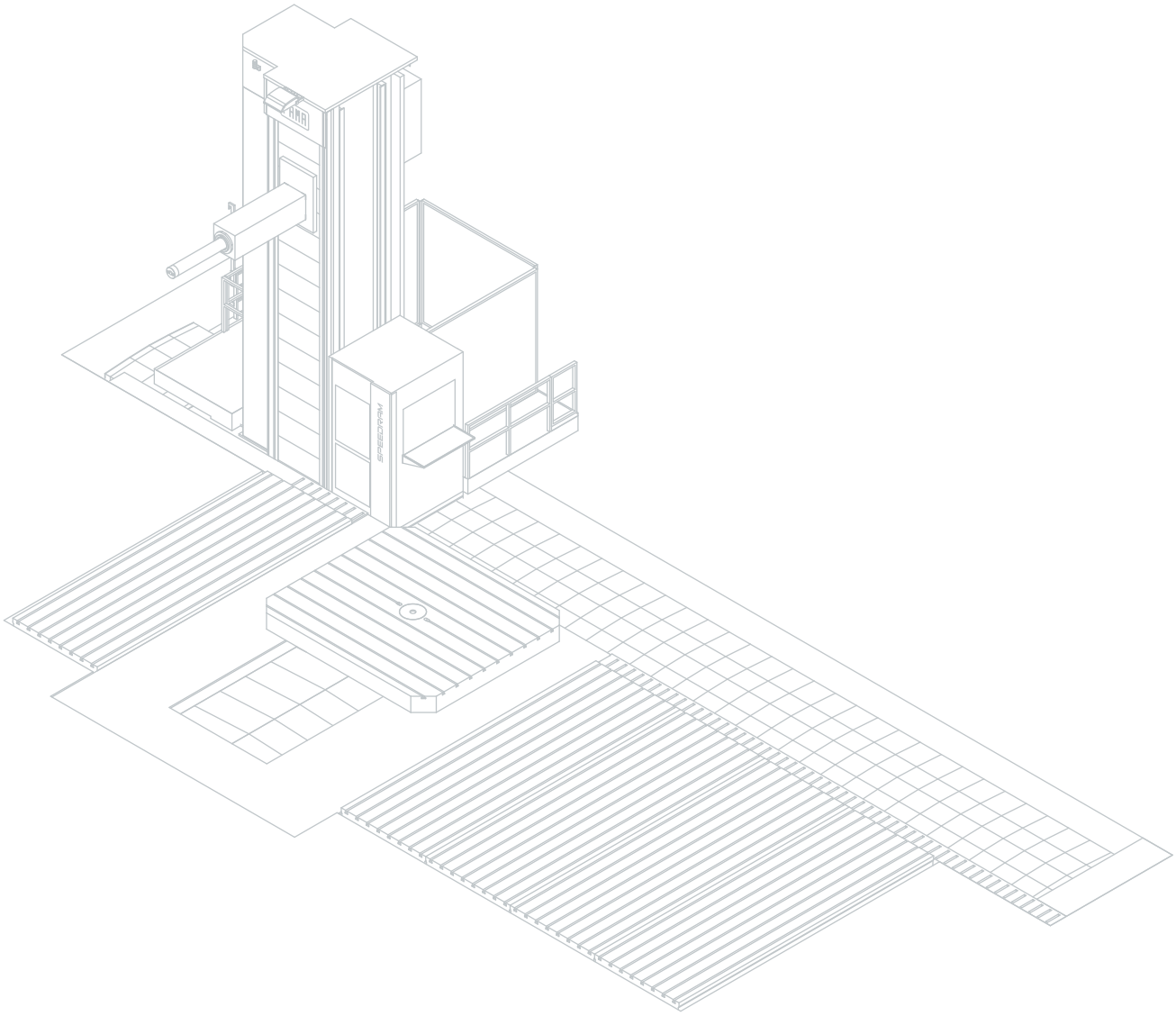
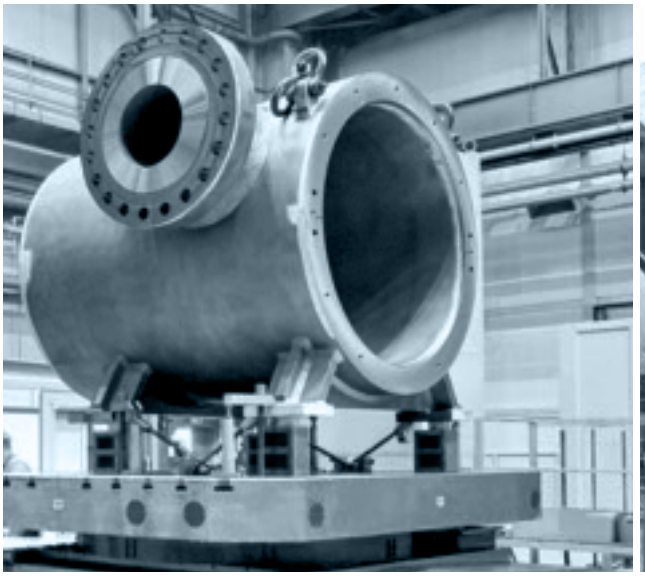
PAMA



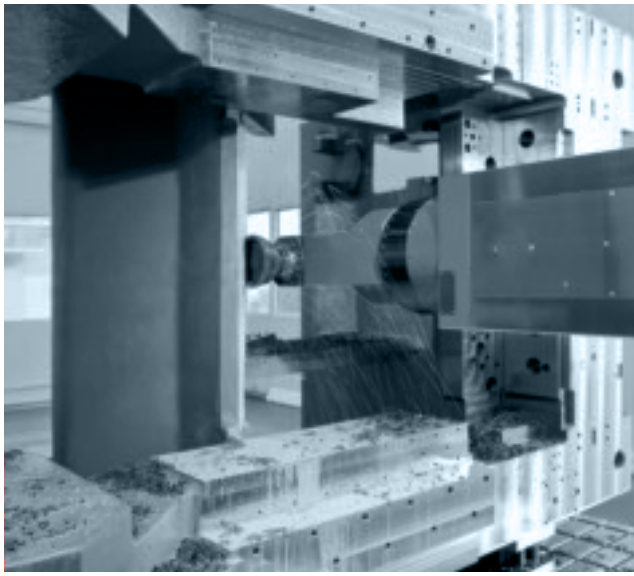
SPEEDRAM

FLOOR TYPE BORING AND MILLING MACHINES

TARGET AND APPLICATION



ENERGY
OIL & GAS
SHIPBUILDING
EARTH MOVING
GENERAL MACHINING



Speedram line is designed for high precision, power and structural rigidity, providing the perfect machining solution for the most demanding applications on all heavy, medium to large size components, requiring high material removal rate coupled to high precision and superior finishing even in hard-to-cut materials.

Speedram product range consists of five models of horizontal boring and milling machines with boring spindle diameter from 130 mm to 300 mm and vertical stroke from 2000 mm to 10000 mm.

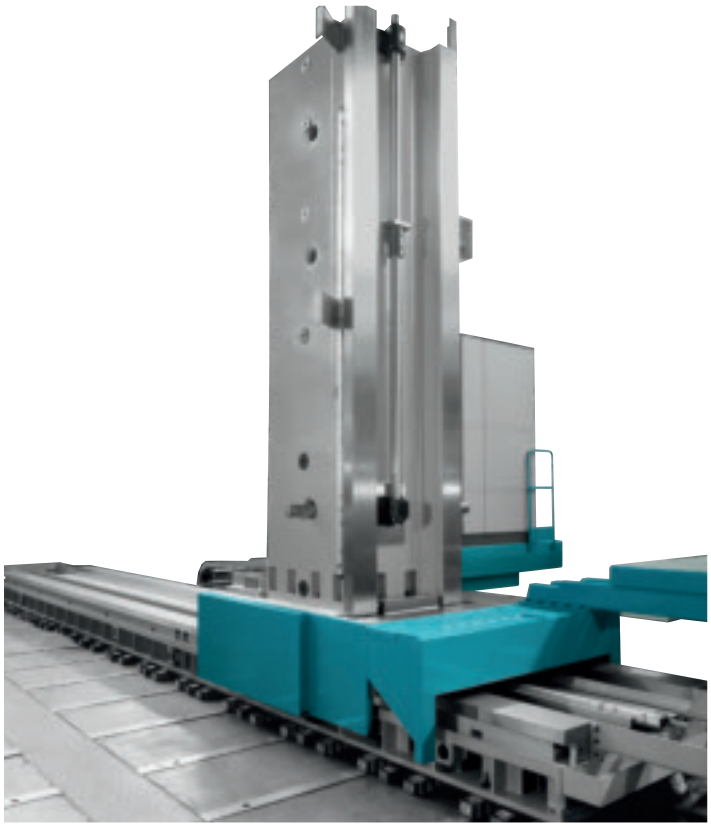
FLOOR TYPE BORING AND MILLING MACHINES


PAMA
SPEEDRAM

MACHINE FEATURES

all linear axes with full hydrostatic guideways

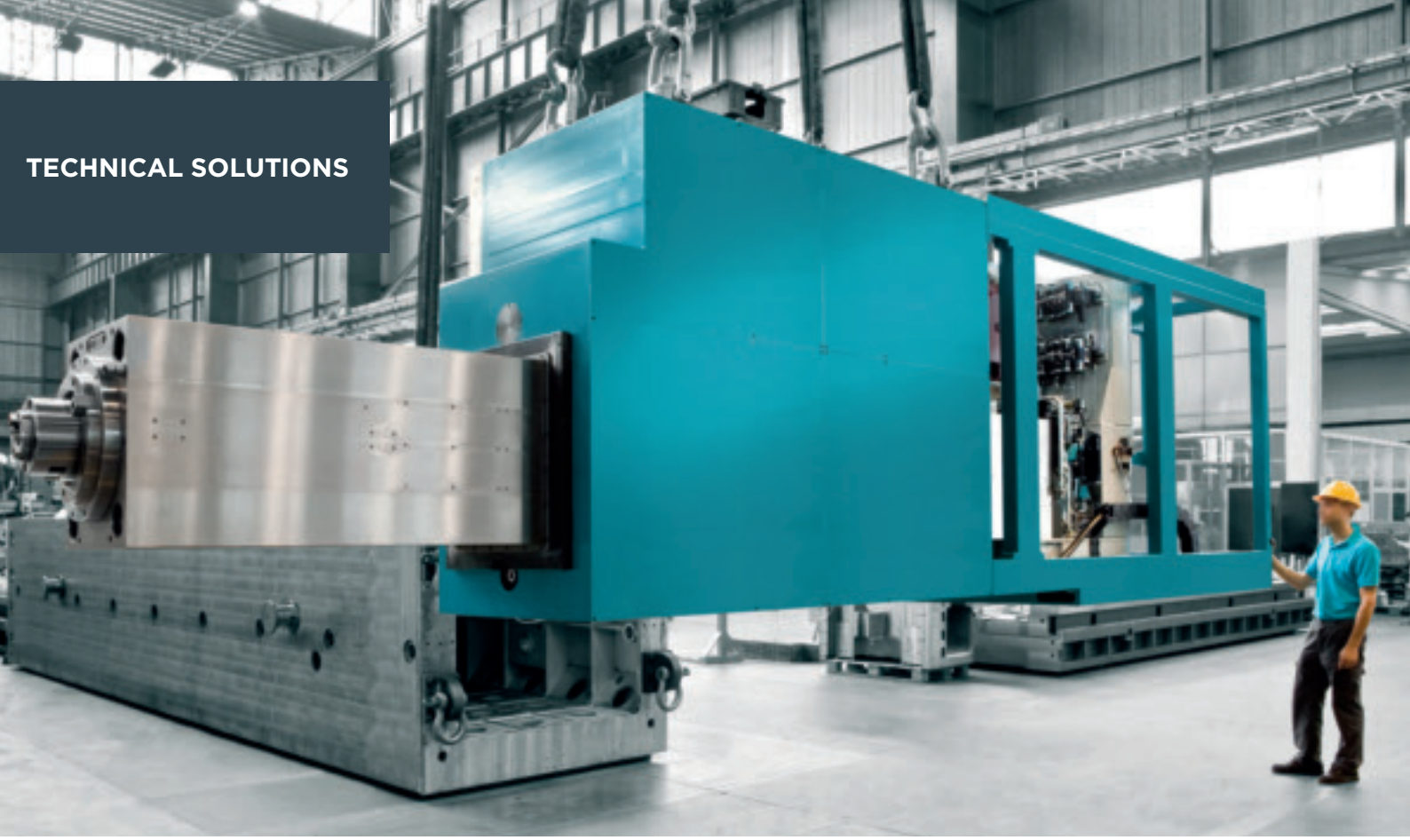
double wall column construction



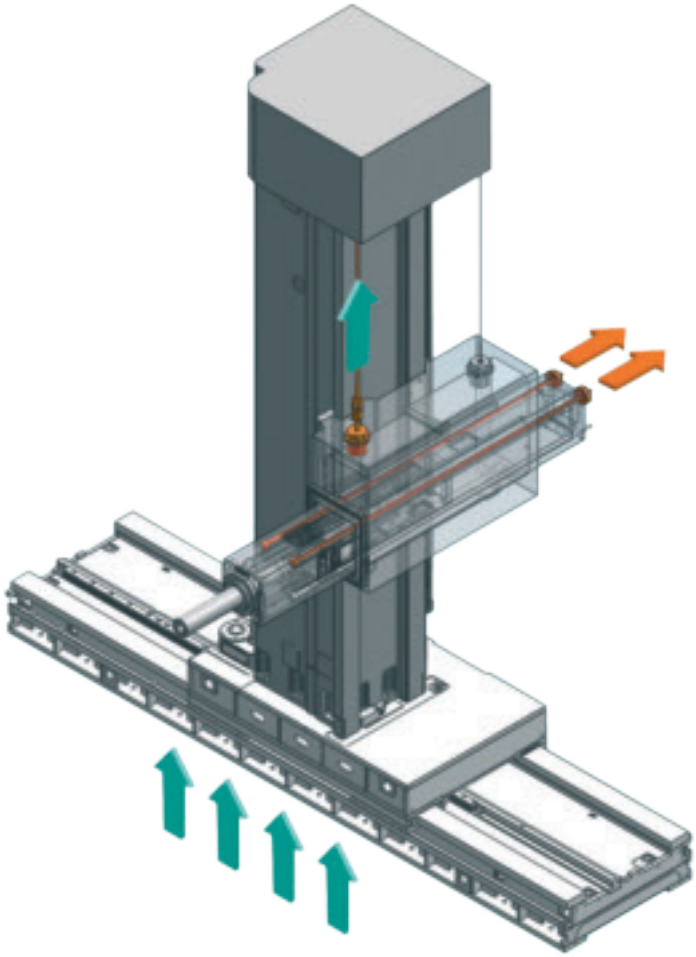
monolithic cast iron headstock with hydrostatic support on all sides

individually hand scraped hydrostatic bronze pads guarantee maximum accuracy of the oil film thickness and performance

TECHNICAL SOLUTIONS



rectangular ram fully enclosed in a monolithic headstock casting with hydrostatic support on all sides

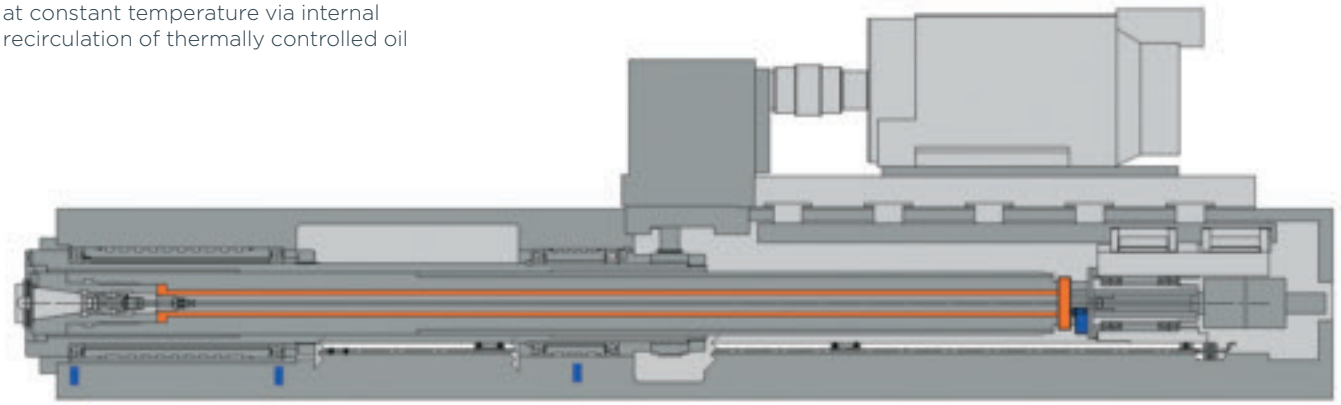


real time CNC controlled geometric compensation of ram droop and sag and headstock tilt

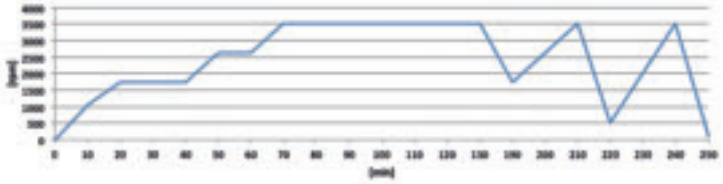
HMC (Hydraulic Machine Compensation): Real time CNC controlled compensation of ram deflection, headstock tilting, column deflection and base rotation

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

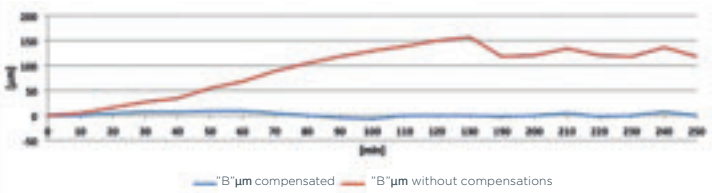
ram and spindle gearbox are maintained at constant temperature via internal recirculation of thermally controlled oil



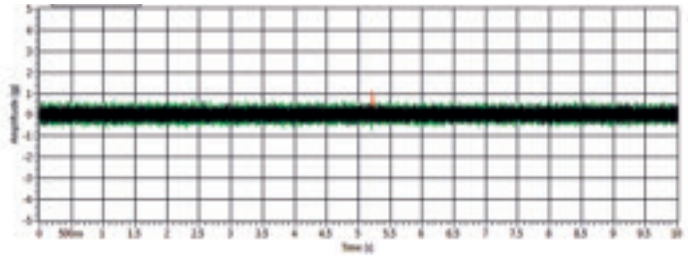
spindle speed



boring bar nose displacement



waveform graph



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

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

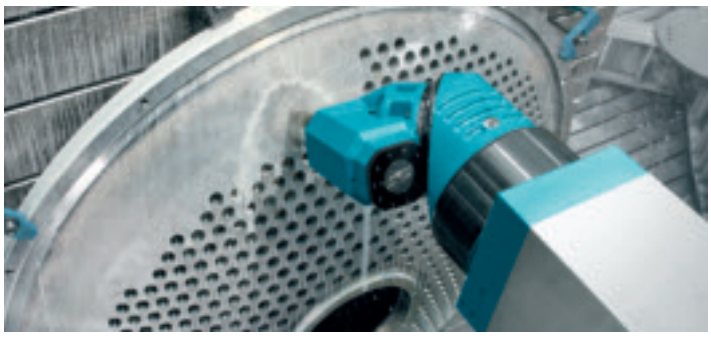
HSS (Hydrostatic Sliding Spindle): boring spindle sliding on hydrostatic bearings

HEAD ATTACHMENTS

the versatility of the Speedram machines is further enhanced by the wide range of attachments available, all capable of being automatically loaded / unloaded for maximum efficiency

TW 2 AC
2 axes contouring head

TU
universal head



TS
right angle head

TTL
universal head with orthogonal axes

UT
facing head

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

HEAD STORAGE

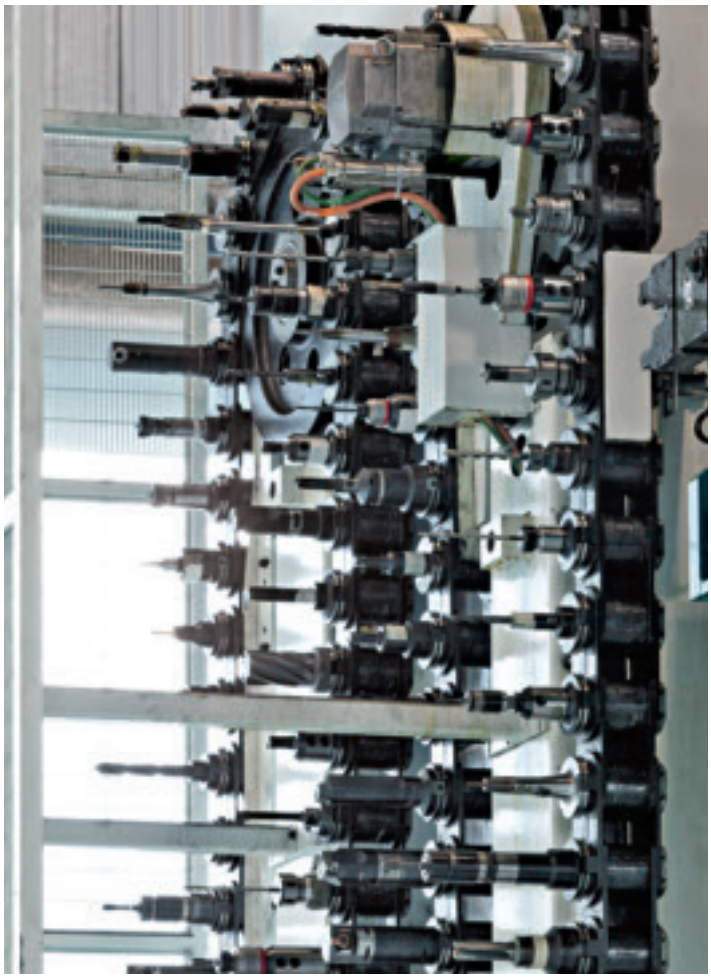
PAMA will design and produce any specialty head requirements leading the industry to specific technological solutions

CUSTOMIZED SOLUTUONS

TOOL MAGAZINES

productivity of Speedram machines is further enhanced by a complete range of tool magazine options

rack type tool magazines, column side mounted, with capacity up to 200 tools



chain type tool magazines, column side mounted, with capacity from 60 to 140 tools

rack type tool magazines, floor mounted and served by robot, with capacity up to 1000 tools

TOOL MAGAZINE*

Tool magazine type		chain
Tool magazine capacity	places	60 / 140
Max. tool diameter	mm	420
Max. tool lenght	mm	600
Max. tool weight	kg	35
Max. tool tilting moment	Nm	60

* larger magazine configurations available upon request

ROTOTRAVERSING TABLES

PAMA produces a wide range of hydrostatic rototraversing tables naturally complementing the Speedram machines. Optimal integration of machines and tables is achieved thanks to the commonality of technology and solutions used

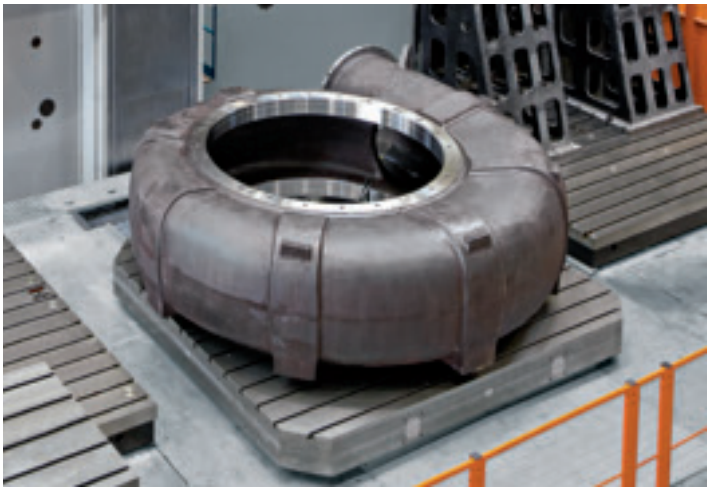
HYDROSTATIC ROTOTRAVERSING TABLES

		TH 50	TH 65	TH 80	TH 100	TH 120
loading capacity	t*	50	65	80	100	120
table surface - min.	mm	2000 x 2000	2500 x 2500	2500 x 2500	3000 x 3000	3000 x 3000
table surface - max.	mm	3000 x 3000	3500 x 3500	4000 x 4000	4500 x 4500	5000 x 5000
V axis longitudinal travel	mm	1500 - 4000	1500 - 4500	1500 - 4500	2000 - 4500	2000 - 4500

		TH 160	TH 250	TH 300	TH 600
loading capacity	t*	160	250	300	600
table surface - min.	mm	4000 x 4000	4500 x 4500	5000 x 5000	5000 x 6000
table surface - max.	mm	6000 x 6000	6000 x 8000	5000 x 10000	5000 x 10000
V axis longitudinal travel	mm	3000 - 5000	5000 - 7000	5000 - 8000	5000 - 8000

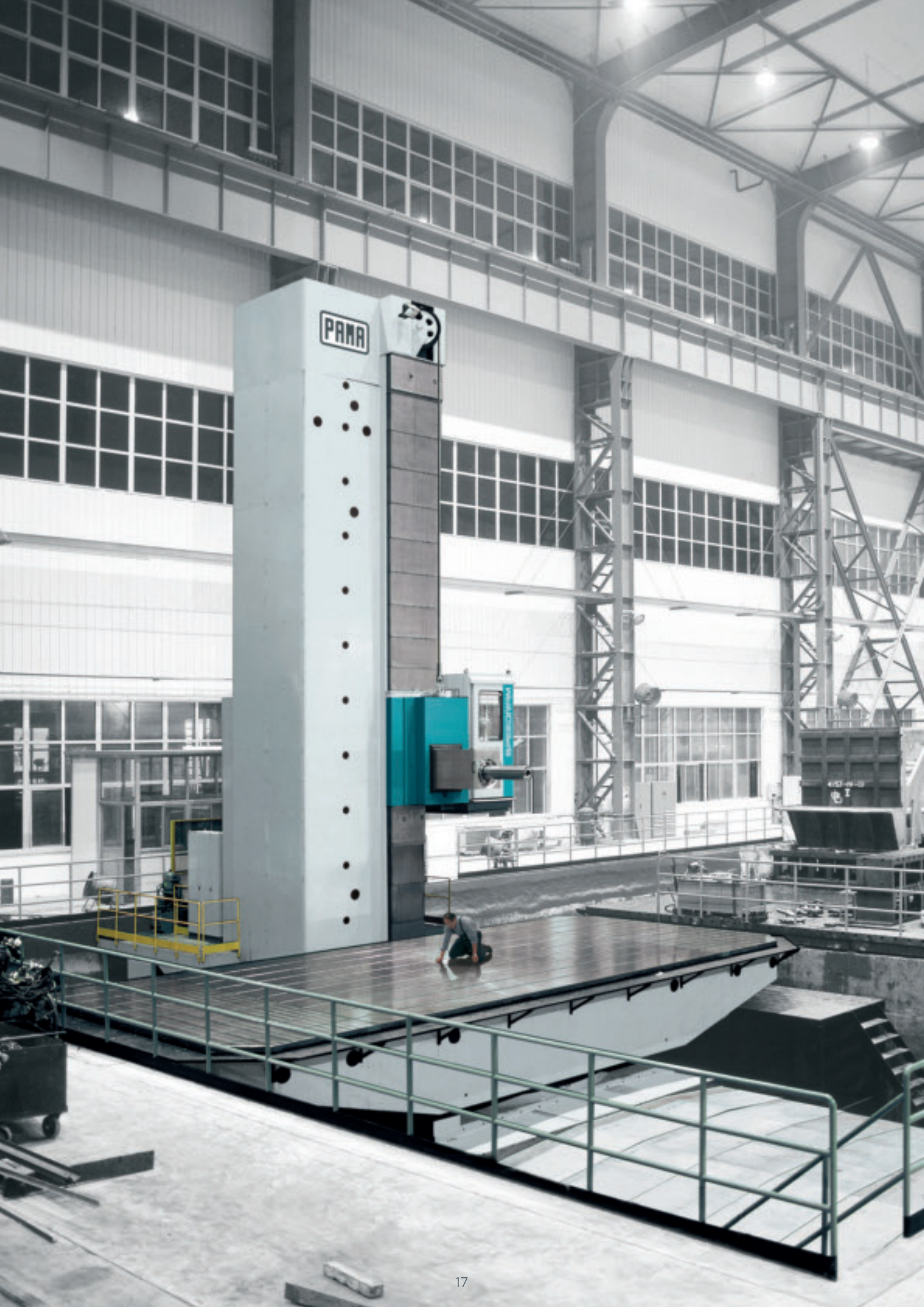
* t in metric ton
tables with other dimensions and loading capacity are available upon request

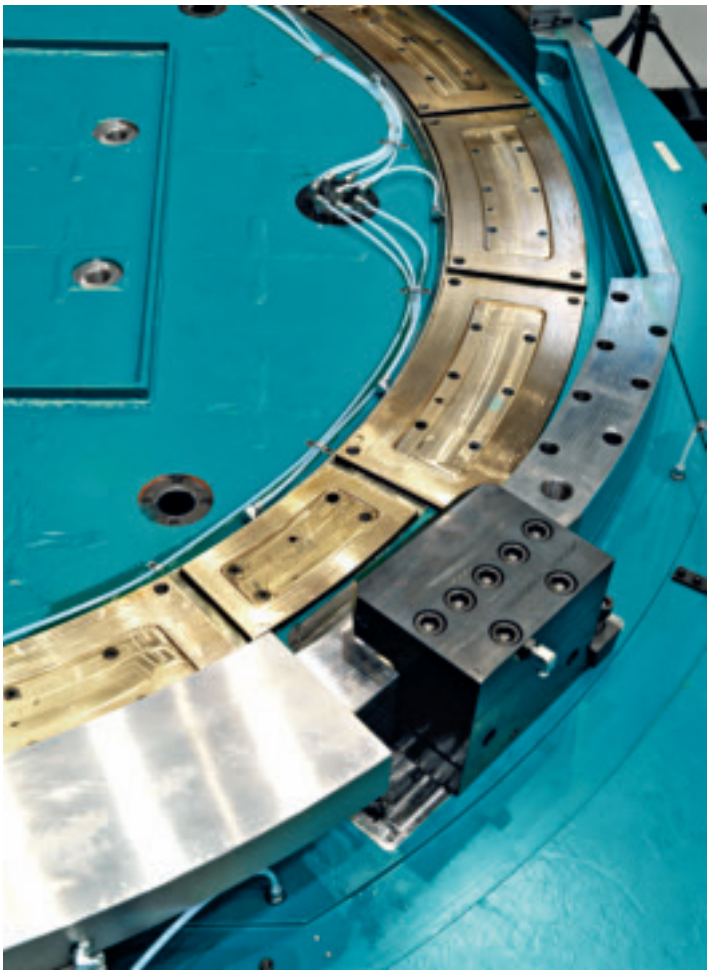
hydrostatic support for both rotary table and linear traversing axis



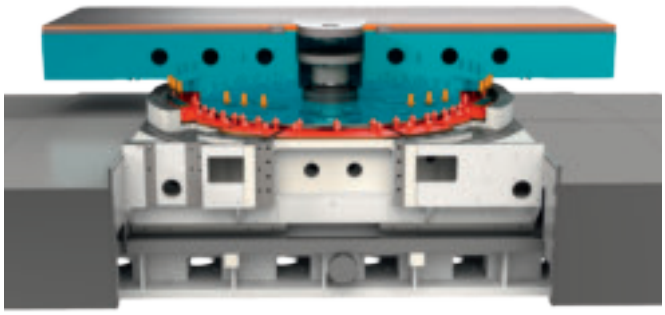
HTC (Hydrostatic Tilting Compensation): automatically detects and compensates the tilting moment from unbalanced table loads (PAMA patented)

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


PAMA



PTB (PAMA Thrust Bearing):
full hydrostatic table axial bearing
preload by hydrostatic counterways
more than 50% encreased tilting stiffness
no table deformation due to preload
no preload changes due to thermal expansion



self adjusting hydraulic
brakes on rotary table (B axis)

ROTOTRAVERSING TABLES

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

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

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

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

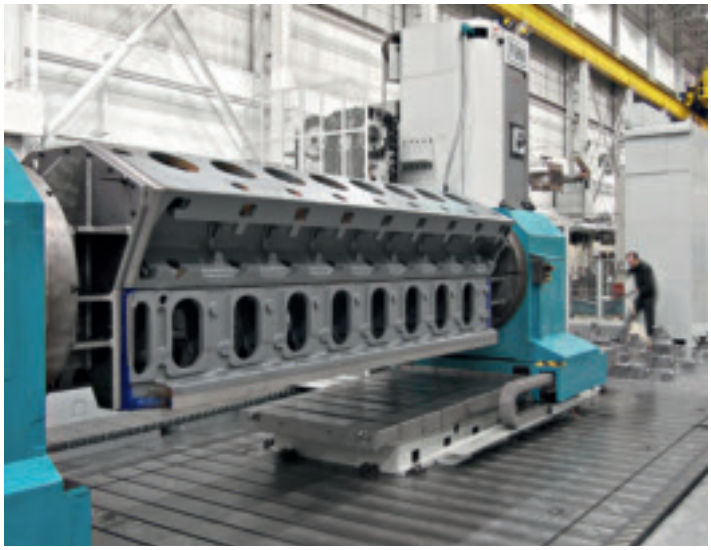
ACCESSORIES

a large number of accessories can be interfaced with Speedram

hydrostatic steady rest

hydrostatic steady rest, divider and tailstock

hydrostatic steady rests, intermediate rests, divider head



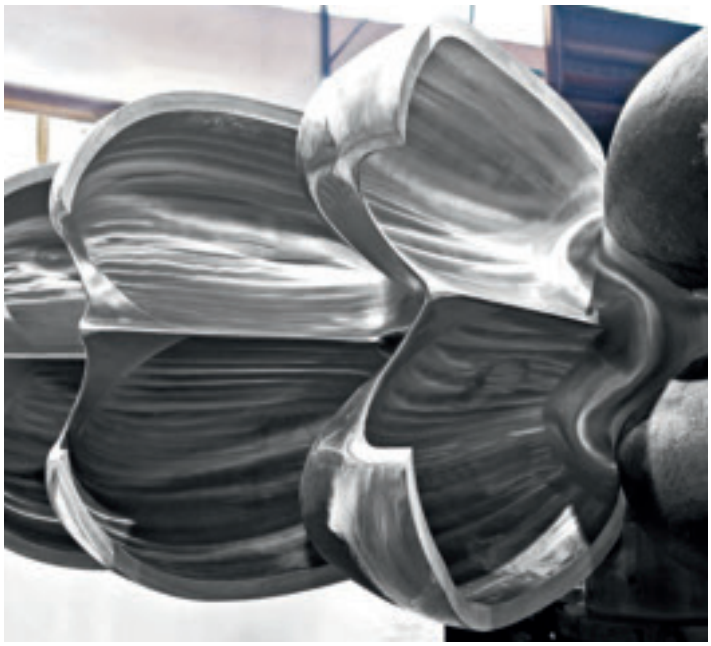
trunnions

APPLICATIONS

POWER GENERATION
steam turbine
rotor

POWER GENERATION
wind power
generation nacelle

POWER GENERATION
steam turbine
case



POWER GENERATION
hydraulic turbine
pelton rotor


PAMA
516

APPLICATIONS

APPLICATIONS

OIL & GAS
valve

LARGE DIESEL
ENGINES
engine block

EARTHMOVING
hydraulic excavator
upper frame

SHIPBUILDING
variable pitch
propeller blade

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

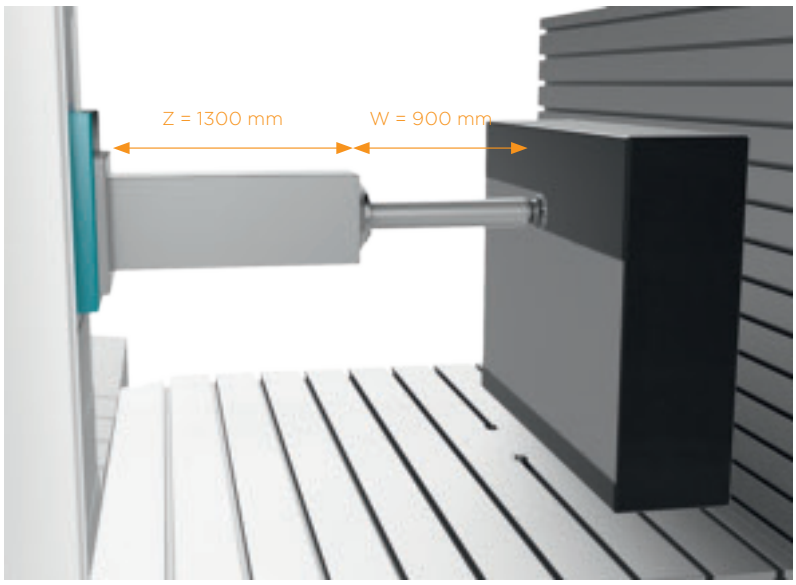
PTB (PAMA Thrust Bearing):
full hydrostatic table axial bearing

APPLICATIONS

The outstanding performances of Speedram are demonstrated by the following examples of real customer's applications, in optimized environment and tooling conditions.

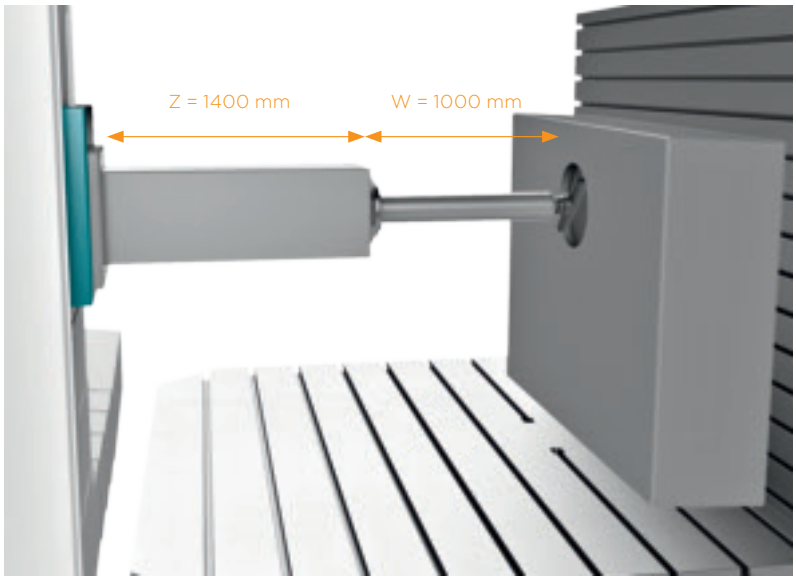
180 mm Hydrostatic Sliding Spindle (HSS) on Speedram 3000: high feed milling

Material: Forged 42CrMo4
Ram extension Z=1300 mm
Boring spindle extension
W=900 mm (5xD)
Chip removal rate > 2300 cm^3/min



180 mm boring spindle on Speedram 3000: heavy cut boring

Material: Nodular cast iron
Ram extension Z=1400 mm
Boring spindle extension
W=1000 mm (5.5xD)
7.5 mm depth of cut, feed 1 mm/rev
Chip removal rate > 930 cm^3/min

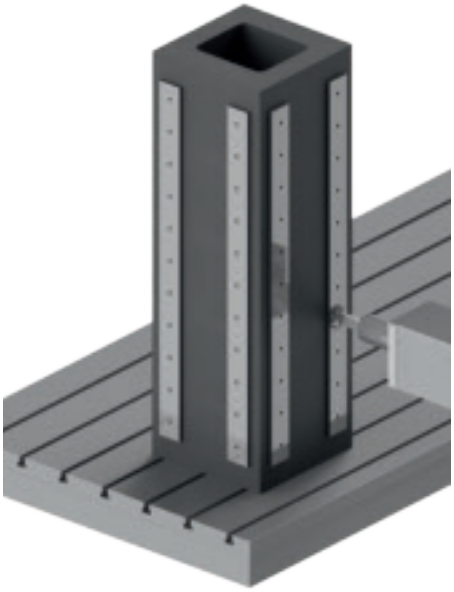


ATC (Automatic Thermal Compensation): real time CNC controlled exclusive compensation of ram and spindle elongation / contraction by direct measurement (PAMA patents)

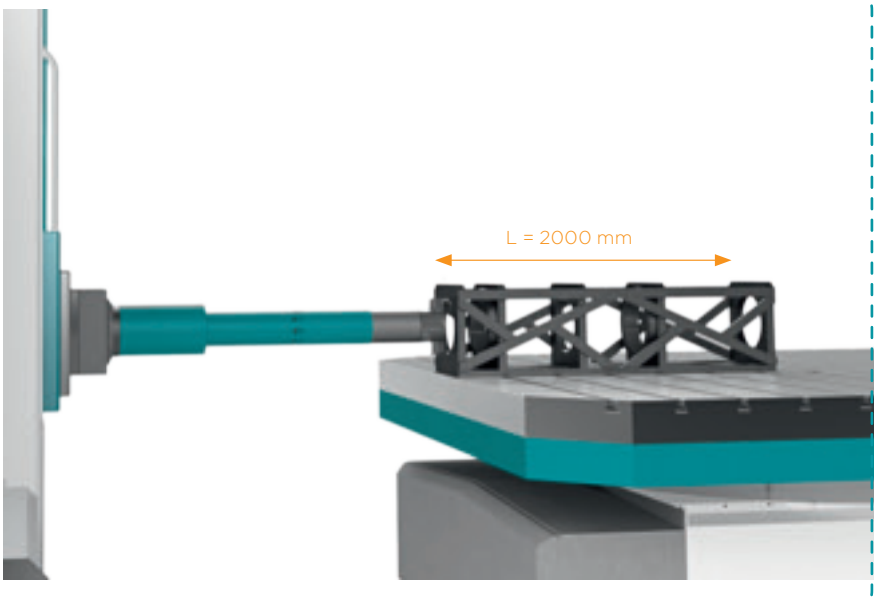
HSS (Hydrostatic Sliding Spindle): boring spindle sliding on hydrostatic bearings

Speedram 1000 with
TS35 milling head:
precision surface finishing

flat, perpendicular and
parallel on three planes
- 0.010/2000



Speedram 3000 with FO boring
head: deep finish boring,
340 mm H6 bore diameter
concentric to 0.008 / 2000
deep 0.008 roundness

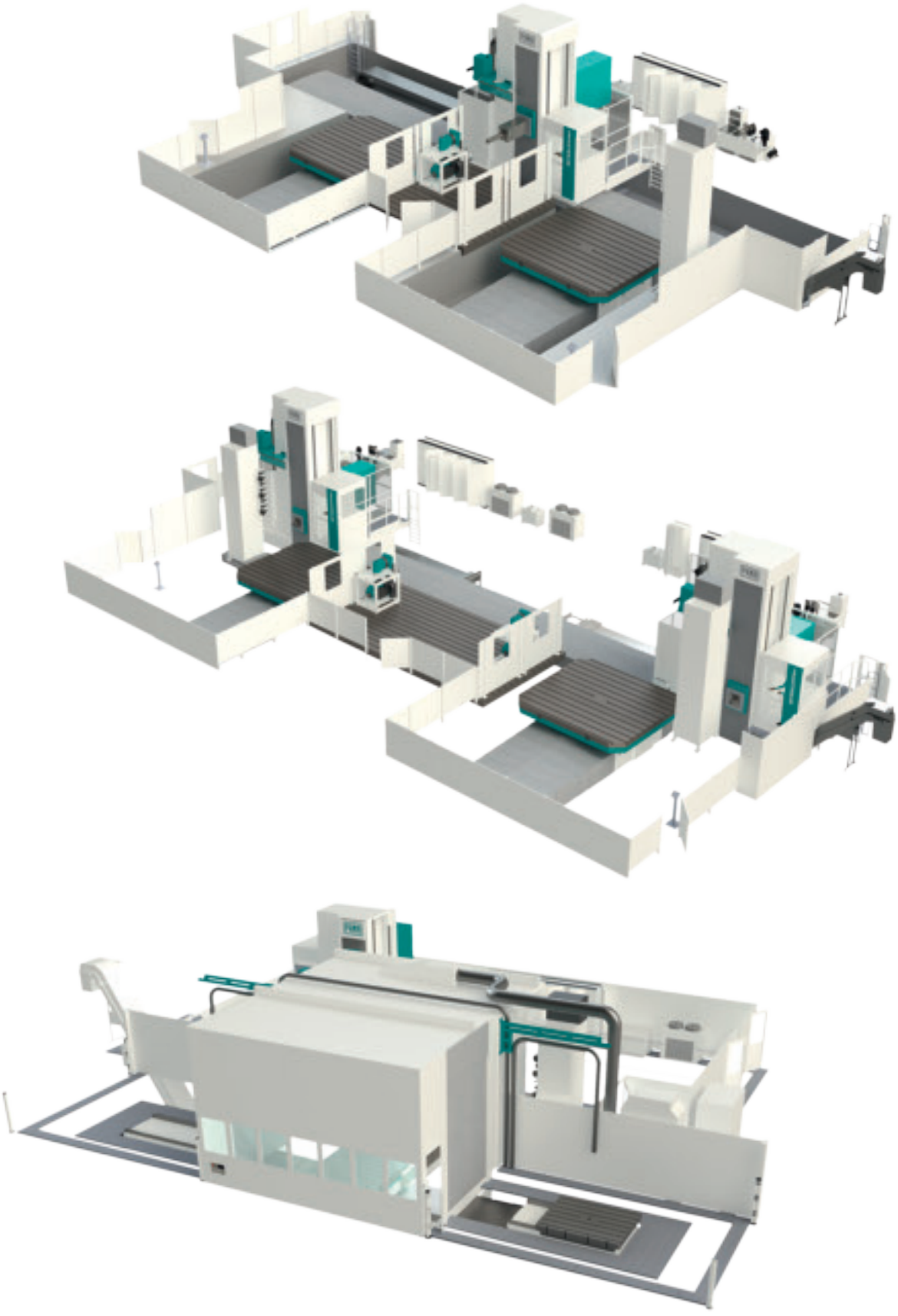


ERGONOMICS AND SAFETY

full enclosure systems are available for Speedram machines in order to guarantee a safe and clean working environment

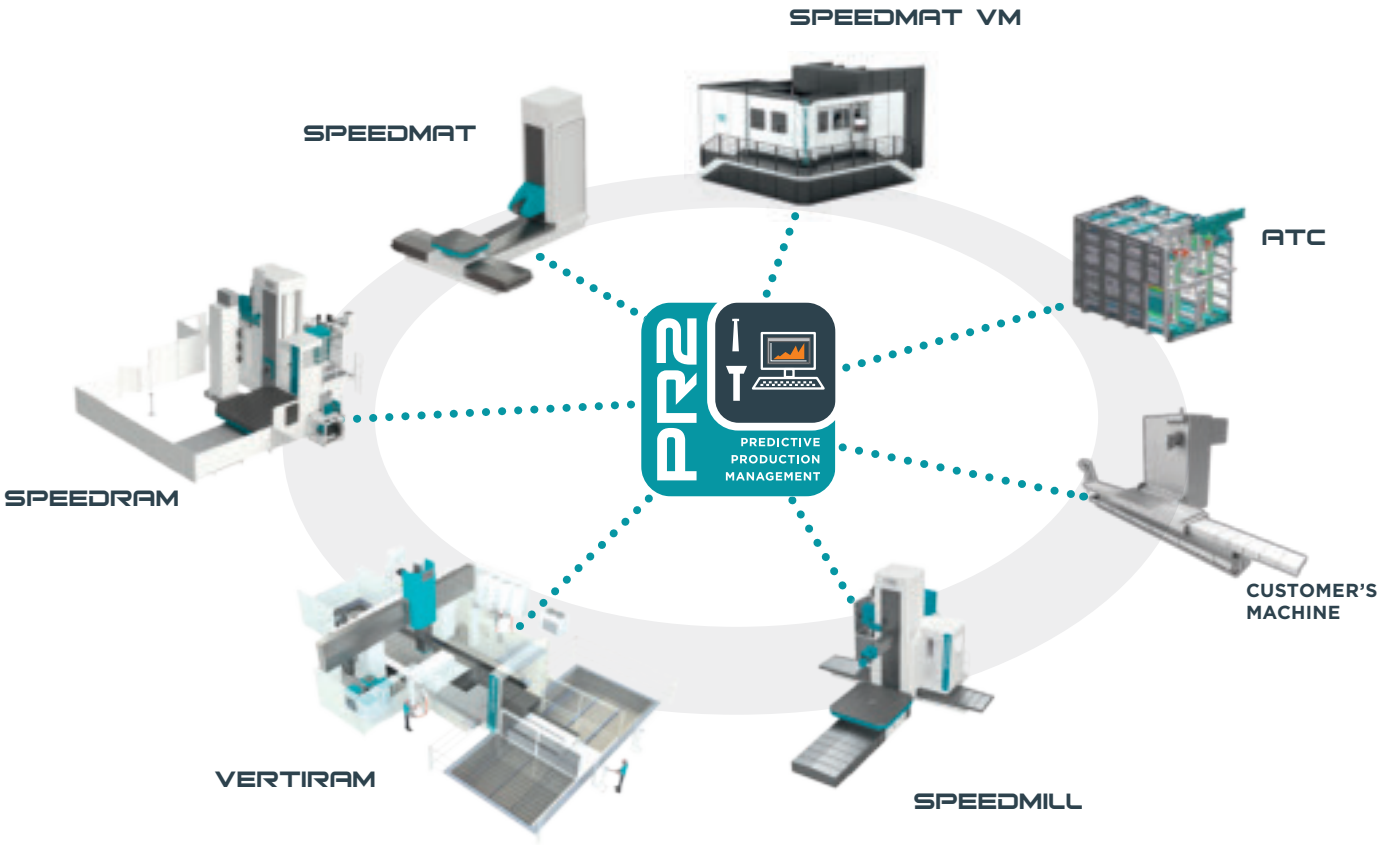
Speedram can be equipped with a large variety of configurations. Multiple table double columns, automatic pallet changing systems or FMS shuttles.

AUTOMATION



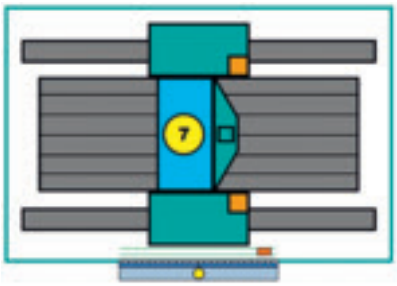
PR2 SUITE

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)



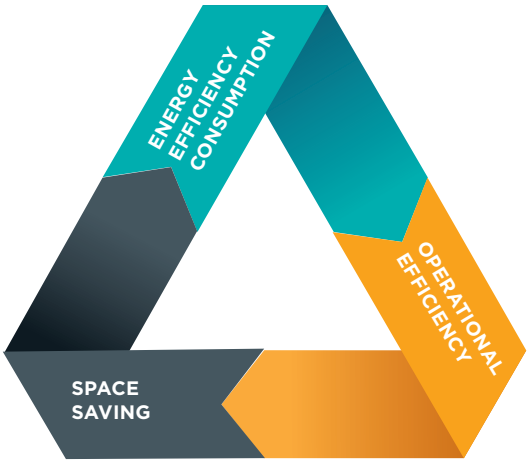
efficient managing of single production unit

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


PAMA

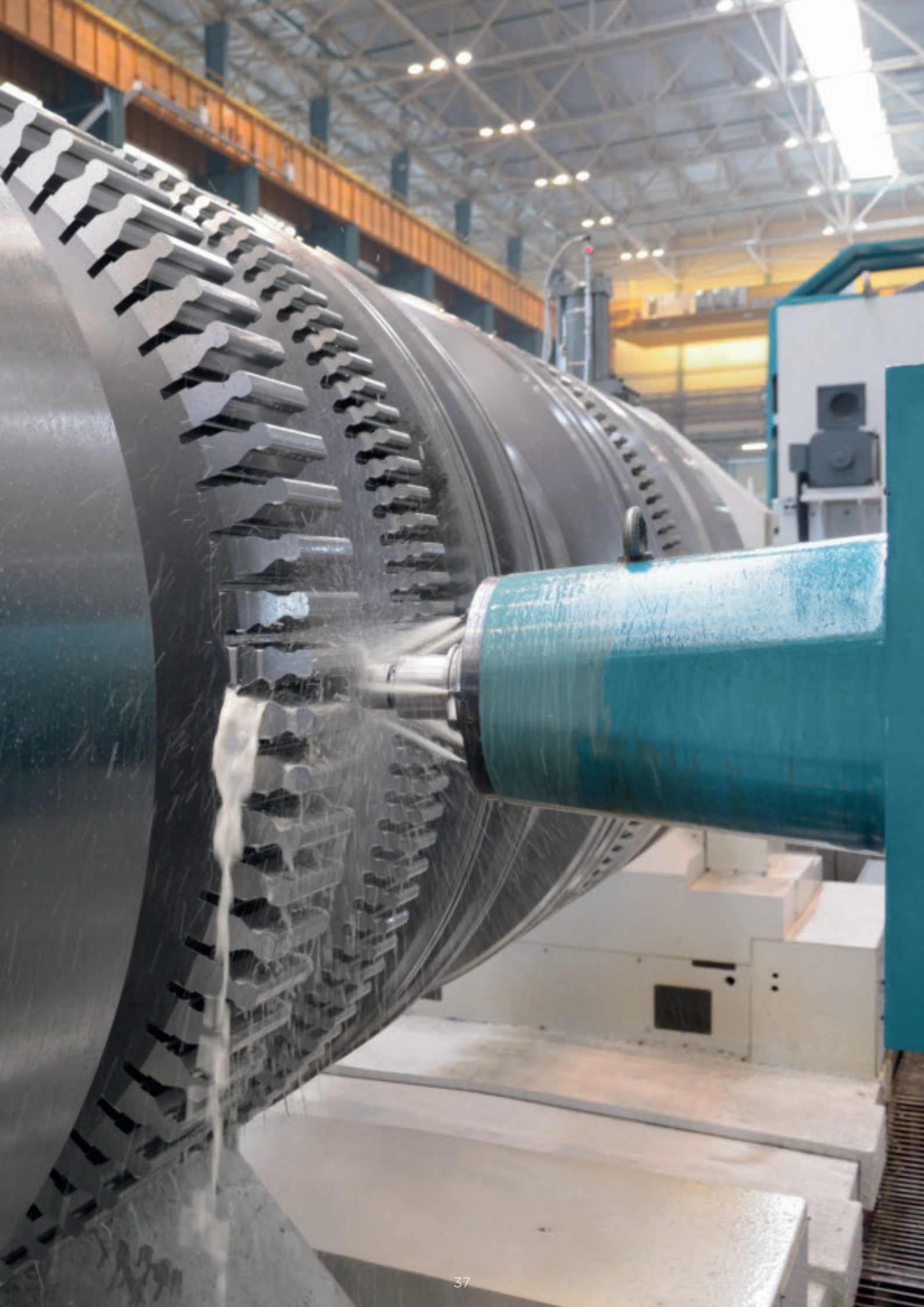
easy maintenance, combined with predictive maintenance, is a must for an efficient workshop management

ERGONOMICS MAINTENANCE

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

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



SPEEDRAM

		1000	2000
WORKING AREA			
X axis (column)	mm	5000	5000
	mm	+N x 1000	+N x 1000
Y axis (headstock)	mm	2000 - 5000	3000 - 7000
Z axis (ram)	mm	1200	1600
W axis (boring spindle)	mm	800	1200
Z+W axes	mm	2000	2800
HEADSTOCK			
Ram section	mm	430x430	430x430
Boring spindle diameter	mm	130 150 / 160	150 / 160
Max spindle power (S1)	kW	(41) / 61 (61) / 82	(61) / 82
Max spindle torque (S1)	Nm	(1389) / 2066 (2571) / 3451	(2571) / 3451
Max spindle speed	rpm	4000 (3500) / 3000	(3500) / 3000
Spindle gear ranges		2	2
AXES FEED RATES			
X-Y-Z-W axes rapid traverse / feed rate	m/min	up to 30	up to 30

3000	4000	5000
5000	5000	5000
+N x 1000	+N x 1000	+N x 1000
3000 - 7000	4000 - 10000	4000 - 10000
1600	2000	2000
1200	1600	1600
2800	3600	3600
500x500	500x500	600x600
150 / 160 180 200 225	180 200 225	200 225 260 280 300
(82) / 111	(82) / 111	(111) / 138
(5751) / 7796 (6730) / 9123 (7219) / 9787 (8198) / 11114	(6730) / 9123 (7219) / 9787 (8198) / 11114	(10304) / 12803 (11565) / 14371 (13668) / 16983 (14900) / 18551 (14900) / 18551
3500 2800 2400 2200	2800 2400 2200	2400 2200 1600 1500 1500
3	3	3
up to 25	up to 20	up to 20

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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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