Orbital Welding
Rotating Pipe Welding
Robotics
Machining
Accessories
Process
Orbital Welding:
Orbital Welding:
Orbital Welding:
Orbital Welding:
Orbital Welding:
Mig Orbital:

- Suitable for passes: Hot, Fill and Capping.
- The Orbital-Technique system is designed to make pipe-to-pipe and pipe-to-fitting welds.
- Interchangeable tracks guide the welding head around pipe, allowing a broad work piece size range from 110mm to 1200mm (4’’-48’’) and larger.
- The System improves productivity by increasing the duty cycle and reduces the repair rates.

Applications:

- Offshore pipelines (lay barges).
- Cross country pipelines.
- Shipyards.
- Piping Fabrication for modular Construction.
- Nuclear piping installation.
- Petrochemical industry.
WELMAX

Mig Orbital:

Programmable Welding Unit Parameters:
- Welding Current.
- Arc Voltage. (AVC)
- Welding Speed.
- Oscillation Speed.
- Oscillation Width.
- Oscillation dwell time.
- Tilt Angle.
- Pulsation Speed.
- Up and Down slope.
- Torch position on circumference.
- Torch Height.
- Torch Cooling.

Specifications:
- **Pipe Size:** ≥ 3” (OD 89 mm)
  Pipe wall thickness: Unlimited
- **Torch Vertical Motion Module:**
  Stroke 6.6 cm (2.625”) Motorized.
  Speed 152 cm/min. Maximum
- **Rotation Motor:**
  Speed Range: 0 – 500 mm/min.
  Travel direction: Bi- Directional.
- **Wire:**
  Wire Diameter: 0.8-1.6 mm.
  Wire Feed Speed: 0.5-25 m/min
  Wire Spool Size: 5 kg and 15 kg
Welbug: Orbital Weld Head for Multi-Pass Welding:
- Suitable for all passes: Rot, Hot, Fill and Cap
- Precision tool for perfect repeatable welds.
- The Orbital-T technique Welbug system is designed to make pipe-to-pipe and pipe-to-fitting welds.
- Interchangeable track rings guide the head around the pipe, allowing a broad workpiece size range from 110mm to 1200mm (4”-48”) and larger.
- The Welbug system improves productivity by increasing duty cycle, reducing repair rates below 0.1% and producing welds of constant quality.

Applications:
- Offshore pipeline (lay barges)
- Cross country pipelines
- Shipyards
- Piping Fabrication for module
- Construction.
- Nuclear piping installation
- Petrochemical industry
Welbug:

Programmable Welding Unit

Parameters:
- Welding Current.
- Arc Voltage. (AVC)
- Welding Speed.
- Oscillation Speed.
- Oscillation Width.
- Oscillation dwell time.
- Tilt Angle.
- Pulsation Speed.
- Up and Down slope.
- Torch position on circumference.
- Torch Height.
- Torch Cooling.
- Gas Type.

Specifications:

- **Pipe Size:** ≥ 3” (OD 89 mm)
  - Pipe wall thickness:
    - Unlimited
- **Torch Vertical Motion Module:**
  - Stroke 6.6 cm (2.625”) Motorized Speed
    - 152 cm/min. Maximum
- **Rotation Motor:**
  - Speed Range:
    - 0-500 mm/min. (30ipm).
  - Travel direction: Bi-Directional.
- **Wire:**
  - Wire Diameter: 0.8-1.6mm.
  - Wire Feed Speed: 0.5-22 m/min
  - Wire Spool Size: 5kg and 15kg
Eidehavn Pipeline:
Eidehavn Pipeline:
Eidehavn Pipeline:
Rotating Pipe Welding:

WELMAX

Welding Automation & Pipe Production Equipment
Rotating Pipe Welding:
Rotating Pipe Welding:
2 axis positioners w/center:

- 50kg
- 100kg
- 150kg
2 axis positioners:

- 50 kg
- 100 kg
- 150 kg
- 200 kg
- 250 kg
- 500 kg
- 750 kg
- 1000 kg
Round feeding table:

- 250kg
- 500kg
- 750kg
- 1000kg

Head & tailstock:
Rollerbeds:

- 500kg
- 1000kg
- 2000kg
- 3000kg
WELMAX

Pipe supports:

- 500kg
- 1000kg
- 1500kg
- 2000kg
Pipe Spool Rotator & Idler:

PR7/10 & IR7

Applications:

- Pipe

PR7/10 is used for Pipe Spool & Flange Welding applications.
## Technical Data:

### Model PR7/10

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Loading Capacity MT</td>
<td>Drive Unit (t)</td>
</tr>
<tr>
<td>Turning Capacity MT</td>
<td>Drive Unit (t)</td>
</tr>
<tr>
<td>Roller Speed</td>
<td>mm/min</td>
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<tr>
<td>Vessel Diameter</td>
<td>Min(90°)</td>
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<tr>
<td></td>
<td>Max(60°)</td>
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<tr>
<td>Power Supply</td>
<td>50Hz/3ph, 60Hz/3ph</td>
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<tr>
<td>Polyurethane Tire Size mm</td>
<td>Dia./mm</td>
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<tr>
<td></td>
<td>Width/mm</td>
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<tr>
<td>Fuses</td>
<td>Amp</td>
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<tr>
<td>Control Voltage</td>
<td>VAC</td>
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<tr>
<td>Motor</td>
<td>kW</td>
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<tr>
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<tr>
<td>AC Inverter</td>
<td>kW</td>
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<td>IP Classification (Electrical)</td>
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<tr>
<td>Weight (KG)</td>
<td>Drive Unit (kg)</td>
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<tr>
<td>Dimension (LxHxW)</td>
<td>Drive Unit</td>
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<tr>
<td>Cable control box</td>
<td>m</td>
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### Model IR7

<table>
<thead>
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<td>Max Loading Capacity MT</td>
<td>Drive Unit (t)</td>
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<tr>
<td>Turning Capacity MT</td>
<td>Drive Unit (t)</td>
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<tr>
<td>Vessel Diameter</td>
<td>Min</td>
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<td></td>
<td>Max</td>
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<tr>
<td>Polyurethane Tire Size mm</td>
<td>Dia./mm</td>
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<tr>
<td></td>
<td>Width/mm</td>
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<tr>
<td>Electrical Panel</td>
<td>kW</td>
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<tr>
<td>Travelcar (Bogie)</td>
<td>Yes, Manual Push</td>
</tr>
<tr>
<td>Weight (KG)</td>
<td>Drive Unit (kg)</td>
</tr>
<tr>
<td>Dimension (LxHxW)</td>
<td>Drive Unit</td>
</tr>
</tbody>
</table>
Pipe Trolley:

MTS1 & MTS3

- MTS1/MTS3 is used for supporting workpieces with different diameter and length.
- Positioning of work piece with Headstock and Positioner.
Pipe to Flange Welder:
Pipe to Flange Welder:
Universal Plasma TIG:
Universal Plasma TIG:
Robotics:
Robotics:
Protem:
Protem, SM8

Inside clamping bevelling machine type SM8
Machining capacity:
8 mm ID – max. 32 mm OD

Clamping capacity:
8 mm ID – 30,5 mm ID

Bevel forms:
I, V, U, J or special
Facing, 30 and 37,5° bevel, counterbore
others on request

Clamping:
manual without key

Feed stroke:
10 mm

Cutting head gear drive:
120 rpm off-load speed, 60 rpm nominal speed
Machine is delivered with:
- 1 expansion collet (please indicate the diameter on order)
- 1 socket rod (please indicate type on order)
- 1 socket holder (please indicate type on order)
- 1 tool bit 90°
- 1 tool bit 30°
- keys and screws
- operating manual
Inside clamping pipe beveling machine type S18
Machining capacity:
18 mm ID – 42 mm OD
Clamping capacity:
18 mm ID – 42 mm ID
Bevel forms:
Facing, 30 and 37,5° V-bevel, counterbore, J-bevel, others on request
Clamping: manual
Feed stroke: 35 mm (S18CA: 16 mm)
Cutting head gear drive:
300 rpm off-load speed, 150 rpm nominal speed
Machine is delivered with:
-5 sets of expansion blades:
17,55 – 23,95 22,50 – 29,50 27,45 – 33,85
32,45 – 38,80 37,35 – 43,75
- 1 tool bit 90°
- 1 tool bit 30°
- keys and screws
- operating manual
Inside clamping pipe bevelling machine type S18 CA
with automatic clamping
Machining capacity:
18 mm ID – 38 mm OD
Clamping capacity:
18 mm ID – 30 mm ID
Bevel forms:
Facing, 30 and 37.5° V-bevel, counterbore, J-bevel, others on request
Clamping:
pneumatic cylinder
Feed stroke:
with feed lever: 12 mm
Cutting head gear drive:
300 rpm off-load speed, 150 rpm nominal speed

Machine is delivered with:
- sets of expansion blades for above mentioned diameters
- automatic pneumatic clamping
- manual feed lever
- 1 tool bit 90°
- 1 tool bit 30°
- keys and screws
- operating manual
Inside clamping beveling machine type US25

**Machining capacity:**
25 mm ID – 90 mm OD

**Clamping capacity:**
25 mm ID – 107 mm ID

**Bevel forms:**
Facing, 30 and 37.5°V-bevel, J-bevel, others on request

**Clamping:**
manual with key

**Expansion:** 10 mm

**Feed stroke:** 35 mm

**Cutting head gear drive:**
150 rpm off-load speed, 70 rpm nominal speed

**Machine is delivered with:**
- tool holder plate
- sets of clamping blades for above mentioned diameters
- 1 tool bit 90°, 1 tool bit 30°
- keys and screws
- operating manual
**Protem, US40**

**Inside clamping beveling machine type US40**

**Machining capacity:**
43 mm ID – 219 mm OD

**Clamping capacity:**
43 mm ID – 219 mm ID

**Bevel forms:**
Facing, 30 and 37.5° V-bevel, J-bevel, others on request

**Clamping:**
manual with ratchet

**Expansion:**
16 mm

**Feed stroke:**
with ratchet

**Cutting head gear drive:**
25 rpm off-load speed, 16 rpm nominal speed
Protem, US80

Inside clamping and bevelling machine type US80

Machining capacity:
80 mm ID – 360 mm OD

Clamping capacity:
80 mm ID – 355 mm ID

Bevel forms:
Facing, 30 and 37,5\(^\circ\)V-bevel, J-bevel, others on request

Clamping:
manual with key

Expansion: 25 mm

Feed stroke: 60 mm

Cutting head gear drive:
16 rpm off-load speed, 11 rpm nominal speed

US80 with flange facing attachment
Protem, US150

Inside clamping bevelling machine US 150

machining capacity:
150 mm ID – 508 mm OD

Clamping capacity:
150 mm ID – 508 mm ID

Bevel forms:
Facing, 30 and 37,5°V-bevel, J-bevel, others on request

Camping:
manual with key

Expansion: 30 mm

Feed stroke: 100 mm

Cutting head gear drive:
7 - 10 rpm off-load speed, 5 - 7 rpm nominal speed

Machine is delivered with:
-1 tool holder plate
-4 tool bit holders
-sets of clamping blades for above mentioned diameters
- 1 tool bit 90°, 1 tool bit 30°
-key and screws
-operating manual
The hydraulic PROTEM **US80/150-HSB** machine can be used either on site or in a workshop.

- The machine is transportable, easy to install and will be clamped into the inside diameter of the pipe.
- The **US80/150-HSB** is used for bevelling, facing and counter boring (short) works. These works can be processed individually or simultaneously.
- It will perform repeatable high quality bevel with a V, J, X shape or compounded bevels perfectly suitable for the orbital or manual welding process.
- It can be used for all main pipe materials such as stainless steel, carbon steel, and all exotic alloys such INCOLOY, HASTELLOY etc.

**Technical features:**
The US80/150-HSB can be equipped with two different clamping mandrels. Within a few hours, through the exchange of the US 150 with the US 80 mandrel or vice versa, the range of diameters can be reduced or increased accordingly.
Protem, SE25

Outside clamping tube and fittings facing machine type SE25. Battery driven.

Machining capacity:
2 mm OD – 25.4 mm OD

Clamping capacity:
2 mm OD – 25.4 mm ID

Clamping:
manual with clamp lever

Feed:
manual with indicator

Gear drive:
1. level: 0–400 rpm, 2. level: 0 – 1450 rpm

Machine is delivered with:
- facing tool block with one tool insert
- storage batteries
- battery charger
- key and screws
- operating manual

WITHOUT EXPANSION COLLET!
Protem, SE65

Outside clamping tube and fittings facing machine type SE65

**Machining capacity:**
12,7 mm OD – 60,3 mm OD

**Clamping capacity:**
12,7 mm OD – 60,3 mm ID

**Clamping:**
manual with clamp lever

**Feed:**
manual with indicator

**Gear drive:**
1. level: 0-450 rpm, 2. level: 0 – 1450 rpm, 3. level: 0 – 1800 rpm

**Machine is delivered with:**
- facing tool block with one tool insert
- storage batteries
- battery charger
- key and screws
- operating manual

WITHOUT EXPANSION COLLET!
Protem, TT-NG Series

The pipe cutting machines of the TT-NG-series are accurate in cutting and/or bevelling tubes and pipes of all schedules in one simultaneous operation. These machines were especially designed to machine pipes with large wall-thicknesses. They are very robust and can be installed in various positions. Their split frame configuration allows opening in 2 half-shells. For the manual clamping 4 independently adjustable jaws are used. The machines have got a rear centering feature and completely enclosed drive gears for the operators’ safety.

**Machining and clamping capacity:**
60,3 mm OD – 914 mm OD
2” – 36” OD
> 914 mm / on request

**Clamping:** manual with key

**Feed:** automatic with clutch

**Machine is delivered with:**
- 2 tool holders
- 1 pointed cutting tool bit
- 1 severing cutting tool bit
- keys, screws
- operating manual
# Protem, TT-NG Series

<table>
<thead>
<tr>
<th>Model</th>
<th>Machining Capacity</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Weight</th>
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<tr>
<td></td>
<td>mm</td>
<td>inch</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>mm</td>
<td>kg(ca.)</td>
</tr>
<tr>
<td>TT-NG 168</td>
<td>60,3 - 168,3</td>
<td>2’’ - 6’’</td>
<td>175</td>
<td>325</td>
<td>217</td>
<td>110</td>
<td>205</td>
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<tr>
<td>TT-NG 219</td>
<td>114,3 – 219,1</td>
<td>4’’ – 8’’</td>
<td>223</td>
<td>373</td>
<td>241</td>
<td>110</td>
<td>205</td>
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<tr>
<td>TT-NG 273</td>
<td>168,3 – 273,1</td>
<td>6’’ – 10’’</td>
<td>282</td>
<td>433</td>
<td>271</td>
<td>110</td>
<td>205</td>
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<tr>
<td>TT-NG 323</td>
<td>219,1 – 323,9</td>
<td>8’’ – 12’’</td>
<td>331</td>
<td>481</td>
<td>295</td>
<td>110</td>
<td>205</td>
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<tr>
<td>TT-NG 406</td>
<td>273,1 – 406,4</td>
<td>10’’ – 16’’</td>
<td>415</td>
<td>565</td>
<td>337</td>
<td>110</td>
<td>205</td>
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<td>TT-NG 508</td>
<td>323,9 – 508,0</td>
<td>12’’ – 20’’</td>
<td>517</td>
<td>667</td>
<td>388</td>
<td>110</td>
<td>205</td>
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<td>TT-NG 610</td>
<td>406,4 – 610,0</td>
<td>16’’ – 24’’</td>
<td>619</td>
<td>788</td>
<td>448</td>
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<td>205</td>
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<td>TT-NG 762</td>
<td>558,8 – 762,0</td>
<td>22’’ – 30’’</td>
<td>776</td>
<td>945</td>
<td>526,5</td>
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<td>TT-NG 900</td>
<td>660,4 – 914,4</td>
<td>26’’ – 36’’</td>
<td>925</td>
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<td>601</td>
<td>110</td>
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<td>TT-NG 1000</td>
<td>889 – 1016</td>
<td>32’’ – 40’’</td>
<td>1016</td>
<td>1200</td>
<td>700</td>
<td>110</td>
<td>205</td>
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<td>TT-NG 1200</td>
<td>914,4 – 1219,2</td>
<td>36’’ – 48’’</td>
<td>1262</td>
<td>1540</td>
<td>826</td>
<td>107</td>
<td>205</td>
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<tr>
<td>TT-NG 1400</td>
<td>1219,2 – 1422,4</td>
<td>48’’ – 56’’</td>
<td>1460</td>
<td>1730</td>
<td>910</td>
<td>107</td>
<td>205</td>
</tr>
</tbody>
</table>
Accessories:
In welding work, positioners are convenient aids in increasing working flexibility, productivity and quality, not to mention labour motivation. The main advantage of positioner utilisation is the fact that work-pieces can always be set up to the best possible downhand welding positions. This way, welding productivity can be raised by as much as 70 percent. Welders also appreciate added ergonomic working comfort.

Extensive range For effective welding work, PEMA has developed a range of positioner series’ which all combine modern design and reliable, efficient technology. In their design, special attention has been paid to safety-at-work and ergonomy. Convenience in use is assured by several features such as a light remote control. PEMA positioner capacities range from 250 kilograms up to a massive 250 tonnes. From this comprehensive selection, every user can find a perfect match to fulfill his requirements.

When welding is carried out in an ergonomically correct manner, the results are easily noticed in the produced quality.
Applications and engineering solutions PEMA designs and manufactures 50 – 250 ton positioners on request for welding of demanding and heavy work-pieces. For this kind of customised engineering solutions, a 2-axis positioner from PEMA Megamaster series is often the most suitable one. Also, a cradle design from PEMA Titan series can be a good alternative. The welding process can be SAW, Narrow Gap, MIG or tandem MIG. PEMA also provides matching welding platforms and column & booms to turn the combinations into complete hard automation welding production cells.

PEMA solutions

Typical applications for heavy positioners include:
- Automated welding of heavy thick-walled dish ends
- Cladding of pressure vessel components
- Narrow gap and tandem narrow gap welding stations of thick-walled pressure vessels
- Foundations for wind energy plants
- Propeller housings, winches, and other shipbuilding and offshore industry components
PEMA APS Skymaster positioners are, in fact, the best solution to the problem of lifting, rotating and tilting heavy work-pieces with complex geometry. Because the height, angle and rotating speed of the work-piece are fully adjustable, an ideal ergonomic working position can always be guaranteed. Loading capacity range is 250-35 000 kg.

*PEMA APS 1500 Skymaster positioner* *PEMA APS 750 Skymaster positioner*

- Large movements - compact size
- Stepless, variable height control by means of hydraulics
- Remote control of all functions
- Advanced precision and working safety

*PEMA APS 15000 Skymaster positioner*
Ideal partner for any welder

All PEMA APS 250 - 35000 positioners are equipped with adjustable rotation, tilting and height movement functions. Possibility for stepless 3-axis work-piece adjustments guarantees ideal, productive and ergonomic working positions. Inverter-controlled AC-driven rotation movements are smooth and accurate in all loading conditions. Powerful, hydraulically operated tilting and height adjustments always enable safe positioning of the work-piece into optimum welding and working positions. The hydraulic system is equipped with in-built safety valves for hose damages. All movements are easily controlled from a handy remote controller, and the operator can monitor rotation speeds from a RPM display. PEMA positioners are designed in close cooperation with the best professionals. PEMA’s extensive experience in designing and manufacturing welding automation solutions has been a key factor in the development of PEMA positioners. The positioners are fundamental tools in every welding shop, and they offer an easy way to increase welding productivity and quality.

POSITIONER FACTS:
• Fast welding in down-hand positions
• Optimum welding parameters
• Quality improvement - less finishing and repairing
• Accurate, safe and ergonomic

Options
• Foot pedal for start/stop of rotation
• Foot pedal for speed control
• External control of rotation
• Wireless remote control
Load calculation

Loading torques should always be calculated from the surface of the table plate to the centre of gravity of the work-piece.

When choosing positioners, the torque of the work-piece should be compared with the maximum allowable torque in the appropriate table.

Rotational torque (Nm): \( G \times Y \)

Tilting torque (Nm): \( G \times X \)

\( G (N) = \text{weight of work-piece (kg)} \times \text{gravity factor approx 10 (m/s}^2) \)

\( Y (m) = \text{distance from the centre of the table plate to work-piece centre of gravity} \)

\( X (m) = \text{distance from the surface} \)

<table>
<thead>
<tr>
<th>Model</th>
<th>APS 250</th>
<th>APS 750</th>
<th>APS 1500</th>
<th>APS 3500</th>
<th>APS 7000</th>
<th>APS 15000</th>
<th>APS 25000</th>
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<tr>
<td>Max. load (N)</td>
<td>2 500</td>
<td>7 500</td>
<td>15 000</td>
<td>35 000</td>
<td>70 000</td>
<td>150 000</td>
<td>250 000</td>
<td>350 000</td>
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<tr>
<td>Rotation speed (rpm)</td>
<td>0.2-4.5</td>
<td>0.09-2</td>
<td>0.07-1.3</td>
<td>0.08-1.6</td>
<td>0.05-1</td>
<td>0.04-0.75</td>
<td>0.02-0.4</td>
<td>0.02-0.4</td>
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<tr>
<td>Max. rotational torque (Nm)</td>
<td>80</td>
<td>600</td>
<td>1 000</td>
<td>2 800</td>
<td>9 000</td>
<td>18 000</td>
<td>40 000</td>
<td>55 000</td>
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<td>Tilting / angle (deg)</td>
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<td>hyd 135</td>
<td>hyd 135</td>
<td>hyd 135</td>
<td>hyd 135</td>
<td>hyd 135</td>
<td>hyd 120</td>
<td>hyd 120</td>
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<tr>
<td>Tilting torque (Nm)</td>
<td>300</td>
<td>1 500</td>
<td>3 000</td>
<td>7 500</td>
<td>14 000</td>
<td>70 000</td>
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<td>280000</td>
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<tr>
<td>Max. welding current (A)</td>
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<td>700</td>
<td>700</td>
<td>700</td>
<td>1 400</td>
<td>1 400</td>
<td>2100</td>
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<tr>
<td>Table plate diameter (mm)</td>
<td>400</td>
<td>700</td>
<td>700</td>
<td>950</td>
<td>1 100</td>
<td>1 490</td>
<td>1 950</td>
<td>1 950</td>
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<tr>
<td>Height min-max ([H1-H2]) (mm)</td>
<td>490-910</td>
<td>720-1450</td>
<td>770-1540</td>
<td>980-1675</td>
<td>1000-1855</td>
<td>1300-2325</td>
<td>1600-2860</td>
<td>2000-3500</td>
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<td>Length ([L]) (mm)</td>
<td>940</td>
<td>1 575</td>
<td>1 640</td>
<td>2 180</td>
<td>2 640</td>
<td>3 150</td>
<td>4 000</td>
<td>4 750</td>
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<tr>
<td>Width (mm)</td>
<td>570</td>
<td>665</td>
<td>810</td>
<td>1 030</td>
<td>1 490</td>
<td>1 820</td>
<td>1 950</td>
<td>2 450</td>
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</table>
PEMA SPS Skyhook positioners are built for demanding tasks with heavy work-pieces with even the most complex product geometry. With a Skyhook, work-pieces are easily set up in a wide variety of attitudes. Loading capacity range is 750-10,000 kg. *PEMA SPS 5000 Skyhook positioner* PEMA SPS 3500 Skyhook positioner PEMA SPS

- Handling of large work-pieces with demanding geometries in all positions
- Stepless, motorised rotation, tilting and height adjustments
- Remote control of all functions
PEMA, Skyhook series

Heavy work-pieces with demanding product geometry PEMA SPS 750 - 10000 Skyhook positioners are the right choice for heavy work-pieces with demanding product geometry. Typical work-pieces are e.g. tractor cabinets and construction machinery parts. Work-pieces can be adjusted in all conceivable positions with a Skyhook positioner. Usually, they rotate around their centre of gravity. This ensures that the welder’s working posture is always productive and ergonomically sound. Stepless 3-axis adjusting function provides easy access for the welder to even the most difficult welds inside the work-pieces. Rotation of the table and tilting of the L-arm are controlled with inverter-controlled AC-drives. Height adjustment is operated hydraulically. The hydraulic system has built-in safety valves. Every PEMA product utilises high quality components from internationally recognised brands. All structures and components are series produced and tested. Designed to the same high quality standards as PEMA roller beds and column & booms, PEMA positioners fulfil the requirements of the European EN-safety norm. All PEMA positioners come with CE-markings.

Options

- Foot pedal for start/stop of rotation
- Foot pedal for speed control
- External control of rotation
- Wireless remote control
Load calculation
Loading torques should always be calculated from the surface of the table plate to the centre of gravity of the work-piece. When choosing positioners, the torque of the work-piece should be compared with the maximum allowable torque in the appropriate table.
Rotational torque (Nm): \( G \times Y \)
Tilting torque (Nm): \( G \times X \)

\[ G \ (N) = \text{weight of workpiece (kg)} \times \text{gravity factor approx 10 (m/s}^2) \]
\[ Y \ (m) = \text{distance from the centre of the table plate to workpiece centre of gravity} \]
\[ X \ (m) = \text{distance from the tilting axle to workpiece centre of gravity} \]

<table>
<thead>
<tr>
<th>Model:</th>
<th>SPS 750</th>
<th>SPS 1500</th>
<th>SPS 3500</th>
<th>SPS 5000</th>
<th>SPS 10000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max load (N)</td>
<td>7500</td>
<td>15000</td>
<td>35000</td>
<td>50000</td>
<td>100000</td>
</tr>
<tr>
<td>Rotation speed (rpm)</td>
<td>0.09-2.0</td>
<td>0.07-1.3</td>
<td>0.08-1.6</td>
<td>0.05-1</td>
<td>0.04-0.7</td>
</tr>
<tr>
<td>Max rotational torque (Nm)</td>
<td>600</td>
<td>1000</td>
<td>2800</td>
<td>6000</td>
<td>18000</td>
</tr>
<tr>
<td>Tilting speed (rpm)</td>
<td>0.1-1.5</td>
<td>0.1-1</td>
<td>0.1-0.8</td>
<td>0.1-0.75</td>
<td>0.1-0.7</td>
</tr>
<tr>
<td>Max tilting torque (Nm)</td>
<td>1500</td>
<td>3000</td>
<td>6000</td>
<td>10000</td>
<td>20000</td>
</tr>
<tr>
<td>Adjust. tilting axle height min-max [H1-H2] (mm)</td>
<td>700 - 1500</td>
<td>850 - 1650</td>
<td>1100 - 1900</td>
<td>1200 - 2000</td>
<td>1400 - 2200</td>
</tr>
<tr>
<td>Offset distance [OF] (mm)</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Table plate diameter (mm)</td>
<td>700</td>
<td>700</td>
<td>950</td>
<td>1100</td>
<td>1490</td>
</tr>
<tr>
<td>Max welding current (A)</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>1400</td>
<td>1400</td>
</tr>
<tr>
<td>Max workpiece diameter (mm)</td>
<td>2000</td>
<td>2400</td>
<td>3000</td>
<td>3200</td>
<td>4000</td>
</tr>
<tr>
<td>Height [H] (mm)</td>
<td>2350</td>
<td>2500</td>
<td>3060</td>
<td>3200</td>
<td>3500</td>
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<tr>
<td>Length [L] (mm)</td>
<td>2660</td>
<td>2980</td>
<td>3680</td>
<td>4400</td>
<td>5700</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>1150</td>
<td>1160</td>
<td>1450</td>
<td>2040</td>
<td>2240</td>
</tr>
</tbody>
</table>
PEMA FPS Megamaster positioners are at their best when large and heavy objects are handled. They offer exceptional loading characteristics in both rotation and tilting, and their massive frames ensure safety at all times. Loading capacity range is 25 000-250 000 kg.
PEMA

Extra large and heavy work-pieces

PEMA FPS 25000 – 250000 Megamaster positioners are designed and manufactured for positioning and rotating/tilting of extra large and heavy work-pieces in automated welding. Typically, these positioners are used in pressure vessel production, for welding of shipbuilding and offshore industry components, welding and/or cladding of circumferential work-pieces, handling of extra heavy cubic frames, etc. FPS positioners feature motorized inverters or servo controlled exact rotation controls, and strengthened rotation torque and hydraulic or motorized tilting with the needed adjustments. Loading capacity in the basic FPS range varies between 25 tons and 250 tons. Work table is equipped with sturdy T-grooves in order to help clamping the work-pieces firmly. Special table designs are also available on request. In every FPS construction, latest strength calculation programs are utilised in order to optimise the design and ascertain reliable and safe structures.

PEMA’s engineers are able to offer the most suitable solutions for every application. Since FPS positioners are often linked to a welding process where the work-piece movements have to be synchronized with a welding head or a column & boom, PEMA can offer a complete hard automation solution to fulfill your needs and requirements.

<table>
<thead>
<tr>
<th>Model:</th>
<th>FPS 25000</th>
<th>FPS 35000</th>
<th>FPS 80000</th>
<th>FPS 120000</th>
<th>FPS 250000</th>
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</thead>
<tbody>
<tr>
<td>Max. load (N)</td>
<td>250 000</td>
<td>350 000</td>
<td>800 000</td>
<td>1 200 000</td>
<td>2 500 000</td>
</tr>
<tr>
<td>Rotation speed (rpm)</td>
<td>0,02-0,4</td>
<td>0,02-0,4</td>
<td>0,0035-0,35</td>
<td>0,0035 - 0,35</td>
<td>0,0035 - 0,35</td>
</tr>
<tr>
<td>Max. rotational torque (Nm)</td>
<td>40 000</td>
<td>55 000</td>
<td>300 000</td>
<td>600 000</td>
<td>1 250 000</td>
</tr>
<tr>
<td>Tilting / angle (deg)</td>
<td>hydr. 110</td>
<td>hydr. 110</td>
<td>hydr. 90</td>
<td>hydr. 90</td>
<td>motor. 90</td>
</tr>
<tr>
<td>Tilting torque (Nm)</td>
<td>175 000</td>
<td>280 000</td>
<td>800 000</td>
<td>1 200 000</td>
<td>2 500 000</td>
</tr>
<tr>
<td>Height (mm)</td>
<td>2 450</td>
<td>2 550</td>
<td>4 110</td>
<td>4 840</td>
<td>5 620</td>
</tr>
<tr>
<td>Length (mm)</td>
<td>3 800</td>
<td>3 800</td>
<td>6 766</td>
<td>7 550</td>
<td>9 020</td>
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<tr>
<td>Width (mm)</td>
<td>1 950</td>
<td>1 950</td>
<td>2 900</td>
<td>3 670</td>
<td>5 050 (base)</td>
</tr>
</tbody>
</table>

Every PEMA positioner model is delivered with a standard remote control unit.
PEMA CPS Titan positioners for heavy and large work-pieces with complex geometry. Loading capacities are between 25 and 250 tons. The main feature of PEMA CPS Titan positioners is their cradletype architecture. Work-pieces can be positioned to all positions. Both rotation and tilting are motorised. Work-piece height is fixed.

<table>
<thead>
<tr>
<th>Model</th>
<th>CPS 25000</th>
<th>CPS 50000</th>
<th>CPS 100000</th>
<th>CPS 250000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. load (N)</td>
<td>250 000</td>
<td>500 000</td>
<td>1 000 000</td>
<td>2 500 000</td>
</tr>
</tbody>
</table>
PEMA HPS Headstock and PEMA TPS Tailstock positioners are specially designed for long, revolving workpieces. Typical applications include manufacturing of wind towers and other kinds of cylindrical workpieces. Loading capacities range from 3,500 to 40,000 kg.

- PEMA HPS Headstock - motorised rotation & stepless height adjustment
- PEMA TPS Tailstock - freely rotating table plate, adjustable height
- Well suited for handling elongated objects
- Versatility: Headstock can be used either with or without the Tailstock
Handling of elongated objects
PEMA 3500 - 40000 Headstock and Tailstock positioners are specially designed for handling of elongated objects. Trailer frames, pipes or beams are ideal this type of positioners. For pairs, standard loading capacities range between 7 tons and 80 tons. PEMA Headstock and Tailstock positioners are efficient and productive for circumferential welding and assembly of difficult and elongated work-pieces. Headstocks and Tailstocks are versatile, you can use a Headstock with or without a Tailstock. Both types come with stepless, hydraulically-operated height adjustment. Tailstocks can have motorised rail car units (R series) for varying lengths of work-pieces. When a Tailstock is used with a rail carriage, the Headstock is equipped with a height extension block. For wind energy tower assembly and welding, PEMA manufactures 80 tons and 120 tons Headstock & Tailstock positioners. The wind energy models are equipped with strong hydraulic clamping of shells, longitudinal and vertical movements, and interface for integration with welding equipment.

Load calculation
Loading torques should always be calculated from the surface of the table plate to the centre of gravity of the work-piece. When choosing positioners, the torque of the work-piece should be compared with the maximum allowable torque in the appropriate table.

Rotational torque (Nm): $G \times Y$
Tilting torque (Nm): $G \times X$

$$G \ (N) = \ \text{weight of work-piece (kg) x gravity factor approx } 10 \ (m/s^2)$$
$$Y \ (m) = \ \text{distance from the centre of the table plate to work-piece centre of gravity}$$
$$X \ (m) = \ \text{distance from the tilting axle to work-piece centre of gravity}$$
## PEMA

<table>
<thead>
<tr>
<th>Model</th>
<th>HPS 3500</th>
<th>TPS 3500</th>
<th>HPS 7000</th>
<th>TPS 7000</th>
<th>HPS 15000</th>
<th>TPS 15000</th>
<th>HPS 25000</th>
<th>TPS 25000</th>
<th>HPS 40000</th>
<th>TPS 40000</th>
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</thead>
<tbody>
<tr>
<td>Max. Load (N)</td>
<td>35 000</td>
<td>35 000</td>
<td>70 000</td>
<td>70 000</td>
<td>150 000</td>
<td>150 000</td>
<td>250 000</td>
<td>250 000</td>
<td>400 000</td>
<td>400 000</td>
</tr>
<tr>
<td>Rotation speed (rpm)</td>
<td>0.08-1.6</td>
<td>0.08-1.6</td>
<td>0.04-0.75</td>
<td>0.04-0.75</td>
<td>0.02-0.4</td>
<td>0.02-0.4</td>
<td>0.02-0.4</td>
<td>0.02-0.4</td>
<td>0.02-0.4</td>
<td>0.02-0.4</td>
</tr>
<tr>
<td>Max. Rotational torque (Nm)</td>
<td>7 500</td>
<td>7 500</td>
<td>14 000</td>
<td>14 000</td>
<td>70 000</td>
<td>70 000</td>
<td>175 000</td>
<td>175 000</td>
<td>280 000</td>
<td>280 000</td>
</tr>
<tr>
<td>Max. Tilling torque (Nm)</td>
<td>7 500</td>
<td>7 500</td>
<td>14 000</td>
<td>14 000</td>
<td>70 000</td>
<td>70 000</td>
<td>175 000</td>
<td>175 000</td>
<td>280 000</td>
<td>280 000</td>
</tr>
<tr>
<td>Adjustable tilling axle height min-max (H1+H2) (mm)</td>
<td>700-1500</td>
<td>700-1500</td>
<td>850-1650</td>
<td>850-1650</td>
<td>1100-1900</td>
<td>1100-1900</td>
<td>1400-2200</td>
<td>1400-2200</td>
<td>2600-3700</td>
<td>2600-3700</td>
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<tr>
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<td>950</td>
<td>1100</td>
<td>1100</td>
<td>1490</td>
<td>1490</td>
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<td>1950</td>
</tr>
<tr>
<td>Height (H) (mm)</td>
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<td>2 350</td>
<td>2 500</td>
<td>2 500</td>
<td>3 060</td>
<td>3 060</td>
<td>3 800</td>
<td>3 800</td>
<td>5 200</td>
<td>5 200</td>
</tr>
<tr>
<td>Length (L) (mm)</td>
<td>1 050</td>
<td>1 050</td>
<td>1 190</td>
<td>1 190</td>
<td>1 320</td>
<td>1 320</td>
<td>2 200</td>
<td>2 200</td>
<td>2 600</td>
<td>2 600</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>1 150</td>
<td>1 150</td>
<td>1 160</td>
<td>1 160</td>
<td>1 490</td>
<td>1 490</td>
<td>2 040</td>
<td>2 040</td>
<td>2 500</td>
<td>2 500</td>
</tr>
</tbody>
</table>
PEMA, Rollerbeds
PEMA, Rollerbeds

Rollerbeds provide assistance in the handling of containers, tubes, pipes and other revolving work-pieces during welding, painting, blasting and assembly. By means of a rollerbed set, work-pieces can always be placed in the most advantageous working position. Use of PEMA rollerbeds also reduces set-up and handling times to minimum.

Extensive range
PEMA offers a wide range of rollerbed models to handle varying weights, diameters and shapes of rotating work-pieces. The range includes automatically and manually adjusted rollerbed types as well as special models designed for demanding product geometries and weights.
Reliable products
Durability, operational reliability and safety are all typical characteristics of PEMA rollerbeds. Designed and built for demanding machine shop operating environment, they fulfil the latest European EN safety-at-work regulations. Loading capacities of PEMA rollerbeds range from 12 to 1600 tons. Every operator can find a perfect solution from the comprehensive PEMA rollerbed selection.

Accessories
PEMA rollerbeds can be equipped with a selection of accessories depending on the requirements of customer’s production flows, used materials and the geometry of manufactured products. All rollerbed models can be equipped with rail cars for enhancing the efficiency of production material flows. On rail cars, loaded rollerbeds are easily and rapidly transported between work stations without need for work-piece lifting. Rail cars also enable effortless handling of work-pieces of varying lengths within the work stations. The cars come in two unit types: powered with motorized motion (2D), or idler (I). For preventing axial creeping of work-piece during rotation, the idler unit can be equipped with anti-creep solution. Other accessories include foot pedal for start/stop of rotation and speed control, external control interface for integration with e.g. PEMA column & boom, and wireless remote control unit.

All PEMA rollerbed models can be equipped with rail cars to enhance the efficiency of production material flows.

ROLLERBED FACTS:
- Quality improvement - less finishing and repairing
- Accurate, safe and ergonomic
- Essential for all automated welding of cylindrical work-pieces by column & booms
- PEMA rollerbeds fulfil the requirements of the European EN-safety norm
- All PEMA rollerbeds come with CE-markings
PEMA N series of conventional rollerbeds make up a basic range of solutions for handling a wide variety of cylindrical work-pieces. They occupy little space and feature a handy manual diameter adjustment. Loading capacities range between 12 and 1 600 tons.

- Compact size
- Easy adjustment of roller distances
- All rollers in the drive unit are power-driven
- Increased precision and work safety

Welding carried out by means of a column & boom and a set of heavy PEMA N rollerbeds

PEMA N12 rollerbed set, drive and idler units
Basic solution for handling cylindrical work-pieces

PEMA N series of conventional rollerbeds make up a range of basic solutions for handling cylindrical work-pieces such as pressure vessels and tanks in automated welding. They occupy little space thanks to their compact size. In the N series, roller distances are manually adjusted to accommodate varying workpiece diameters. The adjustments are stepless in the smaller models but the heavier rollerbeds come with stepped adjustments in order to ascertain appropriate settings of the rollers.

The N series loading capacity ranges from 12 tons up to even 1 600 tons. Heavier rollerbeds often form a part of complete PEMA hard automation welding solutions.

PEMA N 300 ton - 1 600 ton idler units always feature automatic anti-creep equipment for maintaining exact longitudinal position of the work-pieces. This system is essential for e.g. trouble-free welding of thick materials.

Please contact for N300, N500, N700 and up to 1600 tons technical information.
The N series rollerbeds suit well for wind energy tower production as well for other conical work-pieces.

All PEMA rollerbed frames and parts are carefully machined. The structures are dimensioned using high safety factors. Smaller rollerbeds have polyurethane rollers and the heavier beds come with high quality steel rollers.

Powerful and accurate rotation is essential in high quality welding. In PEMA rollerbeds, this is ensured by high quality, inverter controlled AC drives and gears.

### PEMA rollerbed specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Max load (ton/section)</th>
<th>Rolling capacity (ton)</th>
<th>Max rotation force (kN)</th>
<th>Rotation speed range (mm/min)</th>
<th>Diameter range min-max (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N12</td>
<td>6</td>
<td>18</td>
<td>8,5</td>
<td>100 - 2 000</td>
<td>250 - 5 000</td>
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<tr>
<td>N25</td>
<td>12,5</td>
<td>37,5</td>
<td>18</td>
<td>100 - 2 000</td>
<td>250 - 5 000</td>
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<tr>
<td>N50</td>
<td>25</td>
<td>75</td>
<td>40</td>
<td>100 - 2 000</td>
<td>550 - 5 000</td>
</tr>
<tr>
<td>N75</td>
<td>37,5</td>
<td>112,5</td>
<td>50</td>
<td>100 - 2 000</td>
<td>600 - 5 500</td>
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<tr>
<td>N150</td>
<td>75</td>
<td>225</td>
<td>110</td>
<td>100 - 2 000</td>
<td>600 - 7 500</td>
</tr>
</tbody>
</table>

- **Roller material:** PU
- **Length (mm):**
  - N12: 1 350
  - N25: 3 350
  - N50: 3 560
  - N75: 3 820
  - N150: 4 670
- **Width (mm):**
  - N12: 680
  - N25: 680
  - N50: 1 130
  - N75: 1 120
  - N150: 1 430

**Every PEMA rollerbed model is delivered with a standard remote control unit.**
PEMA, A Series

PEMA A series of self-aligning rollerbeds are ideal for handling unbalanced, thin-walled and/or heavy work-pieces. The A series rollerbeds provide even weight distribution, constant rotation speeds and adaptability to a wide range of work-piece diameters without need for separate adjustment. Loading capacities range between 12 and 800 tons. **PEMA A rollerbeds ascertain even weight distribution on the work-piece Longitudinal internal welding carried out with a set of PEMA A rollerbeds and a column & boom PEMA.**

- Ideal for unbalanced, thin-walled and/or heavy work-pieces
- Even weight distribution
- Automatic adjustment for different work-piece diameters

**PEMA products combine modern design and reliable, efficient technology for effective welding work.**

Longitudinal internal welding carried out with a set of PEMA A rollerbeds and a column & boom

PEMA A rollerbeds ascertain even weight distribution on the work-piece
PEMA A self-aligning rollerbeds are ideal for difficult and demanding work-pieces. The A roller bogies automatically adjust to align with the diameter of the work-piece in question. Compared with other rollerbeds, PEMA A series provides superior weight distribution. This is a significant advantage in the handling of thin-walled work-pieces. Either two or all four axles of the drive unit are power-driven. Four-wheel drive provides excellent grip and accurate rotation characteristics even for very unbalanced work-pieces. The A series rollerbeds with two-wheel drives suit well for wind energy tower and other conical work-piece handling. PEMA rollerbeds are designed in close cooperation with the best welding production professionals. PEMA’s extensive experience in designing and manufacturing welding automation solutions has been a key factor in the development of PEMA rollerbeds. Every PEMA product utilises high quality components from internationally recognised brands. All structures and components are series-produced and tested. Designed to the same high quality standards as PEMA positioners and column & booms, PEMA rollerbeds fulfil the requirements of the European EN safety norm. All PEMA rollerbeds come with CE-markings. Special ATEX models are available for use in areas with potentially explosive atmospheres, like shot-blasting and painting shops.

Please contact A400, A800 technical information
### PEMA A12 4D drive unit

<table>
<thead>
<tr>
<th></th>
<th>A12</th>
<th>A25</th>
<th>A40</th>
<th>A80</th>
<th>A150</th>
<th>A300</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max load (tons/unit)</strong></td>
<td>6</td>
<td>12,5</td>
<td>20</td>
<td>40</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>idler unit</td>
<td>6</td>
<td>12,5</td>
<td>20</td>
<td>40</td>
<td>75</td>
</tr>
<tr>
<td><strong>Rolling capacity (tons)</strong></td>
<td>18</td>
<td>37,5</td>
<td>60</td>
<td>120</td>
<td>225</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>Max rotation force (kN)</td>
<td>8,5</td>
<td>18</td>
<td>30</td>
<td>50</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Rotation speed range (mm/min)</td>
<td>100 - 2 000</td>
<td>100 - 2 000</td>
<td>60 - 1 250</td>
<td>60 - 1 250</td>
<td>100 - 2 000</td>
</tr>
<tr>
<td></td>
<td>Diameter range min-max (mm)</td>
<td>50% load</td>
<td>700 - 5 000</td>
<td>700 - 5 000</td>
<td>1 000 - 6 000</td>
<td>1 000 - 6 000</td>
</tr>
<tr>
<td></td>
<td>100% load</td>
<td>1 500 - 5 000</td>
<td>1 500 - 5 000</td>
<td>2 000 - 6 000</td>
<td>2 000 - 6 000</td>
<td>2 900 - 7 000</td>
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<td>Length (mm)</td>
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<td>3 230</td>
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<td></td>
<td>idler unit</td>
<td>2 280</td>
<td>2 280</td>
<td>2 790</td>
<td>2 800</td>
<td>3 460</td>
</tr>
<tr>
<td></td>
<td>Width (mm)</td>
<td>drive unit</td>
<td>710</td>
<td>780</td>
<td>1 120</td>
<td>1 210</td>
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<tr>
<td></td>
<td>idler unit</td>
<td>400</td>
<td>400</td>
<td>700</td>
<td>700</td>
<td>750</td>
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</tbody>
</table>
Joint Preparation:

The shape and recommended tolerances for the joint preparation is shown in figure below, i.e. a machined joint is required.
Comparison:

Narrow Gap Hot Wire TIG against other welding processes:

Example based on welding 42” CS pipe 32,2 mm WT,
<table>
<thead>
<tr>
<th>Welding process</th>
<th>Incl. groove angle</th>
<th>Defect rate(%)</th>
<th>Welding time (hour/weld)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW NG TIG</td>
<td>10</td>
<td>&lt;0.1</td>
<td>3.3</td>
<td>Two welding heads</td>
</tr>
<tr>
<td>NG MIG</td>
<td>10</td>
<td>1-3</td>
<td>1.5, 3</td>
<td>Four welding heads</td>
</tr>
<tr>
<td>TIG (manual)</td>
<td>60</td>
<td>&lt;1.0</td>
<td>20</td>
<td>Two welders</td>
</tr>
<tr>
<td>GS-FCAW (STT root)</td>
<td>60</td>
<td>&lt;1.0</td>
<td>7</td>
<td>Two welders</td>
</tr>
<tr>
<td>Saw (STT root)</td>
<td>60</td>
<td>&lt;1.0</td>
<td>3, 4</td>
<td>Twin wire Single wire</td>
</tr>
</tbody>
</table>
Example based on welding 6” CS pipe, 14 mm WT = 17 minutes

Example based on welding 8” CS pipe, 14 mm WT = 21 minutes

Example based on welding 10” CS pipe, 18 mm WT = 35 minutes
Operator Qualification:

For Narrow Gap Hot Wire TIG, the welding parameters shall be pre-programmed by a welding operator in accordance with a qualified welding procedure.

Welding operators should preferably have a manual TIG certificate. In addition, after one week of training they should be able to pass the NS – EN 1418 approval test required for programming and operation of fully mechanized welding units.
Submerged Arc Welding:

Plate thickness \ type of groove.

- Plate thickness and groove preparation:
  - Make an I-groove for plate thickness of 2 - 12 mm
  - Make a Y-groove for plate thickness above 12 mm
  - The surface of the groove must be smooth and clean
  - Gap.: < 1mm.
  - Please note the importance of a perfect root. Keep the nose of 3-5mm, permanent backing or a manual root pass. Only to avoid burnout as a consequence of the deep penetration of the SAW method
HW Narrow Gap TIG:

About Hotwire TIG welding:
TIG Hotwire is a further development of mechaniced TIG, where high deposition rates are achieved in combination with the first class quality traditionally expected from TIG processes.

The essential element is resistance preheating of the consumable, spooled wire which is continuously added to the melted pool.

The TIG arc is fusing the base material as usual, while a much smaller part of the arc energy is required to melt the wire than in traditional TIG.

This because the wire is already heated close to its melting temperature. Deposition rate therefore increases, and fewer runs are required to fill the joint.

Applications:
- Offshore pipeline.
- Cross Country pipeline.
- Shipyards.
- Piping Fabrications for module construction.
- Nuclear piping installation.
- Petrochemical industry.

Nose: 1.8 mm
Root gap: 0 – 0.2 mm
Groove width: 3+3 mm
Groove angle: 10° incl.
Welmax Group of Companies focusing on Welding Fabrication

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