FLOOR TYPE BORING AND MILLING MACHINES
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
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

all linear axes with full hydrostatic guideways
HMC (Hydraulic Machine Compensation): Real time CNC controlled compensation of ram deflection, headstock tilting, column deflection and base rotation

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
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

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

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

spindle speed

boring bar nose displacement

waveform graph

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

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

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

PMP (PAMA Maintenance Program): software system reminds operators and maintenance personnel of scheduled PM activities
PAMA will design and produce any specialty head requirements leading the industry to specific technological solutions.
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
PAMA produces a wide range of hydrostatic rototransversing 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

<table>
<thead>
<tr>
<th>TH 50</th>
<th>TH 65</th>
<th>TH 80</th>
<th>TH 100</th>
<th>TH 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>loading capacity</td>
<td>t*</td>
<td>50</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>table surface - min.</td>
<td>mm</td>
<td>2000 x 2000</td>
<td>2500 x 2500</td>
<td>2500 x 2500</td>
</tr>
<tr>
<td>table surface - max.</td>
<td>mm</td>
<td>3000 x 3000</td>
<td>3500 x 3500</td>
<td>4000 x 4000</td>
</tr>
<tr>
<td>V axis longitudinal travel</td>
<td>mm</td>
<td>1500 - 4000</td>
<td>1500 - 4500</td>
<td>1500 - 4500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TH 160</th>
<th>TH 250</th>
<th>TH 300</th>
<th>TH 600</th>
</tr>
</thead>
<tbody>
<tr>
<td>loading capacity</td>
<td>t*</td>
<td>160</td>
<td>250</td>
</tr>
<tr>
<td>table surface - min.</td>
<td>mm</td>
<td>4000 x 4000</td>
<td>4500 x 4500</td>
</tr>
<tr>
<td>table surface - max.</td>
<td>mm</td>
<td>6000 x 6000</td>
<td>6000 x 8000</td>
</tr>
<tr>
<td>V axis longitudinal travel</td>
<td>mm</td>
<td>3000 - 5000</td>
<td>5000 - 7000</td>
</tr>
</tbody>
</table>

* 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)
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

B axis is driven via bull gear and double pinion system (preloaded for backlash free operation)
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
POWER GENERATION
steam turbine
rotor

POWER GENERATION
wind power
generation nacelle

POWER GENERATION
steam turbine
case

POWER GENERATION
hydraulic turbine
pelton rotor
APPLICATIONS
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
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 cm³/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 cm³/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
L = 2000 mm

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

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

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

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

**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.

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

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

<table>
<thead>
<tr>
<th></th>
<th>1000</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>X axis (column)</td>
<td>mm 4000</td>
<td>mm 4000</td>
</tr>
<tr>
<td></td>
<td>mm +N x 1000</td>
<td>mm +N x 1000</td>
</tr>
<tr>
<td>Y axis (headstock)</td>
<td>mm 2000 / 4000</td>
<td>mm 2500 / 5000</td>
</tr>
<tr>
<td>Z axis (ram)</td>
<td>mm 1000</td>
<td>mm 1500</td>
</tr>
<tr>
<td>W axis (boring spindle)</td>
<td>mm 700</td>
<td>mm 1000</td>
</tr>
<tr>
<td>Z+W axes</td>
<td>mm 1700</td>
<td>mm 2500</td>
</tr>
</tbody>
</table>

**HEADSTOCK**

<table>
<thead>
<tr>
<th></th>
<th>1000</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ram section</td>
<td>mm 360x400</td>
<td>mm 400x440</td>
</tr>
<tr>
<td>Boring spindle diameter</td>
<td>mm 130 / 150 / 160</td>
<td>mm 150 / 160 / 180</td>
</tr>
<tr>
<td>Max spindle speed</td>
<td>rpm 4000 / 3500 / 3500</td>
<td>rpm 3500 / 3500 / 2500</td>
</tr>
<tr>
<td>Spindle gear ranges</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Max spindle power</td>
<td>kW 37 / 52</td>
<td>kW 74 / 93</td>
</tr>
<tr>
<td>Max spindle torque</td>
<td>Nm 1526 / 2396</td>
<td>Nm 5196 / 9252</td>
</tr>
<tr>
<td>Spindle taper</td>
<td>ISO 50</td>
<td>ISO 50</td>
</tr>
</tbody>
</table>

**AXES FEED RATES**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X-Y-Z-W axes rapid traverse/ feed rate</td>
<td>m/min up to 30</td>
<td>m/min up to 25</td>
</tr>
</tbody>
</table>

**TOOL MAGAZINE***

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool magazine type</td>
<td>chain</td>
<td>chain</td>
</tr>
<tr>
<td>Tool magazine capacity</td>
<td>places 60 / 140</td>
<td>places 60 / 140</td>
</tr>
<tr>
<td>Max. tool diameter</td>
<td>mm 420</td>
<td>mm 420</td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm 600</td>
<td>mm 600</td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>kg 35</td>
<td>kg 35</td>
</tr>
<tr>
<td>Max. tool tilting moment</td>
<td>Nm 60</td>
<td>Nm 60</td>
</tr>
</tbody>
</table>

* larger magazine configurations available upon request
<table>
<thead>
<tr>
<th>WORKING AREA</th>
<th>X axis (column)</th>
<th>Y axis (headstock)</th>
<th>Z axis (ram)</th>
<th>W axis (boring spindle)</th>
<th>Z+W axes</th>
<th>HEADSTOCK</th>
<th>Ram section</th>
<th>Boring spindle diameter</th>
<th>Max spindle speed</th>
<th>Spindle gear ranges</th>
<th>Max spindle power</th>
<th>Max spindle torque</th>
<th>Spindle taper</th>
</tr>
</thead>
<tbody>
<tr>
<td>X axis</td>
<td>mm 4000 4000</td>
<td>mm 2000 4000</td>
<td>mm 1000</td>
<td>mm 700</td>
<td>mm 1700</td>
<td>mm 360 400</td>
<td>mm 440x480</td>
<td>mm 130 / 150 / 160</td>
<td>up to 30</td>
<td>2 3</td>
<td>37 / 52</td>
<td>1526 / 2396</td>
<td>ISO 50 ISO 50</td>
</tr>
<tr>
<td>Y axis</td>
<td>mm 2000 4000</td>
<td>mm 2500 5000</td>
<td>mm 1500</td>
<td>mm 1000</td>
<td>mm 1700</td>
<td>mm 400x400</td>
<td>mm 520x560</td>
<td>mm 150 / 160 / 180</td>
<td>up to 25</td>
<td>3 3</td>
<td>74 / 93</td>
<td>5196 / 9252</td>
<td>ISO 50 ISO 60</td>
</tr>
<tr>
<td>Z axis</td>
<td>mm 6000</td>
<td>mm 3000 6000</td>
<td>mm 1500</td>
<td>mm 1200</td>
<td>mm 3100</td>
<td>mm 440x480</td>
<td>mm 4000 7000</td>
<td>mm 160 / 180 / 200</td>
<td>up to 25</td>
<td>3 3 3</td>
<td>70 / 93</td>
<td>5757 / 10385</td>
<td>ISO 50 ISO 60</td>
</tr>
<tr>
<td>W axis</td>
<td>mm 1000</td>
<td>mm 1500 1000</td>
<td>mm 1500</td>
<td>mm 1400</td>
<td>mm 3500</td>
<td>mm 400x400</td>
<td>mm 560x600</td>
<td>mm 200 / 225 / 260</td>
<td>up to 18</td>
<td>3 3 3</td>
<td>35 / 35</td>
<td>5231 / 25685</td>
<td>ISO 50 ISO 60</td>
</tr>
<tr>
<td>Z+W axes</td>
<td>mm 1700 2500</td>
<td>mm 2200 3000 1000</td>
<td>mm 2700</td>
<td>mm 2200</td>
<td>mm 3100</td>
<td>mm 400x400</td>
<td>mm 520x560</td>
<td>mm 200 / 225 / 260</td>
<td>up to 15</td>
<td>3 3 3</td>
<td>60 / 60</td>
<td>12881 / 20351</td>
<td>ISO 50 ISO 60</td>
</tr>
</tbody>
</table>

**AXES FEED RATES**

- X-Y-Z-W axes rapid traverse/m/min: up to 30, up to 25, up to 25, up to 18, up to 15

**TOOL MAGAZINE**

- Tool magazine type: chain, chain, chain
- Tool magazine capacity: 60 / 140, 60 / 140, 60 / 140, 60 / 140, 60 / 140
- Max. tool diameter: 420, 420, 420, 420, 420
- Max. tool length: 600, 600, 600, 600, 600
- Max. tool weight: 35, 35, 35, 35, 35
- Max. tool tilting moment: 60, 60, 60, 60, 60

**Max. tool diameter**: 420, 420, 420, 420, 420

**Max. tool length**: 600, 600, 600, 600, 600

**Max. tool weight**: 35, 35, 35, 35, 35

**Max. tool tilting moment**: 60, 60, 60, 60, 60