सेल SAIL

COLD ROLLED COILS & SHEETS

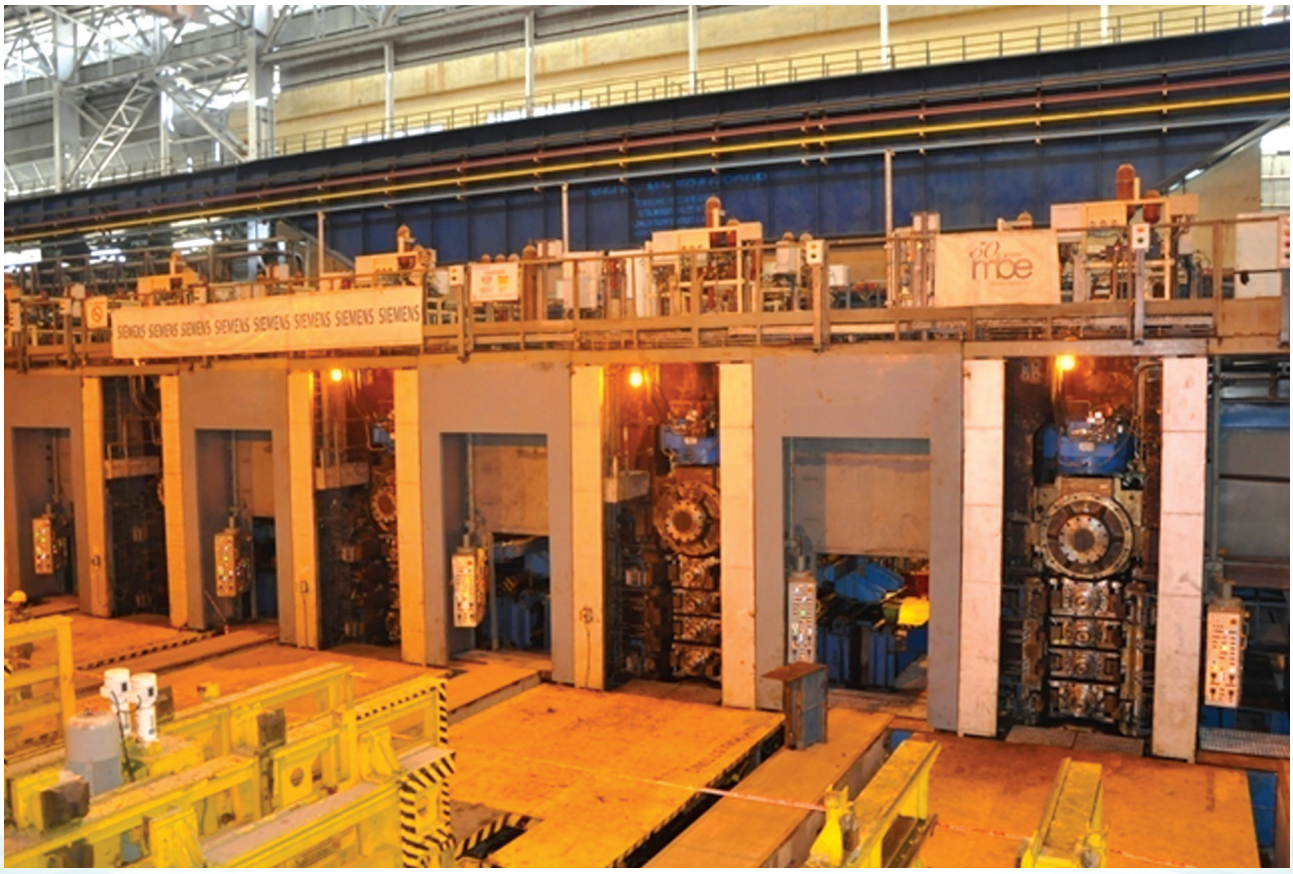
Cold Rolled Products - Bokaro Steel Plant

The new cold rolling mill (CRM-III) at Bokaro Steel Plant, uses state-of-the-art technology to produce top quality Cold Rolled and Galvanized Products. It has a total capacity of 1.2 million tonne with 0.84 million tonne for CRCA and 0.36 million tonne of Galvanised Coils. The CRM-III complex houses following facilities.

PLTCM (Pickling Line Tandem Cold Rolling Mill):

Main features of PLTCM

- Twin Pay off reel & twin Tension reel for endless rolling.
- Laser Welding.
- Scale Breaking Unit (Tension leveler cum scale breaker).
- Fully Automatic Pickle Liquor Analysis (FAPLAC) – shallow pickling tanks with turbulent HCL pickling.
- Turret type edge trimmer.
- 6 high Tandem cold mill with Intermediate Roll shifting.
- Quick Work Roll & Intermediate Roll changing with Strip in Mill.
- Automatic Gauge Control.
- Automatic shape control (SIFLAT).
- Selective cooling.



BAF (Bell Annealing Furnace): To improve mechanical properties lost during rolling, annealing is done. It has super high convection system which includes forward curved convection fan with matching diffuser for the best atmosphere circulation. 100% hydrogen gas is used for annealing, which gives bright and cleaner surface to CR Coils.

ECL (Electrolytic Cleaning Line): After rolling from PLTCM, the strip has emulsion on the surface. To clean this, the electrolytic cleaning line is used. First the strip is passed through a hot alkaline tank & then through a brush scrubber tank after which electrolytic cleaning is done in electrolytic cleaning tank. Two electrodes are dipped in alkaline solution to remove the ionised impurities from the surface. The product from this line has high quality surface finish & is mainly used in automotive industries.

ECL Line has following advantages:

After passing the CR Strip through the ECL the Oil and Iron are reduced to the extend as under :

(Oil & Dirt (max) – <10 mg/m^2 for the both sides

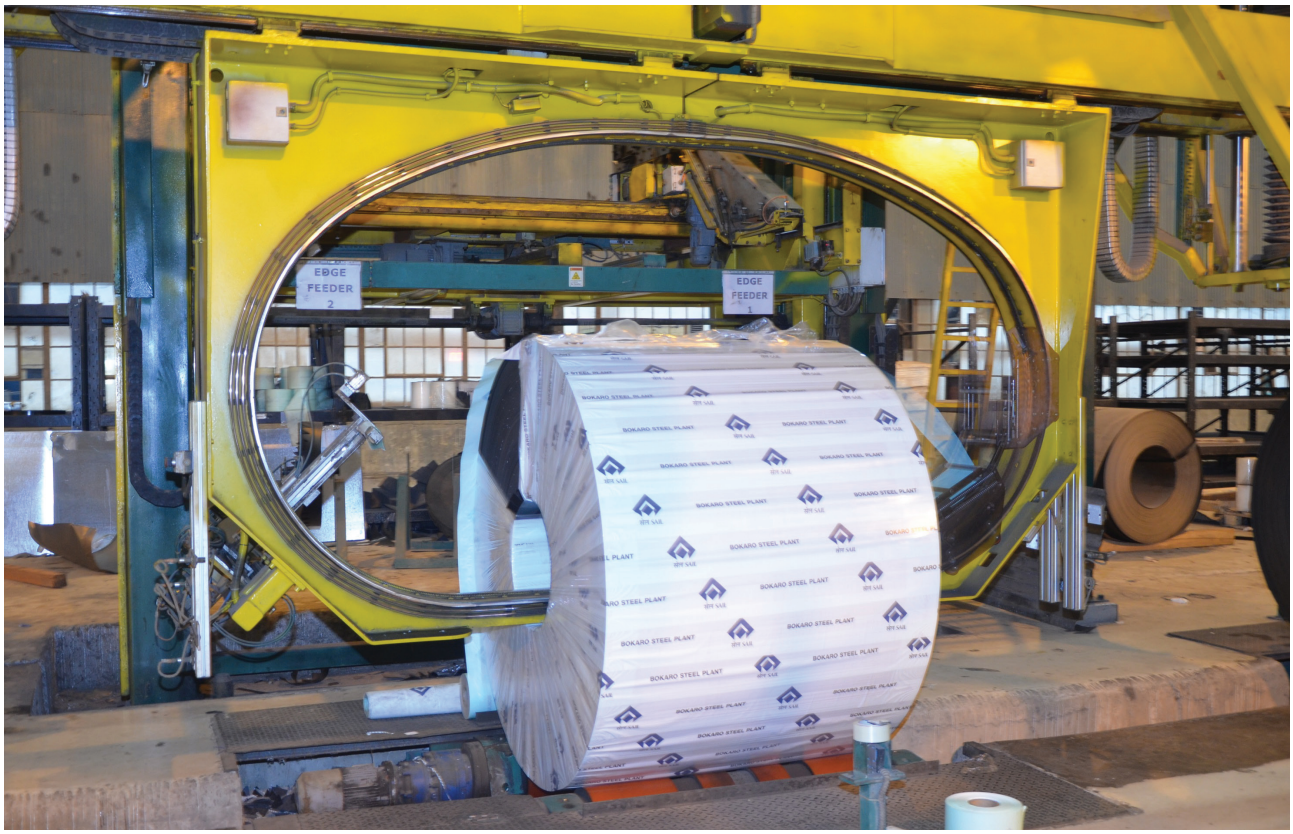
Iron Fines (max) – <20 mg/m^2 for the both sides

SPM (Skin Pass Mill): It is a 4-HI Mill. It processes annealed coil of thickness 0.25 mm to 2 mm & produces final sellable product. Skin passing of the coil is done to remove yield point phenomena & paint ability in the coil. To control flatness, Shape meter roll is used in the line which provides automatic bending & tilting. Line has facility of Electrostatic oiler for oil coating in the strip to improve corrosion resistance. It also has provision of wet skin passing which enhances roll life & cleanliness of the strip.

TLIL (Tension Leveller & Inspection Line): The processed coil from SPM is directly transported to TLIL by a combination of walking beam conveyor, coil shuttle car & coil transfer cars. The shuttle car places the coil on the either of the two number floor mounted fixed coil saddle. Entry coil car pick up the coil & places on the cradle roller station where the coil width is measured & coil is aligned for de-banding operation.

CPL (Coil Packaging Line):

Coils are first packed with paper and high-density polythene and then secured with steel strapping. A coil is strapped with three eye and two circumferential straps. For identification, one sticker and one metallic tag with a sticker are provided. These are then loaded into wagons with the eye of the coil in horizontal position. Coils are then unitized by strapping.



Rationalised sizes of CR Coils

Thickness (mm)	Width (mm)
0.40, 0.45	900, 1000
0.5, 0.55, 0.6, 0.63, 0.7	900, 1000, 1120, 1219, 1220, 1250
0.8, 0.9, 0.95	900, 914, 920, 1000, 1020, 1120, 1219, 1220, 1250, 1320, 1420
1.00, 1.2, 1.25, 1.4, 1.5, 1.6, 1.85, 1.9, 2.0	900, 914, 920, 1000, 1020, 1120, 1219, 1220, 1250, 1320, 1420, 1520, 1580
Bitumen Size	
0.63	876, 896, 1120
Barrel Size	
0.9	914, 920, 1225, 1320
1, 1.2, 1.25	914, 920, 1225, 1320, 1580

Physical attributes of CR Coils

	CRM I/II	CRM III
Inner diameter	510 mm (thickness 0.63 mm and below and width up to 1020 mm) and 600 mm (for other sizes)	508 mm

Range of Cold Rolled Coils

Grade	Mill	Thickness (mm)		Width (mm)	
		Min	Max	Min	Max
IS 513 CR1 Si Al (K)	CRM I/II	0.4	2	900	1000
IS 513 CR1 Si Al (K)	CRM I/II	0.63	2	900	1250
IS 513 CR1 Si Al (K)	CRM I/II	0.8	2	900	1420
IS 513 CR1 Si Al (K)	CRM I/II	1	2	900	1580
IS 513 CR2 / CR3 Si Al (K)	CRM III	0.35	2	900	1000
IS 513 CR2 / CR3 Si Al (K)	CRM III	0.4	2	900	1250
IS 513 CR2 / CR3 Si Al (K)	CRM III	0.6	2	900	1320
IS 513 CR2 / CR3 Si Al (K)	CRM III	0.8	2	900	1420
IS 513 CR2 / CR3 Si Al (K)	CRM III	1	2	900	1520
IRSM 41 (SAILCOR)	CRM I/II	1.6	2	1220	1280
ISC 270 / 390 / 410 / 440	CRM III	1.2	2	1250	1280

*If required some of the above grades can be supplied with Cu also.

Rationalised sizes of Cold Rolled Sheets

Thickness (mm)	Width (mm)	Length (mm)
0.60, 0.63, 0.70	900, 1000, 1100, 1250	2000, 2500, 3000, 3600
0.80, 0.90	900, 1000, 1100, 1250, 1400	2000, 2500, 3000, 3600
1.00, 1.25, 1.50,1.60, 1.85, 2.00	900, 1000, 1100, 1250,1400, 1500	2000, 2500, 3000, 3600

CR coils/sheets are supplied in oiled/unoiled condition as per customers' requirements. Tolerance as per IS - 513/IS/ISO/16162 (2005). However, closer tolerances can be supplied on mutual agreement.

CR Sheets are packed in packets of 3 - 10 tonnes each and covered with high density polythene and paper. Thereafter, these are bound with steel straps. They also have stickers inside the packets and metal tags attached to the strips.

Normal thickness tolerances for coils and sheets (IS - 513/IS/ISO/16162 : 2005)

Dimensions and tolerances in millimeters

Specifiedwidth	Thickness tolerances a, bfor specified thicknesses c						
	≤ 0.4	>0.4 ≤0.6	>0.6 ≤0.8	>0.8 ≤1.0	>1.0 £1.2	>1.2 ≤1.6	>1.6 -2.0
600≤1200	±0.04	±0.05	±0.07	±0.08	±0.09	±0.11	±0.13
>1200 ≤1500	±0.50	±0.06	+0.08	±0.09	±0.10	±0.12	±0.14
>1500 ≤1800	–	±0.08	±0.09	±0.10	±0.12	±0.14	±0.16

Thickness is measured at any point on the sheet not less than 25 mm from a side edge.

Width tolerances		Length tolerances	
Width	Tolerance	Width	Tolerance
≤1200 mm	+3 mm / - 0 mm	≤2000 mm	+10 mm / - 0 mm
>1200 mm ≤1500 mm	+5 mm / - 0 mm	>2000 mm ≤8000 mm	+0.5% of length / - 0 mm
> 1500 mm	+5 mm / - 0 mm	> 8000 mm	+40 mm / - 0 mm

Note: For re-squared material, more restrictive tolerances are subject to negotiation.

Chemical Composition: IS 513Pt(1)/2016

Grade	Carbon	Manganese	Sulphur	Phosphorus
	% Max	% Max	% Max	% Max
CRO	0.35	4.00	0.035	0.050
CR1	0.15	1.00	0.035	0.080
CR2	0.12	0.50	0.035	0.040
CR3	0.10	0.45	0.030	0.025
ISC270C	0.12	0.50	0.035	0.040
ISC270D	0.10	0.45	0.030	0.025
ISC270E	0.08	0.40	0.030	0.020
ISC340W	0.12	0.90	0.030	0.050
ISC370W	0.15	1.30	0.030	0.050
ISC390W	0.20	1.50	0.030	0.050
ISC440W	0.20	1.70	0.030	0.050

Al : 0.02% - 0.07% if Al-killed, Si : 0.1% if Si killed, Si - 0.03% and Al - 0.01% if Si-Al killed.

MAE (Nb, V, Ti, B) 0.20% either singly or in combination.

If B is added it should be 0.006%.

For copper bearing quality permissible Cu is 0.17% to 0.38%. Nitrogen content <0.007% and for grades CR0 & CR 1 <0.012%.

Mechanical Properties

Grade	Yield Point or Proof Stress Mpa, Max	Tensile Strength Mpa, Max	Minimum Elongation		Mean Plastic Strain Ration r-Bar	Tensile Strain Hardening Component n-Value	Test Direction
			Gauge Length- 80 mm	Gauge Length- 50 mm			
CR1	280	410	27	28	-	-	T
CR2	240	370	30	31	-	-	T
CR3	220	350	34	35	1.3 min	0.16 min	T

Chemical

Specification	Grade	C	Mn	S	P	Al	Si	MAE
IRSM-41	SAILCOR	0.1 max	0.25 -0.45	0.03 0.140	0.075 max	0.08 0.72	0.28 max	Ni : 0.2 - 0.47 Cr : 0.35 - 0.6 Cu : 0.3 - 0.6

Mechanical Properties

Specification	Grade	YS, MPa	UTS, MPa	% El min 80 mm GL
IRSM-41	SAILCOR	300	440 min	26

सेल SAIL

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STEEL AUTHORITY OF INDIA LIMITED

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