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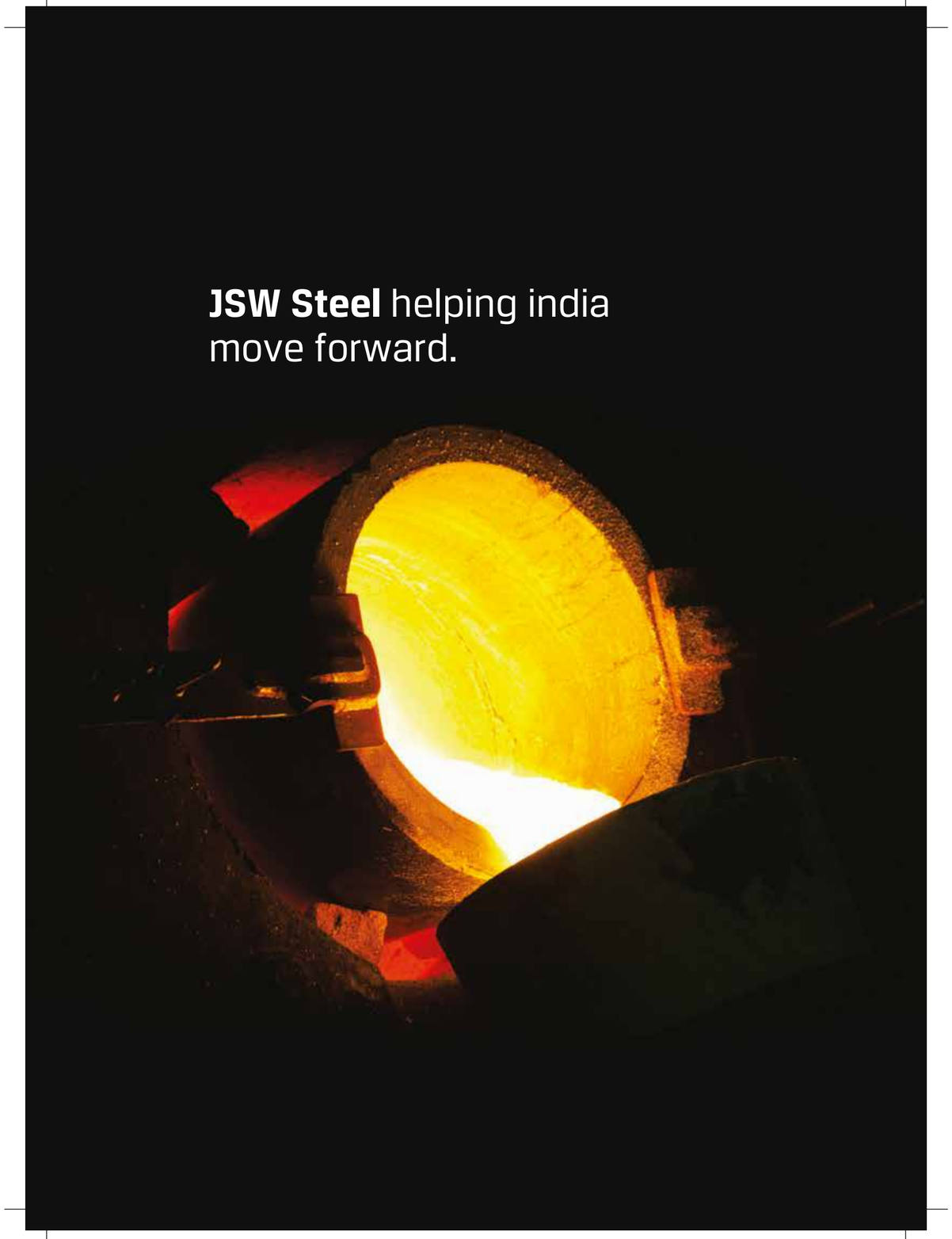
JSW Steel Ltd. - CIN: l27102mh1994plc152925 | JSW Steel Coated Products Ltd.- CIN: U27100mh1985plc037346 Dec'17

COLD ROLLED COILS & SHEETS

Better Everyday



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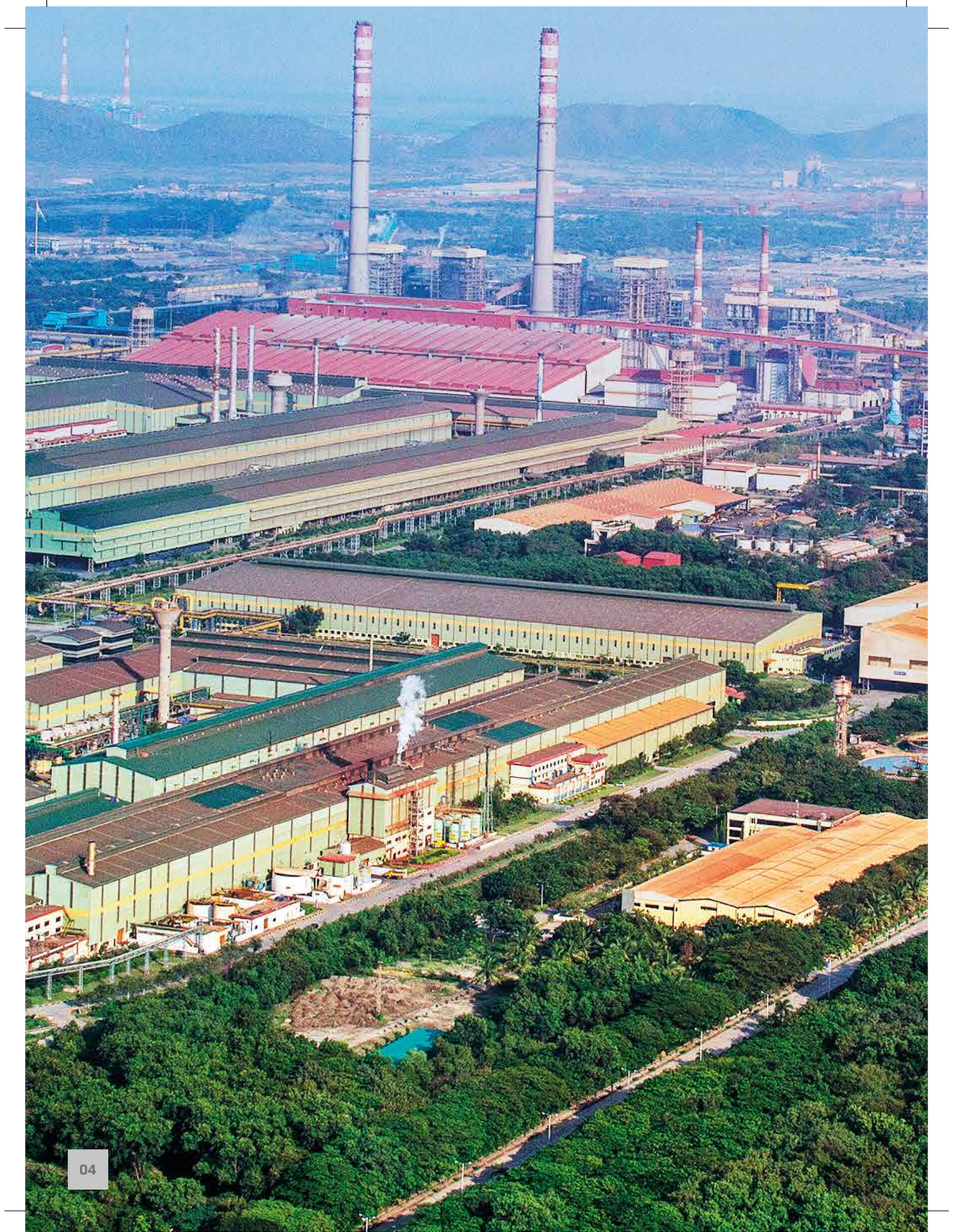


JSW Group

An $11 billion conglomerate, with presence across India, USA, South America & Africa, the JSW Group is a part of the O.P. Jindal Group with strong footprints across core economic sectors, namely, Steel, Energy, Infrastructure, Cement, also in Ventures and Sports.

The Group is paving the way for India's development as a global superpower. JSW Steel is India's leading steel producer and among the world's most illustrious steel company. The Group is also leading in every sector that it operates in.

JSW Energy is one of the earliest private entrants into the power sector positioned strongly as a full-spectrum integrated power company with a presence across the power sector value chain. It is one of the most efficient Power Company in the country with one of the country's largest open cast mining operation by volume and one of the largest private sector Hydro Operator in India. JSW Cement creates the building blocks of India with its environment friendly products. JSW Infrastructure is contributing to the nation's development by providing world class services to clients through state of- the-art ports, terminals, shipyards and other facilities. JSW Sports runs the Sports Excellence Program (SEP) to identify, nurture and develop Indian athletes to ensure that they bring sporting glory to the nation on the global stage. JSW Sports also runs the Bengaluru Football Club & The Bengaluru Yodhas wrestling team.

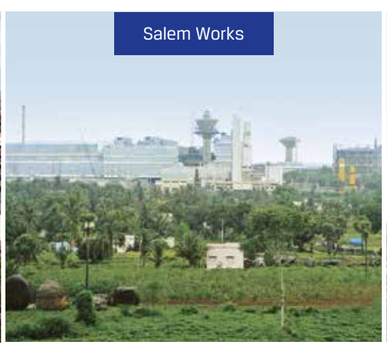
The JSW Group is committed to creating more smiles at every step of the journey. JSW Foundation, the Group's CSR and sustainability arm, is in constant pursuit of making life better for communities with its various initiatives in the fields of health, education, livelihood and sports, along with art and culture.

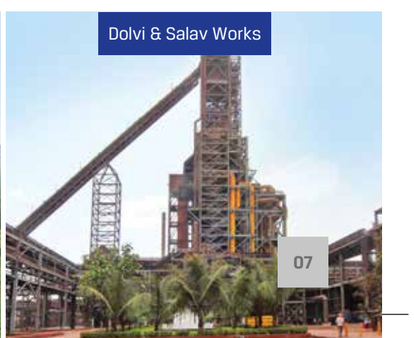
JSW Group is proud to be charting a course to excellence that creates opportunities for every Indian and leads to the creation of a sustainable, dynamic and developed nation.

JSW Steel Ltd.

The flagship company of USD 11 billion JSW Group, JSW Steel is one of India's leading integrated steel manufacturers with a capacity of 18 MTPA. It is one of the fastest growing companies in India with a footprint in over 140 countries. With state-of-the-art manufacturing facilities located in Karnataka, Tamil Nadu and Maharashtra, it is recognized for its innovation and quality.
JSW offers a wide gamut of steel products that includes Hot Rolled, Cold Rolled, Bare & Pre-painted Galvanized & Galvalume®, TMT Rebars, Wire Rods and Special Steel.

JSW Steel continues to enhance its capabilities to meet the rapidly changing global market needs. To stay on the leading edge of technical advancement, JSW has entered into technological collaboration with JFE Steel Corp, Japan to manufacture high strength and advanced high strength steel for the automobile sector. JSW Steel has also entered into a joint venture with Marubeni-Itochu Steel Inc. Tokyo, to set up a state-of-the-art steel processing centers.To strengthen its global network, the Company has also acquired a Pipe and Plate making steel mill in Baytown, Texas in USA. Going forward, JSW Steel aims to produce 40 million tons of steel annually.





JSW Steel
Coated Products Ltd.

JSW Steel Coated Products Limited is 100% subsidiary company of JSW Steel, having state-of-the-art manufacturing facilities in the state of Maharashtra.

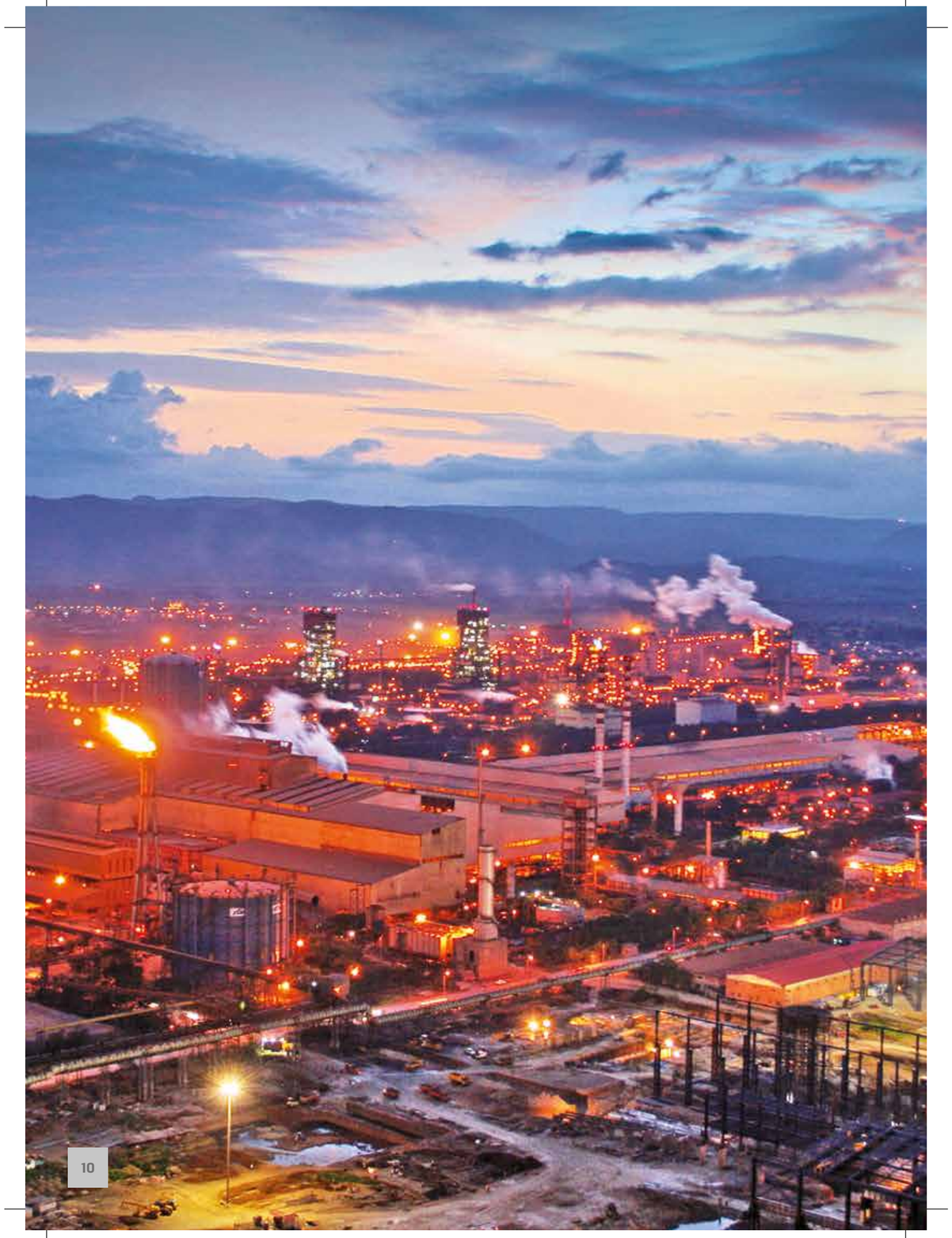
JSW Steel Coated Products Ltd. is India's largest manufacturer and exporter of Coated Steel as well as Colour Coated Steel. The production facilities, Tarapur and Vasind Works, are located in the vicinity of major ports. The company's Kalmeshwar Works is centrally located near Nagpur to serve across regions.

JSW is an ISO 9001: 2008 Certified Organization and the first licensee producer for Galvalume® in India. The Tarapur plant is specialized in manufacturing Ultra-Thin Coated Products. The company is also a manufacturer of appliance grade colour coated products. JSW's Kalmeshwar Works is the first producer of Galvanized and Colour Coated Steel in India. JSW also has established India's first Appliance Grade Line to manufacture Pre Coated and Vinyl Coated Metal.


Vasind Works


Tarapur Works


Kalmeshwar Works

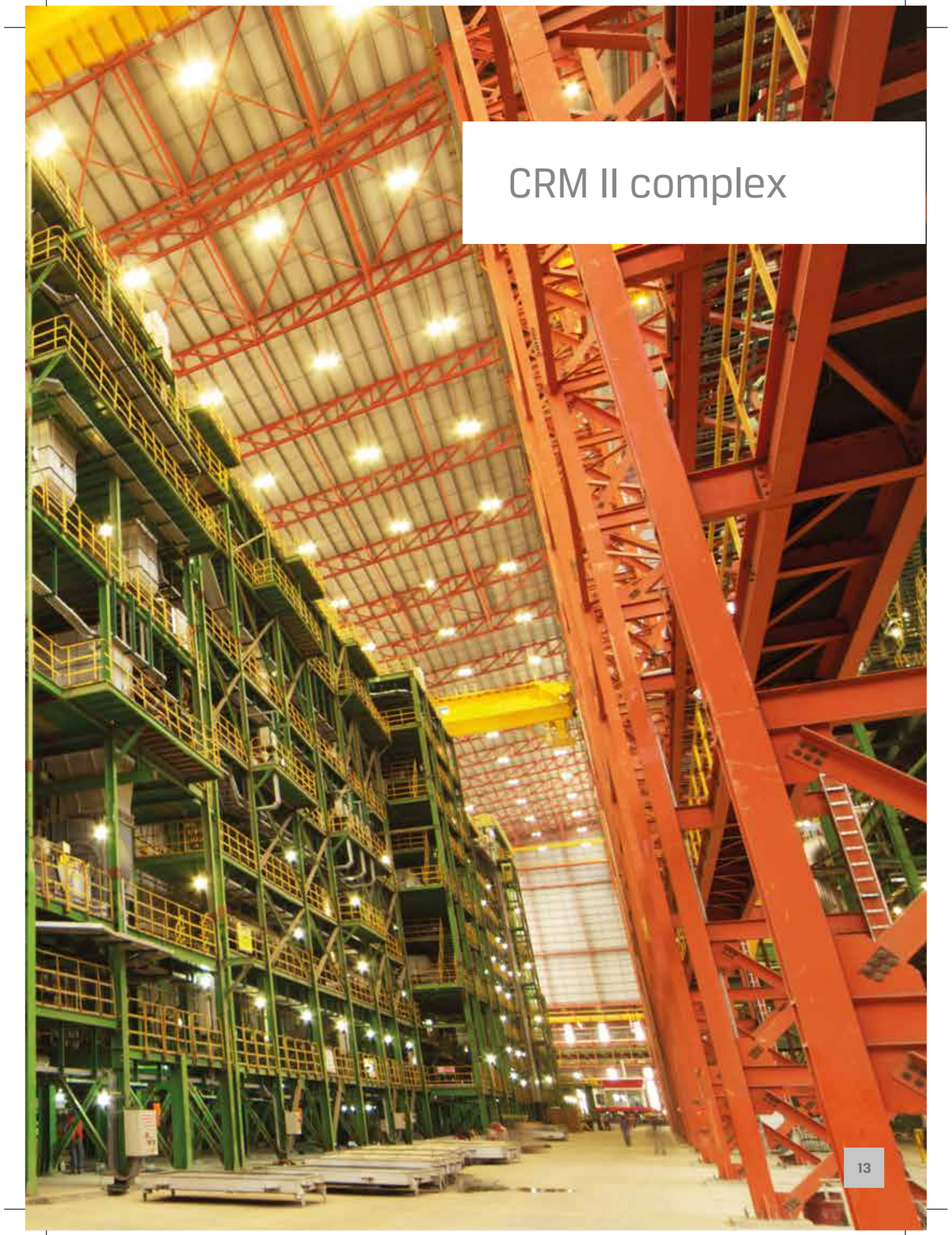


Steel Melting Shop

Setting Benchmarks

- First continuous annealing line in India
- Widest Cold Rolling Mill (upto 1870 mm width)
- India's largest Coated Steel producer
- First Licensee Galvalume® producer in India
- JSW Steel Salem works is the largest integrated Alloy and Special Steel plant in India
- Widest Hot Strip Mill in India
- India's most modern and largest Vertical Caster-300/260/220 x 2200 mm
- India's only Multi-Radii Bloom Caster operational at Salem works
- ZERO EFFLUENT discharge for greener & cleaner environment
- 1.6 million trees planted at Vijayanagar works, transforming the area into a green oasis
- India's largest Long Steel producer by installed capacity

Blast Furnace - IV



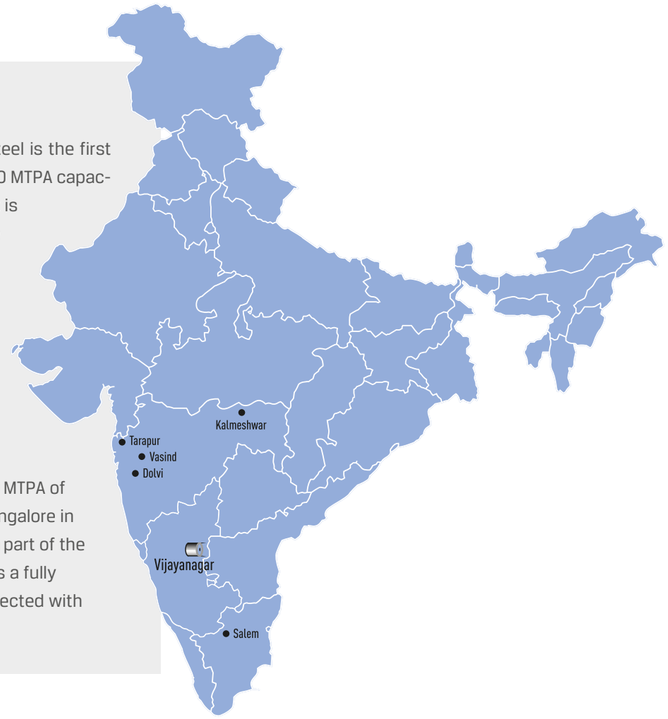
CRM II complex

Manufacturing Facilities

Vijayanagar Works

The Vijayanagar plant of JSW Steel is the first integrated steel plant to reach 10 MTPA capacity at a single location in India. It is the first plant in India to use the Corex technology for hot metal production.

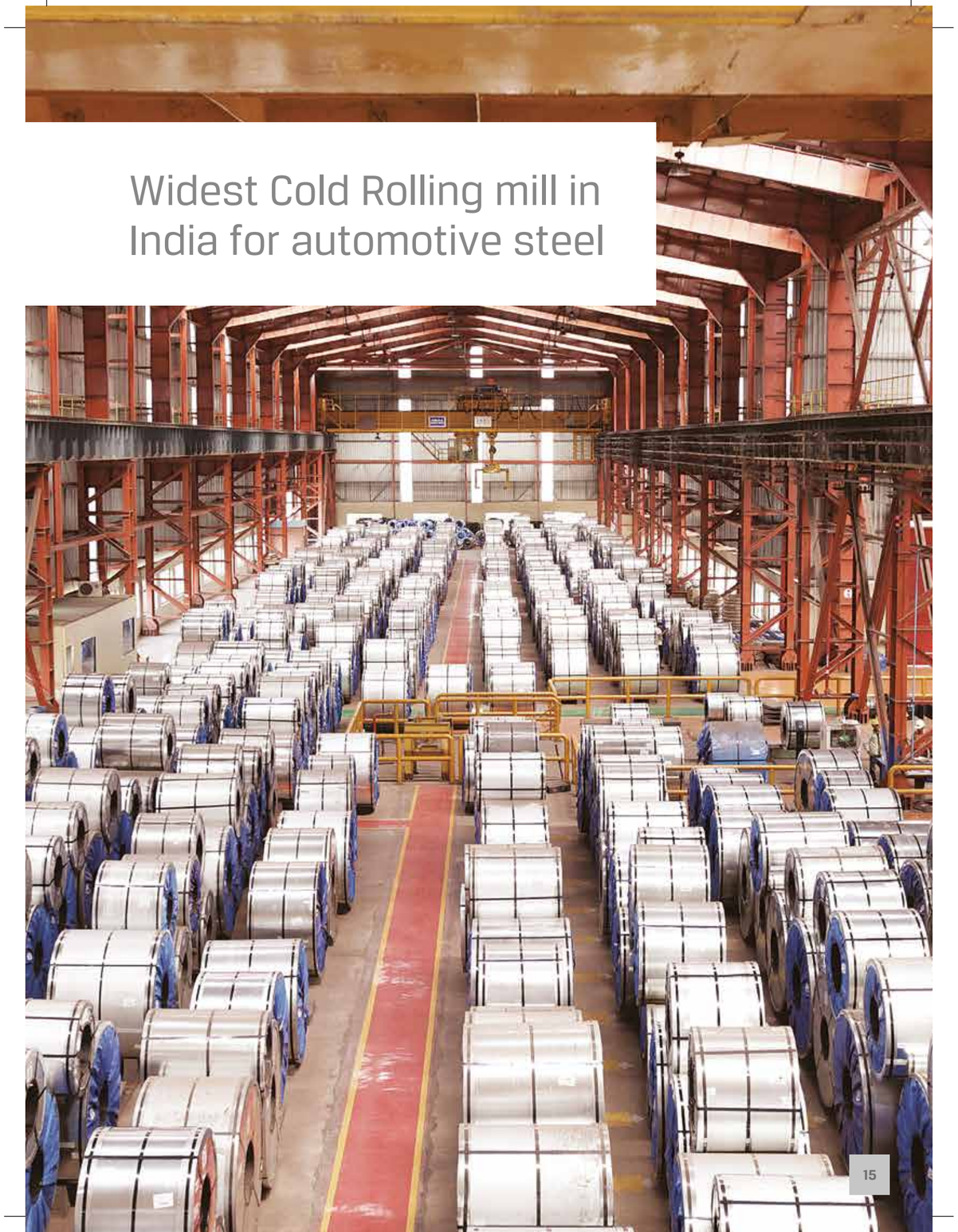
The first Hot Strip Mill at Vijayanagar was commissioned in 1997. Since then it has grown exponentially and now has an installed capacity to produce 10 MTPA of steel. Located 380 kms from Bangalore in Toranagallu, North Karnataka - a part of the Bellary-Hospet iron ore belt - it is a fully integrated steel plant well-connected with both Goa and Chennai ports



Unique Features

- Houses India's largest blast furnace and the widest hot strip mill
- The only plant in India with paircross technology and twin – stand reversible cold -rolling mill
- The highest productivity steel plant in India, producing 800 – plus tonnes per person per annum
- Recognised for its 'zero -effluent discharge status; it reuses more than 95% of process waste
- Low carbon footprint as it recycles 96% of coke oven gas for power generation
- Uses sophisticated ambient air control infrastructure beyond and has reduced gas flaring to lower levels

Widest Cold Rolling mill in India for automotive steel



JSW Cold Rolled products

JSW's Cold Rolled Closed Annealed (CRCA) Coils and Sheets are produced through the cutting -edge Cold Rolling Mills (CRM) at Vijayanagar. The 3.3 Mtpa CRM's modern facilities, advanced operational technologies, strict inspection processes and integrated quality control, ensures an excellent product.

JSW's CRCA is manufactured in Deep Drawing, Extra Deep Drawing, Interstitial Free Steels and High Strength grades, which are conformed to JIS, EN, ASTM and IS standards. Dimensional accuracy is guaranteed by an automatic thickness control system using advanced numerical models.

Easy formability, High -quality Surface Finish, consistent surface texture with the optimum balance between texture (for paint keying] and smoothness (for image distinction) makes JSW's CRCA the product of choice for automobiles, appliances, furniture and many other applications.

- Technical Collaboration with JFE Steel Corporation, Japan to improve Plant, Process and Products
- Development of automotive steel, CR & GA Steel for high end applications
- Jointly provide auto customers with products & services including application engineering solutions
  Proven overseas technology from SMS Siemag for PLTCM and JP Steel Plantech for CAL & CGL

Widest Cold Rolling Mill for automotive steel in India

- First Continuous Annealing Line India
- State-of-the-art continuous galvanizing line with dual pot system for GI & GA production
- Higher Strength (up to TS 980MPa) & SEDDQ grade, which cannot be produced by current Indian facilities
- Seamless automatic material storage, tracking, retrieval and transfer system
- Proven overseas technology from SMS Siemag for PLTCM and JP Steel Plantech for CAL & CGL
- Continuous pickling line (capacity: 1.3 Mtpa) supplier –Flat Products India Ltd.
- Twin Stand 6 -High Reversing Mill (Capacity -0.850 Mtpa) Supplier- SMS Demag, Germany
- Electrolytic Cleaning Line (Capacity 0.6 Mtpa) Supplier- Flat Products India Ltd, India automation by ABB
- Batch Annealing Furnaces Supplier- Ebner, Austria
- 4-High single stand skin pass (Capacity - 0.875 Mtpa) Supplier- SMS Demag, Germany
- Two Re -Coiling Lines (combined capacity - 0.35 Mtpa) Supplier- Bronx, UK
- PLCTM Line (Pickling Line coupled to Tandem Cold- Mill)-Capacity -2.3 Mtpa.
  Supplier- SMS Siemag, Germany, automation by TMEIC,USA
- Two Continuous Annealing Lines — Capacity -0.95 Mtpa each, Steel Plantech Corporation (SPCO),
  Japan Automation by TMEIC, Japan
- Continuous Galvanizing Line - Capacity -0.40 Mtpa Steel Plantech Corporation (SPCO),
  Japan automation was done by TMEIC, Japan
- Recoiling Line (3 in numbers) - combined capacity- 0.6 Mtpa. Supplier- Dongbang, Korea
- Slitting Line - capacity- 0.3 Mtpa Supplier- Dongbang, Korea
- Coal Yard Management System Supplier - Pesmel, Finland

Advantages JSW

Reduced lead time
Quicker serviceability from CAL route.

True customisation
Customised sizes through service center at Vijaynagar & Pune

Master workability
JSW's cold rolled products have splendid formability and minimal deviation in mechanical properties due to company's innovative technologies, and integrated quality control system extending from raw materials to the final product and newly constructed and modernized facilities.

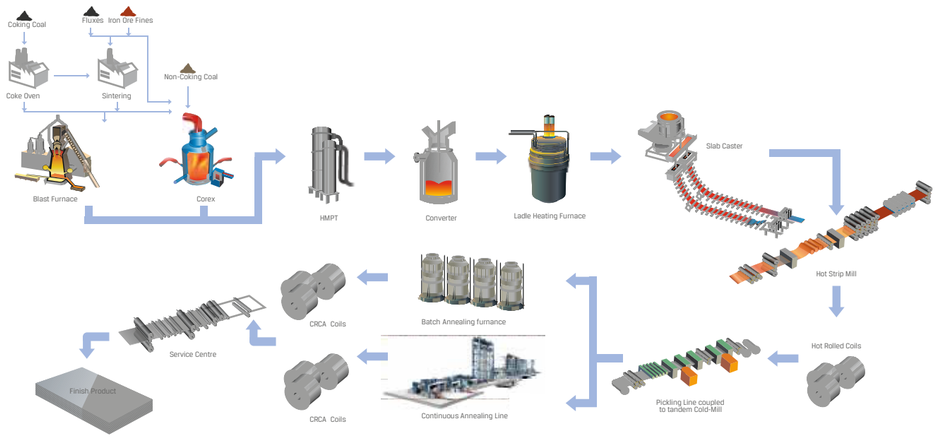
Superior surface quality and dimensional accuracy
Dimensional accuracy is guaranteed by an automatic thickness control system using advanced numerical models, modern facilities, advanced operational technologies, strict inspection, and integrated quality control ensure excellent surface quality.

Wide range of product standards
JSW cold rolled products meet a wide range of product standards, including JIS and other public standards, as well as internal JFE standards.

Wide range of sizes
Wide range of thickness and width options.

Superior shape
Applying tension leveler ensures superior strip flatness.

Manufacturing Process



Cold Rolling Mills

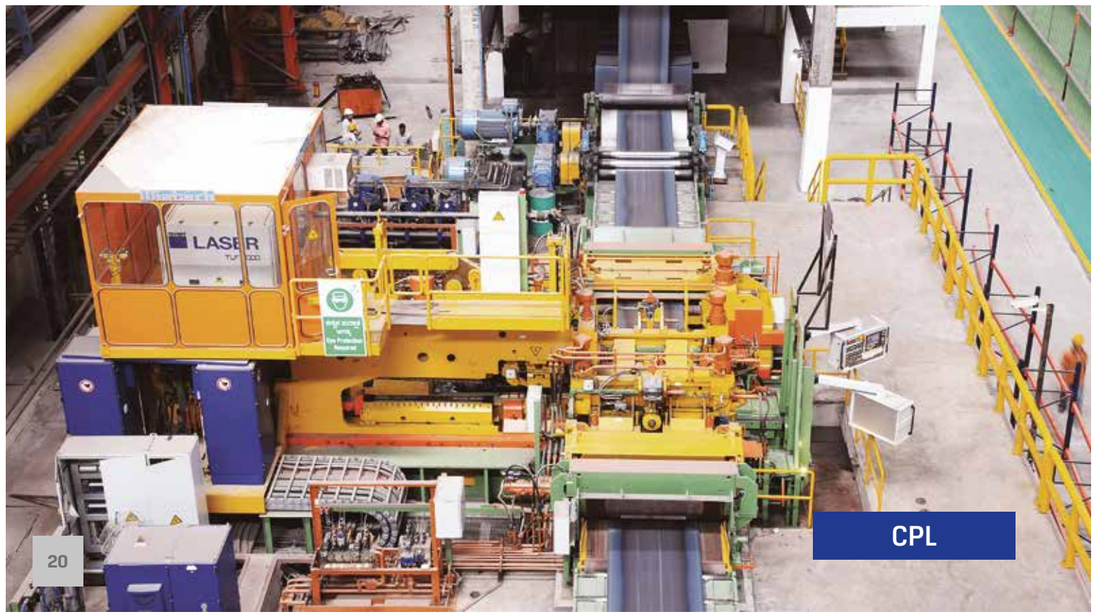
Continuous Pickling Line (CPL)

HCL Continuous Pickling Line with a capacity of 1.4 Mtpa uses proven and reliable technology to process hot rolled carbon steel as per the technical specifications. The process of pickling involves removing oxide scales from the surface of the hot rolled steel, by treating it with dilute hydrochloric acid. The reaction is generally a combination of chemical reaction and mechanical separation of scales due to evolution of hydrogen.

Unique Features
- Laser welder for making 62 T jumbo coils
- Tension leveler cum scale breaking facility
- Online trimming facility
- Electrostatic oiler
- Level 2 automation

Cold Compact Mill (CCM)

Pickled coils are rolled in twin stand cold rolling mill where they are processed into a specified thickness. Generally, the rolling reduction ratio is 50% to 90%. The critical point at this stage of the process is to maintain uniform and precise flatness throughout the entire length of the coil.
Unique Features
- Auto shape control using shape meter rolls on both sides
- Laser velocity meter for better speed accuracy
- Level 2 mathematical modeling and connectivity to Level 3
- Latest X-ray gauging system for better gauge measurement and control



CPL

Electrolytic Cleaning Line (ECL)

The main purpose of electrolytic cleaning is to remove the carried over rolling oils and other debris left on the strip surface after rolling.
Every trace of surface oil is removed by saponification and emulsification of steel in alkaline solution. This degreasing process is necessary for the production of cold rolled strip with smooth surface.
Unique Features
- Level 2 automation
- In line skin pass mill for roughness transfer
- Low current density line for better surface conditions
- Flying shear and accumulator for retaining product quality

Batch Annealing Furnace (BAF)

After cold rolling, the steel strip is hard and brittle with its grains elongated in the rolling direction. To obtain the desired grain structure and to improve the mechanical properties, the strip is annealed at an elevated temperature in a reducing atmosphere.
Unique Features
- Uniform annealing under 100% hydrogen atmosphere
- Hydrogen purity is 99.999%
- Superior surface cleanliness
- Final cooling on separate bases under dry & protected atmosphere

ECL

CCM

BAF

PLTCM-Pickling Line coupled to Tandem Cold-Mill

Every aspect of JSW PLTCM is designed to add precision and quality control to the cold rolled process. In this, pickling line is linked with cold rolling mill, which provides better shape control, delivers significant improvements with regard to mill productivity, yield, and production as a result of the elimination of strip threading and tailing-out operations.
JSW's PLCTM is characterized by high pickling rates, quality pickling operations, flexible production, a wide range of product sizes, qualities, quality product and lower production time requirements, as well as compliance of the highest standards for environmental safety.

Unique Features
- Laser welder with automatic seam evaluation by SMS X -Pro
- Stretch Leveler for shape improvement and scale breaking
- PPMC (Pickling Process Model Computer) from SMS Siemag
- 5 Stand 6 HI CVC6 Plus Technology
- Shapemeter Roll by ABB
- Multizone Cooling System for localized shape control
- Laser Velocity Meter (LVM) for precise speed feedback
- Flying Gauge Change (FGC)
- Carousel reel with 2 mandrels

Value for Customers
- Wider coil width (1870mm)
- Shorter production lead time

CAL-Continuous Annealing Line

The continuous annealing line is design to produce material for automotive industry, appliance industry etc. In order to get uniform mechanical properties, it has a radiant tube heating type vertical annealing furnace followed by the rapid cooling type cooling furnace and overaging section. The entire furnace will be filled with protective HN gas. This wet type skin pass unit improves the flatness with ease, apart from removing the stretcher strain. The annealing process consists of pre -heating, heating, soaking, slow cooling, rapid cooling, overaging, final cooling & water cooling in sequence.
A mathematical model ensures high temperature accuracy. Due to this homogenous heating & cooling takes place which results in superior ductility and superb surface finish.

Unique Features
- Narrow Lap Mash Seam Welding System
- Thermal Crown Control System
- X -Ray Thickness & Width Gauge
- 6 HI Skin Pass Mill with WR, IMR bending with additional IMR shifting for top notch shape
- Vertical & Horizontal In line Inspection
- Electrostatic Oiler
- Automatic Surface Inspection system by Cognex

Value for Customers
- High Tensile sheet (-980Mpa)
- Uniform mechanical property in coil
- Shorter production lead time

CGL-Continuous Galvanizing Line

The Continuous Galvanizing Line, with a few notable exceptions, perform the same operations as Continuous Annealing Line (CAL). Incoming substrate is cleaned with an alkaline detergent, annealed, coated with molten zinc, and tension leveled. This line is capable of producing Galvanneal products.

Unique Features
- Electromagnetic Strip stabilization (e -Mass System)
- In line coating and alloy gauge with feedback and feed forward control
- In line 4 HI Skin pass mill with tension leveler
- Dual pot facility for GI and GA Products
- Anti finger printing (Cr free type organic coating)
- Electrostatic oiler
- JFE Advanced Zinc (JAZ)
- Automatic Surface Inspection (Cognex)

Value for Customers
- High Tensile sheet (-590Mpa)
- Dual pot system for GI & GA
- JFE Advanced Zinc (JAZ* future)

APL

Skin Pass Mill (SPM)

Automatic packing improves packing consistency, aesthetics, quality and annealed coil to restore the desired temper and prevent generation of stretcher strain and coil breaks. Skin pass rolling also helps to produce the desired surface roughness (dull, matte or bright) as per customer's requirements.

Unique Features

- Shape meter at exit side
- Use of temper fluid for better cleanliness
- Level 12 set up and storage system
- Complete automation from coil entry to exit
- AC drives and high speed processors for better quality

Recoiling Inspection Lines (RCL) & Slitting line

3 RCL with 0.20 Mtpa capacity each, and one Slitting Line with 0.30 Mtpa have been procured from DONGBANG, Korea. At the RCL, the coil surface is inspected carefully. Stroboscopic light ensures visibility of defects if any without stopping the process. The value addition of this line is to further improve the strip flatness with the help of a tension leveller unit. An Electrostatic Oilers provided to apply all types of RP and DOS oils uniformly on both surfaces.

Unique Features

- Tension levelers
- De -oiler unit
- Horizontal inspection stroboscopic light
- Two different oiling enclosures
  - DOS: Turbodyn High speed bell system
  - Anti rust oil: Wide range blade system
- Robotic arm for coil marking

Auto Packaging Line (APL)

Automatic packing improves packing consistency, aesthetics, quality and productivity of packing. The line is equipped in meeting the packing requirements for export and domestic markets.

CGL

RCL

SPM

Summary

Product	CRM I	CRM II
Cold Rolling Process	Reverse Type Rolling	Tandem Cold Rolling
Annealing Process	Batch Annealing	Continuous Annealing
Size Availability*	Thickness 0.35mm - 3.2mm Width 1650mm Maximum	Thickness 0.35 - 2.3mm Width 1870mm Maximum
Grade Availability CR	Up to 440MPa UTS	Up to 980MPa UTS
Coated Products	Not Available	GA/GI available including JAZ High Formable GA (Future) upto 590 MPa UTS
Capacity	CRCA: 0.8 Mtpa HRPO: 0.6 Mtpa	CR :1.9 Mtpa CAL 1 -0.95 Mtpa CAL 2 -0.95 Mtpa GA/GI : 0.4 Mtpa

The Right Yardstick

Product Specification

Thickness Range: 0.3mm - 3mm | **Width Range:** 750mm - 1870mm | **Grades:** Cq, Dq, Ddq, Eddq, If, Hif, Hss, Bake Hardening

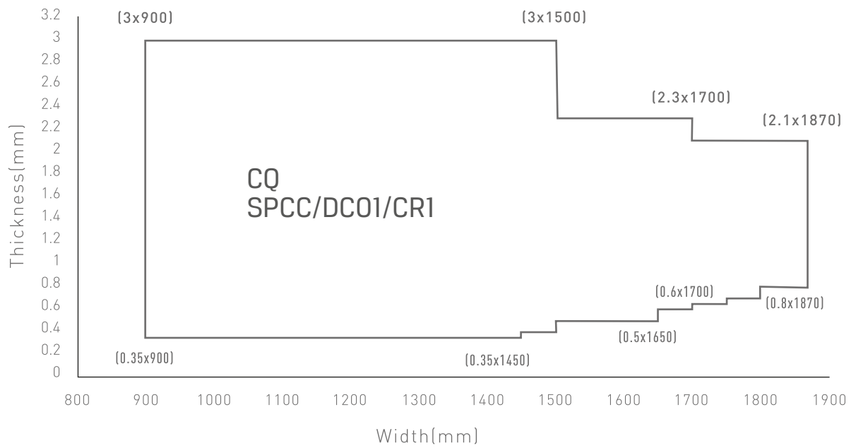
Classification	EN	JIS	ASTM	BIS	JFS
CQ	DC01	SPCC	CS A,B & C	CR1	-
DQ	DC03	SPCD	DS A & B	CR2	JSC270C
DDQ	DC04	SPCE	-	CR3	JSC270D
EDDQ	DC05	SPCF	DDS	CR4	JSC270E
IF	DC06	SPCG	EDDS	CR5	JSC270F
High Strength - IF Based	HC180Y	-	SHS-GR35	CR5_IF340	JSC340P
	HC220Y	-	-	-	-
	HC260Y	-	SHS-GR44	CR5_IF390	JSC390P
	-	-	-	CR5_IF440	JSC440P
Bake Hardened	HC180B	-	BHS-GR26	-	-
	HC220B	-	BHS-GR35	-	JSC340H
	HC260B	-	-	-	-
	HC300B	-	BHS-GR44	-	-
High Strength Micro Alloyed Steel	HC260LA	-	-	-	-
	HC300LA	-	-	-	-
	HC340LA	-	HSLAS-GR50	-	-
	HC380LA	-	HSLAS-GR55	-	-
	HC420LA	-	HSLAS-GR60	-	-
C-Mn High Strength Steel	-	SPFC340	SS GR48	CR1_340	JSC340W
	-	SPFC390	-	CR1_390	JSC390W
	-	SPFC440	SS GR65	CR1_440	JSC440W
	-	SPFC490	SS GR60	-	-
Rephosphorized	HC180P	-	-	-	-
	HC220P	-	-	-	-
	HC260P	-	-	-	-
	-	-	-	-	JSC440R
	-	-	-	-	JSC590R
Dual Phase	HCT500X	-	-	-	-
	HCT600X	-	-	-	JSC590Y
	HCT780X	-	-	-	JSC780Y
	-	-	-	-	JSC980Y
	HCT980X	-	-	-	JSC980YL

Mechanical & Chemical Properties

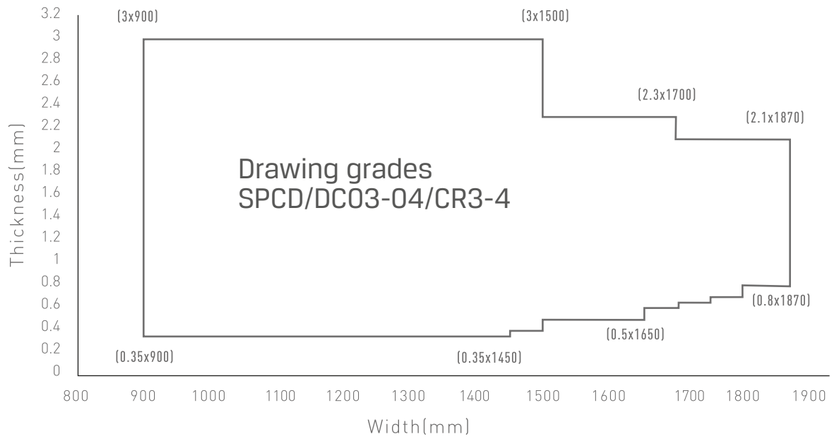
Ref STD	MechanicalProperties						
Steel Type	Ref STD	UTS (N/mm2)	Y.S(N/mm2)		% El	n90	r90
		Min	Min	Max	Min	Min	Min
CQ	EN_DC01	270	140	280	28		-
DQ	EN_DC03	270	140	240	34	-	1.3
DDQ	EN_DC04	270	140	210	38	0.18	1.6
EDDQ	EN_DC05	270	140	180	40	0.2	1.9
IF	EN_DC06	270	120	180	38	-0.22	-1.8
High Strength-IF based	EN_HC180Y	340	180	230	36	0.19	1.7
	EN_HC220Y	350	220	270	34	0.18	1.6
	EN_HC260Y	390	260	320	32	0.17	1.4
Bake Hardened	EN_HC180B	300	180	230	34	0.17	1.6
	EN_HC220	320	220	270	32	0.16	1.5
	EN_HC260B	360	260	320	29	-	-
	EN_HC300B	400	300	360	26	-	-
HIGH STRENGTH / MICRO ALLOYED STEEL	EN_HC260LA	350	260	330	26	-	-
	EN_HC300LA	380	300	380	23	-	-
	EN_HC340LA	410	340	420	21	-	-
	EN_HC380LA	440	380	480	19	-	-
	EN_HC420LA	470	420	520	17	-	-
C-Mn HIGH STRENGTH STEEL	JFS_JSC340W	340	185	285	36	-	-
	JFS_JSC390W	390	225	335	32	-	-
	JFS_JSC440W	440	265	370	29	-	-
	J1S_S PFC490	490	295	NA	24	-	-
Rephosphorized	EN_HC180P						
	EN_HC220P						
	EN_HC260P						
	JFS_JSC440R	440	335	440	26	-	-
	JFS_JSC590R	590	410	560	18	-	-
Dual Phase	EN_HCT500X	500	300	380	23		
	JFS_JSC590Y	590	320	440	19	-	-
	JFS_JSC780Y	780	420	590	14	-	-
	JFS_JSC980Y	980	580	920	10	-	-
	JFS _JSC980YL	980	580	730	11	-	-

	Chemical Properties							
	C% (Max)	Mn °/0 (Max)	Si % (Max)	Al % (Max)	S% (Max)	P% (Max)	Ti%	Nb%
	0.12	0.6	-	-	0.045	0.045		-
	0.1	0.45	-	-	0.035	0.035	-	-
	0.08	0.4	-	-	0.03	0.03	-	-
	0.06	0.4	-	-	0.025	0.025	-	-
	0.02	0.35	-	-	0.02	0.02	0.3	-
	0.01	0.7	0.3	-	0.025	0.06	0.12	-
	0.01	0.9	0.3	-	0.025	0.08	0.12	-
	0.01	1.6	0.3	-	0.025	0.1	0.12	-
	0.05	0.7	0.5	-	0.025	0.6	-	-
	0.06	0.7	0.5	-	0.025	0.08	-	-
	0.08	0.7	0.5	-	0.025	0.1	-	-
	0.1	0.7	0.5	-	0.025	0.12	-	-
						0.025		
	0.1	0.61	0.05	-	0.025	0.025	0.15	0.09
	0.1	1.1	0.05	-	0.025	0.025	0.15	0.09
	0.1	1.6	0.05	-	0.025	0.025	0.15	0.09
	0.1	1.6	0.05	-	0.025	0.025	0.15	0.09
	0.1	0.71	0.05	-	0.025	0.025	0.15	
	0.12	1.5	0.05	0.015	0.025	0.025	-	-
	0.18	1.8	0.05	0.015	0.025	0.025	-	-
	0.22		0.05	0.015	0.025	0.025	-	-
	0.25		0.05	0.015	0.025		-	-
	0.05	0.6	0.08	-	0.025	0.08	-	-
	0.07	0.7	0.08	-	0.025	0.08	-	-
	0.08	0.7	0.1	-	0.025	0.1	-	-
	0.1	1.5	0.5	0.15	0.025	0.12	-	-
	0.15	2	0.5	0.15	0.025	0.12	-	-
						0.08		
	0.14	2	0.8	-	0.025		-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

Available dimensions for commercial grades

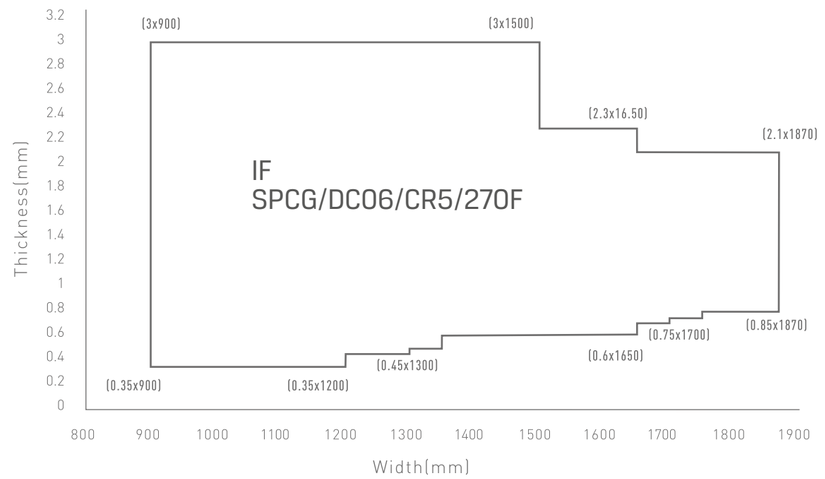


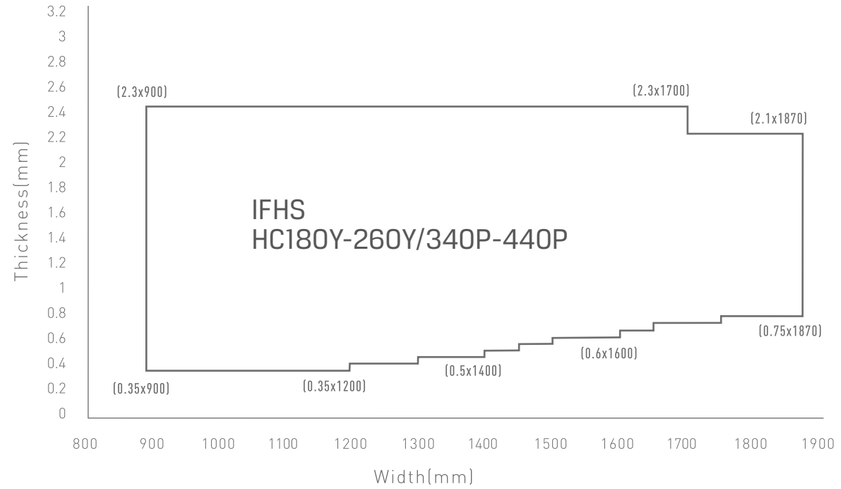
Available dimensions for drawing grades



*This is applicable for Bilateral tolerance and subject to Mutual Agreement

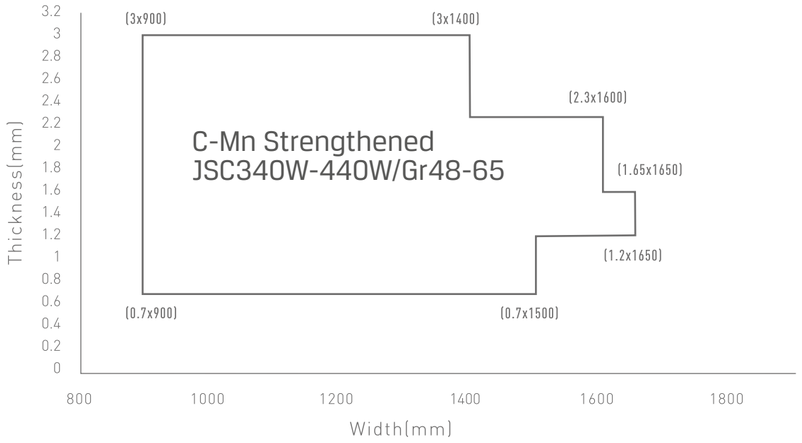
Available dimensions for IF and IFHS Grades

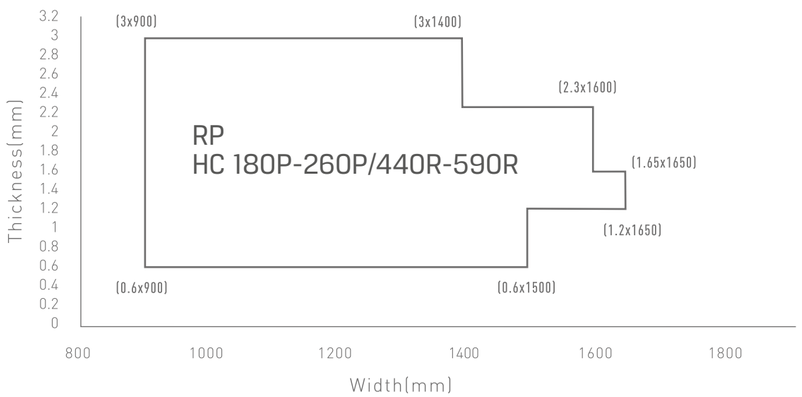




*This is applicable for Bilateral tolerance and subject to Mutual Agreement

Available dimensions for C-Mn and Re-Phosphorized Grades





*This is applicable for Bilateral tolerance and subject to Mutual Agreement

Thickness Tolerances as per EN10131: 2006

	Thickness		Normal Tolerance			Special Tolerance		
	From	To	W < 1200	1200<W <1500	1500<W	W<1200	1200<W <1500	1500<W
UTS <260 M Pa	=0.35	=0.40	±0.030	±0.040	±0.050	±0.020	±0.025	±0.030
	>0.40	=0.60	±0.030	±0.040	±0.050	±0.025	±0.030	±0.035
	>0.60	=0.80	±0.040	±0.050	±0.060	±0.030	±0.035	±0.040
	>0.80	=1.00	±0.050	±0.060	±0.070	±0.035	±0.040	±0.050
	>1.00	=1.20	±0.060	±0.070	±0.080	±0.040	±0.050	±0.060
	>1.20	=1.60	±0.080	±0.090	±0.100	±0.050	±0.060	±0.070
	>1.60	=2.00	±0.100	±0.110	±0.120	±0.060	±0.070	±0.080
	>2.00	=2.50	±0.120	±0.130	±0.140	±0.080	±0.090	±0.100
	>2.50	=3.00	±0.150	±0.150	±0.160	±0.100	±0.110	±0.120
260 M Pa < UTS < 340 M Pa	=0.35	=0.40	±0.040	±0.050	±0.060	±0.025	±0.030	±0.035
	>0.40	=0.60	±0.040	±0.050	±0.060	±0.030	±0.035	±0.400
	>0.60	=0.80	±0.050	±0.060	±0.070	±0.035	±0.040	±0.050
	>0.80	=1.00	±0.060	±0.070	±0.080	±0.040	±0.050	±0.060
	>1.00	=1.20	±0.070	±0.080	±0.100	±0.050	±0.060	±0.070
	>1.20	=1.60	±0.090	±0.110	±0.120	±0.060	±0.070	±0.080
	>1.60	=2.00	±0.120	±0.130	±0.140	±0.070	±0.080	±0.100
	>2.00	=2.50	±0.140	±0.150	±0.160	±0.100	±0.110	±0.120
	>2.50	=3.00	±0.170	±0.180	±0.180	±0.120	±0.130	±0.140
340 M Pa < UTS < 420M Pa	=0.35	=0.40	±0.040	±0.050	±0.060	±0.030	±0.035	±0.040
	>0.40	=0.60	±0.050	±0.060	±0.070	±0.035	±0.040	±0.050
	>0.60	=0.80	±0.060	±0.070	±0.080	±0.040	±0.050	±0.060
	>0.80	=1.00	±0.070	±0.080	±0.100	±0.050	±0.060	±0.070
	>1.00	=1.20	±0.090	±0.100	±0.110	±0.060	±0.070	±0.080
	>1.20	=1.60	±0.110	±0.120	±0.140	±0.070	±0.080	±0.100
	>1.60	=2.00	±0.140	±0.150	±0.170	±0.080	±0.100	±0.110
	>2.00	=2.50	±0.160	±0.180	±0.190	±0.110	±0.120	±0.130
	>2.50	=3.00	±0.200	±0.200	±0.210	±0.130	±0.140	±0.150
420 M Pa < UTS	=0.35	=0.40	±0.050	±0.060	±0.070	±0.035	±0.040	±0.050
	>0.40	=0.60	±0.050	±0.070	±0.080	±0.040	±0.050	±0.060
	>0.60	=0.80	±0.060	±0.080	±0.100	±0.050	±0.060	±0.070
	>0.80	=1.00	±0.080	±0.100	±0.110	±0.060	±0.070	±0.080
	>1.00	=1.20	±0.100	±0.110	±0.130	±0.070	±0.080	±0.100
	>1.20	=1.60	±0.130	±0.140	±0.160	±0.080	±0.100	±0.110
	>1.60	=2.00	±0.160	±0.170	±0.190	±0.100	±0.110	±0.130
	>2.00	=2.50	±0.190	±0.200	±0.220	±0.130	±0.140	±0.160
	>2.50	=3.00	±0.220	±0.230	±0.240	±0.160	±0.170	±0.180

Thickness Tolerances as per JIS G 3141: 2011 &G 3135: 2006

	Thickness		Special Tolerance for normal width				Normal Tolerance for normal width				
	From	To	W ⟨630	160 ⟨W ⟨250		400 ⟨ W ⟨ 630	W ⟨ 630	630 ⟨ W ⟨ 1000	1000 ⟨ W ⟨ 1250	1250 ⟨W ⟨1600	1600⟨W
CR Carbon Steel Sheet		⟨0.10	±0.010	±0.020		-	-	-	-	-	-
	=0.10	⟨0.16	+0.015	±0.020		-	-	-	-	-	-
	=0.16	⟨0.25	±0.020	±0.025		±0.030	0.030	± 0.030	±0.030	-	-
	=0.25	⟨0.40	±0.025	±0.030		±0.035	0.040	± 0.040	±0.040	-	-
	=0.40	⟨0.60	±0.035	±0.040		±0.040	0.050	± 0.050	±0.050	±0.060	-
	=0.60	⟨0.80	±0.040	±0.045		±0.045	0.060	± 0.060	±0.060	±0.060	±0.070
	=0.80	⟨1.00	±0.040	±0.050		±0.050	0.060	± 0.060	±0.070	±0.080	±0.090
	=1.00	⟨1.25	±0.050	±0.050		±0.060	0.070	±0.070	±0.080	±0.090	±0.110
	=1.25	⟨1.60	±0.050	±0.060		±0.060	0.080	±0.090	±0.100	±0.110	±0.130
	=1.60	⟨2.00	±0.060	±0.070		±0.080	0.100	±0.110	±0.120	±0.130	±0.150
	=2.00	⟨2.50	+0.070	+0.080		±0.090	0.120	±0.130	±0.140	±0.150	±0.170
	=2.50	⟨3.15	±0.080	±0.090		±0.100	±0.140	±0.150	±0.160	±0.170	±0.200
	=3.15	-	±0.090	±0.100		±0.110	0.160	±0.170	± 0.190	±0.200	-
	High Strength Steel Sheet										
340 M Pa ⟨= UTS⟨ 780 M Pa	=0.60	⟨0.80	-	-	-	-	0.060	±0.060	±0.060	±0.070	±0.080
	=0.80	⟨1.00	-	-	-	-	0.070	±0.070	±0.080	±0.090	±0.100
	=1.00	⟨1.25	-	-	-	-	0.080	±0.080	±0.090	±0.100	±0.120
	=1.25	⟨1.60	-	-	-	-	0.090	±0.100	±0.110	±0.120	±0.140
	=2.00	⟨2.00	-	-	-	-	0.100	±0.110	±0.120	±0.140	±0.160
	=0.80	=2.30	-	-	-	-	0.120	±0.130	±0.140	±0.160	±0.180
780 M Pa ⟨= UTS	=1.00	⟨1.00	-	-	-	-		±0.090		±0.100	-
	=1.25	⟨1.25	-	-	-	-		± 0.100		±0.120	-
	=1.60	⟨1.60	-	-	-	-		± 0.120		±0.150	-
	=1.60	=2.00	-	-	-	-		± 0.140		±0.160	-

Advanced High-strength Steel

Dual Phase steels DP600 and DP780 offer an excellent combination of strength and drawability as a result of their microstructure, in which a hard martensitic or bainitic phase is dispersed in a soft ferritic matrix. These steels have high strain hardenability which provide them good strain redistribution capacity and thus drawability as well as finished part mechanical properties, including yield strength, that are far superior to those of the initial blank. The yield strength of Dual Phase steels is further increased by the paint baking (also called Bake Hardening, BH) process. High finished part mechanical strength lends these steels excellent fatigue strength and good energy absorption capacity, making them suitable for use in structural parts and reinforcements. The strain hardening capacity of these steels combined with a strong bake hardening effect gives them excellent potential for reducing the weight of structural parts.

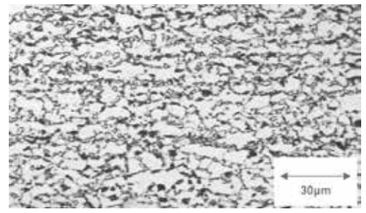
Mechanical properties prJFS A2001_2008

Grade	YS (N/mm^2)	UTS (N/mm^2)	El%
JSC590Y	320-440	›590	≥19
JSC780Y	420-590	›780	≥14
JSC980Y	580-730	›980	≥11

Notes
- 1 N/m m2 = 1MPa
- Yield strength refers to the 0.2% proof strength for the product
- JSW DP steel confortably meets the 'n' value, BH and Hole Expansibility requirements
- JSW DP steels confirms Ageing Guarantee of 6 months

Designation and Standard

	prEN 10338:2009	prJFS A2001_2008	prJIS G_3135_2006
Dual phase 590	HCT600X	JSC590Y	SPFC590Y
Dual phase 780	HCT780X	JSC780Y	SPFC780Y
Dual phase 980	HCT980X	JSC980Y	SPFC980Y



*the service properties of Dual Phase steels are guaranteed by the controlled (temperature, cooling rate) annealing cycle in particular ensures achievment of the Dual Phase microstructure and reproducibility of mechanical properties.

Applications

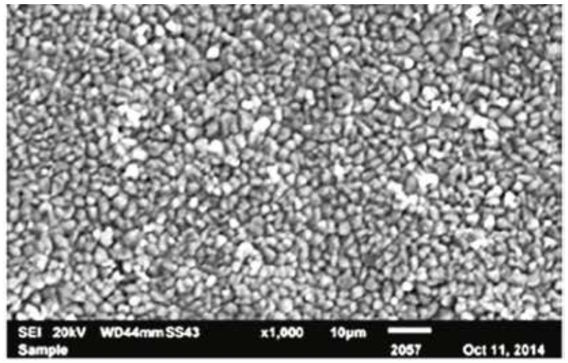
Given their high energy absorption capacity and fatigue strength, cold rolled Dual Phase Steels are particularly well suited for automotive structural and safety parts such as longitudinal beams, cross members and reinforcements.

Typical mechanical properties of DP Grades at JSW Steel

Grade	YS (N/mm^2)	UTS (N/mm^2)	El%	n-value	BH Index (Mpa)	Hole expansion ratio
JSC590Y	380-400	610-640	27-30	0.16	50-60	60%
JSC780Y	540-570	800-830	19-22	-	〉35	40%
JSC980Y	660-700	1020-1050	13-15	-	〉35	30%

* JSW DP Steel comfortably fulfill the aging guarantee of more than 6 months

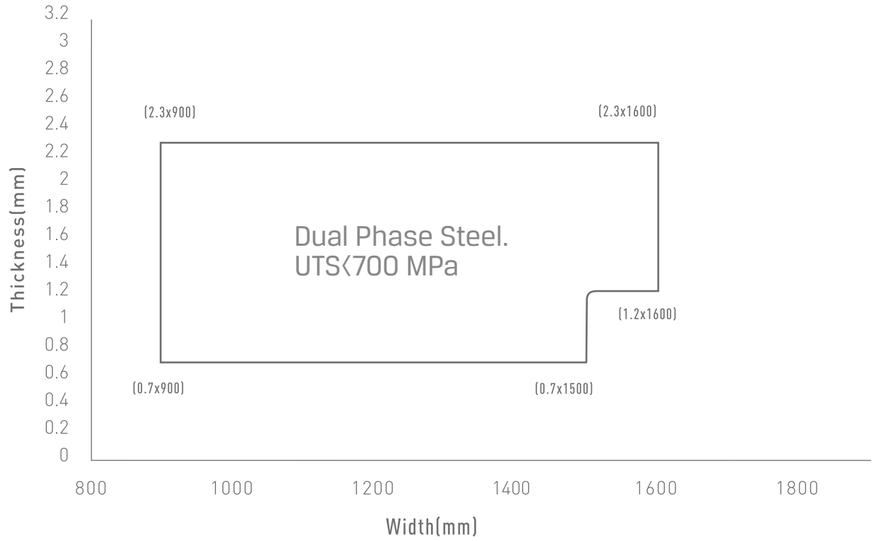
Phosphatability Test



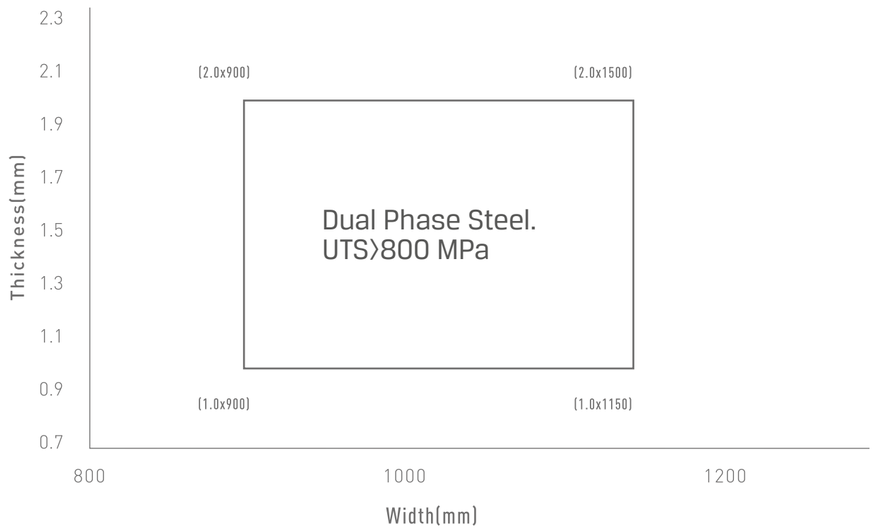
DP600

*JSW DP Steel comfortably satisfy the posibility test requirements having very fine and even phosphate crystal size with Phosphatability ratio 〉90%

Available dimensions for dual phase grades (〈700 MPa)



Available dimensions for dual phase grades (UTS〉800 MPa)



High Strength Low Alloy Steel

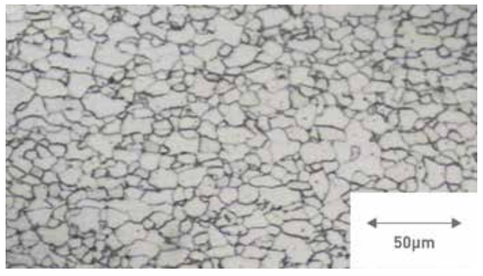
Cold rolled HSLA (High Strength Low Alloy) steels are strengthened by a combination of precipitation hardening and grain size refining resulting in high strength with low alloy. Due to their fine grain microstructure and excellent weldability these grades are particularly suitable for structural components such as suspension systems and chassis and reinforcement parts. HSLA steels offers good fatigue strength suitable for suspension arm, shock tower along with superior impact strength applicable for longitudinal beams cross members, reinforcements, etc. For their respective yield strength levels, these steels show excellent cold forming and low -temperature brittle fracture strength. The various HSLA grades are characterized by their yield strength.

Grades prEN 10268 : 2006	YS (N/mm^2) trans.	UTS (N/mm^2) trans.	El% A_{80} trans.
HC260LA	270-310	350-430	31-34
HC300LA	320-350	420-440	30-33
HC340LA	360-390	410-510	28-32
HC380LA	400-430	510-540	24-28
HC420LA	450-480	550-580	21-25

Cold Rolled HC340LA Microstructure

*The service properties of HSLA Steel are guaranteed by the controlled manufacturing process. the controlled annealing cycle in particular ensures achievement of the Fine Grained (Ferrite+pearlite) microstructure and reproducibility of mechanical properties.

Although the JSW HSLA grades match perfectly well to the designated EN standards, JSW generally offers tighter mechanical properties as mentioned below -



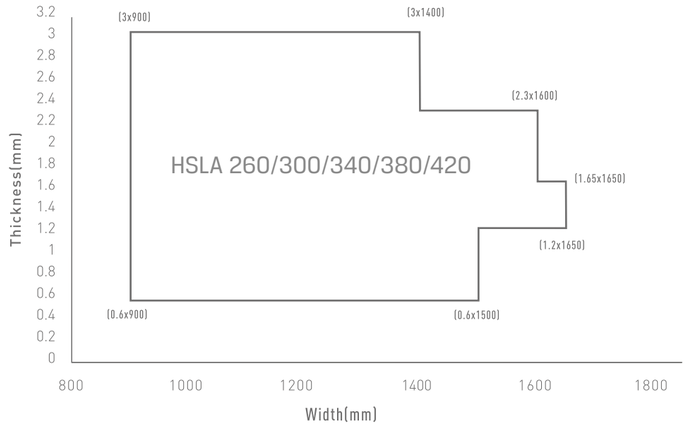
Typical mechanical properties of HSLA grades at JSW Steel

Grades prEN 10268 : 2006	YS (N/mm^2) trans.	UTS (N/mm^2) trans.	El% A_{80} trans.
HC260LA	270-310	350-430	31-34
HC300LA	320-350	420-440	30-33
HC340LA	360-390	410-510	28-32
HC380LA	400-430	510-540	24-28
HC420LA	450-480	550-580	21-25

Notes

- 1 N/m m2 = 1MPa
- Yield strength refers to the 0.2% proof strength for the product

Available dimensions for HSLA grades

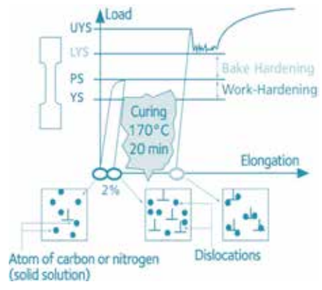


Bake Hardening Grades

JSW BH grades are best suited for the automobile components, which are put for the commercial paint baking operation. Some examples of these components are side, outer, inner body panels. BH grades possesses higher yield and tensile strength than conventional low carbon steel, excellent formability (r & n -value) along with bake hardening strength of 35-50 MPa .BH grades can replace lower strength material with thicker gauge and provide better fuel efficiency by decreasing the weight of the vehicle. It has better dent resistance than conventional low C steel confirming better safety of the automobiles and the passengers as well. The various BH grades are characterized by their yield strength as per EN standard

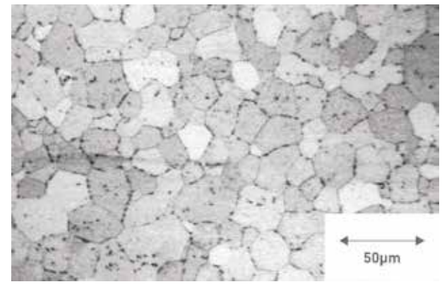
Bake hardening -IF steel having carbon content of ‹0.0035 wt% has very low yield strength initially. Small amount of carbon (approx 5 to 10ppm wt %) is intentionally left unfixed in steel solution by controlled Ti addition. Following press forming via plastic deformation the induced dislocations results in work hardening. The press formed components are heated at approx 1700C for 20mins during bake hardening process. Through the paint baking process the solute carbon stabilizes the dislocations which were induced during work hardening by diffusing next to the core of a dislocation. An additional stress is now required to promote the slip movement once mobile dislocations are pinned down by solute carbon after paint baking. Therefore, a bake hardenable steel sheet exhibits a low yield strength value before press forming and a high yield strength value in a finished car component after paint baking.

BH Effect



The Mechanism and evaluating method of bake hardening in a tensile is illustrated in above figure

Cold Rolled HC220BH Microstructure



BH Grade microstructure showing complete polygonal ferrite grains resulting in excellent drawability

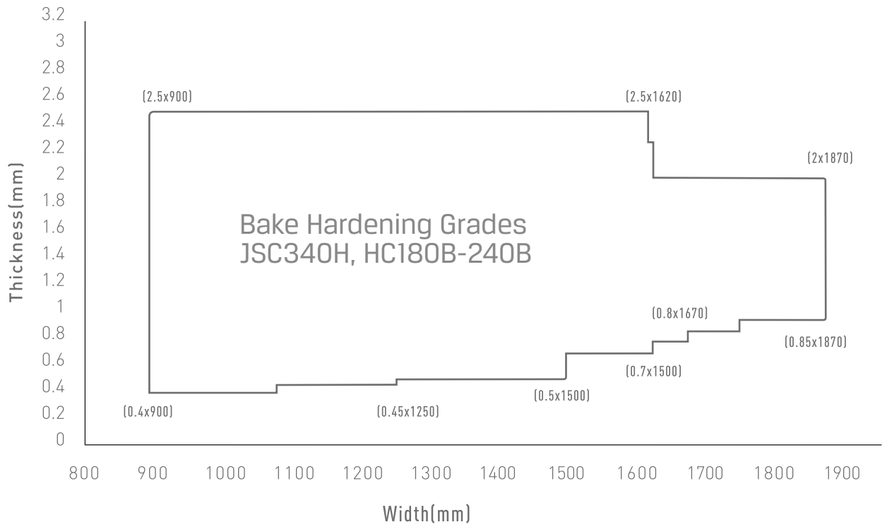
Standard and mechanical properties prEN 10268: 2006

Grades prEN 10268: 2006	YS (N/mm^2) trans.	UTS (N/mm^2) trans.	El% A_{80} trans.	r min trans.	n min trans.	BH_2 (Mpa)
HC180B	180-230	300-360	≥26	≥1.6	≥0.17	≥35
HC220BH	220-270	340-400	≥23	≥1.5	≥0.16	≥35
HC260BH	260-300	370-430	≥21	-	≥0.15	≥35

Note: • $1N/mm^2 = 1$ Mpa

- Yield strength refers to the 0.2% proof strength for the product.
- JSW BH grades confirms Ageing Gaurantee of 6 months.

Available dimensions for Bake Hardening Grades



Standard and mechanical properties prEN 10268: 2006

Steel type	Ref STD	UTS (N/mm^2)	YS (N/mm^2)		El%	n 90	r	BH (Mpa)
		Min	Min	Max	Min	Min	Min	Min
BH	EN_HC300B	〉300	300	360	24	0.14	0.9	30
SEDDQ	JFS_JSC260G	〉260	100	165	42	57	1.8	-
HSLA	EN_HC500LA EN_HC500LA	〉560 〉610	500 550	600 650	18 16	- -	- -	- -
TRIP	EN_HCT590T EN_HCT690T EN_HCT780T	〉590 〉690 〉780	380 410 450	480 510 550	27 25 23	0.2 0.19 0.18	- - -	35 35 35

Testing facilities

- Cupping Test
- Tensile Test
- Thickness Tolerance Test
- Universal Tester for Elongation
- Hardness Tester
- Bend Test
- Roughness Test
- Mopping Test

The Ultimate Test

Cold Rolled sheets are used in varity of applications:

- Automobile
- White goods
- Cold Rolled formed sections
- General engineering and fabrication
- Packaging
- Drums/Barrels
- Furniture
- Electrical Panels

Sales Offices

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Ahmedabad-380 054
Mobile: 09427334449
Tel: 079-49000270/271/272/273/274/275

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Dickenson Road, Bengaluru - 560 042
Tel: 080-42448888

CHENNAI
5th Floor, KRM Plaza, No. 2,
Harrington Road, Chetpet, Chennai - 600 031
Tel: 044-28297420, 28297422

COIMBATORE
T. V. Swamy Road (West), Coimbatore - 641 002
Tel: 0422-2541870

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A-2, Shaheed Jeet Singh Marg,
Qutub Institutiuonal Area, New Delhi – 110016
Tel: 011-48178600 | Fax: 011-48178699

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Main Mathura Road, NH-2, YMCA Chowk, NIT
Faridabad - 121006, Haryana
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Tel: 040-27846669/79

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