



**vertical turning
& boring mills**



RAFAMET



RAFAMET S.A.

Comprehensive solutions, advanced technologies and cost efficient productivity now much more than ever before are obvious requirements that the right equipment supplier is expected to meet in order to help various industries to be successful, to stay competitive in this global manufacturing market.

For more than a century, RAFAMET has served to meet the diverse needs of the metalworking industry. Today RAFAMET SA is one of the world's leading builders of innovative and productive machine tools.

At the beginning of the twentieth century the foundry shops then existing began producing wheel lathes for machining railway wheel sets. This type of production continues up to the present day.

Since then RAFAMET has developed its products to include special purpose wheel lathes for railways and multi-purpose heavy duty single and double column vertical turning and boring mills.

Over the years the Company has become one of the largest suppliers of special purpose machine tools. It has manufactured more than 6000 heavy duty machines to date. These machine tools have been installed in more than 50 countries in the world.

Whilst maintaining its traditional production, RAFAMET continues to develop new product lines, using the Company's own, engineering task force. Such a development, in recent years, has helped RAFAMET to be able to enter new manufacturing fields, i.e. bridge type milling machines, horizontal lathes, special machines, modular machining centres etc.

Simultaneously RAFAMET has developed the customer service and support program. It's total commitment to customer satisfaction has become a daily routine for the entire RAFAMET's staff. Moreover RAFAMET has been working in the ISO 9001 Quality Assurance/Management Standard environment since 1996.



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Vertical Turning & Boring Mills
KCI series 4**



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KCM 150 N 7**



ISO 9001

**BUREAU VERITAS
Certification**

N°199857



Our work is based on the ISO 9001 quality system, which is continuously being improved and our principal goal is the complete satisfaction of our Customers.

>>> KCI

The KCI double-column Vertical Turning & Boring Mills are designed to perform machining operations in a range of turning, boring, drilling, screw cutting, taper turning, and milling.

All machining operations and measurements are controlled by a computer numerical control system according to a technological program. Together with numerous optional equipments, KCI VTLs are suited to our Customers' specific needs. The machine tool body system consists of a base, two columns, and a connecting beam all mechanically connected what forms a frame structure. The bodies are made as iron castings while the connecting beam is welded. The machine tool basic members as the columns, cross rail, rail head, base, and table are made as the GG-25 iron castings. This ensures

both the machine high geometrical stability and its good vibration damping, better than fabricated structures. This is of great importance especially for the columns and cross rail endangered by thermal dilatations affecting the machine geometrical accuracy.

The table is radially mounted in a double-row roller bearing with adjusted backlash / preload. Axially the table may rests on a thrust roller bearing or on the flat sliding guide ways with hydrostatic lubrication. The hydrostatic lubrication system ensures the oil pressure and the gap between the sliding surfaces are stable for both fast rotation and high table load. A workpiece is clamped by means of four jaws. The table working surface is provided with additional T-slots to enable clamping of asymmetrical workpieces.

Design features:

- Compact design adjusted to machining requirements;

- Possibility of workpiece complex machining in one setup with one or two rail heads;
- Vertical head ram for turning or milling, grinding, drilling, and threading;
- High rigidity and high accuracy of machining;
- Accurate ball screws for X and Y axes and drives through planetary gears;
- Measuring scales of Heidenhein make;
- One or two full toolhead and tool magazines;
- Separate drive for table positioning when milling and drilling;
- ISO 50, CAPTO, KM or other tooling system.

Control is carried out from a main control panel located on a free-standing pendant. Workpiece loading and centering is enabled by additional control panels for one or two rail heads. When tool magazine applied, a special control panel for tool exchange is provided.



Technical Specifications

		KCI	KCI	KCI	KCI	KCI	KCI	KCI	KDC	KDC	
		210/280N	250/280N	320/350N	400/540N	500/550N	500/700N	700/800N	630/700N	700/800N	
Table	Table diameter [mm]	2270	2500	3200	4000	5000	5000	7000	6300	7000	
	Max. turning diameter [mm]	2800	2800	3500	5400	5500	7000	8000	7000	8000	
	Max. turning height (from table surface to ram face) [mm]	2500	2500	2500	2500	4500	3200	3200	4000 5000 ⁽¹⁾ 6000 ⁽¹⁾	4000 5000 ⁽¹⁾ 6000 ⁽¹⁾	
	Max. rotation rates of table [rpm] ⁽²⁾	Cast iron table, roller bearing	170	150	110	95	63	63	40	-	-
		Cast iron table, hydrostatic bearing	-	-	-	-	33	33	20	30	25
		Forged steel table, ball bearing	340	-	-	150	-	-	-	-	-
	C axis [rpm] ⁽³⁾	0.001 to 1.5	0.001 to 1.5	0.001 to 1.5	0.001 to 1.5	0.001 to 1.0	0.001 to 1.0	0.001 to 1.0	0.001 to 1.0	0.001 to 1.0	
	Max. weight of workpiece [x10 kN]	Cast iron table	25	25	30	30	90	90	90	200	200
		Forged steel table	6								
	Power of main driver motor [kW]		80	80	80	80	121	121	121	158	158
		121 ⁽¹⁾	121 ⁽¹⁾	121 ⁽¹⁾	121 ⁽¹⁾	158 ⁽¹⁾	158 ⁽¹⁾	158 ⁽¹⁾	195 ⁽¹⁾	195 ⁽¹⁾	
Cross rail	Vertical travel [mm]	1700	1700	1700	1700	3700	2400	2400	3200 4200 ⁽⁴⁾ 5200 ⁽⁵⁾	3200 4200 ⁽⁴⁾ 5200 ⁽⁵⁾	
	Travel rate [mm/min]	700	700	700	700	700	700	700	350	350	
Rail head and ram	Ram travel (Z axis) [mm]	1500	1500	1500	1500	2500	2100	2100	1800 3000 ⁽⁶⁾	1800 3000 ⁽⁶⁾	
		2100 ⁽¹⁾	2100 ⁽¹⁾	2100 ⁽¹⁾	2100 ⁽¹⁾						
	Rapid travel rate (X and Z axes) [mm/min]	7000	7000	7000	7000	7000	7000	7000	3000 4000 ⁽¹⁾	3000 4000 ⁽¹⁾	
		10000 ⁽¹⁾	10000 ⁽¹⁾	10000 ⁽¹⁾	10000 ⁽¹⁾	10000 ⁽¹⁾	10000 ⁽¹⁾	10000 ⁽¹⁾			
	Ram cross-section [mm]	300 x 300	300 x 300	300 x 300	300 x 300	320 x 320	300 x 300	300 x 300	350 x 420	350 x 420	
	Max. rotation rates of ram tool spindle [rpm] ⁽³⁾	1500	1500	1500	1500	1500	1500	1500	1500 ⁽¹⁾	1500 ⁽¹⁾	
2000 ^{(1), (5)}		2000 ^{(1), (5)}	2000 ^{(1), (7)}	2000 ^{(1), (7)}							
Power of ram tool spindle drive motor [kW] ⁽³⁾	22	22	22	22	29	29	29	37 ⁽¹⁾	37 ⁽¹⁾		
	39 ⁽¹⁾	39 ⁽¹⁾	39 ⁽¹⁾	39 ⁽¹⁾	39 ⁽¹⁾	39 ⁽¹⁾	39 ⁽¹⁾				
Positioning	Accuracy (X axis) [mm] (L=1000 mm)	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	
	Accuracy (Z axis) [mm] (L=1000 mm)	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	
	Accuracy (C axis) [deg] ⁽³⁾	±0.003	±0.003	±0.003	±0.003	±0.003	±0.003	±0.003	±0.007	±0.007	
	Repeatability (X axis) [mm] (L=1000 mm)	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	
	Repeatability (Z axis) [mm] (L=1000 mm)	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	
	Repeatability (C axis) [deg] ⁽³⁾	±0.002	±0.002	±0.002	±0.002	±0.002	±0.002	±0.002	±0.004	±0.004	
Overall dimensions of machine tool	Length [mm]	10330	10330	11100	12950	14000	14750	14750	13700	14630	
	Width [mm]	7700	7700	8700	11100	13060	13800	14700	11400 ⁽⁸⁾	11865 ⁽⁸⁾	
	Height [mm]	7900	7900	8100	8100	11745	9945	9945	11600	11.660	
Weight of machine tool	[x10 kN]	100	100	130	165	220	190	240	330	350	

⁽¹⁾ – Option

⁽²⁾ – Increase of table load limits its max. rotation rates

⁽³⁾ – Available only with turning, drilling, milling rail head

⁽⁴⁾ – For max. turning height of 5000 mm

⁽⁵⁾ – For max. turning height of 6000 mm

⁽⁶⁾ – For max. turning height of 5000 or 6000 mm

⁽⁷⁾ – Only for travel in Z axis of 1500 mm

⁽⁸⁾ – Special execution (limitation of machine tool foundation surface)

>>> KDC

The KDC double-column Vertical Turning & Boring Mills incorporate design features based upon the most recent achievements in machine tool design and heavy duty machining techniques. The KDC VTLs are intended for turning the cylindrical, conic, and curved surfaces as well as the complex shaped workpieces. The rail heads may be provided with a live tool spindle making it possible to perform drilling and milling operations.

The use of the latest Siemens SINUMERIK 840D CNC and digital drive technology ensures maximum performance and the com-

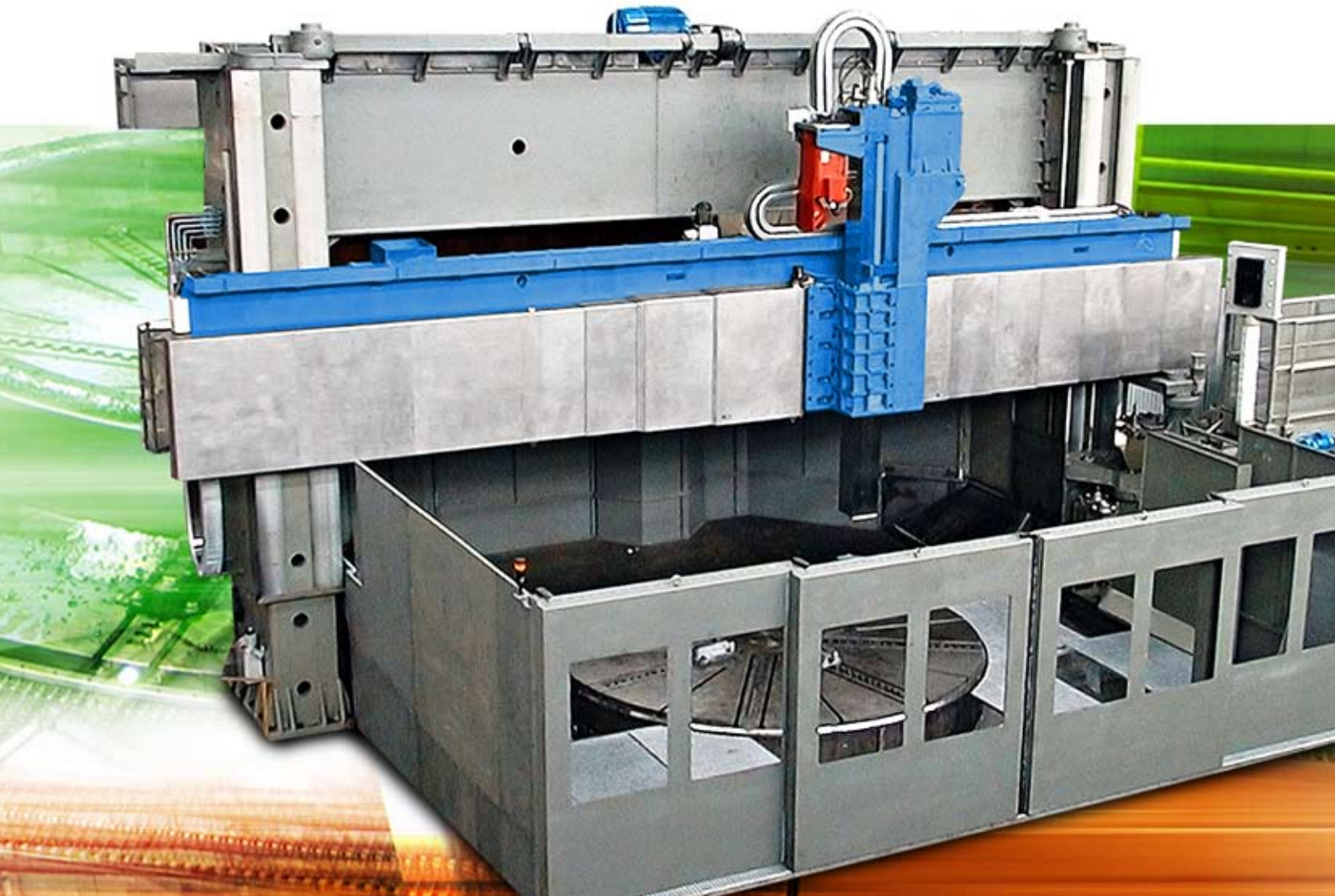
plete compatibility of all drive and control components.

The machine tool basic members as the columns, cross rail, rail head, base, and table are made as high grade iron castings. This ensures both the machine high geometrical stability and its good vibration damping, better than fabricated structures. This is of great importance especially for the columns and cross rail endangered by thermal dilatations affecting the machine geometrical accuracy. Base, table, columns, and cross rail are composed of mechanically connected (bolted) segments.

The table is radially mounted in a double-row roller bearing with adjusted backlash /

preload. Axially the table rests on the flat sliding guide ways with hydrostatic lubrication. The hydrostatic lubrication system ensures the oil pressure and the gap between the sliding surfaces are stable for both fast rotation and high table load.

A workpiece is clamped by means of eight jaws. The table working surface is provided with additional T-slots to enable clamping of asymmetrical workpieces.



>>> KCM

The KCM single-column Vertical Turning & Boring Mills are designed to perform complex machining in range of turning, boring, drilling, reaming, and milling.

All machining operations and measurements are controlled by a computer numerical control system according to a technological program. Together with numerous optional equipments, KCM series VTLs are suited to our Customers' specific needs.

The machine tool main bodies i.e. a base and a column mechanically connected to form a rigid structure. They are made as high grade iron castings.

The table is radially mounted in a double-row roller bearing with adjusted backlash / preload. Axially the table rests on a thrust roller bearing. A workpiece is clamped by means of four jaws. The table working surface is provided with additional T-slots to enable clamping of asymmetrical workpieces.

Design features:

- Compact design adjusted to machining requirements;
- Possibility of workpiece complex machining in one setup with one or two rail heads;
- Vertical head ram for turning or milling, grinding, drilling, and threading;
- High rigidity and high accuracy of machining;
- Accurate ball screws for X and Y axes and drives through planetary gears;
- Measuring scales of Heidenhein make;
- One or two full toolhead and tool magazines;
- Separate drive for table positioning when milling and drilling;
- ISO 50, CAPTO, KM or other tooling system.

Control is carried out from a main control panel located on a free-standing pendant. Workpiece loading and centering is enabled by additional control panels for one or two rail heads. When tool magazine applied, a special control panel for tool exchange is provided.

Technical Specifications

		KCM	
		150 N	
Table	Table diameter[mm]	1500	
	Max. turning diameter [mm]	1800	
	Max. turning height (from table surface to ram face) [mm]	1600	
	Max. rotation rates of table [rpm] ⁽¹⁾	Cast iron table mounted in large-size krzyżowe bearing	250
		Forged steel table mounted in ⁽²⁾ large-size krzyżowe bearing	315
	C axis [rpm] ⁽³⁾	0.005 to 5	
	Max. weight of workpiece [Mg]	Cast iron table	9
		Forged steel table	6
	Power of main driver motor [kW]		55 - 71 ⁽²⁾
	Rail head & ram	Ram travel (Z axis) [mm]	1100
Ram cross-section [mm]		250 x 250	
Max. rotation rates of ram tool spindle [rpm] ⁽³⁾		2000	
Power of ram tool spindle drive motor [kW] ⁽³⁾		12	
Positioning	Accuracy (X axis) [mm] (L=1000 mm)	0.015 - 0.010 ⁽²⁾	
	Accuracy (Z axis) [mm] (L=1000 mm)	0.015 - 0.007 ⁽²⁾	
	Accuracy (C axis) [deg] ⁽³⁾	±0.003	
	Repeatability (X axis) [mm] (L=1000 mm)	0.012	
	Repeatability (Z axis) [mm] (L=1000 mm)	0.012	
	Repeatability (C axis) [deg] ⁽³⁾	±0.002	
Overall dimensions of machine tool	Length [mm]	5500	
	Width [mm]	5850	
	Height [mm]	5680	
Weight of machine tool	[x10 kN]	29	

⁽¹⁾ – Increase of table load limits its max. rotation rates

⁽²⁾ – Option

⁽³⁾ – Available only with turning, drilling, milling rail head





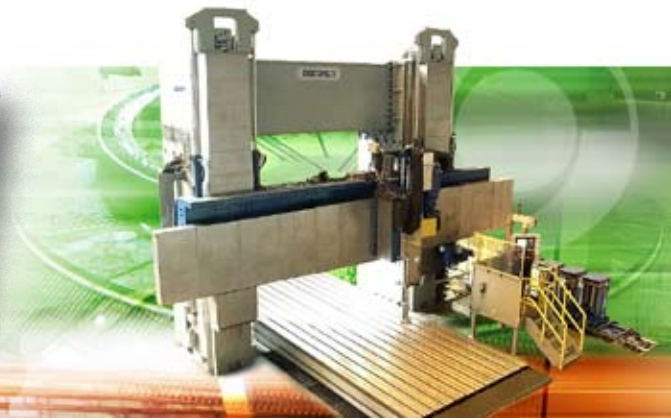
RAFAMET product lines

Besides the Vertical Turning & Boring Mills RAFAMET develops the following product lines:

Horizontal Lathes



Portal Milling Machines



Machine Tools for Shipbuilding Industry



Machine Tools for Railways



RAFAMET S.A.

RAFAMET is one of the worldwide leading companies designing and manufacturing medium- and large-size heavy-duty machine tools.

Engineering & programming

From concept through design & analysis to final implementation, RAFAMET strong engineering & programming task force equipped with 33 Workstations with Solid Edge, AutoCAD, and Prelude CAD Software has the expertise in developing engineering solutions and software programs tailored to meet specific needs of wide variety of metal-working industries.

Own foundry

To ensure required productivity rate and top quality of machined surfaces in the same time, major members of our machine tools are made as heavily-ribbed box-type iron castings providing excellent rigidity and vibration damping of main structures even when machining at high cutting parameters.

- Grey iron: 0.1-40 ton piece
- Ductile iron: 0.1-15 ton piece
- Overall dimensions: 10000×4000×3000 mm

- Pattern making, moulding, heat treatment, laboratory

Contract machining

- As a machine tool builder having great metalworking experience, RAFAMET offers customers a contract machining capability.
- Our stock of machine tools can handle cast iron, forged and fabricated workpieces weighting up to 60 tons within working envelope of 14000×3600×3600 mm.

Service & technical support

- At RAFAMET, we not only build quality machines, we also provide training, service, and support to keep them in peak operating condition.



During installation, operators and maintenance staff receive a specific training on how to use and maintain the machine in order to ensure its best performance and a fault-free operation.

The English / German / Russian speaking servicemen having great skills in CNC machine tools are ready to assist our customers in case of any need.

RAFAMET machine tools users have at their disposal dedicated ISDN-based remote diagnostics facility able to communicate with the machines' control systems for immediate fault recognition and reporting.



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