



Radial and radial-axial ring rolling machines

Improved efficiency and product quality in ring production



Productive, precise and cost-effective

Flexible plants for a wide range of ring profiles

Radial and radial-axial ring rolling machines from SMS group play a leading role on the world market. Our ring rolling experts consistently tailor the individual machines to the specific requirements of our business partners, meaning the plants are both extremely cost-effective and precise. Sophisticated control and technology programs for the entire production process ensure a constant high quality of ring of virtually any size and shape.

Designed for efficiency

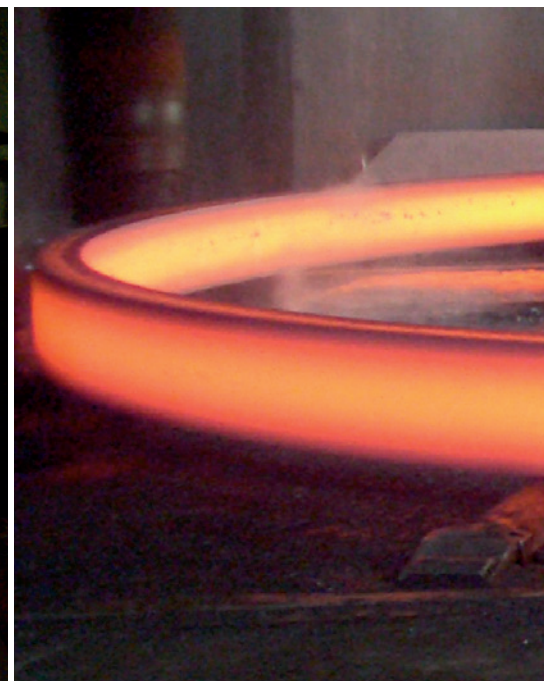
The particular advantage of SMS group ring rolling machines is that they require a minimum of energy, material and tools and offer intuitive, efficient operation as well as a high level of manufacturing precision. The high degree of rolling process automation ensures maximum utilisation of the machine's capacity. The result is a stable, cost-effective production process.

Wide range of materials

SMS group ring rolling machines can run all forgeable materials, including carbon steel, low and high-alloy steel, austenitic steel, super alloys such as Inconel, Hatelloy, Waspaloy, Incoloy and Nimonic, as well as non-ferrous metals such as titanium, aluminium and copper alloys.

Technological lead based on decades of experience

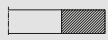
The Forging Plants business unit is where SMS group has brought together the know-how of the traditional Wagner Werkzeugmaschinenfabrik and J. Banning AG brands. Both companies were founded in the middle of the 19th century and for decades were pioneers in the field of ring rolling technology. Since 1997 their expertise has been bundled under the umbrella of SMS group. The ring rolling experts in the Forging Plants business unit use this know-how to help their business partners find the right plant or machine to meet their needs.



Customised rings using precise and productive solutions

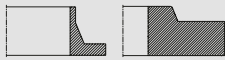
Radial and radial-axial ring rolling machines of type RW and RAW are capable of producing a variety of ring profiles, for example:

Non-profiled rings



Profiled rings

Flanges



Tyres for rail vehicles



Bearing bushes



Gear wheels



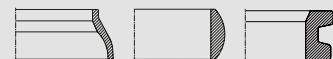
Sheaves



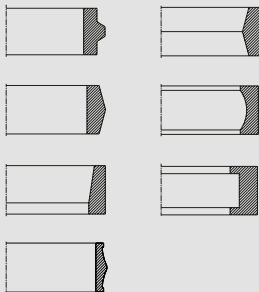
Idlers



Ball valves



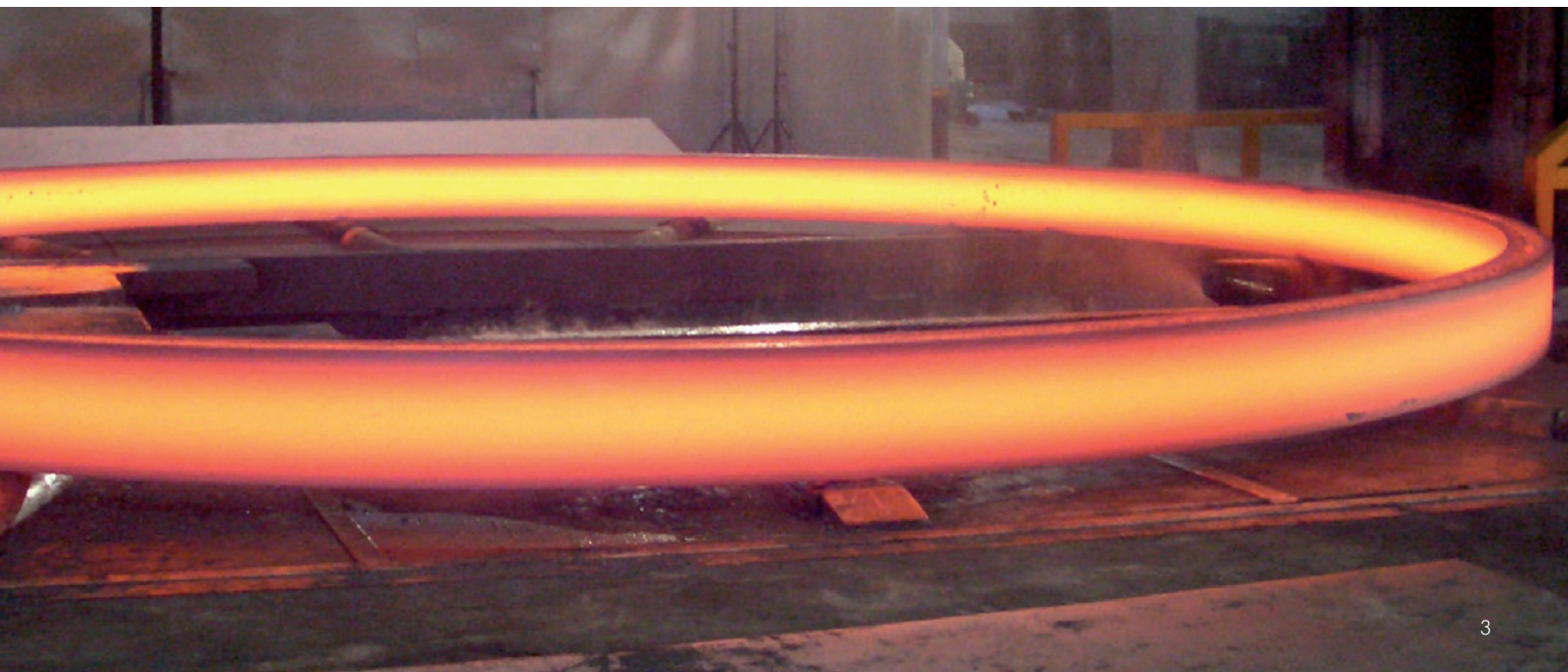
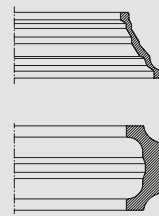
Anti-friction bearing rings



Flanges for wind turbines



Rings for jets engines and other applications in the aerospace industry



Process-wide optimisation potential

From the blank to the finished ring

Ring manufacture begins with production of the ring blank on specially-designed ring blank presses. Multiple upsetting and piercing processes give the blanks their perfect shape for rolling. The next stage is radial or radial-axial rolling of the blank.

Precise rolling means reduced subsequent process costs

A laser measuring system for non-contact detection of the ring outside diameter during rolling, together with the other measuring axes, supply all the data required by the control system for the relevant ring dimensions. The CNC system makes it possible to reproduce rolling processes and thus ensures consistently high product quality and close manufacturing tolerances. Since around 90% of the energy used in ring rolling is required for heating, precise rolling has a direct

effect on energy consumption: the required component weight results in energy savings during heating. What's more, the close tolerances mean lower costs and time for machining.

Planning and technological support

SMS group tailors standard-range machines to suit the individual requirements of its business partners. The world's largest ring rolling machine, developed by SMS group for Forgiatura Morandini, is just one example of this. This Italian company is successfully using its RAW 2500/1000-7000/3500 to produce large-scale, extremely robust pressure vessel rings. For rings made of super alloys, SMS group offers a series of machines that is specially designed for the high demands of this sector.





Raw-type ring rolling machines

Machine size ¹⁾	Ring data				Machine data			
Type	Standard outside diameter	Outside diameter ²⁾	Height	Max. weight	Rolling force		Drive power	
RAW	mm	mm	mm	kg	Radial kN	Axial kN	Radial kW	Axial kW
20/16 – 800/160	160 – 800	1000	20 – 160	40	200	160	50	2 × 38
25/20 – 800/160	200 – 800	1000	20 – 160	63	250	200	75	2 × 38
32/25 – 1000/180	200 – 1000	1250	20 – 180	125	315	250	75	2 × 55
40/32 – 1250/210	200 – 1250	1500	20 – 210	250	400	315	100	2 × 55
50/40 – 1400/250	250 – 1400	1750	30 – 250	400	500	400	125	2 × 68
63/50 – 1600/315	250 – 1600	2000	30 – 315	630	630	500	160	2 × 75
80/63 – 2000/400	300 – 2000	2500	30 – 400	1000	800	630	200	2 × 110
100/80 – 2500/480	300 – 2500	3000	30 – 480	1600	1000	800	250	2 × 140
125/100 – 3000/560	400 – 3000	3600	30 – 560	2500	1250	1000	315	2 × 160
160/125 – 4000/630	400 – 4000	4600	30 – 630	4000	1600	1250	400	2 × 200
200/160 – 5000/710	500 – 5000	5600	40 – 710	6300	2000	1600	500	2 × 250
250/200 – 6000/800	500 – 6000	6600	40 – 800	8000	2500	2000	630	2 × 315
315/250 – 7000/900	630 – 7000	7800	40 – 900	10000	3150	2500	800	2 × 400
400/315 – 8000/1000	800 – 8000	9000	40 – 1000	12500	4000	3150	1000	2 × 500
500/400 – 8000/1250	800 – 8000	9000	40 – 1250	16000	5000	4000	1260	2 × 630
630/500 – 8000/1600	800 – 8000	9000	40 – 1600	20000	6300	5000	1460	2 × 730
800/630 – 8000/2000	800 – 8000	9000	40 – 2000	32000	8000	6300	1600	2 × 800
1000/800 – 10000/2500	800 – 10000	11000	40 – 2500	50000	10000	8000	2000	2 × 1000
...

¹⁾ Other machine sizes on request

²⁾ Max. outside diameter for horizontal unloading

Reproducible Rolling results

Reliability with sophisticated control technology

Rolling seamless rings on radial and radial-axial ring rolling machines in a way that saves on material and costs places huge demands on the machinery and the control systems. Computer systems with operator guidance such as CARWIN from SMS group allow the rolling process to be influenced reproducibly and help in defining the rolling parameters.

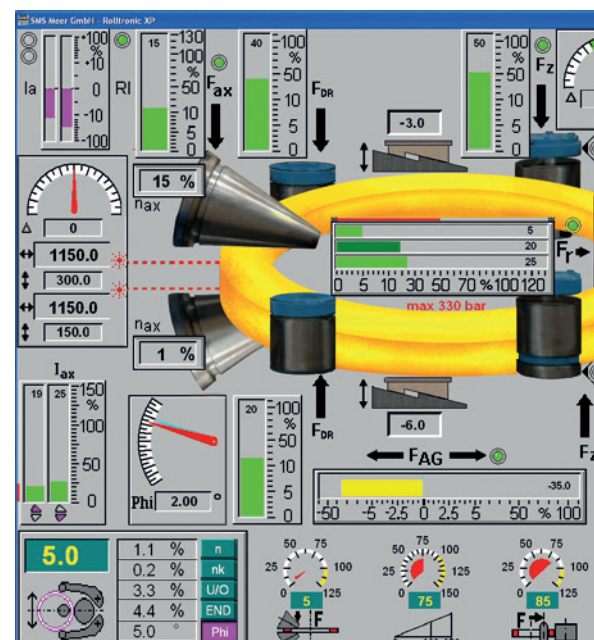
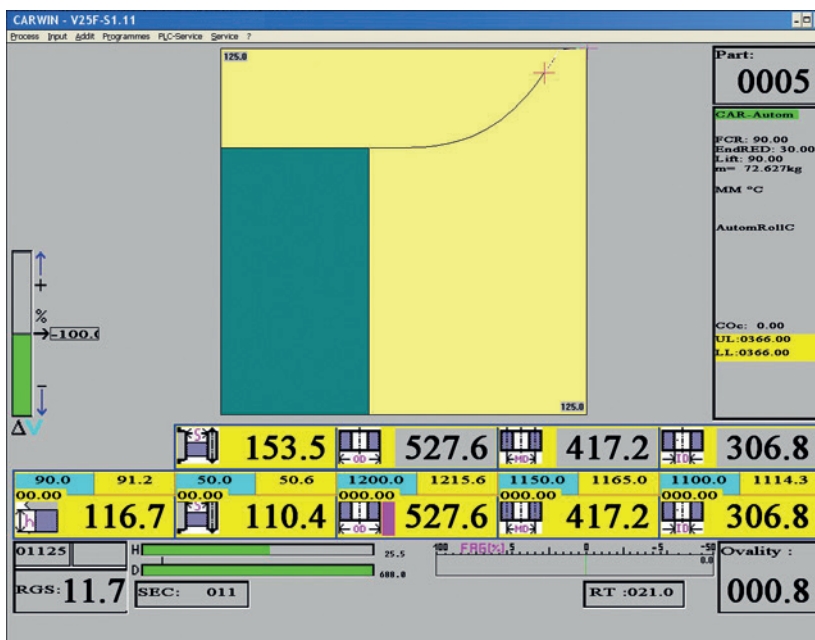
CARWIN: Close tolerances, flawless surfaces

CARWIN (Computer Aided Rolling under MS Windows) is a program that works with the ring rolling machine's CNC system to enable most of the rolling process to take place fully automatically and to ensure production of consistently high-quality rings. The software minimises the ovality and conicity of the rings, guarantees close tolerances and prevents surface defects. In addition, it provides the basis for automated manufacturing processes and thereby ensures efficient,

cost-effective ring production. Every rolling process can be programmed exactly according to the specifications of the ring to be manufactured. The system checks the input data for plausibility and converts it into control data for the rolling machine. As an alternative to manual data input, the control data can also be transferred from the technology computer.

Open, modular architecture

SMS group radial and radial-axial ring rolling machines are equipped with high-performance CNC systems for automatic rolling to the relevant technological standards. Based on standardised control modules, the modular architecture is open and compatible with future upgrades and new developments. At the heart of the concept is a microprocessor system featuring the CARWIN software, specifically developed for the radial-axial ring rolling process.



Machining, energy and material savings

SMS group designed and supplied two ring rolling lines for FRISA Forjados in Mexico. The first line includes a PL 8000 ring blank press and a RAW 500/400 ring rolling machine. The second, fully automatic ring rolling line uses a PL 5000 ring blank press and a RAW 315/200 ring rolling machine. With both these plants FRISA is able to make significant savings in material and energy consumption as well as machining costs, and can produce a wide range of wind tower flanges for wind turbines in a various sizes. FRISA can also react flexibly to changing market conditions: both lines are designed for the production of flanges for wind turbines, however the company also manufactures high-quality products for the oil and gas industry.



Technology software for greater efficiency

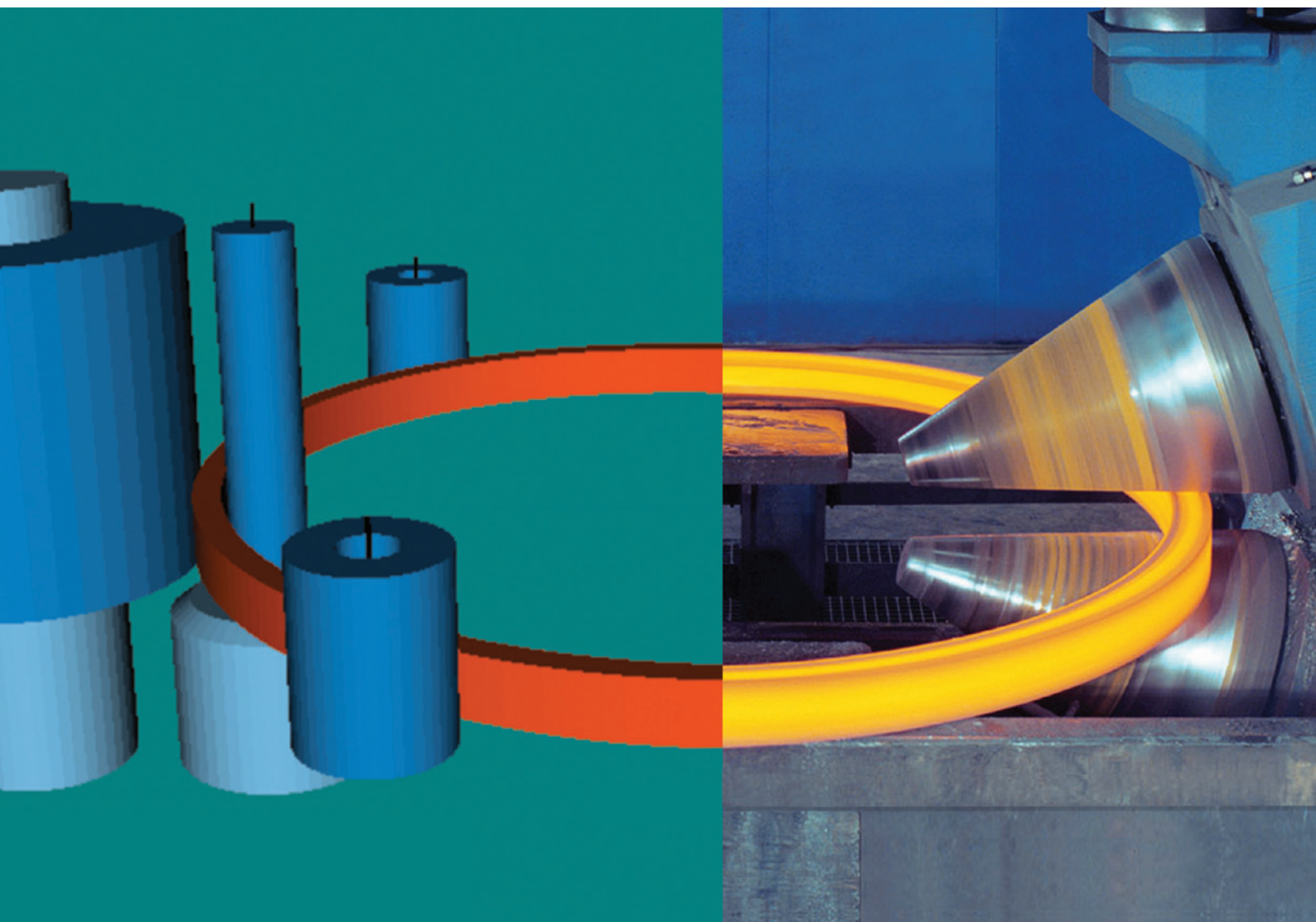
ROLLTECH

The key to cost-effective ring production and greater flexibility in order processing lies primarily in the control and technology software used. SMS group has just the solution: ROLLTECH (Rolling Technology Systems). This software goes significantly further than CARWIN, the control program for radial-axial ring rolling machines. ROLLTECH enables plant owners to identify potential savings in the use of materials, for example with allowances, tolerances, slugs or scale. The software offers clear benefits for special applications in particular. Manufacturers of flanges for wind turbines, for example, can achieve material savings of up to 30 percent, because the flanges are directly profiled for rolling, instead of producing the final contour at great expense in a designated

machining process. This reduces machining and tooling costs for the subsequent process stages at the same time. The software also delivers improvements at process level: the operating personnel can easily identify what performance limits are preventing faster production or what non-productive times can be shortened, for example during workpiece handling.

ROLLTECH can be used on external computers for optimum process planning, from the ingot to the rolled ring, incorporating all machine capacity limits and process simulation, NC data generation and easy data transfer to the machine control system.





ROLLTECH is based on decades of experience of ring rolling technology. The software is regularly updated to accommodate the latest developments.

ROLLTECH: Programmed for every customer requirement

ROLLTECH is primarily used in job preparation, where the entire ring production process, from the ingoing material to the finished rolled ring, can be planned with computer assistance. All the modular system initially requires is information on the finished ring geometry and material. The program is variable in structure: it enables both simplified, fast calculations for everyday manufacturing and complex calculations for selected special orders.

ROLLTECH offers comprehensive technological support, based on its main objective: rings that are ready to be sold. From this basis the software calculates the required parameters for the entire production process, from the rolled ring through the rolling process and definition of a requisite blank, right up to the selection of a suitable ingoing block.

A flexible, modular design for variable demands

Basic and additional equipment

The universal applications of SMS group ring rolling machines are made possible thanks to their modular design: the system offers a wide variety of possibilities, customised tooling and various technological concepts for rolling process control.

Basic equipment

- Main roll and mandrel roll with bearings on both sides – high rigidity, small tool dimensions
- Main roll, mandrel roll and rolling table are height-adjustable
- Circular guides for the radial carriage and roller guide for the axial frame – no „stick-slip“
- Electrohydraulic position control loops, servohydraulics – high operational accuracy
- Non-contact digital measuring axes with actual value display – high operational accuracy, low maintenance
- Ring centricity control – optimised rolling process, enhanced product quality

- PLC for all motion sequences – automatic control of all machine movements
- Test and fault diagnosis system – increased availability

Additional equipment

The ring rolling machines can be extended to include additional equipment that is proven in practice to create greater flexibility and offer further technological possibilities, enhance productivity and ease of operation and provide increased availability with additional monitoring functions. The standard machine versions can be adapted with little extra effort to the individual demands of special markets. SMS group also offers customised machines and constructions for special applications.

The ring rolling specialists at SMS group are always on hand to engage with customers and develop new concepts for cost-effective ring rolling to meet their specific requirements.

Special machine series for real competitive advantages

For particularly challenging applications SMS group offers special series of machinery that offer plant owners huge advantages in their respective markets. In terms of the production of flanges for wind turbines, material savings of up to 30 percent can be made compared to conventional manufacturing methods.

Our specialists have also developed a special series for the aerospace industry, specially tailored to the demands of this particular sector: these compact machines produce huge rolling forces and can easily

process materials that are difficult to form. The rings which are often heavily profiled are near-net-shape after rolling. This means less work during subsequent process stages and less materials are required which, given the costly stock used, results in significant cost benefits. One further advantage for plant owners: the rings produced on SMS group ring rolling machines comply fully with the end users' demanding certification requirements concerning safety-related components.



Select ring rolling plants and machines from SMS group

Customer	Plant/machine	Country
ThyssenKrupp Rothe Erde	RAW 63/63-1250/450 ring rolling machine	Germany
Schmiedewerk Stooss AG	RAW 80/63-1600/480 ring rolling machine	Switzerland
TRIANGOLO spol. s r.o.	RAW 100/100-2000/400 ring rolling machine	Czech Republic
Ohmi Press Works & Forging	RAW 160/125-3000/630 ring rolling machine	Japan
McInnes Rolled Rings	RAW 160/125-3000/630 ring rolling machine	USA
ThyssenKrupp Rothe Erde	RAW 200/200-5500/630 ring rolling machine	Germany
Officine A. Melesi	RAW 200/160-3500/1000 ring rolling machine	Italy
IRE-OMBA S.p.A.	RAW 315/200-4000/1000 ring rolling machine	Italy
ASFO S.p.A.	RAW 400/400-6000/1200 ring rolling machine	Italy
OAo Ruspolimet	RAW 400/400-6000/1200 ring rolling machine	Russia
Electrostal	RAW 400/200-3000/600 ring rolling machine	Russia
Bohai Steel Group Corp.	RAW 800/500-10000/2500 ring rolling machine	China
Forgiatura Morandini	RAW 2500/1000-7000/3500 ring rolling machine	Italy
Ovako Tube & Ring	RiWa 2000/80 ring rolling plant	Sweden
S. E. Forge	RiWa 5000/200/1000 ring rolling plant	India
Frisa Forjados	RiWa 5000/315 ring rolling plant	Mexico
Frisa Forjados	RiWa 8000/500 ring rolling plant	Mexico

Explanation of machine designation

RAW 315/200-4000/1000

315 ▶ nominal radial rolling force [t]

200 ▶ nominal axial rolling force [t]

4000 ▶ max. ring diameter [mm]

1000 ▶ max. ring height [mm]

RiWa 2000/80

2000 ▶ ring blank press force [t]

80 ▶ nominal radial rolling force of RAW [t]



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