



SIEMENS
V A I 

Metals Technologies

Red Ring stands

Maximizing mill productivity with robustness and flexibility

www.siemens-vai.com

Outstanding flexibility and cost-effectiveness

Your challenge:

Being able to change your line with virtually no downtime is critical to meet tight delivery deadlines and remain competitive. To be successful, you have to be able to quickly configure modern mills. You must provide a wide range of products from a single mill layout.

Our solution:

With thousands of installations world-wide, Red Ring stands are one of Siemens VAI's main products for the rolling sector. These high-performance rolling stands succeed because of their great robustness and flexibility. They can be very quickly reconfigured while in operation, permitting a wide range of production that is virtually uninterrupted.

High stiffness and reduced elongation

"Red Ring" refers to the reduced ring of stress generated by rolling forces across the main stands' screws and chocks. This allows for the stand's very compact design, which significantly contributes to its rigidity. Even when experiencing intense rolling forces, the design limits the strain while enabling very tight product tolerances.

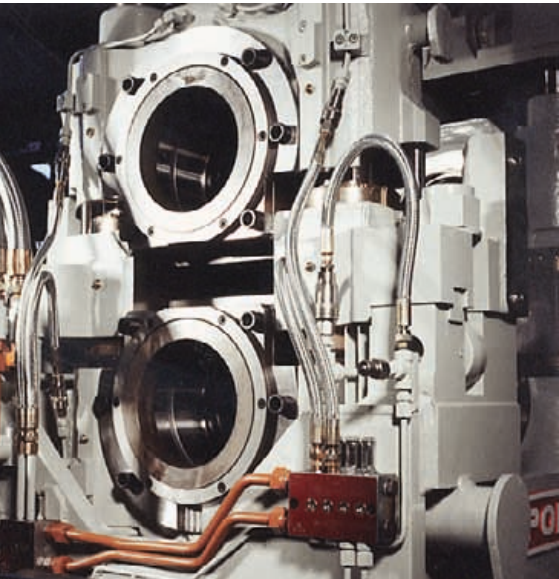




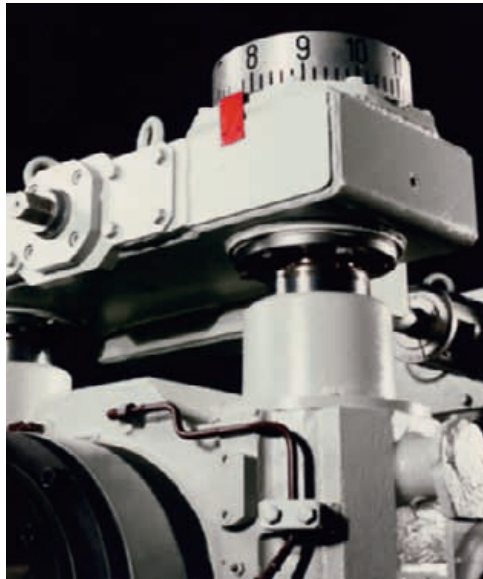
Advantages of Siemens VAI Red Ring stands:

- **Fast changeover**
Red Ring stands minimize idle time because of their quick changeovers.
- **More product flexibility**
A wide variety of rolled products can be produced thanks to fully automatic stand interchanges.
- **Longer lifetime**
Red Ring stands have a longer life span because of the components' high stiffness and minimal wearing. Self-balancing spindle support also provides positive engagement.
- **Axial roll adjustment**
Axial roll adjustment (even under load) and hydraulic chock balancing for excellent rigidity provide close product tolerances and high-quality rolling products.
- **Quick interchange**
The connection and disconnection of the spindles and all the fluid utilities are fully automated. That means the stands can be very quickly interchanged. Because different versions, including horizontal, vertical, convertible, mono-groove or drop-in joker (which converts a horizontal to a vertical) are all in operation simultaneously, they allow rapid adaptation to the variety of the rolled products needed to fulfill stringent market demands. Their line flexibility permits rolling with low-temperature, high-alloy, and wide forming passes.

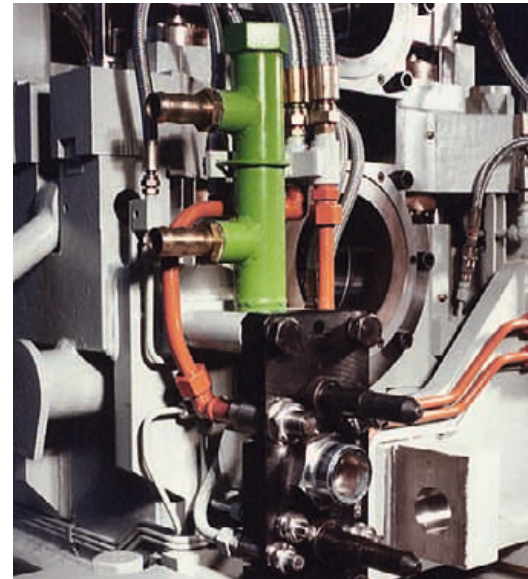
Red Ring stands



Red Ring with utilities piping



Onboard dial for gap measurement



Quick interface for utilities

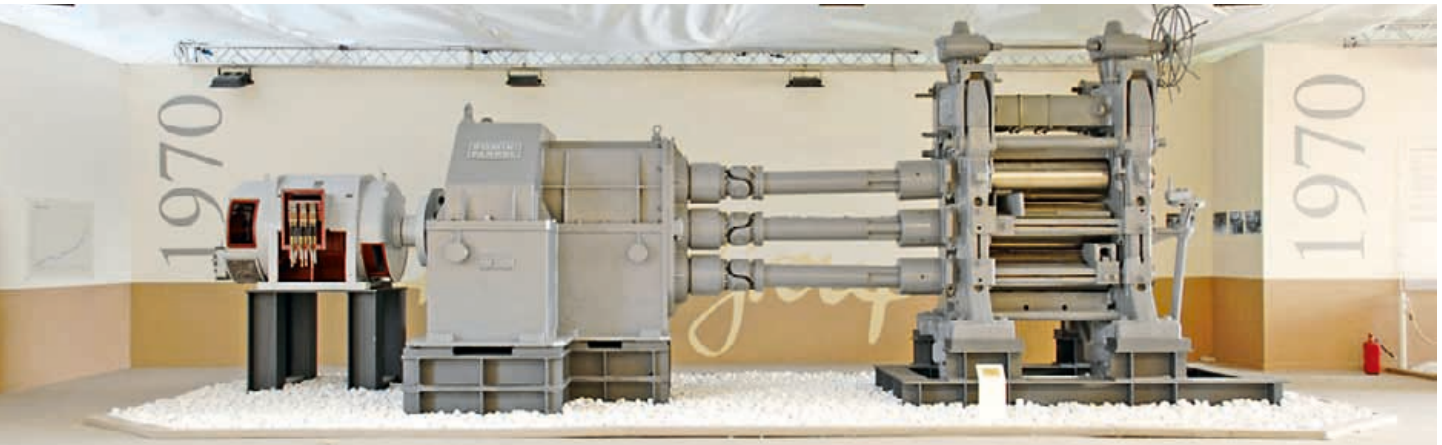
Our latest generation of Red Ring rolling stands is based on years of operational experience and continuous improvements. Four-row cylindrical radial bearings combined with separate axial thrust bearings provide maximum load carrying capability and long service life. Available in several configurations, the Red Ring rolling stands yield optimum product tolerance and offer many advantages compared with other stand types.

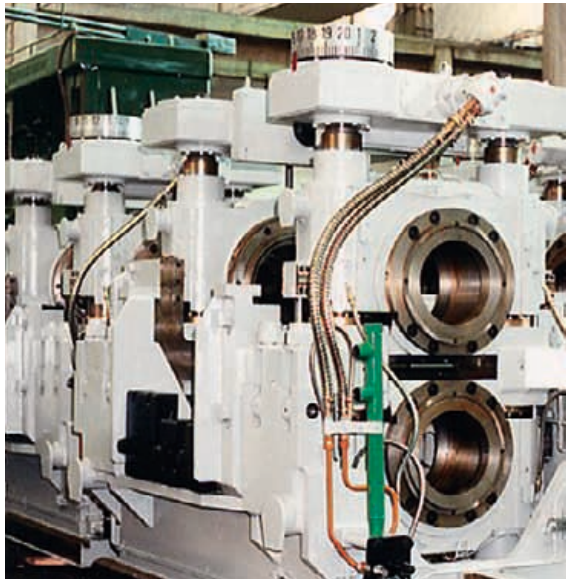
Complete 3-high rolling group, Feralpi, Brescia, Italy – quality, dependability, and uninterrupted operation for more than 40 years

High stiffness – Red Ring HS housingless rolling stand
“HS” refers to the “high stiffness” and reduced elongation, deriving from the robust design and short stress path offered by the fully automated Red Ring housingless stand.

Advances with Red Ring 5XX series:

- Increased rigidity, for minimal deflections
- Possibility of using rolls with a larger diameter, hence reducing the bite angle
- Improved design of chock pivoting system, for longer bearing lifetime
- Best selection of material for tie rods
- Optimized manufacturing of chocks

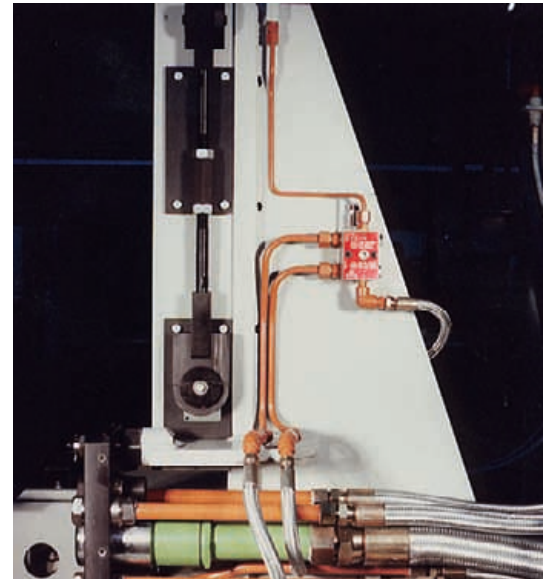




Red Ring assembled stand



Hydraulic motor for gap adjustment



Self-balancing spindle holder

Integrated design

The Red Ring design concept is integrated with the stand ancillary systems: rest bars, guide components and roll cooling devices. This enables a simpler and therefore faster stand preparation, it optimizes the maintenance procedures and contributes to a long service life.

Proven in operation

Several tested features make operation easy:

- The automatic hydraulic motor-powered symmetrical screw-down system
- The ability to adjust the gap under load
- The wear-resistant, self-balancing spindle support
- The hydraulic stand release clamp units for maximum rigidity
- easy access to the stand components for simple maintenance

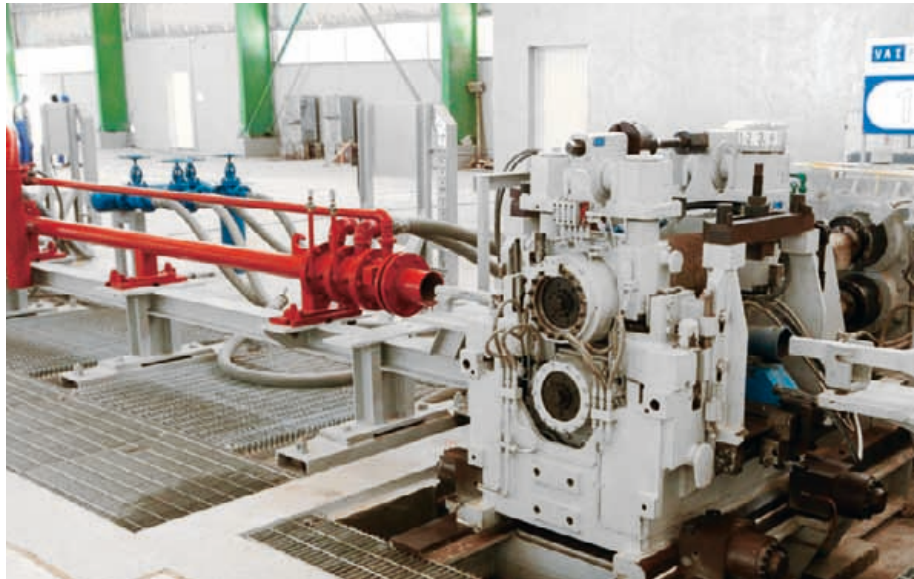
Red Ring series 5XX – standard sizes of stand families					
Stand families	Ranges of roll working center distance ¹		Chock tie rods center distance	Neck diameter	Neck max load
	Min [mm]	Max [mm]	[mm]	[mm]	[kN]
RR-538 HS	260	345	375	160	1,050
RR-545 HS	320	530	445	200	1,500
RR-555 HS	380	580	550	230	2,000
RR-564 HS	520	700	635	280	2,800
RR-572 HS	570	760	720	300	3,500
RR-577 HS	650	870	770	340	4,400
RR-590 HS	750	1,020	900	370	6,500

¹ Each stand family comprises several stand units with scaled combinations of min/max roll center distances.

Maximum rigidity and flexibility



Rolling mill overview



Finishing rolling stand before in-line thermoprocessing

Our 2-high HS rolling mill stands are based on the Red Ring housingless unit with four-row cylindrical roller radial bearings and separate thrust bearings. They allow the highest rolling forces in any direction.

Maximum rigidity

Our stands excel because of their “high stiffness.” Chocks adjust symmetrically about the pass line and are hydraulically balanced for maximum rigidity. Because only bearing and tie rod thread clearance is released, the stands are protected if there is a drop in hydraulic pressure.

Interchangeable cartridge components

The innovative screw-down system is also hydraulically powered. That means it can be adjusted under load. All cartridge components are interchangeable in horizontal or vertical positions, standardizing procedures while reducing spare parts inventory. A single cartridge model is used for all applications – from the lowest grades of rebar up to the superalloys.

Improved axial thrust system

Besides the new screw-down system that uses commercial components to increase capacity, the latest model features an improved axial thrust system. It also uses an oil/air lubrication on mill bearings that reduces the amount of continuous lubrication required and provides a cleaner overall operation.

Long bearing life

The four-row cylindrical bearings have an outstanding lifecycle that’s achieved through the equal distribution of loads over the cylindrical rollers. Our design – in which a spherical pivot point is ideally placed close to the roll center line – allows chocks to fully compensate for roll bending under load.

The bearing thickness for Red Ring stands is much greater than in other designs. This feature reduces the risk of permanent deformation by “counterstroke”, which may occur when the bar leaves the loaded stand. As proof of their long lifecycle, some roller bearings of Red Ring stands have operated for more than 15 years.



Horizontal stand – 3D view



Red Ring stand with gear spindles

Gear spindles

Red Ring gear spindles are customized with Siemens VAI's proprietary design, and were developed over the years and continuously improved. The gear spindles offer a compact and reliable construction. In fact, they present an array of points over the cardan spindles, including:

- Smaller overall stand dimension, and therefore simpler building and foundation requirements
- Reduction of torsion spring effect, of vibrations and of noise
- Greater rigidity of the transmission
- Elimination of the cinematic imperfection of cardan spindles which occurs in nonideal conditions
- Smooth torque transmission
- High capacity of peak loads withstanding
- Simple maintenance requirements



Gear spindle

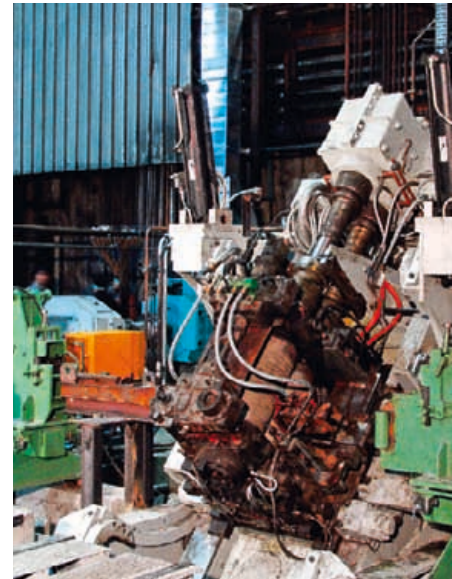
Quick changeovers – always



Convertible stand in horizontal position



Convertible stand in vertical position



Convertible stand during rotation

Convertible stands can be quickly modified from horizontal to universal configuration, and vice versa, with an automatic in-line operation. This eliminates the lengthy procedures associated with old-style mill changeovers. Our stands allow the intermediate or finishing trains to be positioned either horizontally or vertically according to production requirements.

Changeover in minutes

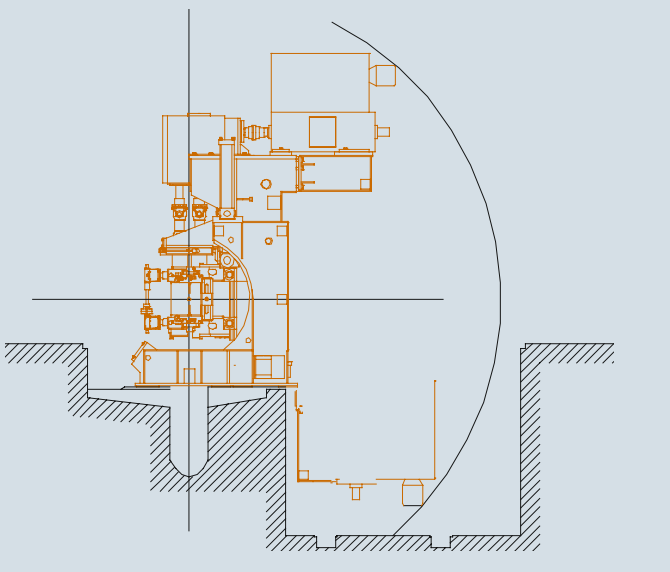
To arrange the proper mill configuration for the various products, the combination stands are always rotated from horizontal to vertical positions as required. The motor is always horizontal, while the stand, gearbox and spindle support all rotate to the alternate position. Changing from vertical to horizontal or vice versa takes just a few minutes.

Reduced foundation depth

In order to minimize foundation work, we've developed a special modification of the driving shaft for the vertical arrangement. That has resulted in a considerable decrease of required stand foundation depth. The combination stand requires the same foundation depth as a normal 2-high stand.

Excellent system rigidity

During rotation of the stand assembly from either the horizontal or vertical mode of operation, the main guide wheels travel in the tracks of the foundation-mounted side frames. Once in position, the wheels are freed of any load and a unique spring set locks the stand unit in place. For exceptional stand rigidity, a hydraulic release clamping system acts in connection with a tapered seat at the home position.



Convertible stand with motor on rotating structure



Roll shop

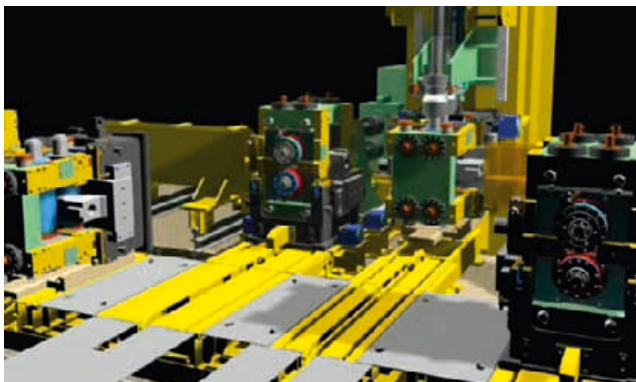


Hydraulic robot device for roll change

Quick stand change without crane

There's no need for a mill crane when it comes to removing stands from the mill rolling line. A stand change sledge is positioned at each stand with the capacity for two Red Ring stands set side by side. Before the end of the rolling campaign, the spare stand is preset and placed in the stand change sledge.

At the end of rolling, the old stand is withdrawn hydraulically from the rolling line onto the stand change sledge. The sledge is moved sideways until the new stand is lined up with the rolling position. Then the new stand is pulled hydraulically into the mill line ready for rolling. The old stand, meanwhile, can be removed from the sledge whenever the mill crane becomes available.



Quick stand change system

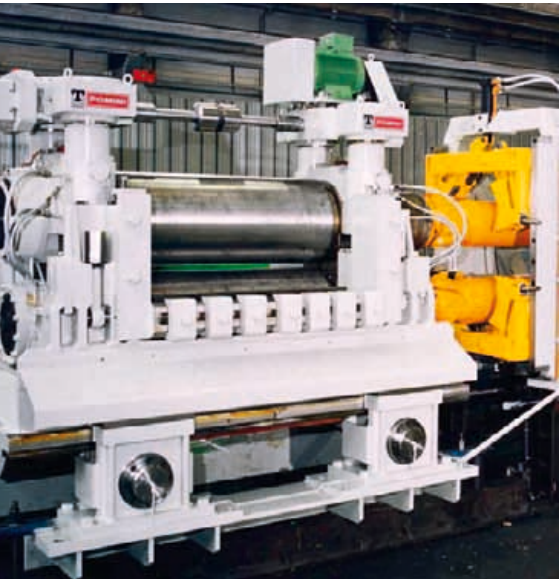
Quick roll change

A Red Ring stand consists of several basic elements, including four chock and bearing assemblies, screw-downs, tie rods and the rolls.

Changing a roll is easy. By simply removing two screws, the stand can be split in two halves – with chocks separated in pairs. Even after the rolls are removed, all the components remain in place.

Worn-out rolls can be replaced by shifting them transversally via a supporting carriage. That allows a new set of rolls (which rest sideways on the same carriage) to take their place. The two stand halves are then reassembled by reverse movement. The robot roll change unit, usually located in the roll shop, handles the complete roll change operation in about 12 to 15 minutes.

Special-application stands



Sliding reversible 2-high stand



Sliding reversible 2-high stand with roller table and bar manipulator

Sliding stands

Modern 2-high sliding stands represent an innovative solution for roughing and intermediate mills, as they are reversible and fully automated.

Features:

- Fixed rolling line
- Smaller roller table width
- Automatic billet manipulation system
- Automatic roll gap adjustment
- Smaller cost of foundations
- Compact multirougher arrangement

Compact roughers

Our compact roughers are ideal for limited spaces or for situations requiring greater than normal reductions. These roughers are equipped with special shoe plates and clamps to allow for minimized centers.

For space compactness, the horizontal stands are driven by especially stacked gearboxes.

The billet's own beam strength helps it enter successive passes, allowing for higher reductions.

When the centers are close, the stands can be shifted in and out of the pass line to adjust or change the guides.

Features:

- Small space requirement
- High reductions possible
- Easy access to guide equipment

Monogroove stands

Using the same Red Ring design, they feature shorter roll barrels with only one groove. The resulting higher stand rigidity allows for larger reductions. Besides, the elevating mechanism for the vertical stands is eliminated, which reduces the requirement of vertical space.

Our monogroove stand is also a very effective solution in terms of original equipment and operational roll cost. Spare cartridges can be installed quickly and rolls easily and quickly changed in the robot.

Features:

- Smaller space envelope
- Easy maintenance
- Conventional rolls or rolling rings mounted on shafts

2-high stand blooming mill

A group of two Red Ring stands in horizontal and vertical (H-V) arrangement roll the prepared blooms or ingots. Every two passes, the roll gap is adjusted and rolling direction reversed.

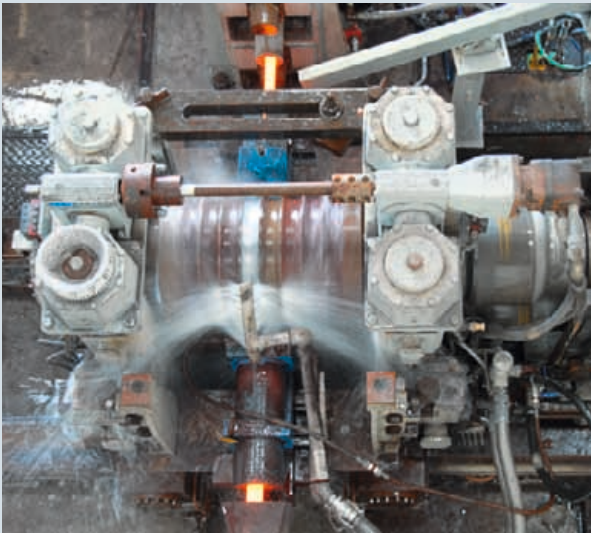
The result is a large-dimension bar that can be used as a final product or rerolled. For in-line thermal treatment of special steels, a water soaking pit may be added at the outgoing roller table.

Features:

- Fixed or sliding stands
- Automatic bar manipulation system
- Automatic roll gap adjustment

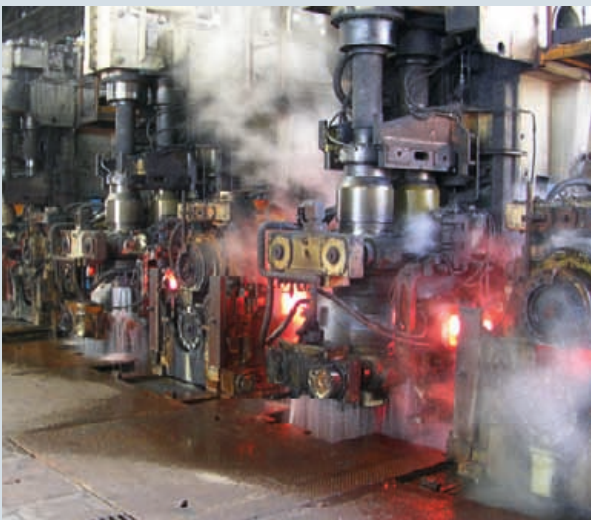
Excellence from experience

Selected success stories with Siemens VAI Red Ring stands



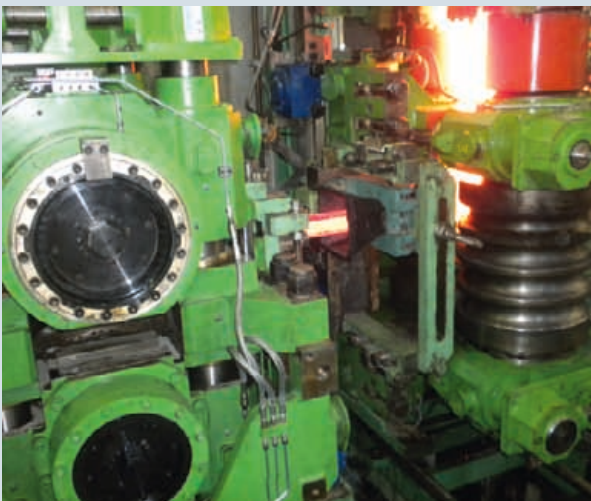
High mill utilization for rebar rolling

- Customer:** Qasco Dubai Steel FZE, Dubai, United Arab Emirates
- Plant type:** Rebar mill
- Our solution:** A continuous rolling mill with 16 Red Ring stands
- Technical data:** 300,000 tpy of low- and medium-carbon steel bars
- The result:** Minimum changing times for continuous operation



Guaranteed availability

- Customer:** Feralpi Siderurgica, Brescia, Italy
- Plant type:** Rebar mill
- Our solution:** A Red Ring mill with slit-rolling operation
- Technical data:** 700,000 tpy
- The result:** Maximum plant availability and operational efficiency



Siemens VAI's complete solution for combined mills

- Customer:** Handan Iron & Steel Company, Handan, China
- Plant type:** Bar and coil mill for engineering steel
- Our solution:** A combined mill with bar rolling and sizing line, rod outlet with Morgan Vee No-Twist mill and rod/reducing sizing, with a total supply of 60 Red Ring stands
- Technical data:** 800,000 tpy of bars and 700,000 tpy of coils
- The result:** A complete range of quality steel shapes rolled with high productivity

Competence Center:

Siemens Industry Inc.
15 Belmont Street
Worcester, MA 01605-2665, USA
Phone: +1 508 755-6111
Fax: +1 508 832-0139
E-mail: longrolling.metals@siemens.com

Siemens VAI
Metals Technologies S.r.l.
Via L. Pomini, n. 92
21050 Marnate (VA), Italy
Phone: +39 0331 741211
Fax: +39 0331 741386

Headquarters:

Siemens VAI
Metals Technologies GmbH
P.O. Box 4, Turmstr. 44
4031 Linz, Austria
Phone: +43 732 6592-0
Fax: +43 732 6980-0
E-mail: contact.metals@siemens.com

www.siemens-vai.com

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