



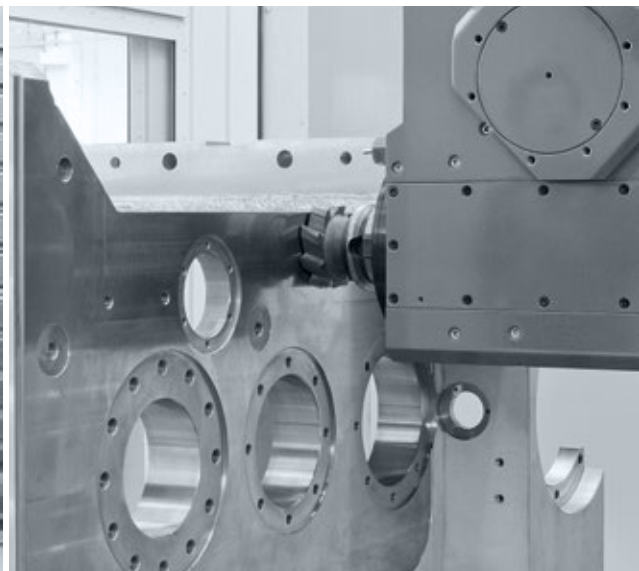
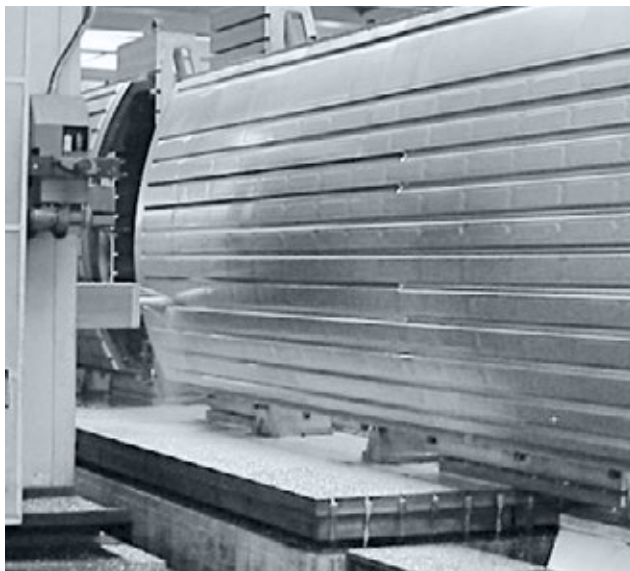
BORING AND MILLING CENTERS

SPEEDMAT HP

**TARGET
AND APPLICATION**



**AEROSPACE
ENERGY
EARTH MOVING
DIE & MOLD
GENERAL MACHINING**



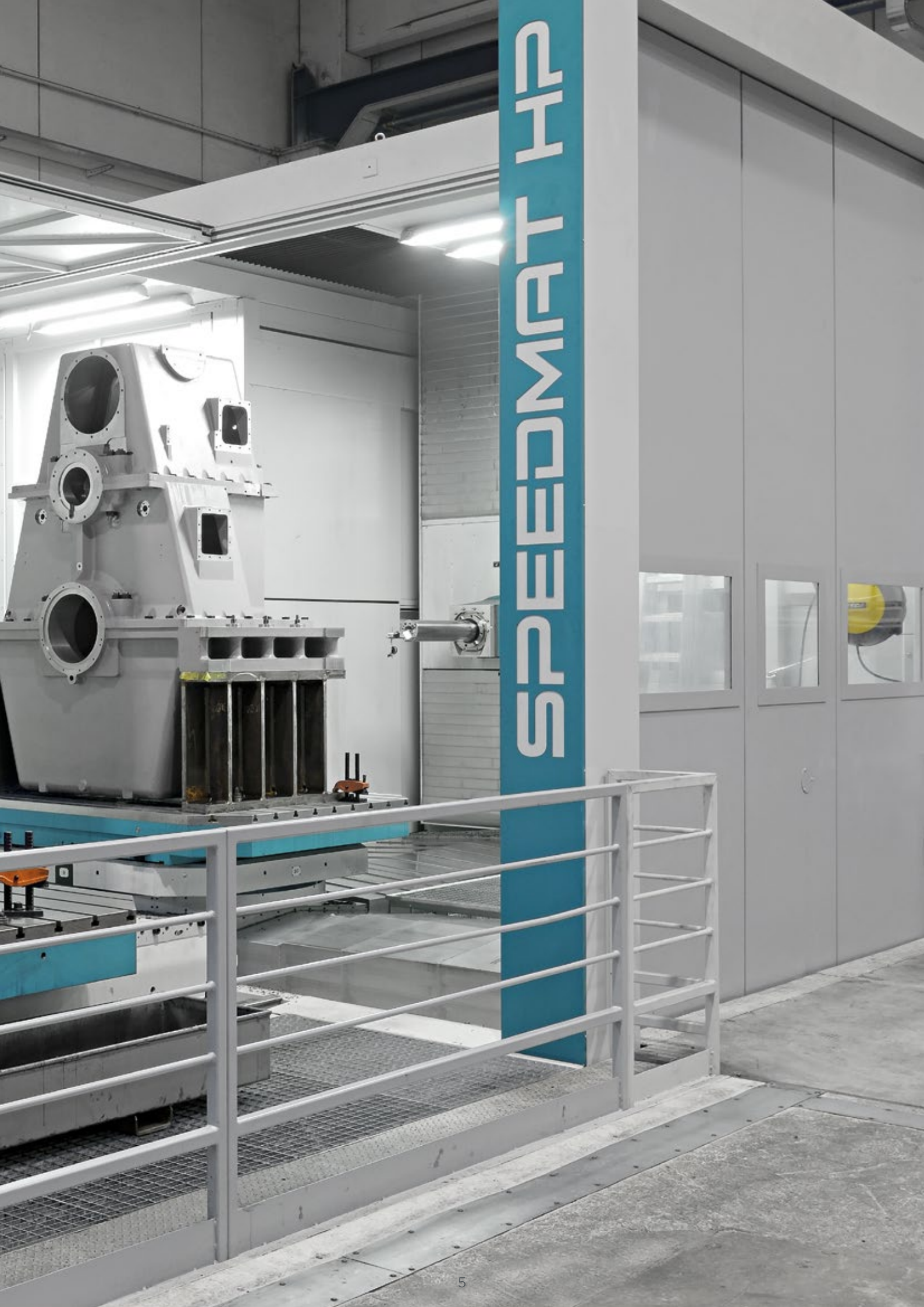
Speedmat HP technology provides the perfect solution for the most demanding machining application requiring utmost rigidity and precision even on the hardest materials. Multitasking capability allow for milling, boring and turning operation to be carried out in the same set up.

The Speedmat HP series consists of seven base models with: pallet sizes from 1000 x 1000 mm up to 2000 x 2500 mm with maximum table load capacity from 3 to 35 t (metric ton) maximum work piece swing diameter from 2000 to 4600 mm

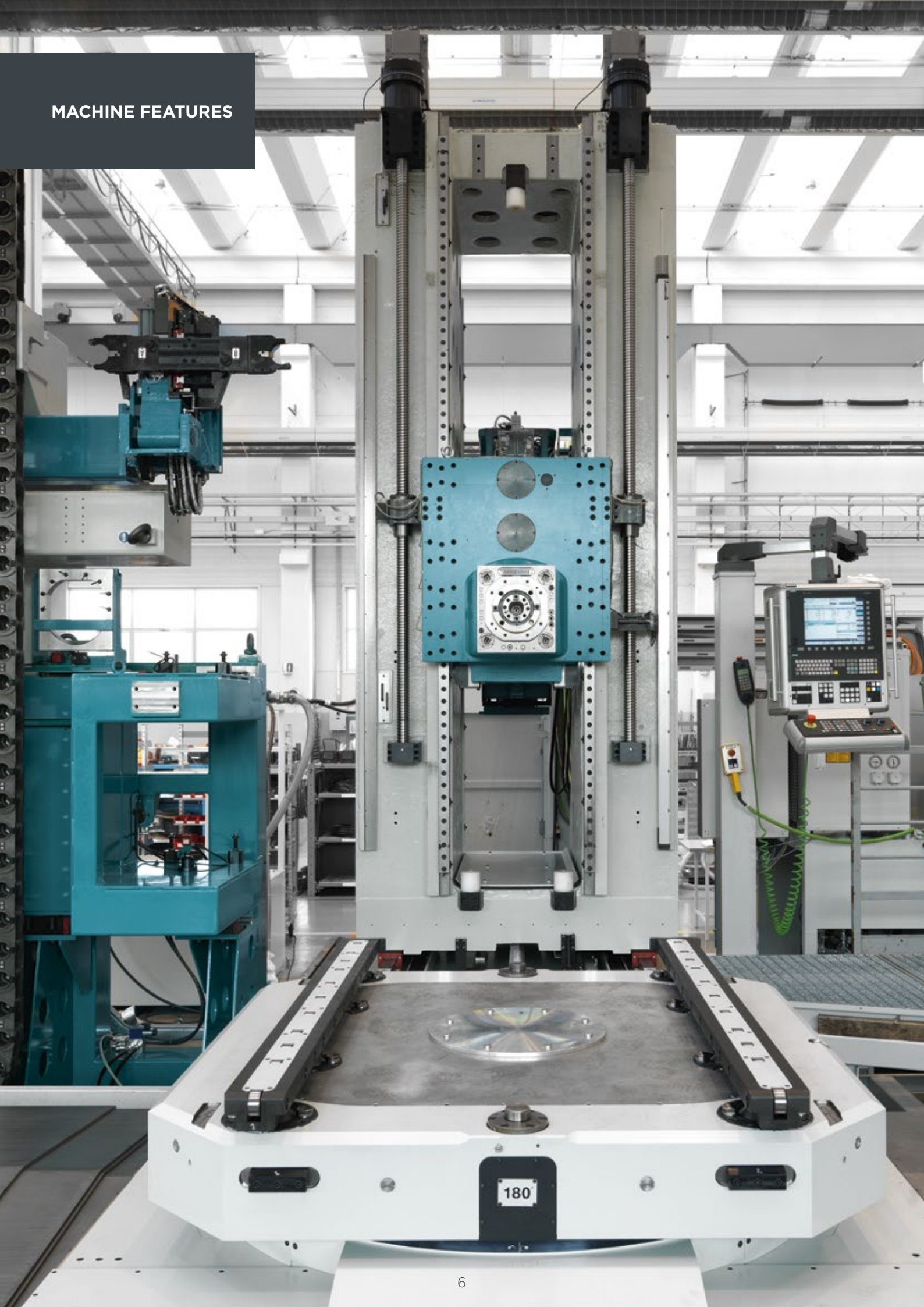
BORING AND MILLING CENTERS



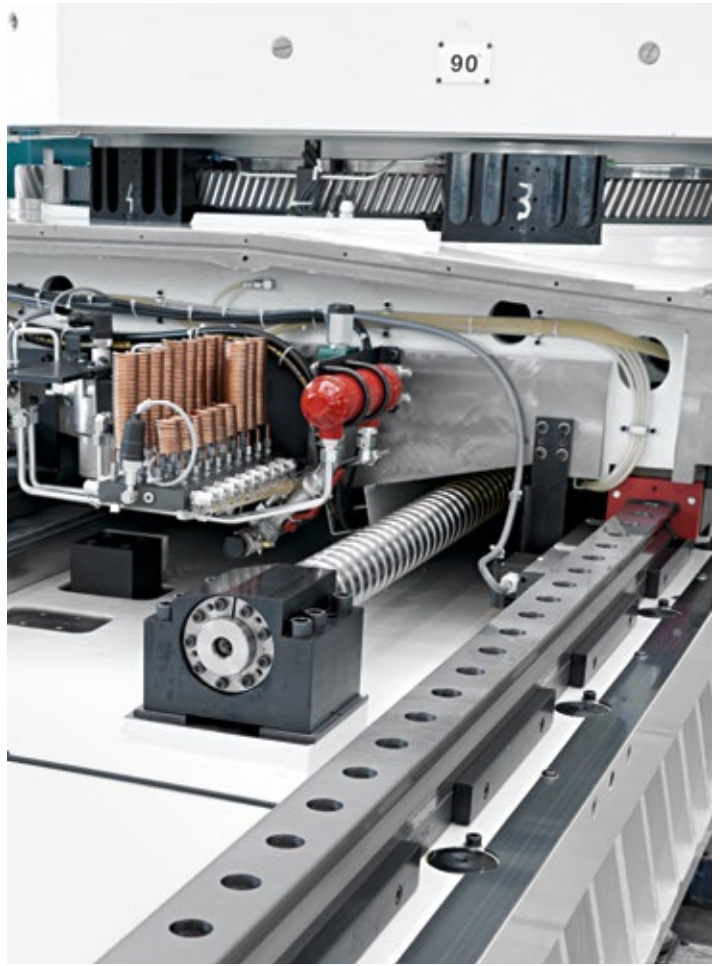
SPEEDMATE HP



MACHINE FEATURES



thermo-symmetric structure with headstock located in central position for maximum accuracy.
Gantry type double ball-screw Y axis for high dynamic performance.



large size linear roller guideways to provide high rapid traverse rate as well as maximum rigidity on all linear axes

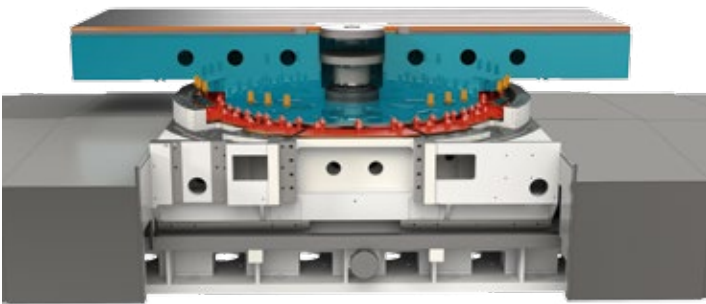


X and Z beds conceived for positioning at floor level, to reduce installation time and civil works costs



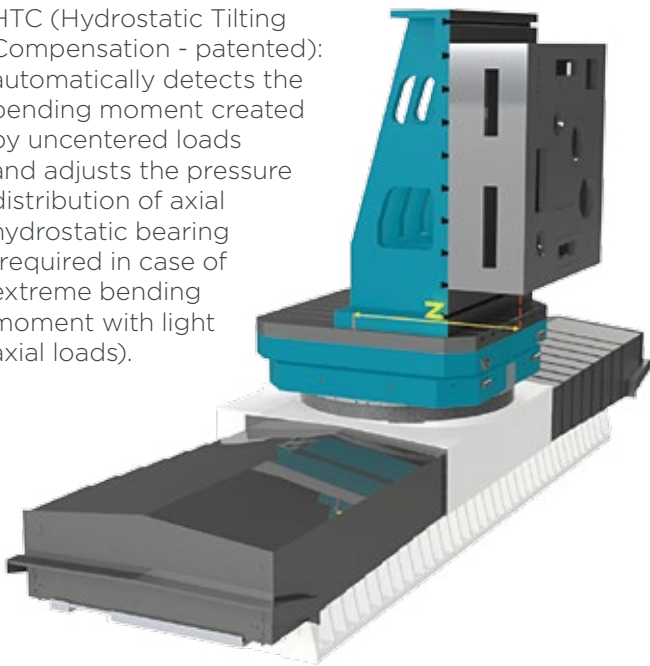


B axis is driven via bull gear and double pinion system (preloaded for backlash free operation)



hand scraped and fully hydrostatic contouring tables allows for optimal simultaneous 4 and 5 axes precision machining

HTC (Hydrostatic Tilting Compensation - patented): automatically detects the bending moment created by uncentered loads and adjusts the pressure distribution of axial hydrostatic bearing (required in case of extreme bending moment with light axial loads).



HTC (Hydrostatic Tilting Compensation): automatically detects and compensates the tilting moment from unbalanced table loads (PAMA patented)

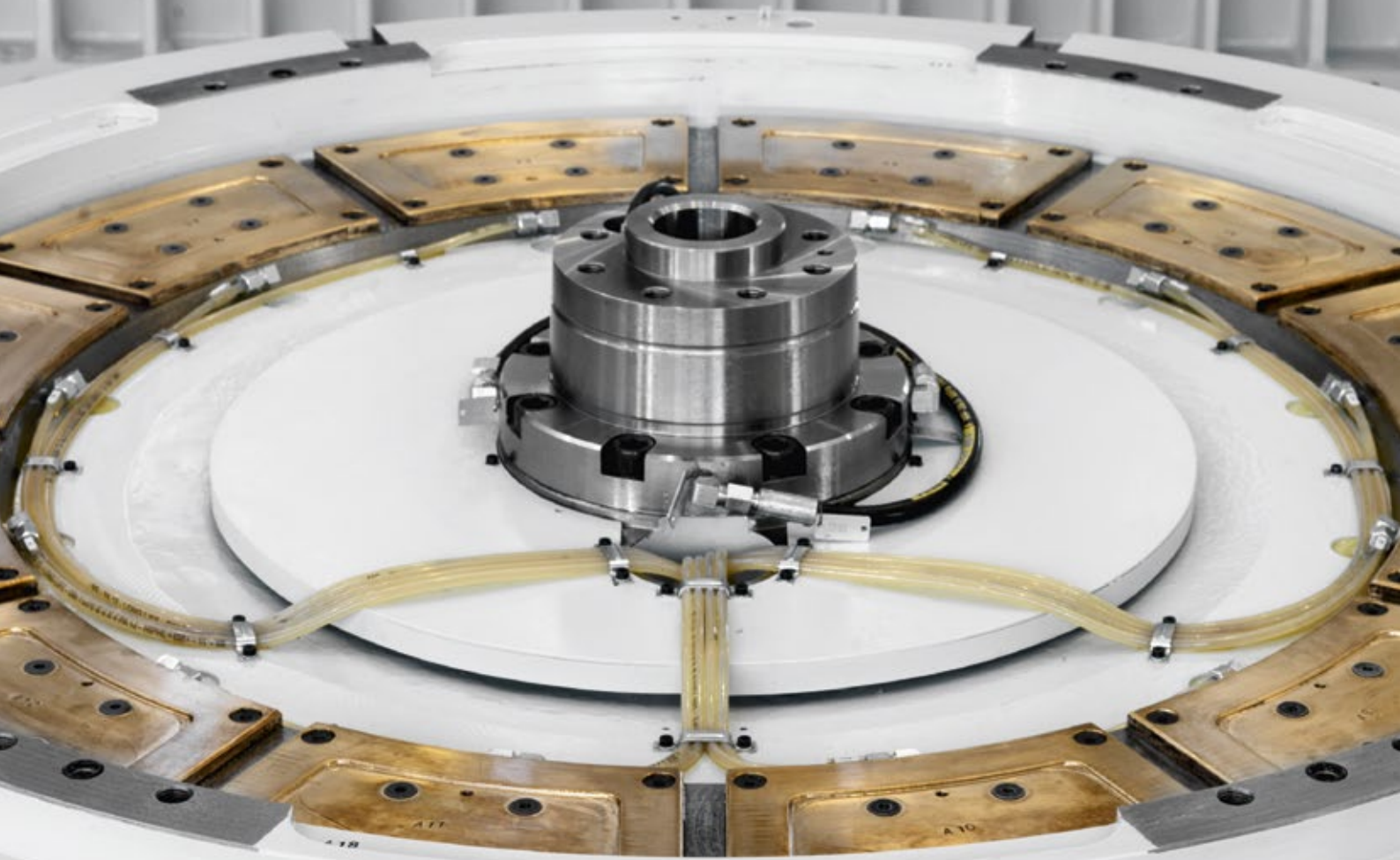


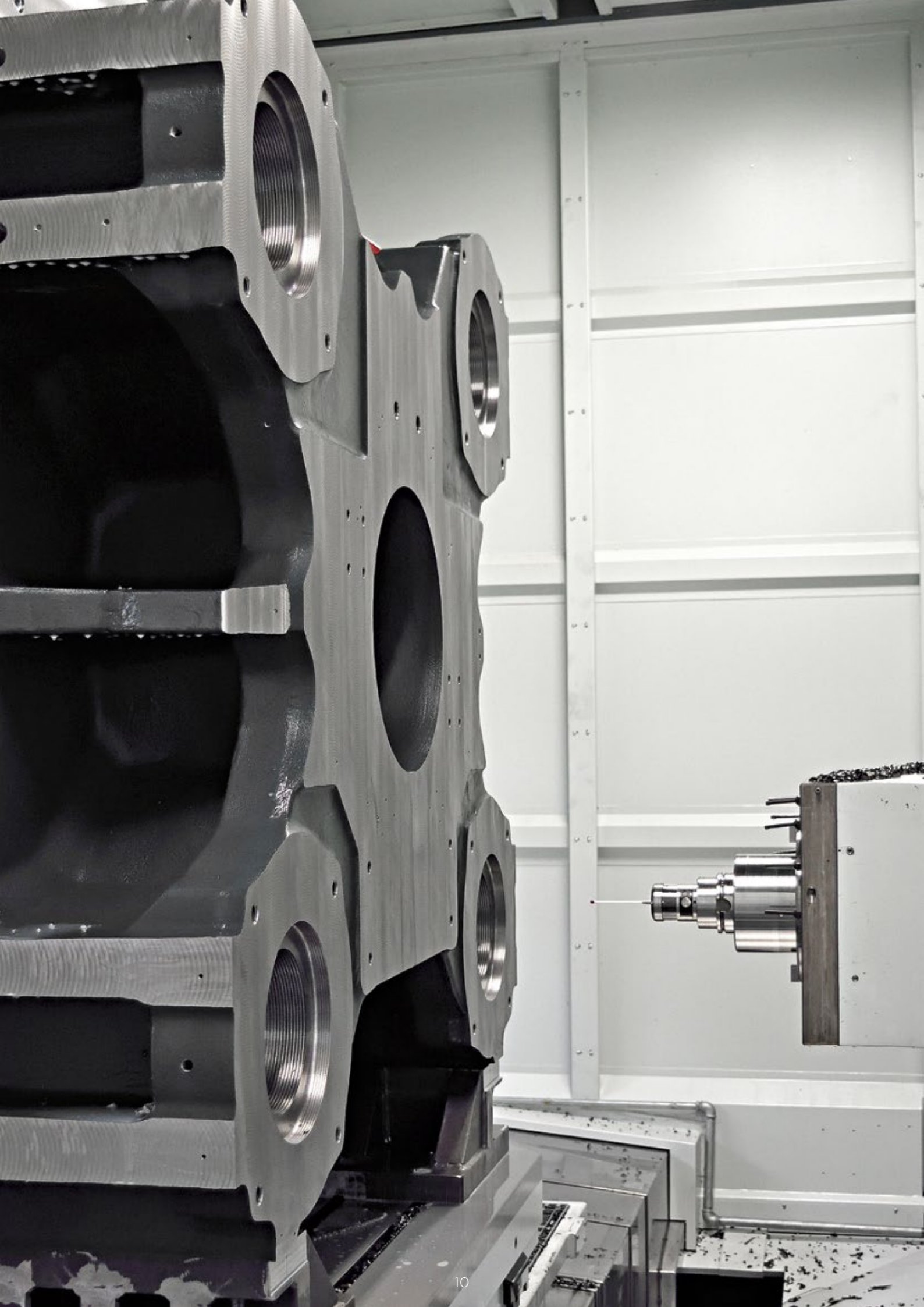
DOT (Dynamic Optimized Tuning): optimized automatic adjustment of table control parameters according to work piece inertia



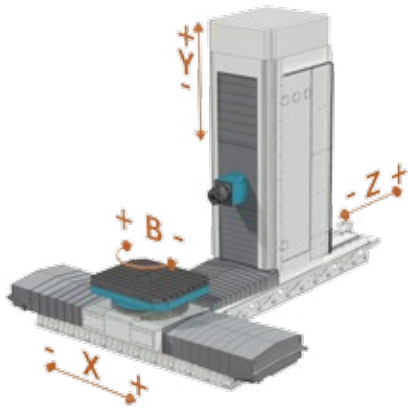
PTB (PAMA Thrust Bearing): full hydrostatic table axial bearing

MACHINE FEATURES

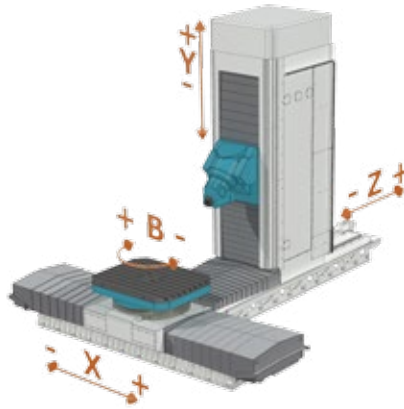




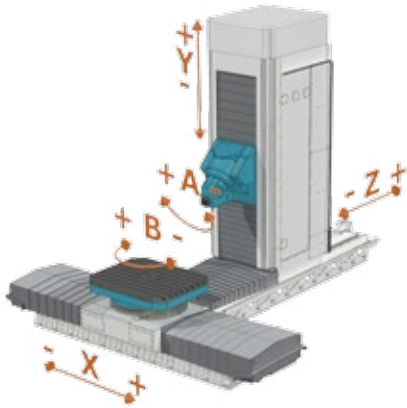
I



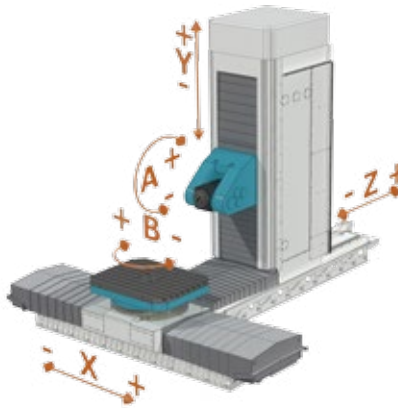
HV



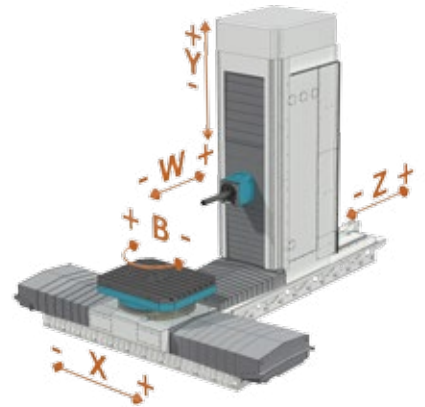
HVA



F



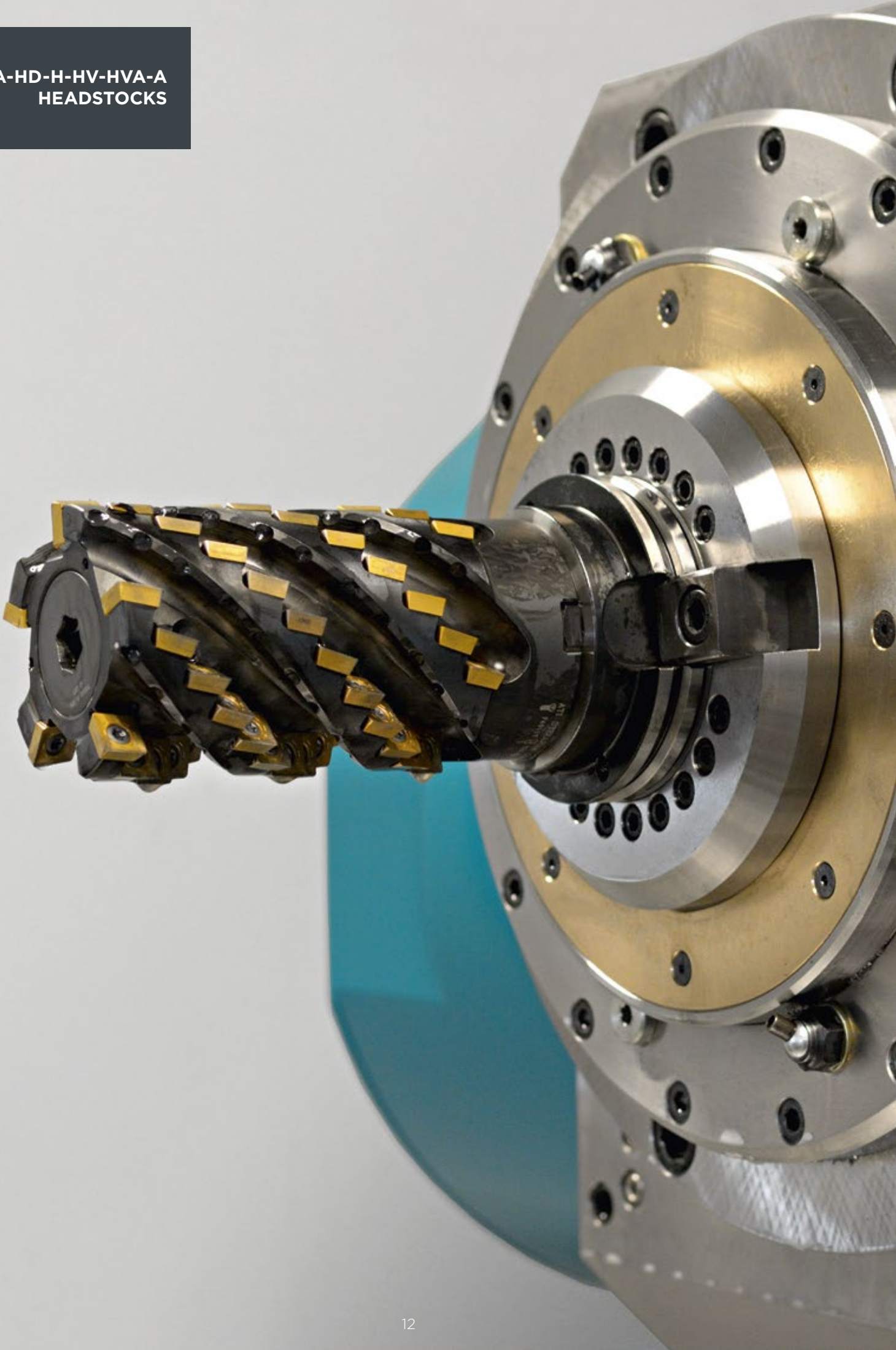
WD

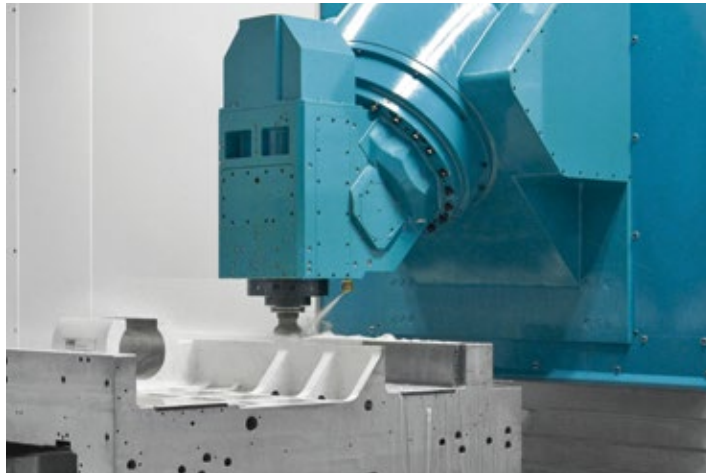


HEADSTOCK

		I	HV	HVA	F	F-HD	WD110	WD180	WD160
Max. spindle speed	rpm	8000	4500-7000	6000-8000	6000-12000	6000	6000	5000	4000
Max. spindle power (S1 - 100%)	kW	73	50	105	50-66	105	90	90	90
Max. spindle torque (S1 - 100%)	Nm	1210	975-624	1035-780	780-320	1035	1500	1800	2200
Boring spindle diameter	mm	-	-	-	-	-	110	130	160
W axis (boring spindle)	mm	-	-	-	-	-	500	700	800
W axis feed / rapid	m/min	-	-	-	-	-	30	30	30
A axis continuous torque (S1 - 100%)	Nm	-	-	4500	4000	8000	-	-	-
A axis clamping torque	Nm	-	-	10000	6000	12000	-	-	-

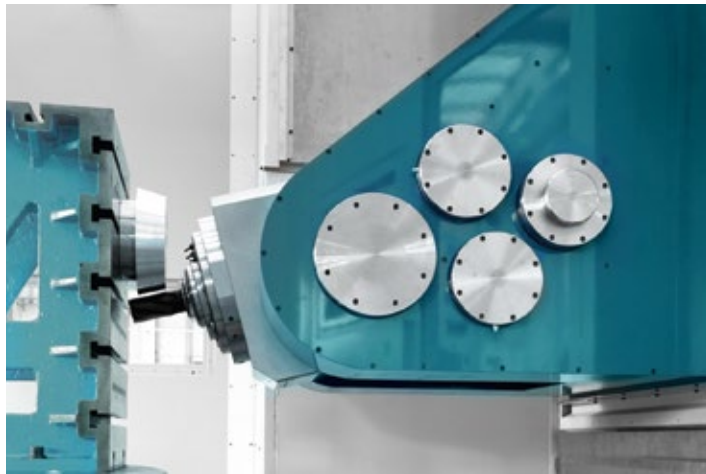
A-HD-H-HV-HVA-A
HEADSTOCKS





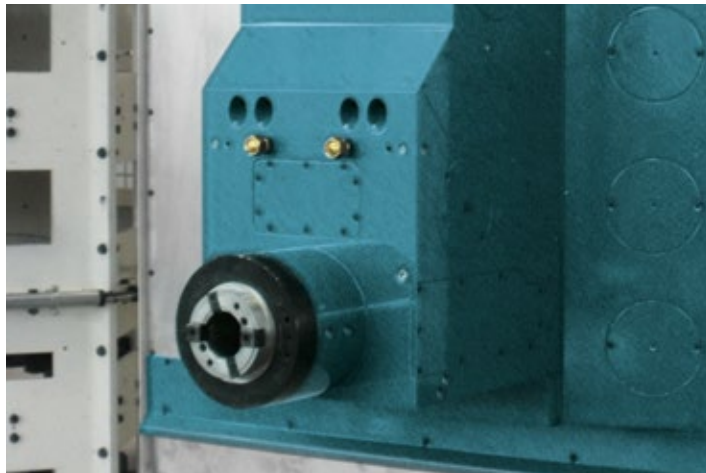
HV-HVA

- horizontal/vertical spindle orientation for easy machining of 5 sides of the workpiece in one set-up
- available with continuous A axis, suitable for 5-axes machining



A, A-HD

- high dynamic performance for 5-axes machining
- available to heavy duty configuration with HSK 125A tool connection for more tough to cut materials



H

horizontal spindle orientation designed with Direct Spindle Drive (DSD)



CSH (Clever Sensored Heads): equipped with temperature and acceleration sensors, allows for continuous head monitoring and predictive maintenance



AHC (Automatic Head Calibration): automatic verification of head geometry and adjustment of offset parameters



DSD (Direct Spindle Drive): no gearbox

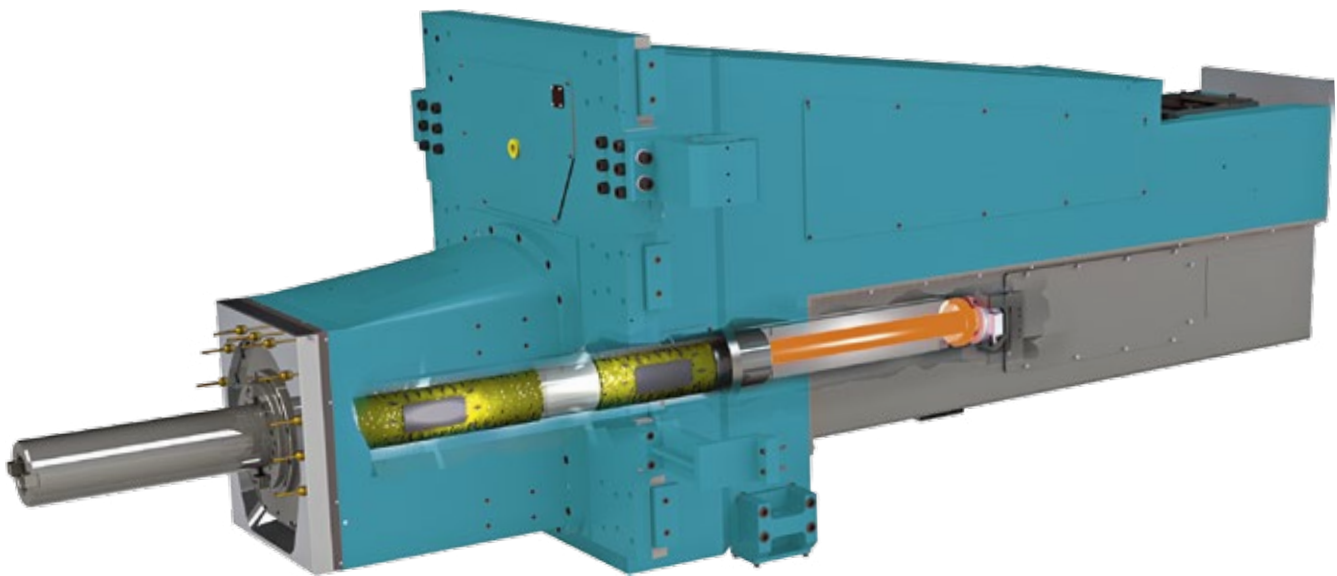
main technical features

- monolithic headstock casting
- high spindle speed, power and torque
- superior machining accuracy
- high material removal rate (MRR) on cast iron, steel and titanium alloys
- wide range of electric spindle options are available

WD HEADSTOCK

headstock design:
incorporates the classic
PAMA boring spindle
with new features and
direct drive technology

WORLD PREMIERE FOR BORING



EXCLUSIVE DIRECT DRIVE TECHNOLOGY

DSD - Direct spindle drive™
increased spindle stiffness and dynamic
performances
rigid tapping without heavy limitation
increased tool life

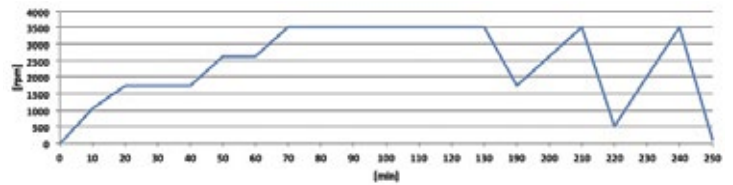
Higher reliability:
mechanical components reduced by 30%,
simpler auxiliary devices (hydraulics and
electrics)

Hybrid spindle bearings with variable preload:
increased spindle speed,
increased stiffness at low speed

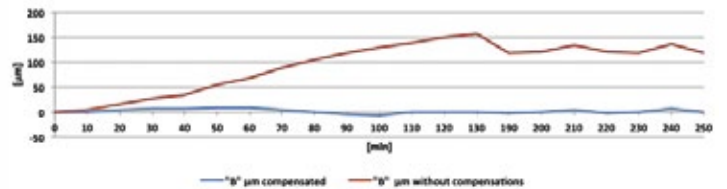


ATC (Automatic Thermal Compensation):
Real time CNC controlled compensation of spindle elongation / contraction by direct measurement (PAMA patent)

spindle speed



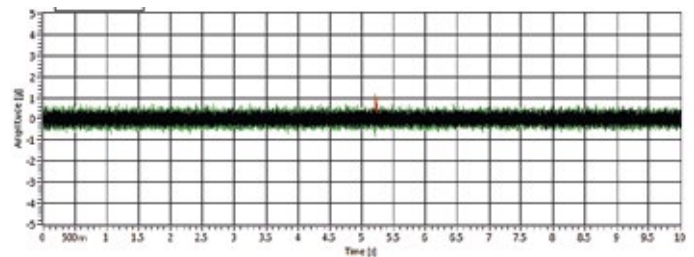
boring bar nose displacement



HSS (Hydrostatic Sliding Spindle):
precise stiffness and dampening control for better machining in difficult conditions: no metal on metal contact, no stick slip, less risk of bar surface damage, for higher positioning accuracy, less vibration and longer tool life, unique PAMA innovative oil supply system:

- less flow required
- no supplementary hydraulic power pack and piping
- no supplementary chiller
- energy saving

vibration amplitude



DSD (Direct Spindle Drive): no gearbox



HSS (Hydrostatic Sliding Spindle): boring spindle sliding on hydrostatic bearings



ATC (Automatic Thermal Compensation): real time CNC controlled exclusive compensation of ram and spindle elongation / contraction by direct measurement (PAMA patents)

**WD HEADSTOCK
ACCESSORIES**



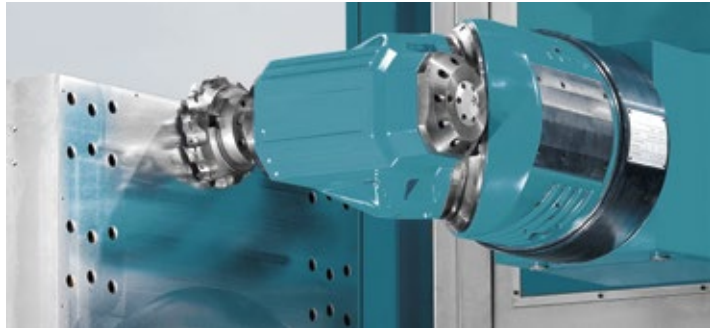
UT
facing heads



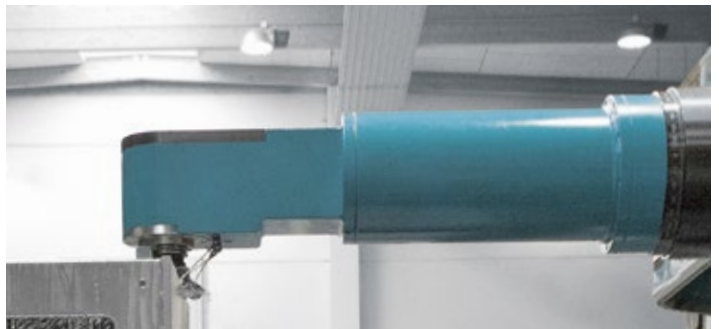
TS
right angle milling heads



TU
indexable universal milling heads



TTL
right angle indexing universal heads



customized solutions

PAMA will design and produce any specialty head requirements - leading the industry to specific technological solutions



CSH (Clever Sensored Heads): equipped with temperature and acceleration sensors, allows for continuous head monitoring and predictive maintenance



AHC (Automatic Head Calibration): automatic verification of head geometry and adjustment of offset parameters



PMP (PAMA Maintenance Program): software system reminds operators and maintenance personnel of scheduled PM activities

WD HEADSTOCK AUTOMATIC ATTACHMENT CHANGER



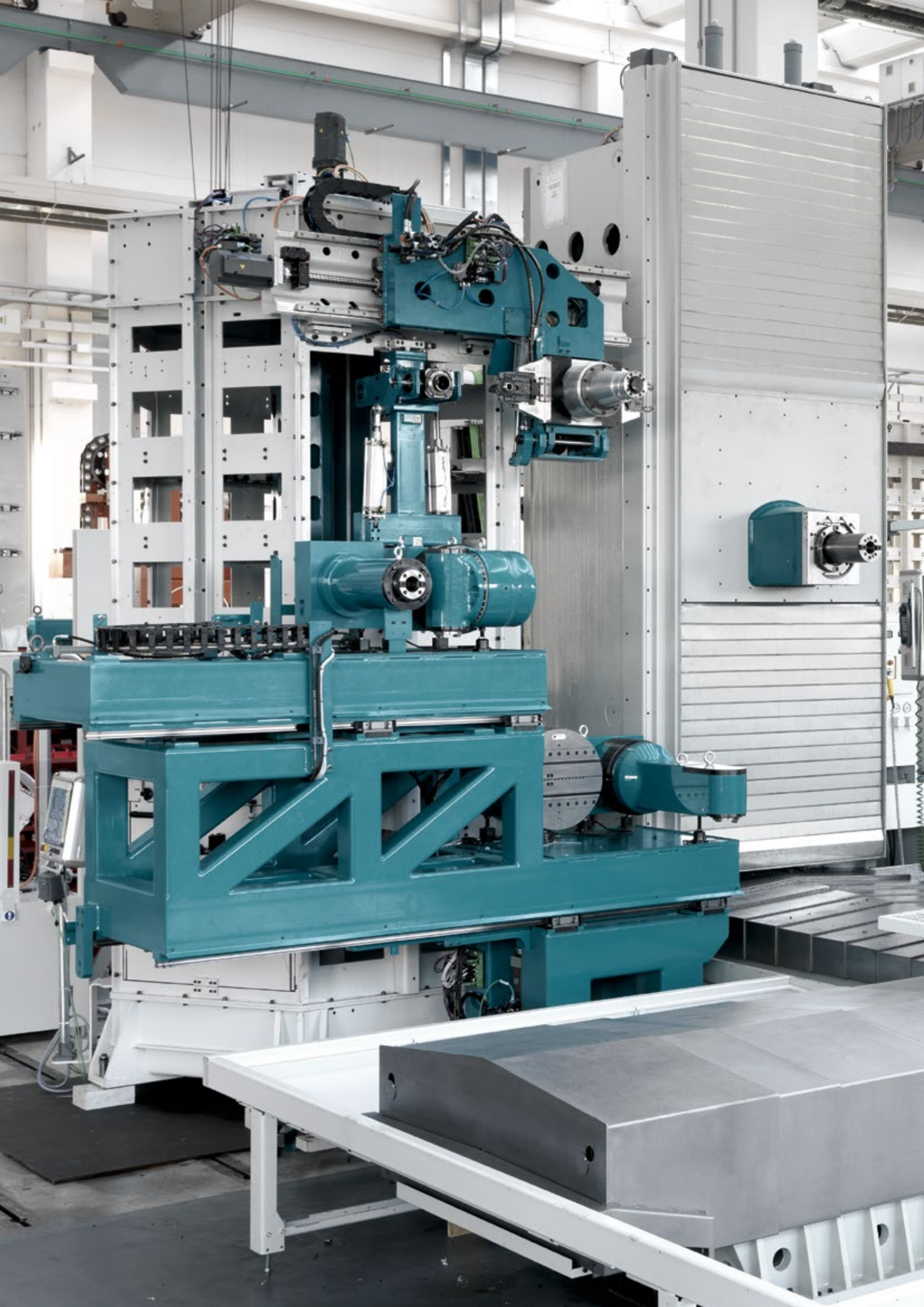
the versatility of Speedmat HP can be further enhanced by a wide range of head attachments that can be automatically interchanged for maximum efficiency



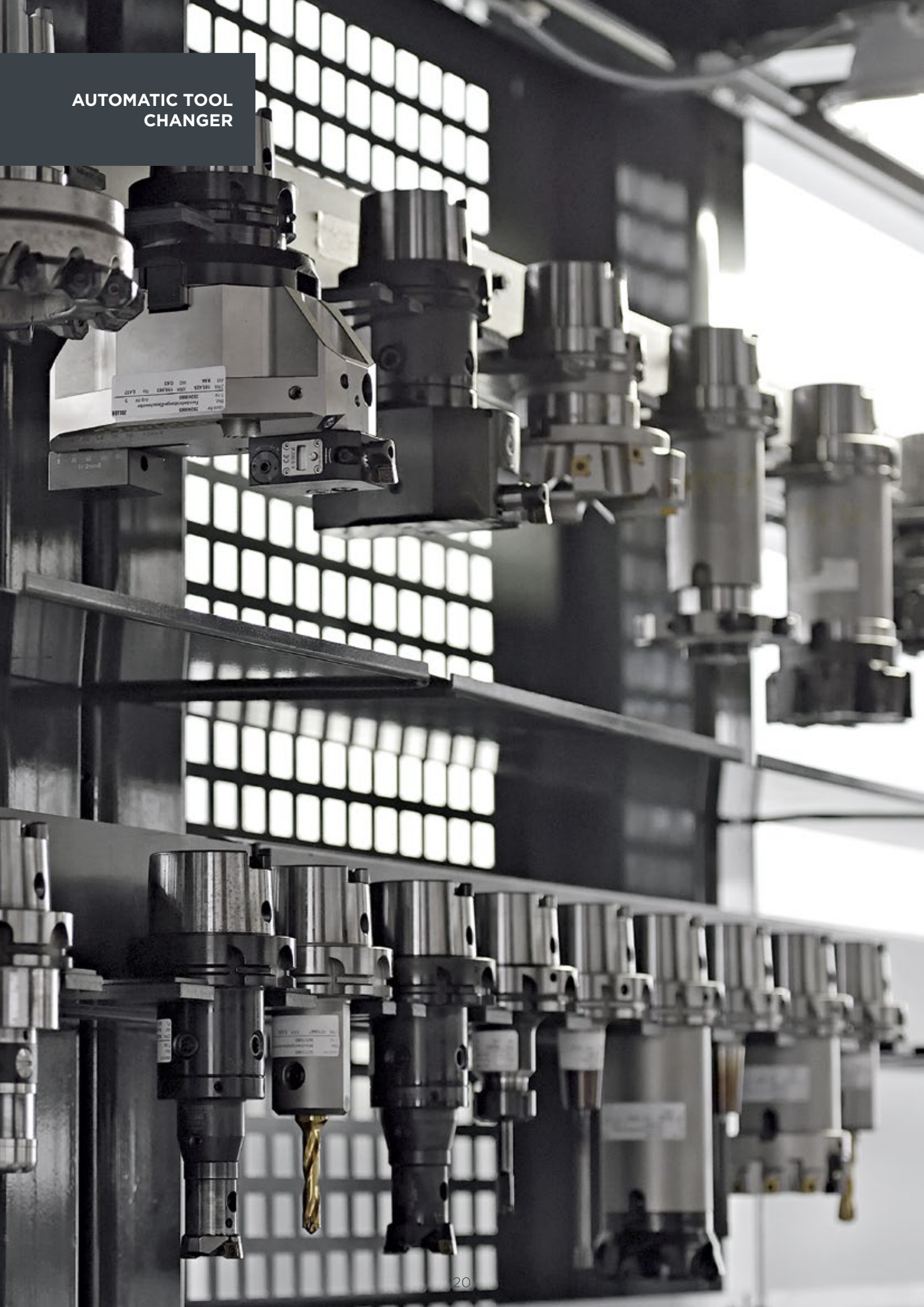
PMP (PAMA Maintenance Program): software system reminds operators and maintenance personnel of scheduled PM activities



PR2 (Predictive Production Management): optimize the efficiency and the saturation of the production system



**AUTOMATIC TOOL
CHANGER**

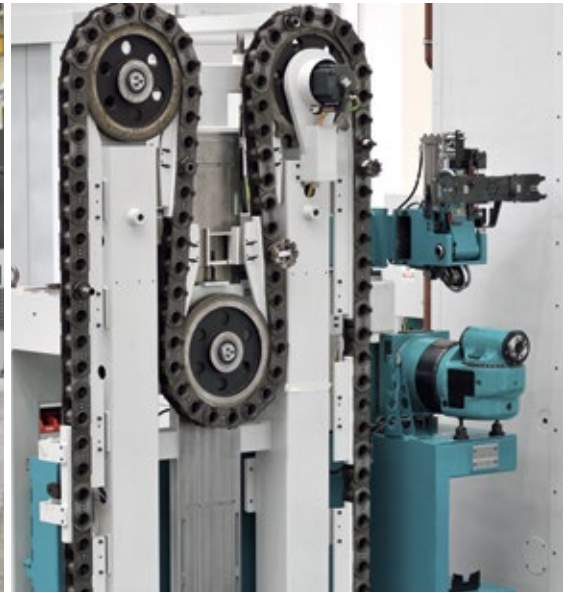




tower



rack



chain

TOOL MAGAZINE

CHAIN 130

CHAIN 145

TOWER

SINGLE RACK

DOUBLE RACK

		CHAIN 130	CHAIN 145	TOWER	SINGLE RACK	DOUBLE RACK
Tool magazine capacity	places	60/80/112/120/140	60/80/120	154/190*/256**	300/400	570/770
Max. tool diameter (all pockets engaged)	mm	125	140	125	110	110
Max. tool diameter (adj. pockets empty)	mm	420	420	400	325	325
Max. tool diameter (oriented tool)	mm	420	420	730	730	730
Max. tool length (ISO 50)	mm	600	600	600	600 (1200)	600 (1200)
Max. tool length (HSK 100)	mm	600	600	700	700 (1200)	700 (1200)
Max. tool weight	Kg	35	35	35	35	35
Max. tool tilting moment	Nm	60	60	120	120	120

(*) reduced to 180 if machine installed under floor - (**) reduced to 246 if machine installed under floor

Speedmat HP can be equipped with a variety of automatic tool change handling and tool storage solutions to fulfil any customer needs. Other tooling options can include tool coding systems, tool length measurement and tool taper cleaning to further enhancement of the automation control.



PR2 (Predictive Production Management): optimize the efficiency and the saturation of the production system

CHIP MANAGEMENT



Chip and coolant management are an integral part in the design of the Speedmat HP machines, a wholly designed system of coolant recovery, chip conveyors

and the full enclosure system provides the best solution for any material, in any lay-out requirement, and ideally integrated into FMS.

screw type chip conveyor



screw type chip conveyor with vertical exit



chip and coolant recovery with double chip conveyor



integrated chip washing system





COOLANT UNIT

high pressure self cleaning filtration coolant unit

COOLANT SYSTEM

**SELF CLEANING
DRUM FILTER**

**PAPER BAND
FILTER**

tank capacity	2000 l		2000 l	
filtering capacity	40 µm - 500 l/min		40 µm (25 µm) - 500 l/min	
extra cartridge filter (option)	25 µm			
internal coolant	30 bar - 20 l/min	60 bar - 30 l/min	30 bar - 20 l/min	60 bar - 30 l/min
external coolant	8 bar - 70 l/min		8 bar - 70 l/min	
ejector drilling pump (option)	10 bar - 400 l/min		10 bar - 400 l/min	
washing pump for workpiece and cabin	300 l/min		300 l/min	

APPLICATIONS

The outstanding performances of Speedmat HP are demonstrated by real customer's cases, in optimized environment and tooling conditions.

Table rotation accuracy and boring bar stability:
 N°4 Ø220 H6 mm
 concentricity 0.02 mm
 parallelism 0.02 mm

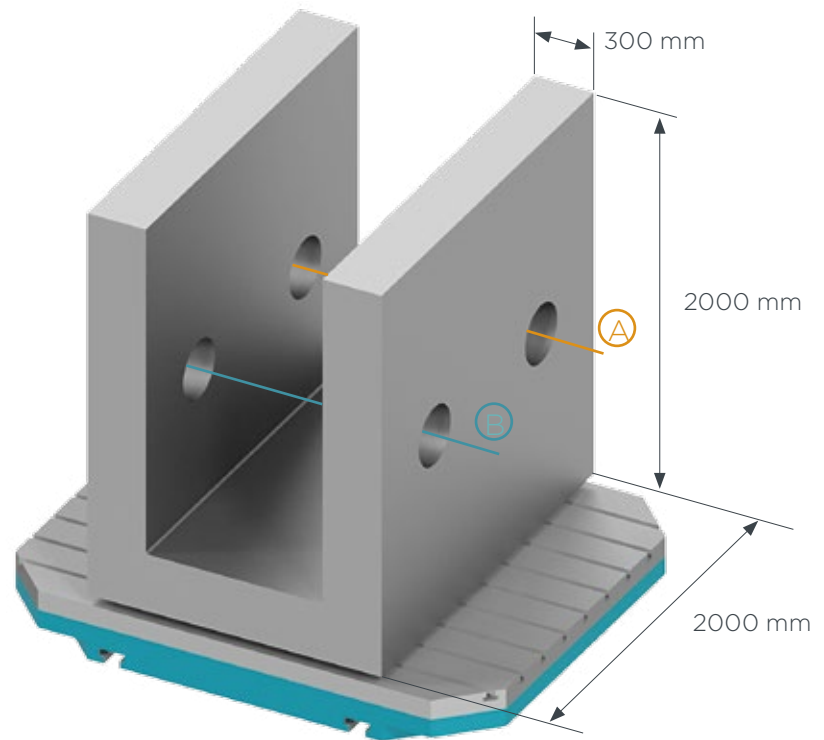
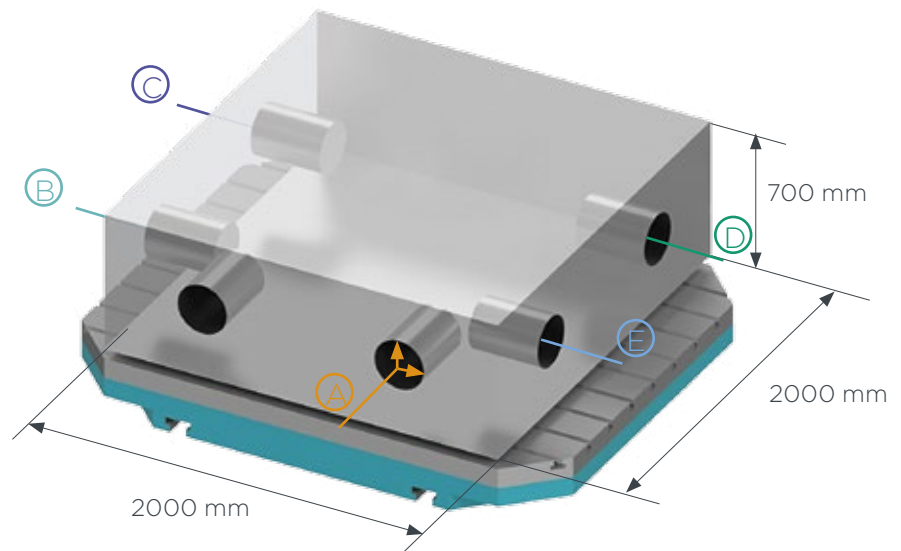


Table rotation, boring accuracy and volumetric accuracy:
 B, C, D and E true position referred to A: 0.015 mm



ATC (Automatic Thermal Compensation): real time CNC controlled exclusive compensation of ram and spindle elongation / contraction by direct measurement (PAMA patents)



HSS (Hydrostatic Sliding Spindle): boring spindle sliding on hydrostatic bearings

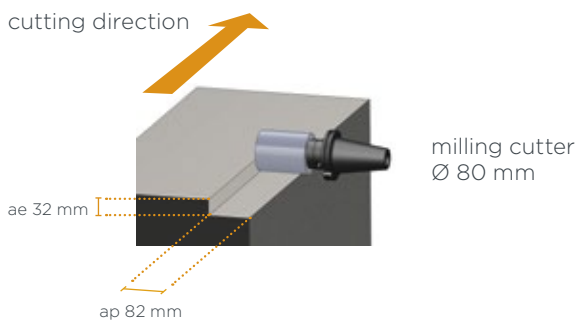


HTC (Hydrostatic Tilting Compensation): automatically detects and compensates the tilting moment from unbalanced table loads (PAMA patented)

Milling of herringbone gear:
tooth profile quality IT7 by milling



Titanium alloy machining:
Ti-6AL-4V material
removal rate > 500 cm³/min
with standard headstock "A"
in real production

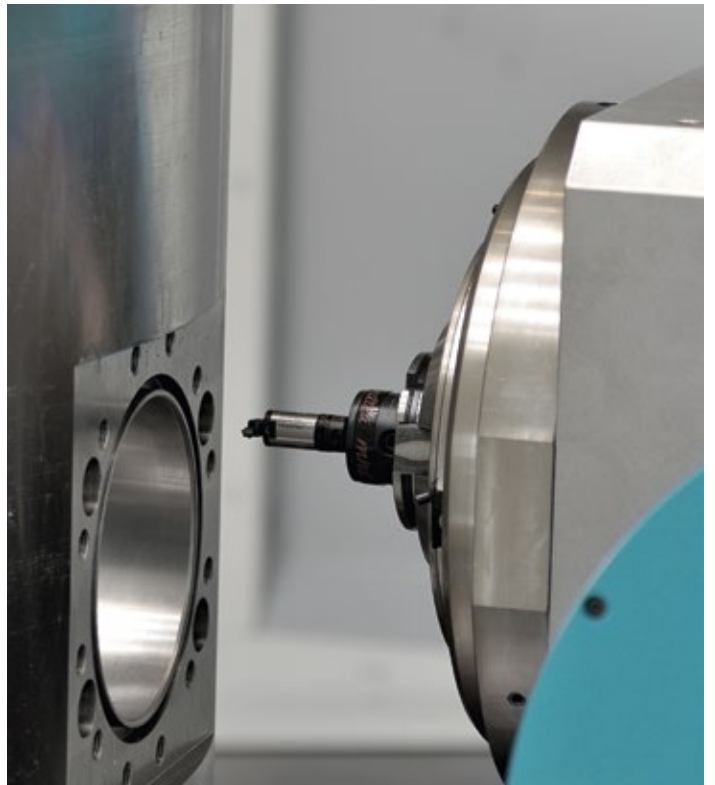
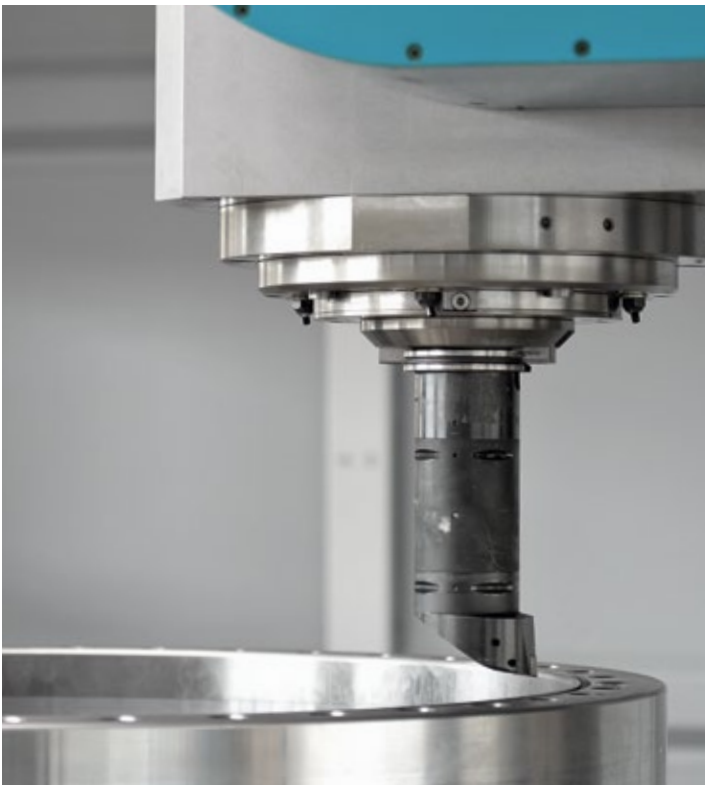
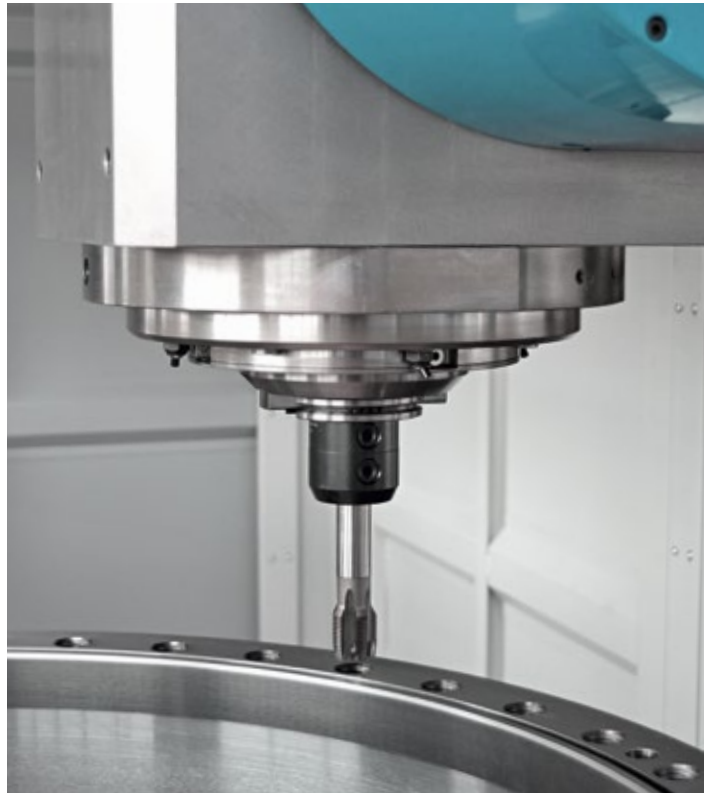
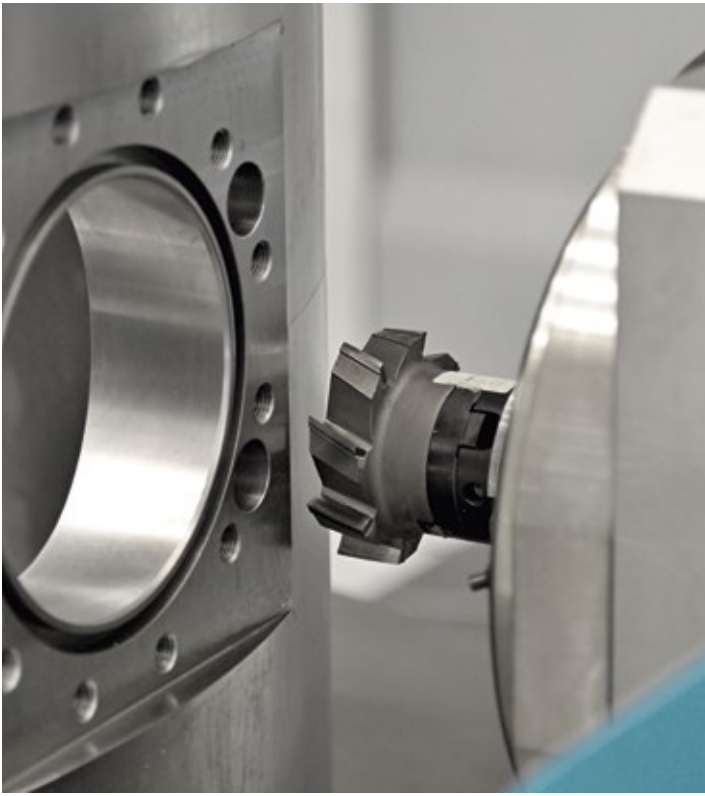


Ø 80 mm insert end mill (porcupine)

feed rate	184 mm/min
axial depth	82.0 mm
radial depth	32.0 mm
cooling device	200 l/min - 70 bar

MULTITASKING
SOLUTION





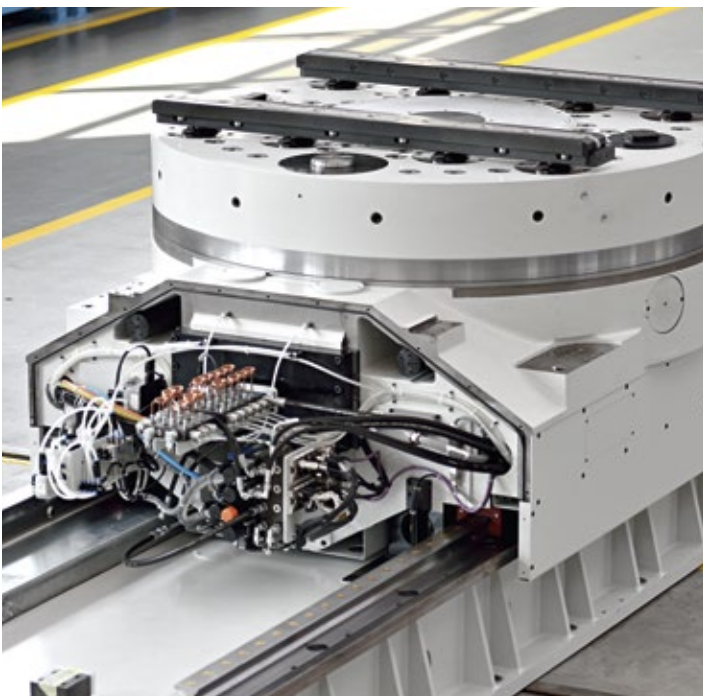
The high versatility of the Speedmat HP is now enhanced with the introduction of the turning function. Together with the large number of headstock configurations and tailor made tool attachments, makes the Speedmat HP the ideal, unique and unbeatable multitasking machining system: less set-ups, better accuracy, less space requirement and more spindle time in the part.

MULTITASKING TURNING TABLES



The new TRT rotary tables with turning mode are designed according to the exclusive PAMA THT concept (patented). The system guarantees the best performance in turning with limited heat generation

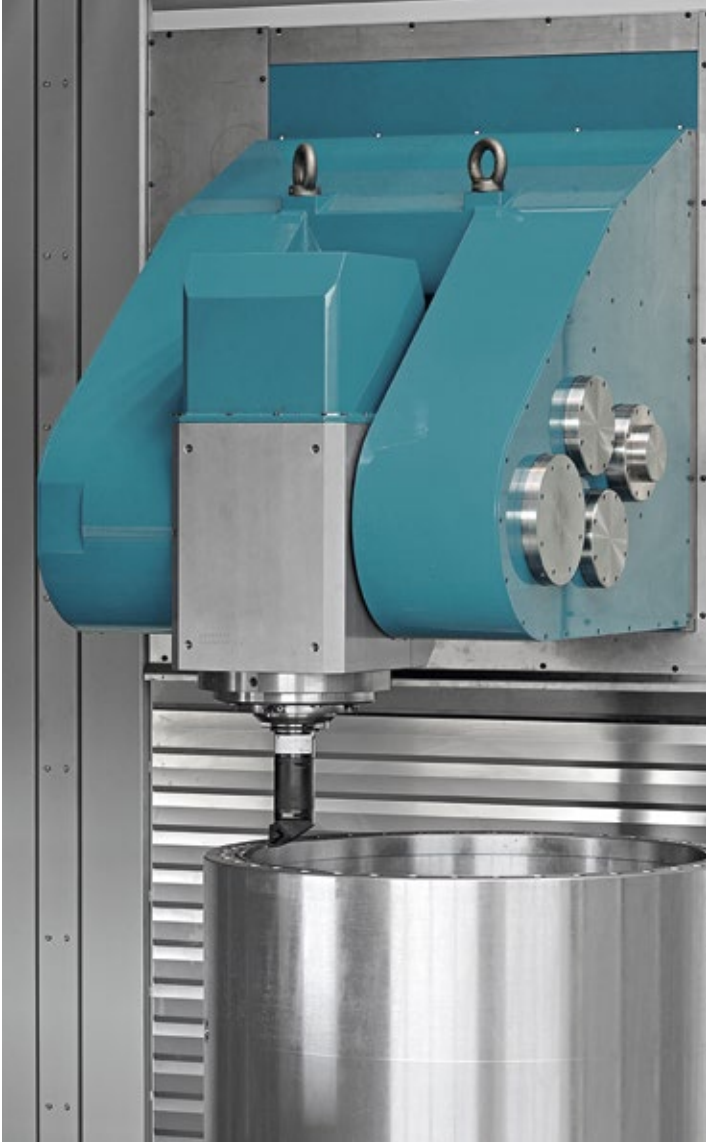
and the best rigidity (more than double) when milling: a real machining center, a real milling and boring machine and a real VTL combined in a unique multitasking system.



THT (Turning Hybrid Table): combined technology of rolling and hydrostatic bearings for best turning and milling



DOT (Dynamic Optimized Tuning): optimized automatic adjustment of table control parameters according to work piece inertia



MULTASKING TURNING ATTACHMENTS

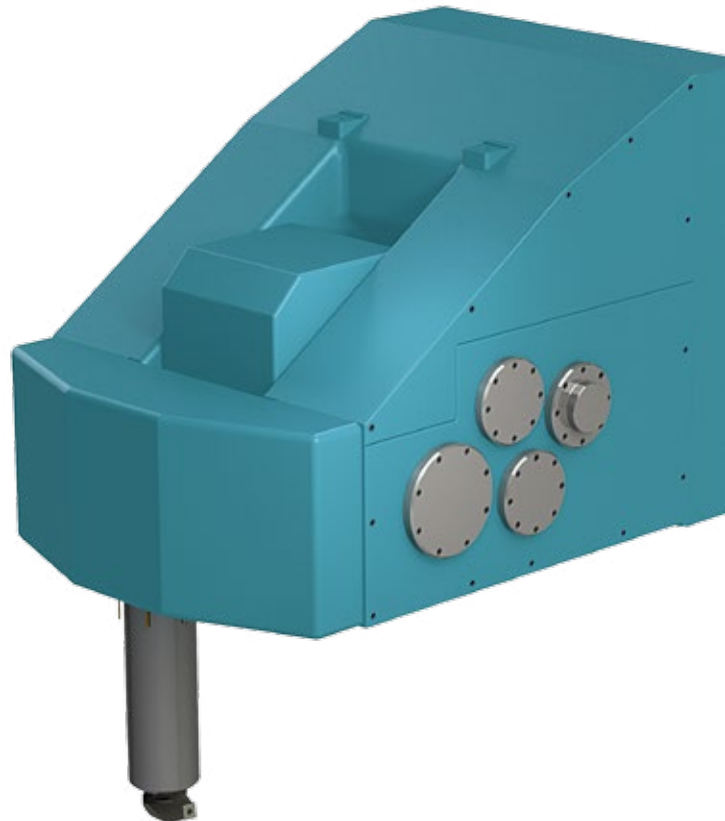
Several solutions for turning tools are possible, to provide in any case the best global answer to the technological need.

Different head attachments for radial turning, axial turning or combined, are available for the WD headstock



HV, HVA and A-type headstocks can be equipped with a special tool clamping system allowing to use the spindle for turning and milling.

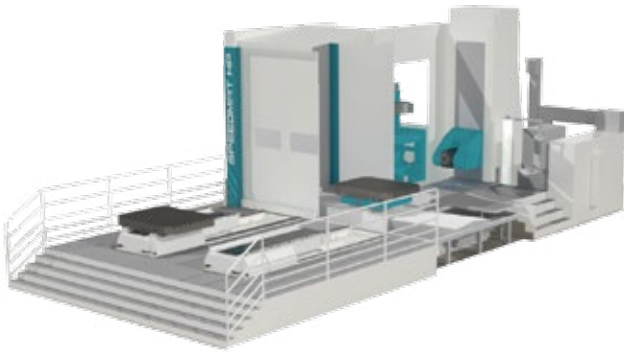
A-type headstocks can be equipped with an automatic attachment clamping system allowing to mount turning attachment heads, thus allowing deep internal turning.



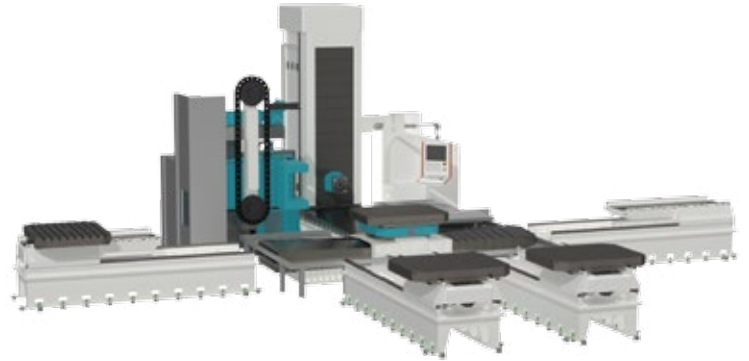
CSH (Clever Sensored Heads): equipped with temperature and acceleration sensors, allows for continuous head monitoring and predictive maintenance

AUTOMATION

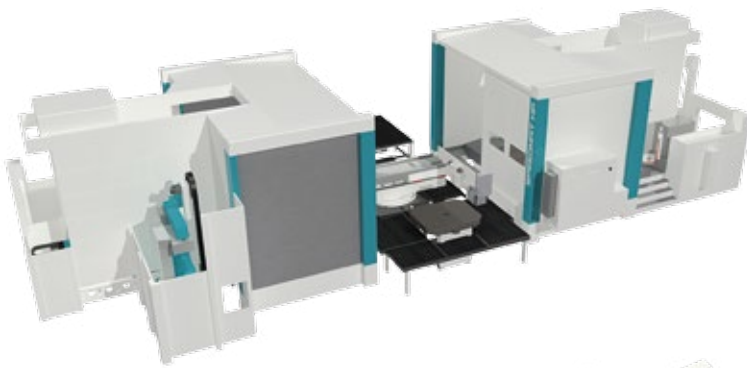
Speedmat HP can be equipped with a variety of automatic pallet changers. Integration into simple cell or more complex FMS is possible thanks to our designed pallet shuttles managed by our PAMA PR2 Suite.



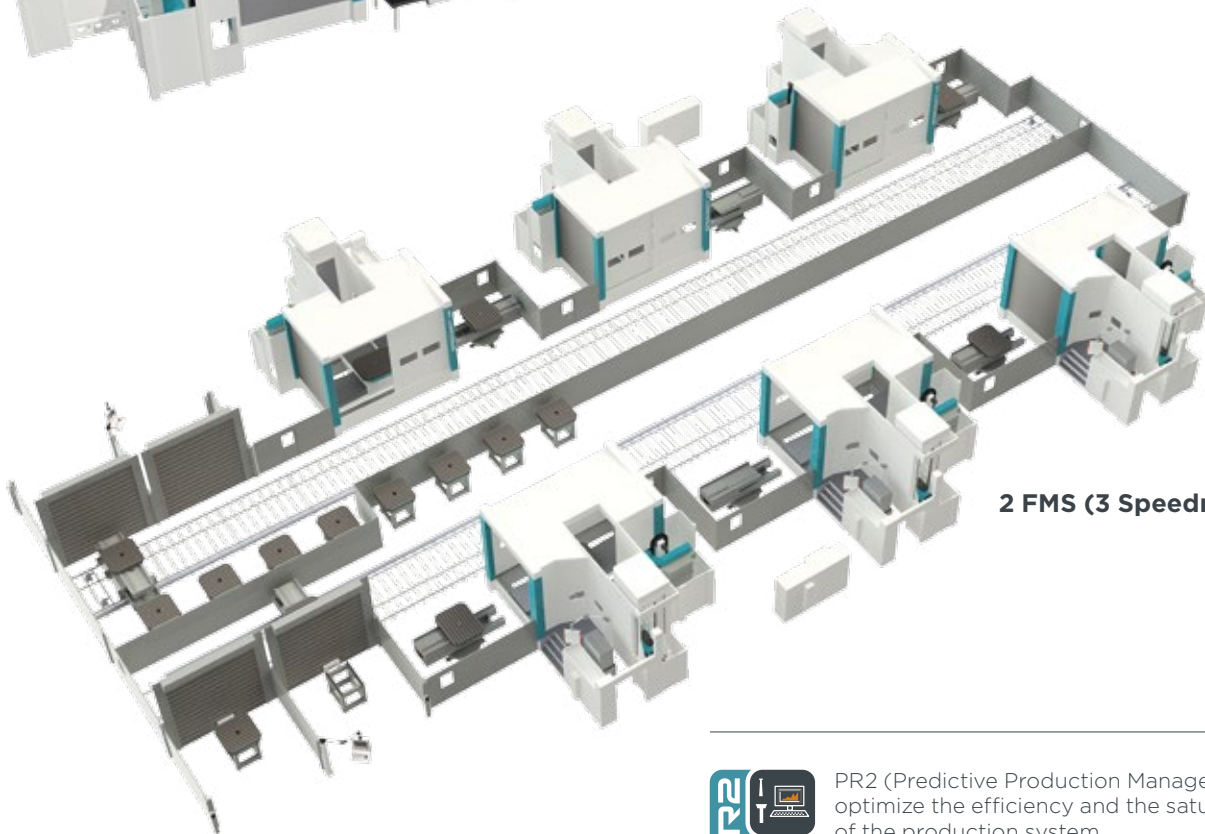
2 front pallets



2 front and 2 lateral pallets



Cell of 2 Speedmat HP



2 FMS (3 Speedmat HP each)



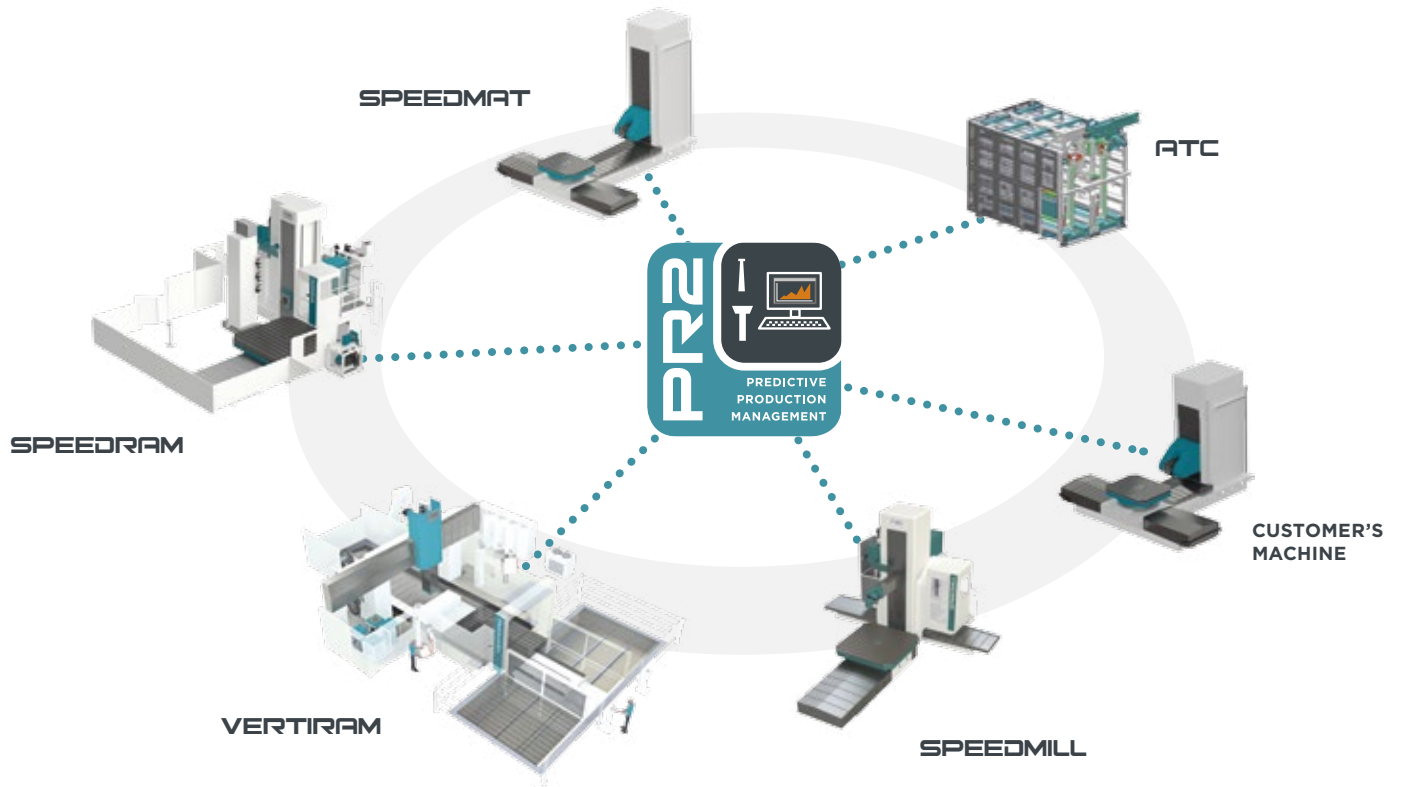
PR2 (Predictive Production Management): optimize the efficiency and the saturation of the production system



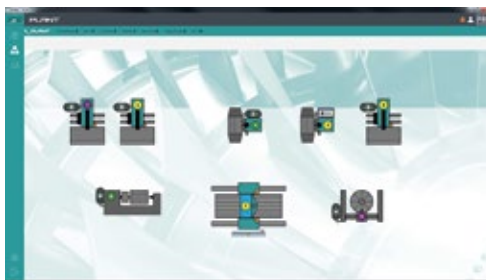
SPELWEL

PR2 SUITE

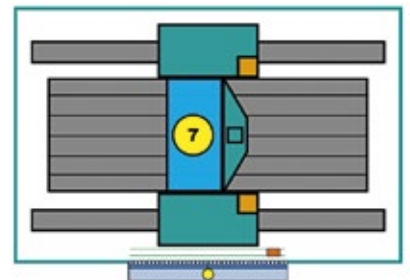
multi-level, applications integrated software developed by PAMA, designed to bring our clients to a higher level of efficiency and profit, thanks to our intuitive user interface, management of the production units in real time with predictive approach in both manned or unmanned conditions.



complete reporting of production unit activities



efficient managing of complex units (even with clients existing, compatible machines)

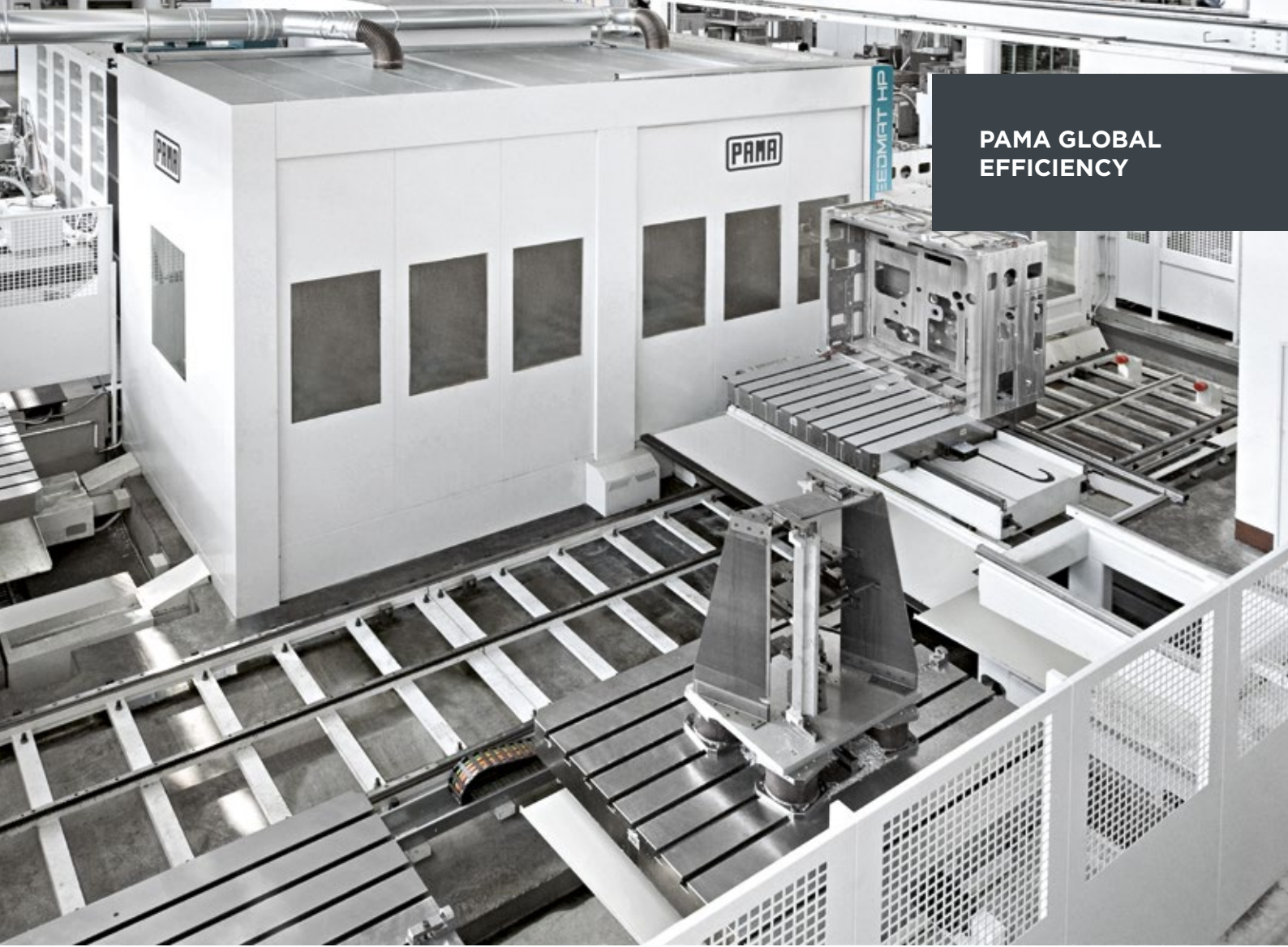


efficient managing of single production unit



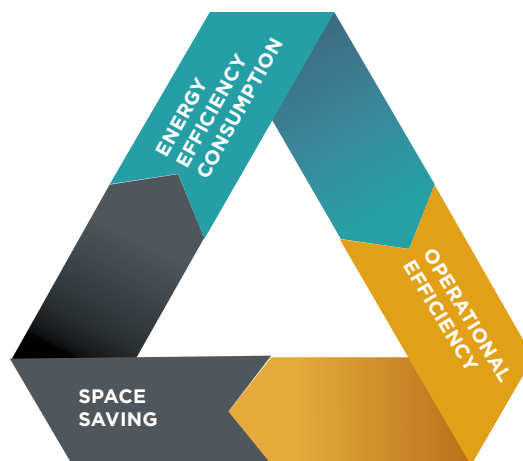
PR2 (Predictive Production Management): optimize the efficiency and the saturation of the production system

PAMA GLOBAL EFFICIENCY



energy saving: low friction guides, use of direct drive technology, regenerating drives, intelligent use of all auxiliary units

space saving: compact design, wide choice of tool changer, pallet changer and chip conveyors



operational efficiency: multitasking configuration, machine reliability, PMP preventive maintenance software, MSM machine sensor monitoring and predictive maintenance, PR2 suite to optimize the efficiency and the saturation of the production system



PGE (PAMA Global Efficiency): energy saving, space saving, operational efficiency

**ERGONOMICS
MAINTENANCE**



Easy maintenance, combined with predictive maintenance, is a must for an efficient workshop management.



Piping, wiring and components location are studied for easy visual inspection at a glance.

PMP (PAMA Maintenance Program): software system reminds operators and maintenance personnel of scheduled PM activities via messages, alarm and or icons permanently displayed on the CNC screen.



Required operations are illustrated by the visualization of the corresponding part of the operator maintenance manuals



PMP (PAMA Maintenance Program): software system reminds operators and maintenance personnel of scheduled PM activities



MSM (Machine Sensor Monitoring): temperature and acceleration sensors for continuous machine monitoring and predictive maintenance

**BORING AND
MILLING CENTERS**





SPEEDMAT HP

PAMA

21

180

90

WORKING AREA

X axis (table)	mm	2000	2600
Y axis (headstock)	mm	1500 / 1700 / 2000	1700 / 2000 / 2500
Z axis (column)	mm	1500 / 2000	2300 / 2600
Max swing diameter	mm	2000	2600

TABLE

Table or pallet size	mm	1000x1000	1250x1250
	mm	1000x1250	1250x1600
Table capacity	t*	4	6
Pallet capacity	t*	3	5
B axis feed/rapid	rpm	10	10

Linear axes features (Headstock H - HV - A)

X axis rapid traverse/feed rate	m/min	50	50
Y and Z axes rapid traverse/feed rate	m/min	50	50
Max acceleration	m/s ²	4	3,5
X, Y, Z axes thrust	kN	20	20

Linear axes features (Headstock WD)

X axis rapid traverse/feed rate	m/min	40	30
Y and Z axes rapid traverse/feed rate	m/min	40	30
X, Y, Z, W axes thrust	kN	20	20

WORKING AREA

X axis (table)	mm	2000	2600
Y axis (headstock)	mm	1500 / 1700 / 2000	1700 / 2000 / 2500
Z axis (column)	mm	1500 / 2000	2300 / 2600
Max swing diameter	mm	2000	2600
Max turning diameter	mm	1600	2000
Max inner turning length	mm	800	1200

TURNING TABLE

Table or pallet size	mm	Ø1250	Ø1600
Table/pallet capacity	t*	3	6
Max workpiece inertia	kg•m ²	3000	6000
B axis milling feed rate	rpm	10	10
Max spindle power (S1/S6)	kW	40 / 50	51 / 58
Max spindle torque (S1/S6)	kNm	5 / 6	10 / 16
Max turning speed	rpm	320	250

* t in metric ton

HP3**HP4****HP5****HP6****HP7**

3000	3000	3800	3800	4600
2000 / 2500	2000 / 2500	2500 / 3000	2500 / 3000	2500 / 3000 / 3500
2300 / 2600	2300 / 2600	2600 / 3200	2600 / 3200	3200
3000	3000	3800	3800	4600

1250x1250	1600x1600	1600x1600	2000x2000	2000x2000
1250x1600	1600x2000	1600x2000	2000x2500	2000x2500
10	16	16	25 (35)	25 (35)
8	12	12	20 (32)	20 (32)
7	5	5	3.5 (2.5)	3.5 (2.5)

40	40	40	25	25
45	45	45	30	30
3.5	3.5	3.5	3	3
20	20	20	20	20

30	30	30	25	25
30	30	30	30	30
20	20	20	20	20

HP8/T**HP5/T**

3000	3800
2000 / 2500	2500 / 3000
2300 / 2600	2600 / 3200
3000	3800
2600	3600
1200	1200

Ø2000	Ø2500
10	15
10000	15000
10	5
51 / 58	51 / 58
13 / 20	16 / 25
200	160

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PAMA has a policy of continuous improvement of its products and reserves the right to change materials and specifications without notice.

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SYSTEM CERTIFIED BY DNV
= ISO 9001:2008 =

