KALIKA STEEL, JALNA, MAHARASHTRA, INDIA
ONE MORE FEATHER IN PRIMETALS TECHNOLOGIES’ CAP
In August 2013, Kalika Steel Alloys Pvt. Ltd., a steel product manufacturing organization awarded a contract to Primetals Technologies (then Siemens VAI Metals Technologies) for the supply of a 250,000 tons/yr Rebar Mill at its integrated steel complex located in Jalna, in the Indian state of Maharashtra.

The scope encompassed the complete design, engineering, manufacturing supply of the facility, including electrics & automation, supervision of erection & commissioning, and demonstration of performance guarantees of the mill equipment. The project was completed in eighteen (18) months. The start-up of the mill (first rolled billet) was in March 2015 and Primetals Technologies completed the Performance Tests in July 2015.
The plant includes state-of-the-art technologies and boasts a compact design and layout. The mill produces rebars in straight length. There is space provision for a Wire Rod line in the future. The approximate area required for the plant is 315 m X 46 m excluding balance-of-plant facilities. This includes the disposition of upstream facilities such as the induction furnace and the casters.

One of the key features of the plant is that it is designed for 100% hot billet charging where billets coming from the caster pass through an induction heating furnace to maintain the temperature required for rolling. The main advantages of hot charging are:

- High efficiency of process with reduced OPEX.
- Increase of the metallic yield due to reduced scale formation and losses.
- Reduction in CAPEX as the mill can operate without a conventional billet reheating furnace.
- Smaller area requirement as the billet storage area can be eliminated.

As Kalika contemplates also the possibility of cold billet charging operation, a pusher-type billet reheating furnace with billet storage area is provided.
## PLANT DATA

### UPSTREAM FACILITIES

- **Induction Furnace**
  - One (1) 30 t
  - One (1) 25 t

- **Billet Caster**
  - 6/11 m x 3 strand
  - 130 sq. mm, 110 sq. mm billet

### MILL PARAMETERS

- **Plant capacity**: 250,000 tpy
- **Input material**: 130 X 130 X 9,000 mm; 1,194 kg
- **Reheating furnace capacity (for cold charging)**: 20 t/h, pusher-type
- **Induction heater installed power**: 3,600 kW
- **Charging scheme**: 100% hot charging of billets with cold charging provision
- **Steel grade**: Low carbon steel (IS 1786-2008, Grade Fe500)
- **Finished Product**: Rebar Ø 8 - Ø 40 mm, length: 9 - 15 m
- **Finished product bundle size**: 2 t - 3 t master bundle with 100 kg sub-bundle
- **Max. rolling speed**: 13 m/s for 8 and 10 mm
- **No. of slits**: 8 mm - 3 Slit; 10 & 12 mm - 2 Slit; 16 - 40 mm - Single strand
- **Max. production rate**: 50 t/h
- **No. of mill stands**: 18
- **Net rolling hours**: 5,000 hrs
- **Yield**: 96%

### Project Schedule

- **Engineering completion**
  - 0 Month
  - 4th Month
  - 11th Month

- **Manufacturing competition**
  - 11th Month
  - 18th Month

- **PG Test & FAC**
  - 18th Month
  - 22nd Month

- **Mill start-up**
  - 22nd Month
MILL STANDS
• (Qty 18) Red-Ring stands in H-V configuration (before slitting) and H-H configuration (after slitting)
• Mill stand sizes:
  - RR 455 (Stand 1 – 6)
  - RR 445 (Stand 7 -12)
  - RR 436 (Stand 13-18)
• Fixed rolling line
• Main features of Red-Ring stands:
  - Reduced stress path for better tolerance
  - High strength and rigidity
  - Horizontal and vertical cartridge are completely interchangeable
  - Symmetrical roll adjustment by screwdown mechanism

QUENCHING SYSTEM
• Located after the mill, specially designed “Venturi pipes” provides thermal treatment to rebars to attain the desired metallurgical properties.
• The process obviates the addition of costly materials e.g. Mo, Cr, V therefore significantly reducing the manufacturing cost to achieve the required yield strength and weldability
• Different sizes of cooling elements are provided for different sizes of bars
• Water flow rate : 360 m³/h
• Water pressure : 24 bar

HOT DIVIDING SHEAR
• Divides the bars in multiple of commercial length
• Convertible flying type : For low speed (below 5.5 m/s), the shear can perform in crank mode and for high speed it can perform in rotary mode
• Minimum shearing temperature: 600 deg °C
• Nominal shearing force: 40 tons
• Cutting accuracy: + 60 mm

COOLING BED
• Size : 54 m x 8 m
• Bars are braked by tilting aprons during their upward stroke. The aprons are electrically driven and their weight is pneumatically balanced
• Magnetic aprons have been provided to compensate the lower friction coefficient of hot bars and reduce the cycle time
• Rake type : movable rakes advance the bars. They are operated by cams driven by variable speed motors.
• Aligning rollers are provided in the final notched segment of rakes for head alignment of bars
• Notch pitch : 80 mm

COLD SHEAR
• It cuts the bars to commercial length
• Nominal shearing force : 360 tons
• Blade width : 1,000 mm
• The bottom blade is fixed. The top blade is movable and operated by electrical motors with pneumatic clutch and brake
• The shear is equipped with a bar holding device, and with a bar head aligning device for cut optimization
• A system for the collection and removal of crops is also provided

GAUGE BEAM
• Located after cold shear for commercial length setting
• The stopper is mounted on a carriage which slides along a gauge beam. The car is driven by an electric motor with rack-pinion transmission while the stopper is actuated by a pneumatic cylinder
• Max. cutting length : 15 m
• Min. cutting length : 9 m
BUNDLE FORMING STATION AND SHORT BAR COLLECTION SYSTEM

• The bar cut is optimized so that the number of bars saleable at the best market price is maximized.
• The short bars remaining from the last cut layer are brought to a short-bar roller table from where are collected in a cradle, where bundles are manually tied.
• These short bars can be sold in local market.

• Maximum short bar length : 11.5 m
• Minimum short bar length : 3.0 m

BAR COUNTER

• Located in the bar bundling area, it automatically and accurately counts the bar before bundle is formed.
• The photocell detects the bar heads and a wheel counts the bars. The bars head-ends are separated by a faster moving chain transfer which facilitates the precise counting.
• After determined numbers of bar are counted, the counted bar layers are separated from uncounted layers by pneumatically operated separating fingers.
• Counting speed : 8 bars/sec max

BINDING MACHINE

• A wire tying machine is used for tying the master bundles.
• A set of sub-bundling machines are provided for making sub-bundles of 100 kg before the master bundle is formed.
• The equipment is hydraulically operated.
• Bundle dimension : Ø 150 mm (min.) Ø 400 mm (max.)
• Bundle weight : 2 t – 3 t
• Bundle length: 9 m – 12 m
• No. of ties : 6 for 9 m bundles : 9 for 12 m bundles
• Binding cycle: 8 sec.
• Product temperature (max.): 150 °C

COMPACT SPEED MASTER (CSM)

• CSM is a cost effective solution for mills and provides the following features:
  - An open solution, easily handled by Simatic S7 and WinCC
  - CPU 319, the fastest CPU in the Simatic S7-300 family
  - Standard hardware and software integration according to plug-and-play principles
  - Modular design for easy integration with downstream packages (rod/bar outlets)
  - Shorter commissioning times

• Automatic minimum tension control
• Storage of pass schedules
• Speed setting either manually or via pass schedules
• Cascade speed control
• Interstand tension control
• Impact speed drop compensation
• Loop position regulation and cascade control
• Shear head and tail cut control
• Shear automatic cobble cutting
• Fault protection
• Compact operator desk with full HD HMI station
• Drive interfaces/sensor interfaces (Sinamics DCM for stand and shears/Sinamics S120 for auxiliaries)
• Total installed power for mill equipment: 7990 kW

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SALIENT FEATURES ELECTRICS & AUTOMATION
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