Hydrostatic floor type horizontal boring mill WRD 180 H

Milling machine manufacturer

TOS VARNSDORF a.s.

FEATURES OF THE PRODUCT

WRD 180 H hydrostatic floor-type horizontal boring and milling machines are designed to serve for precise coordinate drilling, boring, milling, and thread cutting. They are particularly suitable for the machining of box-, plate- and complex-shape work pieces made of cast iron, cast steel, steel or other materials machinable with cutting tools, and for large and very large size and weighty components. The machine can be completed with an accessory table, or possibly with two rotary tables and a clamping field composed of clamping plates.

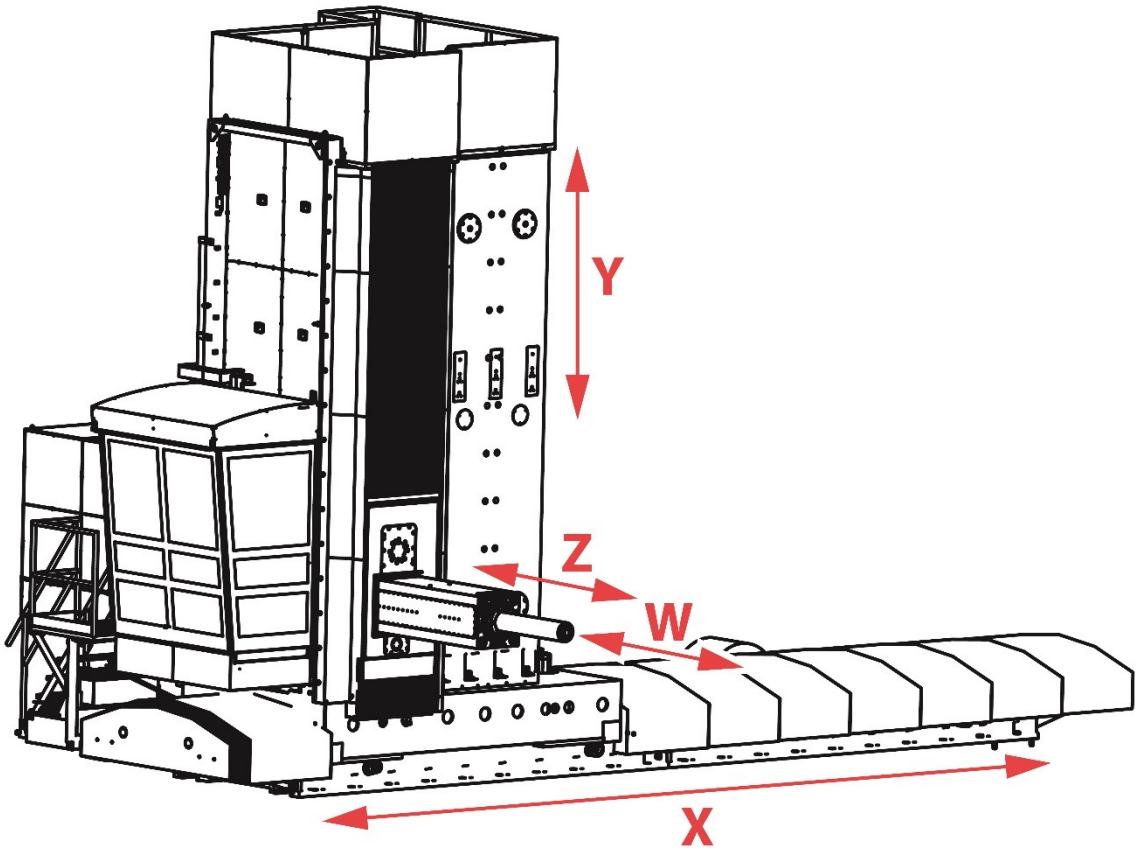
The machines are well usable for batch production and complex process applications. The machines are controlled continuously in four axes (X, Y, Z, W) from a continuous control system in positional relations. They can be extended with a wide selection of technological accessories that significantly widen the machine technological utility value.

BASIC CONCEPT OF THE MACHINE

Basic concept of the machine:

The WRD 180 H machine is a floor-type horizontal boring and milling machine of left-hand type, equipped with an extending RAM (quill), extending work spindle and crosswise traversing column (X-coordinate). A headstock (Y-coordinate), with horizontally extending ram of square section (Z-coordinate) and extending work spindle (W-coordinate), moves vertically on a column guide.

The machines are continuously controlled in four axes (X - base cross travelling, Y - headstock vertical adjustment, Z - RAM longitudinal travel and W - working spindle longitudinal travel).

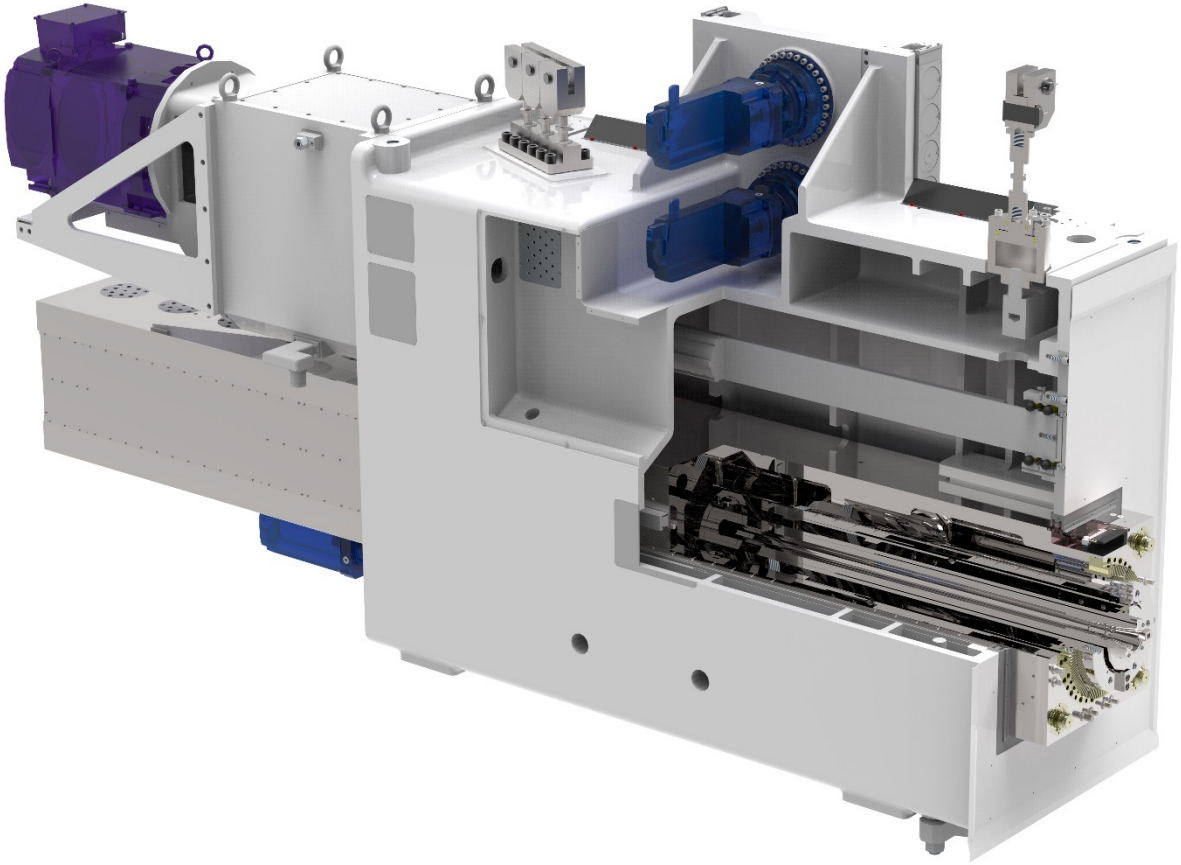


HEADSTOCK

Headstock:

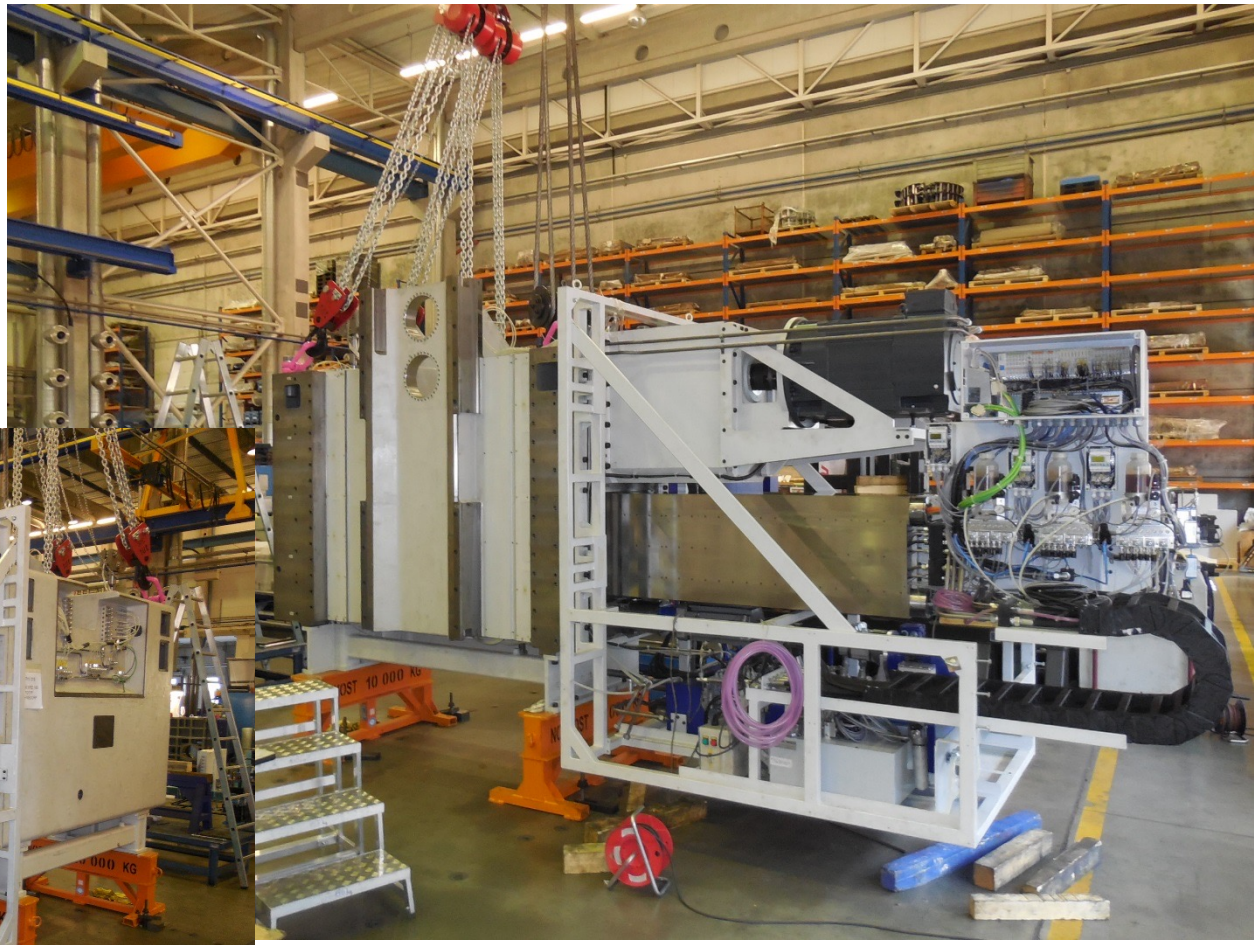
Cabinet of Headstock is closed rigid casting of high quality cast iron to which the other group of machine are established. Inside the casting goes through horizontal square tunnel with precisely machined surfaces for ram guiding. The body of ram consists of prismatic cast ductile iron with a cavity for storing the machine spindle in axis. Unified transverse dimension of the ram is 550 x 550 mm.

The hollow spindle is placed in three groups of special ball bearing with oblique joint.



HEADSTOCK

Headstock of WRD 180 H



BALANCE AND DRIVE OF AXES Y, Z, W

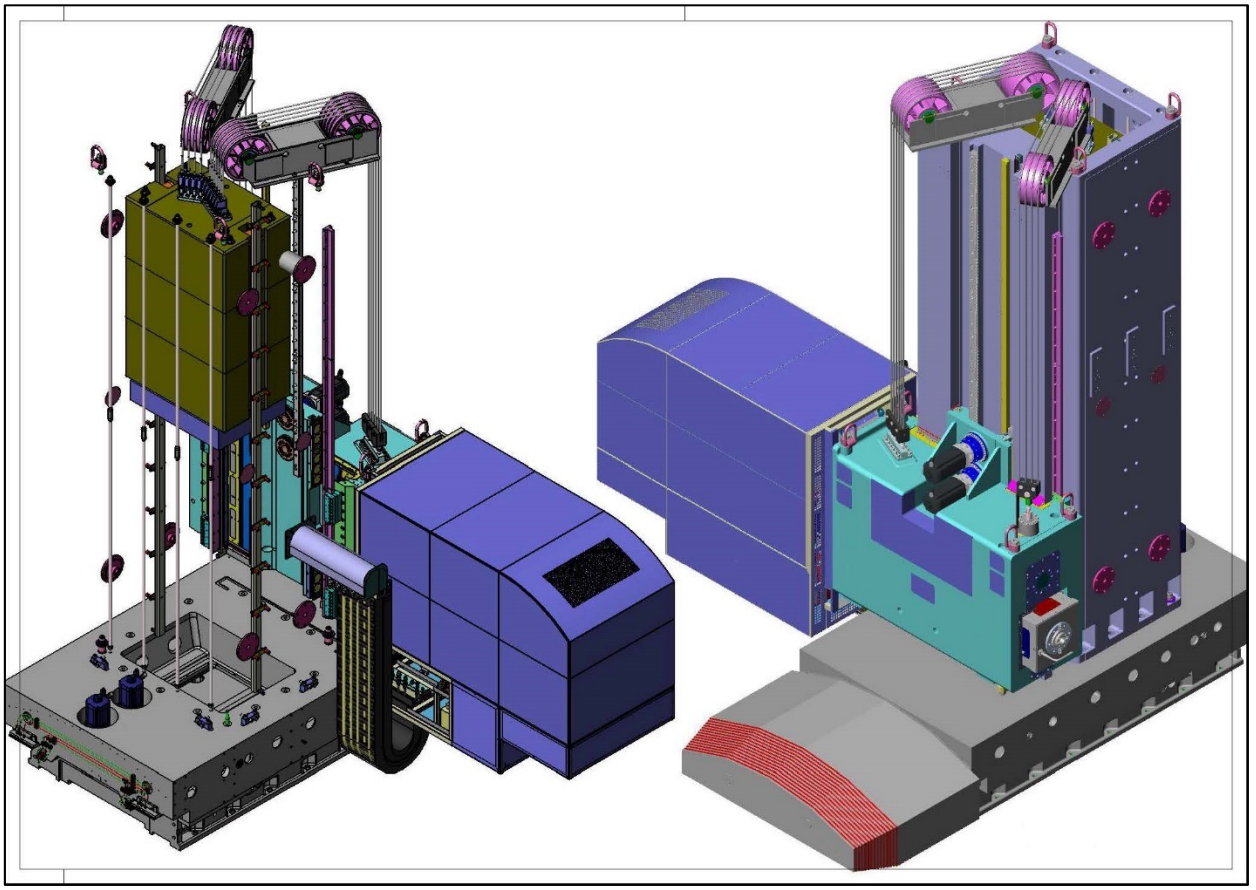
Balance and drive of axes Y, Z, W:

All four axes (X, Y, Z, W) are equipped with individual electrical regulating actuators. The movement of axes X and Y is implemented by using of pair of electric actuators with reducers. Preload of pinions in the output of reducers towards geared rack concluded electrically connecting of the drives in function „Master – Slave“. (Requires two controlled axes).

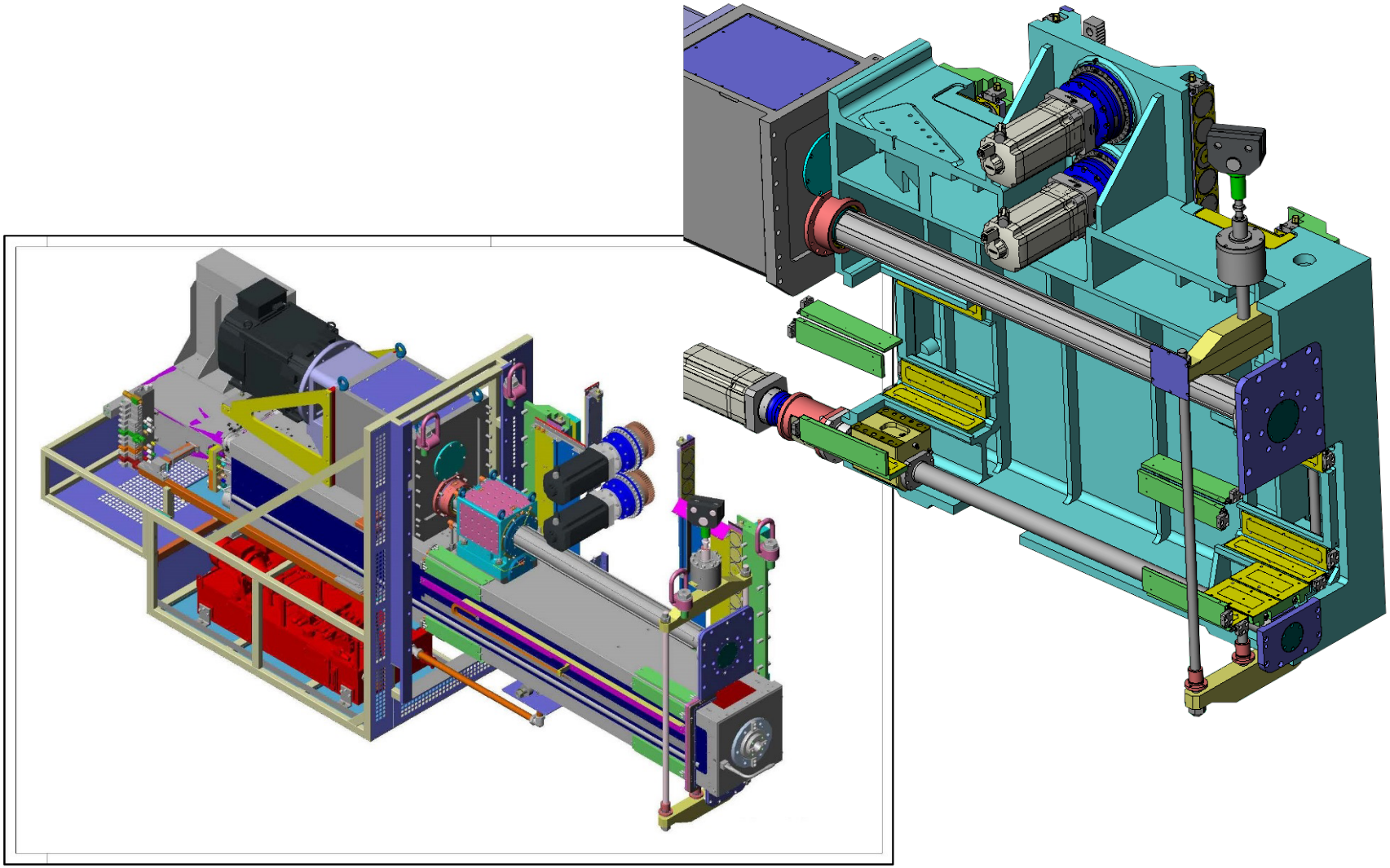
Transmission to the linear motion of axes W and Z is realized by ball screw. The primary stage of drives of axes Z and W is solved using the transmission by gearwheels.

Compensation of Headstock weight:

Two suspenders of the ram connecting the quill with counterweight. Front hinge of four sections of steel ropes Hercules and back of six of the same. Cables tensions are adjusted with the tension screws



BALANCE AND DRIVE OF AXES Y, Z, W



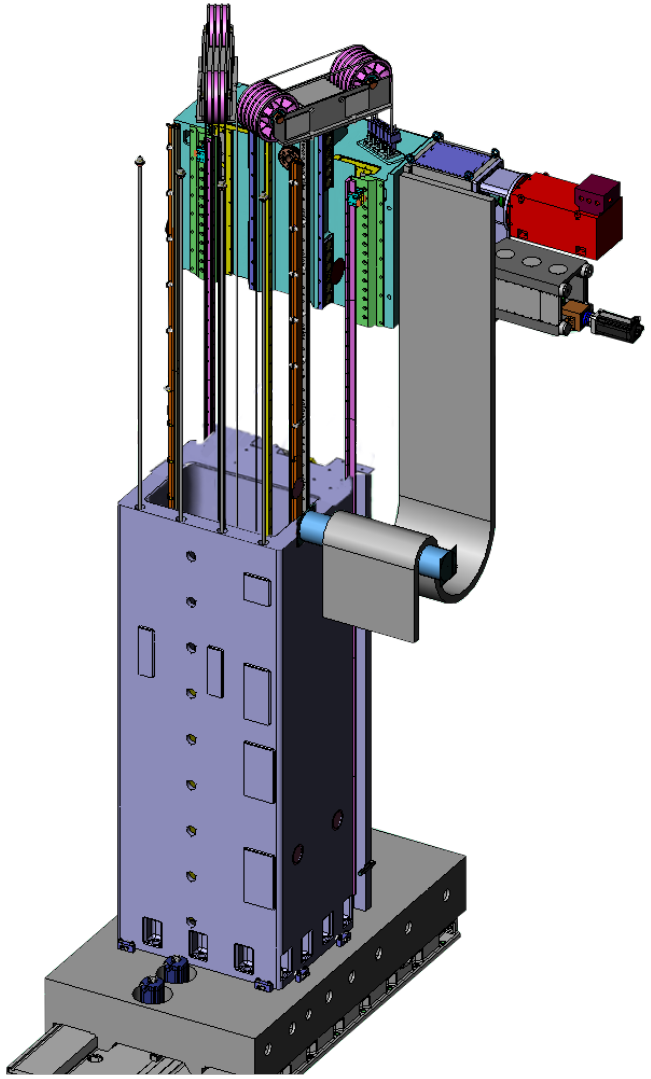
COMPENSATION

Compensation of the deformation of the stand shape:

In the rear wall of the stand there are four rods which can correct static deformations of the guide surfaces of opposite side of the stand, resulting suspension of Headstock and weights.

Compensation of thermal expansion:

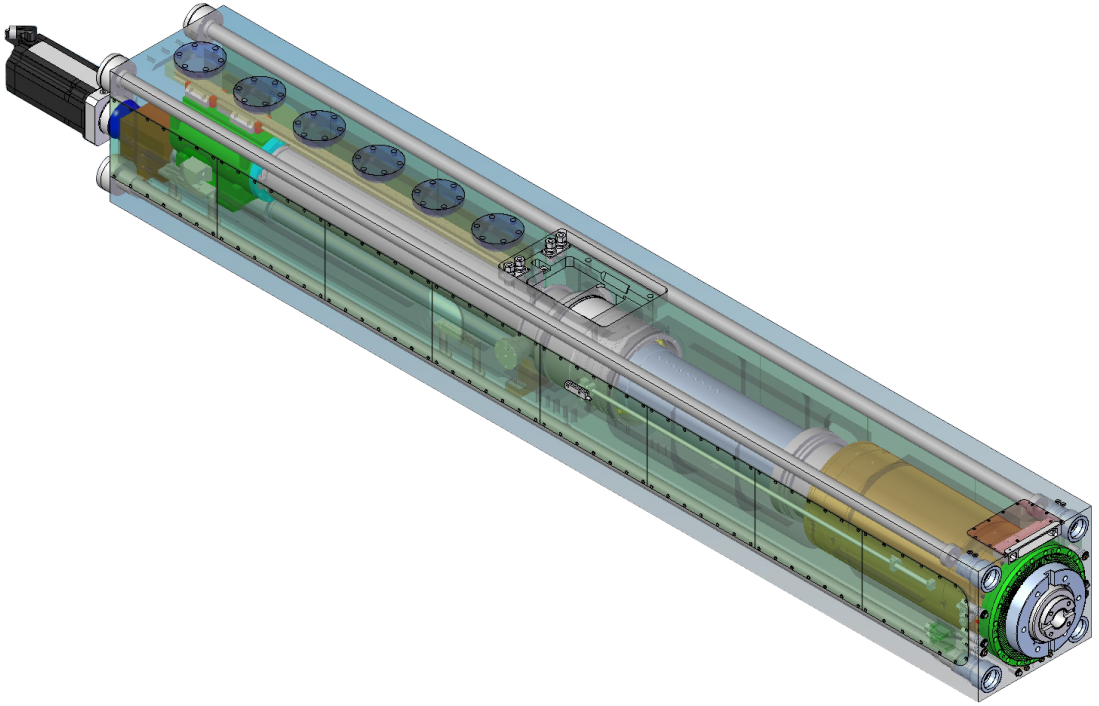
Special storage and cooling of bearing optimize their preload, minimizes the amount of heat generated in the storage and allows its quick drainage from the ram. Low rise temperature of the ram allows quick temperature stabilization and small thermal expansion, which can be further corrected.



COMPENSATION

Compensation of shape distortion and declination of the ram:

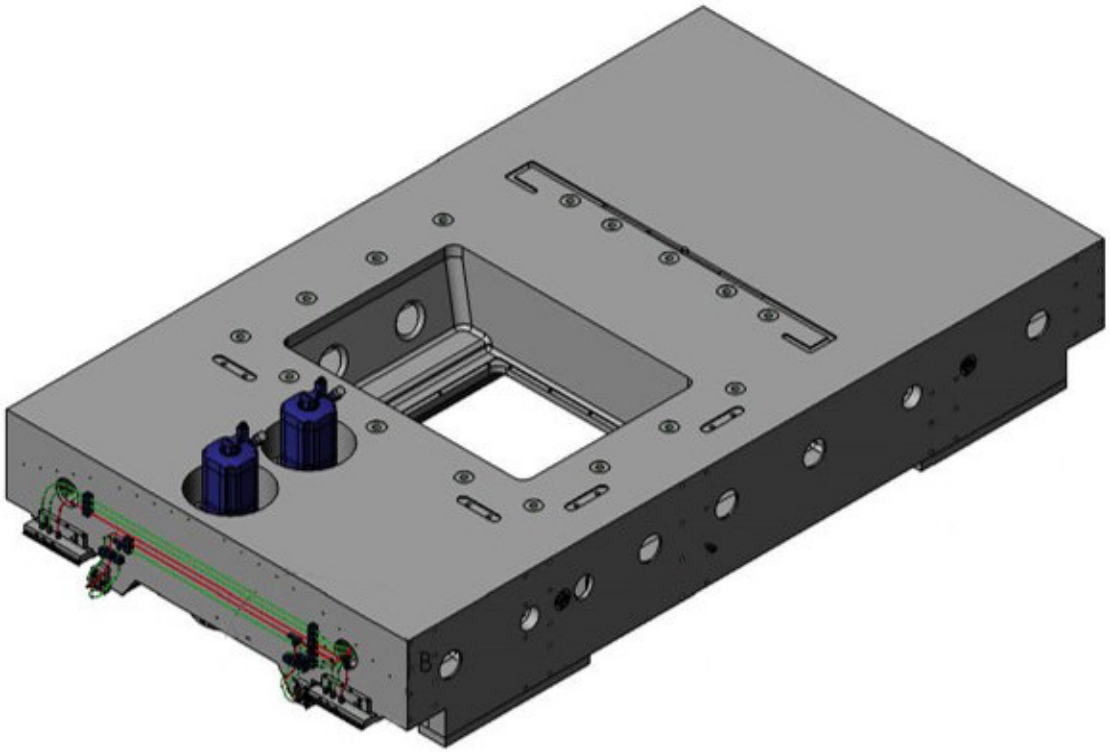
4 tensioning rods in its corners defend bending deformation of the ram from its own weight. In the upper corners of the ram there are two pulling rods in longitudinal bores, in bores in the lower corners there are two push bars. Rods and bars are pulled/pushed by hydraulic cylinders bed by variable pressure controlled by proportional valve depending on the position of the ram.



FEED DRIVES AND CLAMPING

Feed drives and clamping:

Axis X is equipped with individual electrical regulating actuators. The movement of axis X is implemented by using of pair of electric actuators with reducers. Preload of pinions in the output of reducers towards geared rack concluded electrically connecting of the drives in function „Master – Slave“. (Requires two controlled axes).

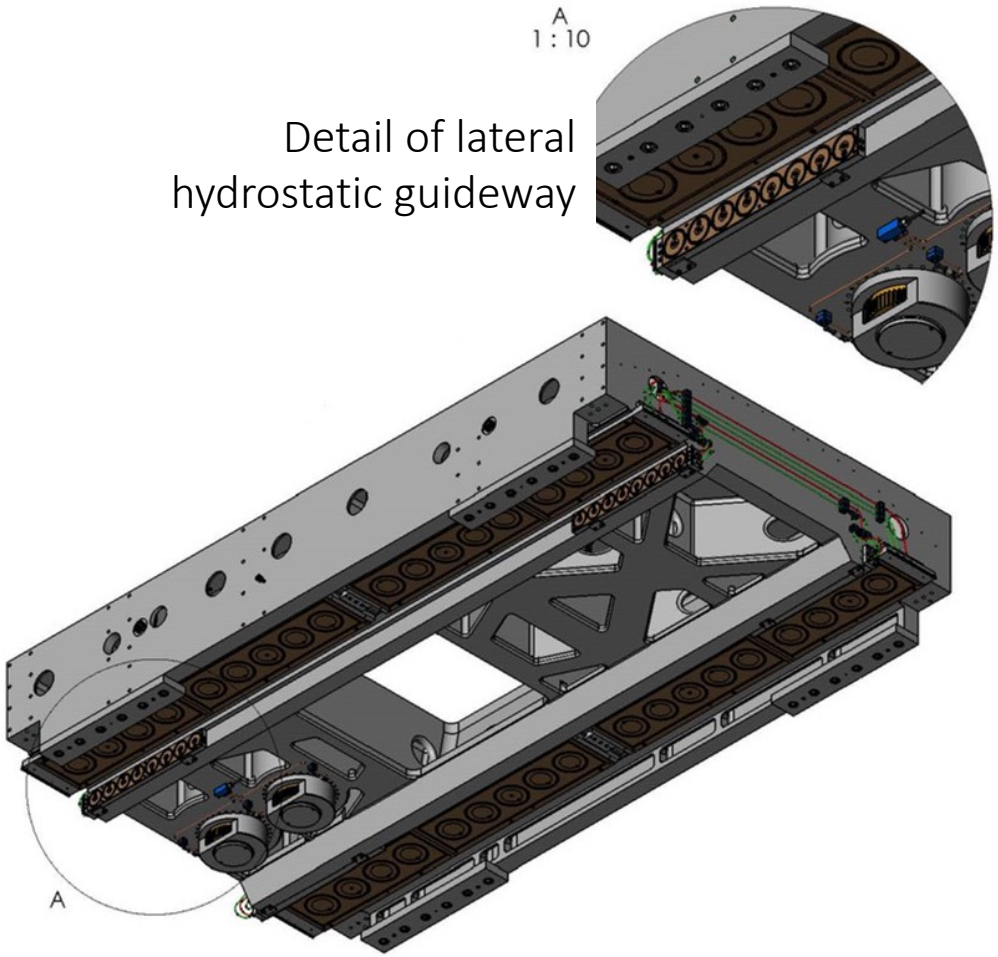


Asix X

GUIDEWAYS OF MOVABLE GROUPS

Guideways of movable groups:

Main support line (axis X) is formed in the four large bars, interposed between the bed and slide. In each bar is 9 closed hydrostatic cells arranged in two separately powered sections. In addition, there are 4 side bars, each with 8 hydrostatic cells, on the column saddle. Totally, the machine is carried by 68 closed cells, in which the pressure is in the range of 10-15bars, depending on height, respectively weight of the machine.



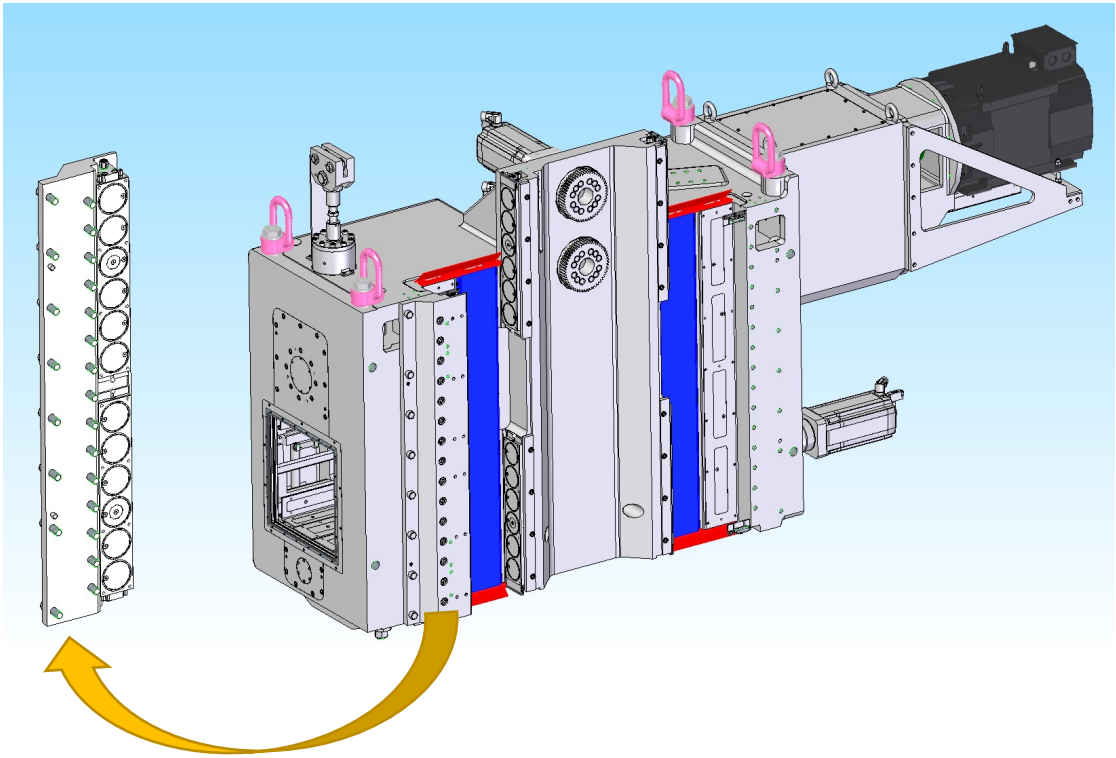
Detail of lateral hydrostatic guideway

column saddle

GUIDEWAYS OF MOVABLE GROUPS

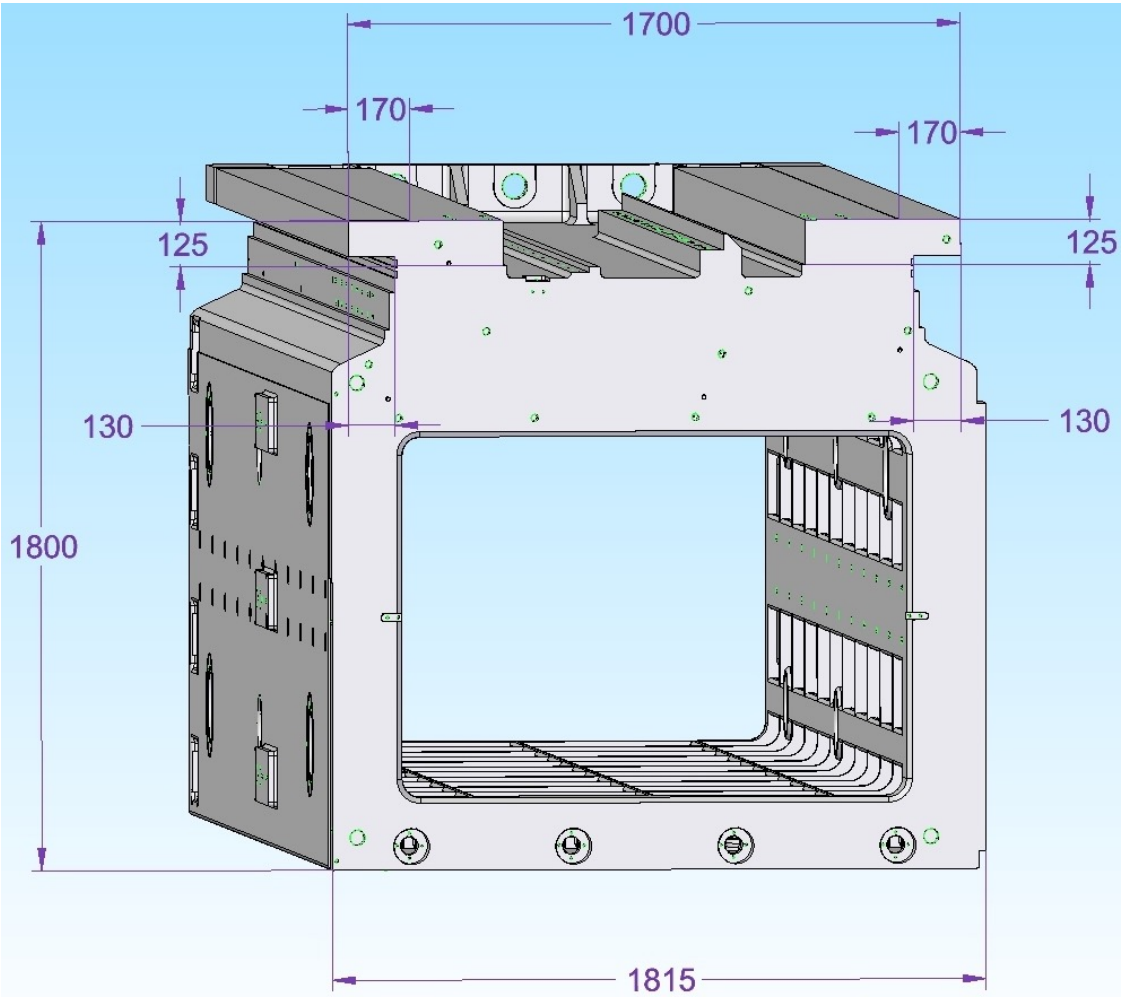
Guideways of movable groups:

The guide surfaces of the front, side and rear guides (Y axis) are precisely grinded. The guide surfaces of the headstock body are formed by 2 bars, each of 4 hydrostatic cells with independent pressurized oil inlets. The side guide surfaces are in 4 wedge bars with six closed hydrostatic cells and the same bars form the rear headstock guide in the attached robust battens.



Asix Y

GUIDEWAYS OF MOVABLE GROUPS



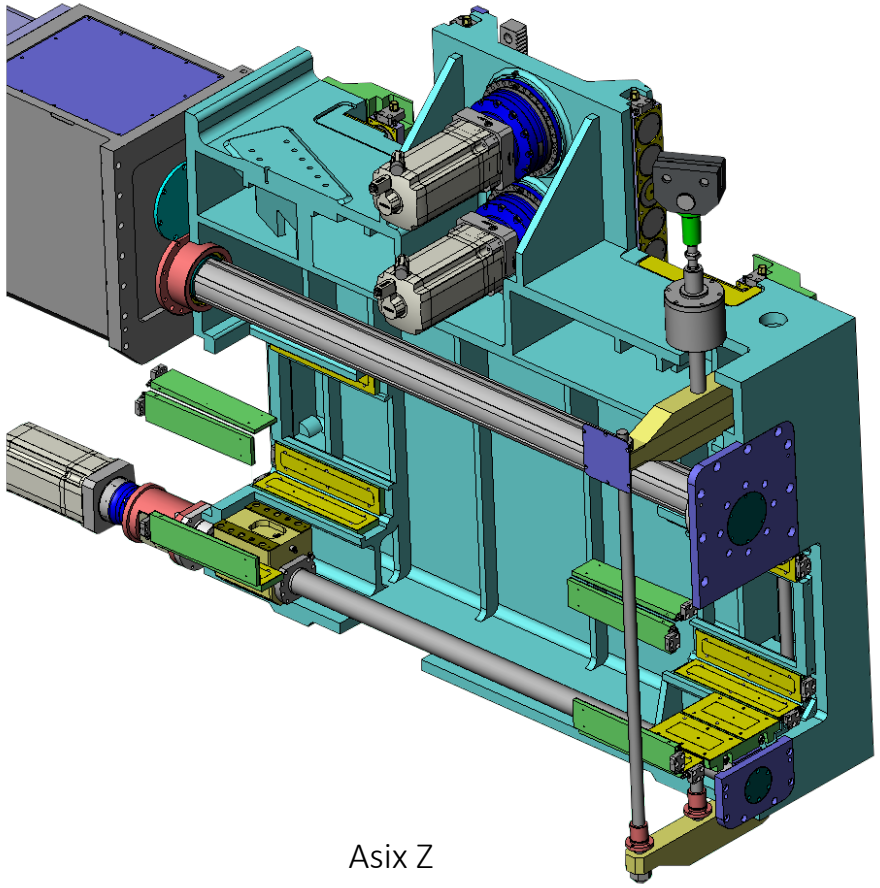
Axis Y

GUIDEWAYS OF MOVABLE GROUPS

Guideways of movable groups:

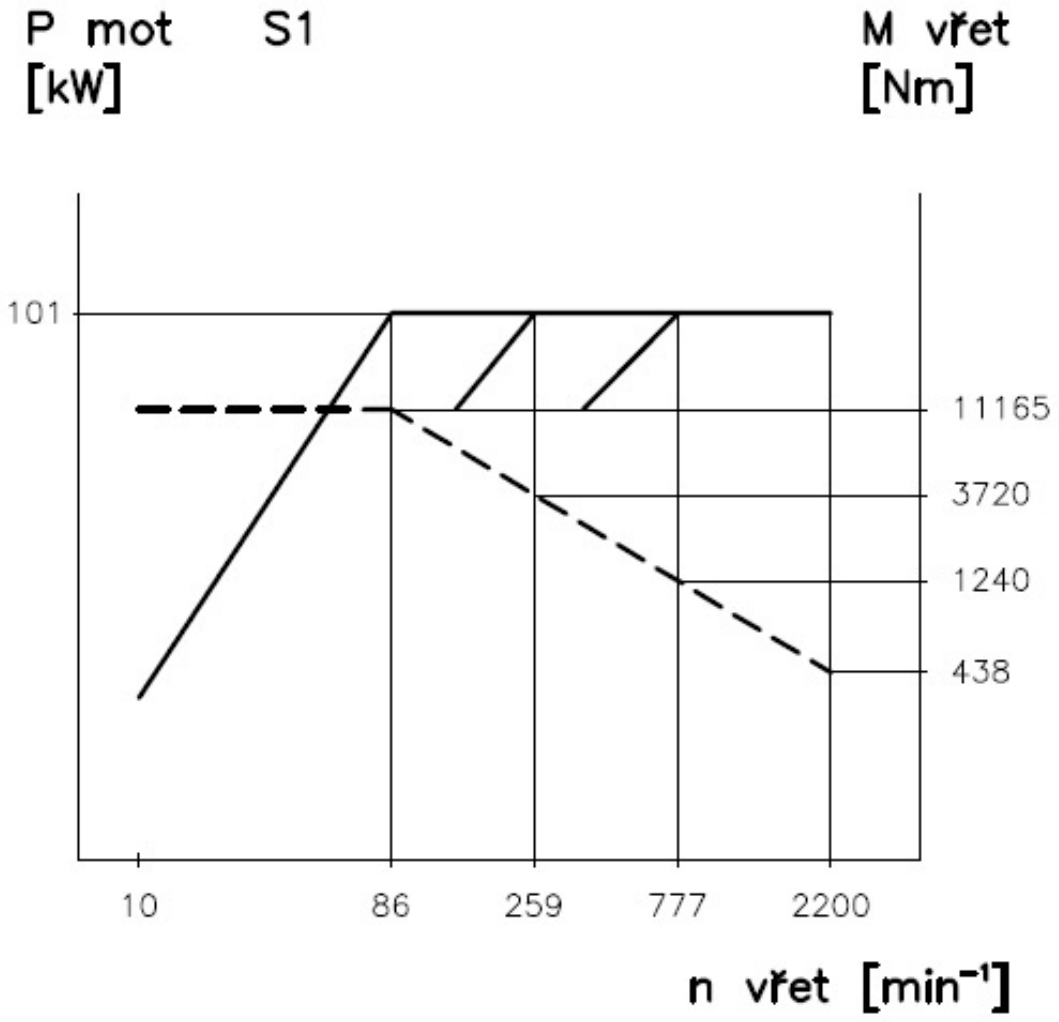
Guiding surfaces of the ram (axis Z) consist of 16 bars lined by Biplast with hydrostatic chambers. Bars adjoining to the top and front of the ram are wedge-shaped and they allow precise adjustment of lining.

In front of the headstock at the bottom of the ram are two other bars that are part of a mechanism for ram falling compensation.

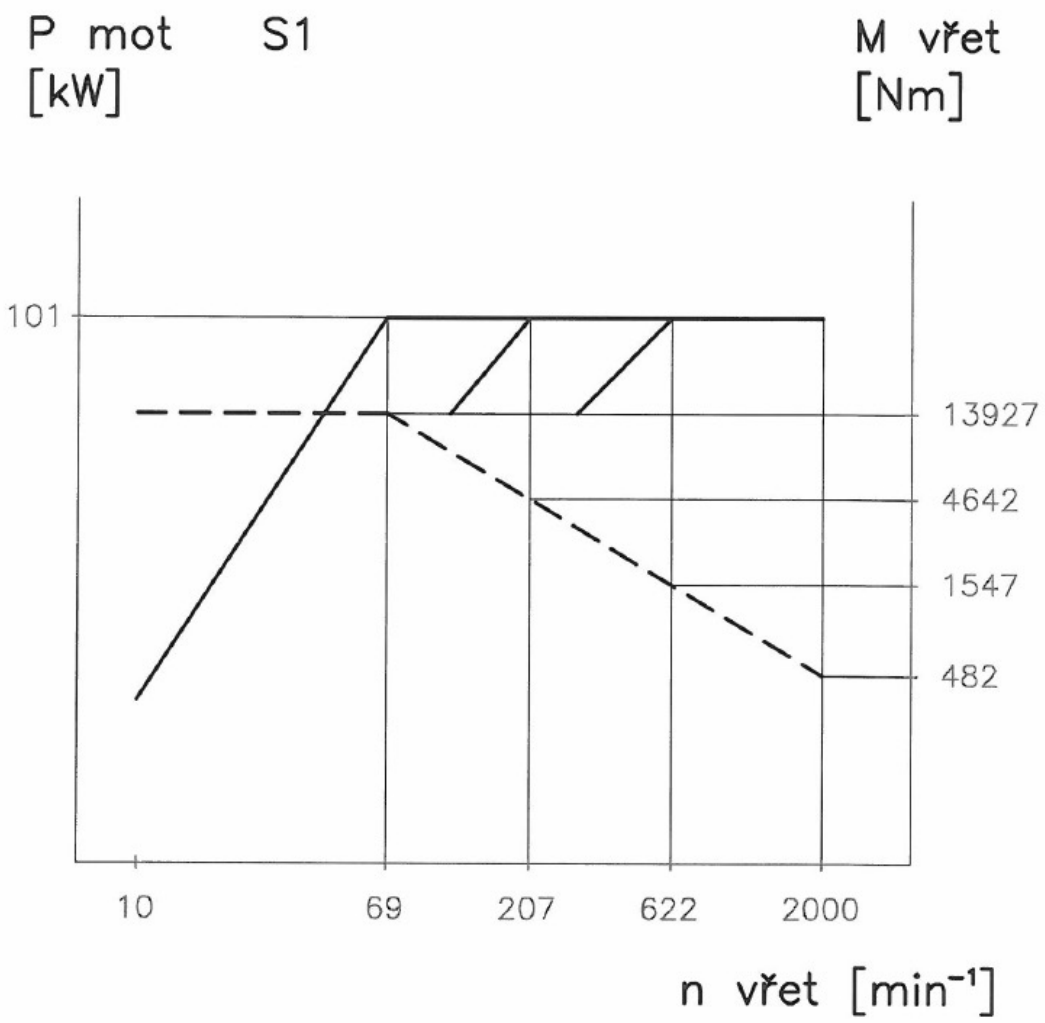


Asix Z

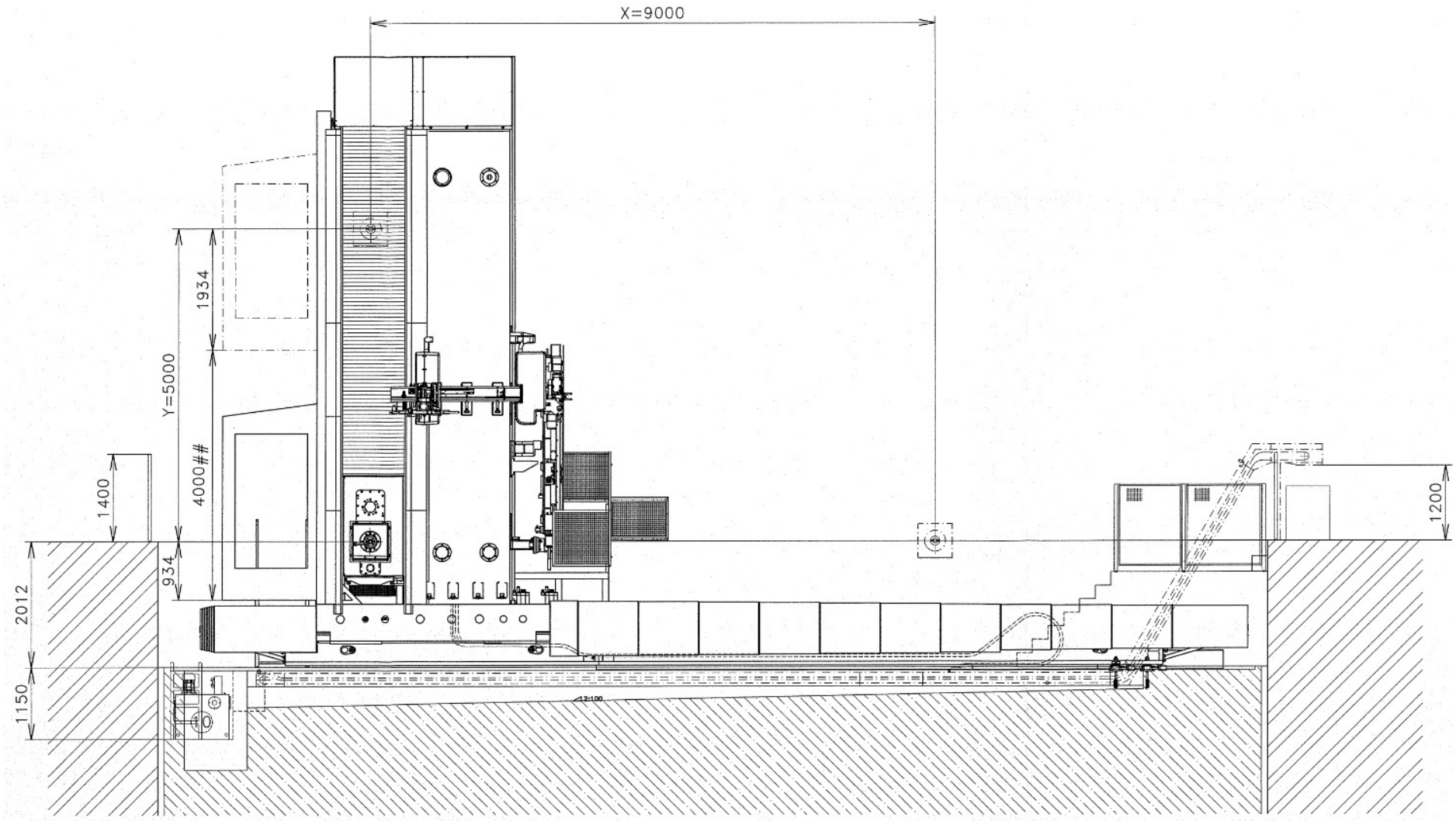
PERFORMANCE DIAGRAM Ø180 mm



PERFORMANCE DIAGRAM Ø200 mm



EXAMPLE OF A DIMENSIONAL SKETCH



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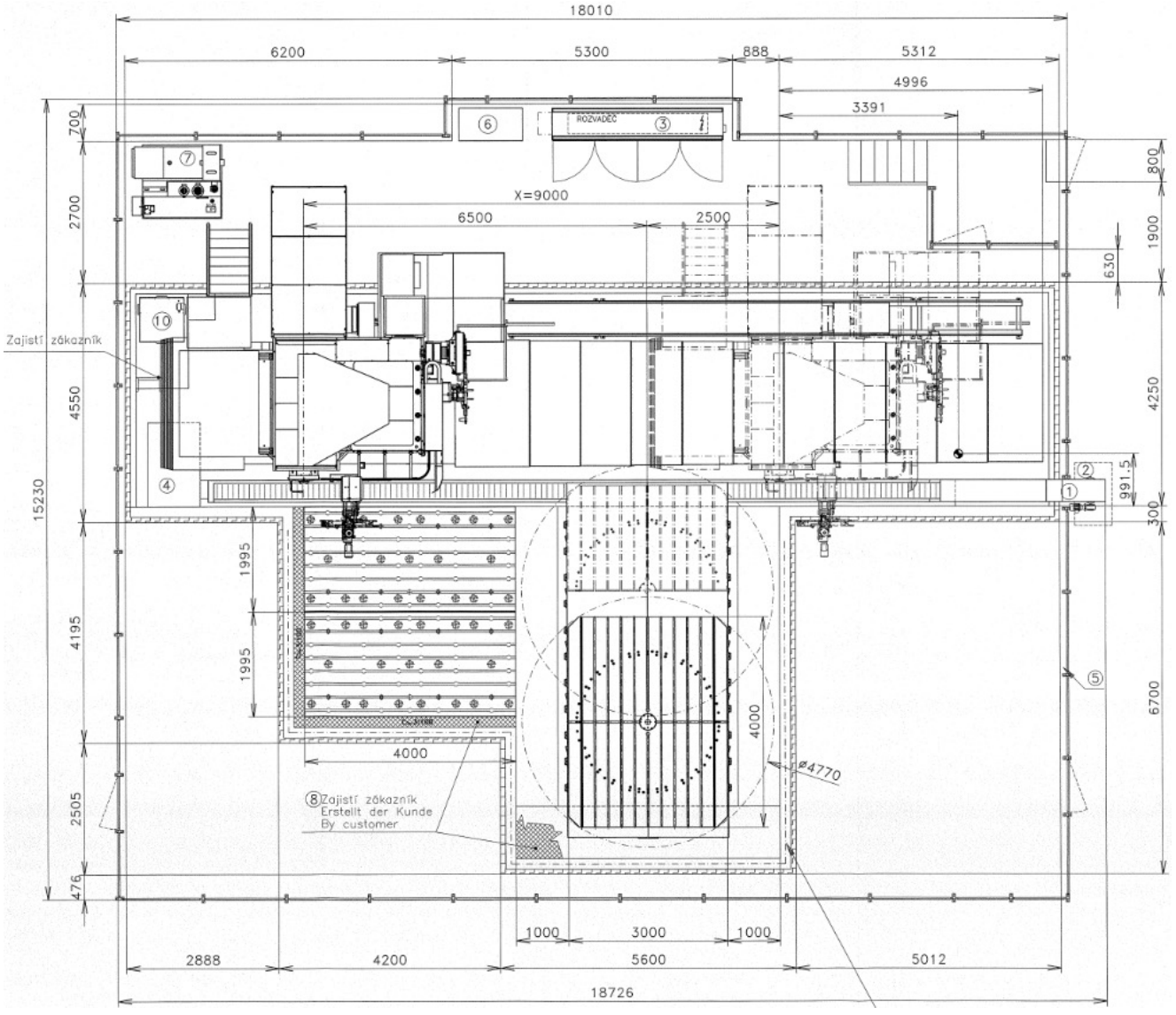

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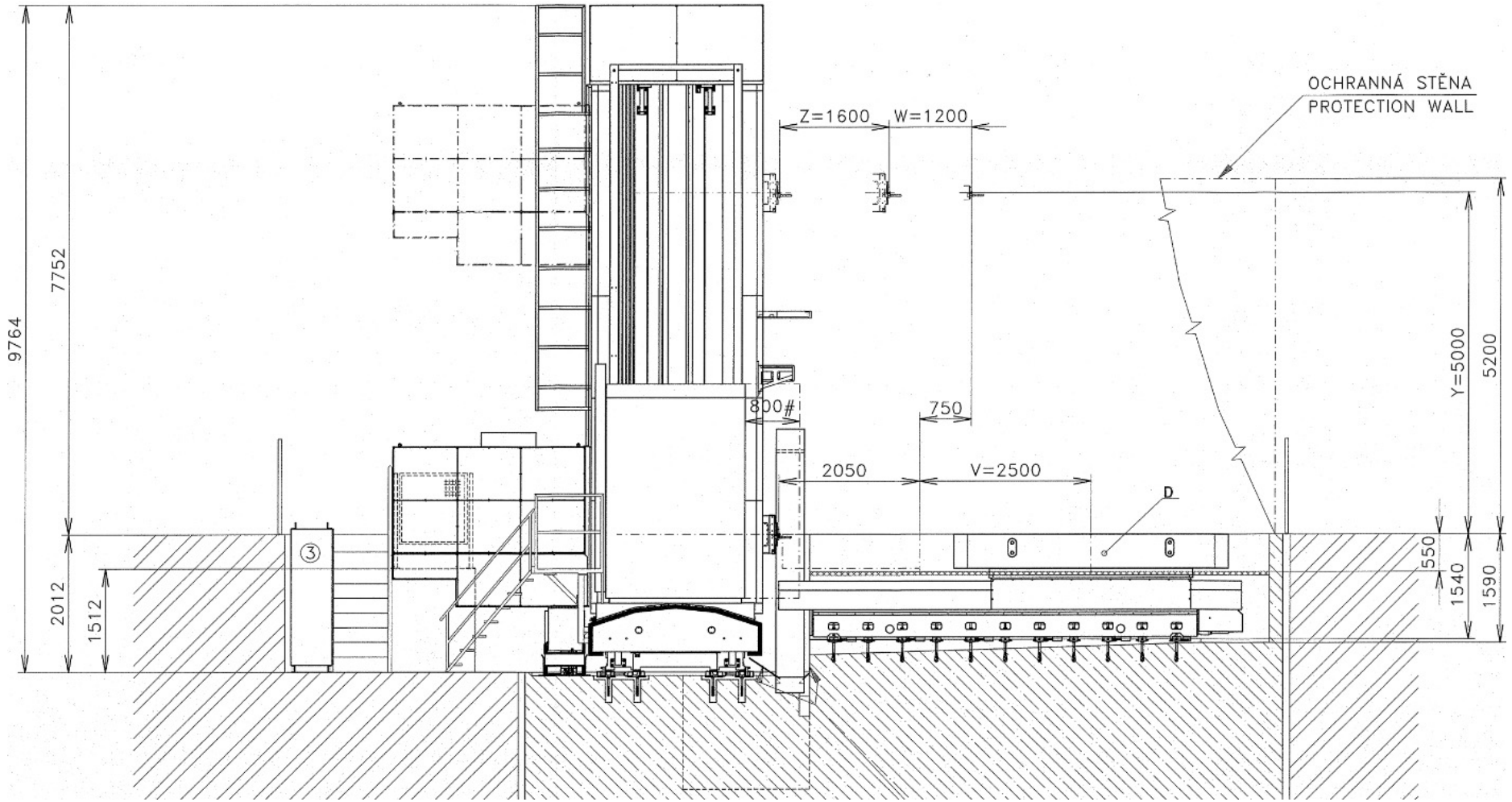


BASIC PARAMETERS

Type of machine: WRD 180 H		**Ø 160 mm**	**Ø 180 mm**	**Ø 200 mm**
Spindle diameter	mm	160	180	200
RAM dimensions	mm	550 x 550		
Spindle taper		ISO 50 / ISO 50 BIG+		
Taper standards available		DIN 69871/A (without tool cooling kit) DIN 69871/AD (with tool cooling kit) BT 50 MAS 403-1982 CAT ANSI/ASME B5		
Clamping force	kN	35		
Spindle flange outside diameter	mm	335		
Spindle speed range	1/min	10 – 2 200	10 – 2 200	10 – 2 000
Main motor power, rated (continuous load operation S1)	kW	74	101	
Spindle revs, rated	1/min	103	86	69
Spindle torque, rated (S1)	Nm	6 820	11 165	13 955
RAM stroke **Z**	mm	1 600		
Spindle stroke **W**	mm	1 200		

BASIC PARAMETERS

Headstock vertical travel **Y**	mm	3 000 – 6 000 (step by 500 mm)
Column transverse travel **X**	mm	5 000 – 29 000 (step by 1 000 mm)

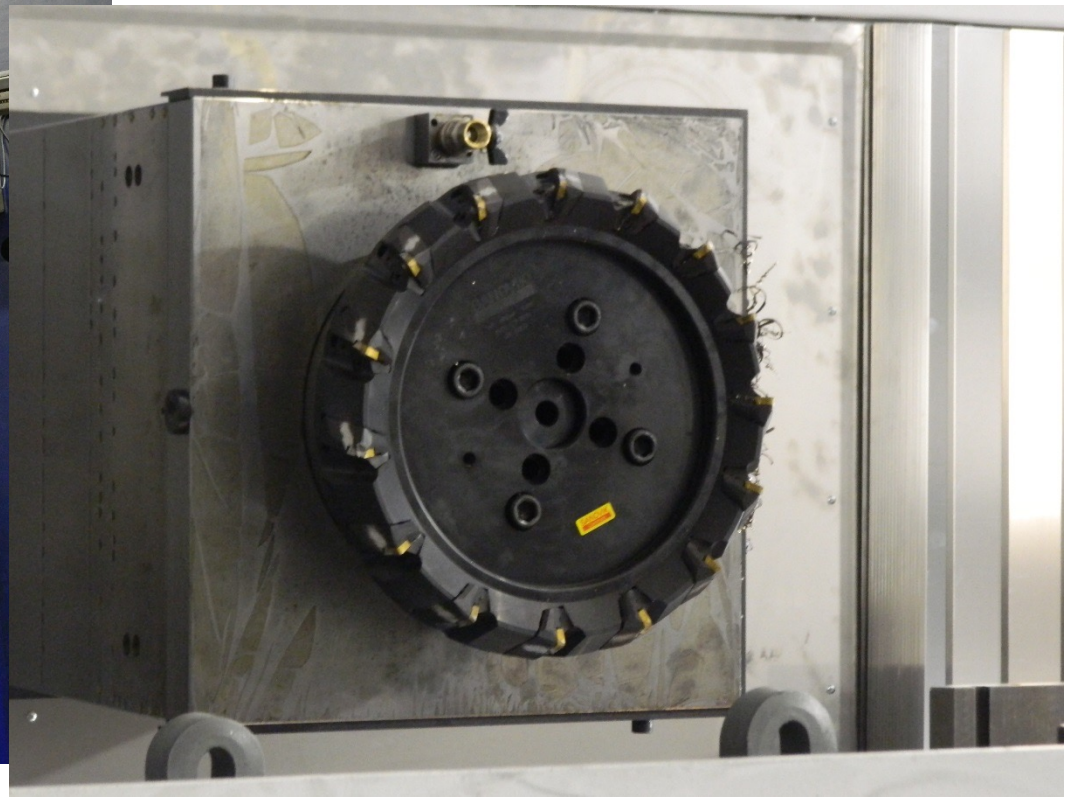
Feed range (working and rapid traverse) – **X, Y, Z, W**	mm/min	1 - 20 000
Max. feed forces in **X, Y, Z, W** axes	kN	50

Number of pockets in magazine		40, 60, 80, 120*
Pitch of pockets in magazine	mm	130
Tool dia max		
- with fully loaded magazine	mm	125
- with free neighboring places	mm	320
Dia max. of a special flat tool	mm	390 (600)
Tool length max	mm	500
Tool weight max	kg	25 (35**)
Total weight of tools in magazine	kg	1 000
Imbalance of tools in magazine max	kg	150
Tool change time (tool – tool)	sec	20

* The device is mounted on a concrete base on the edge X coordinate.

** Option

TECHNOLOGICAL EXAMPLES



TECHNOLOGICAL EXAMPLES

TOS VARNSDORF a.s.

Říční 1774
407 47 Varnsdorf
Česká republika

Tel: +420 412 351 203
Fax: +420 412 351 269
E-mail: info@tosvarnsdorf.com
www.tosvarnsdorf.com
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