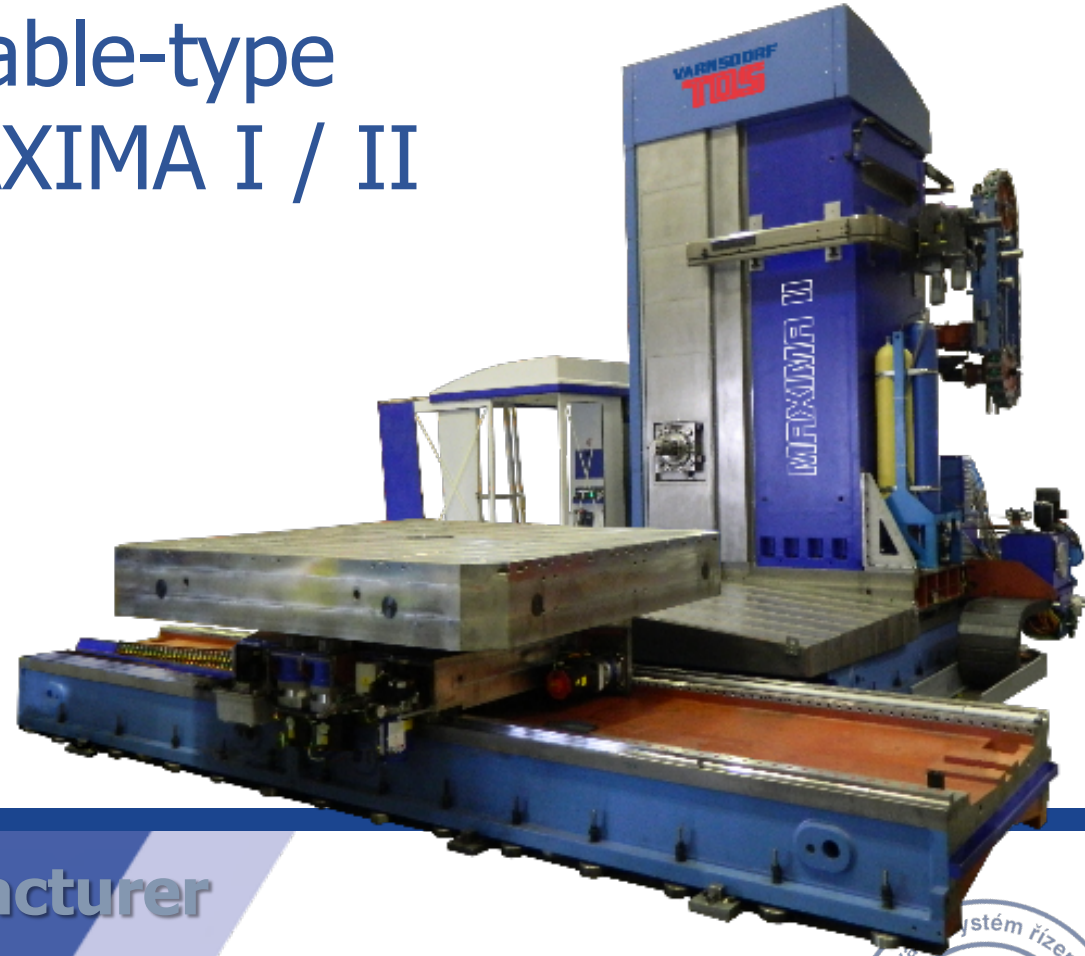


The Horizontal Table-type Boring Machine MAXIMA I / II



Milling machine manufacturer

TOS VARNSDORF a.s.



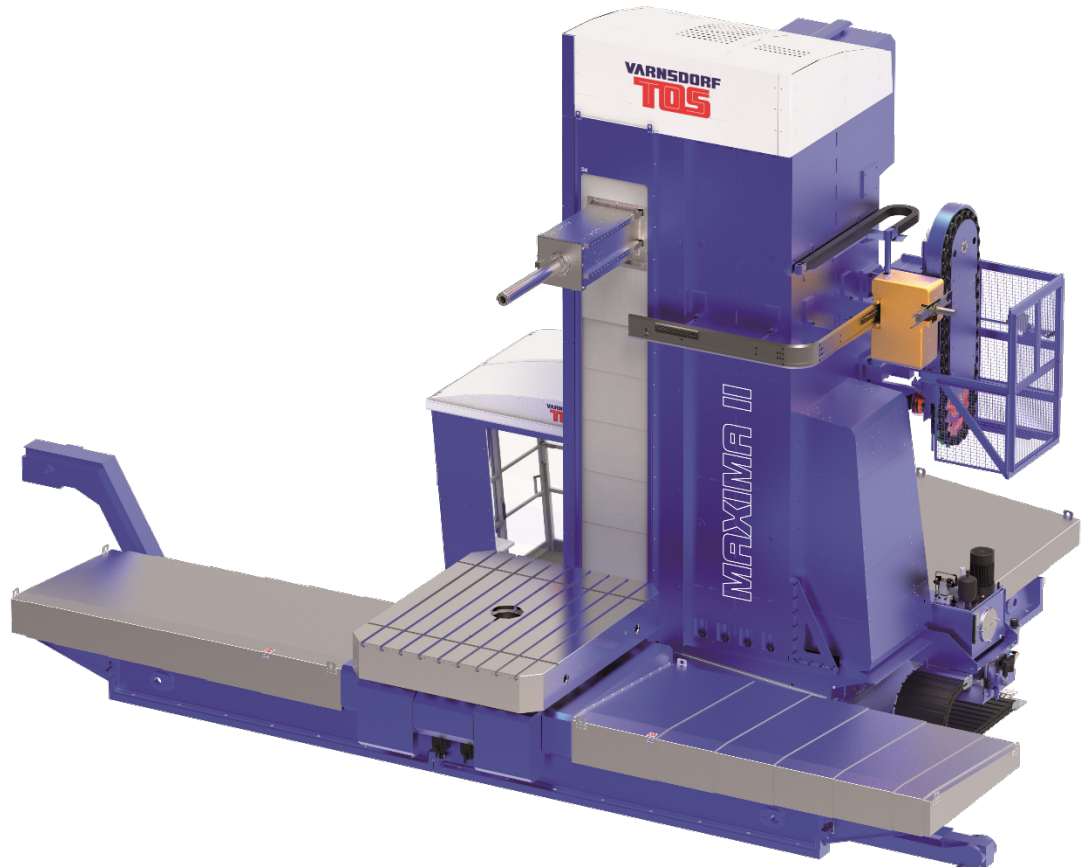
BASIC FEATURES

Basis features of the machine:

MAXIMA I, II are the next representative of the most advanced CNC horizontal boring mills from TOS VARNSDORF. These offer the superior performance and user comfort based on technically relevant philosophy and the broad menu of dimensional options and user functions.

Machine design is based on design groups of WRD machines, which are arranged in a cross-bed design.

MAXIMA horizontal boring machines are typical for their modern, state-of-art design stage and top level of performance parameters. They can be extended with a wide selection of technological accessories that significantly widen the machine technological utility value.



BASIC CONCEPT

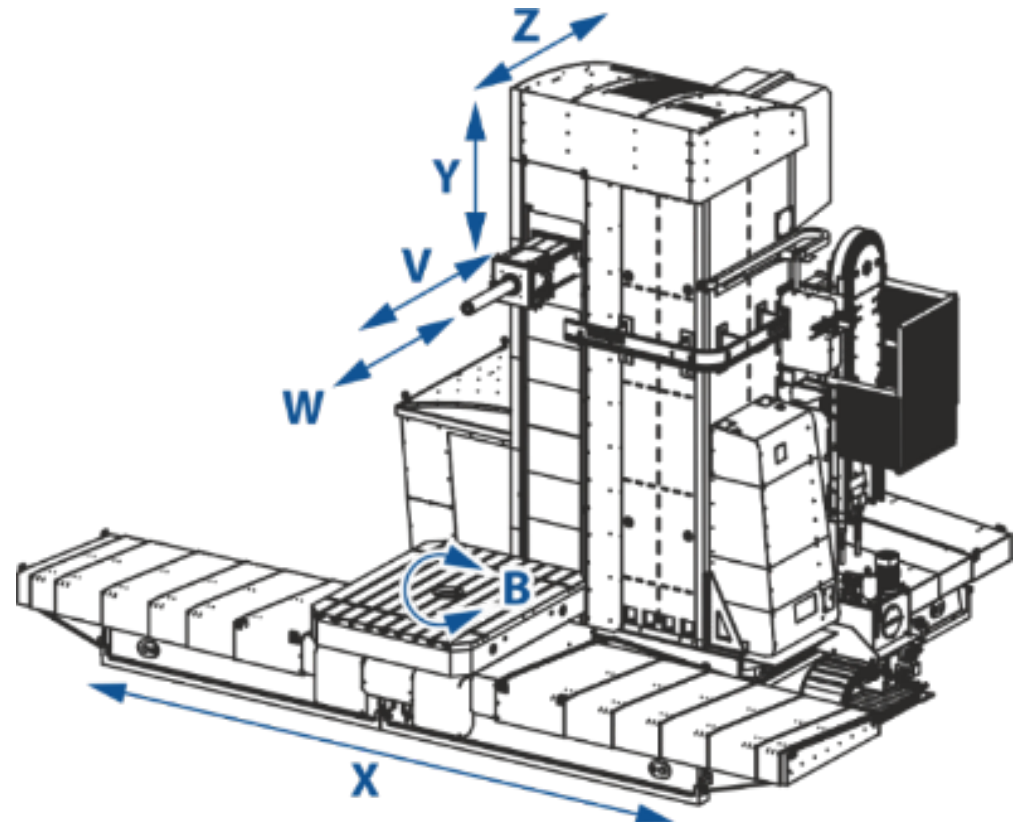
Basic concept of the machine:

MAXIMA I, II horizontal boring mill is milling and boring machine tool with bed arrangement into shape T with a tail-stock barrel (sliding block) and telescopic working spindle.

The machines are continuously controlled in six axes (X - cross travel of the table, Y - vertical travel of the headstock, V - longitudinal travel of the RAM, W - spindle travel, Z - longitudinal travel of the column, B - rotation of the table).

Additionally, the machine is provided with a vertically adjustable operator's platform, which improves handling of the machine particularly at higher positions of the spindle head.

HEIDENHAIN TNC 640, Sinumerik 840D SL or FANUC 30i /31i control system can be selected for controlling the machine.



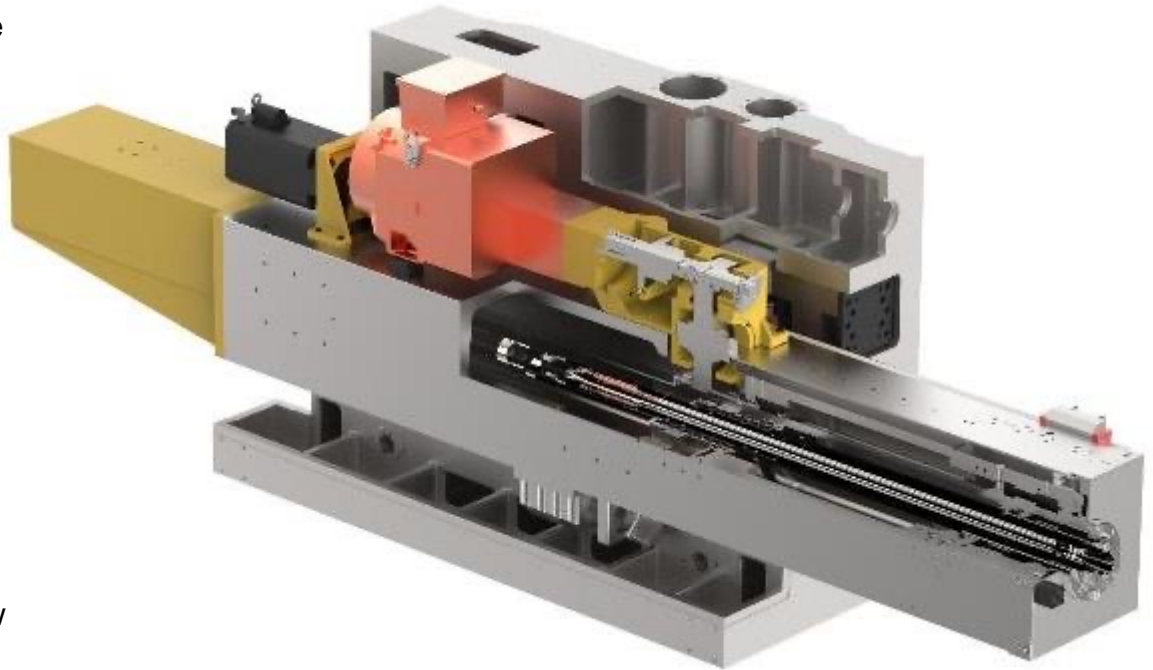
HEADSTOCK

Headstock:

The main casing is a rigid ductile iron casting, as well as the other connected L-shaped part, which forms a guide for the sliding block. At the same time, this assembly is designed in a manner allowing for electro-mechanic compensation of sliding-block head dropping during its extension travel within the V axis.

The working spindle rev drive is derived from the electric control drive over a two-speed gearbox. The spindle speed is thus controlled in two mechanical sequences. In the gearbox, two mechanical gears are automatically engaged - by an electrically controlled shifter. The drive from the gearbox to the hollow shaft of the working spindle is designed by cogged wheels.

The working spindle is nitrided and it is push-fit with a minimum clearance into a nitrided hollow spindle with bronze bushing in its front. The hollow spindle is fitted into the pre-stressed spindle ball bearings.



FEED DRIVES AND CLAMPING

Feed drives and clamping:

The conversion to the linear motion at X (3,000 mm and 4,000 mm), Y, Z, W and V axes is designed through ball bolts with pre-stressed nuts. By the option of X axis = 5,000 mm or 6,000 mm the movement is carried out by the use of a pair of electric servomotors with reducers. The gear pinion pre-stressing force on the reducing gear outputs against the rack bar is generated by wiring the drives in the "master-slave" function.

The drive of the continuously controlled table is with two adjusted pinion gears using the "master-slave" function.

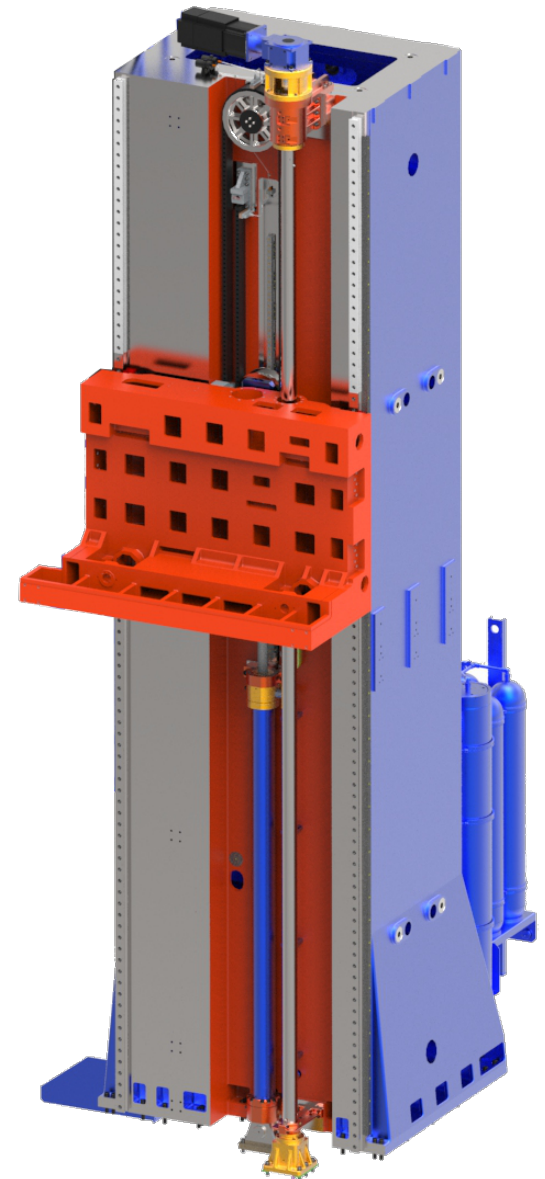
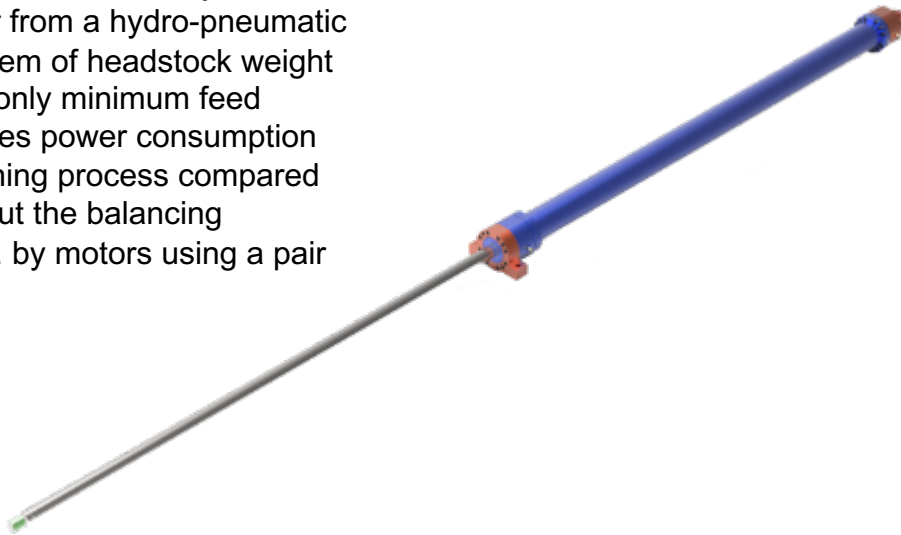
After reaching their target positions, the linear axes are kept live in a closed positional feedback. Once positioned, the B axis (turning of the table) is automatically strengthened by the hydraulic system.



COMPENSATION

Headstock weight balancing :

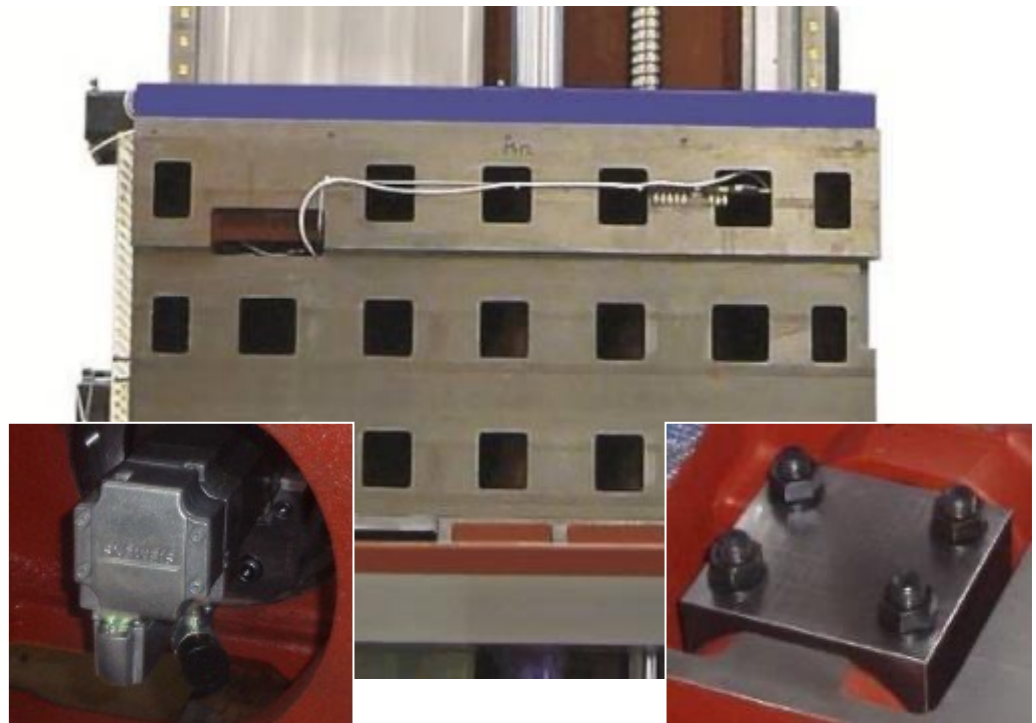
Headstock weight is balanced by a telescopic roller from a hydro-pneumatic system. This system of headstock weight balancing needs only minimum feed forces thus reduces power consumption during the machining process compared to solutions without the balancing mechanisms, e.g. by motors using a pair of ball screws.



COMPENSATION

Compensation of ram deflection:

This solution of the compensation of ram deflection is unique and it is also patented. The entire headstock is designed to allow compensating the ram face deflection during its stroke in V axis. The ram deflection is compensated with special electro-mechanic system (s. fig.) as the stepping electro-motor rotates an eccentric, on which the whole group of ram and headstock plate is stored (second storage of ram and headstock plate is solved by a rotary pin). This solution enables high range of compensation without insertion of additional forces on linear guide. This kind of compensation of ram balancing contributes to longer working life of the linear guide.



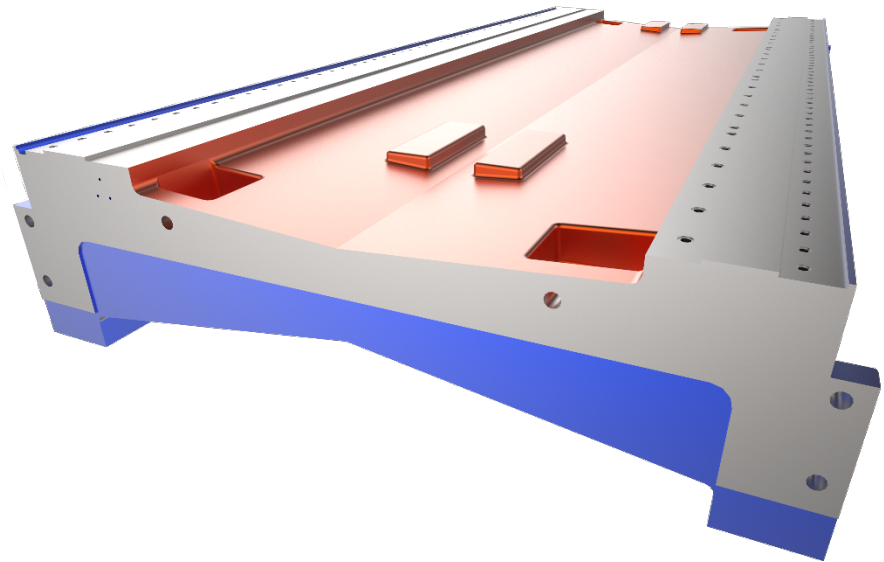
GUIDEWAYS OF MOVABLE GROUPS

Guideways of movable groups:

Guiding of the CNC controlled traveling axes have been designed as a rolling type, preloaded, employing the compact linear roller pads - headstock guiding, ram guiding, column slide ways, table slide ways

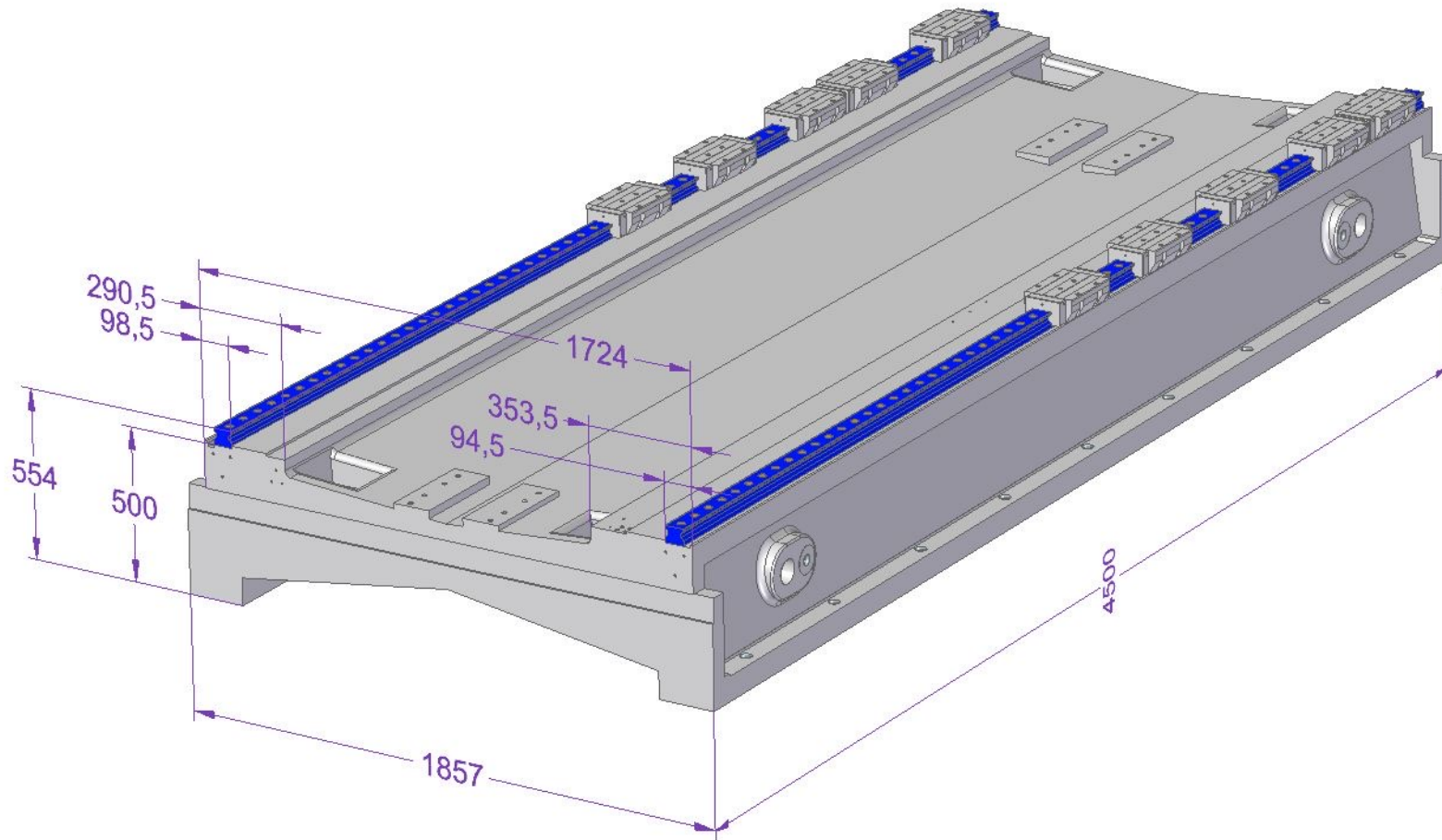
The bed guides are provided with steel telescopic covers.

The guide on the base is protected with an overall case covering the whole space of headstock travel; at the machine face, in the direction to the workpiece, the covering is made of steel segments, the whole space is protected with a fixed cover and covering bellows in the rear.



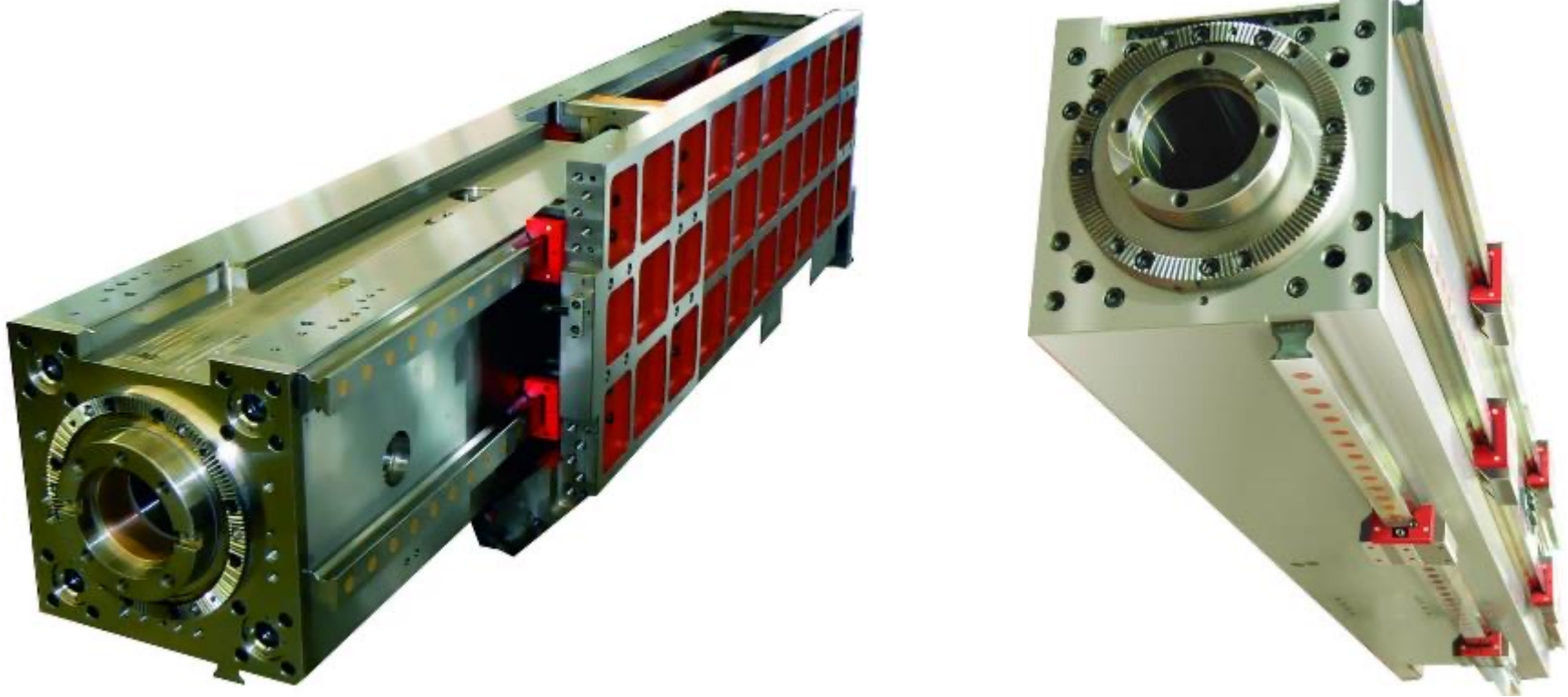
The bed of the machine - axis X

GUIDEWAYS OF MOVABLE GROUPS



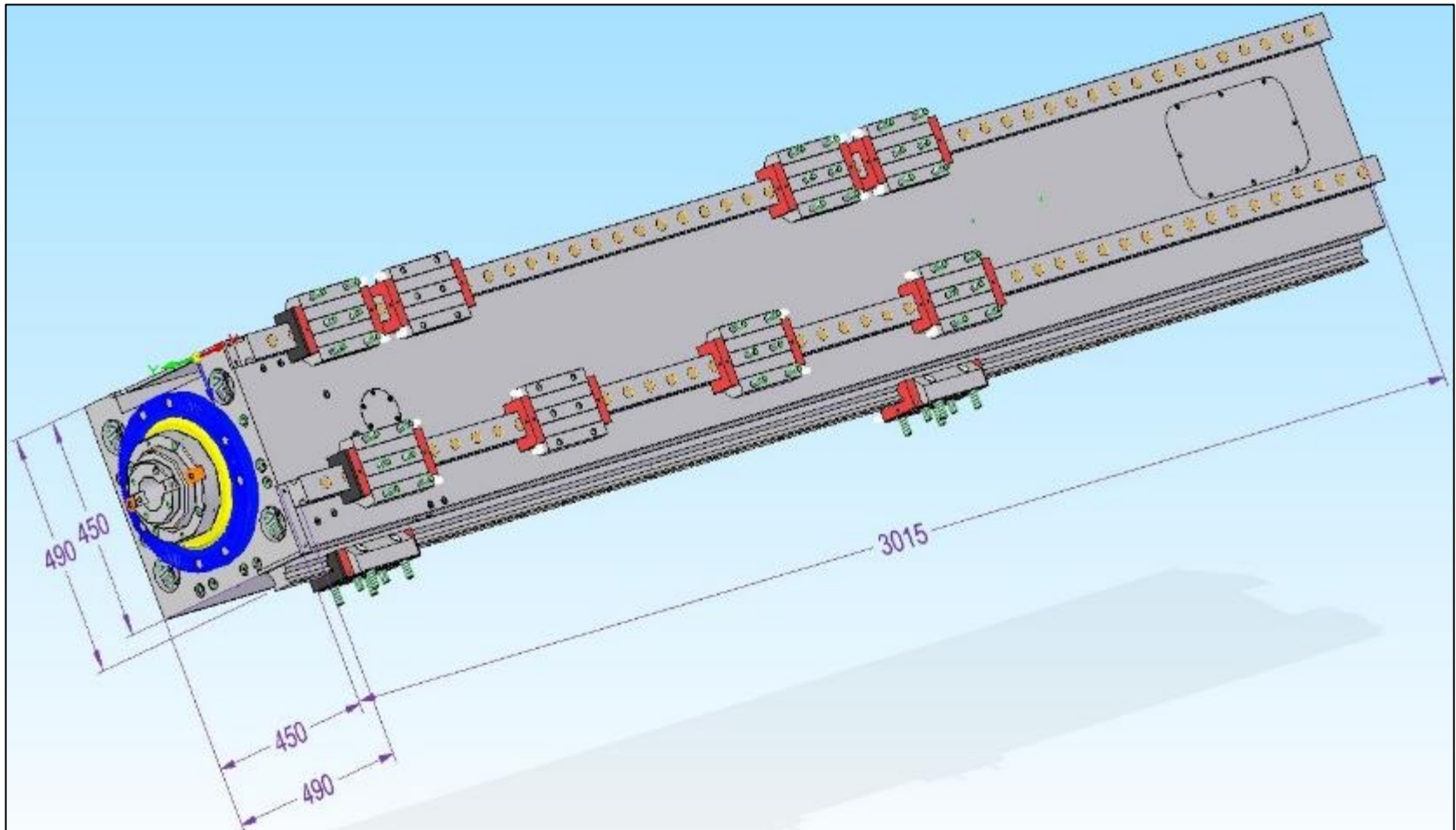
The bed of the machine- axis X

GUIDEWAYS OF MOVABLE GROUPS



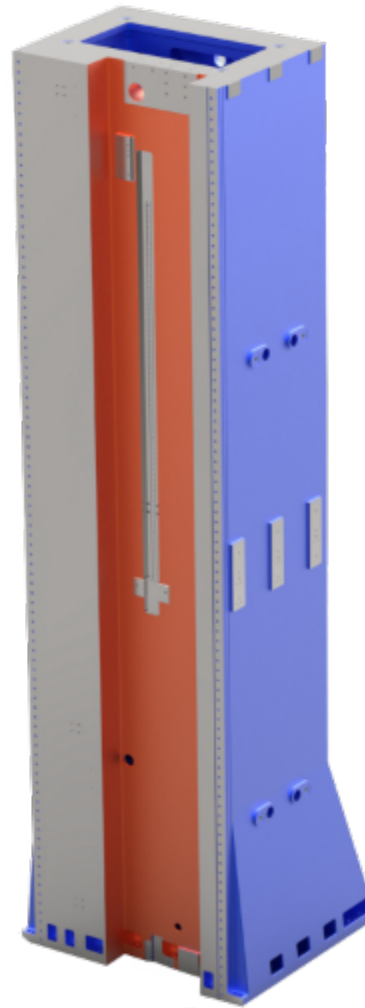
ram and spindle of the machine – V and W axes

GUIDEWAYS OF MOVABLE GROUPS



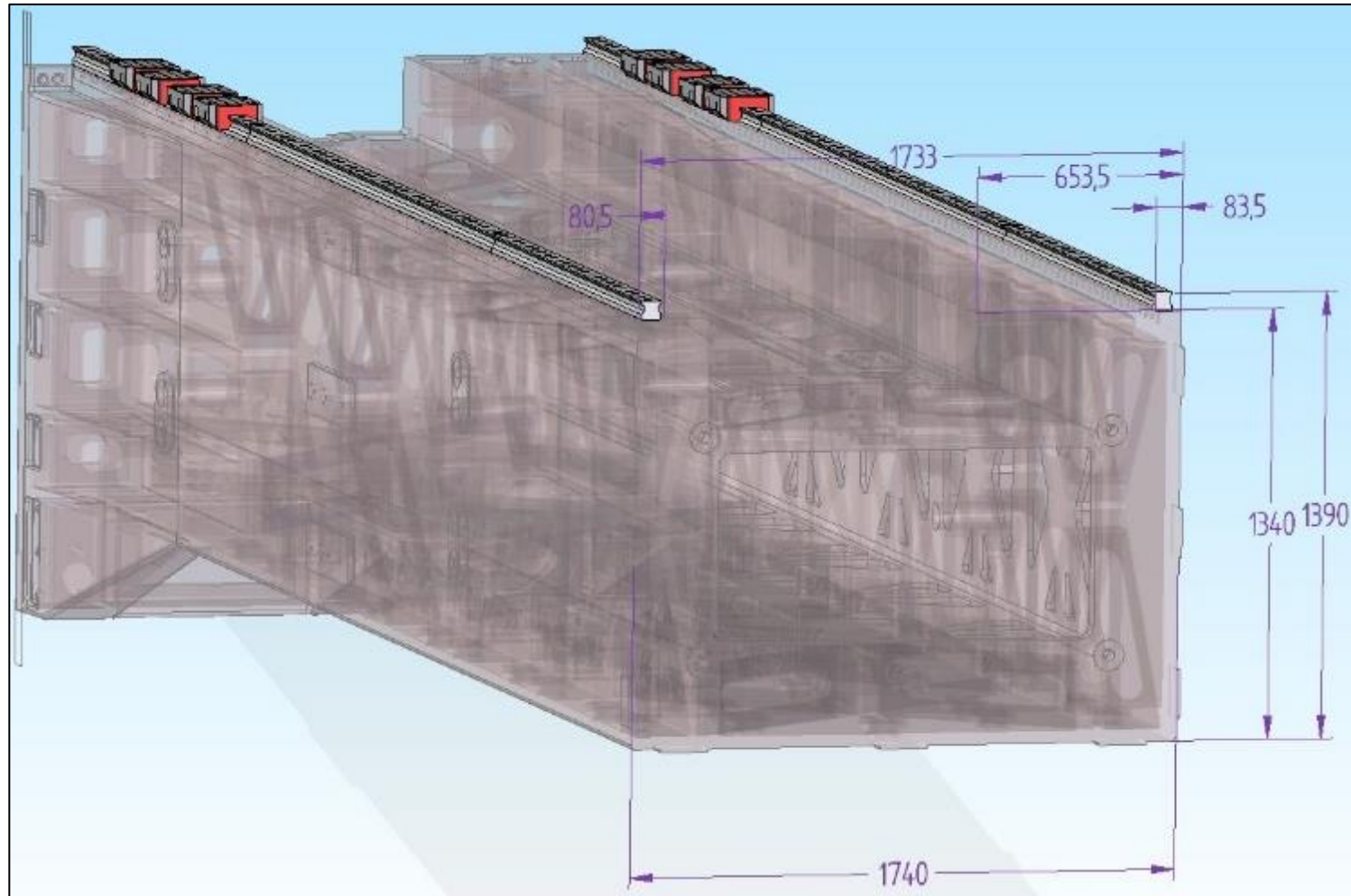
ram and spindle of the machine - axes V and W

GUIDEWAYS OF MOVABLE GROUPS



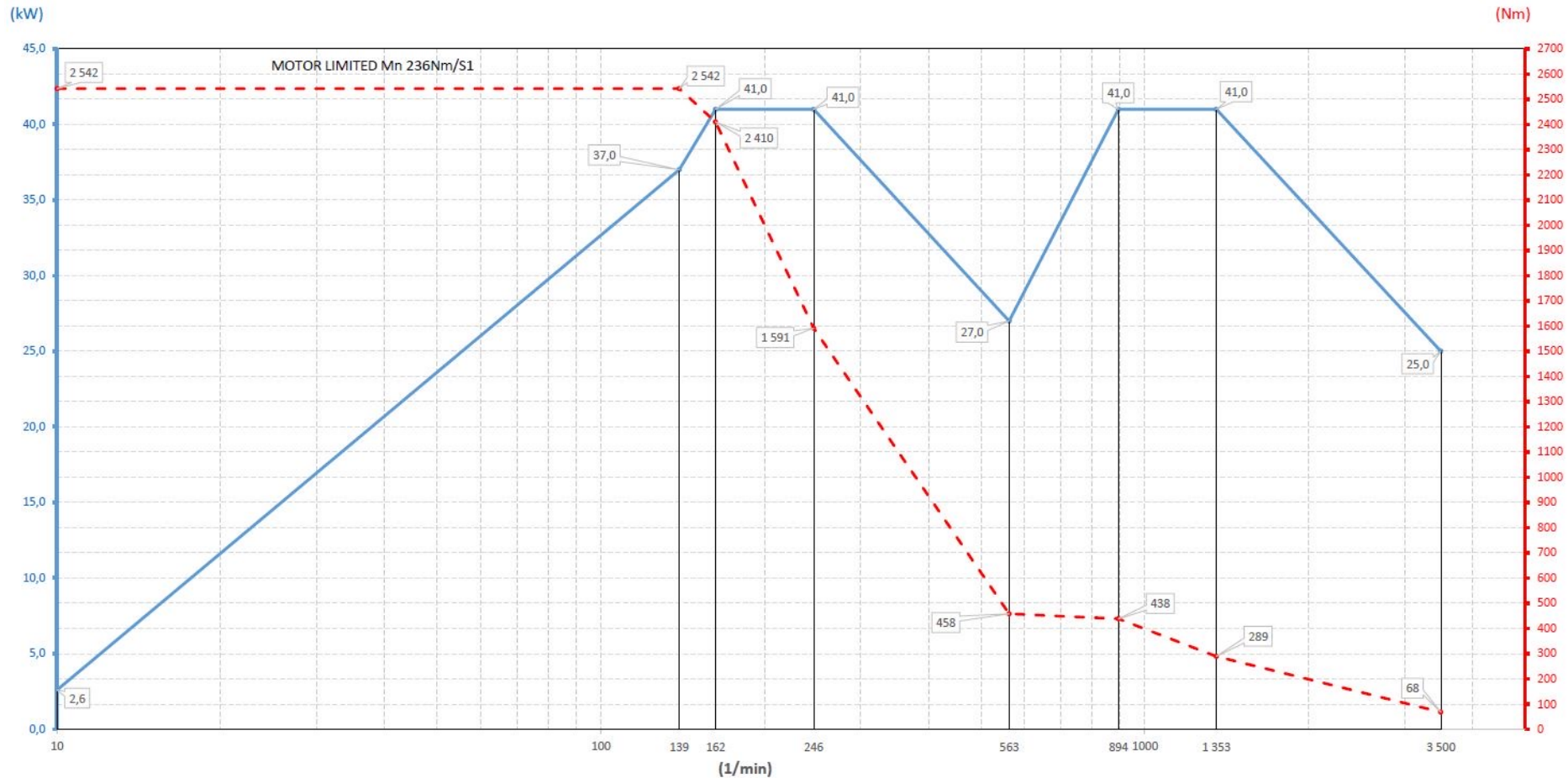
Column of the machine – axis Y

GUIDEWAYS OF MOVABLE GROUPS



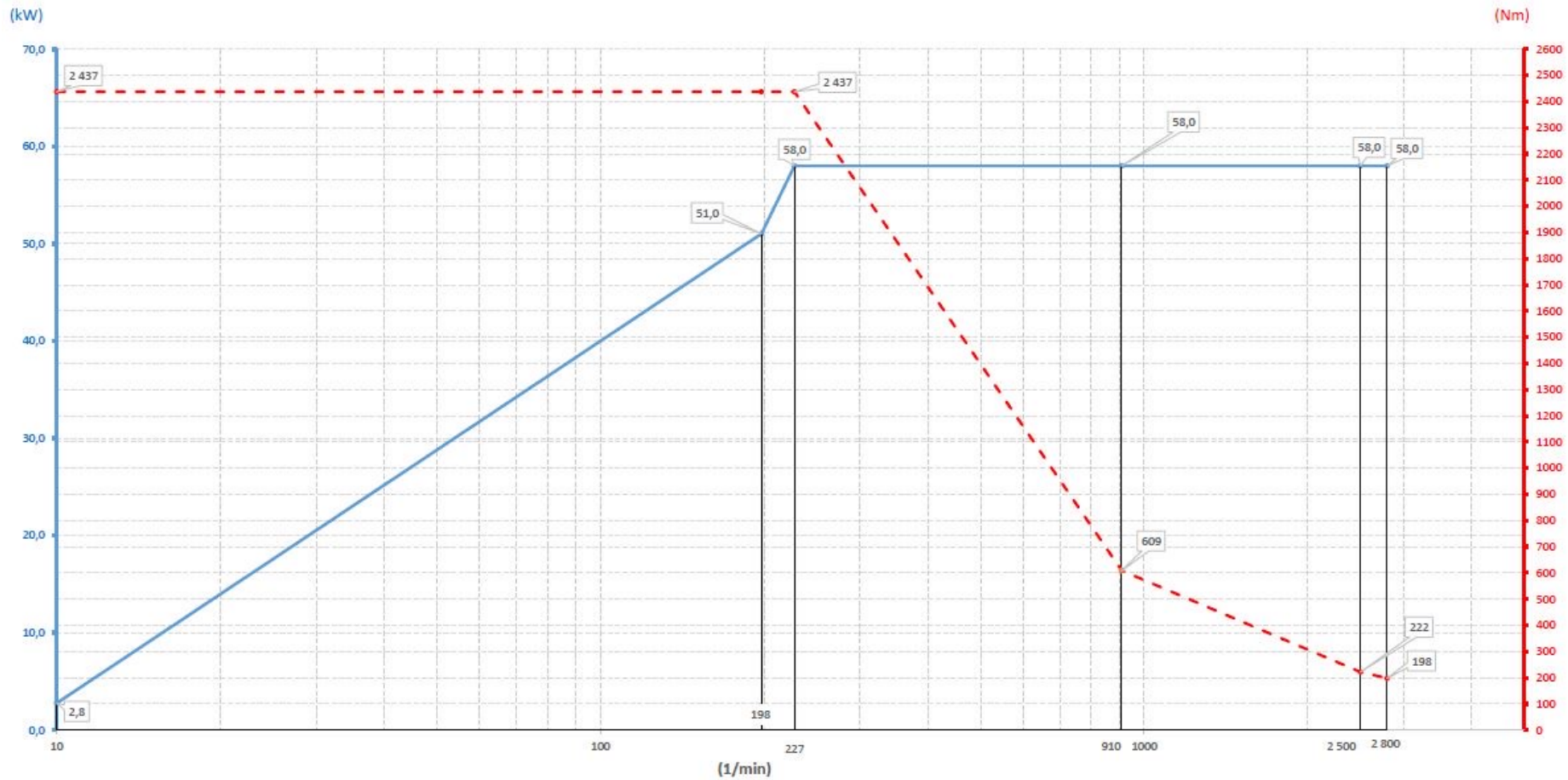
Column of the machine – axis Y

PERFORMANCE DIAGRAM



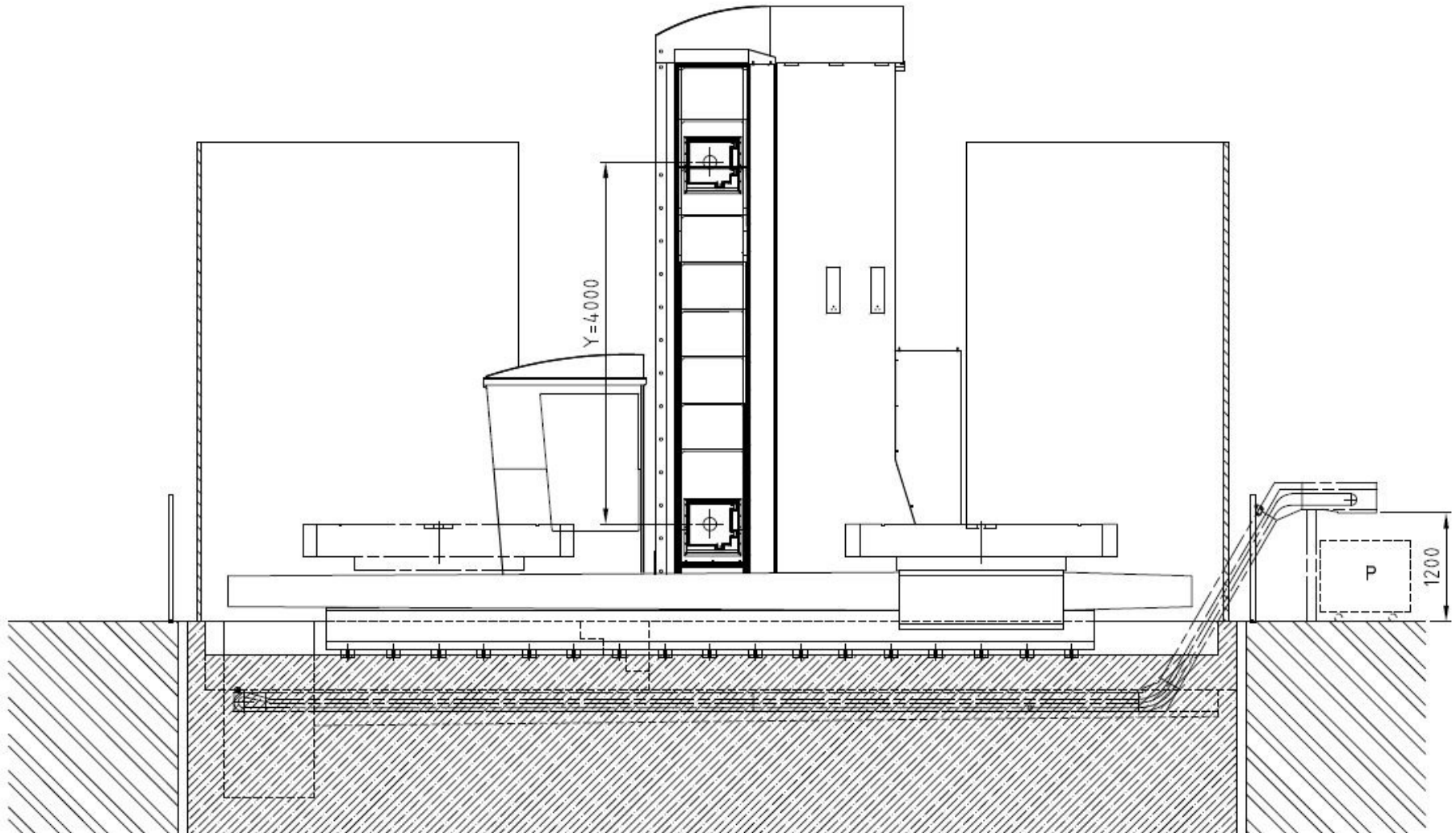
MAXIMA | 41 kW

PERFORMANCE DIAGRAM

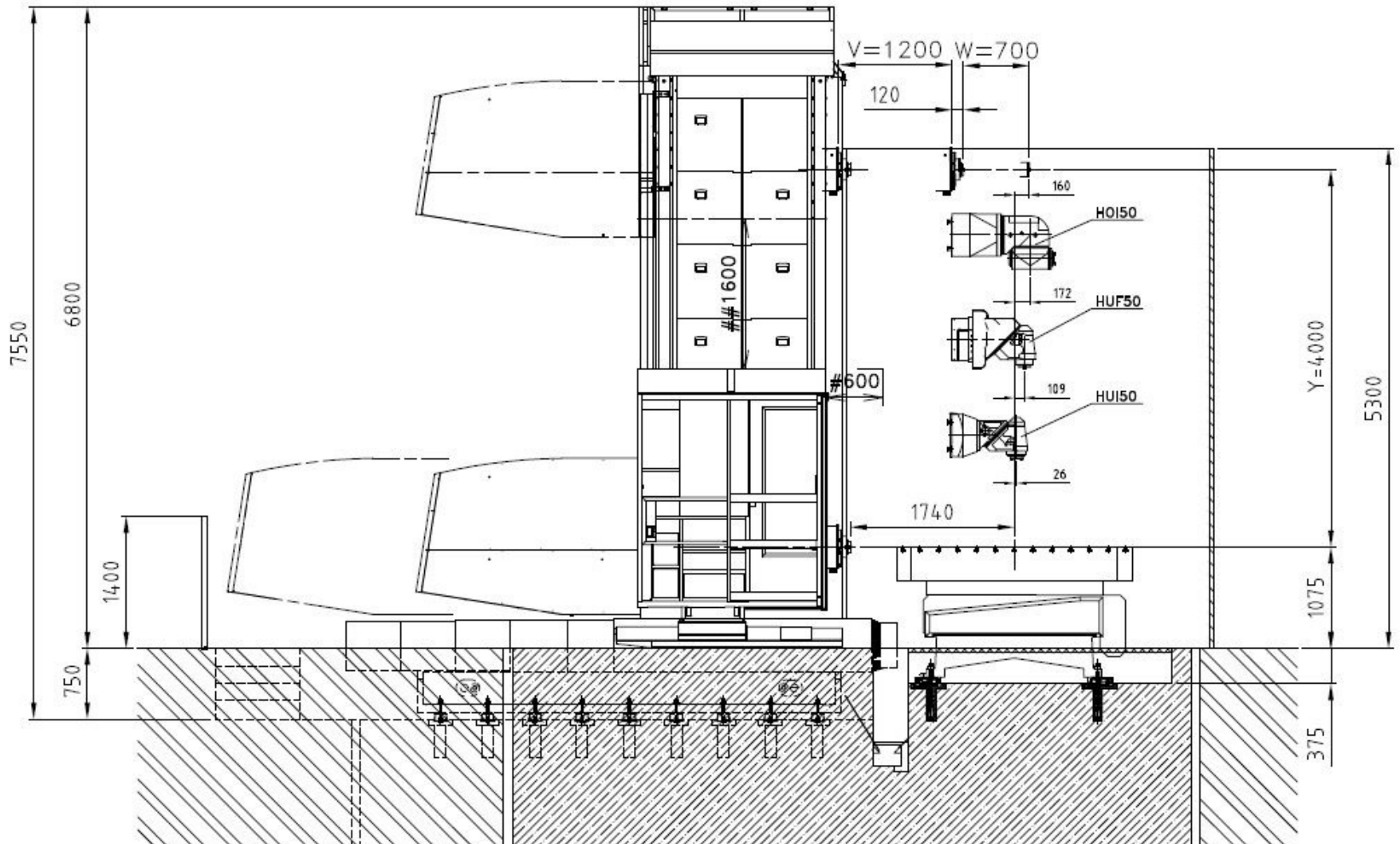


MAXIMA II 58 kW

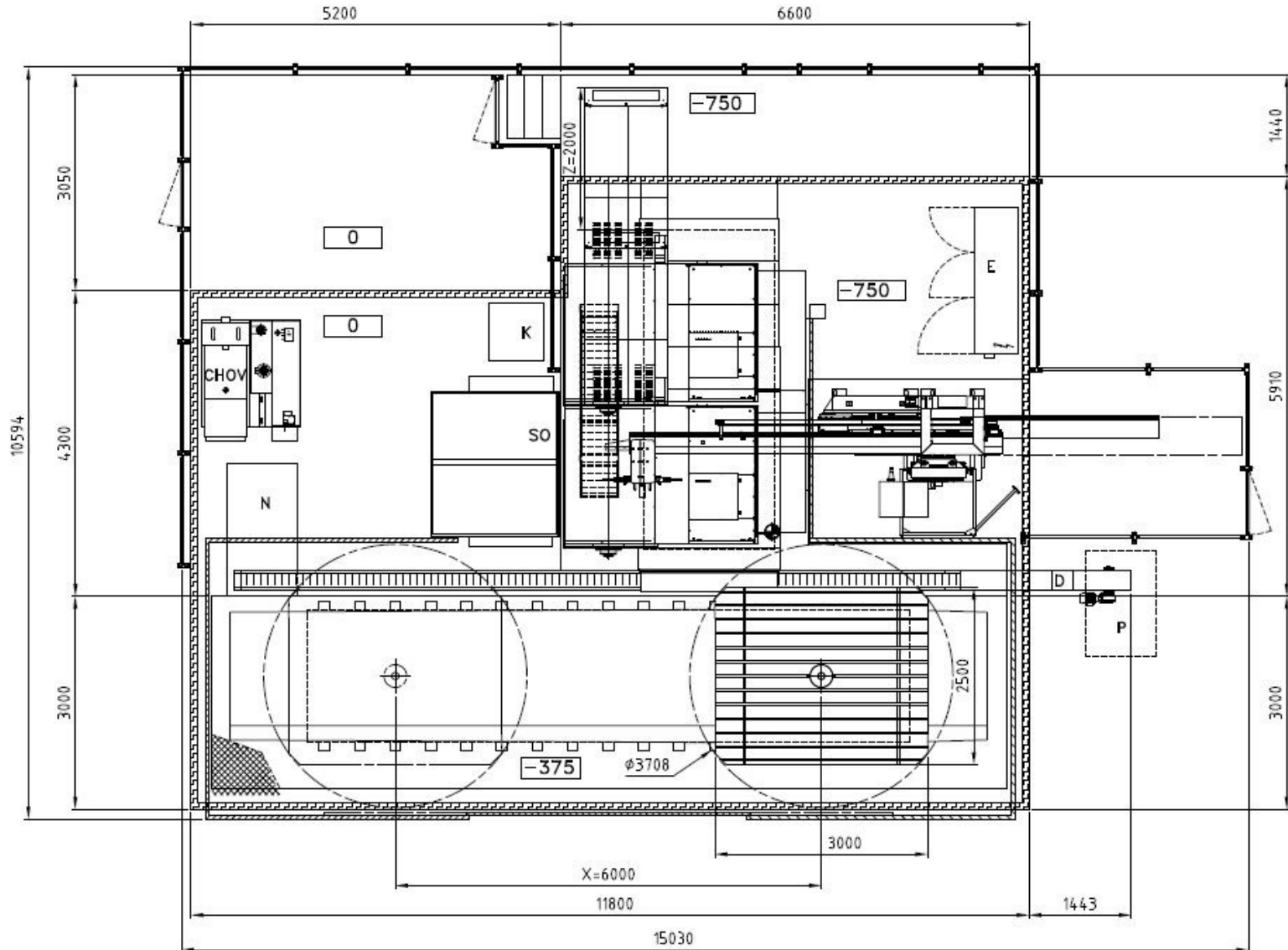
AN EXAMPLE OF A DIMENSIONAL SKETCH



AN EXAMPLE OF A DIMENSIONAL SKETCH



AN EXAMPLE OF A DIMENSIONAL SKETCH



BASIC PARAMETERS

Machine type		MAXIMA I	MAXIMA II	
Work spindle diameter	mm	130	150	160
RAM size	mm	450 x 450		
Spindle taper		ISO 50 / ISO 50 BIG+		
Tool clamping force	kN	25	25	25
Spindle flange outside diameter	mm	221.44	221.44	221,44
Work spindle speed range	1/min	10 – 3,000	10 – 2,500 (2,800)	10 – 2 400
Main motor power, rated (continuous run S1)	kW	41	58	58
Max. motor power (operation S6 - 60% of the load time)	kW	46	65	65
Spindle speed range, rated	1/min	162	227	227
Spindle torque, rated (S1)	Nm	2,535	2,437	2 437
Spindle torque max. (S6-60 %)	Nm	3,152	3,138	3 138
RAM stroke V	mm	1,200		
Spindle stroke W	mm	700	800	800

Optional table size	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*
Max. workpiece weight	kg	30,000	50,000
Table transverse travel X	mm	3,000, 4,000, 5,000, 6,000	3,000, 4,000
T-slots dimensions		28H8	28H8

* the table capacity is reduced to 40 000 kg

Range of feeds (working and rapid traverse) – X, Y, Z, V	mm/min	1 – 16,000
– W	mm/min	1 – 12,000
– B	1/min	0.003 - 3
Max. feed forces in X, Y, Z, V, W axes	kN	40
Max. feed force in B axe	kNm	15*
Max. load torque with the B axe clamped (stabilized)	kNm	25*

* by table type

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