weight			
	42000 kg (92.500 lbs)	50000 kg (11.0000 lbs)	

(*) +150 mm (6") rotating the C axis with vertical spindle



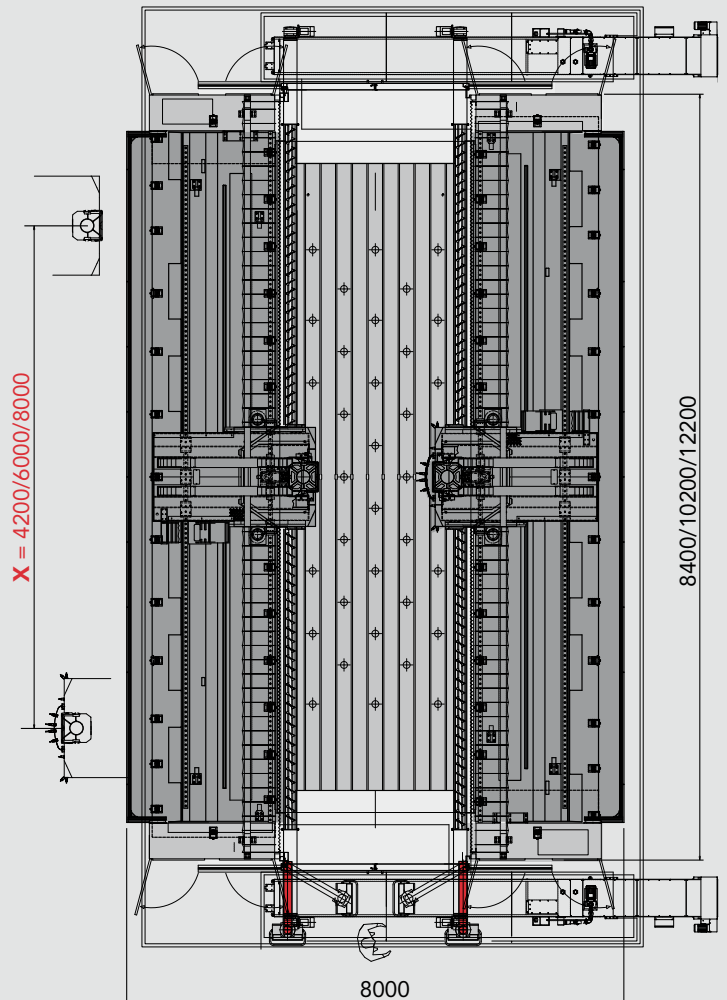
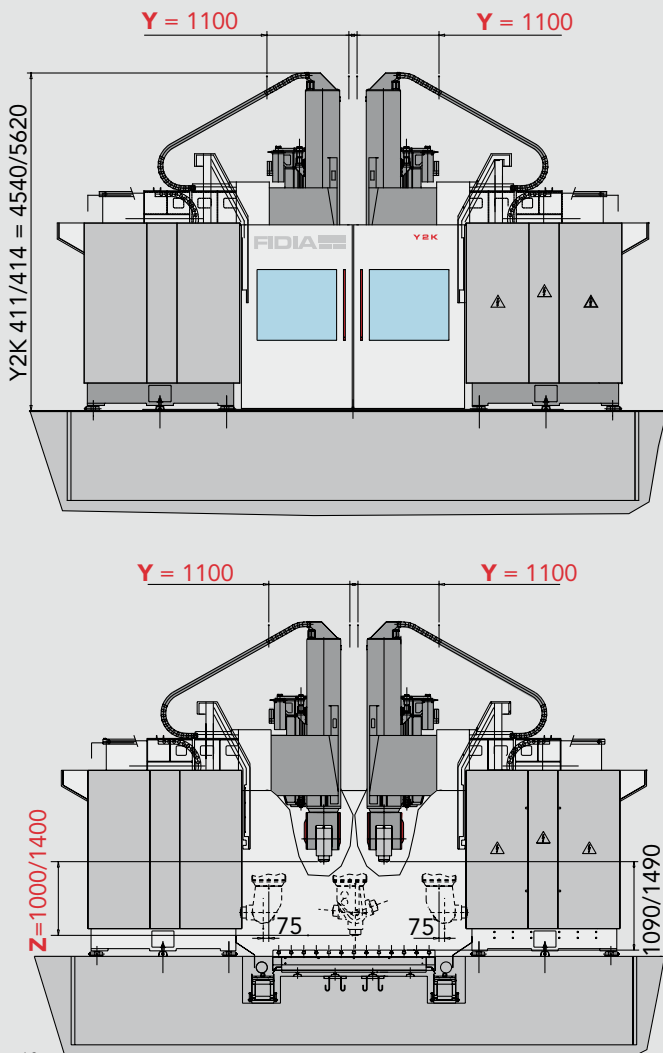


Y2K

Fidia's experience as a unique supplier of global solutions has made this special configuration possible. It consists in the combination of two basic systems sharing the same work-piece table. Productivity is therefore doubled compared to a traditional portal machine.

Furthermore, the extremely flexible software gives excellent results when machining dies, large dimensioned single components or when directly approaching separate pieces. This is achieved thanks to the fact that the 2 NCs allow for independent and different milling part-programmes ensuring total safety for each machine's working area.

A tool measuring system in common with both sections and a piece alignment device grant a correct synchronism between the machines allowing for a perfect and constant machining of parts.





Technical data	Y2K4	Y2K7	Y2K10
Linear axis travel			
X (*)	4200 mm (165")	7500 mm (295")	10800 mm (425")
Y (*)	2200 mm (87")		
Z	1000/1400 mm (39"/55")		
Linear axis speed			
	X	Y	Z
	50 m/min (1968 ipm)	40 m/min (1575 ipm)	30 m/min (1181 ipm)
Positioning accuracy			
X	± 0,0075 mm (±.0003")	± 0,010 mm (±.0004")	± 0,0125 mm (±.0005")
Y Z	±0,005 ±0,004 mm (±.0002" ±.00015")		
Work-piece table:			
dimensions	5000 x 2200 mm (197" x 87")	7500 x 2200 mm (295" x 87")	10000 x 2200 mm (394" x 87")
T-Slots	n° 9 pitch 250 mm (10")		
loading capacity	9000 kg/m ² (1843 lbs/ft ²)		
Tool magazine			
No of positions	2 x 42 - 2 x 84		
Weight			
	64000 kg (13108 lbs)	84000 kg (185000 lbs)	100000 kg (220000 lbs)

(*) +150 mm (6") rotating the C axis with vertical spindle



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