

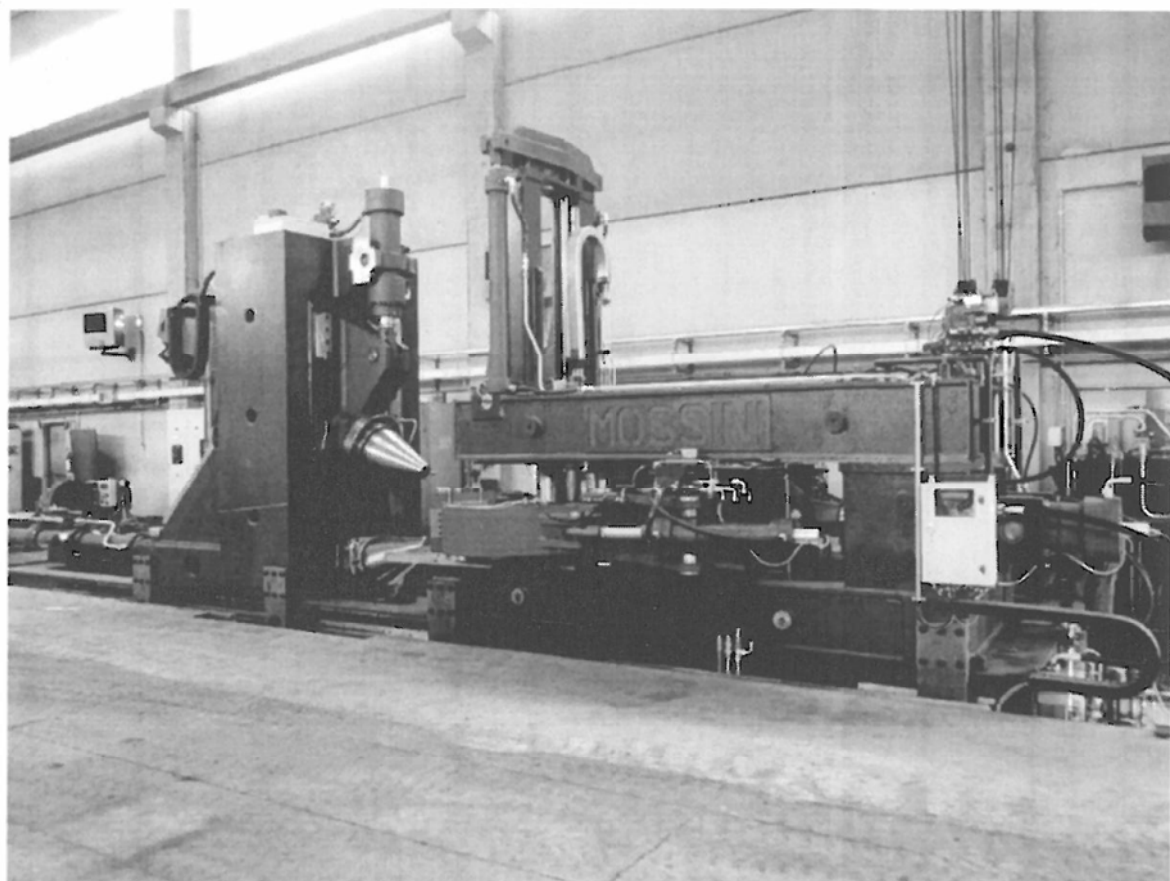


**MOSSINI** PRESSE

**RING ROLLING MACHINE  
MODEL  
"MS 125/100 - 3000/600"**



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## TABLE OF CONTENTS

1	Description of the supply .....	
2	Mode of operation of the radial-axial Ring Rolling Mill.....	
3	Working ranges and machine data .....	
3.1	Data of finished ring (cold dimensions) .....	
3.2	Rolling data.....	
3.3	Main roll .....	
3.4	Axial rolls .....	
3.5	Mandrel .....	
3.6	Rolling table level.....	
3.7	Electrical equipment .....	
3.8	Machine main dimensions.....	
4	Scope of supply.....	
4.1	MS 125/100 – 3000/600:.....	
4.2	Main system components makers .....	



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## 1 Description of the supply

Mainly the Ring Rolling Mill consists of 2 horizontal, independent radial (upper and lower) sleeves and 1 vertical axial sleeve (upper cone). The axial cones are, in turn, installed on a horizontally moving axial frame.

Main dimensions are reported in the annexed layout sketch which, eventually, **will be revisited to match your layout constraints.**

The Ring Rolling Mill will develop as an arc welded steel-structure integrating the following main groups:

- Radial rolling assembly: fixed;
- Upper axial rolling edge roll: mobile;
- Axial frame, integrating lower edge roll and upper axial rolling edge: mobile;
- Mandrel sleeve (vertical): mobile;
- Basement.

In the following are listed the main guidelines which characterize the machine configuration, oriented to meet your expectations:

- Double radial Slide to facilitate changing tools;
- Main Roll and Mandrel supported by both sides to maximize the stiffness and thus the accuracy of rolling
- Height-adjustable radial Main Roll and Mandrel;
- Linear Roller Bearings Axial Sleeves to maximize movement precision;
- Centring Rollers housed in pre-assembled frames to facilitate their replacement;
- Laminating Plates supporting the rings adjustable in height;
- Mechanical measuring system
- Main actuators hydraulically operated;
- Both axial edge rolls motorised;
- Control system main characteristics:
  - Full automatic ring rolling process;
  - User-friendly HMI (Human Machine Interface) supporting the implementation of the technological requirements (ring dimensions, tools dimensions, material data, lamination curve, ring growth speed, etc.);
- Check of consistency of geometric input data. Subsequently all data are converted into input for the machine;



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- Possibility to record and plot technological rolling parameters (diameters, height, etc.);
- Mobile panel to facilitate maintenance and tooling change operations.



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## **2 Mode of operation of the radial-axial Ring Rolling Mill.**

The machine is designed for the manufacture of seamless rings by a radial-axial ring rolling process.

The radial rolling force is hydraulically generated and transmitted to the work-piece by the Mandrel. The radial thickness reduction is achieved by reducing, horizontally, the gap between the motor driven Main Roll and the Mandrel.

The axial rolling force is hydraulically generated and transmitted to the work-piece by the upper axial conical roll (Edge Roll). The axial reduction is achieved by vertically reducing the gap between the upper and lower axial conical rolls. Both the upper and lower axial rolls are motor driven.

Two centring rolls enable the machine to maintain the symmetric position of the ring, with respect to the longitudinal axis, during the rolling process.

The control system is suited for automatically operated rolling process: a modern computer controlled system, specifically suited for the radial-axial ring rolling process, has been developed.

Such a control system combines technology-oriented algorithms with the servo-hydraulic position control loops, leading to the following features:

- It allows the production of seamless rings, utilising the machine capacity in an optimum way;
- The rolling sequences may be easily tuned by the operator, according to technological requirements, via a user friendly HMI;
- The coherence of geometric data of the ring to be rolled is checked by the computer; all input data are then transferred into control data for the process control;
- Rolled ring data and related technological data can easily be saved and re-loaded for future productions of the same ring;



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This results in decisive advantages for the user:

- Production mainly independent from operator's skills;
- Constant, high quality of the rings;
- Minimum material requirement and minimum forming energy;
- Minimum time to set new ring data, leading to high productivity, even when producing small batches or individual rings;



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### 3 Working ranges and machine data

#### 3.1 Data of finished ring (cold dimensions)

- Ring outer diameter:	400÷3000 [mm]
- Ring height:	40÷600 [mm] <sup>1</sup>
- Max ring weight	2000 [kg]

#### Remark

The machine is designed for the above mentioned ring dimension limits. Anyway, it may be worth to say that in the ring rolling process, some machine-independent rolling-technological parameter can affect the process itself.

For instance, the possibility to roll rings depends, among the others, on the forming resistance of the raw material, the ring cross-section, as well as on the shape of the pre-formed ring blank.

For this reason, it could not be possible to roll all rings whose final dimensions require the simultaneous utilization of all machine limit values.

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<sup>1</sup> The minimum value is mainly associated to mechanical diameter sensing device. With the option (not included in the offer) of laser sensing device, the same value can be reduced to 30 [mm].





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### 3.2 Rolling data

The technical data mentioned below are to be considered as reference. We reserve the right to make any technical modification, which is advisable or necessary in the interest of the machine.

- Radial rolling force, max.:	1250 [kN]
- Axial rolling force, max.:	1000 [kN]
- Radial drive power:	315 [kW]
- Axial drive power:	2x160 [kW]

### 3.3 Main roll

- Nominal diameter:	700 [mm]
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### 3.4 Axial rolls

- Usable length:	450 [mm]
- Angle of edge rolls:	45°
- Distance between the axial rolls, max:	650 [mm]

### 3.5 Mandrel

- Mandrel diameter at max. ring height and max. radial rolling force:	250 [mm]
- Minimum mandrel diameter:	150 [mm] <sup>2</sup>

<sup>2</sup> Blank minimum inner diameter: 160 [mm]



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### **3.6 Rolling table level**

- Height of rolling table above floor level: ~400 [mm]

### **3.7 Electrical equipment**

Rated Voltage 400 V AC, 50 Hz.

The power supply will be ensured by Customer supply utility.

Execution of the electrical equipment according to harmonized European standards.

### **3.8 Machine main dimensions**

According to the annexed layout which, eventually, will be revisited to match your layout constraints.



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## 4 Scope of supply

### 4.1 MS 125/100 – 3000/600:

#### Mechanics:

- Main Frame with possibility of levelling on the foundation;
- Radial frame in welded steel;
- Main roll supported at both ends;
- Main Roll height adjustment, manually;
- Mandrel height adjustment;
- Mandrel slides (radial rolling) wizard on horizontal columns;
- A device for raising and lowering mandrel on prismatic guides
- Axial frame integrated lower edge roll;
- Axial slides (axial rolling) guided vertically in the axial frame;
- Centering rolls with full opening to allow the passage of rings of maximum diameter;
- Rolling table, manually adjustable in height;

#### Hydraulics:

- Hydraulic Power source unit, including tank, pumps, motors, air-conditioning systems oil (filters, heat exchangers, etc. );
- Hydraulic manifolds for every drives, integrating proportional adjusting valves, switching and/or interception valves;;
- On board hydraulic piping, including fittings and fixing materials;
- Hydraulic actuators;

#### Lubrication and cooling:

- On Board cooling piping and spraying nozzles for rolling tools;
- Autonomous oil lubrication system for gearboxes;
- Centralised grease lubrication system, remote controlled and time programmable, for bearing assemblies and guiding (Air-oil for Axial Edge Rolls);

### ELECTRICAL SYSTEM AND CONTROL FUNCTIONS

- Electrical System, made according to the regulations in force;
- Three-phase power supply with voltage  $400V \pm 10\%$  50 Hz;
- Electrical equipment in separate cabinets (power and signals) containing respectively the drives of the motors and Siemens PLC;



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## **Rolling Drives:**

- Variable speed drive for the upper and lower axial roll;

## **Electric and electronic systems, positioned in cabinets, including:**

- Main contactors;
- Voltage transformers;
- Drivers for fixed and variable speed motors;
- Drivers for proportional and ON-OFF valves;
- Automatic control modules, mainly represented by:
  - Simatic PLC S7;
  - Simatic FM458-1DP, integrated with expansion for analogical and digital signal analysis;
  - Ethernet interface with HMI;
- Control desk integrating 1 display, Profibus and Ethernet interfaces and characterised by:
  - IP 65 frontal protection;
  - Programmable via WinCC Flexible;
- N° 1 industrial PC with color monitor;
- Control Software for automatic processing with viewing computer graphics. It provides:
  - PLC Software (SIEMENS S7) for the coordination and control of the drives, as well as management of the whole rolling process;
  - Software for operator panel (PC/Windows CE networkable industrial ETHERNET). Allows the introduction and displaying geometrical parameters and technological processing of rings;
  - Bank management data with parameters rings already made;
  - Recording of machining parameters of the rings (to be agreed criterion);
  - calibration Management in automatic through ring sample;
  - diagnostic Management, alarms, and operator's guide;
  - Any additional functions to agree.

## **Devices and accessories**

- extraction cylinders of the main roll;
- system of rapid release for main roll;
- centering rollers with removable cassette;
- N° 1 laser device for measuring rings
- System for remote assistance;
- Mobile Panel with attacks on board machine to allow maintenance and calibration movements;



## 4.2 Main system components makers

Hereinafter we list the main components used.

	Component	Supplier	Note
Electric and Electronic	Cabinets and Boxes:	Ceb or Quadritalia or Rittal	
	Cooling Systems	Not Included	The electric and electronic apparatus will be installed in a conditioned room supplied by the Customer
	Line Sectional Switches	Telemecanique Or Siemens	
	Contactors	Telemecanique or Siemens	
	Aux. Relays	Telemecanique Or Siemens Or Phoenix	
	Ac&Dc Converters	Siemens	
	PLC	Siemens S7 400	
	Basic Hmi Terminal	Siemens	
	Computers	Hp or Lenovo	
	Selector And Buttons	Telemecanique or Siemens	
Pneumatics	Cylinders	Waircom and Festo (or Norgreen)	
	Piping	Conventional supplier	
	Pipe fittings	Conventional supplier	
	Air supply module	Festo or Norgreen	
	Precision pressure regulator	Festo or Norgreen	
	Solenoid and passive valves	Festo or Norgreen	



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Hydraulics	Tank		According to DIN 24339
	OIL	Not included	HPL-D46 ISO quality
	Pumps	Rexroth or Parker or ATOS	
	Piping	Conventional supplier	
	Piping fittings	Parker or Voss	
	Piping installation	Some specific tool (small adaptation to standard tool) may be sometime required for fittings.	
	Cylinders	Grices or Rexroth or Similar;	ISO 6022 standard
	Position transducer	Balluff or MTS	
	Proportional valves	Rexroth and Moog	
	Solenoid valves	Rexroth or Parker or ATOS	
	Pressure accumulators	Hydac or Parker or EPE	
	Pressure transducer	Hydac or Trafag	
Mechanics	Bearings	SKF/FAG	
	Gearboxes	Flender or Rossi	
	Linear guidance system	Schneeberger or Rexroth	
	Grease centralised lubrication system	Dropsa	
	Couplings	Stromag/Radex (KTR) or Mondial	