

**HEAVY DUTY
MACHINE TOOLS
SINCE 1903**

WHT 110 C

PRODUCTION PROGRAMME

HORIZONTAL MACHINING CENTERS

HORIZONTAL BORING MILLS

PORTAL MILLING MACHINES



**VARNSDORF
TOS**

1903

The company
was established

53,7

Milion EUR was the annual
turnover of the company
for the year 2022

30

Football pitches
would fit on the land
of TOS VARNSDORF a.s.

418

Is the number
of employees

19 951

Machines sold
between 1941 and 2022

7

Subsidiaries
companies around
the world

0,01

Machine accuracy
in the order of hundreds
of a millimeter

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TOScontrol

MAIN ADVANTAGES OF THE SYSTEM

- ➔ ON-LINE DATA EXCHANGE WITH ERP SYSTEM
- ➔ SPECIALIZED APPS FOR EXTENSION OF FUNCTIONALITIES
- ➔ USER-FRIENDLY CONTROLS

TOScontrol is a set of applications and functions for advanced machine management. For easy and intuitive operation, the system consists of a default screen with icons for each application (similar to mobile device operating systems). The applications are clearly displayed on the machine's control panel and the operator can switch between them easily. The solution also includes, among other things, user account management. **TOScontrol** is part of the standard equipment of all machines.

STANDARD MACHINE EQUIPMENT



STATUS SCREEN

Clearly displays basic information about the machine (coordinates, program, alarms, logged in user, etc.).



CNC CONTROL SYSTEM

Displays the standard control system screen supplemented by a sidebar with a button for returning to the TOS Control default screen.



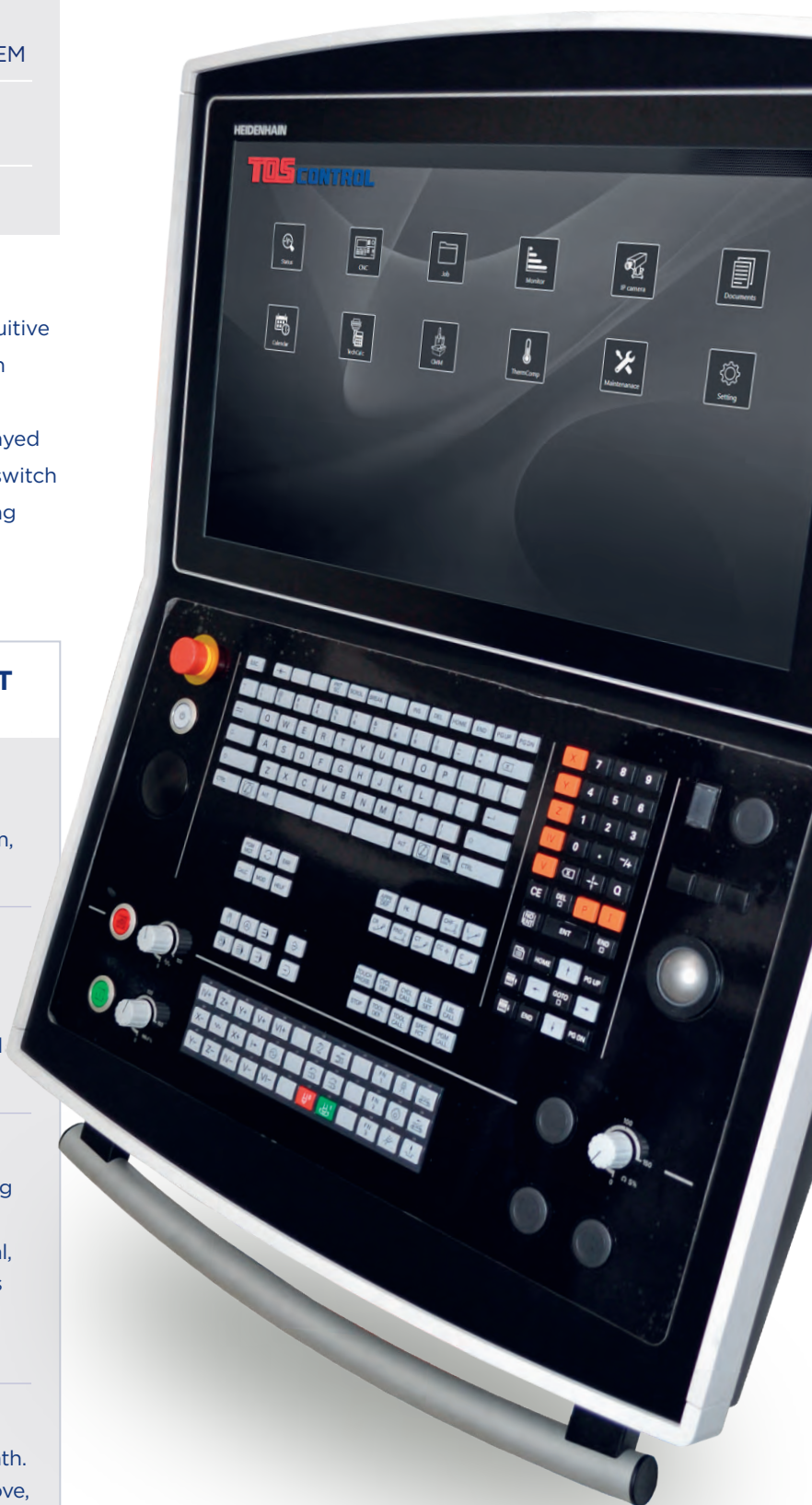
DOCUMENTATION

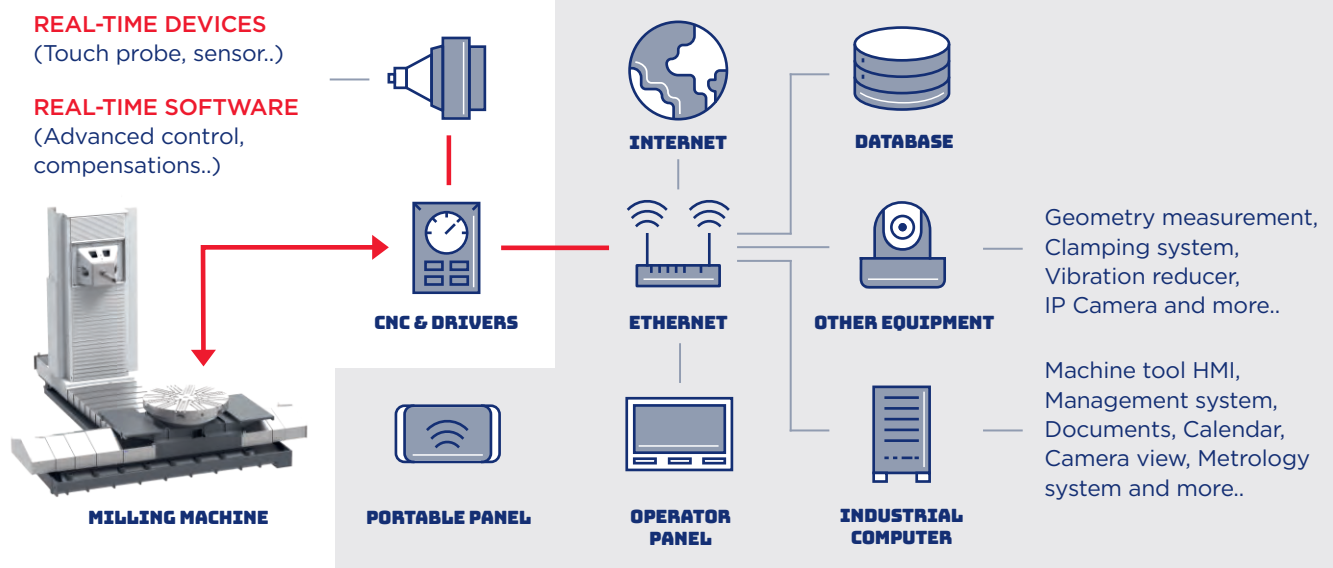
This is an application enabling the reading and management of PDF documents (e.g. operating instructions, repair manual, etc.), including the creation of user rights and the creation of tabs and notes in documents.



CALENDAR

Standard calendar view - day, week, month. Event/ service event - add, change, remove, remind. All data stored in the local database.





OPTION APPLICATIONS

Not included in standard TOS equipment.



IP CAMERA

The application enables control of one or more motorised cameras located on any part of the machine. Data from the camera can also be used to facilitate machine operation.



INSPECTION AND COMPENSATION

This is metrological software integrated into the control system, which together with the touch probe allows the work-piece to be measured accurately and directly on the machine making it possible to perform the automatic compensation of errors and program debugging.



JOB – WORK ADMINISTRATOR

Displays the work order view and the overview of operations directly on the machine tool control panel, which is linked to the ERP system. It is also possible to add other documents into the application, e.g., operation description, photographs, tables of NC programs.



MACHINE MONITOR

An integrated system for monitoring the history of machine tool use. This system displays the time axis of basic machine states, e.g., ready, production, production slowdown, error, off, etc.

UPCOMING APPLICATIONS

Apps we are currently developing.



TECHNOLOGICAL CALCULATOR

A technology consultant for a selected tool that facilitates the selection and control of cutting conditions and provides optimal utilisation of the tool properties.



THERMAL COMPENSATION


This is an application that depicts a virtual model of the machine tool's thermal behaviour and comparison of previously measured thermal deformation with the current thermal conditions of the machine. Based on this comparison, the application compensates the actual thermal deformation of the machine.



PREDICTIVE MAINTENANCE

Expands the machine monitor application to enable service intervention prediction to decrease maintenance costs and prolong machine operation.

CENTERS

The image shows a contemporary architectural space. On the left, a dark, vertically-paneled wall dominates the frame. A horizontal white line, possibly a light fixture or a structural element, cuts across the wall. To the right, a large window or glass partition reveals an outdoor balcony with a metal railing. The balcony has a perforated metal floor. In the foreground, there are various architectural details, including a metal railing and some mechanical components. The overall aesthetic is clean, modern, and industrial.



HORIZONTAL MACHINING CENTERS

WHT 110/130

- ➔ machines with excellent ergonomics and service readiness (applied smart solutions for easy access to service points on the machine)
- ➔ option to apply turning technologies with carousel table
- ➔ compliance with ecological standards (closed system for collection and removal of chips and cooling fluid from the work area)
- ➔ elimination of idle times, non-stop machining (high degree of automation and connection to the production system)
- ➔ highest cutting parameters – high productivity

Machining centres create a modular kit, which can be used for assembling various versions of machines by selecting the modules and their sizes.

Basic modules: stand, table, basic headstocks with horizontal axes of spindle and special headstocks equipped with milling heads with automatically controlled angular position of the spindle.

Supplementary modules: peripheries for automatic tool changer (ATC), automatic pallette changer (APC), technological equipment and various machine coverings.

Machining centres **WHT 110/130** are standardly equipped with complete covering, which prevents spraying of the cooling fluid and scatter of chips.

These machines are built for demanding customers, who can apply very demanding technological procedures.



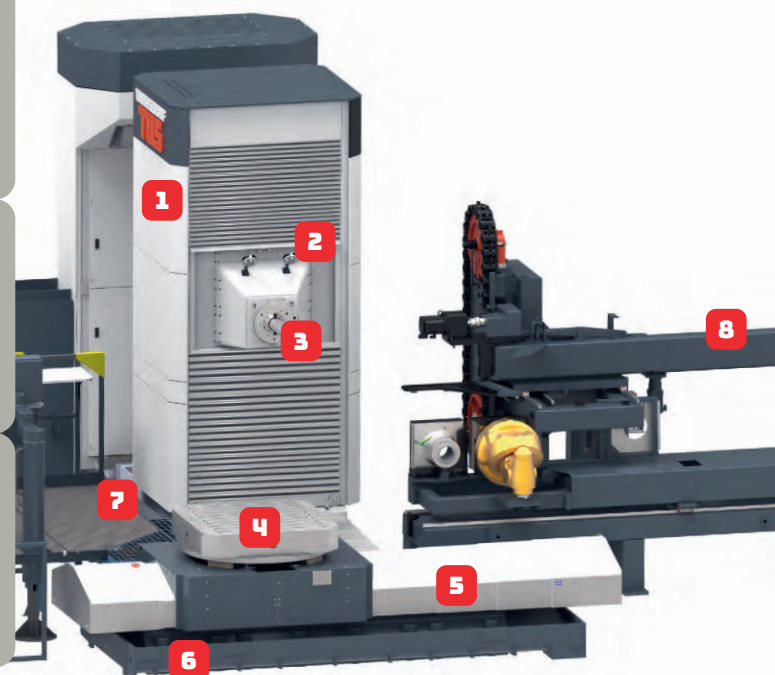
WHT 110/130

MAIN ADVANTAGES OF THE MACHINE

- ➔ TOP TECHNICAL PARAMETERS
- ➔ HIGH DEGREE OF AUTOMATION - SIGNIFICANT REDUCTION OF IDLE TIMES
- ➔ FULL CAROUSEL APPLICATION
- ➔ LOW REQUIREMENTS ON MACHINE INSTALATION
- ➔ MEETS THE MOST DEMANDING ENVIRONMENTAL REQUIREMENTS

The new high-performance **WHT 110/130** is a horizontal machine tool suitable for the most demanding operations that require precise drilling, gear cutting, turning operations or milling.

WHT 110/130 machines may be designed as machining centres with a wide choice of accessories, e.g., automatic change of technological palletes, tools, special accessories, turning tables, and a range of other options that will satisfy the needs of the most demanding applications in areas such as the aerospace industry, power industry, mining industry, oil industry, and engineering industry. These "multi-tasking machines are suitable both for the single-piece and the batch production.



USER FRIENDLY

Machine cover is adapted for easy and fast service access. Simply removable with magnet fixed covers. The machining center is equipped with a rolling shutter along the Z axis.

KEY MACHINE FEATURES

1. maximum machine dimensions:

WHT 110

X 3,000 mm, Y 2,000 mm and Z 2,500 mm
(X 118.1102 inch, Y 78.7401 inch and Z 98.4251 inch)

WHT 130

X 5,000 mm, Y 3,000 mm and Z 3,000 mm
(X 196.8503 inch, Y 118.1102 inch and Z 118.1102 inch)

2. types of headstock:

WHT 110

4,000 RPM, 31 kW (42.1 HP), 1,205 Nm (888.8 ft lb)
6,000 RPM, 31 kW (42.1 HP), 1,375 Nm (1,014.1 ft lb)
7,500 RPM, 40 kW (54.4 HP), 1,245 Nm (918.3 ft lb)

WHT 130

4,000 RPM, 41 kW (55.7 HP), 3,200 Nm (2,360.2 ft lb)
4,500 RPM, 41 kW (55.7 HP), 1,500 Nm (1,106.3 ft lb)
5,000 RPM, 41 kW (55.7 HP), 1,718 Nm (1,267.1 ft lb)
7,500 RPM, 40 kW (54.4 HP), 1,245 Nm (918.3 ft lb)

3. temperature monitoring and compensation on the machine

4. a wide choice of clamping devices rotary table capacity:

WHT 110 up to 6,000 kg (13,227.7 lbs)

WHT 130 up to 20,000 kg (44,092.5 lbs)

carousel table:

WHT 110 Ø 1,600 mm (62.9921 inch), 400 RPM

WHT 130 Ø 2,000 mm (78.7401 inch), 250 RPM

5. linear guideways in X, Y and Z axes ensure a high accuracy and strength of the guide with a very low friction coefficient.

6. the basic parts of the frame (tables, pallets, longitudinal and transverse beds) are made of the highest quality grey cast iron of Czech origin

7. high feed speeds in X, Y, Z axes in two versions:

WHT 110 25,000 mm/min and 40,000 mm/min
(984.2519 ipm and 1,574.8031 ipm)

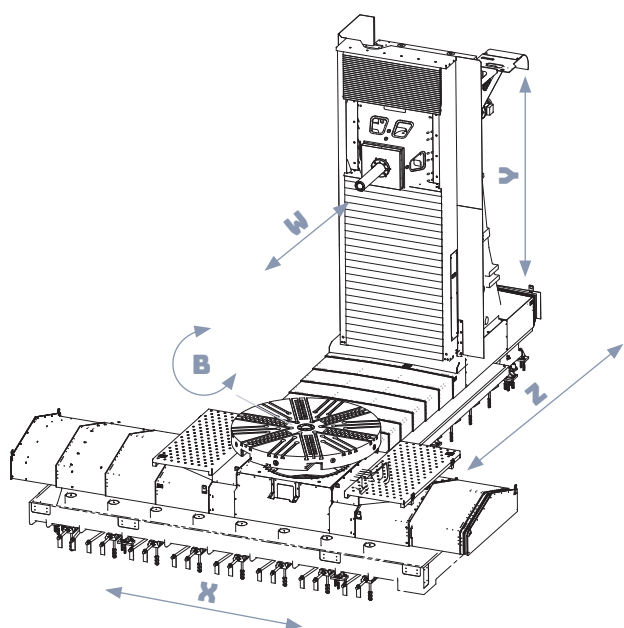
WHT 130 25,000 mm/min and 36,000 mm/min
(984.2519 ipm and 1,417.3228 ipm)

8. automatic replacement of special accessories with two storage sites and a cover plate



MACHINE CONFIGURATION

- + basic machine version with a rotary table, rotation speed of work spindle up to 4,000 RPM
- + machining centre version (automatic pallette and automatic special accessory change, fully covered) with work spindle revolutions up to 6,000/5,000 RPM
- + **WHT 110** machines are equipped with work spindle diameter 112 mm
- + **WHT 130** machines are equipped with work spindle diameter 130 mm



MAXIMUM MACHINE AUTOMATIZATION

Automatic changing of the tools, special accessories, and technological pallets.

MULTIPLE MACHINE UTILIZATION

The machine can be used for milling, boring, gear cutting, turning operations, toothed gear manufacturing, and 5-axis machining.



WHT 110/130

OPTIONAL MACHINE VERSIONS

MACHINE TYPE		WHT 110		
HEADSTOCK				
Work spindle diameter	mm (in)	112 (4.4094)		
Spindle taper		ISO 50 / ISO 50 BIG+		
Spindle speed range	RPM	10–4,000	10–6,000	10–7,500*
Main motor power (S1)	kW (HP)	31 (42.1482)		
Torque on spindle (S1)	Nm (ft lb)	1,205 (888.8)	1,375 (1,041.1)	1,245 (918.3)*
Spindle stroke W	mm (in)	650 (25.5905)		
COLUMN				
Headstock vertical travel Y	mm (in)	1,250, 1,600, 2,000* (49.2125, 62.9921, 78.7401**)		
Longitudinal column adjustment Z	mm (in)	1,500, 2,000, 2,500 (59.0551, 78.7401, 98.4251)		
ROTARY TABLE				
Transverse table travel X	mm (in)	1,500, 2,000, 2,500, 3,000 (59.0551, 78.7401, 98.4251, 118.1102)		
Max. workpiece weight	kg (lbs)	6,000 (13,227.7)		
Table clamping area	mm (in)	1,250 x 1,250, 1,250 x 1,600 (49.2125 x 49.2125, 49.2125 x 62.9921)		
TURNING TABLE				
Transverse table travel X	mm (in)	1,500, 2,000, 2,500, 3,000 (59.0551, 78.7401, 98.4251, 118.1102)		
Max. workpiece weight / max. pallette load	kg (lbs)	6,000 (13,227.7) / 4,000 (8,818.5)		
Table clamping area	mm (in)	Ø 1,600 (62.9921)		
Max. speed	RPM	400		
AUTOMATIC PALLETTE CHANGE (APC)				
Transverse table travel X	mm (in)	1,500, 2,000, 2,500, 3,000 (59.0551, 78.7401, 98.4251, 118.1102)		
Max. workpiece weight	kg (lbs)	6,000 (13,227.7)		
Pallette clamping area	mm (in)	1,250 x 1,250, 1,250 x 1,600 (49.2125 x 49.2125, 49.2125 x 62.9921)		
Max. number of pallets	pcs	2 to 4		
AUTOMATIC TOOL CHANGE (ATC)				
Number of storage sites – chain type magazine	pcs	40, 60, 80		
Number of storage sites – rack type magazine	pcs	100+		
Max. tool diameter				
– with fully loaded magazine	mm (in)	125 (4.9212)		
– with free neighbouring storage sites	mm (in)	320 (12.5984)		
Max. tool length	mm (in)	500 (19.6850)		
Tool change time	s	16		

*Headstock with non-traveling spindle; **Only for the **WHT 110** horizontal boring machine.

OPTIONAL MACHINE VERSIONS

MACHINE TYPE		WHT 130			
HEADSTOCK					
Work spindle diameter	mm (in)	130 (5.1181)			
Spindle taper		ISO 50 / ISO 50 BIG+			
Spindle speed range	RPM	10–4,000	10–4,500	10–5,000	10–7,500*
Main motor power (S1)	kW (HP)	41 (55.7)			
Torque on spindle (S1)	Nm (ft lb)	3,200 (2,360.2)	1,500 (1,106.34)	1,718 (1,267.1)	1,245 (918.3)*
Spindle stroke W	mm (in)	800 (31.4960)			
COLUMN					
Headstock vertical travel Y	mm (in)	1,500, 2,000, 2,500, 3,000 (59.0551, 78.7401, 98.4251, 118.1102**)			
Longitudinal column adjustment Z	mm (in)	1,500, 2,000, 2,500, 3,000 (59.0551, 78.7401, 98.4251, 118.1102)			
ROTARY TABLE					
Transverse table travel X	mm (in)	2,000, 3,000, 4,000, 5,000 (78.7401, 118.1102, 157.4803, 196.8503**)			
Max. workpiece weight	kg (lbs)	20,000 (44,092.5)			
Table clamping area	mm (in)	1,800 x 1,800, 1,800 x 2,200, 1,800 x 2,500, 2,000 x 3,000, 2,500 x 3,000 (70.8661 x 70.8661, 70.8661 x 86.6141, 70.8661 x 98.4252, 78.74016 x 118.1102, 98.4252 x 118.1102)			
TURNING TABLE					
Transverse table travel X	mm (in)	2,000, 3,000, 4,000, 5,000 (78.7401, 118.1102, 157.4803, 196.8503**)			
Max. workpiece weight / max. pallette load	kg (lbs)	10,000 (22,046.2)			
Table clamping area	mm (in)	Ø 2,000 (78.74016)			
Max. speed	RPM	250			
AUTOMATIC PALLETTE CHANGE					
Transverse table travel X	mm (in)	2,000, 3,000, 4,000, 5,000 (78.7401, 118.1102, 157.4803, 196.8503**)			
Max. workpiece weight	kg (lbs)	16,000 (35273.96) / 10,000 (22,046.2)			
Pallette clamping area	mm (in)	1,600 x 1,600, 1,600 x 2,000 (62.9921 x 62.9921, 62.9921 x 78.7401) Ø 2,000 (78.74016)			
Max. number of pallets	pcs	2 to 4			
AUTOMATIC TOOL CHANGE (ATC)					
Number of storage sites – chain type magazine	pcs	40, 60, 80			
Number of storage sites – rack type magazine	pcs	100+			
Max. tool diameter					
– with fully loaded magazine	mm (in)	125 (4.9212)			
– with free neighbouring storage sites	mm (in)	320 (12.5984)			
Max. tool length	mm (in)	500 (19.6850)			
Tool change time	s	16			

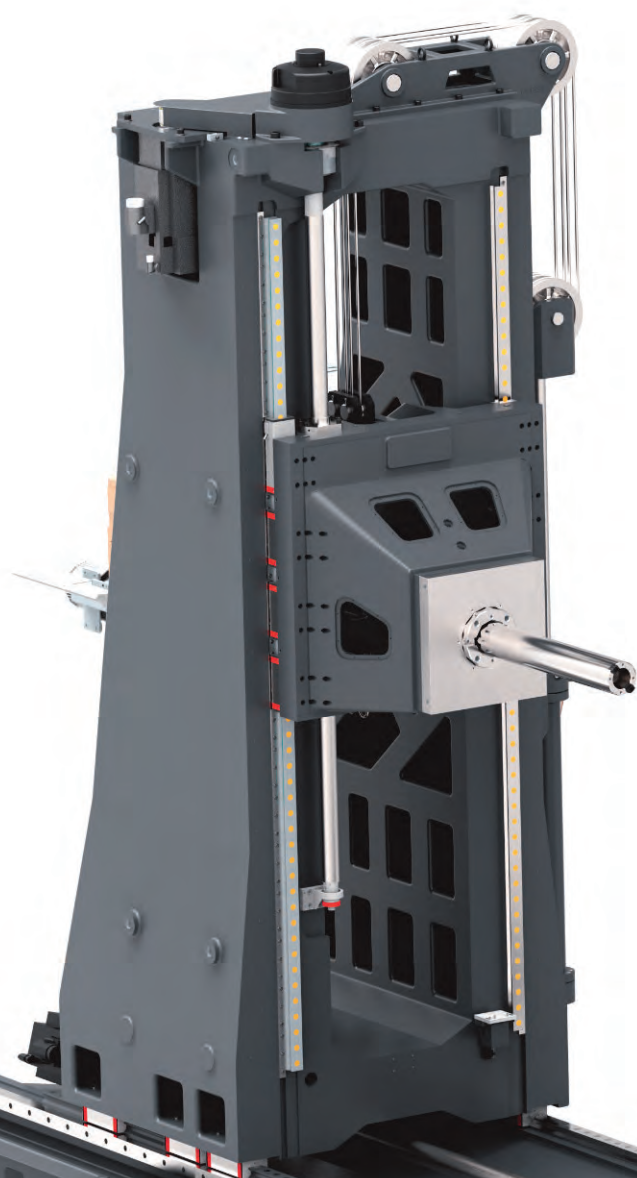
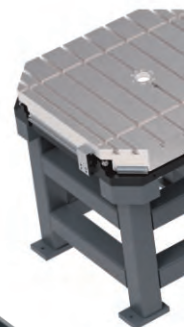
*Headstock with non-traveling spindle; **Only for the **WHT 130** horizontal boring machine.



WHT 110/130

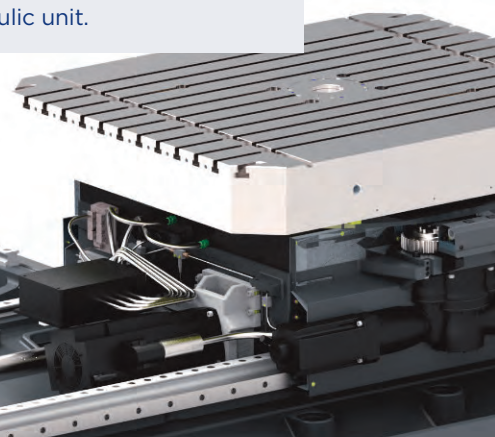
MACHINE FRAME

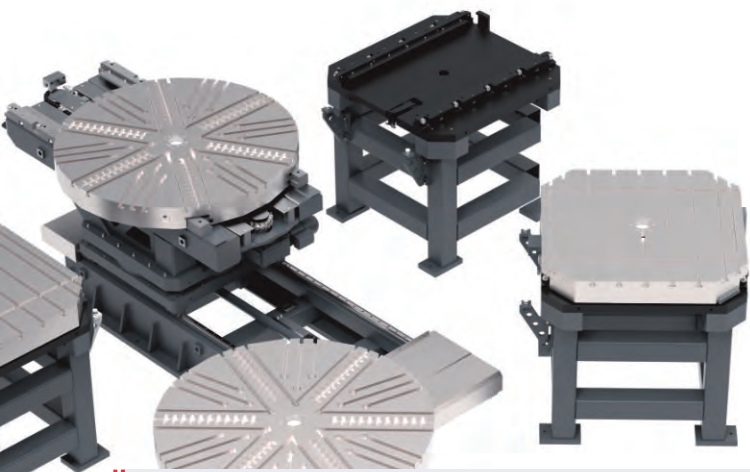
Basic heavy machine parts (tables, palletes, longitudinal and transverse beds) are casted from grey iron. The machine column is designed as a twin-shell casting also made of grey iron with an optimised structure. The high rigidity of the whole machine structure is ensured by joining the X and Z axes together.



BALANCING

The headstock weight is hydro-mechanically compensated (by a hydraulic cylinder) using a standalone hydraulic unit.





AUTOMATIC PALLET CHANGE

Conceptually, the pallet change equipment is based on the automatic change of the technological pallets between the stationary stowage stations and the pallet clamping base on the machine. With 2 pallets design, the pallets are exchanged directly between storage stations and the machine. In case of 3 or 4-pallet system.

X, Y, Z, W AXIS DRIVES

Linear axes are driven by standalone servo-actuators with embedded belt gears and a high lead ball screw with a large pitch. The X and Z axes are driven from the ball screws with rotating ball nuts. The Y and W axis are driven from the rotating ball screws.

TRAVELLING GROUP GUIDES

All the linear travelling machine groups in the X, Y and Z axes are guided in the pre-loaded compact rolling linear guideways. The travelling spindle is sliding in the hollow spindle. Table is mounted on a large-dimensional radial-axial rolling bearing, which has a high load-bearing capacity and rigidity.



CHIP CONVEYOR

The chip conveyor is provided with each version of the machine as a standard part of delivery.

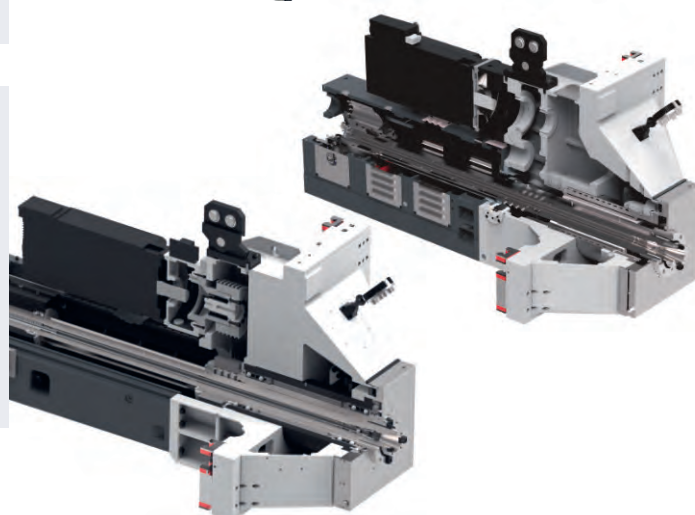


MACHINE CONTROL

Machine control is concentrated on the main control panel. It is mounted on a rotary arm that can be adjusted vertically in the operators position.

CENTRAL HEADSTOCK

The machine is equipped with a central core headstock. This solution is optimum in respect to a uniform thermal and mechanical loading of the machine frame. The spindle is driven from a standardised gear case connected to the main motor. Two mechanical spindle speed ranges are shifted electromechanically. The travelling spindle is sliding in the hollow spindle.





WHT 110/130

MACHINE COVERING

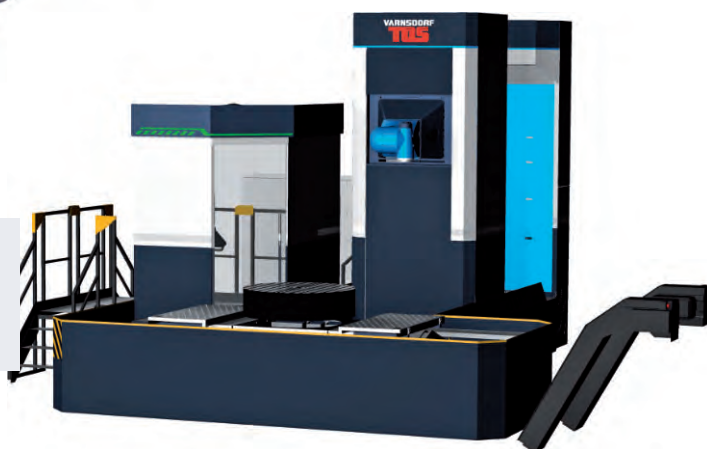


COVERING OF THE MACHINING CENTRE

A complete covering of the machining centre. In addition to the covering, a chip washing option or the workspace exhaustion can be specified.

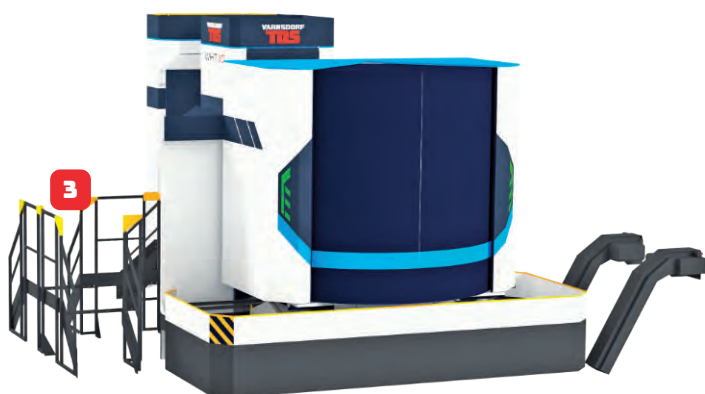
BASIC MACHINE COVERING

Covering basic version: the bed, column and operators place covers.



OPTION DESIGN

1. machine covers with the automatic tool change: bed, column, operators place and automatic tool change covers
2. C cover: the beds, the column, the machine operators station, and the workspace covering along the X and Z axes
3. protective covering of the workspace KVR: the bed, column and operators position covers and workspace protective covering that includes a removable sheet metal cab



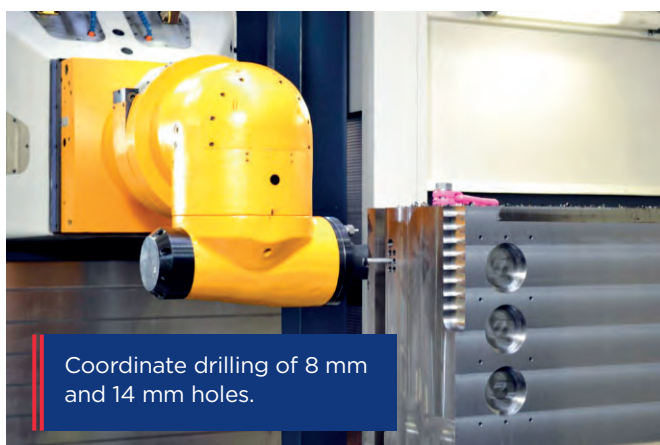
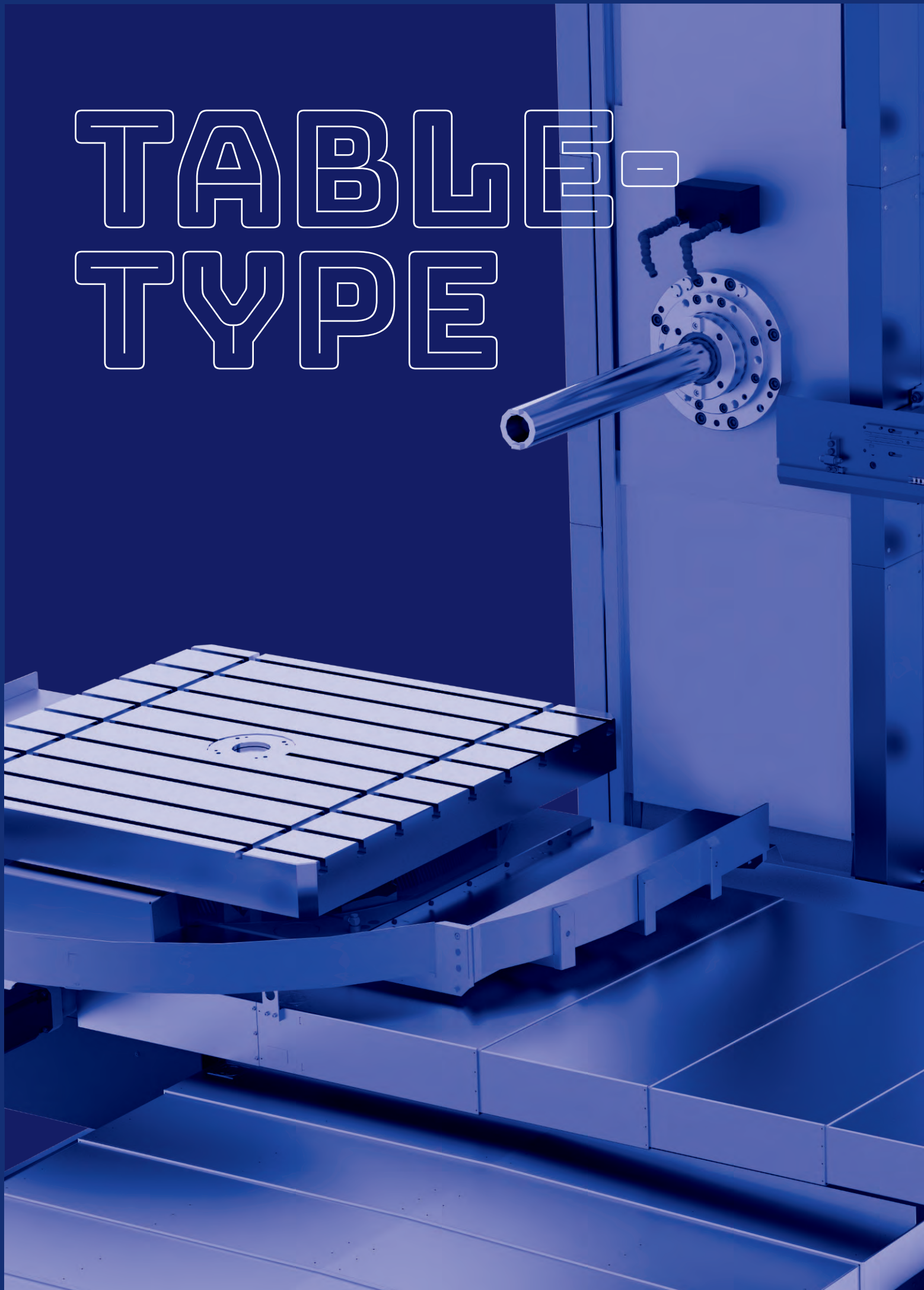


TABLE- TYPE





HORIZONTAL TABLE-TYPE MILLING MACHINES

WH 10

WH 105

WHN 110/130

WHN 13/15

WHR 13

MAXIMA I/II

- ➔ high value to price ratio
- ➔ universal and proven design
- ➔ simple operation, workshop programming
- ➔ option to finish all operations with a single clamping
 - when using a rotary table
- ➔ reduction of idle times - pallet arrangement

Horizontal table-type milling and boring machines with a cross-arrangement of the beds. The machines are on top-class technical level corresponding to the needs of modern progressive technology. The machines design offers a wide choice of versions in all parameters, thus allowing the customer to choose the optimum version. The horizontal table-type machines offer effective machining with a great cutting performance and high precision.

These machines have a proven design and are suitable for universal usage.



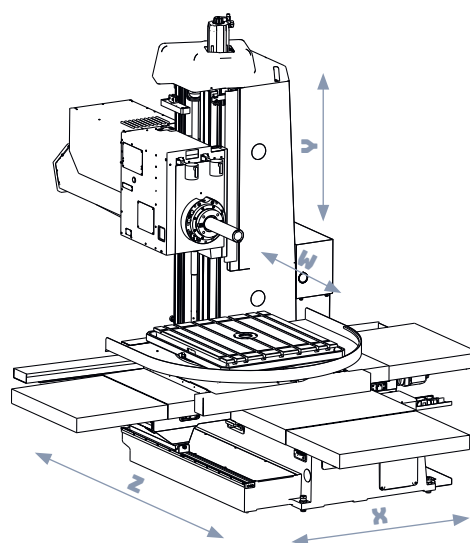
WH 10

MAIN ADVANTAGES OF THE MACHINE

- ➔ SUITABLE FOR SMALL WORKPIECES UP TO 3 TONS
- ➔ POSSIBLE ATC OPTION
- ➔ SUITABLE FOR PIECE OR SMALL BATCH PRODUCTION

WH 10 is a horizontal table-type boring machine with travelling work spindle 100 mm in diameter and maximum weight capacity of the table 3,000 kg. This is the smallest machine in the TOS VARNSDORF range.

The optimally dimensioned structure from grey cast-iron consists of a Fixed Column and a longitudinal bed with a cross moving Rotary Table. Thanks to a rigid structure excellently absorbing vibrations, sufficiently dimensioned drives and accurate guides, the machine is designed for universal cutting operations of Prismatic parts, light



workpieces from cast iron, cast steel and steel including technologically demanding operations. The machine can be extended by special equipment, peripheral devices and special technological equipment (e.g. spindle supports, facing head, milling heads, chucking equipment, etc.).

TECHNICAL PARAMETERS

HEADSTOCK		
Work spindle diameter	mm (in)	100 (3.9370)
Spindle taper		ISO 50
Spindle speed range	RPM	10-2,500
Main motor power (S1 / S6 - 60%)	kW (HP)	22.5 (30.6) / 34 (46.2)
Torque on spindle (S1 / S6 - 60%)	Nm (ft lb)	812 (598.9) / 1,218 (898.4)
Spindle stroke W	mm (in)	710 (27.9527)
COLUMN		
Headstock vertical travel Y	mm (in)	1,100 (43.3070)
Table longitudinal travel Z	mm (in)	940 (37.0078)
ROTARY TABLE		
Transverse table travel X	mm (in)	1,250 (49.2125)
Max. workpiece weight	kg (lbs)	3,000 (6613)
Table clamping area	mm (in)	1,000 x 1,120 (39.3700 x 44.0944)
FEEDS		
Range of feeds (working and rapid traverse) - X, Y, Z, W	mm/min (ipm)	4-8,000 (0.1574-314.9606)
- B	RPM	0.003-2



MACHINE CONFIGURATION

- + basic version with work spindle diameter 100 mm
- + version with an automatic tool change

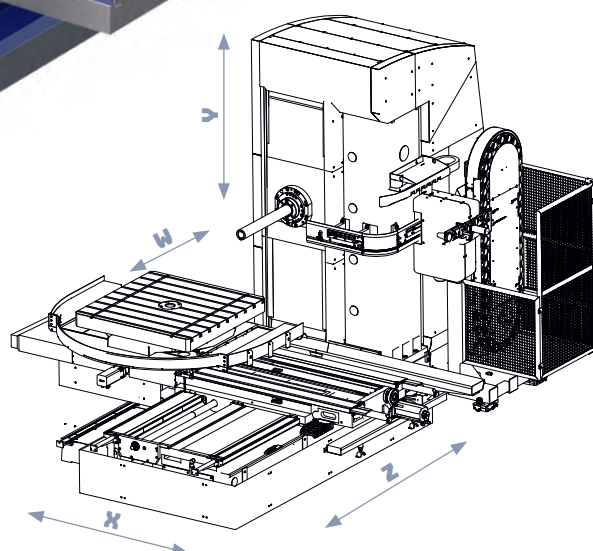


WH 105



MAIN ADVANTAGES OF THE MACHINE

- ➔ COMPACT AND MODERN STRUCTURAL DESIGN
- ➔ WORKPIECE UP TO 4 TONS
- ➔ OPTION TO USE MILLING HEADS



The horizontal milling and boring machine **WH 105** is a modern, efficient, continuously controlled milling machine. The high cutting parameters and broad comfort of technological features predestine this machine for application in very demanding technological operations. The continuous control of the X, Y, Z and W coordinates and the rotating positioning table create conditions for universal application. It can be used for efficient milling

of box-type components from multiple sizes as well as milling of moulds and other complicated workpieces.

The machine can be supplemented with a series of technological devices, which greatly extend technological possibilities.

TECHNICAL PARAMETERS

HEADSTOCK		N	R	R4
Work spindle diameter	mm (in)	105 (4.1338)		
Spindle taper		ISO 50		
Spindle speed range	RPM	10–2,300	10–3,300	10–4,000
Main motor power (S1 / S6 – 60%)	kW (HP)	29 (39.4) / 35 (47.6)		
Torque on spindle (S1 / S6 – 60%)	Nm (ft lb)	1,170/1,462 (862.9/1,078.3)	921/1,148 (679.3/846.7)	
Spindle stroke W	mm (in)	630 (24.8)		
COLUMN				
Headstock vertical travel Y	mm (in)	1,250 (49.2125), 1,600 (62.9921)		
Minimum height of spindle axis above work table	mm (in)	0		
ROTARY TABLE				
Max. workpiece weight	kg (lbs)	5,000 (11,023) / 3,000 (6,613)		
Table clamping area	mm (in)	1,400 x 1,400, 1,400 x 1,600 (55.1181 x 55.1181, 55.1181 x 62.9921)		
Table longitudinal travel Z	mm (in)	1,250 (49.2125)		
Transverse table travel X	mm (in)	1,800 (70.8661) / 2,000 (78.7401)*		
FEEDS				
Range of feeds (working and rapid traverse) – X, Y, Z	mm/min (ipm)	5–10,000 (0.1968–393.7007)		
Range of feeds (working and rapid traverse) – W	mm/min (ipm)	5–8,000 (0.1968–314.9606)		
Range of feeds (working and rapid traverse) – B	RPM	0.003–2		

*Max. workpiece weight 3,000 kg (6,613 lbs).

MACHINE CONFIGURATION

- + basic version with work spindle diameter 105 mm
- + version with an automatic tool change
- + headstock N suitable for power machining
- + headstock R suitable especially for high-performance milling operations
- + R4 headstock high-speed version of headstock up to 4,000 RPM
- + work table with maximum load 3 tonnes or 5 tonnes

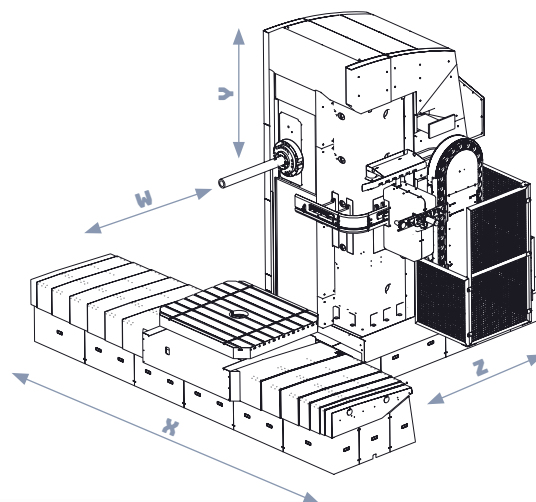




WHN 110/130

MAIN ADVANTAGES OF THE MACHINE

- ➔ UNIVERSAL USAGE
- ➔ POSITIONING MILLING HEADS APPLICATION
- ➔ INCLINED SURFACE MACHINING
- ➔ INTERPOLATION TURNING APPLICATION



The horizontal boring and milling machines

WHN 110/130 are powerful, efficient representatives of the TOS VARNSDORF advanced generation, which responds to the needs of modern progressive technology.

The machines are produced in a cross arrangement of the beds, with a longitudinally adjustable column, a traveling spindle and cross-wise moveable rotary table.

MACHINE CONFIGURATION

- + **WHN 110** – basic version with work spindle diameter 112 mm
- + **WHN 130** basic version with work spindle diameter 130 mm
- + version with an automatic tool change
- + version with an automatic pallet change
- + variable work table clamping area size



TECHNICAL PARAMETERS

MACHINE TYPE		WHN 110	WHN 130
HEADSTOCK		N/R	N/R
Work spindle diameter	mm (in)	112 (4.4094)	130 (5.1181)
Spindle taper		ISO 50 / ISO 50 BIG+	
Spindle speed range	RPM	10-3,300	10-3,000
Main motor power (S1 / S6 - 60%)	kW (HP)	41 (55.7) / 46 (62.5)	
Torque on spindle (S1 / S6 - 60 %)	Nm (ft lb)	1,463 (1,079.1) / 1,811 (1,335.7)	1,624 (1,197.8) / 2,017 (1,487.7)
Spindle stroke W	mm (in)	710 (27.9527)	800 (31.4960)
COLUMN			
Headstock vertical travel Y - version with normal rotary table	mm (in)	1,250, 1,400, 1,600 (49.2125, 55.1181, 62.9921)	1,600, 2,000, 2,500 (62.9921, 78.7401, 98.4251)
- version with technological pallette	mm (in)	1,120, 1,250, 1,400 (44.0944, 49.2125, 55.1181)	1,400, 1,800, 2,240 (55.1181, 70.8661, 88.1889)
Minimum height of spindle axis above work table / pallette	mm (in)	50 (1.9685)/0	
Longitudinal column adjustment Z	mm (in)	800, 1,000, 1,250 (31.4960, 39.3700, 49.2125)	1,000, 1,250, 1,600, 2,000 (39.3700, 49.2125, 62.9921, 78.7401)
ROTARY TABLE			
Max. workpiece weight	kg (lbs)	8,000 (17637)	12,000 (26455.5)
Table clamping area	mm (in)	1,250 x 1,400, 1,400 x 1,600, 1,400 x 1,800* (49.2125 x 55.1181, 55.1181 x 62.9921, 55.1181 x 70.8661*)	1,600 x 1,800, 1,800 x 2,240 (62.9921 x 70.8661, 70.8661 x 88.1889)
Transverse table travel X	mm (in)	1,600, 2,000, 2,500, 3,000 62.9921, 78.7401, 98.4251, 118.1102	2,000, 2,500, 3,000, 3,500, 4,000 78.7401, 98.4251, 118.1102, 137.7952, 157.4803
AUTOMATIC PALLETTE CHANGE			
Max. workpiece weight	kg (lbs)	5,000 (11,023.1)	8,000 (17,636.9)
Pallette clamping area	mm (in)	1,250 x 1,400, 1,250 x 1,600 (49.2125 x 55.1181, 49.2125 x 62.9921)	1,600 x 1,800 (62.9921 x 70.8661)
Number of Pallets in the system		2	2
Total period of automatic pallette change	s	85	85
FEEDS			
Range of feeds (working and rapid traverse) - X, Y, Z, W	mm/min (ipm)	1-10,000 (0.0393-393.7007)	
B	RPM	0.003-2.5	0.003-2

*Reducing table load on 5,000 kg (11,023.1 lbs).

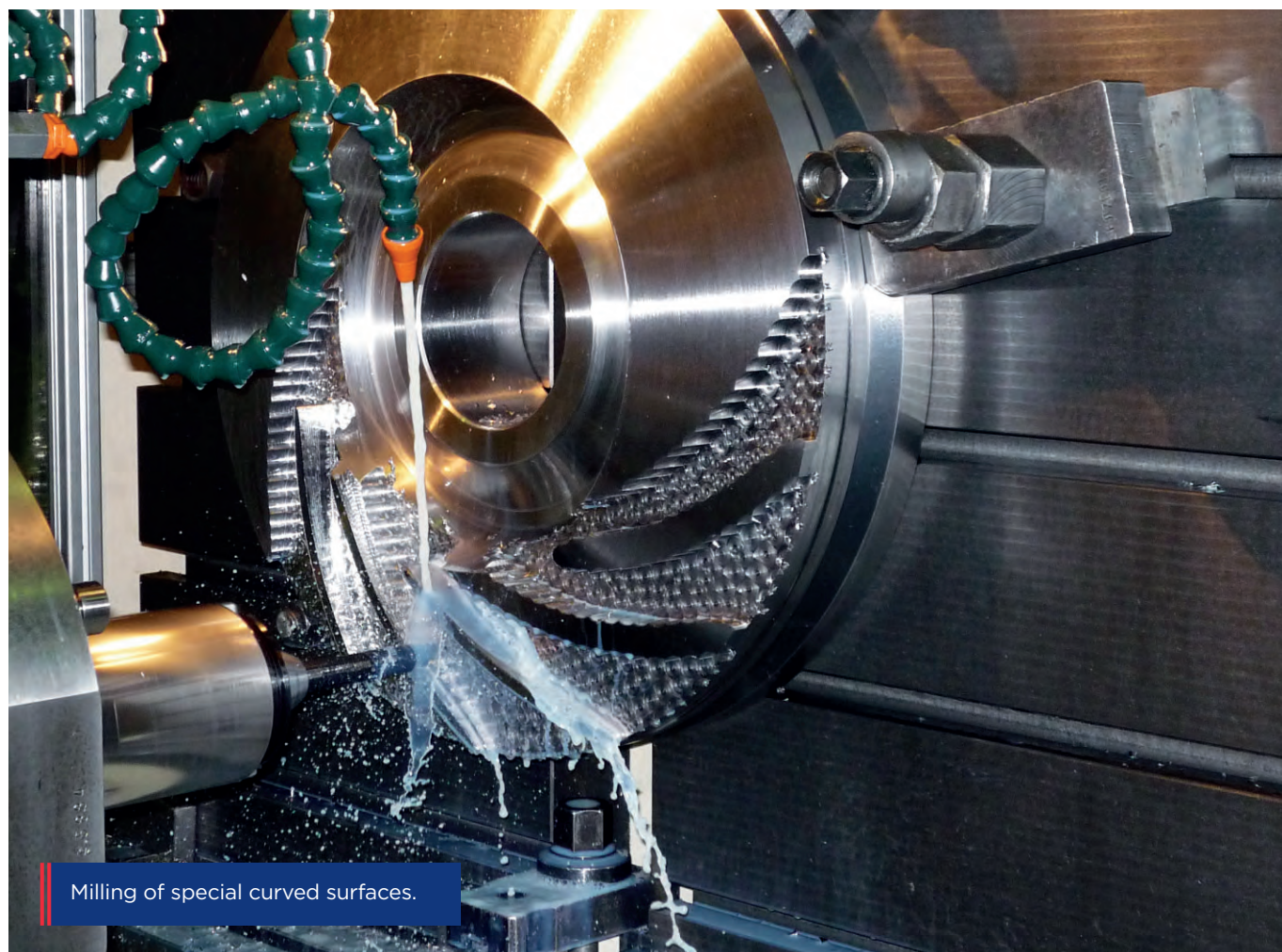


Minimisation of downtime when replacing a workpiece with a pallette system that replaces a product in only 85 seconds.



WHN 110/130

EXAMPLES OF USAGE



Milling of special curved surfaces.



Deep drilling and reaming.



Interpolation turning of large diameter holes.



Drilling and milling at angles.



CoroDrill® DS20

What innovation looks like

After years of R&D and customer testing, we are convinced – CoroDrill® DS20 is truly the best indexable short hole drill on the market.

CoroDrill® DS20 is the first indexable drill to reach hole depths up to 7×DC – with no need for pilot drilling – reducing your cycle time and cost per hole.

We proudly welcome you to discover the new benchmark for indexable drilling – CoroDrill® DS20.

www.sandvik.coromant.com/corodrillds20

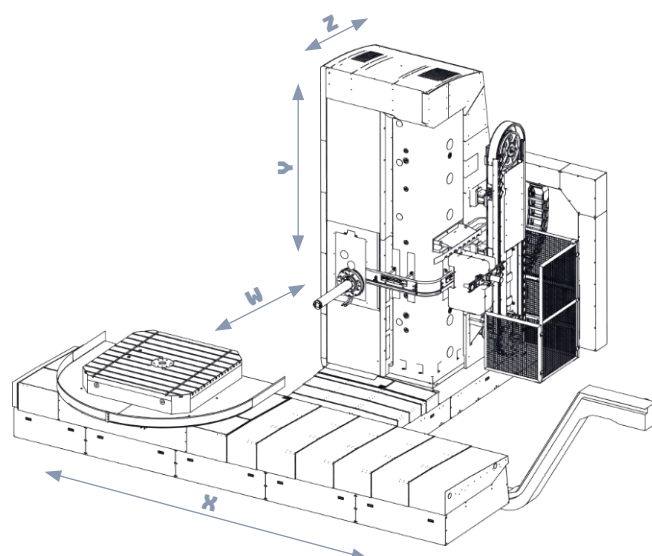
SANDVIK
Coromant



WHN 13/15

MAIN ADVANTAGES OF THE MACHINE

- ➔ VERIFIED AND RIGID STRUCTURAL DESIGN
- ➔ LONG SERVICE LIFE AND RELIABILITY
- ➔ SUITABLE FOR CUSTOMIZED PRODUCTION
- ➔ VARIABLE HEADSTOCK DESIGN
- ➔ OPTION TO USE ATC/APC



The horizontal milling and boring machine **WHN 13/15** is a universal machine designed for precise milling, line-coordinate drilling, boring and thread cutting of box- and board-type workpieces as well as complicated workpieces from cast-iron, steel cast-iron and steel with the weight of up to 25,000 kg. **WHN 13/15** is the most successful machine from the company production. The first model of the machine was produced in 1968. The success of this machine can be documented by the fact that almost 2,800 pieces of these machines have been sold up to now.

It particularly excels in the ratio between capacity and the purchasing costs. The users value the structure of the machine, which guarantees high rigidity and reliability as well as high technical parameters and a broad range and comfort of the technological features. They can be extended with a wide selection of technological accessories that significantly widen the machine technological utility value.



TECHNICAL PARAMETERS

HEADSTOCK		R	R4	15
Work spindle diameter	mm (in)	130 (5.1181)	130 (5.1181)	150 (5.9055)
Spindle taper		ISO 50 / ISO 50 BIG+		
Spindle speed range	RPM	10–3,000	10–4,500	10–3,000
Main motor power (S1 / S6 – 60%)	kW (HP)	41 (55.7) / 49 (66.6)		53 (72.1) / 55 (74.8)
Torque on spindle (S1 / S6 – 60%)	Nm (ft lb)	2,508/3,111 (1,849.8/2,294.6)	1,518/1,800 (1,119.6/1,327.6)	3,114/3,720 (2,296.8/2,743.7)
Spindle stroke W	mm (in)	800 (31.4960)		900 (35.4330)
COLUMN				
Headstock vertical travel Y	mm (in)	2,000, 2,500, 3,000, 3,500 (78.7401, 98.4251, 118.1102, 137.7952)		
Longitudinal column adjustment Z	mm (in)	1,250, 1,600, 2,200, 3,200 (49.2125, 62.9921, 86.6141, 125.9842)		
ROTARY TABLE				
Transverse table travel X	mm (in)	3,500, 4,000, 5,000, 6,000 (137.7952, 157.4803, 196.8503, 236.2204)		
Max. workpiece weight	kg (lbs)	12,000 / 16,000 / 18,000 / 25,000 (26,455.5 / 35,273.9 / 39,683.2 / 55,115.6)		
Table clamping area	mm (in)	1,800 x 1,800 / 1,800 x 2,200 / 1,800 x 2,500 2,000 x 3,000 / 2,500 x 3,000 (70.8661 x 70.8661 / 70.8661 x 86.6141 / 70.8661 x 98.4251 / 78.7401 x 118.1102 / 98.4251 x 118.1102)		
FEEDS				
Range of feeds (working and rapid traverse) – Y, Z	mm/min (ipm)	4–10,000 (0.1574–393.7007)		
– W	mm/min (ipm)	4–10,000 (0.1574–393.7007)		
– X = 3,500 mm (137.7952 inch) / capacity 12,000 kg	mm/min (ipm)	4–10,000 (0.1574–393.7007) / 12,000 (472.4409)		
– X = 3,500 mm (137.7952 inch) / other tables	mm/min (ipm)	4–8,000 (0.1574 – 314.9606)		
– X = 4,000, 5,000, 6,000 mm (157.4803, 196.8503, 236.2204 inch)	mm/min (ipm)	4–8,000 (0.1574 – 314.9606)		
– B capacity 12,000 kg (26,455.5 lbs) / other tables	RPM	0.003–2/1.5		



MACHINE CONFIGURATION

- + **WHN 13** – basic version with work spindle diameter 130 mm
- + **WHN 15** – basic version with work spindle diameter 150 mm
- + version with an automatic tool change
- + machine with a character of a machining centre (automatic tool change and automatic pallet change)
- + wide range of work table designs

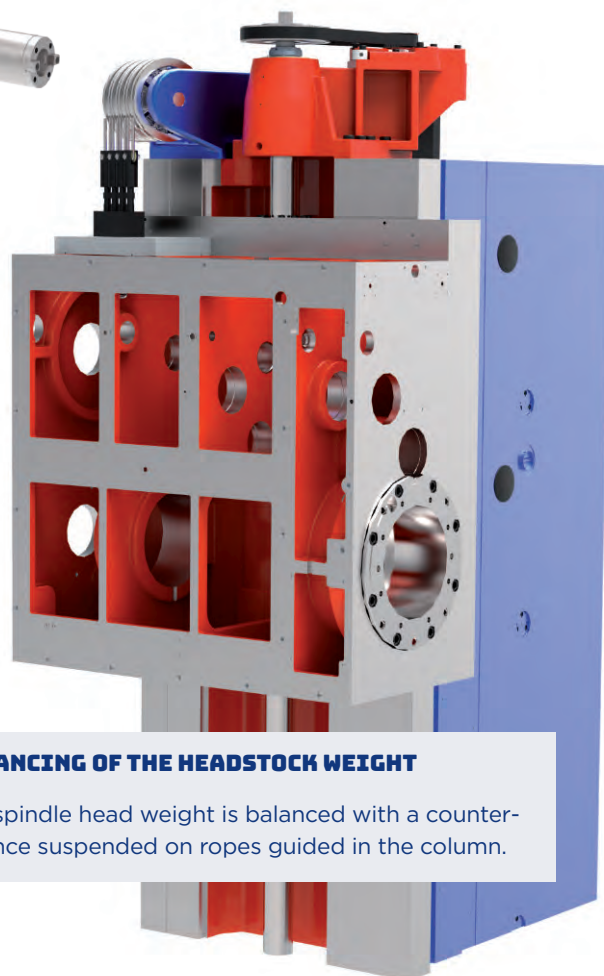
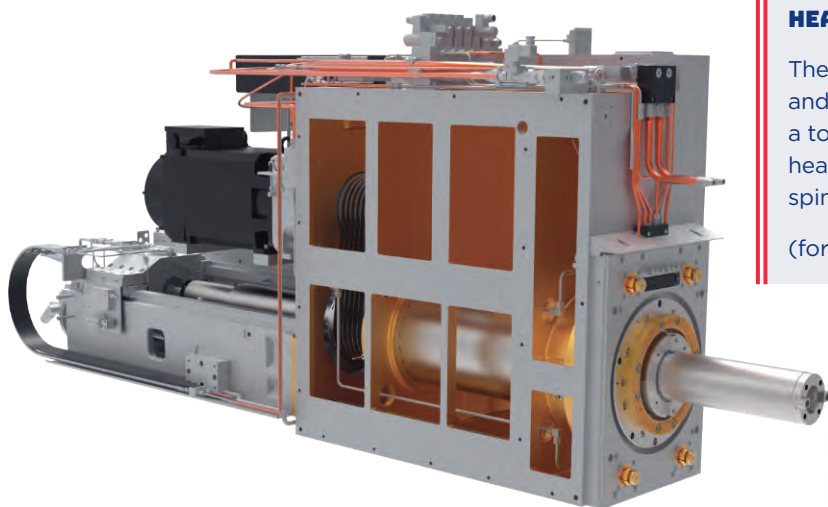
The machine has been manufactured for more than 50 years with almost 2,800 pieces sold.



HEADSTOCK

The headstock contains the spindle drive motor and gearbox together with the W axis drive system a tool clamping system. The main housing of spindle heads consists of an assembly of hollow and work spindles.

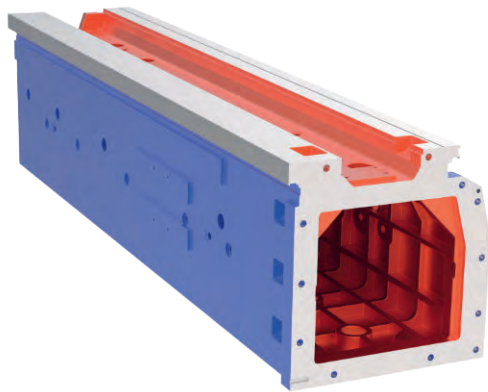
(for more information see page 85 - Headstocks)



BALANCING OF THE HEADSTOCK WEIGHT

The spindle head weight is balanced with a counterbalance suspended on ropes guided in the column.



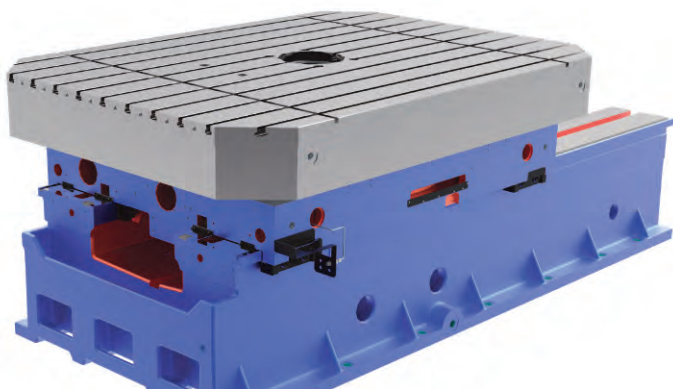
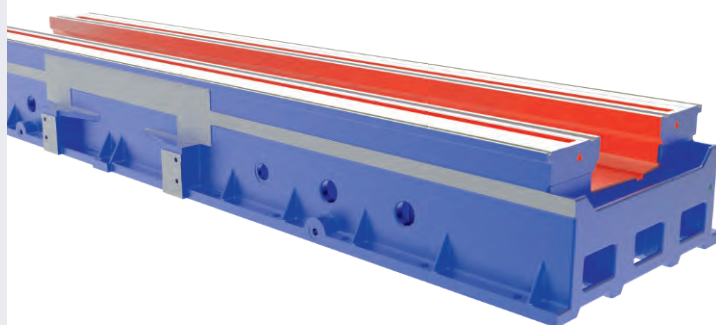


COLUMN

The basic part of the **WHN 13/15** machines are made of high-quality grey cast-iron made in the Czech Republic, which forms a cast-iron skeleton. The structure and the ribbing of the frame guarantee high rigidity.

GUIDES OF ADJUSTABLE GROUPS

Guides of all linear groups are sliding. The main guideways are laser-hardened. Hardened steel rails on guideways are placed under the bearings and on the other stressed places. The counter-surfaces are provided with artificial sliding low-friction materials. In addition, the table carriage slightly lifted by the use of four roller units. Guides on the beds are protected against dirt with telescopic covers, while the machine frame guiding surfaces are protected with bellows covered with steel slats. The table is laid on external circular sliding housing and near the centre on a circular bearing.

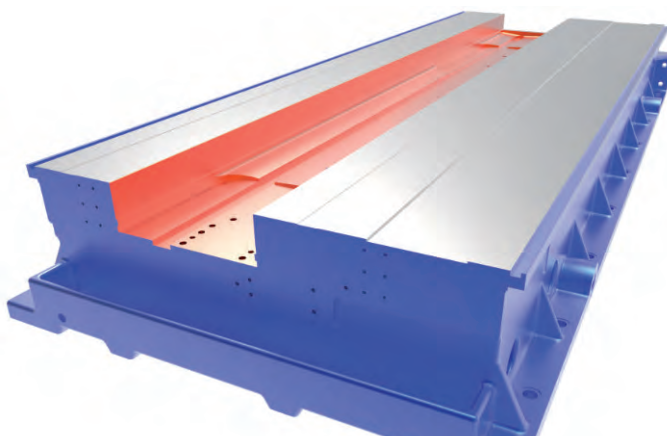


ROTARY TABLE

It is equipped with a rotation sensor, which allows automatic positioning of the table with an increment of 0.001° . After reaching the target position, the table is automatically fixed. Turning of the table is provided as a two-motor drive with two pinions that are engaged in the gear ring.

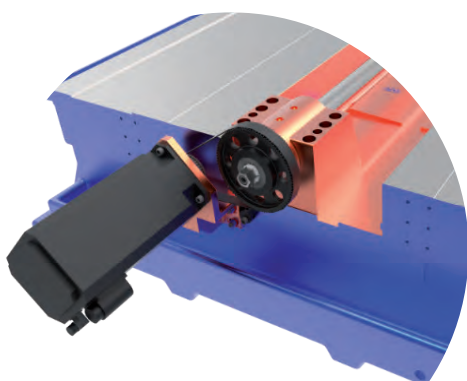
BED

We use the GG 25 cast iron for production of the support sections because of high demands for vibration absorption in the horizontal boring machines. High rigidity of an optimally dimensioned cast-iron frame guarantees high efficiency and productivity of the milling machine while securing top geometrical accuracy of the workpiece.



DRIVES OF FEEDS

The travel units are driven by digitally controlled AC servo drives Siemens. To reach higher travel forces, an allowance-free gear is inserted between the servo drive and the ball screw.





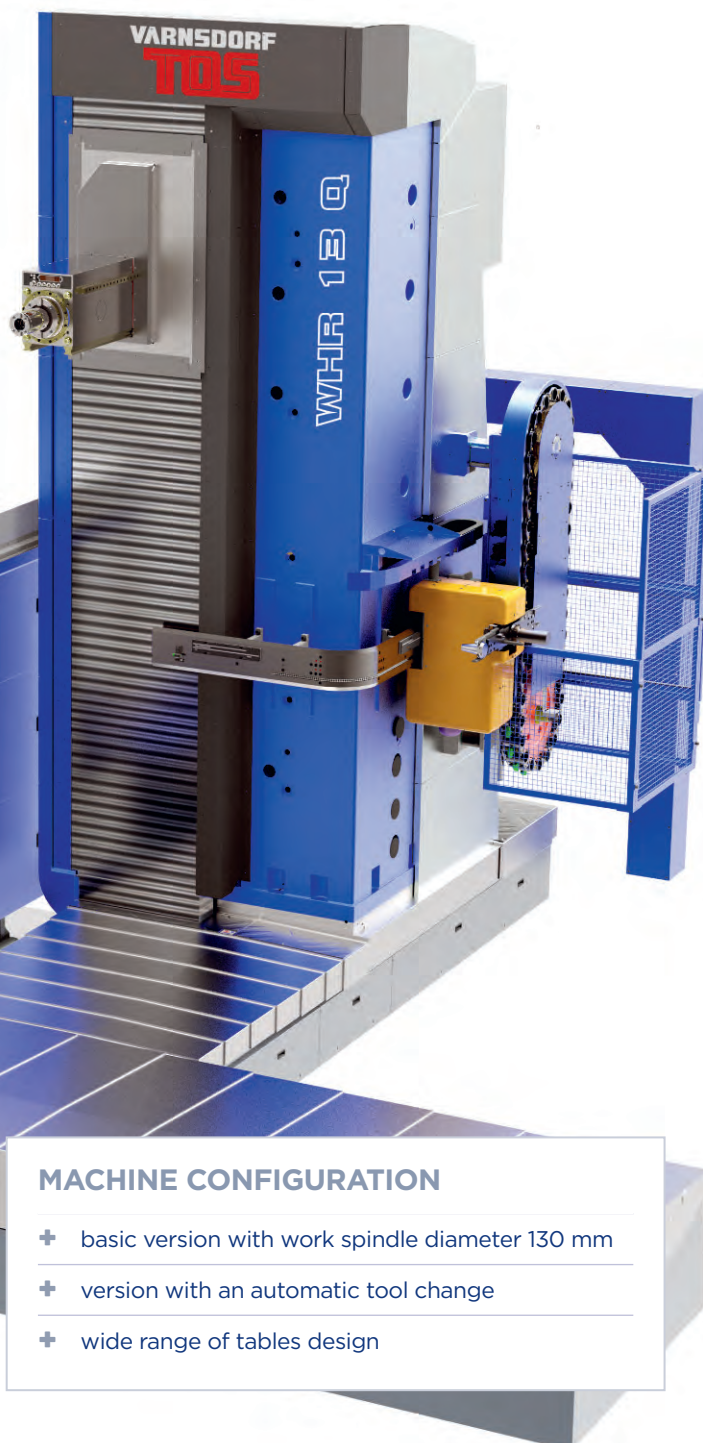
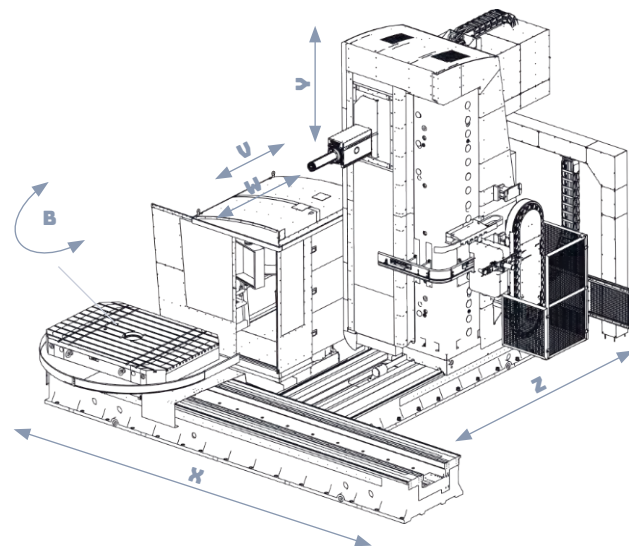
WHR 13

MAIN ADVANTAGES OF THE MACHINE

- ➔ MULTIPLE SIDE MACHINING
- ➔ SPINDLE REACH BEYOND TABLE CENTER
- ➔ COMFORTABLE USAGE OF MILLING HEADS

The latest representative of horizontal table-type boring machines **WHR 13** produce by TOS VARNSDORF.

The **WHR 13** has been developed from the most successful generation of table-type WHN 13 CNC machines, which have reached customers all around the world over the past few decades (more than 2,800 of all versions and types have been sold) and they are still popular and in high demand. The WHN 13 machines have become through their unique properties, reliability and power parameters a standard for all machines in this category. The horizontal boring machine **WHR 13** takes the best from its predecessor and, using the most modern technology, represents another step forward in its class.



MACHINE CONFIGURATION

- + basic version with work spindle diameter 130 mm
- + version with an automatic tool change
- + wide range of tables design

TECHNICAL PARAMETERS

HEADSTOCK		
Work spindle diameter	mm (in)	130 (5.1181)
RAM size	mm (in)	320 x 400 (12.5984 x 15.7480)
Spindle taper		ISO 50 / ISO 50 BIG+
Spindle speed range	RPM	10–3,000
Main motor power (S1 / S6 – 60%)	kW (HP)	41 (55.7) / 46 (62.5)
Torque on spindle (S1 / S6 – 60%)	Nm (ft lb)	2,542/3,111 (1,874.9/2,294.6)
Spindle stroke W	mm (in)	650 (25.5905)
RAM stroke V	mm (in)	700 (27.6)
COLUMN		
Headstock vertical travel Y	mm (in)	2,000, 2,500, 3,000 (78.7401, 98.4251, 118.1102)
Longitudinal column adjustment Z	mm (in)	1,250, 1,600, 2,200, 3,200 (49.2125, 62.9921, 86.6141, 125.9842)
ROTARY TABLE		
Transverse table travel X	mm (in)	3,500, 4,000, 5,000, 6,000 (137.7952, 157.4803, 196.8503, 236.2204)
Max. workpiece weight	kg (lbs)	12,000 / 16,000 / 18,000 / 25,000 (26455.5 / 35273.9 / 39683.2 / 55115.6)
Table clamping area	mm (in)	1,800 x 1,800 / 1,800 x 2,200 / 1,800 x 2,500 2,000 x 3,000 / 2,500 x 3,000 (70.8661 x 70.8661 / 70.8661 x 86.6141 / 70.8661 x 98.4251 / 78.7401 x 118.1102 / 98.4251 x 118.1102)
FEEDS		
Range of feeds (working and rapid traverse) – Y, Z, W, V	mm/min (ipm)	5–10,000 (0.1574–393.7007)
– X = 3,500 mm (137.7952 inch) / capacity 12,000 kg	mm/min (ipm)	4–10,000 (0.1574–393.7007) / 12,000 (472.4409)
– X = 3,500 mm (137.7952 inch) / other tables	mm/min (ipm)	4–8,000 (0.1574–314.9606)
– X = 4,000, 5,000, 6,000 mm (157.4803, 196.8503, 236.2204 inch)	mm/min (ipm)	4–8,000 (0.1574–314.9606)
– B capacity 12,000 kg (26,455.5 inch) / other tables	RPM	0.003–2/1.5



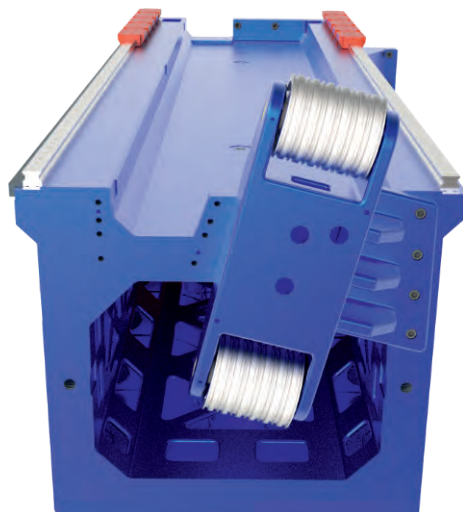
The robotic manipulator provides effective tool exchange in the main spindle and milling head.



WHR 13

COLUMN

The basic part of the machine frames made by TOS VARNSDORF are of high-quality grey cast-iron made in the Czech Republic, which forms a cast-iron skeleton. The structure and the ribbing of the frame guarantee high rigidity.

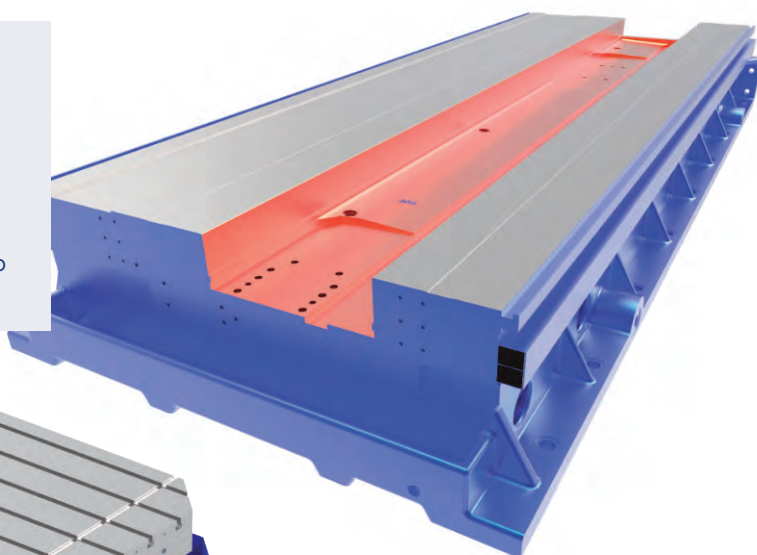


DRIVES OF FEEDS

The travel units are driven by digitally controlled AC servo drives Siemens. To reach higher travel forces, an allowance-free gear is inserted between the servo drive and the ball screw.

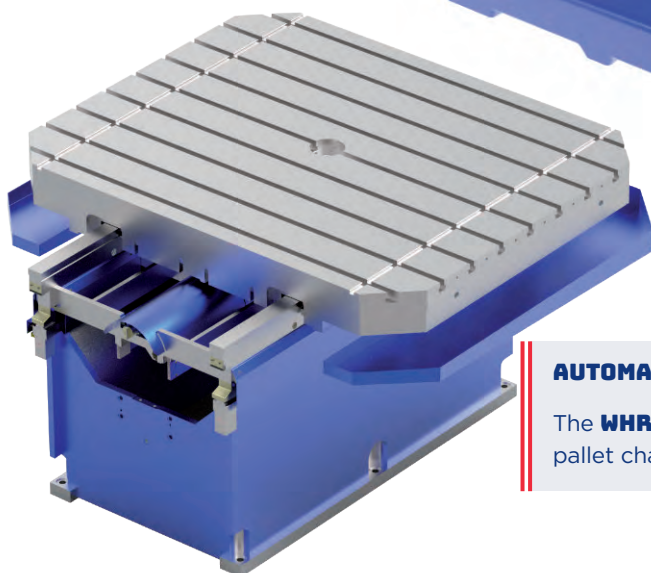
BED

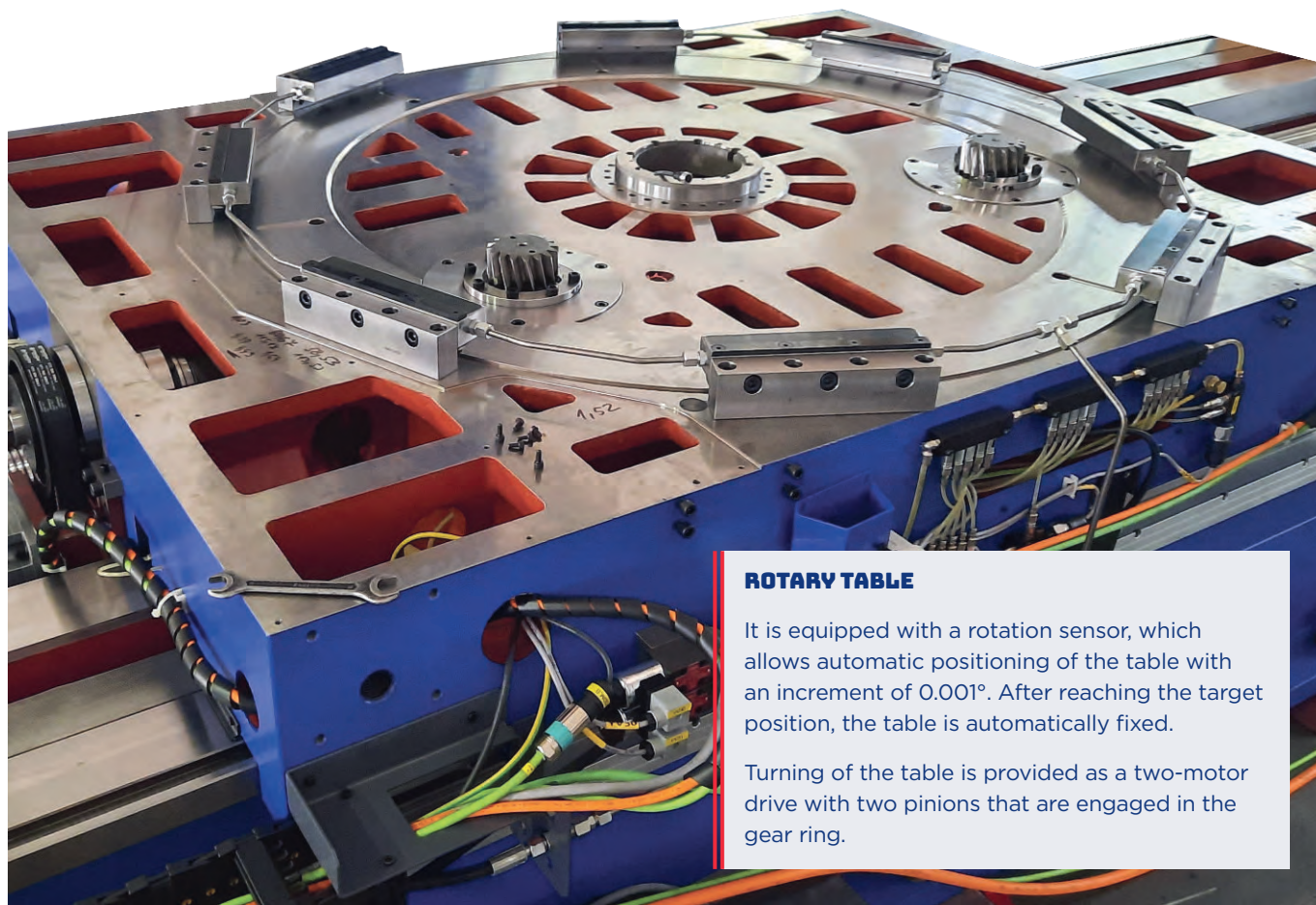
We use the GG 25 cast iron for production of the support sections because of high demands for vibration absorption in the horizontal boring machines. High rigidity of an optimally dimensioned cast-iron frame guarantees high efficiency and productivity of the milling machine while securing top geometrical accuracy of the workpiece.



AUTOMATIC PALLETE CHANGE

The **WHR 13** machine can be equipped with automatic pallet change; for more information see page 65.

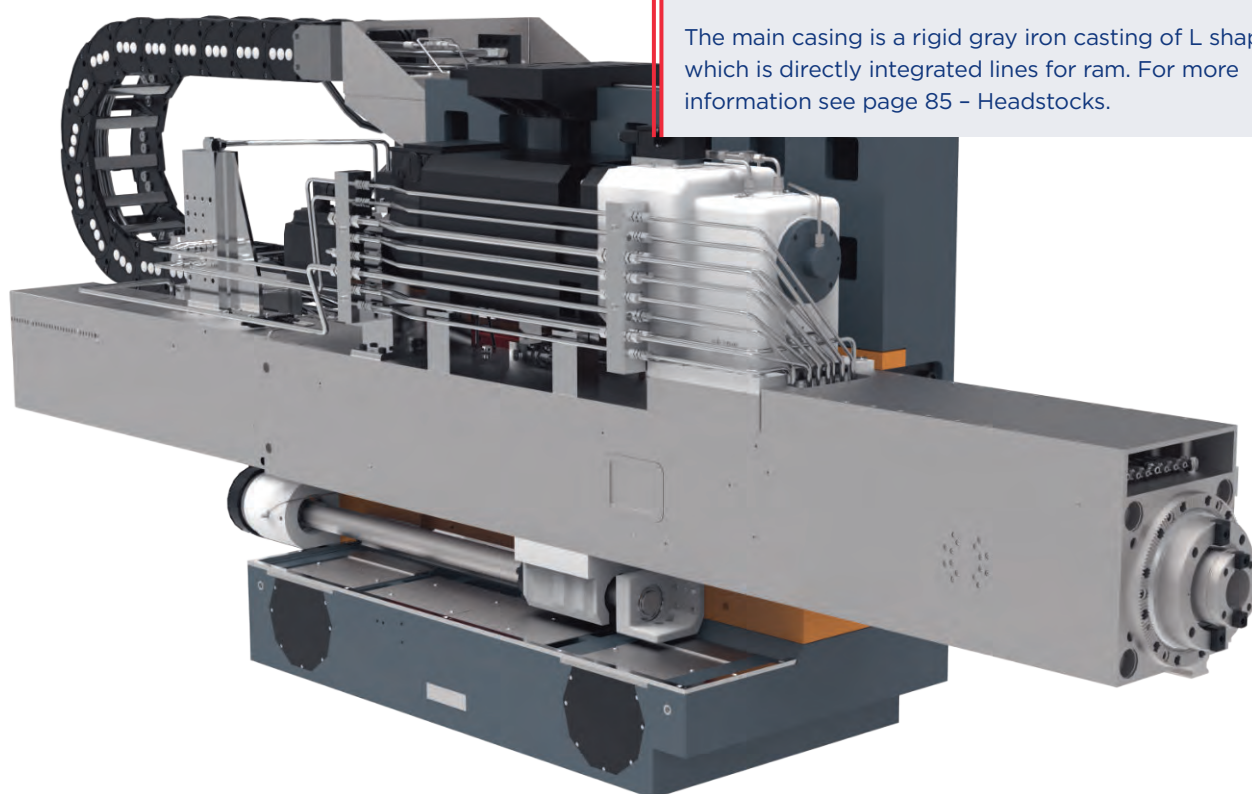




ROTARY TABLE

It is equipped with a rotation sensor, which allows automatic positioning of the table with an increment of 0.001° . After reaching the target position, the table is automatically fixed.

Turning of the table is provided as a two-motor drive with two pinions that are engaged in the gear ring.



HEADSTOCK

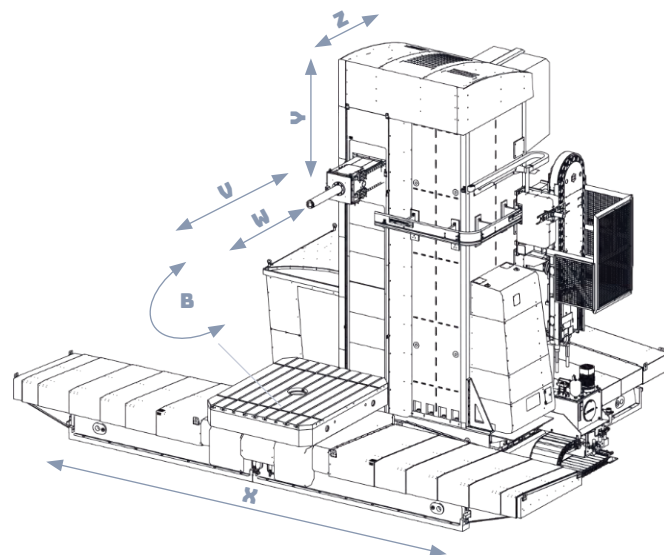
The main casing is a rigid gray iron casting of L shape which is directly integrated lines for ram. For more information see page 85 – Headstocks.



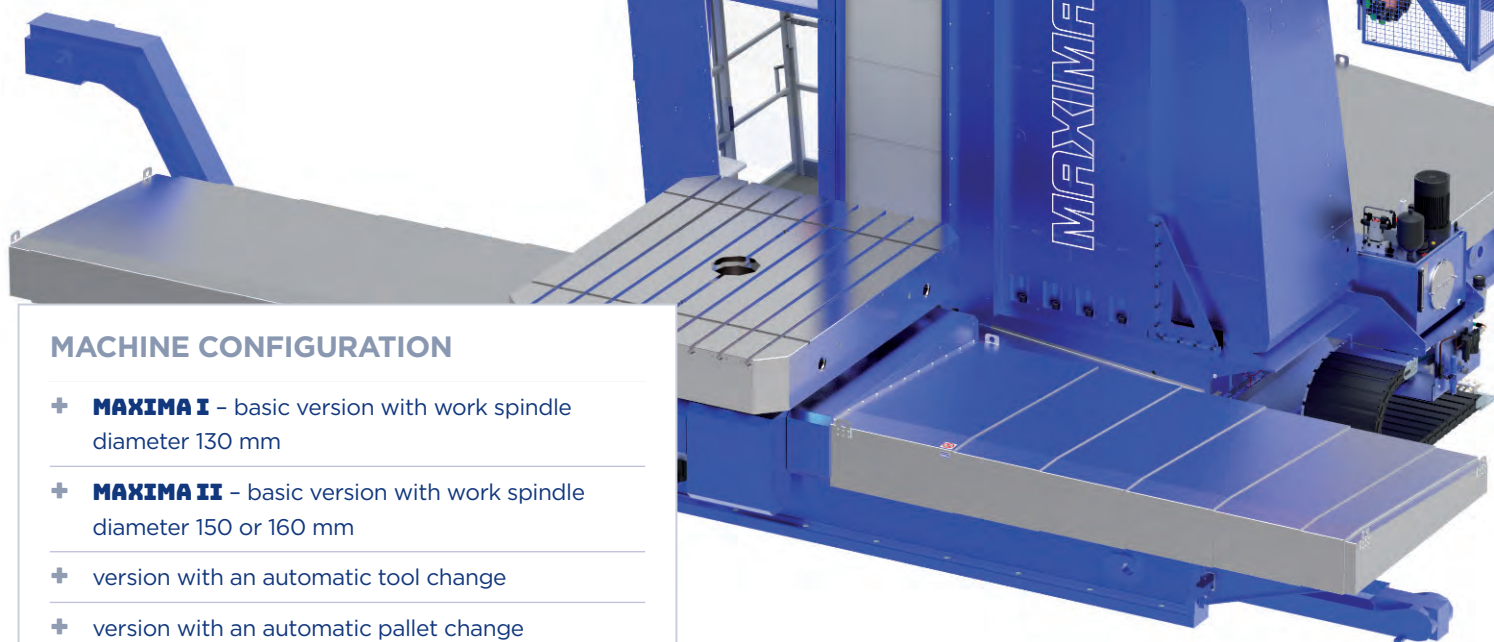
MAXIMA I/II

MAIN ADVANTAGES OF THE MACHINE

- STRONG, POWERFUL, VERTICAL TABLE BORING MACHINE
- EXTENDABLE RAM, A WIDE RANGE OF HEADS
- COMPLETE PROCESSING OF WORKPIECES UP TO 50 TONS
- HIGH RIGIDITY AND PRECISION



The horizontal table-type boring machines **MAXIMA I/II** are another representative of the CNC generation of TOS VARNSDORF machines, which excel in the top level of performance parameters and a user comfort based on technically advanced concept and a broad offer of variants and user functions. The structure of the machine is based on structural groups of the WRD machines, which are arranged in a cross-mounting of the table-type machines. The **MAXIMA** boring machines are characterized by a modern technical design of the structure and high level of performance. The **MAXIMA** machines are equipped with a traveling RAM and a work spindle. The machine can be supplemented with a series of technological devices, which greatly extend the machines potentialities.



MACHINE CONFIGURATION

- + **MAXIMA I** – basic version with work spindle diameter 130 mm
- + **MAXIMA II** – basic version with work spindle diameter 150 or 160 mm
- + version with an automatic tool change
- + version with an automatic pallet change
- + work table with maximum load 30 tonnes or 50 tonnes

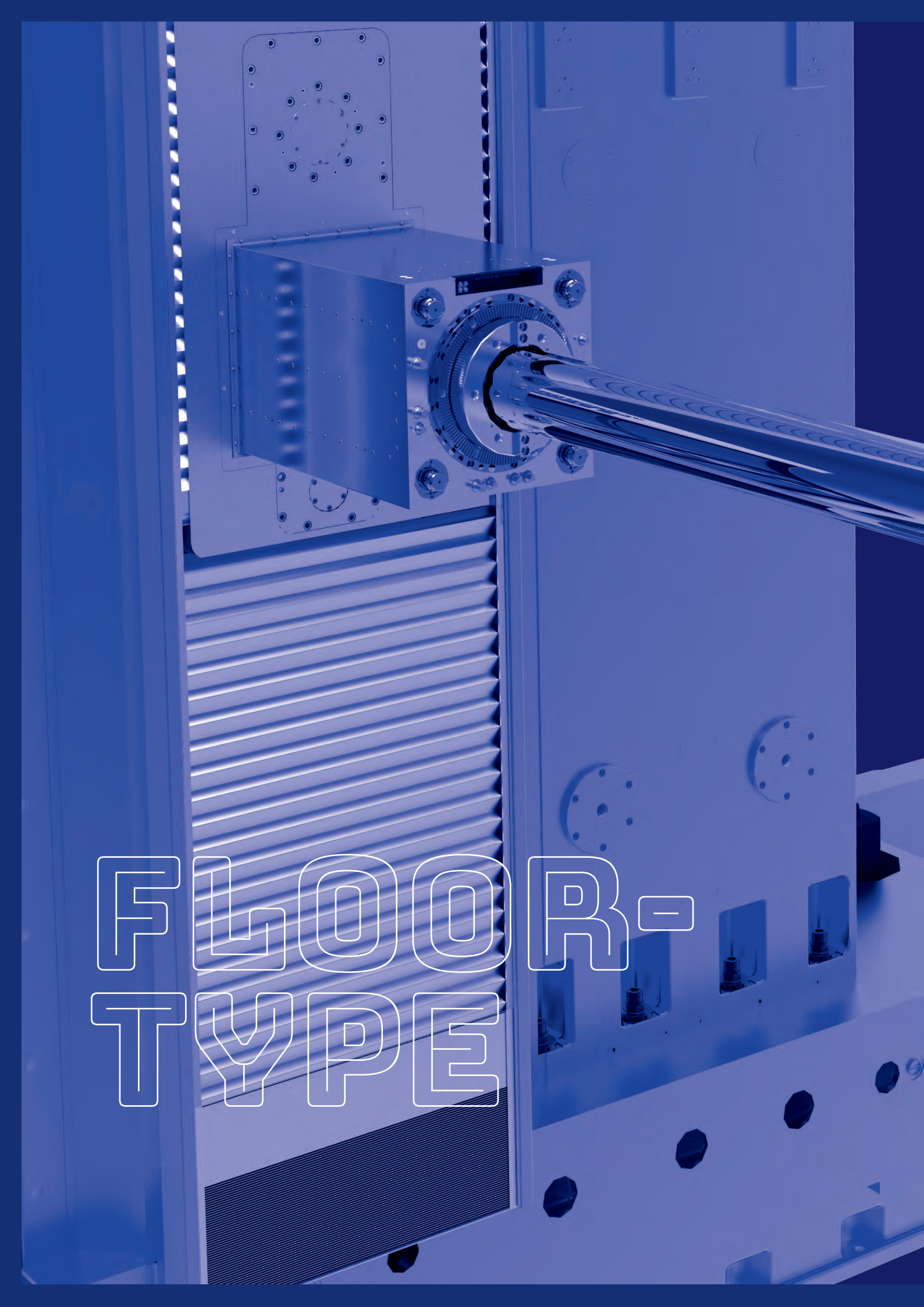
TECHNICAL PARAMETERS

MACHINE TYPE		MAXIMA I		MAXIMA II
Work spindle diameter	mm (in)	130 (5.1181)	150 (5.9055)	160 (6.2992)
RAM size	mm (in)	450 x 450 (17.7165 x 17.7165)		
Spindle taper		ISO 50 / ISO 50 BIG+		
Spindle speed range	RPM	10-3,000	10-2,500 (2,800)	10-2,400
Main motor power (S1 / S6 - 60%)	kW (HP)	41 (55.7) / 46 (62.5)	58 (78.9) / 65 (88.4)	
Torque on spindle (S1 / S6 - 60%)	Nm (ft lb)	2,542/3,152 (1,874.9/2,324.8)	2,437/3,138 (1,797.4/2,314.5)	
RAM stroke V	mm (in)	1,200 (47.2440)		
Spindle stroke W	mm (in)	700 (27.6)	800 (31.4960)	
COLUMN				
Headstock vertical travel Y	mm (in)	2,500-6,000 (98.4251-236.2204) in steps of 500 mm		
Longitudinal column adjustment Z	mm (in)	1,500, 2,000, 2,500 (59.0551, 78.7401, 98.4251)		
ROTARY TABLE				
Table clamping area	mm	2,000 x 2,000, 2,000 x 2,500, 2,500 x 3,000 / 3,000 x 3,000, 3,000 x 3,500, 3,000 x 4,000		
	(in)	(78.7401 x 78.7401, 78.7401 x 98.4251, 98.4251 x 118.1102 / 118.1102 x 118.1102, 118.1102 x 137.7952, 118.1102 x 157.4803)		
Max. workpiece weight	kg (lbs)	30,000 (66,138.7) / 50,000 (110,231.1)		
Transverse table travel X	mm (in)	3,000, 4,000, 5,000*, 6,000* (118.1102, 157.4803, 196.8503*, 236.2204*)		
FEEDS				
Range of feeds (working and rapid traverse) - X, Z	mm/min (ipm)	1-15,000 (0.0393-590.5511)		
- Y, V	mm/min (ipm)	1-24,000 (0.0393-944.8818)		
- W	mm/min (ipm)	1-12,000 (0.0393-472.4409)		
- B	RPM	0.003-3		

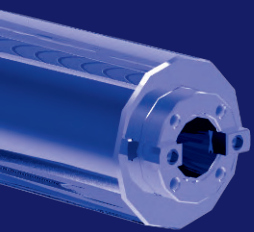
*Only for rotary tables with a load capacity of 30 tonnes (33.06 tons).

The machine concept delivers a large working space and enables the machine to apply efficient machining.





FLOOR- TYPE



HORIZONTAL FLOOR-TYPE MILLING MACHINES

WRD 13

GRATA

WRD 130/150/160

WRD 170/200

WRD 160/180/200 H

- ➔ excellent value to price ratio
- ➔ variable solutions for different types of parts
- ➔ wide range of clamping devices: clamping plates, rotary and sliding tables, or optional combinations
- ➔ option to finish all operations with a single clamping – when using a rotary table
- ➔ workspace can be divided and used alternately for machining

Horizontal floor-type boring machines are designed for precise coordinate drilling, boring, milling and thread cutting. They are particularly suitable for machining box- and board-type workpieces and complicated shapes from cast-iron, steel cast-iron and other machinable materials, especially large as well as the largest sizes and weights. The machines are suitable for series manufacture as well as demanding technological applications. The user can extend technological potentialities of the machine by a series of additional equipment.



WRD 13

MAIN ADVANTAGES OF THE MACHINE

- ➔ THE SMALLEST OF FLOOR-TYPE MACHINES
- ➔ ECONOMICAL MACHINING OF LARGE WORKPIECES
- ➔ SUITABLE FOR WELDED PIECE MACHINING
- ➔ VARIABLE DESIGN

The **WRD 13** horizontal floor-type boring machine with a RAM and a work spindle is based on the original generation of **CNC** horizontal milling and boring machines WHN 13 produced by TOS VARNSDORF the headstock and the column are identical with the **WHR 13** machine. The drive in the X axis is the Master & Slave system. Three linear guides in the X axis secure perfect accuracy when machining and high speed traverse up to 21,000 mm/min.

MACHINE CONFIGURATION

- + basic version with work spindle diameter 130 mm
- + version with an automatic tool change
- + machine can be equipped with an additional rotary table

TECHNICAL PARAMETERS

HEADSTOCK

Work spindle diameter	mm (in)	130 (5.1181)
RAM size	mm (in)	320 x 400 (12.6 x 15.7)
Spindle taper		ISO 50 / ISO 50 BIG+
Spindle speed range	RPM	10-3,000
Main motor power (S1 / S6 - 60%)	kW (HP)	41 (55.7) / 46 (62.5)
Torque on spindle (S1 / S6 - 60%)	Nm (ft lb)	2,542 (1,874.9) / 3,111 (2,294.6)
Spindle stroke W	mm (in)	650 (25.5905)
RAM stroke Z	mm (in)	700 (27.6)

COLUMN

Headstock vertical travel Y	mm (in)	2,000, 2,500, 3,000 (78.7401, 98.4251, 118.1102)
Column horizontal transverse travel X	mm (in)	3,000-20,000 (118.1102-787.4015) in steps of 1,000 mm

FEEDS

Range of feeds (working and rapid traverse) - X	mm/min (ipm)	5-21,000 (0.1968-826.7716)
- Y, Z, W	mm/min (ipm)	5-10,000 (0.1968-393.7007)





GRATA

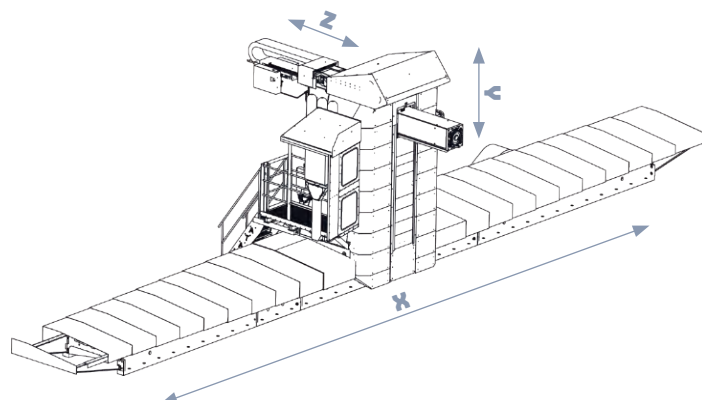
MAIN ADVANTAGES OF THE MACHINE

- ➔ UNIQUE TECHNICAL DESIGN AND SOLUTION
- ➔ SUPERB RIGIDITY AND PERFORMANCE
- ➔ EXCELENT PRECISION
- ➔ HIGH FEED SPEED

The **GRATA** floor-type machine tools are designed for precise line-coordinate milling, drilling, boring, milling and thread cutting. They are particularly suitable for machining of box- and plate-type workpieces and complicated workpieces from cast-iron, steel cast-iron, steel and other machinable materials, mainly large as well as the largest sizes and weights.

The machines are equipped with an extensible RAM, which can be fitted with a broad range of additional devices that significantly enhance the machines potentialities.

The machines are suitable for series manufacture as well as demanding technological applications. They are continuously controlled in three basic coordinates (X, Y, Z) or other axes according to the used special equipment by the machines control system.



MACHINE CONFIGURATION

- + basic version of the machine
- + machine with an automatic tool change
- + headstock with an exchangeable spindle attachment
- + headstock with an exchangeable spindle unit and milling head (see page 69)
- + machine can be equipped with an additional rotary table

TECHNICAL PARAMETERS

HEADSTOCK

Termination of RAM by an interface for application of technological accessories

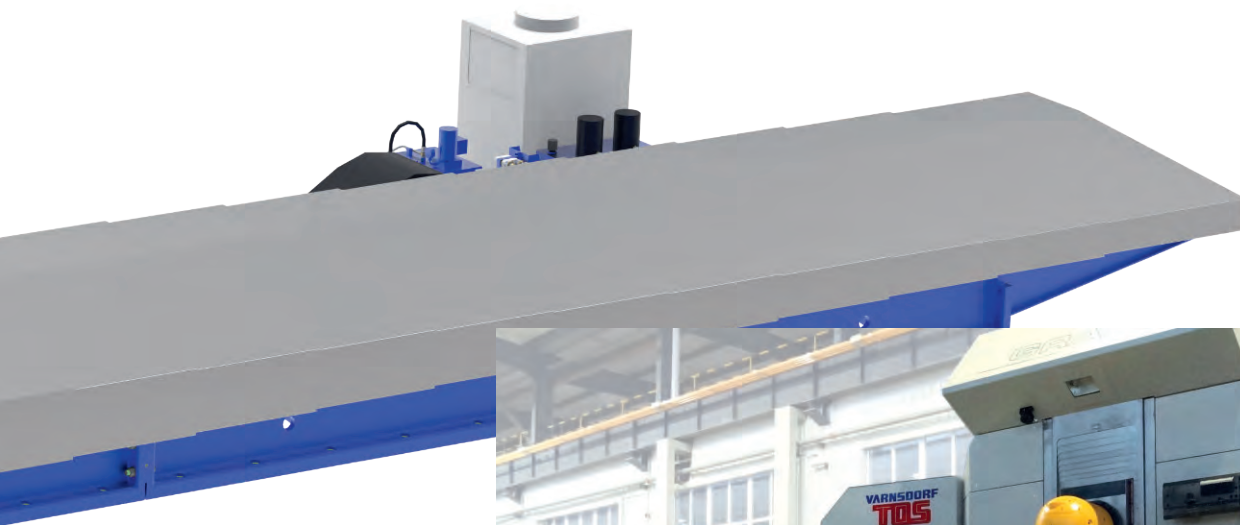
RAM size	mm (in)	500 x 500 (19.6850 x 19.6850)
Speed of the main motor	RPM	10–5,000
Main motor power (at permanent operation S1)	kW (HP)	37 (50.3)
Torque on the driving shaft (S1)	Nm (ft lb)	1,375 (1,014.2)
RAM stroke Z	mm (in)	1,500 (59.0551)

COLUMN

Traverse Column travel X	mm (in)	5,000–25,000 (196.8503–984.2519) in steps of 2,000 mm
Headstock vertical travel Y	mm (in)	1,600, 2,000, 2,500, 3,000 (62.9921, 78.7401, 98.4251, 118.1102)

FEEDS

Range of feeds (working and rapid traverse) – X, Y	mm/min (ipm)	1–25,000 (0.0393–984.2519)
– Z	mm/min (ipm)	1–15,000 (0.0393–590,5511)



Example of crankshaft machining at a Chinese customer, customised technology was turnkey delivered with a complete set of tools and special accessories.



WRD 130/150/160

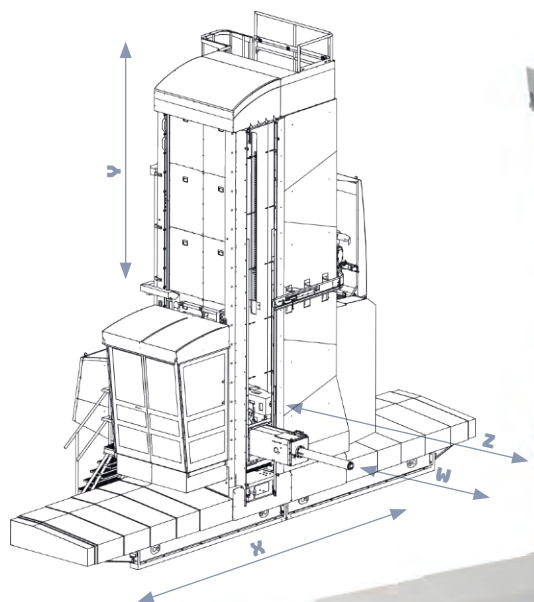
MAIN ADVANTAGES OF THE MACHINE

- ➔ SUPERB RIGIDITY AND PERFORMANCE
- ➔ LARGE WORKPIECE MACHINING PRECISION
- ➔ VARIABLE WORK SPACE DESIGN
- ➔ MODERN STRUCTURAL ELEMENTS

The floor-type boring machines are characterized by a modern technical design of the structure and high level of performance. They can be supplemented with a number of technological devices, which can greatly extend the technological capabilities of the machine.

The machines are intended for precision and high-efficient coordinate boring, drilling, milling and thread-cutting particularly in the case of large-scale, heavy and structurally difficult work-pieces made of cast iron, cast steel and steel.

According to concrete process needs, the machines can be extended with a clamping field consisting of clamping plates or with one of more additional tables.



TECHNICAL PARAMETERS

HEADSTOCK		WRD 130	WRD 150/160	
Work spindle diameter	mm (in)	130 (5.1181)	150 (5.9055)	160 (6.2992)
RAM size	mm (in)	450 x 450 (17.7165 x 17.7165)		
Spindle taper		ISO 50 / ISO 50 BIG+		
Spindle speed range	RPM	10–3,000	10–2,500 (2,800) (10–1,500*)	10–2,400
Main motor power (at permanent operation S1)	kW (HP)	41 (55.7)	58 (78.9)	58 (78.9)
Max. power of the main motor (operation S6 - 60% of the load time)	kW (HP)	46 (62.5)	65 (88.4)	65 (88.4)
Torque on spindle (S1)	Nm	2,542	2,437 (2,465/4,870*)	2,437
	(ft lb)	(1,874.9)	(1,797.4 1,818.1/3,591.9*)	(1,797.4)
Max. torque on spindle (S6 – 60 %)	Nm (ft lb)	3,152 (2,324.8)	3,138 (2,314.5)	3,138 (2,314.5)
RAM stroke Z	mm (in)	1,200 (47.2440)		
Spindle stroke W	mm (in)	700 (27.6)	800 (31.4960)	800 (31.4960)
COLUMN				
Headstock vertical travel Y	mm (in)	2,500–6,000 (98.4251–236.2204) in steps of 500 mm		
Traverse column travel X	mm (in)	5,000–27,000 (196.8503–1,062.9921) in steps of 2,000 mm		
FEEDS				
Range of feeds (working and rapid traverse) – X, Y, Z	mm/min (ipm)	1–24,000 (0.0393–944.8818)		
– W	mm/min (ipm)	1–12,000 (0.0393–472.4409)		

*An option suitable for drive of the facing head from the hollow spindle, Nmax=1,500 RPM, 2,465 Nm (1,818.1 ft lb) on the work spindle, 4,870 Nm (3,591.9 ft lb) on the hollow spindle.

MACHINE CONFIGURATION

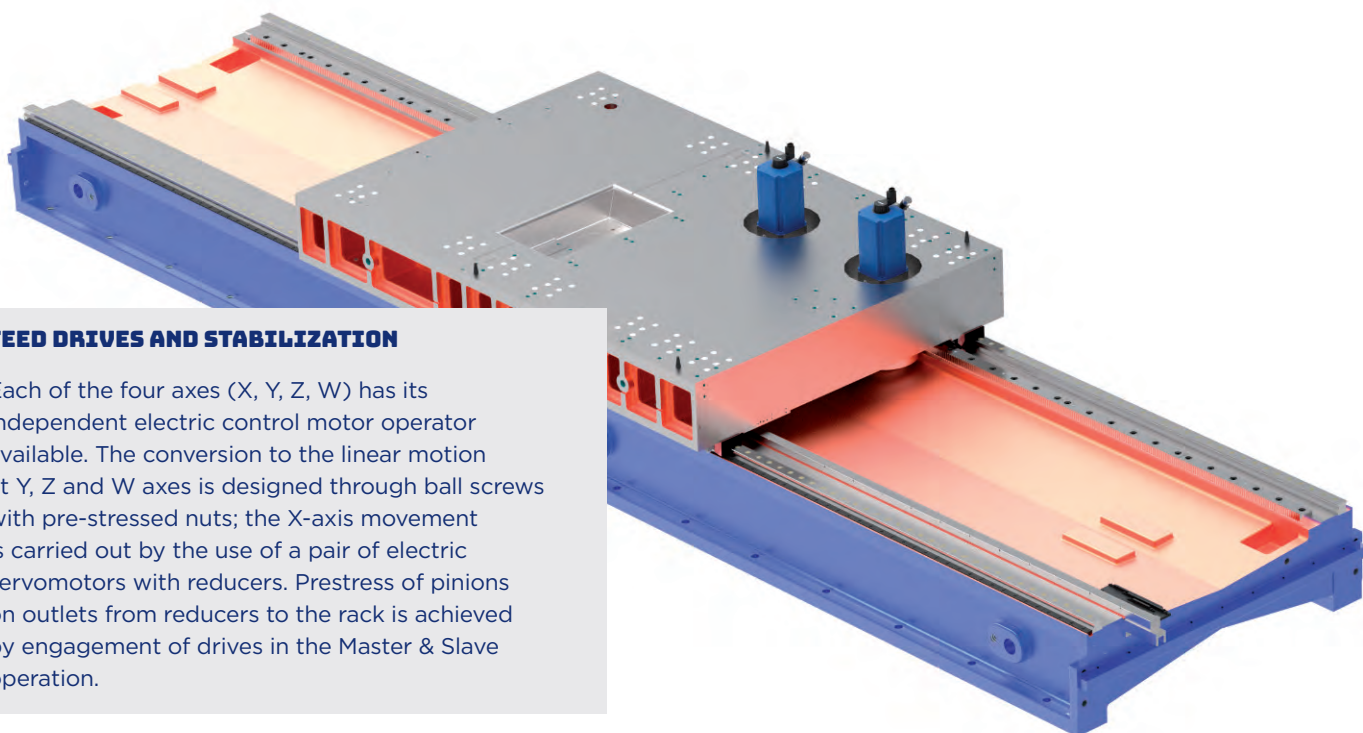
- + **WRD 130** – basic version with work spindle diameter 130 mm
- + **WRD 150/160** – optional version with work spindle diameter 150 or 160 mm
- + version with an automatic tool change
- + machine can be equipped with an additional rotary table

Example of an application at a Finnish customer, where the machine was also adapted for the application of turning operations (special milling heads, extensions and carousel table).





WRD 130/150/160



FEED DRIVES AND STABILIZATION

Each of the four axes (X, Y, Z, W) has its independent electric control motor operator available. The conversion to the linear motion at Y, Z and W axes is designed through ball screws with pre-stressed nuts; the X-axis movement is carried out by the use of a pair of electric servomotors with reducers. Prestress of pinions on outlets from reducers to the rack is achieved by engagement of drives in the Master & Slave operation.

GUIDES OF ADJUSTABLE GROUPS

Guides of all linear adjustable groups are rolling with pretensioning (guide of the headstock, the column rail, the RAM plate guide), based on compact linear rolling guides.

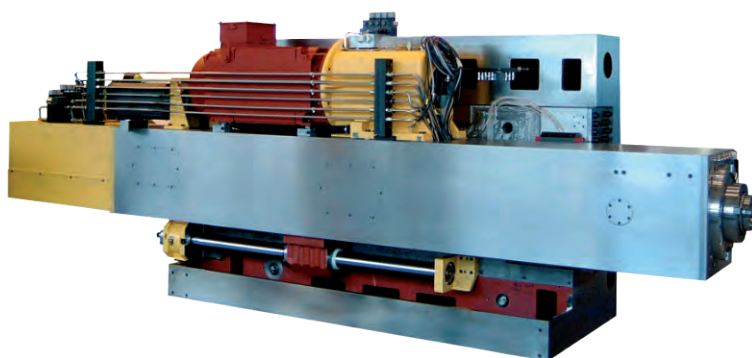
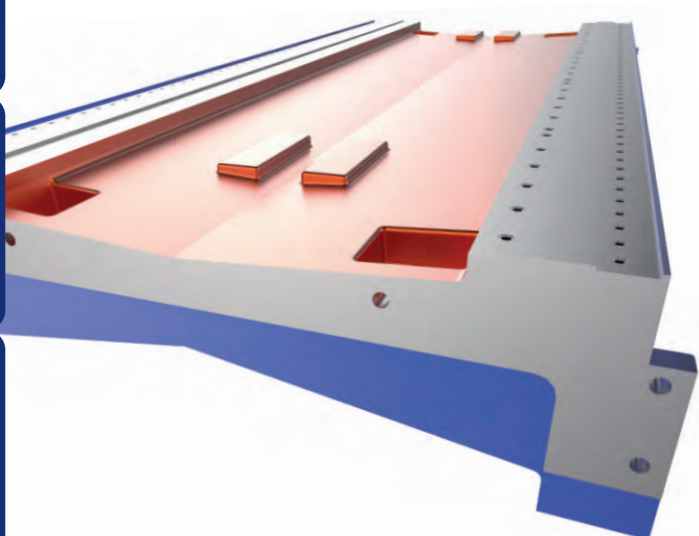
Guides of the beds are covered by steel telescopic covers. The guide on the column is protected by steel covers of the whole headstock movement area; on the face towards the workpiece by steel plates; on the operators platform side, the whole area is covered by a fixed covering; on the rear side by cover bellows.

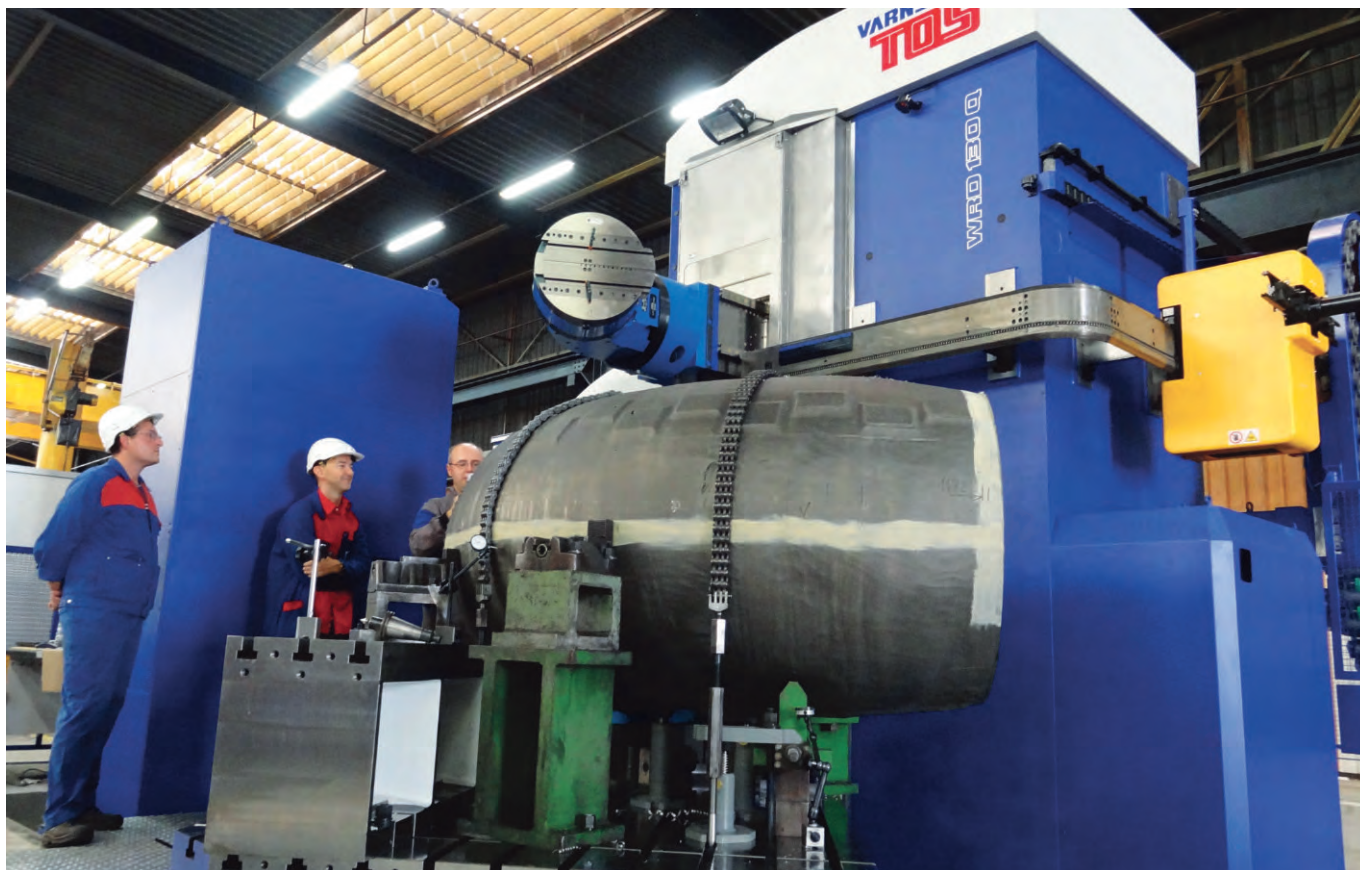
HEADSTOCK

The main body is a rigid grey iron casting, as well as the other connected L-shaped part, which forms a guide for the RAM. The conception of this unit allows electro-magnetic compensation of the RAM drop during its extension in the Z axis (for more information see page 85 - Headstocks).

Headstock Weight Balancing: The weight of the headstock is balanced by a telescopic cylinder from the hydropneumatic system. This system of the headstock balancing requires demands minimum traverse forces, thus reducing power consumption during the machining process.

Compensation of the RAM dropping: This solution of the RAM descending compensation is unique and patented. The entire headstock is designed to compensate for the descend of the RAM head when it is slid in the Z axis. Dropping of the RAM is compensated by a special electromechanical system.





Machine handed over including the technology of turning internal curved holes.



COLUMN

The column is designed as a rigid optimally dimensioned castings of gray iron. To column vertically moves the headstock with ram which is guided on two linear guide ways.

On the column is fastened a ball screw, drive of Y-axis and hydraulic cylinder for weight balancing of the headstock.



WRD 170/200

MAIN ADVANTAGES OF THE MACHINE

- ➔ POWERFUL PERFORMANCE
- ➔ COMPLETE MACHINING OF LARGE AND MULTI-SHAPED WORKPIECES
- ➔ LONG RAM AND SPINDLE EXTENSION (1.5 m + 1 m)

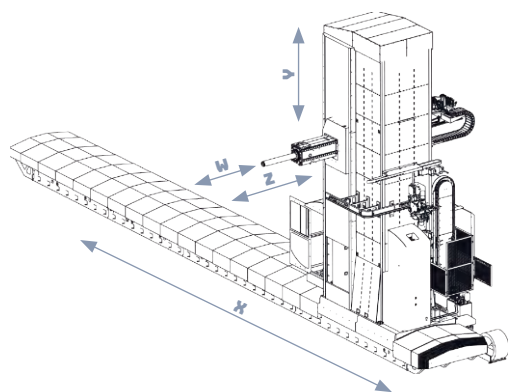
The **WRD 170/200** machine is the largest and heaviest representative of floor-type machine with linear guide in the manufacturing portfolio of TOS VARNSDORF a.s. The machines are designed for precise coordinate drilling, boring, milling and thread cutting. **WRD 170/200** is suitable for machining of box- and plate-type workpieces and complicated workpieces from cast iron, steel cast-iron, steel and other machinable materials, mainly large as well as the largest sizes up to 150 tons. The machine can be supplemented with a series of technological devices, which greatly extend the machines flexibility.



Example of machine propeller blade machining at a Russian customer, where the machine was equipped with an additional rotary table with load capacity of up to 130 tonnes.

TECHNICAL PARAMETERS

HEADSTOCK			
Work spindle diameter	mm (in)	170 (6.6929)	200 (7.8740)
RAM size	mm (in)	550 x 550 (21.6535 x 21.6535)	
Spindle taper		ISO 50 / ISO 50 BIG+	
Spindle speed range	RPM	10–2,200	10–1,800
Main motor power (at permanent operation S1)	kW (HP)	81 (110.1)	
Max. power of the main motor (operation S6 - 60% of the load time)	kW (HP)	88 (119.6)	
Torque on spindle (S1)	Nm (ft lb)	3,846 (2,836.7)	
Max. torque on spindle (S6 – 60 %)	Nm (ft lb)	4,800 (3,540.3)	
RAM stroke Z	mm (in)	1,500 (59.0551)	
Spindle stroke W	mm (in)	1,000 (39.3700)	
COLUMN			
Headstock vertical travel Y	mm (in)	3,000–6,000 (98.4251–236.2204) in steps of 500 mm	
Traverse column travel X	mm (in)	5,000–29,000 (196.8503–1,141.7322) in steps of 2,000 mm	
FEEDS			
Range of feeds (working and rapid traverse) – X	mm/min (ipm)	1–16,000 (0.0393–629.9212)	
– Y, Z, W	mm/min (ipm)	1–12,000 (0.0393–472.4409)	



MACHINE CONFIGURATION

- + basic version with work spindle diameter 170 mm or 200 mm
- + version with an automatic tool change
- + machine can be equipped with an additional rotary table



WRD 160/180/200 H

MAIN ADVANTAGES OF THE MACHINE

- ➔ HYDROSTATIC GUIDEWAYS
- ➔ SPINDLE DIAMETER UP TO 200 mm
- ➔ HIGH PRECISION AT MAXIMUM POWER OUTPUT
- ➔ WIDE RANGE OF ACCESSORIES
- ➔ TECHNOLOGICAL UNIVERSALITY

The largest, heaviest and most powerful, this is a representative of fully hydrostatic **WRD 160/180/200 H** machines. Thanks to excellent properties of hydrostatic guide, the machines are designed for the most demanding machining methods.

MACHINE CONFIGURATION

- + basic version with work spindle diameter 180 mm, optionally 160 mm or 200 mm
- + version with an automatic tool change
- + machine can be equipped with an additional rotary table

The **WRD 160/180/200 H** machines are designed for precise line-coordinate drilling, boring, milling and thread cutting. They are particularly suitable for machining of box- and plate-type workpieces and complicated workpieces from cast-iron, steel cast-iron, steel and other machinable materials, mainly large as well as the largest sizes up to 200 tons.



TECHNICAL PARAMETERS

HEADSTOCK				
Work spindle diameter	mm (in)	160 (6.2992)	180 (7.0866)	200 (7.8740)
RAM size	mm (in)	550 x 550 (21.6535 x 21.6535)		
Spindle taper		ISO 50 / ISO 50 BIG+		
Spindle speed range	RPM	10–2,400	10–2,200	10–2,000
Main motor power (at permanent operation S1)	kW (HP)	74 (99.23)	101 (135.44)	
Torque on spindle (S1)	Nm (ft lb)	6,820 (5,030.1)	11,165 (8,234.8)	13,927 (10,272)
RAM stroke Z	mm (in)	1,600 (62.9921)		
Spindle stroke W	mm (in)	1,200 (47.2440)		
COLUMN				
Headstock vertical travel Y	mm (in)	3,000–6,000 (118.1102–236.2204) in steps of 500 mm		
Traverse column travel X	mm (in)	5,000–29,000 (196.8503–1141.7322) in steps of 1,000 mm		
FEEDS				
Range of feeds (working and rapid traverse) – X, Y, Z, W	mm/min (ipm)	1–20,000 (0.0393–787.4015)		



Example of an application at an Indian customer, where the machine has been operating under demanding conditions for almost 5 years.



WRD 160/180/200 H

DRIVES OF X, Y, Z, W AXES

Each of the four axes (X, Y, Z, W) has its independent electric control motor operator available. The X, Y axis movement is realized by a pair of electric servomotors.

Transfer to straight motion of the W and Z axes is achieved by ball screws.

The primary level of the Z and W axes is provided by cogwheel gears.



BALANCING AND COMPENSATION

Headstock weight compensation: By means of steel cables, which connect the headstock with a counter-weight.

Compensation of the deformation of the column shape: By means of four rods passing through the rear wall of the column, which can be used for correction of the guide surfaces.

Thermal compensation: Special housing and cooling of bearings minimizes the amount of heat generated in the housing.

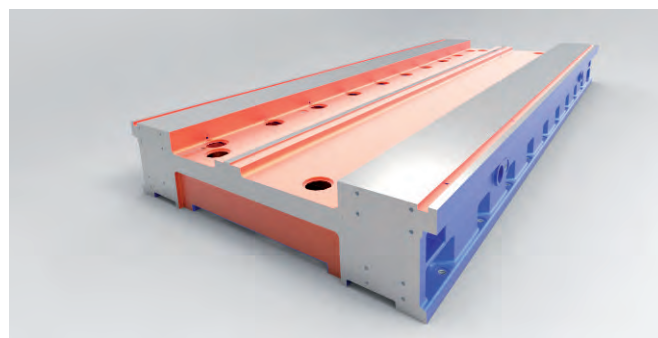
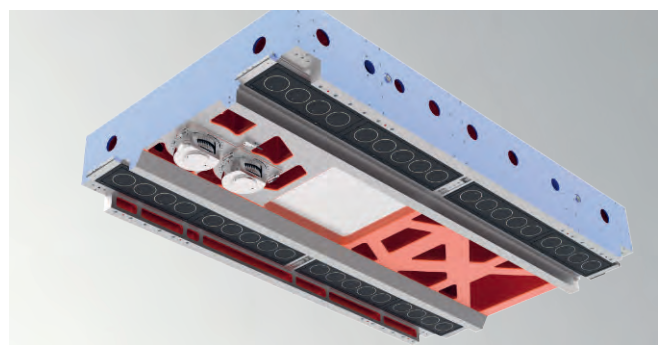
Compensation of deformation of the shape and incline of the RAM: Bending deformations of the RAM are prevented by four prestressing rods. The rods are pushed by hydraulic cylinders according to the RAMs position. The front hanger incorporates a hydraulic cylinder, which tensions cables according to the RAMs traverse.



GUIDES OF ADJUSTABLE GROUPS

The main support guide (X axis) consists of four sizeable bars inserted between the bed and the rails. Each bar incorporates 9 closed hydrostatic cells arranged in two separately powered sections. In total, the machine is carried by 36 closed cells. Guideways of front, side and rear line (axis Y) are precisely grinded. Guiding surfaces of the headstock housing consist of two rows of classic hydrostatic cells with separate pressure oil inlets.

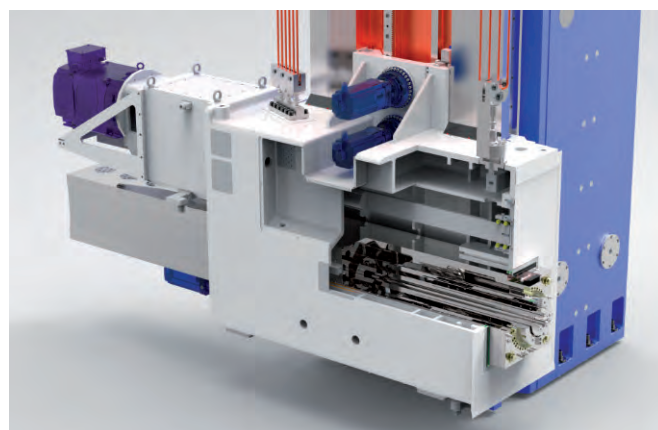
Guiding surfaces of the ram (axis Z) consist of 16 bars lined by Biplast with hydrostatic chambers.



HEADSTOCK

Cabinet of the headstock is closed rigid casting of high quality cast iron to which the other group of machine are established.

The internal area of the casting has a horizontal square tunnel with precisely machined surfaces for guiding the RAM. The RAM housing is a prismatic casting from ductile cast iron with a hollow for housing of the traveling spindle.





PORTAL



PORTAL MILLING MACHINES

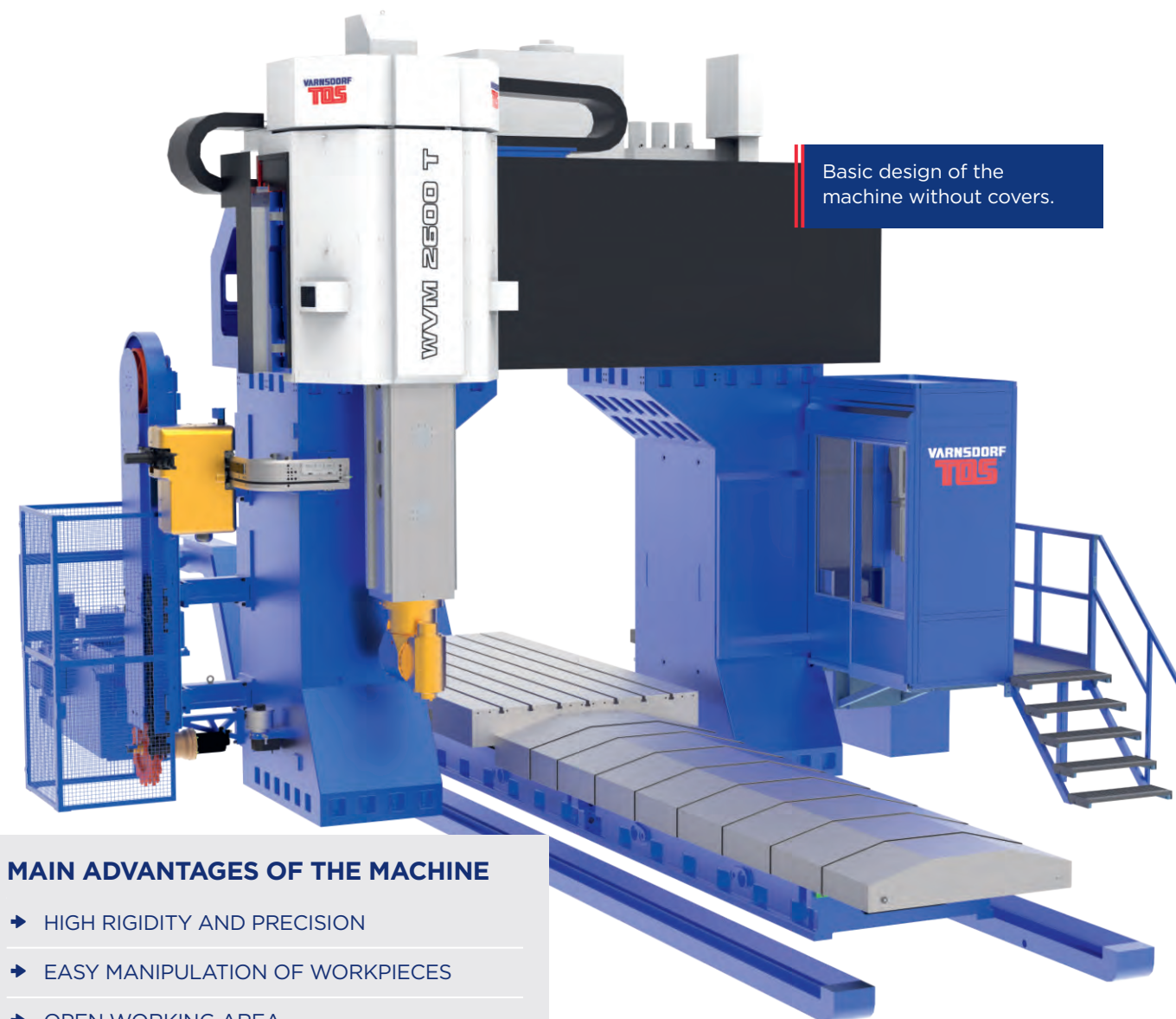
WVM 2600/3600 T

- ➔ expand production program to machines with a vertical axis of spindle
- ➔ versatile machines (like current horizontal machines), but are intended for "orthodox" customers (who for some reason prefer portal machines) who want a machine with a vertical axis of spindle – machining from the top
- ➔ high frame rigidity (closed sturdy portal) and excellent precision
- ➔ particularly suitable for the production of large rotating parts a rotary table and a vertical RAM (with a milling head/adapter) may be used
- ➔ open work space facilitates handling of workpieces by a crane



WVM 2600/3600 T

Basic design of the machine without covers.



MAIN ADVANTAGES OF THE MACHINE

- ➔ HIGH RIGIDITY AND PRECISION
- ➔ EASY MANIPULATION OF WORKPIECES
- ➔ OPEN WORKING AREA
- ➔ VERTICAL WORK AXIS OF SPINDLE
- ➔ TABLE LENGTH UP TO 10 m

Vertical machining centers of the **WVM 2600/3600 T** series are designed as a unified series of machines for universal machining of steel and cast iron parts especially in the general engineering segment. Thanks to its unique construction of a solid portal with a mobile headstock (Y), a vertically traveling RAM (Z) and a sliding table (X), the machines stand out with high precision and stiffness. The high installed output of the machine (53 kW) is especially designed for force and productive machining.

The machines can be equipped with different types of milling heads, which are automatically placed and thus enable even further extension of the technological possibilities of the machine. Machines can be supplemented by other types of accessories to increase machine efficiency, such as cooling system or tool change system.

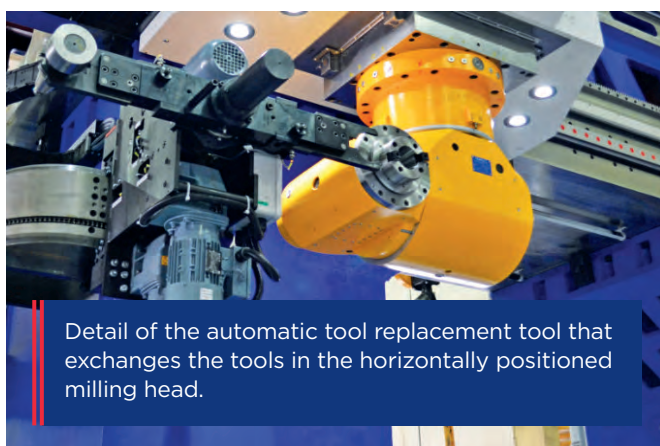
Machine control is managed from the operators platform installed on the side of one of racks, and the machines can also be equipped with the covers around the table axis (X) to minimise chip flashing and fluid splashing.



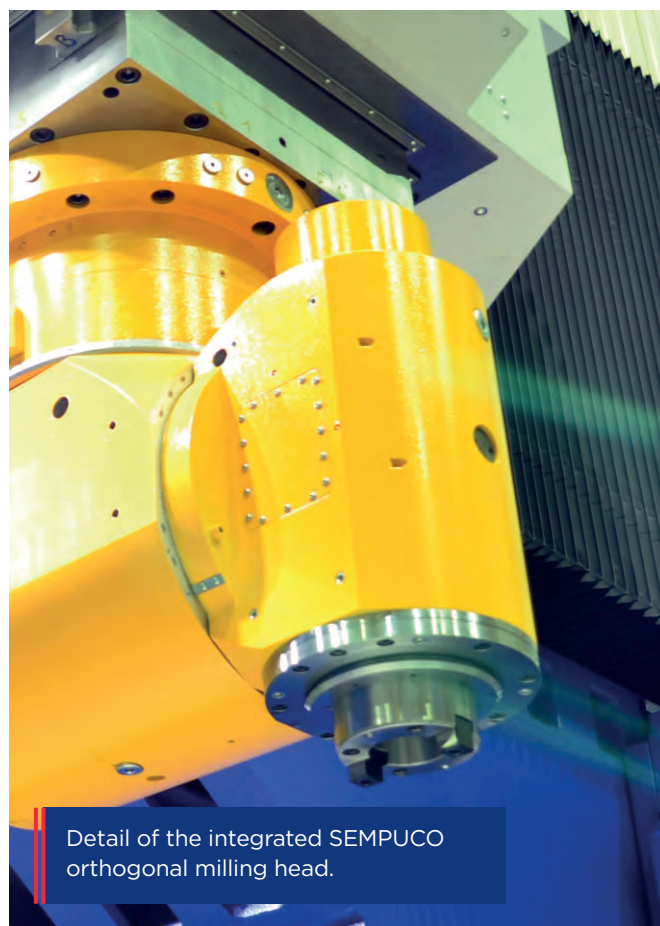
Total view of the machine with the horizontal travelling headstock and vertically traversing quill.



View of the orthogonal 2 axis automatically indexed milling head.



Detail of the automatic tool replacement tool that exchanges the tools in the horizontally positioned milling head.



Detail of the integrated SEMPUCO orthogonal milling head.

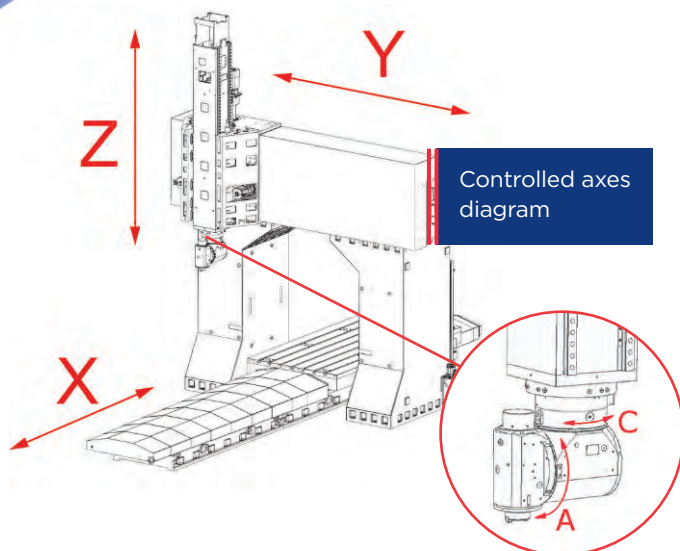


WVM 2600/3600 T

MACHINE CONFIGURATION

- + machine with integrated milling head
- + machine equipped with automatic tool exchanger
- + machine equipped with special accessory exchanger
- + wide range of work table designs

Basic design of the machine with covers.



TECHNICAL PARAMETERS

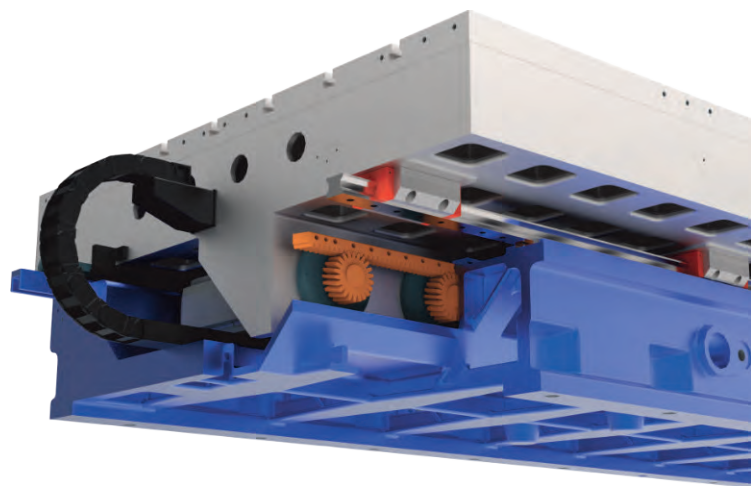
HEADSTOCK		WVM 2600 T				WVM 3600 T	
END OF THE RAM BY AN INTERFACE FOR APPLICATION OF TECHNOLOGICAL ACCESSORIES							
RAM size	mm (in)	500 x 500 (19.6850 x 19.6850)					
Main motor speed range	RPM	10–5,000					
Max. power of the main motor (S1)	kW (HP)	53 (72.1)					
Max. torque on driving shaft (S1)	Nm (ft lb)	1,375 (1,014.1)					
RAM stroke Z	mm (in)	1,500 (59.0551)					
Headstock vertical travel Y	mm (in)	3,200 (125.9843)				4,200 (165.3543)	
– with APC and ATC system	mm (in)	4,900 (192.9134)				5,900 (232.2835)	
HEADSTOCK WITH INTEGRATED ORTHOGONAL MILLING HEAD							
Spindle taper		ISO 50					
Max. spindle speed range	RPM	5,000					
Max. transmitted power	kW (HP)	40 (53.6)					
Max. torque on spindle	Nm (ft lb)	1,200 (885)					
Basic positioning increment of both dividing planes	°	1					
A-axis rotation range	°	±180					
C-axis rotation range	°	±180					
WORK TABLE FOR WVM 2600 T							
Table longitudinal traverse X	mm (in)	4,000, 5,000, 6,000, 7,000, 9,000, (157.4803, 196.8503, 236.2204, 275.5905, 354.3307)					
Distance between the columns	mm (in)	2,600 (102.3622)					
Width of table clamping area	mm (in)	2,000 (78.7401)					
Length of the table clamping area	mm (in)	3,000 (118.1102)	4,000 (157.4803)	5,000 (196.8503)	6,000 (236.2204)	8,000 (314.9606)	–
Maximum workpiece weight	tonnes (tons)	16 (17.6)	20 (22)	24 (26.5)	28 (30.9)	36 (39.7)	–
Size of the clamping T-slots	mm (in)	28H8 (1.1023)					
Spacing of the clamping T-slots	mm (in)	250 (9.8425)					
WORK TABLE FOR WVM 3600 T							
Table longitudinal traverse X	mm (in)	4,000, 5,000, 6,000, 7,000, 9,000, 11,000 (157.4803, 196.8503, 236.2204, 275.5905, 354.3307, 433.0708)					
Distance between the columns	mm (in)	3,600 (141.7322)					
Width of table clamping area	mm (in)	3,000 (118.1102)					
Length of the table clamping area	mm (in)	3,000 (118.1102)	4,000 (157.4803)	5,000 (196.8503)	6,000 (236.2204)	8,000 (314.9606)	10,000 (22,046.2)
Maximum workpiece weight	tonnes (tons)	20 (22)	24 (26.5)	28 (30.9)	32 (35.3)	40 (44.1)	40 (44.1)
Size of the clamping T-slots	mm (in)	28H8 (1.1023)					
Spacing of the clamping T-slots	mm (in)	250 (9.8425)					
FEEDS							
Range of feeds (working and rapid traverse) – X, Y, Z	mm/min (ipm)	1–25,000 (0.0393–984.2519)					
Max. traverse forces in the X, Y, Z, W axes	kN (lbf)	20 (4,496.2)					
AUTOMATIC TOOL CHANGE (ATC)							
Number of storage sites – chain type magazine	pcs	60, 80, 120					
Tool change time	s	20					



WVM 2600/3600 T

X, Y, Z AXES DRIVES

The drives of all linear axes are equipped with separate electric regulating actuators. The Z axis is driven via a ball screw with pre-loaded nuts. The X and Y axes are driven via a rack and two pre-loaded pinion gears controlled by a Master & Slave system.



MACHINE FRAME

The frame consists of a bed with a travelling table, above which a transversely housed headstock moves on the crossbeam that is attached to two vertical stands. All the frame parts are designed as rigid and optimally sized castings.



GUIDING OF MOVEABLE GROUPS

Linearly traversing groups of the X, Y, and Z machine axes are guided using linear roller guides. Bed guideways are covered with telescopic steel covers. A crossbeam guideway is protected by folded fabric bellows.

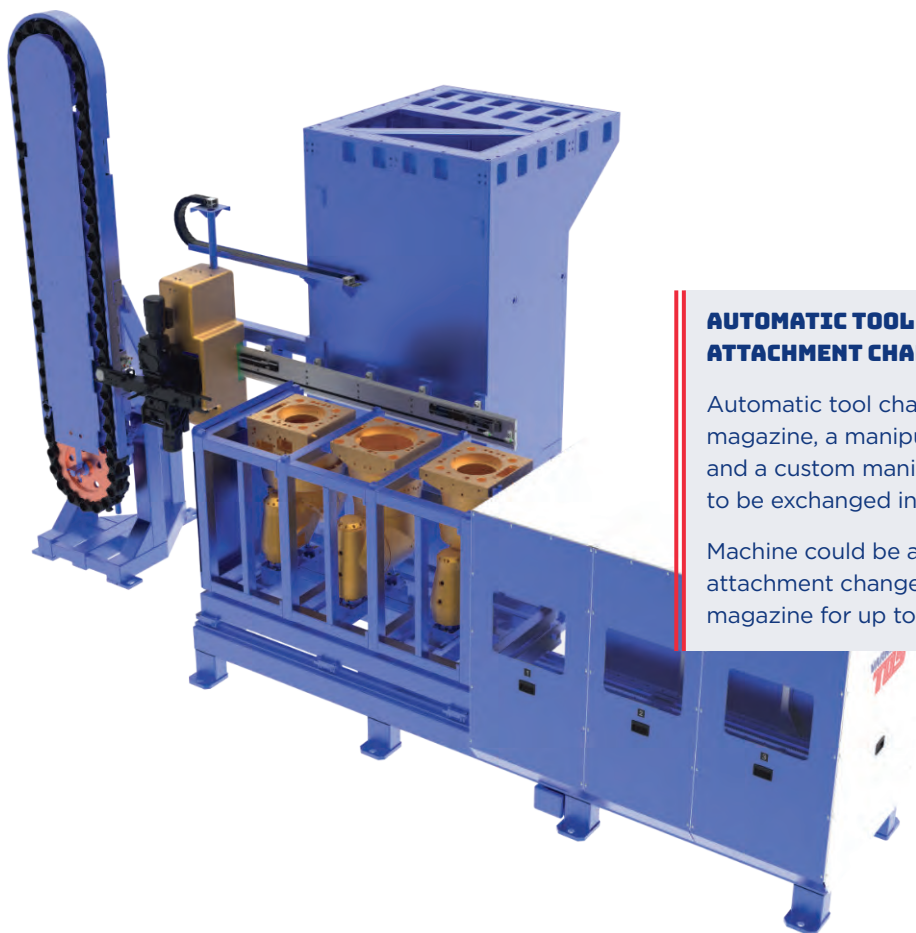


HEADSTOCK

The basic body is a rigid casting of ductile cast iron, in which a vertically traversing RAM made of cast steel is mounted. The main spindle rotation drive is transmitted from a powerful electric drive via a robust two-speed gearbox with automatic shifting.

BALANCING

Ram weight is compensated hydromechanically (with a hydraulic cylinder) using a standalone hydraulic unit.



AUTOMATIC TOOL AND TECHNOLOGICAL ATTACHMENT CHANGE

Automatic tool change consists of a chain tool magazine, a manipulator guideway on the stand, and a custom manipulator that allows the tool to be exchanged in the milling head.

Machine could be also equipped by the automatic attachment change system. It contains moveable magazine for up to 3 technological attachments.

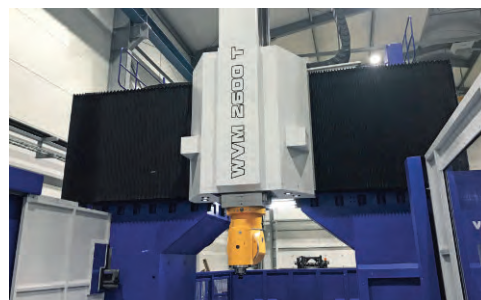
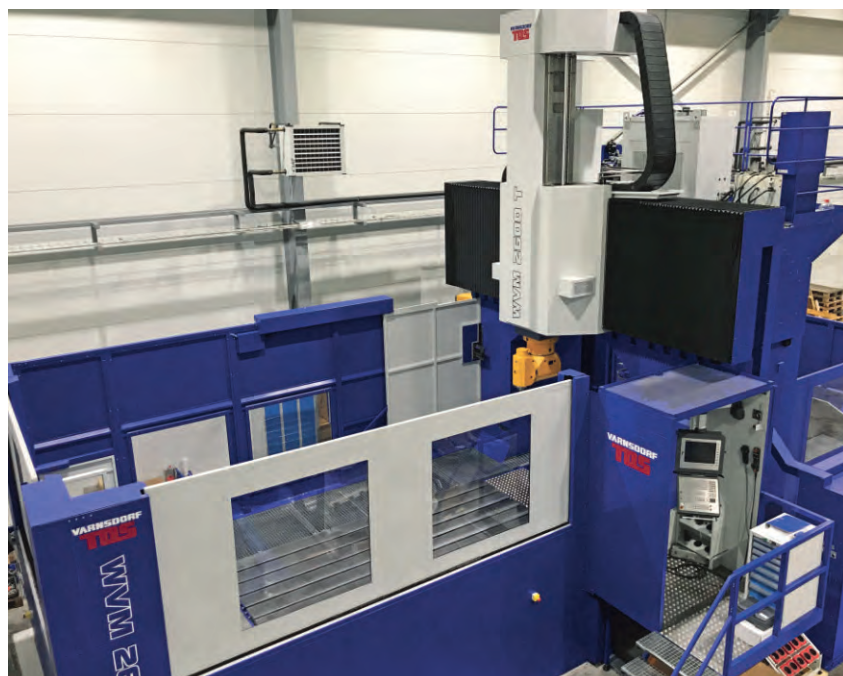


WVM 2600/3600 T

EXAMPLES OF USAGE

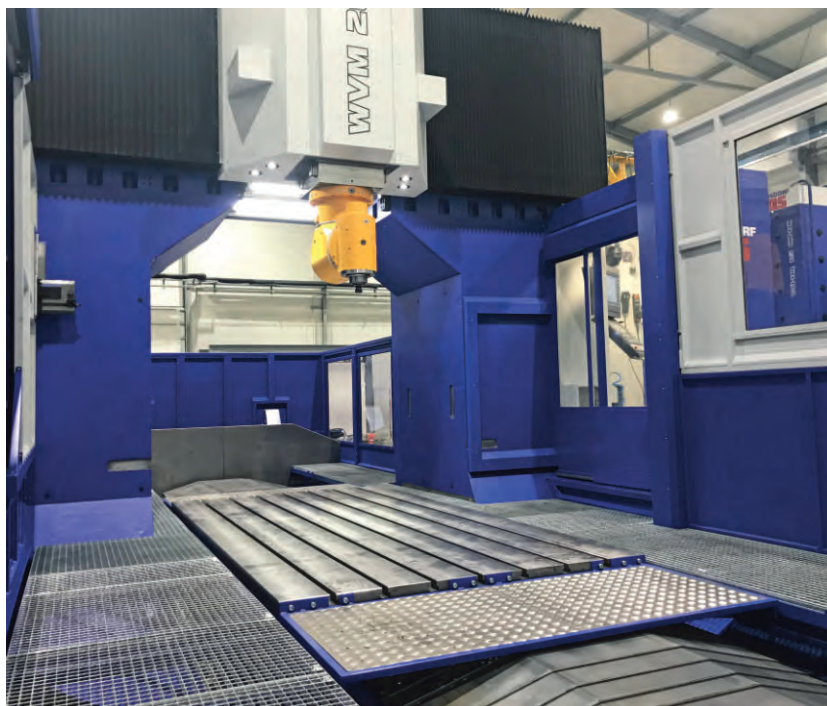


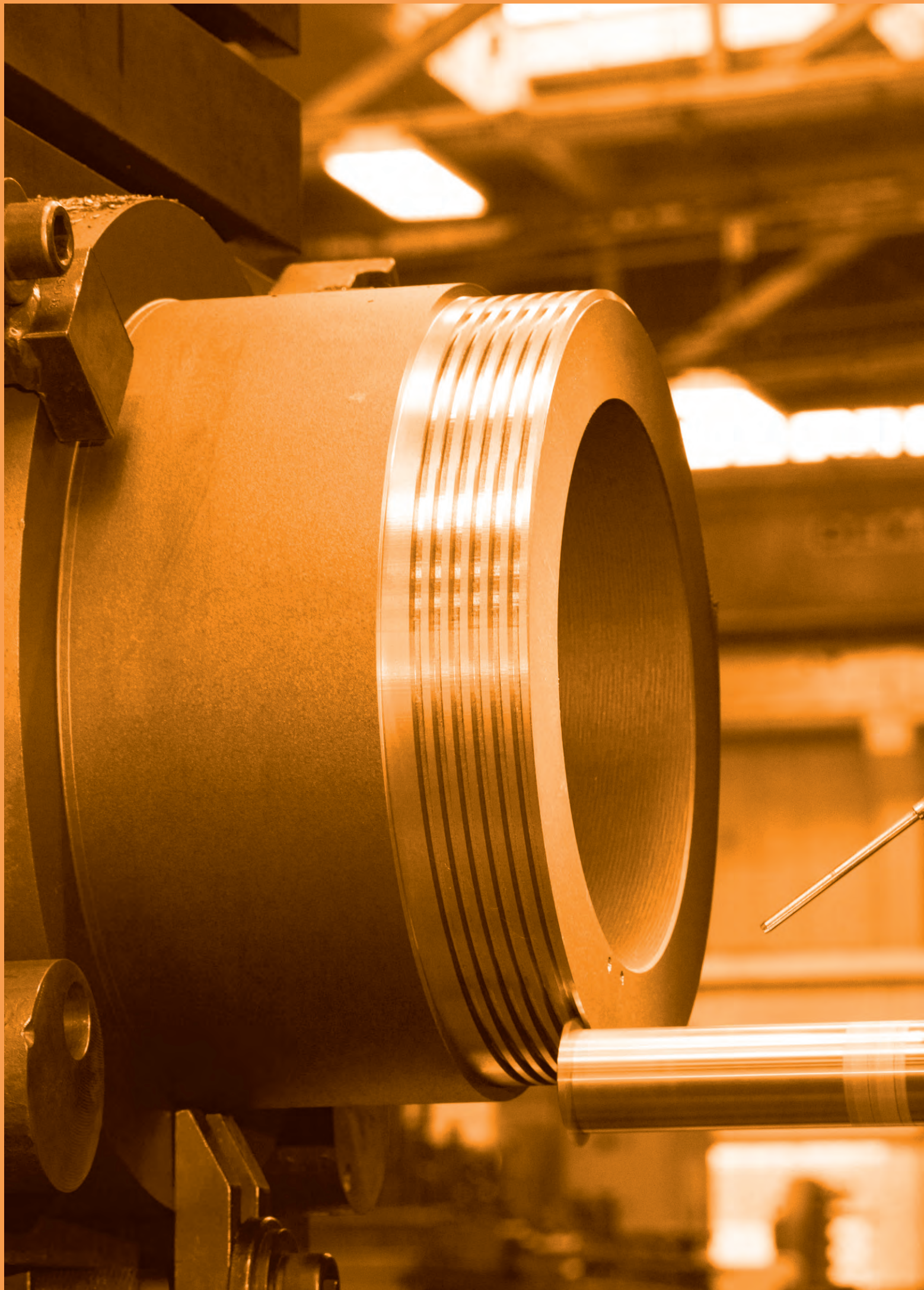
The first implementation of the WVM 2600 T machine for a Czech customer.



X = 4,500 mm (177.1653 inch)
Y = 3,200 mm (125.9842 inch)
Z = 1,500 mm (59.0551 inch)

ATC 60
Work table
= 4,000 x 2,000 mm (20 tonnes)
157.4803 x 78.7401 inch (22 tons)







ACCESSORIES

ROTATING TABLES

AUTOMATIC PALLET CHANGE (APC)

AUTOMATIC TOOL CHANGE (ATC)

MILLING HEADS

FACING HEADS

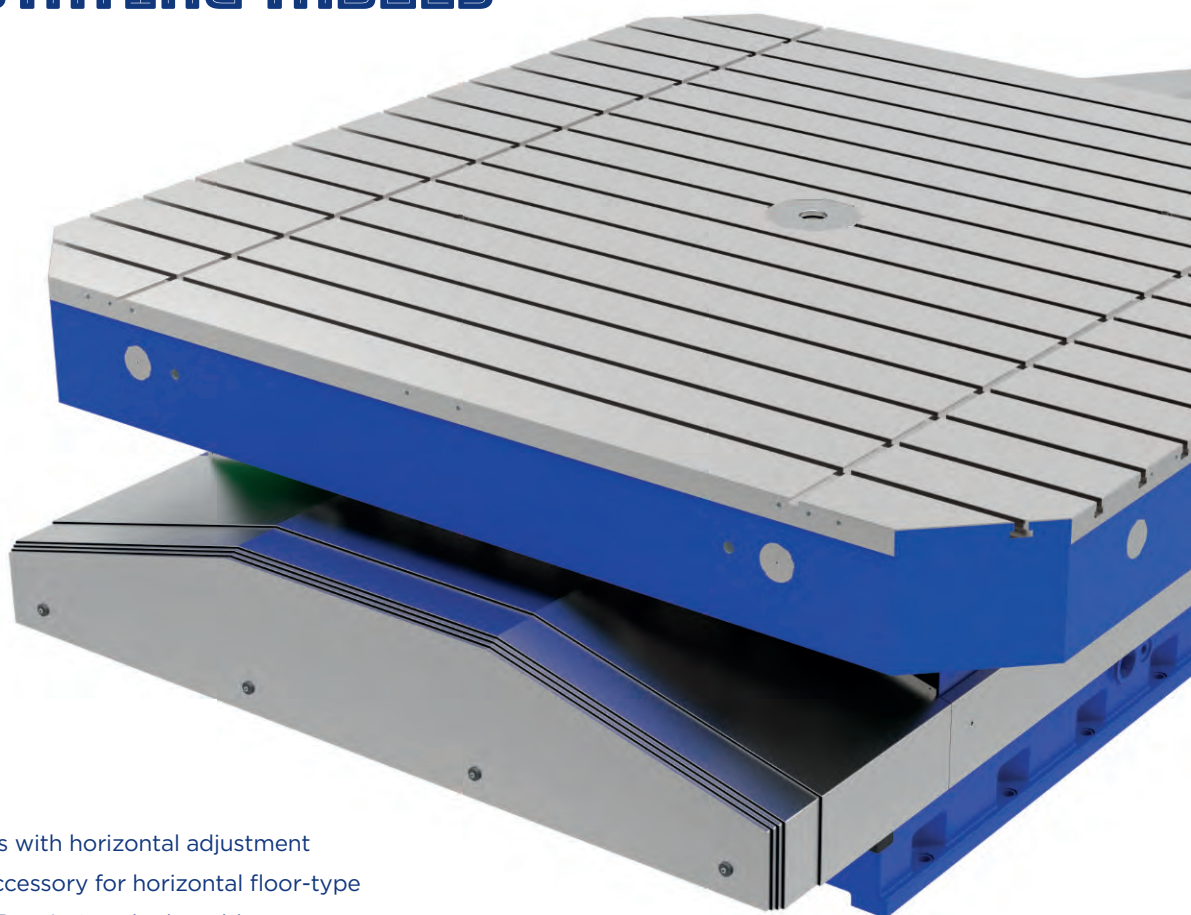
OPERATOR'S PLATFORM AND MACHINE COVERING

CONTROL SYSTEMS

OTHER ACCESSORIES AND SERVICES



ROTATING TABLES



The additional work tables with horizontal adjustment are designed as special accessory for horizontal floor-type boring machines (the **WRD** series) and adaptable for machines by other manufacturers.

The additional turning tables with horizontal adjustment consist of a rigid bed on the top of which a table with horizontal attachment area rotationally housed on the rail usually travels.

The CNC-controlled table is used for attachment and positioning of workpieces on the technological sites and can be multiply applied. It allows interpolation in the longitudinal axis, in the rotational axis and both axes simultaneously with other continuously controlled axes of the corresponding machine.

The control of the supplementary tables and the servo drives are integrated in the CNC control, operation and electrical equipment of the machine. The position in the coordinates is programmed with the increment of 0.001° .

The B coordinate is driven by the Master & Slave system, which incorporates two separate servo drives and their control.

Table control as a full-fledged CNC axis. In this case used for machining the inner surface of curved armature.



TECHNICAL PARAMETERS

ADDITIONAL ROTATING TABLE		S16	S30	S50	S 80
Max. workpiece weight	kg (lbs)	16,000 (35,274)	30,000 (66,138.7)	50,000 (110,231.1)	80,000 (176,369.8)
Table clamping area	mm	1,800 x 2,240 2,000 x 2,500	2,000 x 2,000 2,000 x 2,500 2,500 x 3,000	3,000 x 3,000 3,000 x 3,500 3,000 x 4,000	3,500 x 3,500 3,500 x 4,000 4,000 x 4,000 4,000 x 4,500
	in	70.8661 x 88.1889 78.7401 x 98.4251	78.7401 x 78.7401 78.7401 x 98.4251 98.4251 x 118.1102	118.1102 x 137.7952 118.1102 x 118.1102 118.1102 x 157.4803	137.7952 x 137.7952 137.7952 x 157.4803 157.4803 x 157.4803 157.4803 x 177.1653
Size of clamping T-slots	mm (in)	28H8 (1.1023)			
Size of table adjustment	mm	0, 1,400, 1,800	0, 1,300, 1,800, 2,500, 3,000, 3,500	0, 1,500, 2,000, 2,500, 3 000, 3,500	2,000, 3,000, 4,000
	in	0, 55.1181, 70.8661	0, 51.1811, 70.8661, 98.4251, 118.1102, 137.7952	0, 59.0551, 78.7401, 98.4251, 118.1102, 137.7952	78.7401, 118.1102, 157.4803
Feed range V	mm/min ipm	1-5,000 0.0393-196.8503	1-8,000 0.0393-314.9606		1-6,000 0.0393-236.2204
Feed range B	RPM	0.003-1	0.003-1.5		0.002-1
Rapid traverse - V	mm/min ipm	10,000 393.7007	15,000 590.5511	15,000 590.5511	13,700 539.3700
Rapid traverse - B	RPM	1.75	3	2.5	1.6

Min. programmable
positioning increment
- in the V coordinate
- in the B coordinate

mm (in)
°

0,001 (0.0000393)
0.001

ADDITIONAL ROTATING TABLE		S5	S10	S20
Max. workpiece weight	kg (lbs)	5,000 (11,023.1)	10,000 (22,046.2)	20,000 (44,092.5)
Table clamping area	mm	1,000 x 1,250	1,250 x 1,250 1,250 x 1,600	1,800 x 1,800 1,800 x 2,200 1,800 x 2,500 2,500 x 2,500
	in	39.3700 x 49.2125	49.2125 x 49.2125 49.2125 x 62.9921	70.8661 x 70.8661 70.8661 x 86.6141 70.8661 x 98.4251 98.4251 x 98.4251
	Size of clamping T-slots			
	mm (in)	28H8 (1.1023)		
Size of table adjustment	mm	0, 1,600, 2,000	0, 1,500, 2,000, 3,000	0, 1,500, 2,000, 3,000, 4,000
	in	0, 62.9921, 78.7401	0, 59.0551, 78.7401, 118.1102	0, 59.0551, 78.7401, 118.1102, 157.4803
Feed range V	mm/min ipm	1-20,000 0.0393-787.4015	1-15,000 0.0393-590.5511	
Feed range B	RPM	0.003-1.5		
Rapid traverse - V	mm/min ipm	30,000 1,181.1023	24,000 944.8818	20,000 787.4015
Rapid traverse - B	RPM	7	5	3.5

Min. programmable
positioning increment
- in the V coordinate
- in the B coordinate

mm (in)
°

0,001 (0.0000393)
0.001

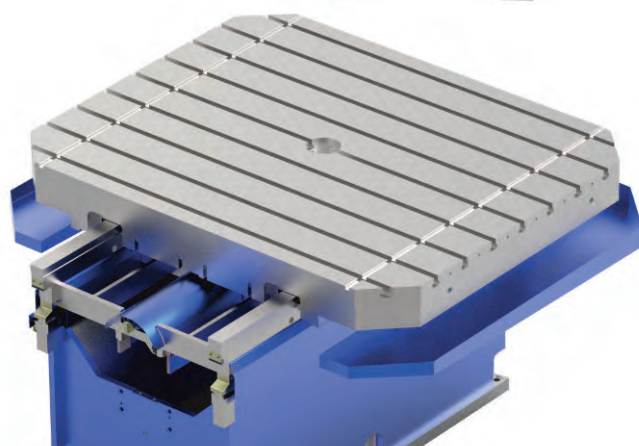


AUTOMATIC PALLET CHANGE

APC

The APC automatic pallet changer replaces the table; it is suitable for quick replacement of the workpiece by preparation and setting of another workpiece during machining of the first workpiece. This significantly speeds up the machining. Conceptually, the pallet change system is based on the automatic change of the technological pallets between the pallet stations, which are equipped with pallet changing mechanism, and a pallet clamping base on the machine saddle. The pallet is fixed to the clamping base by center bolts and it is clamped by cup springs, unclamping of pallet is hydraulic.

The automatic pallet changer is designed for machines **WHN 110/130, WHN 13/15, WHR 13, MAXIMA I/II** and **WHT 110/130**.



TECHNICAL PARAMETERS

TYPE MARKING OF THE PALLETS		P 4	P 5	P 8	P 16
Pallet clamping area	mm	1,250 x 1,250 1,250 x 1,600	1,250 x 1,400 1,250 x 1,600	1,600 x 1,800	1,600 x 1,600 1,600 x 2,000 1,800 x 1,800 1,800 x 2,200 1,800 x 2,500
	in	49.2125 x 49.2125, 49.2125 x 62.9921	49.2125 x 49.2125, 49.2125 x 62.9921	62.9921 x 70.8661	62.9921 x 62.9921 62.9921 x 78.7401 70.8661 x 70.8661 70.8661 x 86.6141 70.8661 x 98.4251
Max. workpiece weight	kg (lbs)	4,000 (8,818.5)	5,000 (1,1023.1)	8,000 (17,637)	16,000 (35,274)
Size of clamping T-slots	mm (in)	22H8 (0.8661)			
Size of adjustment	mm	1,500, 2,000, 2,500, 3,000	1,600, 2,000, 2,500	2,000, 2,500, 3,000, 3,500, 4,000	3,000, 3,500, 4,000
	in	59.0551, 78.7401, 98.4251, 118.1102	62.9921, 78.7401, 98.4251	78.7401, 98.4251, 118.1102, 137.7952, 157.4803	118.1102, 137.7952, 157.4803
Number of pallets in the system	pcs	2-4	2	2	2-4
Pallet change time	s	150	85	85	120



BLUM

PARTNER FOR EXTREME ENVIROMENT

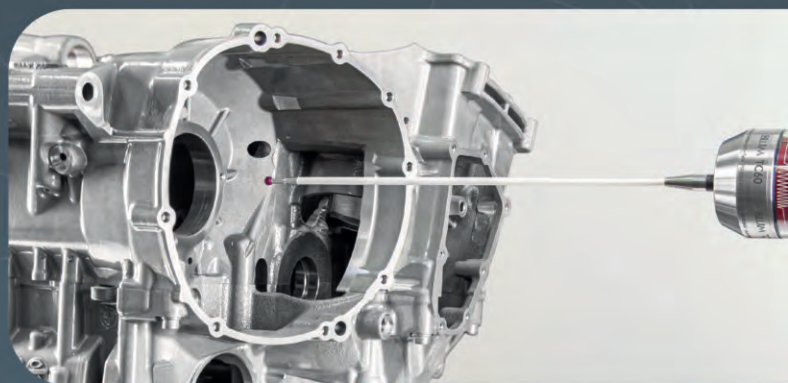
- | stylus up to 300 mm for complex parts
- | high measuring forces for maximum stability
- | wear-free optoelectronic mechanism

Blum-Novotest, s.r.o.

Tovačovského 318/18,
767 01 Kroměříž, Czech Republic

+420 (573) 352 755 info@blum-novotest.cz

www.blum-novotest.com

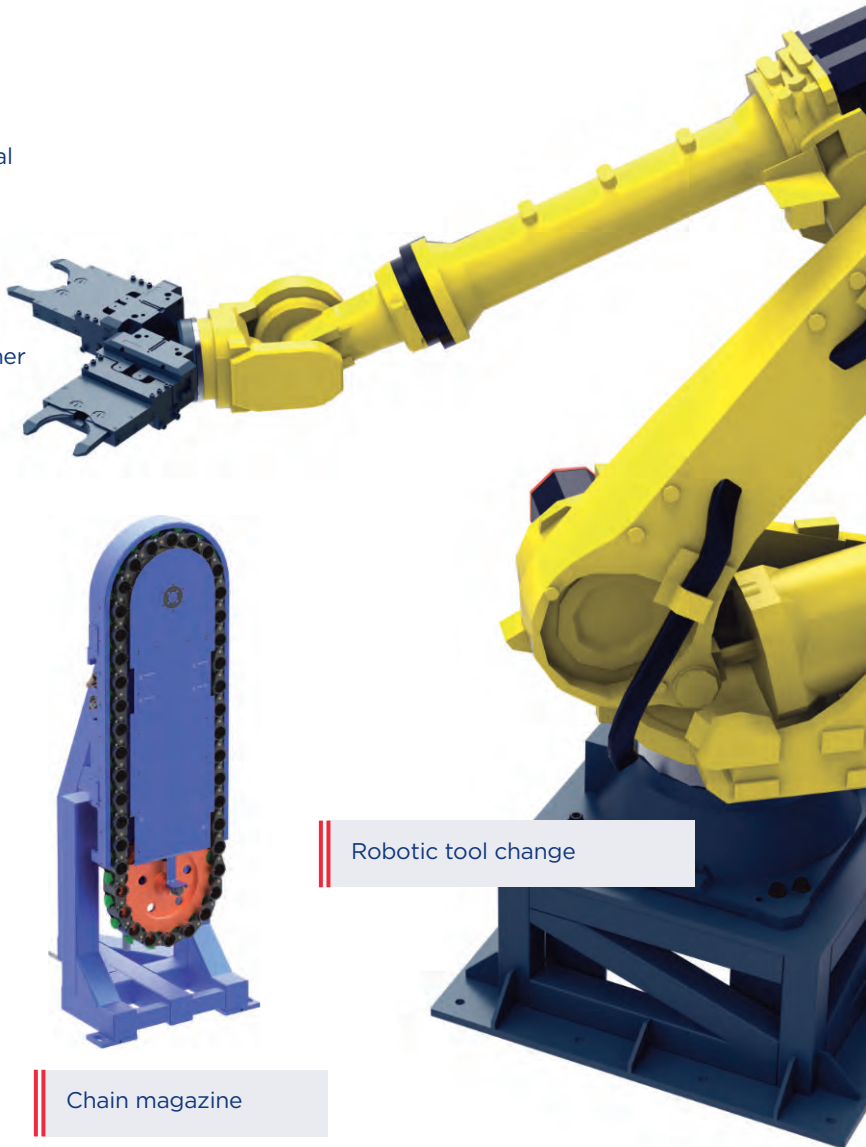




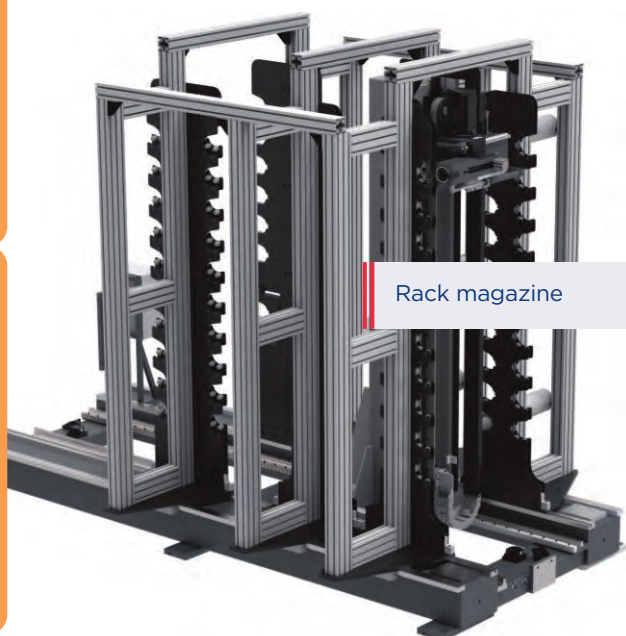
AUTOMATIC TOOL CHANGE

ATC

It consists of a chain meander- or rack-type magazine, a manipulator path on the column or rack and the actual manipulator equipped with a rotating two-arm hand. It is also possible to solve the tool change system using a robot. The tools are searched for milling heads in horizontal or vertical direction. It is possible to choose a variable number of storage sites on customer demand.



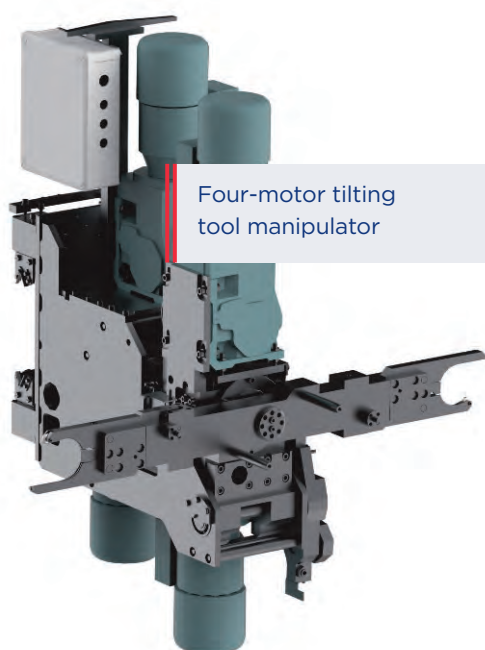
Robotic tool change



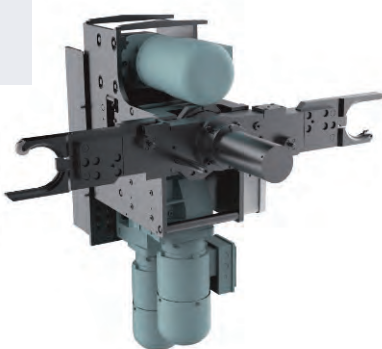
Rack magazine



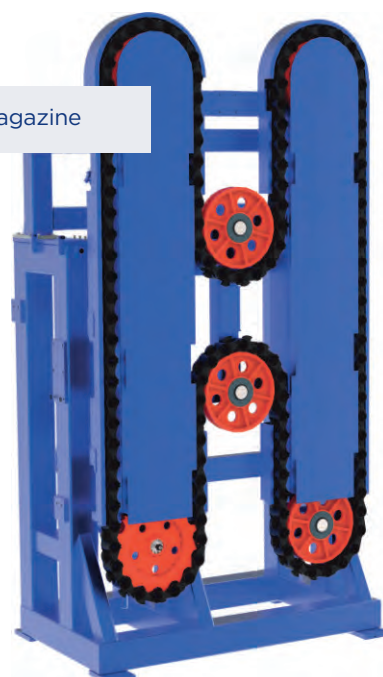
Chain magazine



Four-motor tilting tool manipulator



Three-motor untilting tool manipulator



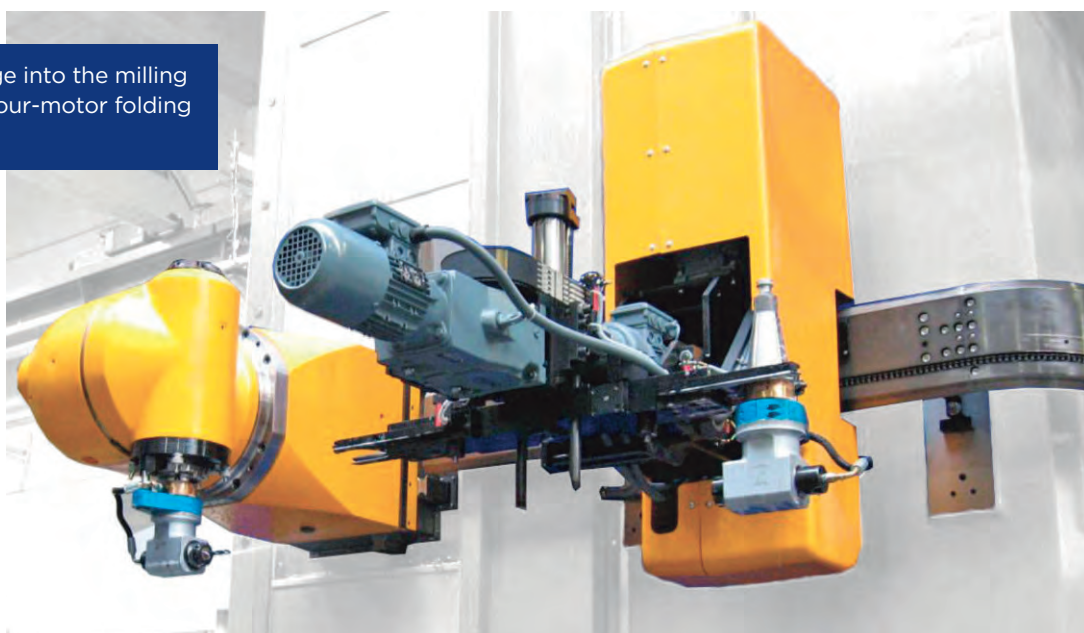
Meander magazine

TECHNICAL PARAMETERS

TABLE-TYPE MACHINES		FLOOR-TYPE MACHINES
Number of storage sites in the magazine	pcs	40, 60, 80, 120
Pitch of storage sites in the magazine	mm (in)	130 (5.1181)
Max. tool diameter - with fully loaded magazine - with free neighbouring storage sites	mm (in) mm (in)	125 (4.9212) 320 (12.5984)
Max. diameter of a special flat tool	mm (in)	390 (15.3543)
Max. tool length	mm (in)	500 (19.6850)
Max. tool weight	kg (lbs)	25 (55.1)
Max. tool weight in the chain	kg (lbs)	1,000 (2,204.6)
Max. tool imbalance in the chain	kg (lbs)	150 (330.7)
Tool change time (tool-tool)	s	15 (25) 20 (25)

		MACHINING CENTRES	PORTAL MILLING MACHINES
		WHT 110/130	WVM 2600/3600 T
Number of storage sites in the magazine	pcs	40, 60, 80, 100+	40, 60, 80, 100, 120
Pitch of storage sites in the magazine	mm (in)	130 (5.1181)	
Max. tool diameter - with fully loaded magazine - with free neighbouring storage sites	mm (in) mm (in)	125 (4.9212) 320 (12.5984)	
Max. tool length	mm (in)	500 (19.6850)	
Max. tool weight	kg (lbs)	25 (55.1)	
Max. tool weight in the chain	kg (lbs)	1,000 (2,204.6)	
Tool change time (tool-tool)	s	16	20

Automatic tool change into the milling head by means of a four-motor folding manipulator.





MILLING HEADS

HAND ADJUSTABLE HEADS

UFP 50

Used as an accessory for the **WH 10** and **WHN 13** machines. It is suitable for machining variously inclined surfaces parallel with one of the machines main axes. Manual attachment of the tool and the milling instrument on the machine.



number of axes:	2
speed (RPM):	600
output kW (HP):	10 (13,6)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	200 (440.9)
positioning:	manual

HPR 50

The vertical head consists of two compact parts that may be swiveled against each other so as the requested angular position of the head's spindle may be set. The adjustment angles have an increment of 0.1° on the circumferential scales fitted with a nonius.



number of axes:	1
speed (RPM):	3,000
output kW (HP):	25 (34)
moment Nm (ft lb):	1,200 (885.1)
weight kg (lbs):	200 (440.9)
positioning:	manual

HUR 50

The HUR 50 universal milling head consists of three compactly connected basic parts with the possibility of their mutual turning in order to achieve the needed general position of the head work spindle. Adjustment angles are readable with increment of 0.1° on circumferential scales fitted with nonius. To adjust the head parts to a total of 8 basic positions (4x90° in the vertical dividing plane, 2x180° in the inclined dividing plane).



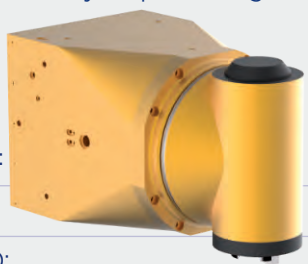
number of axes:	2
speed (RPM):	3,000
output kW (HP):	20 (27.2)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	330 (727.5)
positioning:	manual

MILLING HEADS

AUTOMATICALLY POSITIONING HEADS

HPI 50

The head consists of two compactly connected basic parts enabling their mutual rotation to reach necessary general position of working spindle of the head. Positioning of rotation part is ensured by mechanical drive from the machine spindle and gives the possibility for positioning $\pm 185^\circ$.



number of axes:	1
speed (RPM):	3,500
output kW (HP):	37 (50.3)
moment Nm (ft lb):	1,200 (885.1)
weight kg (lbs):	600 (1,322.8)
positioning:	index 1°

HUI 50

The HUI 50 milling head is automatically indexed in both planes by 2.5° , allowing for greater efficiency when rotating the head spindle relative to the machine's orthogonal coordinate system.



number of axes:	2
speed (RPM):	3,000
output kW (HP):	32 (43.5)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	440 (970)
positioning:	index 2.5°

HUIL 50

The universal automatically indexed milling head HUIL 50 is based on the same concept as the HUI 50 milling head. However, this head design has more precise positioning and allows a significantly higher speed. The head is equipped with cooling channels to ensure even cooling of the head.



number of axes:	2
speed (RPM):	5,000
output kW (HP):	25 (34)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	600 (1,322.8)
positioning:	index 1°

HUIT 50

The universal automatically indexed milling head HUIT 50 is based on the same concept as the HUIL 50 milling head.

However, this head design is significantly more powerful and has higher torque.



number of axes:	2
speed (RPM):	4,000
output kW (HP):	35 (47.6)
moment Nm (ft lb):	1,400 (1,032.6)
weight kg (lbs):	710 (1,565.3)
positioning:	index 1°



MILLING HEADS

AUTOMATICALLY POSITIONING HEADS

HUF 50

Universal continuously positioned milling head HUF 50 consists of three compact sections that may be swiveled against each other. The angular positioning of the head is controlled through the machine spindle CNC controlled rotation. Continuous positioning is provided by servo motors which allow the rotation of Hirth-toothed rims and the subsequent step of 0,001° in both axes A and C.



number of axes:	2
speed (RPM):	3,000
output kW (HP):	32 (43.5)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	610 (1,344.8)
positioning:	index 0.001°

HUFT 50

The universal automatically indexed milling head HUFT 50 is based on the same concept as the HUF 50 milling head. However, this head design is significantly more powerful and has higher torque. The head is equipped with cooling channels to ensure even cooling of the head.



number of axes:	2
speed (RPM):	4,000
output kW (HP):	35 (47.6)
moment Nm (ft lb):	1,400 (1,032.6)
weight kg (lbs):	850 (1,873.9)
positioning: index	0.001°

HOI 50

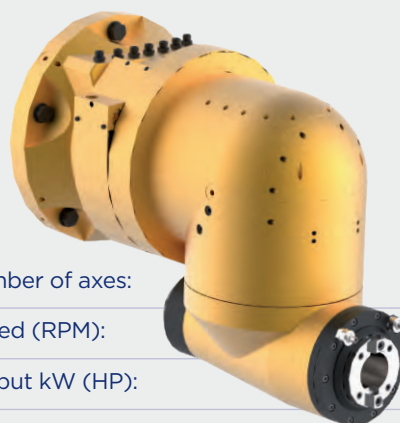
Orthogonal automatically indexed milling head HOI 50 consists of three compactly joined basic parts, which can be mutually rotated in the A and C axes to achieve the required general position of the working head spindle. The rotational parts are positioned by a mechanical drive from the machines spindle, which allows positioning $\pm 180^\circ$ in axis C and $\pm 120^\circ$ in axis A.



number of axes:	2
speed (RPM):	3,500
output kW (HP):	37 (50.3)
moment Nm (ft lb):	1,200 (885.1)
weight kg (lbs):	1,100 (2,425.1)
positioning:	index 1°

HOIL 50

Orthogonal automatically indexed milling head HOIL 50 is based on the same concept as the milling head HOI 50. However, this head design is significantly lighter, with the weight of the head reduced by more than half.



number of axes:	2
speed (RPM):	3,500
output kW (HP):	25 (34)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	450 (992.1)
positioning:	index 1°

HOIT 50

Orthogonal automatically indexed milling head
HOIT 50 is based on the same concept as the
milling head HOI 50. However, this head design
is significantly more powerful and has higher torque.
The head is designed especially for hydrostatic
machines.



number of axes:	2
speed (RPM):	2,000
output kW (HP):	50 (68)
moment Nm (ft lb):	2,500 (1,843.9)
weight kg (lbs):	1,100 (2,425.1)
positioning:	index 1°



Control run of the HOIT 50 milling head on the **WRD 180** machine.



MILLING HEADS

AUTOMATICALLY POSITIONING – CONTINUOUSLY CONTROLLED HEADS

HPFL 50

The head consists of three compactly connected basic parts, where the two parts are firmly connected and one part is rotatable in the A axis. The movement of this part is provided from the independent servo-drives, which enable the continuous positioning in the full rotation range as well as the smooth movement of axis A during machining.



number of axes:	1
speed (RPM):	5,000
output kW (HP):	20 (27.2)
moment Nm (ft lb):	1,000 (737.6)
weight kg (lbs):	550 (1,212.5)
positioning:	continuous



Successful testing of full-fledged 5-axis machining with the new HPFL 50 milling head.

ASSORTMENT OF MILLING HEADS

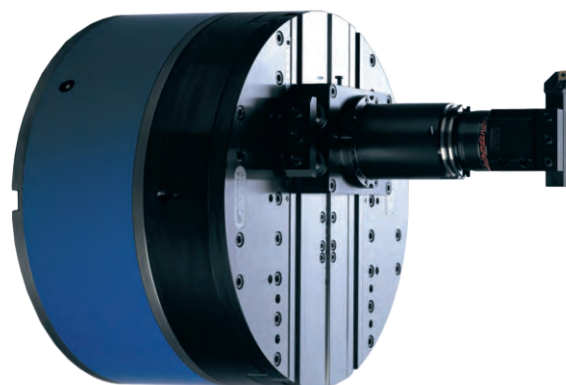
HEAD ASSORTMENT	UFP 50	HPR 50	HUR 50	HPI 50	HUI 50	HUIL 50	HUIT 50	HUF 50	HUFT 50	HOI 50	HOIL 50	HOIT 50	HPFL 50
WH 10	◆	◆											
WH 105		◆	◆										
WHN 110		◆	◆										
WHN 130		◆	◆		◆						◆		
WHN 13/15	◆	◆	◆		◆	◆		◆			◆		
WHR 13	◆	◆	◆		◆	◆		◆			◆		◆
MAXIMA I/II		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆
WRD 13	◆	◆	◆		◆	◆		◆			◆		◆
WRD 130/150/160		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆
WRD 170/200		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
WRD 160/180/200 H		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
GRATA		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆
WHT 110		◆	◆		◆	◆					◆		◆
WHT 130		◆	◆		◆	◆	◆	◆	◆		◆		◆
WVM 2600/3600 T							◆		◆	◆			



FACING HEADS

D'ANDREA

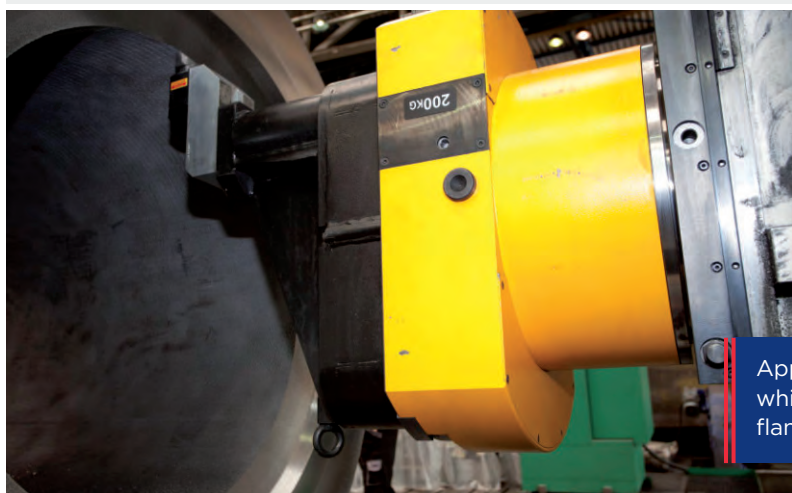
Maximum boring diameter:	1,000/1,250/1,400 mm 39.3700/49.2125/55.1181 inch
Plate dimensions:	500/600/800 mm 39.3700/49.2125/55.1181 inch
Traverse range:	160/200/250 mm 6.2992/7.8740/9.8425 inch
Boring accuracy:	0.01 mm (0.000393 inch)
Positioning:	Automatic



LD 650

The facing head consists of an axially symmetrical rotational basic body fitted with an axial hole for potential passage of the machine's work spindle and a slide conducted perpendicularly to the body.

Diameter of the basic body	mm (in)	650 (25.5905)
The slide's adjustment	mm (in)	170 (6.6929)
Max. speed of the facing head	RPM	150
Max. speed during using work spindle	RPM	200
Range of the slide's working traverses	mm/min ipm	1-1,000 0.0393-39.3700
Slide's rapid traverse	mm/min ipm	1,000 39.3700
Max. diameter of face turning	mm in	1,000 39.3700
Range of the boring diameters	mm in	300-1,000 11.8110-39.3700



Application of LD 650 facing head, which is used for turning of valve flange.



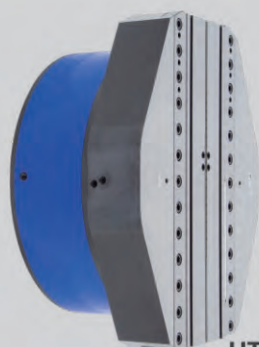
D'ANDREA®

U-TRONIC

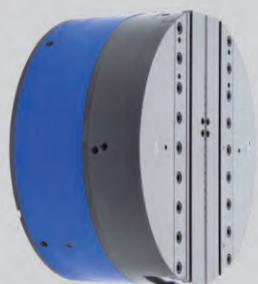
Medium and large CN heads, that can be applied on boring machines, machining centers and special machines.

The movement of the slide is managed by a built-in servomotor directly connected to the CN and the application provides an intermediate flange that can be manual, automatic, extended and angular.

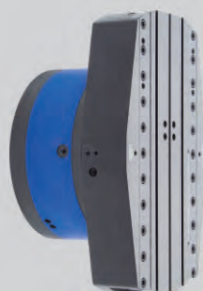
In addition to the standard range, the version with integrated reducer is available and, on request, special versions with hole, up to $\varnothing 1600$ mm, with two slides and with counterweights for self-balancing.



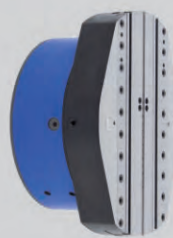
UT 8-1000 S



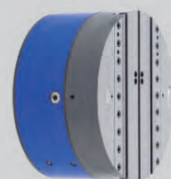
UT 8-800 S



UT 5-800 S



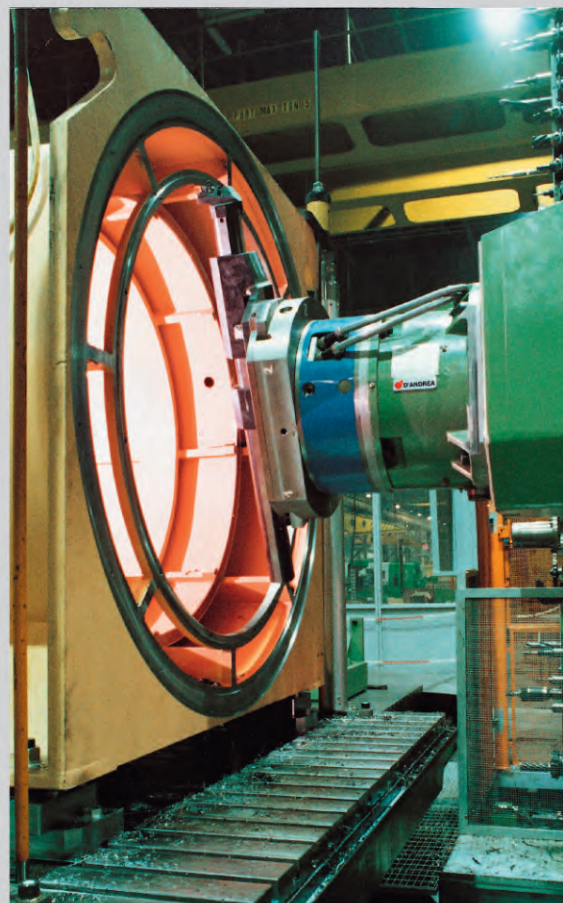
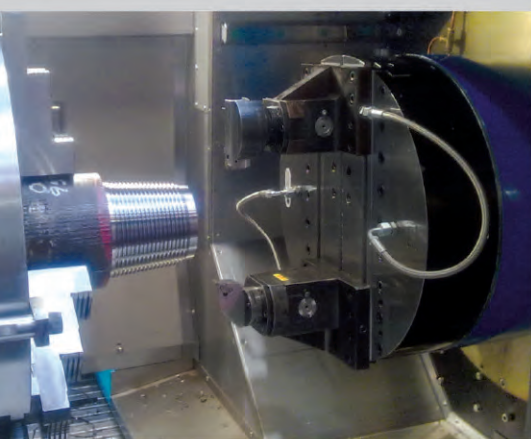
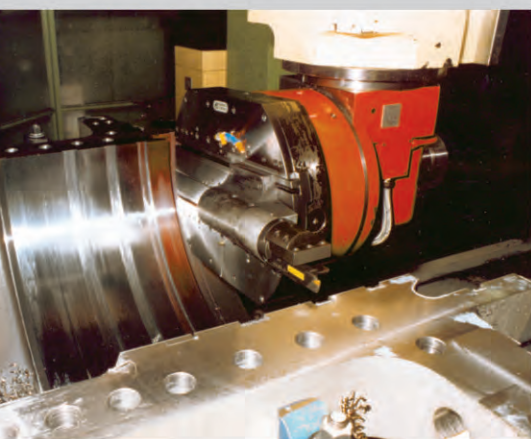
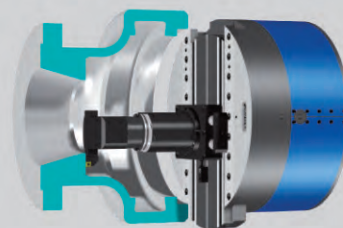
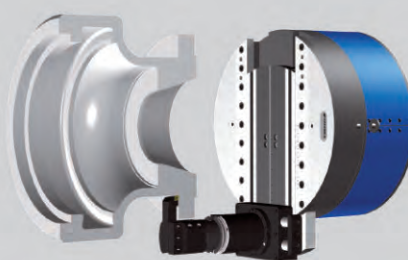
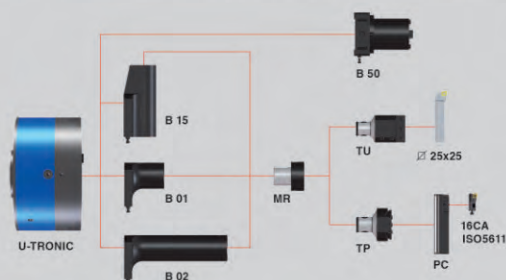
UT 5-630 S



UT 5-500 S



UT 3-360 S





OPERATOR'S STATION AND MACHINE COVERING

OPERATOR'S STATION

To make the work of an operator easier, machines are equipped with operator stations that are spacious and meet the strictest ergonomic requirements. Stations are fitted with either a fixed cover or movable cabins (independently adjustable horizontally and vertically).

Excellent ergonomics guarantee visual contact of the machine operator with the workpiece, enable access to the workpiece during clamping or "debugging" of NC program, and offer comfortable manual tool change.



THE MACHINE COVERING DESIGN

The TOS VARNSDORF a.s. machines are delivered in modern designs, which satisfy the customers ecological and ergonomic demands and correspond to the strictest safety standards (CE). The covering also protect key components of the machine against mechanical damage and pollution.



1. Basic covers operator covering and machine fencing
2. Additional KVR cover
3. Partial C type cover



COMPLETE MACHINE COVERING



HORIZONTAL MACHINING CENTERS

HORIZONTAL BORING MILLS

PORTAL MILLING MACHINES

ACCESSORIES

COMPONENTS

REFERENCES



CONTROL SYSTEMS

Specifications of the **HEIDENHAIN TNC 640**, **Siemens Sinumerik 840D sl** or **FANUC 30i/31i** control systems correspond to demands for control of all TOS VARNSDORF a.s. machines and demands for all technological operations performed on these machines. The control systems allow simple control of the machine in the manual as well as fully automatic mode. The control systems can also be operated by a manual wheel and control panel for automatic tool replacement.



Siemens SINUMERIK 840D sl

Heidenhain TNC 640



HR510



HR520



HR550



Fanuc 31i



HMOP



I-Pendant



HT2



HUBITRON

THE FACTORY AUTOMATION COMPANY

FANUC

Highest quality

shortest processing time

NEW
30i-B Plus
series



designed and built
in Japan

FANUC offers the widest range of CNC systems in the industry from best value controllers with powerful functionality to highperformance control systems for complex machines – fast programming and easy to use. For the highest quality and short processing times. **Ask us: our dedicated support team is available any time.**

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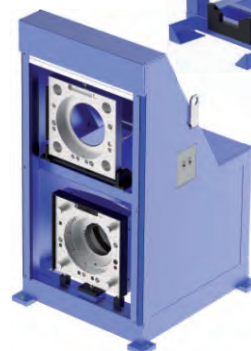
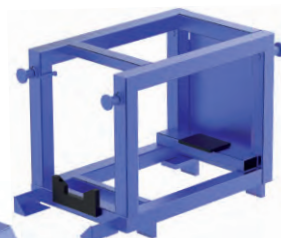
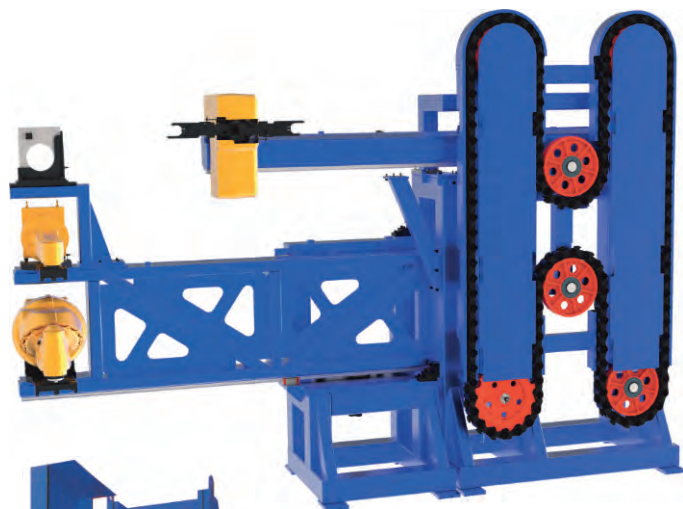
OTHER ACCESSORIES AND SERVICES

AUTOMATIC CHANGE OF TECHNOLOGICAL ACCESSORIES

A special accessory stand (SZP) is intended for storing special technological accessories and replacement using the so-called "PICK-UP" system. The design - number of storage places, method of replacement, etc. is done on the basis of individual customer requirements customer.

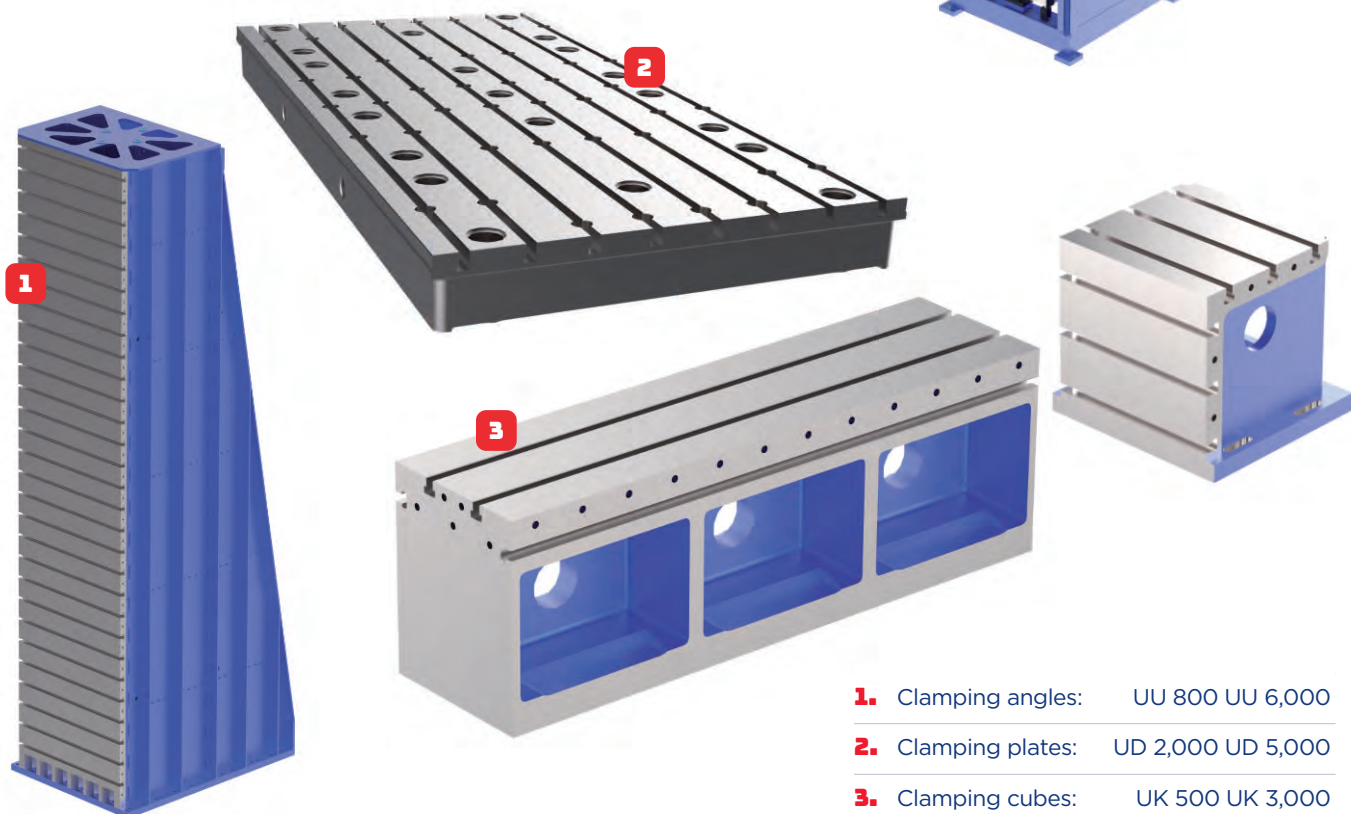
Plate machines are available in two versions of the SZP stand cover - hinged door or a roller shutter door.

As for table machines, you can choose an additional SZP stand, which is fixed and locked on the surface of the rotary table, or additional SZP stand, which is locked on hinged consoles on the rotary table, or you may use a separate magazine with a manipulator, which is placed on a concrete floor next to (AVTP) machine, and may be added with an ATC system.



CLAMPING EQUIPMENT

Clamping devices are intended as special technological accessories for horizontal boring machines. They are used for clamping of the workpiece.



- | | |
|---------------------|-------------------|
| 1. Clamping angles: | UU 800 UU 6,000 |
| 2. Clamping plates: | UD 2,000 UD 5,000 |
| 3. Clamping cubes: | UK 500 UK 3,000 |

TOOL COOLING

Three tool cooling methods can be applied on the TOS VARNSDORF a. s. machines. Cooling by adjustable nozzles (CHZ) or internal axial tool cooling (CHOV). The axial cooling can be used with an inserted milling head. Alternatively can be applied tool cooling with air (CHVZ).

PROBES

All control systems can use various types of measurement probes.

CHIP CONVEYOR

It is possible to supply the machine with a chip conveyor at customer demand. The length of the conveyor and the delivery height can be adjusted to the user needs.

SPINDLE GUIDE SUPPORTS

The guide support provides increased rigidity of the housing and guiding of the work spindle, thus making it usable for power machining or precise machining at large traverses within the entire range of speeds, while allowing traverse of the work spindle.

REMOTE DIAGNOSTICS

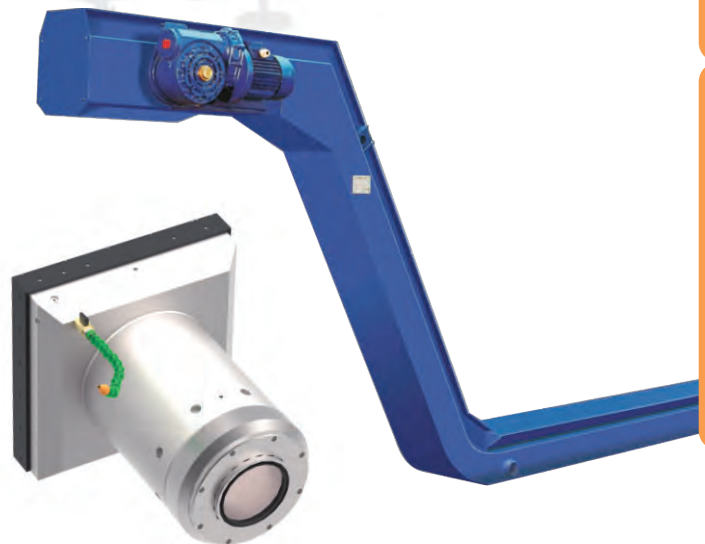
Visualization of the current screen of the connected control system and its remote controlling

Reception of data from connected control system for inspection

Quick remote solution of problems (error determination) on the machine tool transfer of interactive data on the machines condition

Diagnostics of drives, measurements and indication of the machines inputs/outputs

Transfer of data from the service network into the customers control system as a support during technological utilization of the machine (transfer of NC programmes, tool tables and zero points) and modifications of the machines properties (transfer of PLC programmes and machine parameters).



FOR PERMANENT
CUSTOMER SUPPORT



MACHINING THE FUTURE



COMPONENTS

HEADSTOCKS

OTHER COMPONENTS

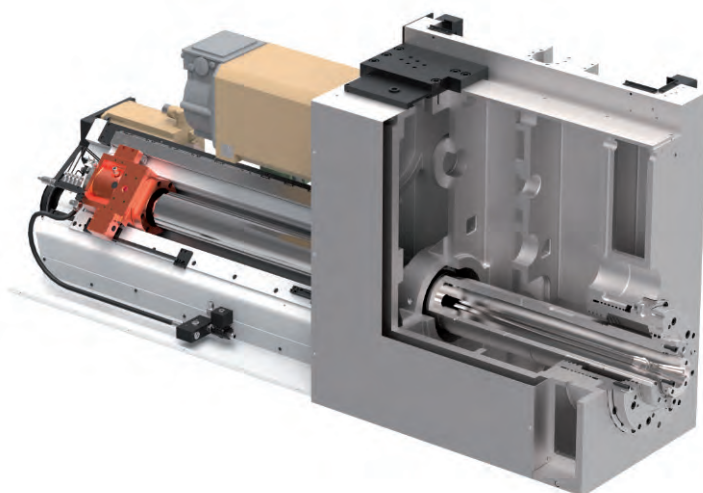


HEADSTOCKS

HEADSTOCKS FOR THE WH MACHINES:

10 105 110 130 13 15

The headstocks contain complete nodes and mechanisms of the spindle housing and driving (the C axis) and traverse of the work spindle (W axis) including chucking of the tool. On the spindle head can be mounted detachable special technological accessories of the type of guide support, plate, milling heads etc. The spindle is housed in precise spindle ball bearings with oblique-angled contact of increased accuracy in multiple arrangement with a prestress. The spindle head weight is balanced with a counter-balance suspended on ropes guided in the column.



HEADSTOCKS FOR THE WHR/WRD MACHINES:

13 130 150 160 170 MAXIMA I/II

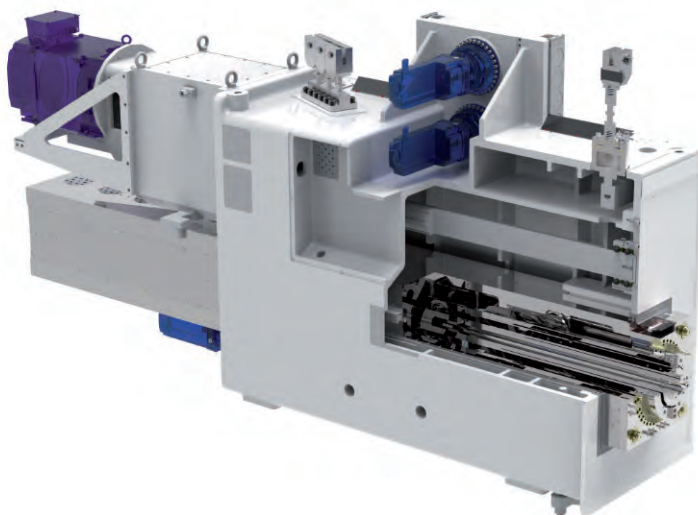
The main casing is a rigid grey iron casting, as well as the other connected L-shaped part, which forms a guide for the RAM. The concept of the WHR/WRD 13, WRD 130-170 headstocks allow electro-mechanical compensation of the RAMs drop during its traverse in Z-axis.

The drive of the work spindle is derived from the electric regulation drive through a two-speed gearbox. The weight of the WRD 130-170 headstock is balanced by a hydraulic cylinder. In addition, the balancing equipment contains pressure vessels for hydraulic oil and gas fixed to the column slide. The weight of the WHR/WRD 13 headstock is compensated by a counter-weight housed in the stands hollow.

HEADSTOCKS FOR HYDROSTATIC MACHINES WRD H:

160 180 200

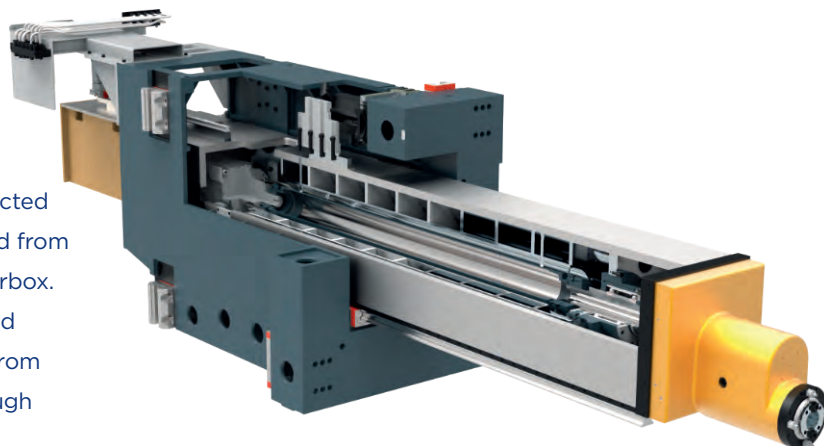
Cabinet of the headstock is closed rigid casting of high quality cast iron to which the other group of machine are established. The internal area of the casting has a horizontal square tunnel with precisely machined surfaces for guiding the RAM. The spindle speed is derived from a powerful electric drive through a robust gearbox. Three mechanical speeds of the gearbox are shifted automatically. Two traverse motors are incorporated in the internal section to drive the headstock in the Y coordinate.



HEADSTOCKS FOR UNIVERSAL MILLING MACHINES:

GRATA

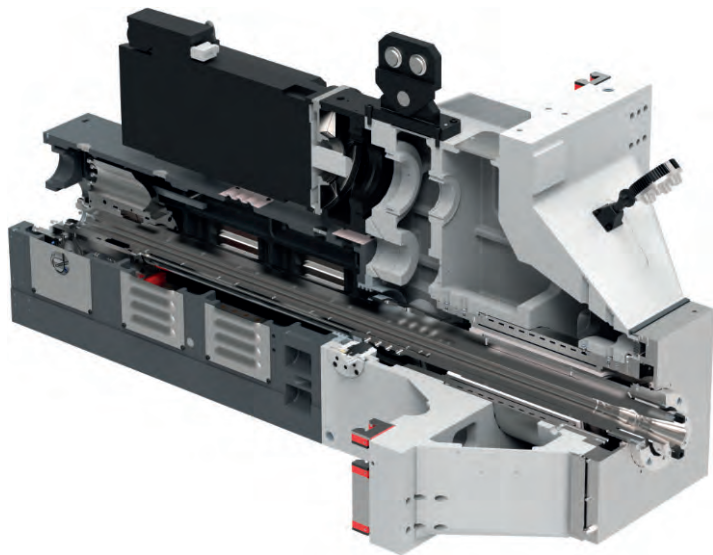
The headstock is produced with centrally conducted traveling RAM. The driving shaft speed is derived from a powerful electric drive through the robust gearbox. Two mechanical gears are automatically engaged – by an electrically controlled shifter. The drive from the transmission to the drive shaft is made through a torsional rigid coupling. The coupling includes electromechanical compensation of the RAM movements.



HEADSTOCKS FOR MACHINING CENTRES:

WHT 110/130

Headstocks for machining centres are produced with centrally conducted spindle. This design is optimal for even distribution of both the thermal and mechanical loading of the machine frame. In machines with traveling spindle the main housing consists of a set of hollow and work spindle. The traveling work spindle is nitrided, housed with a minimum allowance in an all-nitrided hollow spindle. The hollow spindle is supported in an assembly of highly precise preloaded oblique contact spindle bearings.

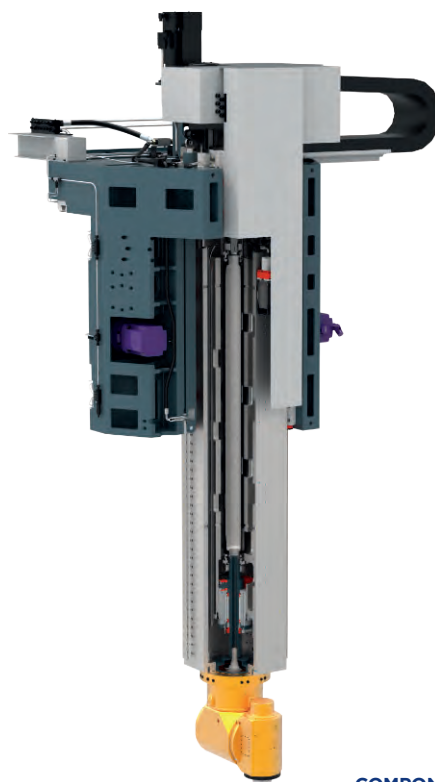


HEADSTOCKS FOR PORTAL MILLING MACHINES

WVM 2600/3600 T

The basic body is a rigid casting of ductile cast iron, which creates a guideway for the horizontally traveling RAM of cast steel.

The driving shaft in the RAM is driven by a powerful electrical control drive via a robust gearbox. The two mechanical gears are engaged mechanically by an electrically controlled shifter. The spindle head also incorporates a motor with a belt drive and a ball screw for the traverse of the quill, end switch, and measuring gauge of the quill and a safety brake of the vertically traversing quill. The quill is guided by the four tracks of the linear guideway. On the sides, the weight of the quill is symmetrically counter-balanced by hydraulic cylinders (plungers).





OTHER COMPONENTS

LUBRICATION SYSTEM

The automatic loss lubrication system with a central lubrication aggregate ensures lubrication of sliding guide surfaces of adjustable groups and the ball nuts in the traverse drives. Cogwheels of the spindle drive in the headstock are lubricated by a circulating oil system.

HYDRAULIC AGGREGATE

The source of pressure oil for lubrication of the guide surfaces comes from a lubrication aggregate located together with the hydro-aggregate in a separate energy box.

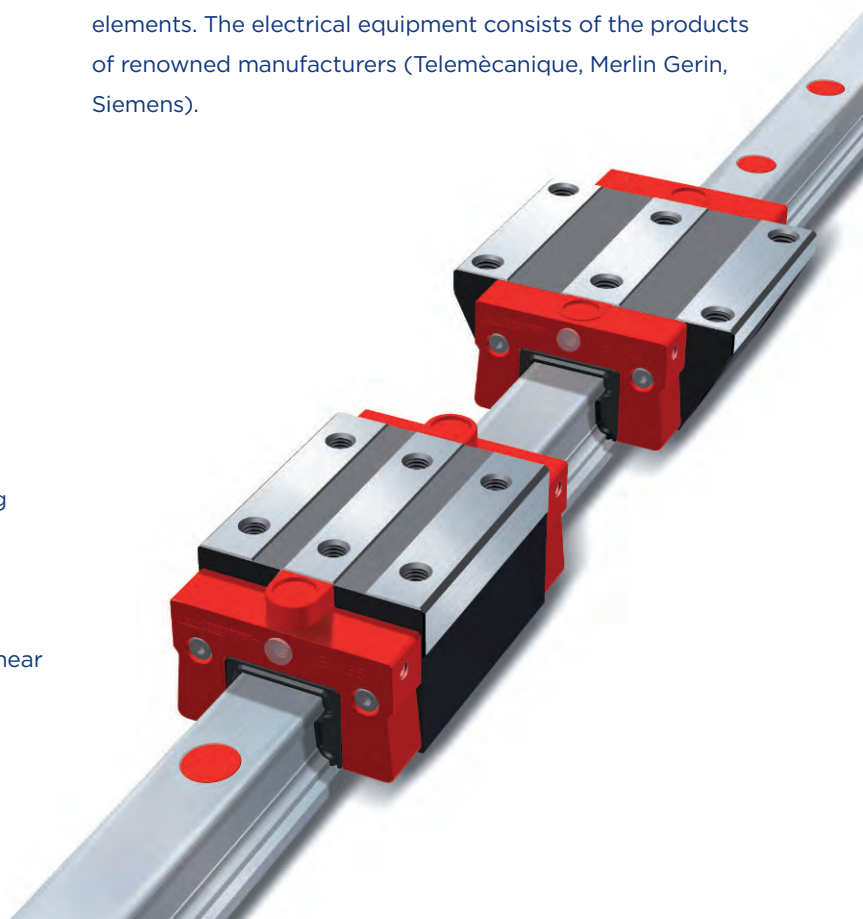


ENERGY SOURCES

The electrical equipment is mostly located in a four-part electric box. It includes the basic module of the control system and control of drives and traverses as well as the spindle and all supply, switch and protection elements. The electrical equipment consists of the products of renowned manufacturers (Telemécanique, Merlin Gerin, Siemens).

LINEAR GUIDES

This concept ensures high accuracy and rigidity of the guides at a very low friction coefficient. It allows application of high traverse speeds and guarantees long life. The individual linear guides are located in areas of the largest stress and force transmission. Thanks to the profile rail, the carriage can capture forces in the vertical and horizontal direction. Machines with linear guides can be equipped with direct gauging integrated directly in the linear guide.

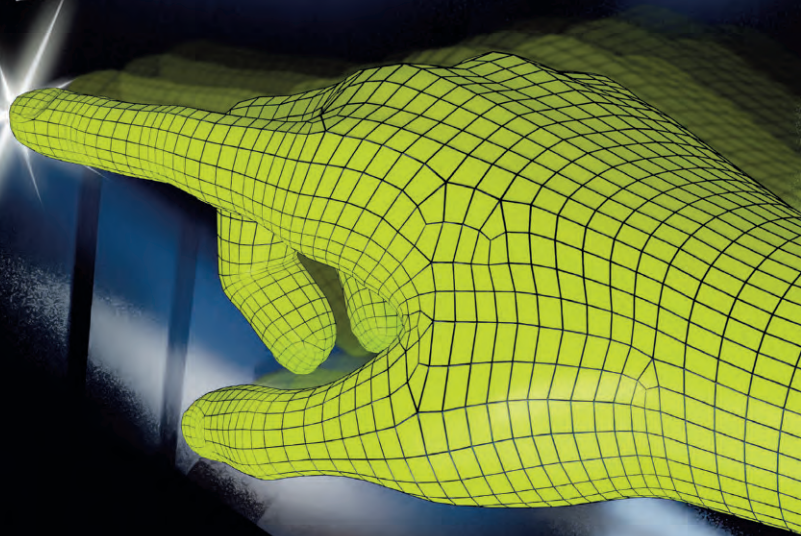


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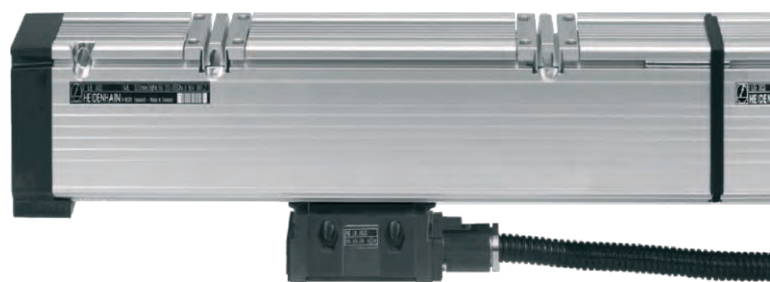
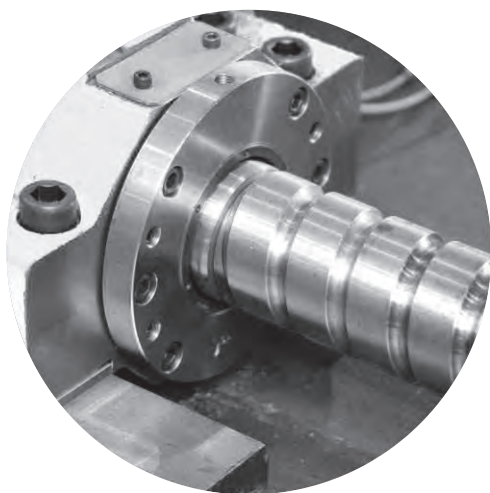
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OTHER COMPONENTS

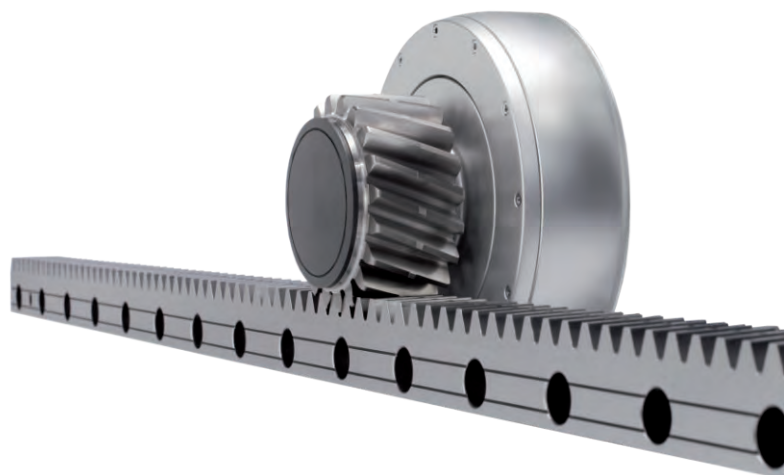
GAUGING

As standard, the linear axes X, Y, Z are equipped with direct measurement with closed electro-optical HEIDENHAIN gauges.



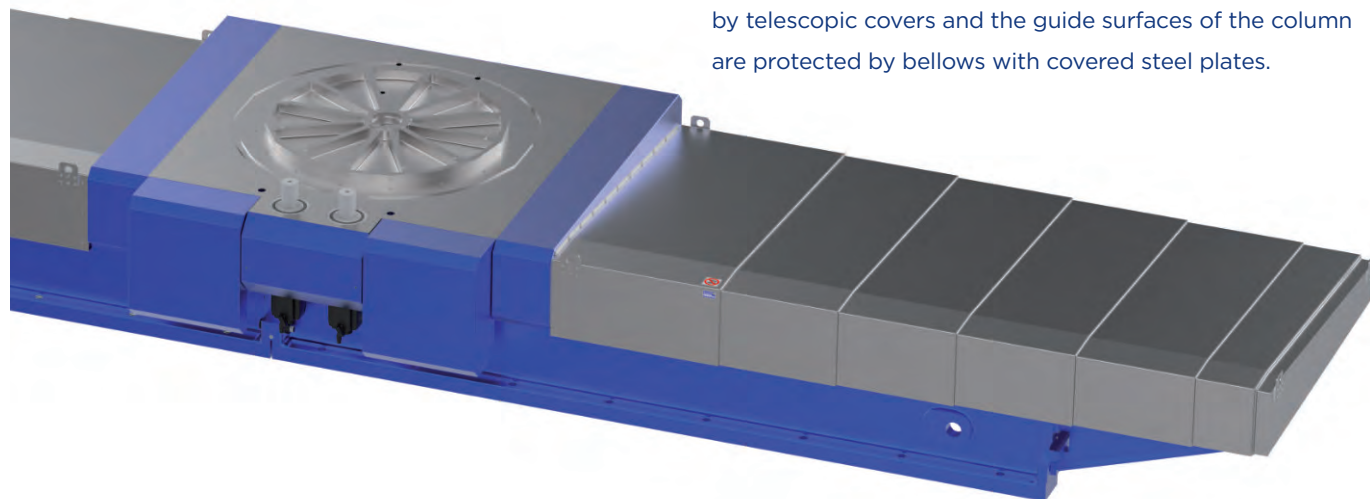
BALL SCREWS

The linear axes are driven by ball screws with pre-stressed nuts. Sufficient diameters of the ball screws guarantee top-level rigidity of the drive in the individual linear axes.



TOOTHED SHAFT

If the X axis is longer than 6,000 mm, the ball screw is replaced with a tooth shaft. This concept is driven by an AC-digital servo drive and a pinion-toothed shaft gear (the Master & Slave system).



TELESCOPIC COVERS

The guides on the rails are protected against dirt by telescopic covers and the guide surfaces of the column are protected by bellows with covered steel plates.

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More flexible than
ever before.



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For turning, holmaking or milling – Tiger-tec® Gold is at home in any environment. With geometries that are optimised for each task and a coating structure designed specifically for each machining operation, there really is only one answer to the search for the best tool solution: Tiger-tec® Gold.

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REFERENCES

SIGNIFICANT CLIENTS



WRD 130 Q

FERRAM MACHINE FACTORY
Opava - Czech Republic

X = 11,000 mm (433.0708 inch)
Y = 3,500 mm (137.7952 inch)
Rotary table
2,000 x 2,000 mm (30 tonnes)
78.7401 x 78.7401 inch (33.1 tons)





WRD 130 Q

Manoir Industries - France

X = 9,000 mm (354.3307 inch)

Y = 2,500 mm (98.4251 inch)

ATC 40

Rotary table

1,800 x 2,200 mm (20 tonnes)

157.4803 x 78.7401 inch (22 tons)



WRD 150 Q

Tecnoweld Italia srl - Italy

X = 11,000 mm (433.0708 inch)

Y = 4,500 mm (177.1653 inch)

ATC 60

Rotary table

3,000 x 3,500 mm (50 tonnes)

118.1102 x 137.7952 (55.1 tons)

3x TOS VARNSDORF MACHINE WHQ 15 CNC, WHQ 13 CNC, WHN 110 Q

Machine factory TYC s.r.o. - Czech Republic



WRD 170 Q

GE CANADA - Canada

X = 13,000 mm (511.8110 inch)
Y = 4,000 mm (157.4803 inch)
ATC 80
Rotary table
3,000 x 3,500 mm (50 tonnes)
118.1102 x 137.7952 (55.1 tons)





WHT 110 LC

Persa a.s. – Czech Republic

X = 2,500 mm (98.4251 inch)

Y = 1,600 mm (62.9921 inch)

Z = 2,500 mm (98.4251 inch)

ATC 60

2x clamping pallet

1,250 x 1,600 mm (4 tonnes)

49.2125 x 62.9921 inch (4.4 tons)

WH 10 CNC

ŠKODA AUTO Mladá Boleslav
– Czech Republic

X = 1,250 mm (49.2125 inch)

Y = 1,100 mm (43.3070 inch)

Z = 940 mm (37.0078 inch)

Rotary table

1,000 x 1,120 mm (3 tonnes)

39.3700 x 44.0944 inch (3.3 tons)



WRD 130 Q

Faymonville - Belgium

X = 11,000 mm
(433.0708 inch)

Y = 4,000 mm
(157.4803 inch)

ATC 80

Milling head HOI 50





WRD 150 Q

S.E.P.F.A. - France

X = 8,000 mm (314.9606 inch)
Y = 3,000 mm (118.1102 inch)
ATC 40
Rotary table
2,000 x 2,500 mm (25 tonnes)
78.7401 x 98.4251 inch (27.5 tons)



WHQ 13 CNC

Frýdlantské strojírny
- Czech Republic

X = 3,500 mm (137.7952 inch)
Y = 2,500 mm (98.4251 inch)
Z = 1,250 mm (49.2125 inch)
ATC 40
Rotary table
1,800 x 2,200 mm (12 tonnes)
78.7401 x 118.1102 inch (13.2 tons)



WVM 2600 T

TYC Kooperace s.r.o.
- Czech Republic

X = 4,500 mm (177.1653 inch)
Y = 3,200 mm (125.9842 inch)
Z = 1,500 mm (59.0551 inch)
ATC 60
Working table
4,000 x 2,000 mm (20 tonnes)
157.4803 x 78.7401 inch (22 tons)



WHQ 13 CNC

Hiecise Heavy-duty
Machines Co., Ltd. - China

X = 3,500 mm (137.7952 inch)

Y = 2,500 mm (98.4251 inch)

Z = 1,600 mm (62.9921 inch)

ATC 60

Rotary table

1,800 x 2,200 mm (12 tonnes)

78.7401 x 118.1102 inch (13.2 tons)





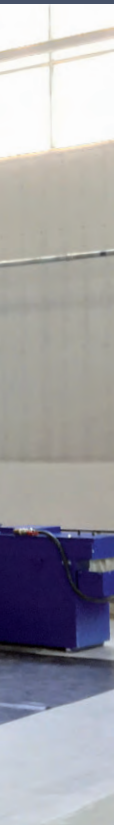
3× WRD 150 Q

Indian Railways - India

X = 11,000 mm (433.0708 inch)

Y = 3,000 mm (118.1102 inch)

ATC 40



WRD 170 Q

JOY Global Inc. - Chile

X = 17,000 mm

(669.2913 inch)

Y = 6,000 mm

(236.2204 inch)

ATC 80

Rotary table

5,000 x 5,000 mm

(65 t)

196.8503 x 196.8503 inch

(71.6 tons)



WHN 130 MC

Solar Turbines EAME s.r.o.
- Czech Republic

X = 2,000 mm (78.7401 inch)
Y = 2,240 mm (88.1889 inch)
Z = 1,250 mm (49.2125 inch)
ATC 120
2x clamping pallet
1,600 x 1,800 mm
(62.9921 x 70.8661 inch)





WHT 110 C

Engel Austria GmbH - Austria

X = 2,000 mm (78.7401 inch)
 Y = 1,600 mm (62.9921 inch)
 Y = 1,600 mm (62.9921 inch)
 ATC 80
 Rotary table
 1,250 x 1,600 mm (6 tonnes)
 49.2125 x 62.9921 inch (6.6 tons)



WHN 110 MC

CERFONTAINE SPRL - Belgium

X = 2,500 mm (98.4251 inch)
 Y = 1,400 mm (55.1181 inch)
 Z = 1,250 mm (49.2125 inch)
 ATC 60
 2x clamping pallet
 1,250 x 1,600 mm (5 tonnes)
 49.2125 x 62.9921 inch (5.5 tons)



WHN 110 Q

KLEMENT a.s. - Czech Republic

X = 3,000 mm (118.1102 inch)
 Y = 1,650 mm (64.9606 inch)
 Z = 1,250 mm (49.2125 inch)
 ATC 40
 Rotary table
 1,400 x 1,800 mm (8 tonnes)
 55.1181 x 70.8661 inch (8.8 tons)



WHR 13 Q

Wrazidlo Sp. Z.o.o. - Poland

X = 3,500 mm (137.7952 inch)

Y = 2,500 mm (98.4251 inch)

Z = 1,600 mm (62.9921 inch)

Rotary table

2,000 x 3,000 mm (12 tonnes)

78.7401 x 118.1102 inch (13.2 tons)





WRD 150 TANDEM

Hydra Arc - JAR

common axis X = 33 000 mm
(1299.2125 inch)
Y = 2x 5 000 mm
(196.8503 inch)
2x AVN 60



WHQ 105 CNC

Engcon Poland

X = 1,800 mm (70.8661 inch)
Y = 1,250 mm (49.2125 inch)
Z = 1,250 mm (49.2125 inch)
ATC 40
Rotary table
1,400 x 1,400 mm (5 tonnes)
55.1181 x 55.1181 inch (5.5 tons)

WORLD WIDE

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America LLC.

**VARNSDORF
CZECH REPUBLIC**
TOS VARNSDORF a.s.

**SHANGHAI
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TOS Machine Tools
(Shanghai) Ltd.

**KUNMING
CHINA**
TOS Kunming
Machine Tool Co.



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