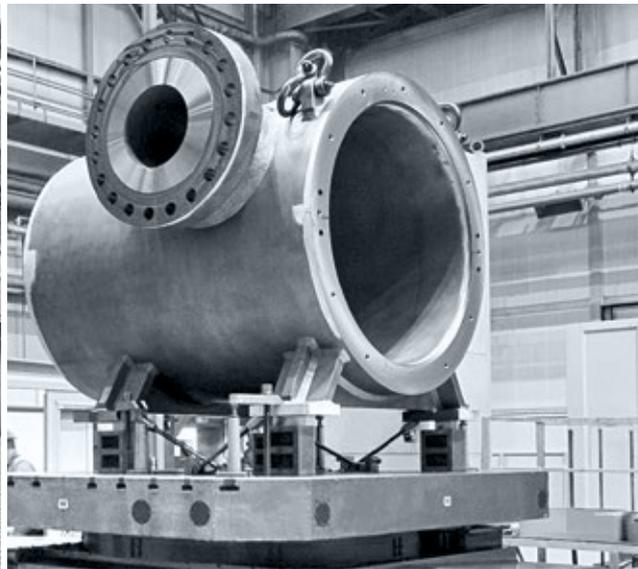




**FLOOR TYPE  
BORING AND MILLING MACHINES**

**SPEEDORAM**

**TARGET  
AND APPLICATION**



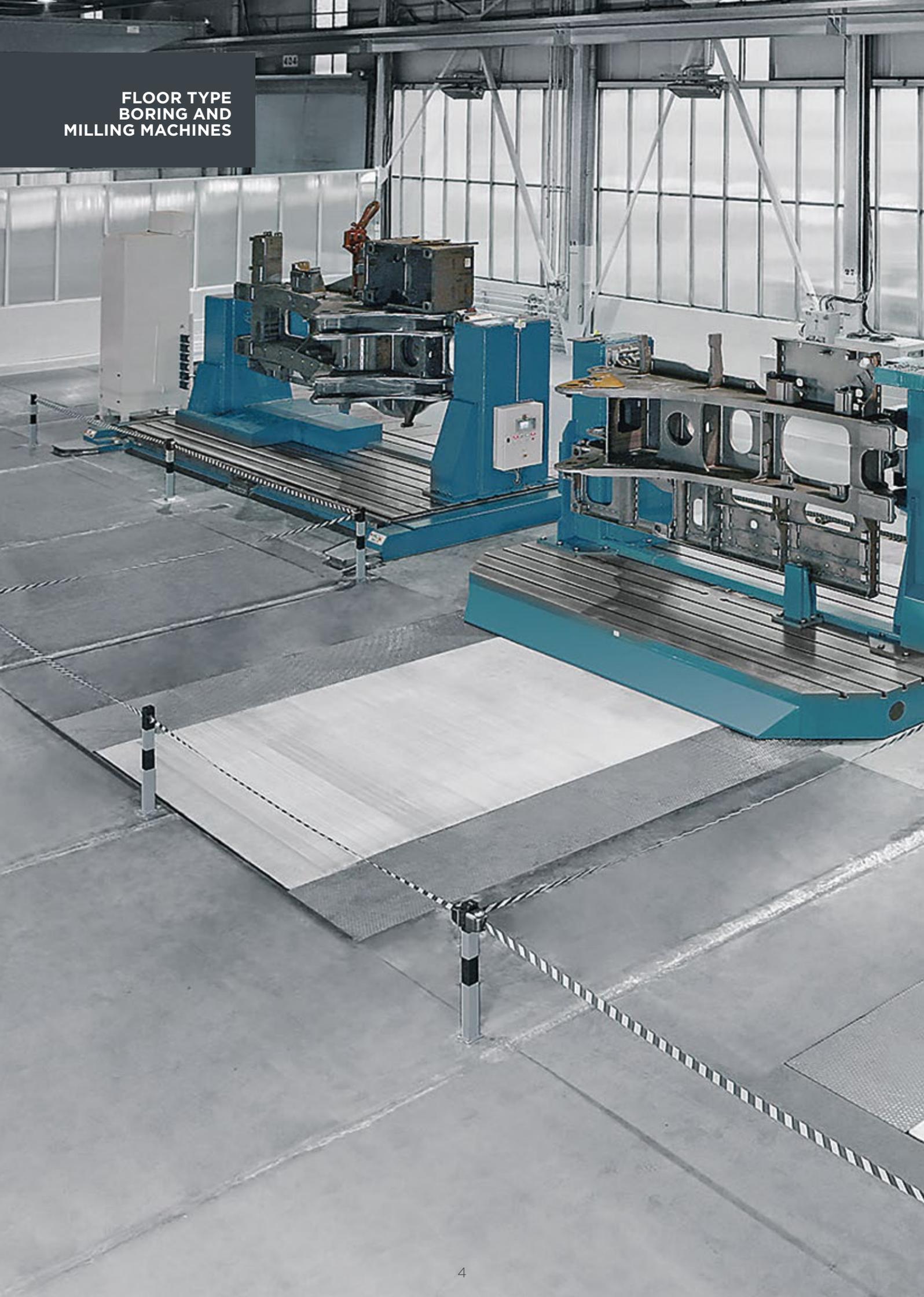
ENERGY  
OIL & GAS  
SHIPBUILDING  
EARTH MOVING  
GENERAL MACHINING



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 260 mm and vertical stroke from 2000 mm to 8000 mm.

**FLOOR TYPE  
BORING AND  
MILLING MACHINES**

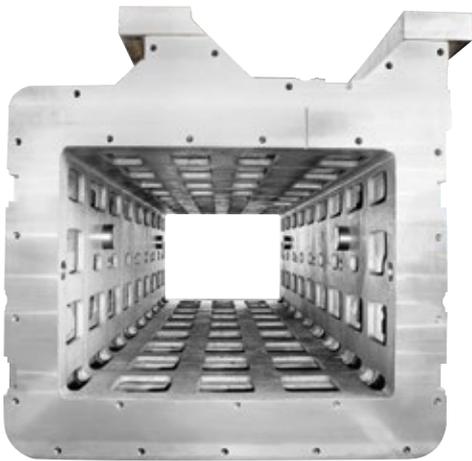
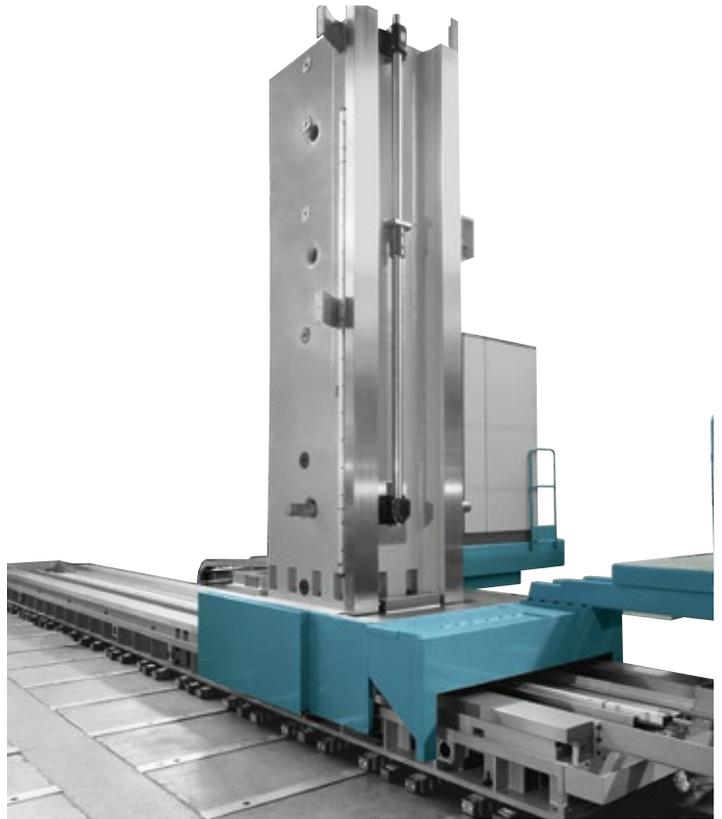




**MACHINE FEATURES**



all linear axes with full hydrostatic guideways



double wall column construction

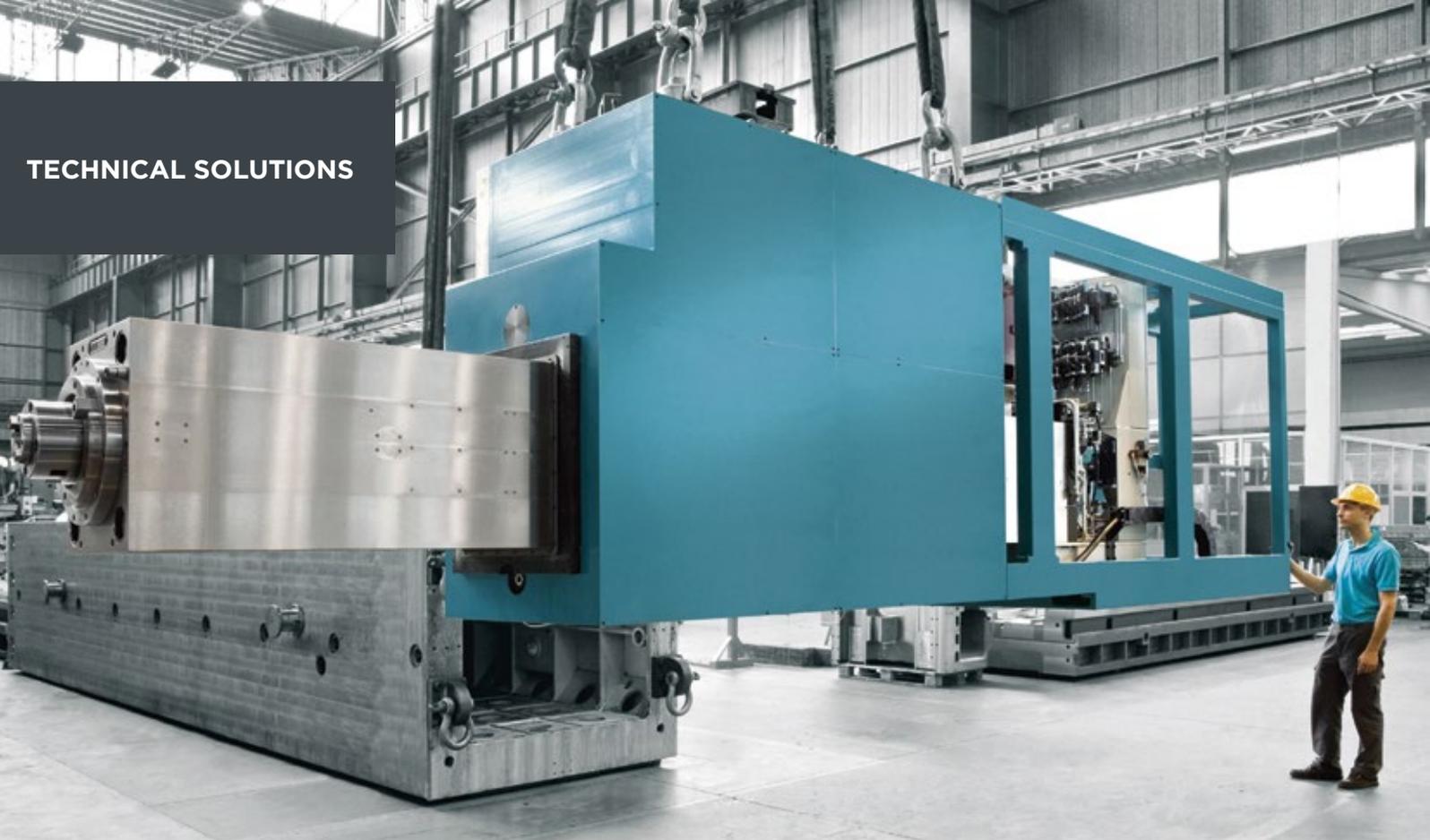


monolithic cast iron headstock with hydrostatic support on all sides



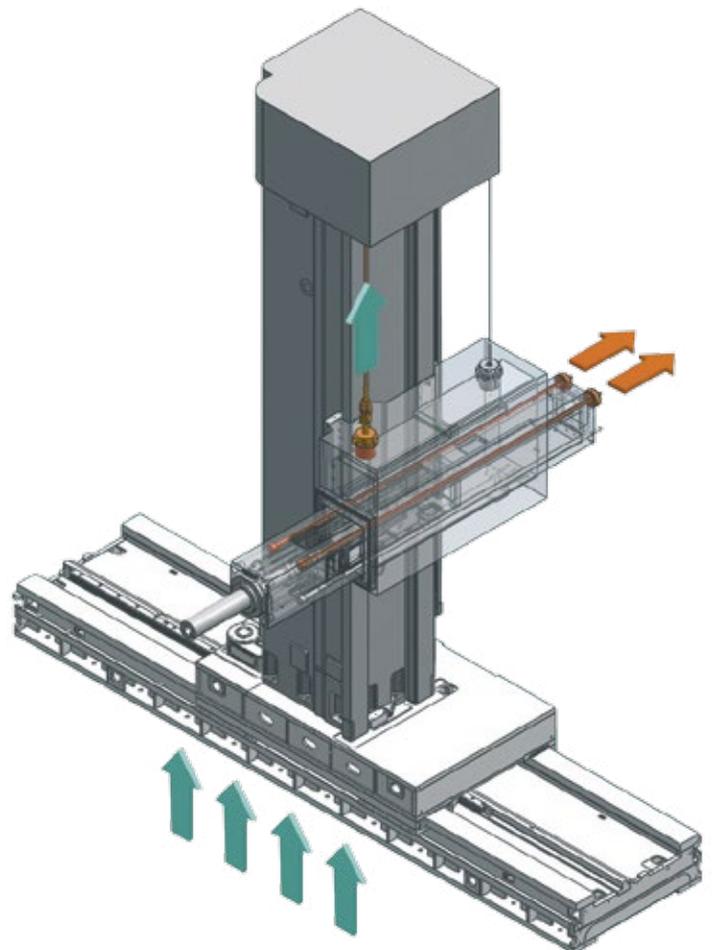
individually hand scraped hydrostatic bronze pads guarantee maximum accuracy of the oil film thickness and performance

## TECHNICAL SOLUTIONS



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

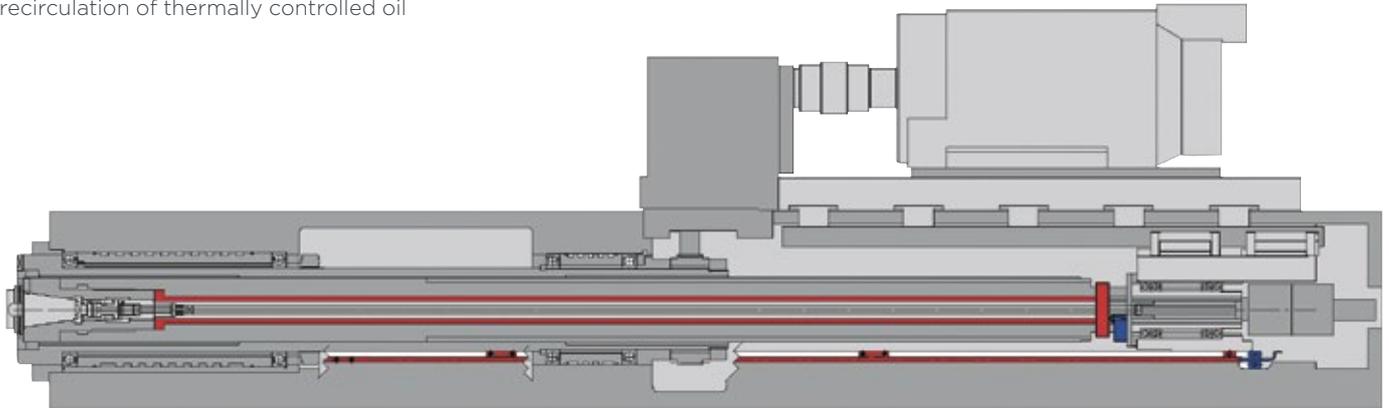
real time CNC controlled geometric compensation of ram droop and sag and headstock tilt



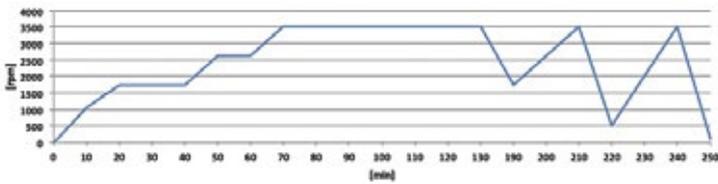
HMC (Hydraulic Machine Compensation): Real time CNC controlled compensation of ram deflection, headstock tilting, column deflection and base rotation

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

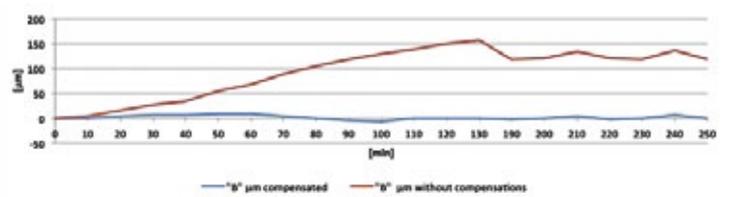
ram and spindle gearbox are maintained at constant temperature via internal recirculation of thermally controlled oil



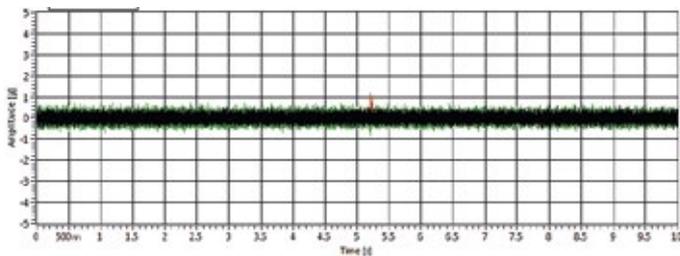
**spindle speed**



**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



SPEEDORAM

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 SOLUTIONS**

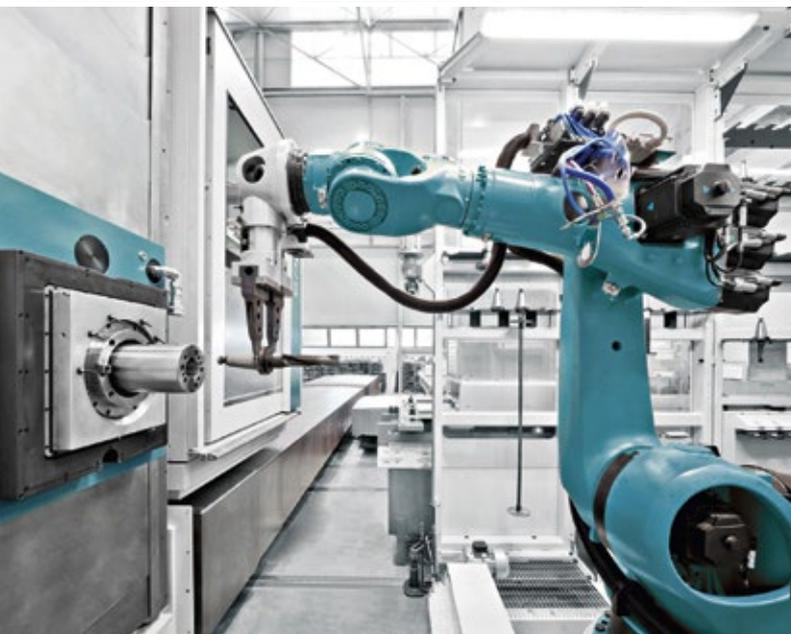




productivity of Speedram machines is further enhanced by a complete range of tool magazine options

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

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



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

## TOOL MAGAZINES



## 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	6000 x 6000
table surface - max.	mm	6000 x 6000	6000 x 8000	6000 x 12000	8000 x 12000
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



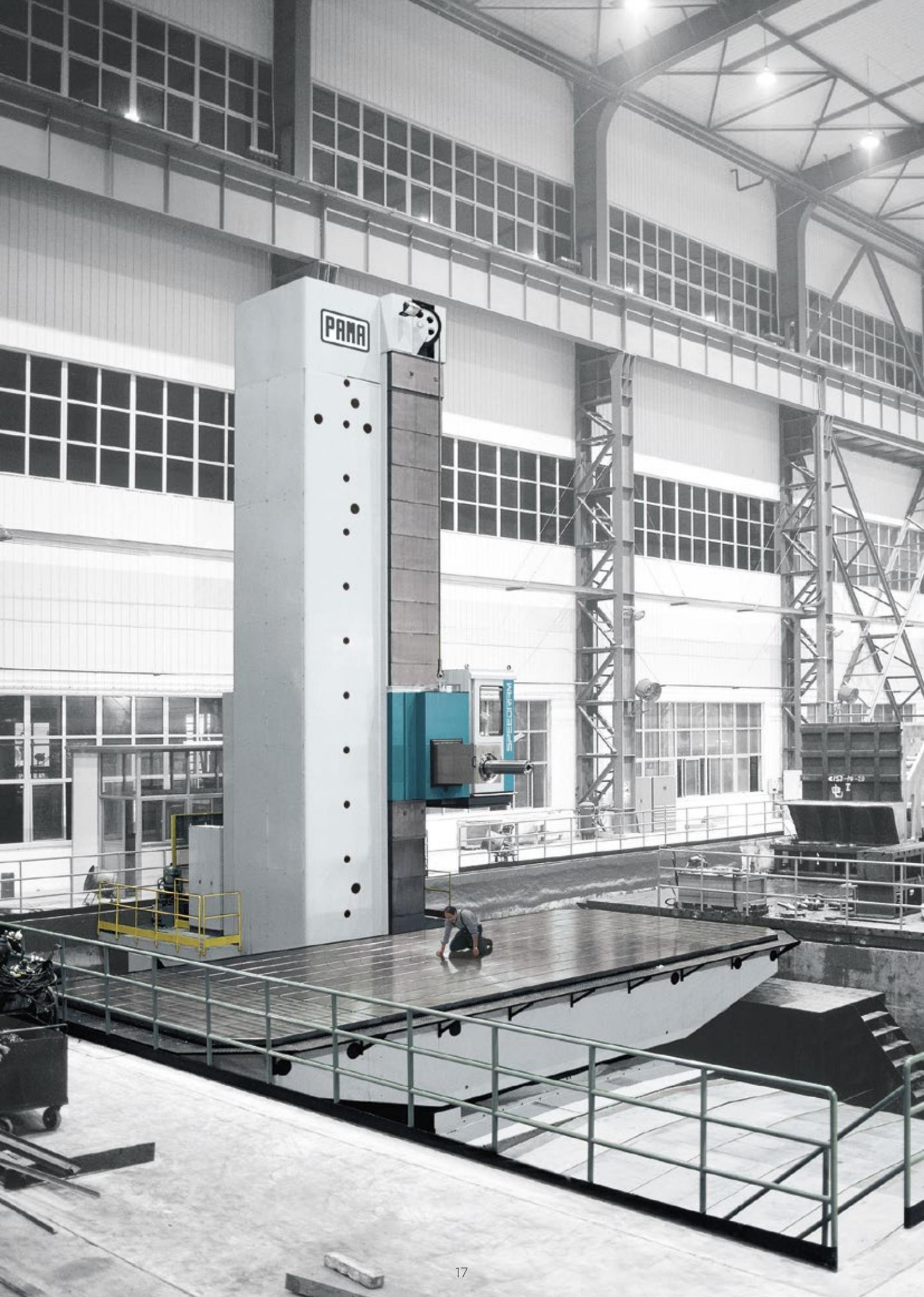
HTC (Hydrostatic Tilting Compensation): automatically detects and compensates the tilting moment from unbalanced table loads (PAMA patented)

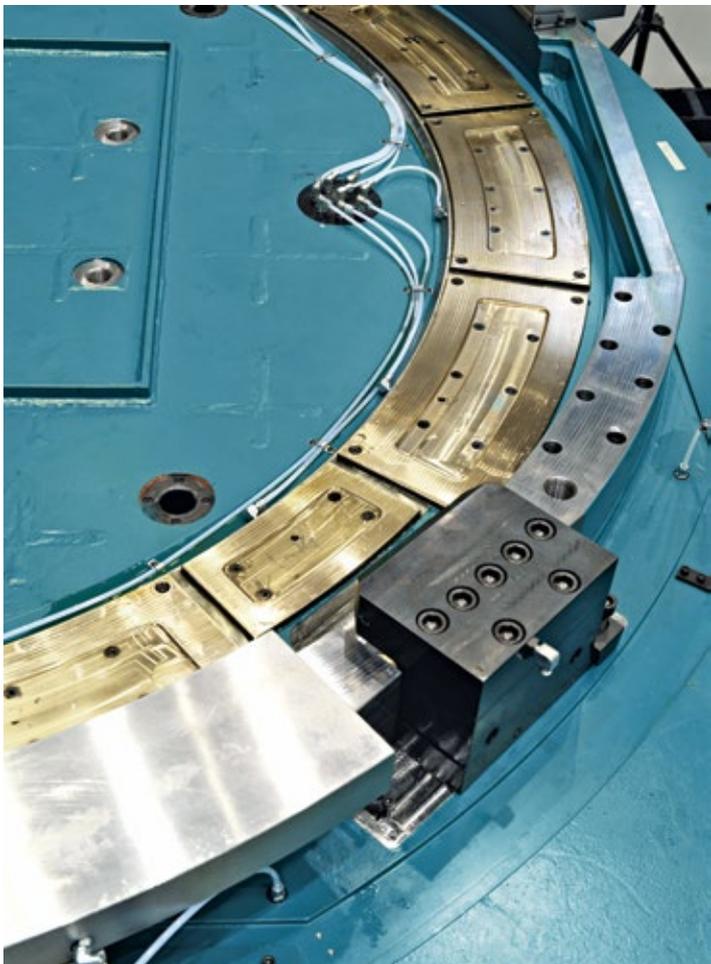


PTB (PAMA Thrust Bearing): full hydrostatic table axial bearing



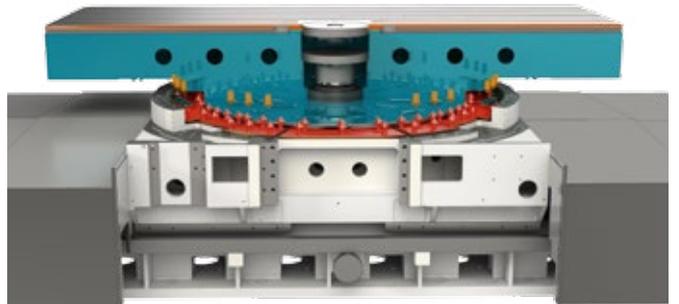
DOT (Dynamic Optimized Tuning): optimized automatic adjustment of table control parameters according to work piece inertia





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  
 preload by hydrostatic counterways  
 more than 50% increased 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)



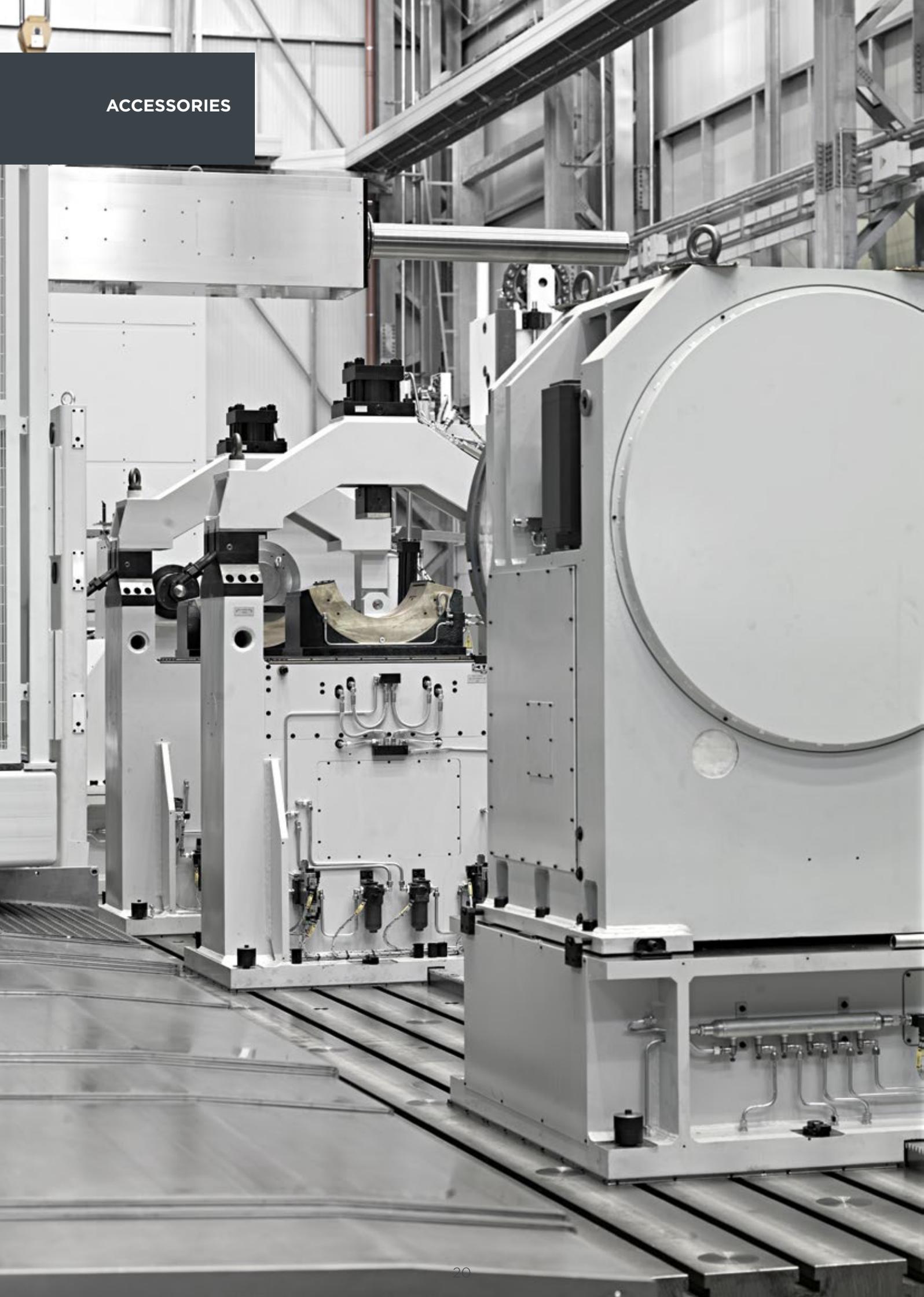
PTB (PAMA Thrust Bearing): full hydrostatic table axial bearing



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



ACCESSORIES



a large number of accessories can be interfaced with Speedram

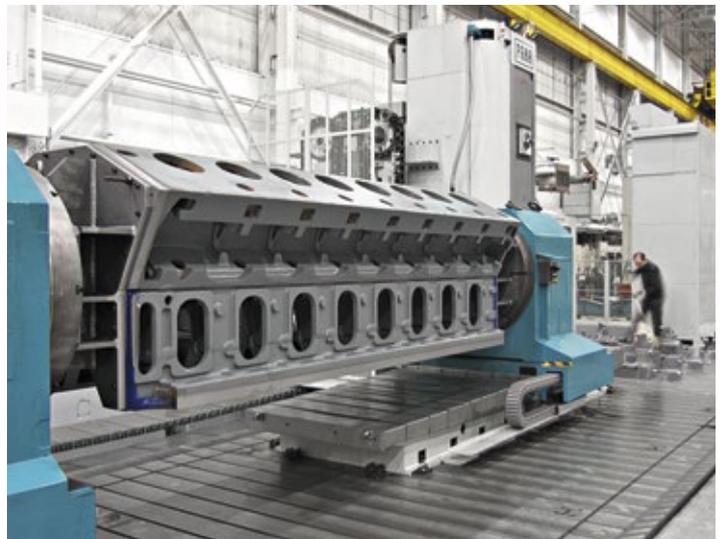


hydrostatic steady rest

hydrostatic steady rest, divider and tailstock



hydrostatic steady rests,  
intermediate rests,  
divider head

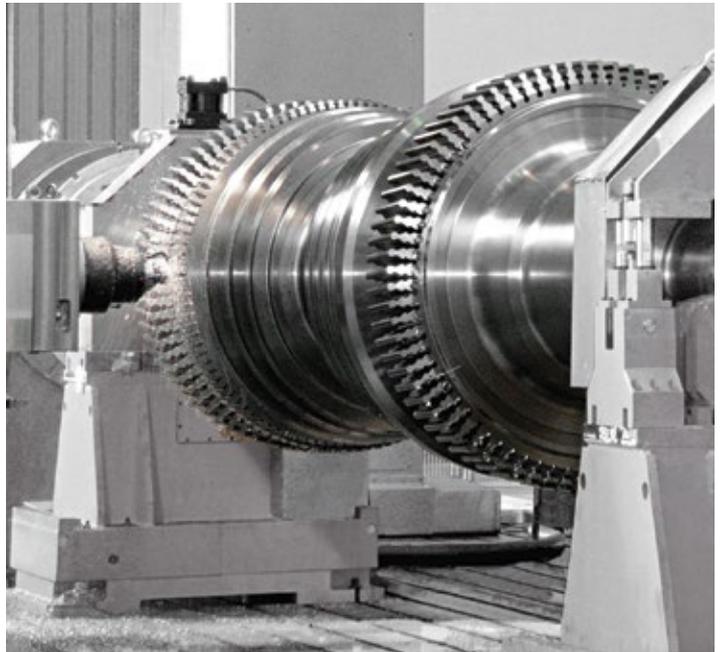


trunnions

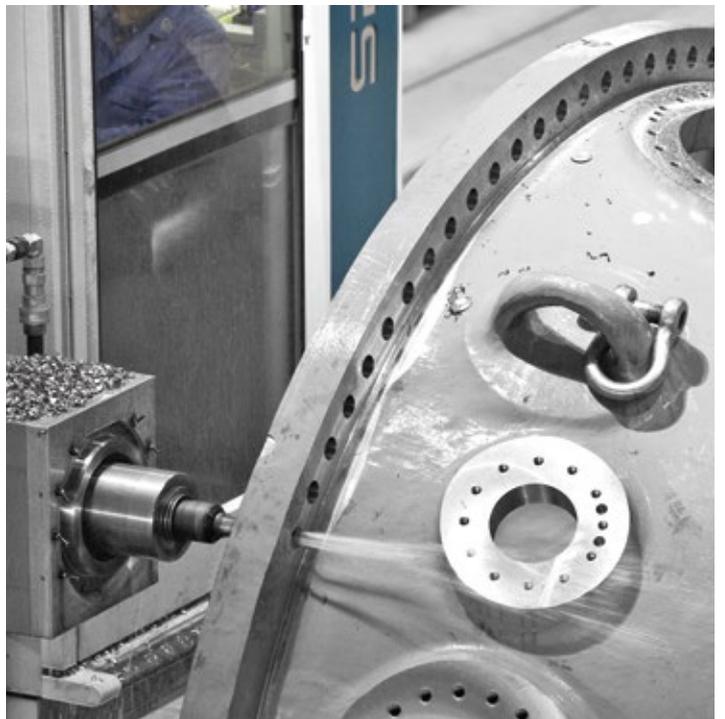
APPLICATIONS



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



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



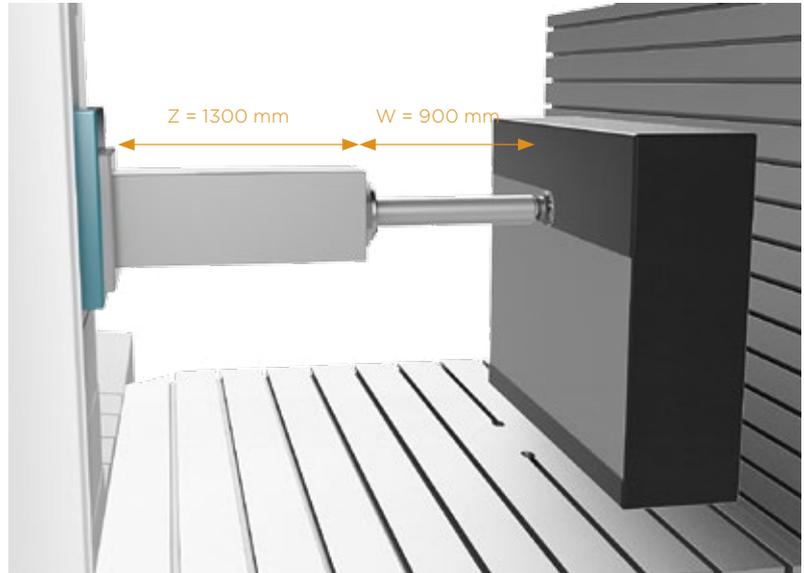
DOT (Dynamic Optimized Tuning): optimized automatic adjustment of table control parameters according to work piece inertia

## APPLICATIONS

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

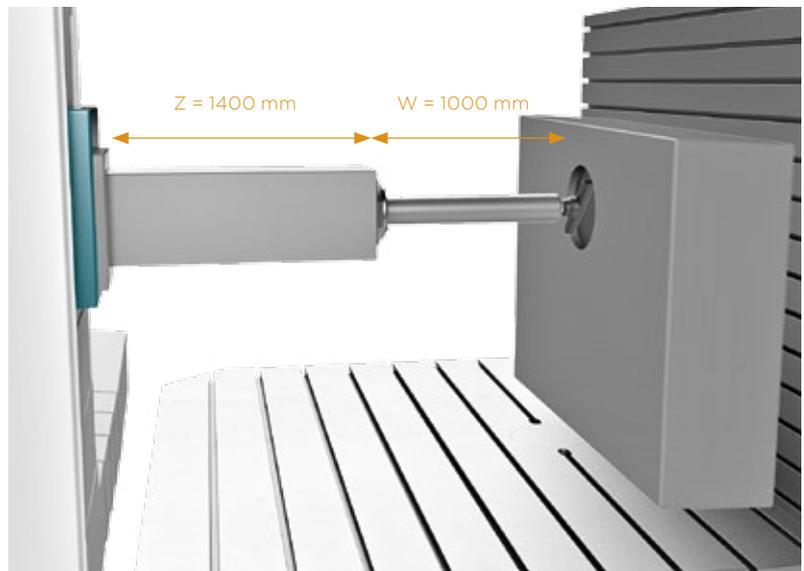
180 mm Hydrostatic Sliding Spindle (HSS) on Speedram 3000: high feed milling

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



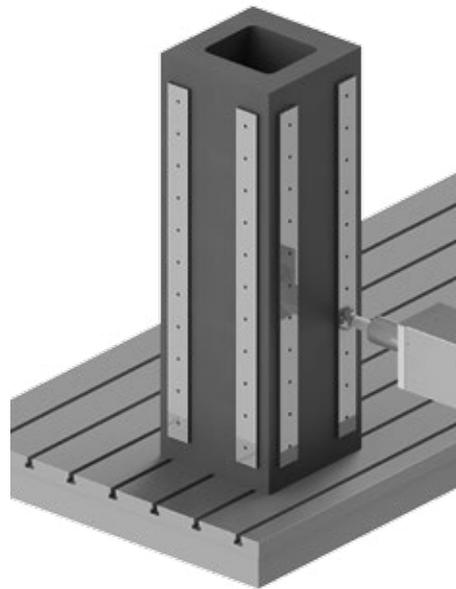
ATC (Automatic Thermal Compensation): real time CNC controlled exclusive compensation of ram and spindle elongation / contraction by direct measurement (PAMA patents)



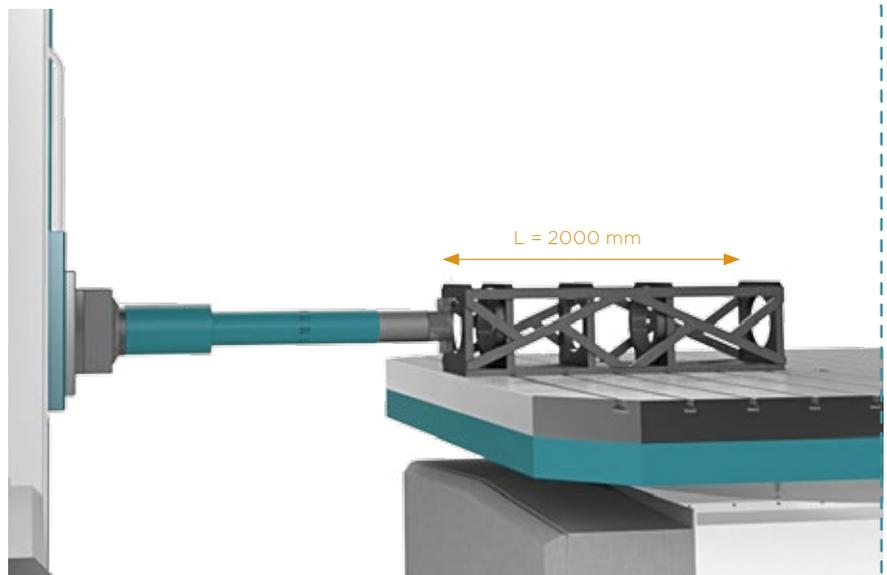
HSS (Hydrostatic Sliding Spindle): boring spindle sliding on hydrostatic bearings

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

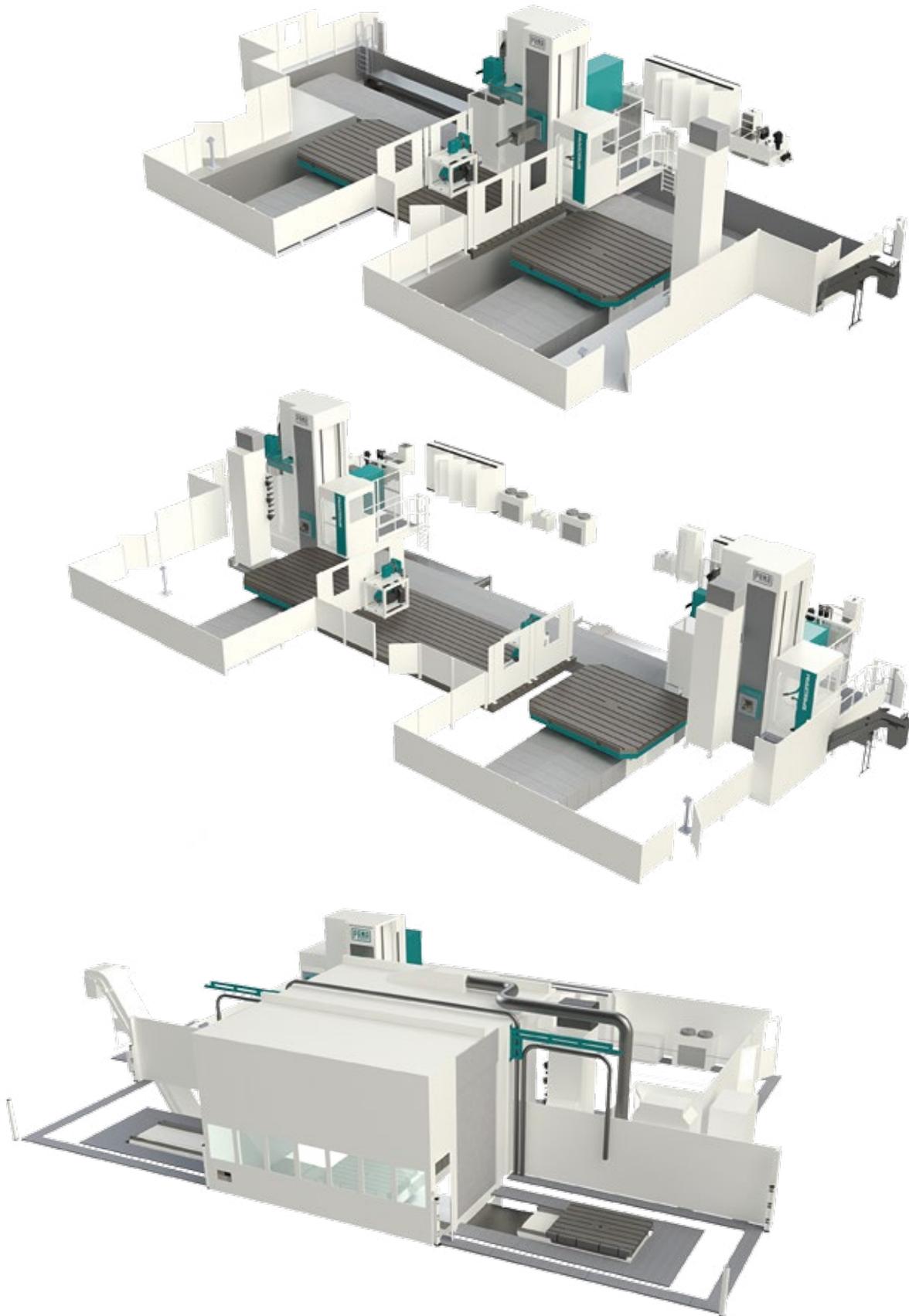


full enclosure systems are available for Speedram machines in order to guarantee a safe and clean working environment



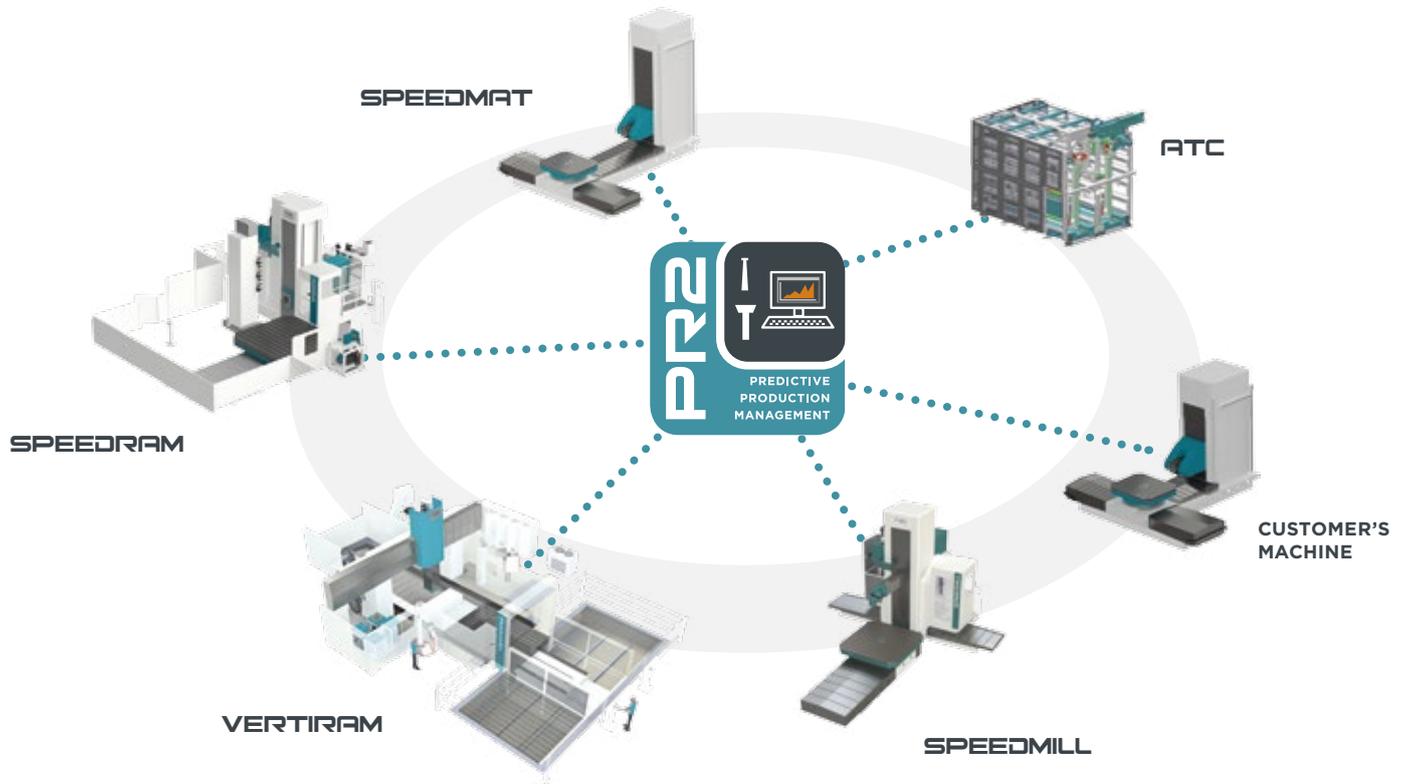
Speedram can be equipped with a large variety of configurations. Multiple table double columns, automatic pallet changing systems or FMS shuttles.

## AUTOMATION

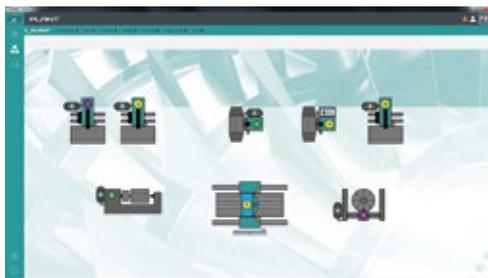


## PR2 SUITE

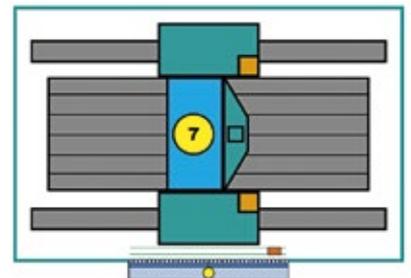
multi-level, applications, integrated software developed by PAMA, designed to bring our clients to a higher level of efficiency and profit, thanks to our intuitive user interface, management of the production units in real time with predictive approach in both manned or unmanned conditions.



complete reporting of production unit activities



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



efficient managing of single production unit



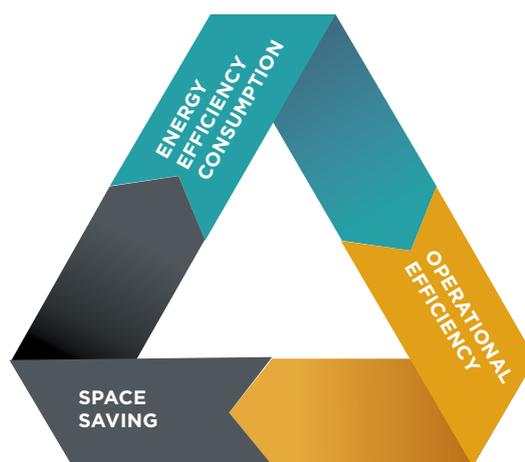
PR2 (Predictive Production Management): optimize the efficiency and the saturation of the production system

## 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



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

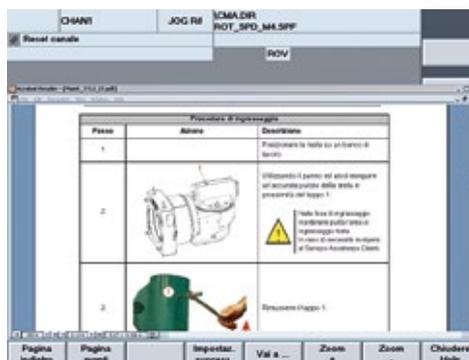
## ERGONOMICS MAINTENANCE



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



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





# SPEEDRAM

1000

2000

## WORKING AREA

X axis (column)	mm	4000	4000
	mm	+N x 1000	+N x 1000
Y axis (headstock)	mm	2000 / 4000	2500 / 5000
Z axis (ram)	mm	1000	1500
W axis (boring spindle)	mm	700	1000
Z+W axes	mm	1700	2500

## HEADSTOCK

Ram section	mm	360x400	400x440
Boring spindle diameter	mm	130 / 150 / 160	150 / 160 / 180
Max spindle speed	rpm	4000 / 3500 / 3500	3500 / 3500 / 2500
Spindle gear ranges		2	3
Max spindle power	kW	37 / 52	74 / 93
Max spindle torque	Nm	1526 / 2396	5196 / 9252
Spindle taper		ISO 50	ISO 50

## AXES FEED RATES

X-Y-Z-W axes rapid traverse/ feed rate	m/min	up to 30	up to 25
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## TOOL MAGAZINE\*

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

\* larger magazine configurations available upon request

8000

4000

5000

6000	6000	6000
+N x 1000	+N x 1000	+N x 1000
3000 / 6000	4000 / 7000	5000 / 8000
1500	1700	1900
1200	1400	1600
2700	3100	3500
440x480	520x560	560x600
160 / 180 / 200	200 / 225 / 260	225 / 260
3500 / 2500 / 2200	2200 / 2000 / 1600	2000 / 1600
3	3	3
70 / 93	119	145
5757 / 10385	12881 / 17087	20351 / 25685
ISO 50 / ISO 60	ISO 50 / ISO 60	ISO 60
up to 25	up to 18	up to 15
chain	chain	chain
60 / 140	60 / 140	60 / 140
420	420	420
600	600	600
35	35	35
60	60	60

**PAMA SPA**

Viale del Lavoro, 10  
I-38068 Rovereto (TN)  
ITALY  
Sales:  
Tel. (+39) 0464 455511  
Fax (+39) 0464 438609  
info@pama.it  
www.pama.it  
Service:  
service@pama.it  
Tel. (+39) 0464 455603  
Fax (+39) 0464 438609

**PAMA INC.**

890 Tollgate Rd.  
Elgin, IL 60123-9300  
USA  
Sales:  
Tel. (+1) 847 6086400  
Fax (+1) 847 6954676  
info@pama.us  
www.pama.us  
Service:  
service@pama.us  
Tel. (+1) 847 6086400  
Fax. (+1) 847 6954676

**PAMA GMBH****WERKZEUGMASCHINEN**

Kurt-Schumacher-Str. 41B  
D-55124 Mainz  
GERMANY  
Sales:  
Tel. (+49) 6131 6007261  
Fax (+49) 6131 6007268  
vertrieb@pama.de  
www.pama.de  
Service:  
service@pama.de  
Tel. (+49) 6131 6007260  
Fax (+49) 6131 6007269

**PAMA FRANCE**

Les Forques  
F - 46320 Livernon  
FRANCE  
Tel. +33 (0) 9.67.60.04.72  
pama.france@orange.fr

**OOO PAMA SERVICE**

Viborgskaya Naberezhnaya  
Dom 61, Liter A, Office 326  
197342 Saint Petersburg  
RUSSIA  
Sales/Service:  
Tel. (+7) 812 3092444  
Fax (+7) 812 3092126  
info@pamaservice.ru

**PAMA DO BRASIL LTDA**

Rua Antonio Carlos de Barros Bruni 119  
Jardim Nova Manchester  
CEP 18052-017 Sorocaba SP  
BRAZIL  
Service:  
Tel. (+55) 15 3388 7352  
assistencia@pamabrasil.com.br

**PAMA INDIA (P) LTD.**

D-156 Okhla Industrial Area  
Phase I  
New Delhi 110020  
INDIA  
Sales/Service:  
Tel. (+91) 11 40604801  
Fax (+91) 11 40604808  
pama.india@pamaindia.com

**PAMA (SHANGHAI)****MACHINE TOOL CO., LTD.**

No. 358 Feizhou Road  
Lingang Industrial Zone  
201306 Shanghai  
P.R.CHINA  
Tel: (+86) 21 604 504 88  
Fax: (+86) 21 604 504 87  
Sales / Service:  
Tel: (+86) 21 604 504 88  
Fax: (+86) 21 604 504 87

**PAMA TECHNOLOGY CENTER BRESCIA**

Via Renolda, 23  
I-25030 Castel Mella (BS)  
Tel. (+39) 030 2583643  
ptc.bs@pama.it

**PAMA TECHNOLOGY CENTER ROVERETO**

Viale del Lavoro, 10  
I-38068 Rovereto (TN)  
Tel. (+39) 0464 455401  
ptc.rov@pama.it

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COMPANY WITH QUALITY MANAGEMENT  
SYSTEM CERTIFIED BY DNV  
= ISO 9001:2008 =

