GSTIN : 03BCNPS3825B1ZS

PAN : BCNPS3825B

INDIAN IRON & STEEL INDUSTRIES

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Committed to Optimal Production Output, Quality and Total Cost of Ownership

GSTIN : 03BCNPS3825B1ZS PAN : BCNPS3825B

INDIAN IRON & STEEL INDUSTRIES

ISO 9001 : 2015

Products Profile: Metal Rolls (Rolling Mill's Rolls), Rolling Mill's Machineries, Steel & Iron Castings

Brief About Us

Respected Sir / Madam,

We **"M/S. INDIAN IRON & STEEL INDUSTRIES"** from North India (Punjab) is a fully integrative enterprise which is dedicated to Design the Metal Rolls (Rolling Mill's Rolls) suitable to very high performance (Maximum Pass-Life with Better Finishing) according to the application and conditions of rolling mills and their various stands.

We are associated with our Manufacturing Partners for their infrastructure and raw materials only. We used to provide our Design, Q.A.P. (Quality Assurance Plan), R & D (Research and Development) to our Manufacture according to application of Metal Rolls.

Our Technical and skilled team who having vast experience in the same field (More than 20 Years) are always focused towards on Quality Assurance Plan (Q.A.P.) to every step of Manufacturing's Process to the "characteristics" required to Metal Rolls (Rolling Mill's Rolls) like; **Good wear- resistance against friction's load, A firm structure against breaking, Good mechanical-resistance even at temperature change, Good resistance against sudden heavy Impact, Bending & tensile load, Good resistance against thermal & fire-cracks on surface.**

Our main goal is supply the product (Rolls) that provide Optimal Production Output, Quality and Total Cost of Ownership (TCO). with throughout team of Engineers, Skilled workers & Allied Professionals who have experience over many years in same field.

We have the range of manufacturing the Rolls (Rolling Mill's Rolls) in all applicable grades for all stands of Steel Re-Rolling Mills, consisting of **300 Kgs. to 10,000 Kgs.** in finished weight of single Roll which range of **Barrel Dia** starting from **300 mm to 850 mm. and Total Length of Roll up-to 5000mm.**

We are specialised to Manufacture the Rolls for: -

1. TMT and Wire Rod Rolling Mills
2. Section or Structural Steel Rolling Mills (Angle, Channel, Beam & Girder)
3. Profiles Steel (Rounds Bar, Square & Flat) Rolling Mills
4. Strips Rolling Mills

PRODUCTS PROFILE

1. **Alloy Cast Steel Base ADAMITE Rolls & Rings.**
2. **Graphitic Steel / Graphitized Steel Rolls & Rings.**
3. **Spheroidal Graphite (Nodular) Cast Iron Rolls- (I) S.G.I.-Ferritic, (II) S.G.I. Pearlitic & (III) S.G.I.-Bainitic Accicular.**
4. **Chilled Cast Iron Rolls-(I) Definite Chilled Cast Iron (II) Alloy Indefinite Chilled Cast Iron & (III) Bainitic Chilled Cast Iron Rolls.**
5. **Forged Steel Rolls, Shafts & Rings. (EN 8, EN 9, EN 31 & EN 42)**
6. **High Speed Steel (HSS) Rolls**
7. **Tungsten Carbide (T.C.) Rings**

"We will be very much OBLISED & THANKFUL to you for the consideration of our request for Business Opportunity with you."

Warmest Regards

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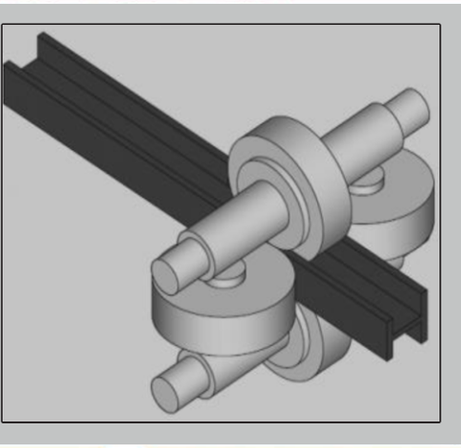
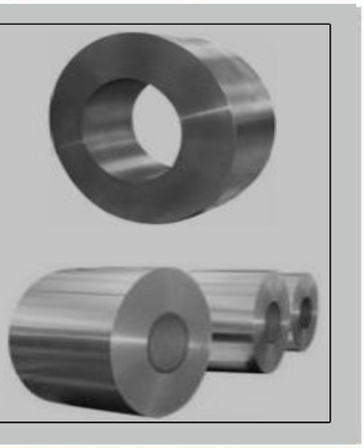
1. ALLOY CAST STEEL BASE ADAMITE ROLLS & RINGS:

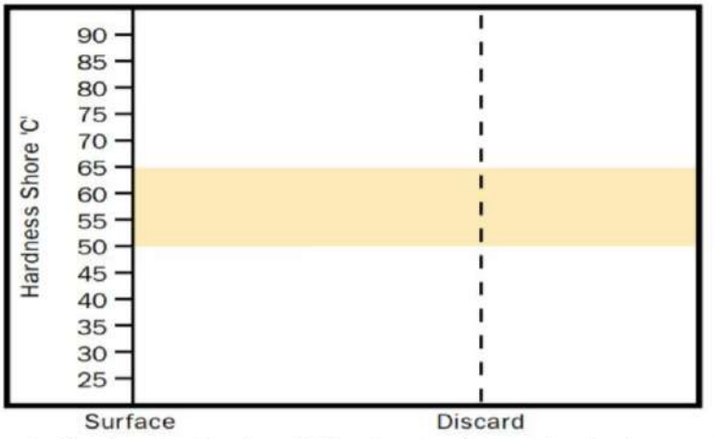
Alloy Cast Steel Base Adamite Rolls are hypereutectoid steel of Pearlitic Microstructure (Pearlite + Carbides) which are produced from alloyed **(Mn, Cr, Ni & Mo).** These Rolls are subjected to sophisticated multi-stage high temperature Heat- Treatment by Double Annealing followed by tempering cycle to the best microstructure which is capable of a higher mechanical strength with thermal and wear resistance along with hardness in depth (Constant Hardness Curve).

Chemical Composition-Range:									Physical Properties:		
C%	Mn%	Si%	Cr%	Ni%	Mo%	V%	S%	P%	Hardness Range (Shore ^{0} C)	Tensile Strength (N/mm^2)	Bending Resistance (N/mm^2)
0.60 2.00	0.50 1.20	0.20 0.80	1.00 2.00	0.50 2.00	0.20 0.80	0.10 0.60	0.040 Max	0.045 Max	30 ^{0}C to 60 ^{0}C	350 – 700	600 – 1100

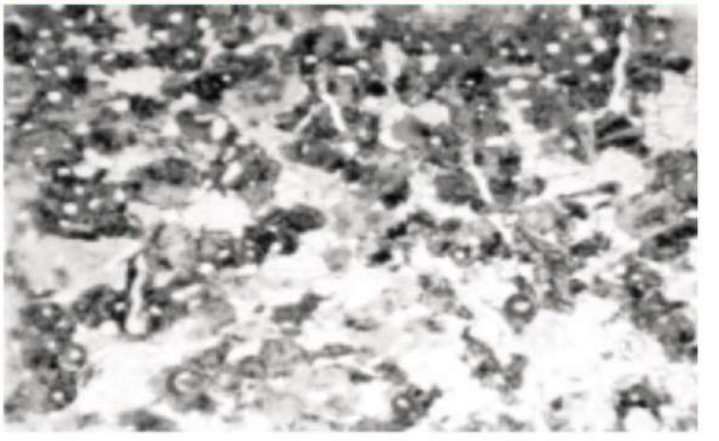




DEPTH OF HARDNESS



MICROSTRUCTURE X500



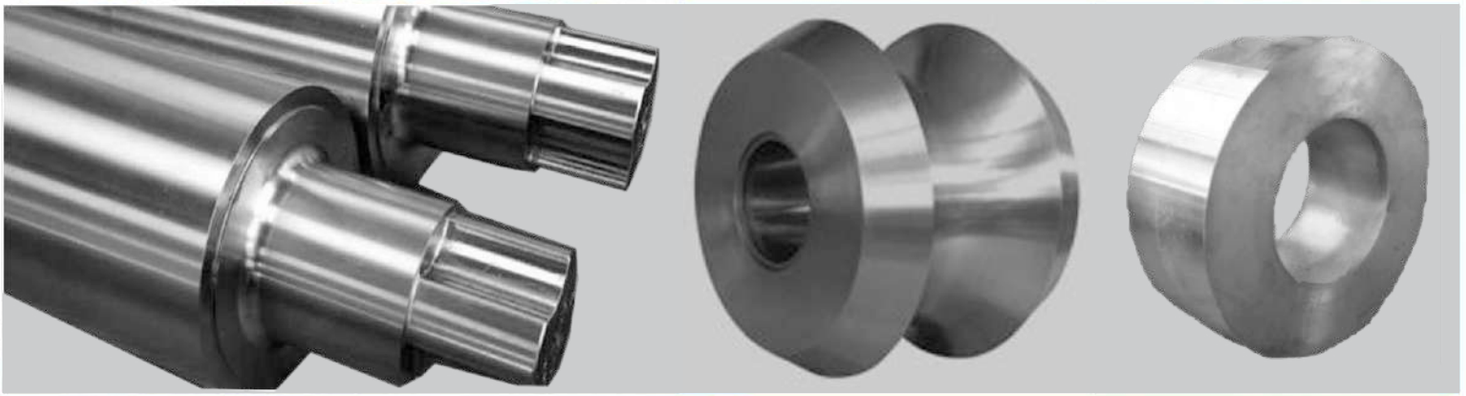
Application: Application of Alloy Cast Steel Base Adamite is very suitable according to Hardness & Chemical Composition range as per below:

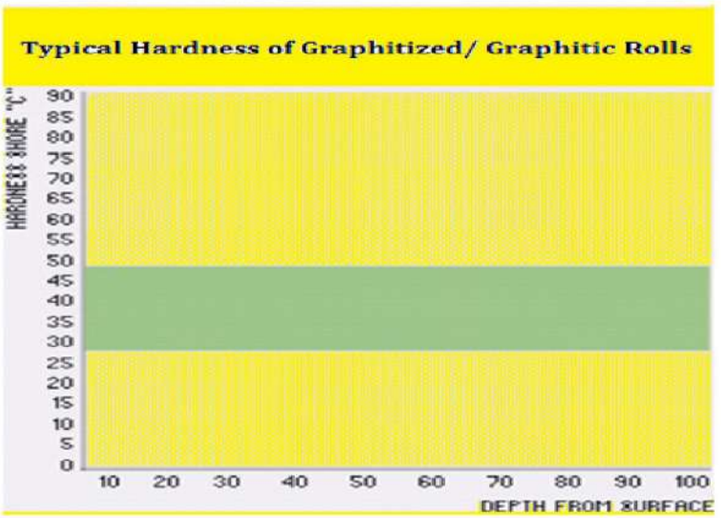
Rolling Mills	Mill- Type	Stands- Position	Pass- Condition
Heavy, Medium & Light Section, Beams, Rail & Bar Mills	2 & 3 Hi or Universal	In all stands (Rough, Intermediate & Finish)	In case deep or light groove pass, low reduction & low RPM.
Medium & Narrow Strip TMT & Wire Rod Mills	2 & 3 Hi	Only on Roughing Stand	
Heavy, Medium & Light Section Mills	Can be used for Straightening Rollers (Reels)		

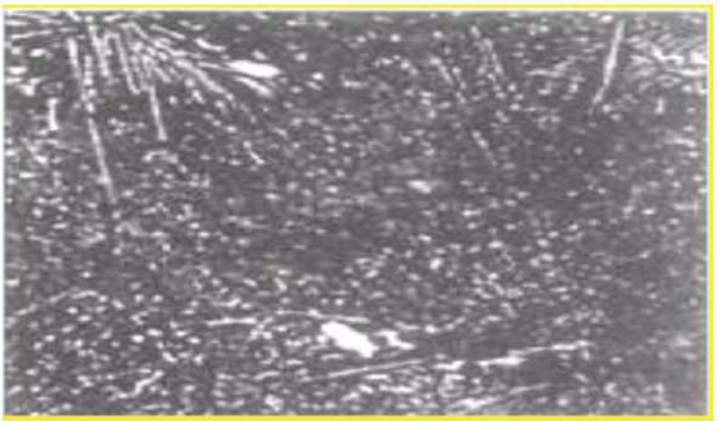
2. GRAPHITIZED STEEL / GRAPHITIZED STEEL ROLLS, REELS & RINGS:

Graphitic Steel Base Roll is similar to normal steel base but these rolls have the structure consists of Carbide in a Pearlitic matrix with free Graphite. Therefore, it is known as Graphitic Rolls. By modification of the alloy content and suitable heat treatment a controlled amount of fine graphite particles dispersed throughout the structure of the rolls are produced. These Rolls are greater than any other steel base Roll due to presence of the graphite improves the fire-crack resistance of the roll material and reduces thrust collar wear and the side wears which occurs during indirect heavy reduction

Chemical Composition-Range:									Physical Properties:		
C%	Mn%	Si%	Cr%	Ni%	Mo%	V%	S%	P%	Hardness Range (Shore ^{0} C)	Tensile Strength (N/mm^2)	Bending Resistance (N/mm^2)
1.20 2.50	0.70 1.25	0.60 2.00	1.00 2.00	0.80 2.50	0.20 0.80	0.10 0.60	0.045 Max	0.045 Max	**40^0 C to 60^0 C**	500-800	850-1300







X100

Microstructure of Graphitized/ Graphitic Rolls
(Hard. 45° - 50° Shore °C)

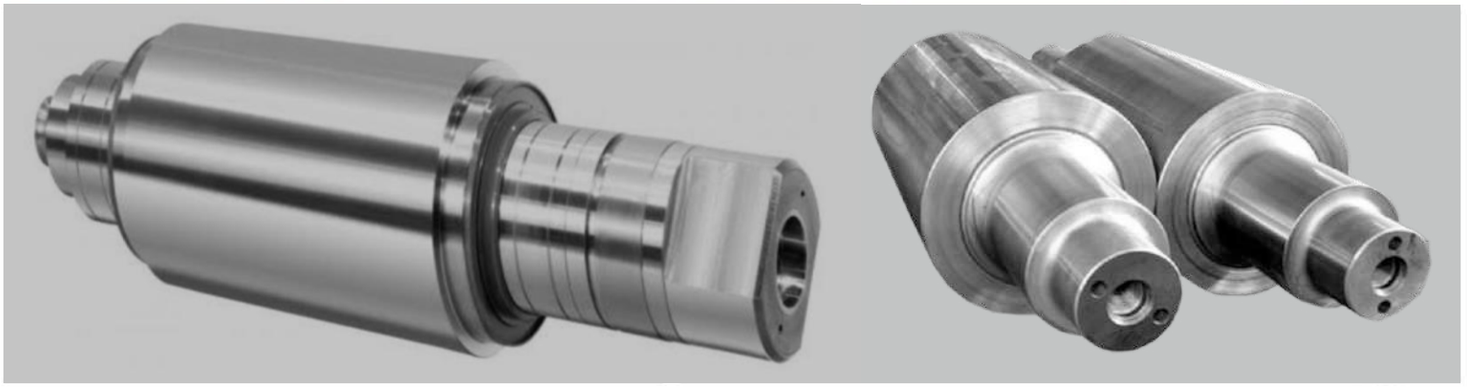
Application: Application of **Graphitic Steel Base** is very suitable according to Hardness & Chemical Composition range as per below:

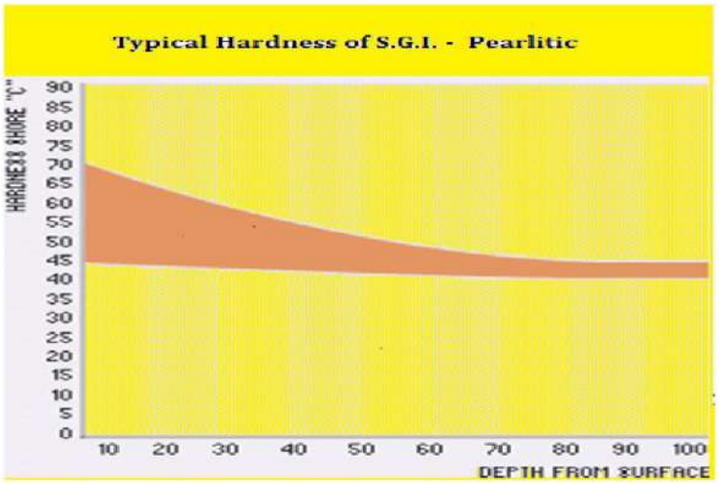
Rolling Mills	Mill- Type	Stands- Position	Pass- Condition
Heavy Section, Medium Section, Light Section, Beams, Rail & Bar Mills	2 & 3 Hi or Universal	In all stands (Rough, Intermediate & Finish)	In case deep groove pass, Hi-reduction –ratio & Hi-thermal load
Medium & Narrow Strip TMT & Wire Rod Mills	2 & 3 Hi	Only on Roughing Stand	
Heavy, Medium & Light Section Mills	Can be used for Straightening Rollers (Reels)		

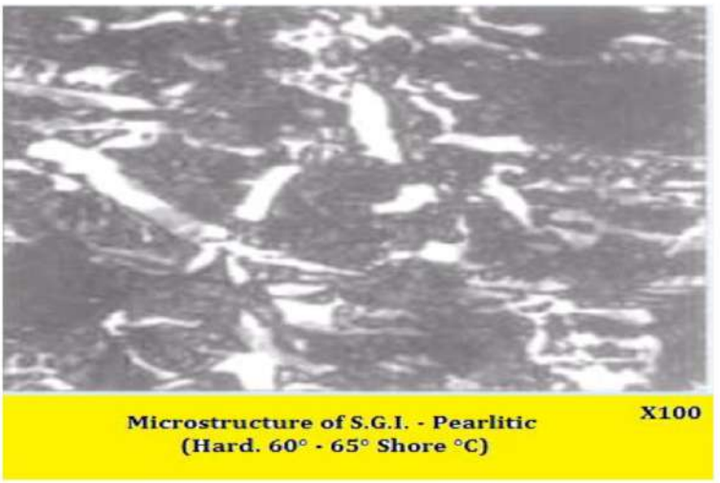
3. SPHEROIDAL GRAPHITE (NODULAR) CAST IRON (S. G. IRON) ROLLS:

These Rolls are structurally characterized by nodular graphite as against flack graphite by Nodularizing in the normal cast iron through Magnesium Treatment, Indefinite Chill type material, but with the Graphite in Nodular form instead of flake and having alloyed with higher percentage of Carbon along with Nickel, Molybdenum and Chrome. So these rolls have a much higher Mechanical Strength and allow the use of an iron Rolls in applications which would re-present too high a duty for a flake iron quality due to internal 'notch effect' of nodular graphite is relatively small. The microstructure consists of a Ferritic, Pearlitic and Bainitic Metric with minor traces of cementite (Fe3C) but different forms of free Graphite (Flake & Nodular). These rolls are very much suitable for the rolling of row products with vide range of applications due to its hardness penetration; good wear resistance and tough necks. These rolls are available in three different grades; **(I) S.G.Iron - Ferritic, (II) S.G.Iron - Pearlitic & (III) S.G.Iron - Bainitic Accicular.**

Chemical Composition-Range:									Physical Properties:		
C%	Mn%	Si%	Cr%	Ni%	Mo%	Cu%	S%	P%	Hardness Range (Shore ^{0} C)	Tensile Strength (N/mm^2)	Bending Resistance (N/mm^2)
3.00 3.60	0.30 0.80	1.20 2.50	0.50 1.20	1.50 3.50	0.30 1.10	0.20 Max	0.015 Max	0.10 Max	**50^0 C to 75^0 C**	400 – 800	700 – 1350







Microstructure of S.G.I. - Pearlitic (Hard. 60° - 65° Shore °C) X100

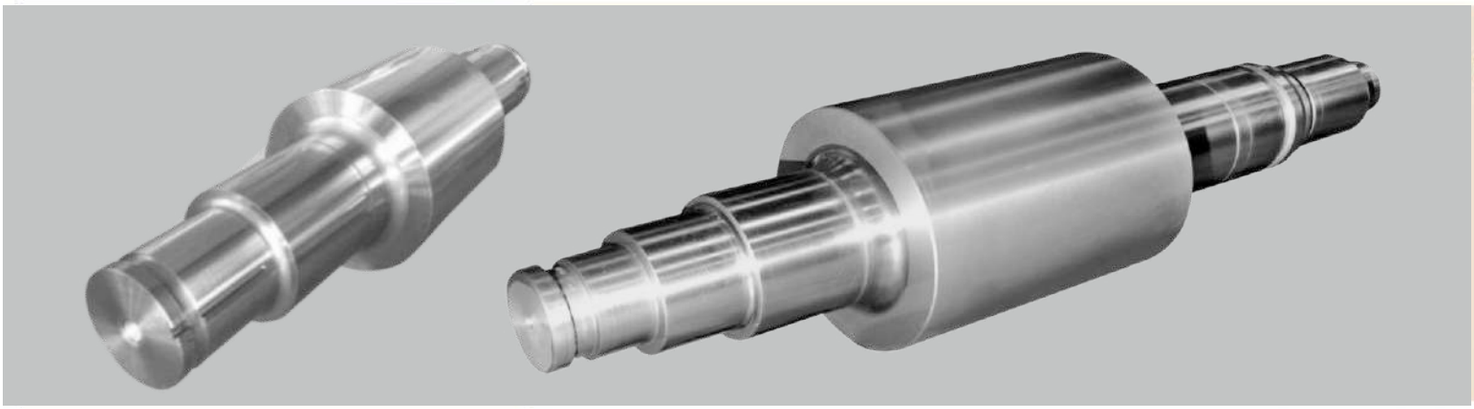
Application: Application of S.G.I.-Pearlitic is very suitable according to Hardness & Chemical Composition range as per below:

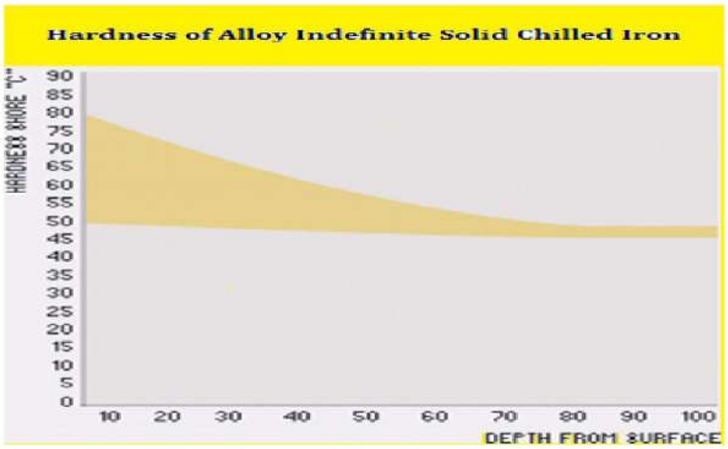
Rolling Mills	Mill- Type	Stands- Position	Pass- Condition
Plate, Sheet, Billet & Sheet Bar	2 & 3 Hi	Only on Finishing- stand	In case low reduction, light groove pass & low or high RPM as well as short rolling length.
TMT, Wire-rod, Medium & Light Section Mill		Roughing, Intermediate & Finishing- stand	
Round & Bar Mill		Intermediate & Finishing-stand	

4. CHILLED CAST IRON ROLLS:

Chilled Cast Iron Rolls have a structure consisting of more flake graphite with few uniform carbides in a Pearlitic matrix. Harder grades have a Bainitic-Martensitic matrix with an increased amount of carbides. The presence of flake graphite improves spilling resistance and also enhances resistance to fire cracking. All of these properties combined with the excellent surface finish make AIC Alloy Indefinite Chill very suitable for rolling flats sections and similar products where surface finish is critical. Due to alloy additions, hardness penetration is better than that of a clear chill roll and this material may be used in applications with deeper groves such as small and medium section rolling and also for finishing billets. Generally there are three types; (I) Definite Chilled Cast Iron, (II) Indefinite Chilled Cast Iron & (III) Bainitic Chilled Cast Iron.

Chemical Composition-Range:									Physical Properties:		
C%	Mn%	Si%	Cr%	Ni%	Mo%	Cu%	S%	P%	Hardness Range (Shore ^{0} C)	Tensile Strength (N/mm^2)	Bending Resistance (N/mm^2)
2.80 3.50	0.60 1.25	0.60 1.25	1.00 2.00	1.00 3.50	0.50 1.50	0.20 Max	0.080 Max	0.10 Max	**50^0 C to 80^0 C**	150 – 250	250 – 350





Application: Application of Alloy Indefinite Solid Chilled Iron Rolls according to Hardness range as per below:

Rolling Mills	Mill- Type	Stands- Position	Pass- Condition
Plate, Medium & Narrow Strip	2, 3 & 4 Hi	Roughing	In case of deep or light groove pass, low reduction & short or long rolling length.
Billet & Sheet Bar, Medium Section Mill & Flat	2 & 3 Hi	Intermediate & Finishing- stand	
TMT, Wire Rod, Round & Bar		Intermediate & Finishing- stand	

5. FORGED STEEL ROLLS, SHAFT AND RINGS:

These are carbon steel and alloy steel Rolls and these are manufactured by metal is pressed, pounded or squeezed under great pressure into high strength by open die hot forgings. Preheating the metal to a desired temperature before it is worked normally performs the process hot.

Application: Application of Forged Steel Rolls can be used only on Roughing Stand in all types of Hot Steel Rolling Mills.

Grade	Chemical Composition – Range				
	C%	Mn%	Si%	S%	P%
EN 8 (Forged Steel)	0.35 0.45	0.60 1.00	0.10 0.35	0.045 Max	0.045 Max
EN 9 (Forged Steel)	0.50 0.60	0.60 0.80	0.15 0.35	0.045 Max	0.045 Max
EN 31 (Forged Steel)	0.90 1.20	0.30 0.75	0.35 0.45	0.045 Max	0.045 Max
EN 42 (Forged Steel)	0.70 0.85	0.55 0.75	0.10 0.40	0.045 Max	0.045 Max

QUALITY ASSURANCE PLAN (Q. A. P.) of Metal Rolls - Production

Metal Roll is tailor made products to crafting various types of steels in different shape and size (Angle, Channel Beams, Girder, Flat, Strips, Round, Square, TMT & Wire Road etc.) it has to perform under many critical conditions during Hot Rolling. So required below characteristics: -

- **High wear resistance due to friction.**
- **A firm structure against breaking high mechanical resistance even at temperature change.**
- **Resistance against sudden heavy Impact and Bending load due to reduction.**
- **Resistance against thermal and fire cracks on surface which gets in contact with constant hot materials.**
- **Machining ability so that can be machining according to pass design and assembling with bearing.**
- **Resistance against Tensile load due to Hi RPM.**

To fulfill above entire characteristics, need very careful operation at every step of production process. Therefore we have **Quality Assurance Plan (Q.A.P.)** to achieve better Quality Parameter which provides more Pass life with better finishing in Rolling Products controlling with Breakdown in Rolling Mills:

1. Melting

(i) Melting of Spheroidal (Nodular) Graphite Iron (S.G.I.) Rolls -

Melting is carried out through Induction Furnace by charge-mix of selective alloy based melting fresh scrap after chemical composition analysis by Spectro lab of each lot. Addition of Ferro Alloys (Carbon, Silicon, Manganese, Chromium, Nickle, Molybdenum & Vanadium) are to be done at initial stage during melting depending upon requirement of grades as per charge-mix. After successfully achieving required elements (Ferro Alloys) we use to do Soda Ash-Treatment in Ladle applying with Orgon Gas Treatment (Purging) to De – Sulphurising on High Temperature (1500°C to 1550°C) to reduce Sulphur (Max. 0.020%) as well as proper homogeneity of liquid metal. After De – Sulphurising liquid metal again re-pour to the Induction Furnace then Post-Nodulising by Magnesium (NiMg) to get Spheroidal (Nodular) Structure to done in another second ladle. During melting, we used to get multiple bath samples for chemical composition to determine formation of microstructure (Pearlitic Matrix with Nodular Graphite, Carbides and some Pearlite as well as Bainitic – Martensitic Matrix with Nodular Graphite and Carbides). As well as to achieve required chemical composition - range which is aimed by view point of application in rolling mills.

(ii) Melting of Alloy Cast Steel Or Adamite and Graphitized Or Graphitic Steel:

Melting is carried out through Induction Furnace by charge-mix of selective Alloyed Based Melting fresh Scrap after chemical analysis by Spectro lab of each lot. Ferro Alloys are to be added during melting depending upon requirement of grades. During melting we used to get multiple bath samples for chemical composition to achieve required chemical composition - range which is aimed by view point of application in rolling mills. After melting, molten metal is being taken in Ladle Refining Furnace (L.R.F.) at 1500°C to 1550°C temperature for the purpose of spheroidization, Seeding, De-Oxidation and Grain Thinning and make castable temperature.

2. Moulding & Casting

Moulds of Metal Rolls are prepared by applying of **Directional Solidification Static Vertical Casting with Tangential Gate through Bottom Pouring System.** In preparation of mould we used to apply green sand process with proper contraction and machining allowances then go to baking in oven before assembling. Casting of entire Rolls are carried out in closed Pit to avoid direct air contact of moulds. Moulds of single roll are assembled in five parts as per below:

(i) Bottom Journal (Drive Side) - Moulding with Green sand along with Cast Iron Side Segment Chills with Bottom Chill Plate for the purpose of directional solidification.

(ii) Barrel – Barrel of Rolls Casted in Cast Iron Chiller (Chill Die) for the purpose of directional solidification due to Higher Conductivity of Heat.

(iii) Top Journal (Non Drive Side) – Moulding only with Green sand for reducing chilling to feeding of liquid metal to barrel.

(iv) Riser (Feeder) – Through Exothermic Sleeves to provide long time temperature in liquid metal for feeding against shrinkage.

(v) Runner & Getting System – Moulding with Refectory Sleeves, Washer and Tangential Getting of high alumina refractory. In our Pouring technique, liquid metal poured throughout in mould through bottom **Tangentially Gate** with high presser so that direction of liquid metal filling inside the mould in vertical upward in circular motion (clock-wise). Therefore casting becomes free from any type of inclusion and air-blow. We apply re-pouring after few times again direct in riser with hot metal to extra feeding as well as used to apply exothermic powder time to time in riser to make liquids. Entire moulds of roll covered with vermiculate in close pit till certain period according to volume and shape of Roll-Castings to controlled cooling.

3. Heat – Treatment (FOR ALLOY CAST STEEL & GRAPHITIZED STEEL ROLLS)

We used to apply Double Annealing followed by Tempering Cycle in Heat Treatment furnaces with modern pulse firing system and high speed burners with automatic zone & individual burner control systems ensure high precision heat treatment. Entire Alloy Cast Steel & Graphitized Steel (Graphitic) Rolls undergo a sophisticated multistage with high temperature H. T. cycle with proper soaking period to achieve combination of Hardness, Toughness and Wear Resistance require of particular application.

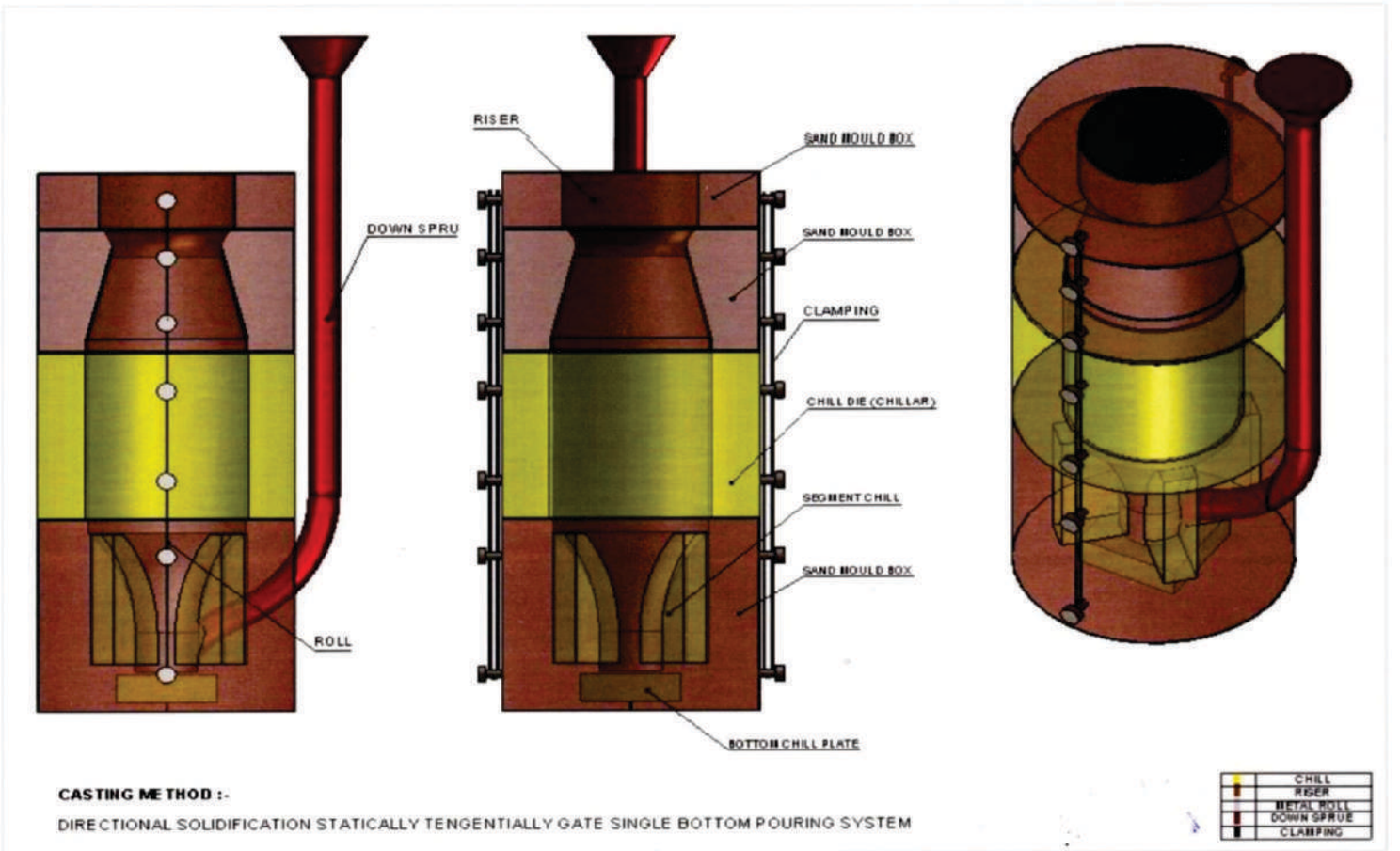
4. Machining

Machining of Metal Rolls carried out after Primary Inspection like Dimensional, Chemical Composition and Micro Structure. Machining has been done in two Phase – in 1st Phase Rough Cast Rolls machined in Proof Machine Condition then secondary inspections used to do like Dimensional and Physical Testing (Hardness, Tensile, Bending & Impact) and in 2nd Phase Proof Machined Rolls again machined in Finish Machine Condition as per approved drawing. Machining process is carried out with controlled RPM and tolerance. During machining, have to take very careful supervision about measurement and surface conditions time to time.

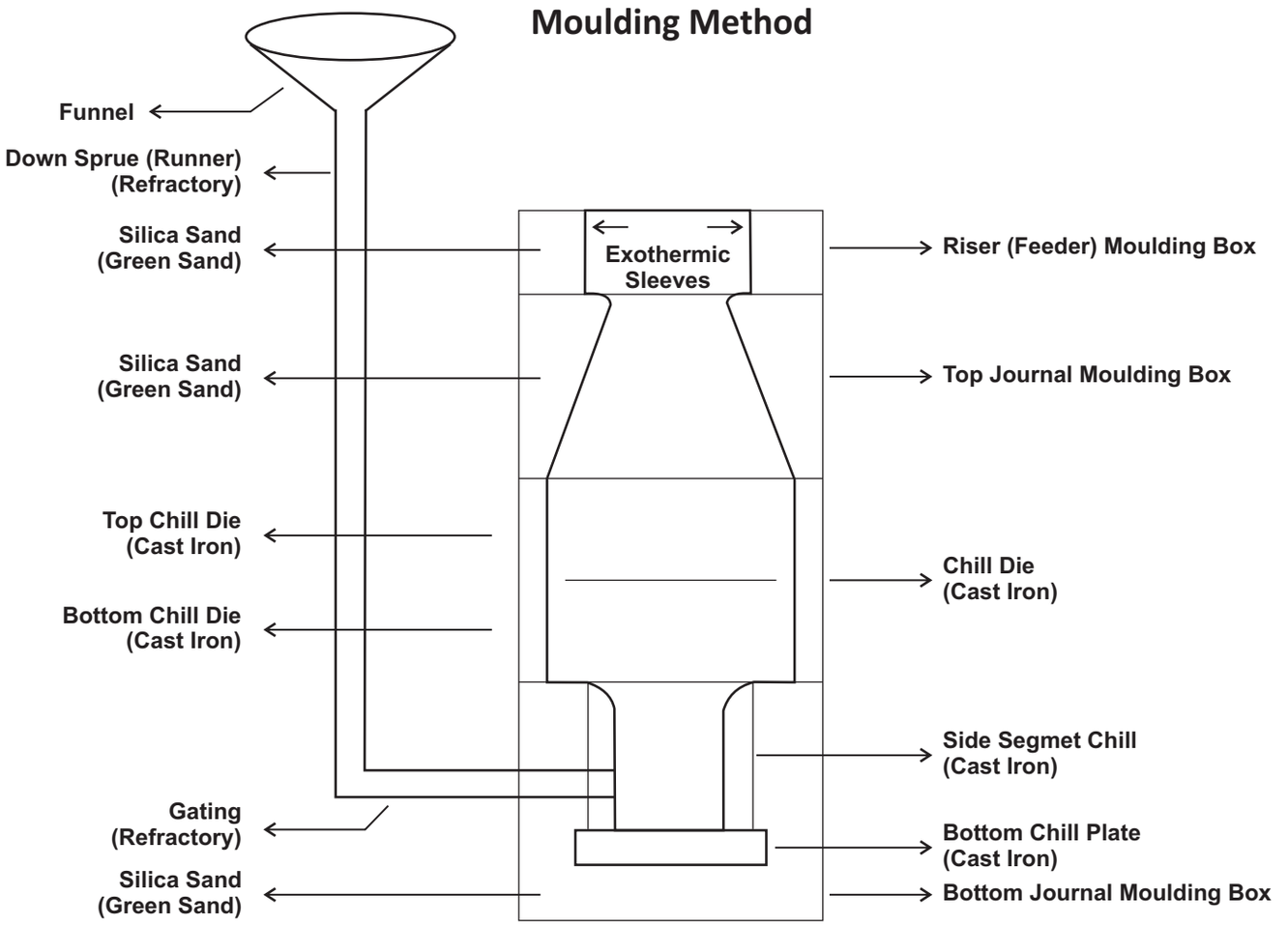
5. Quality Inspection

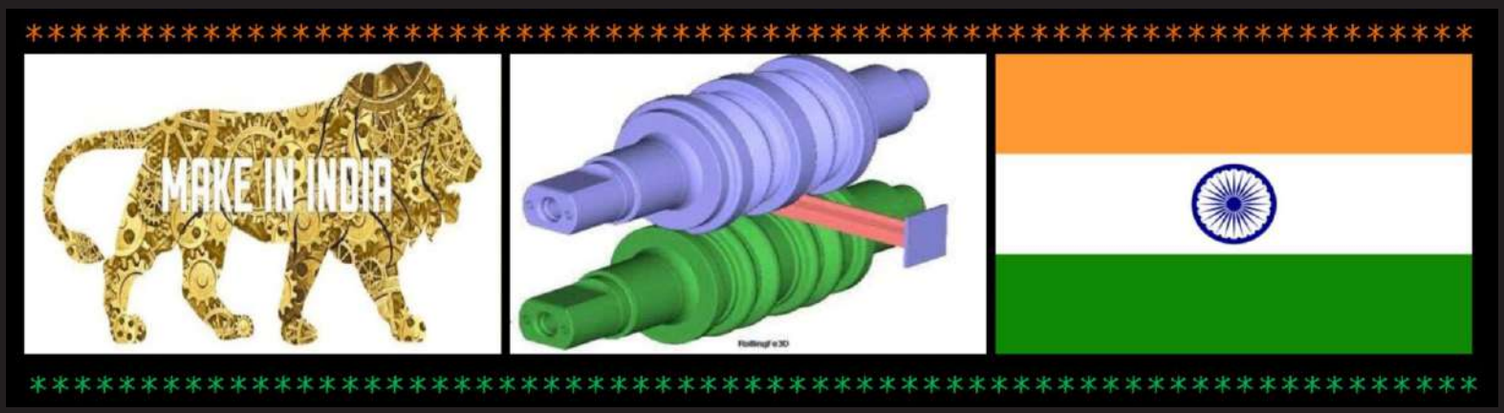
Our Quality Control Engineers and Experts go through final Inspection by latest calibrated Measuring, DT & NDT equipments of Finished Rolls for Dimensional, Chemical Composition as well as DT & NDT according to requirement from party or need to application of Metal Rolls in rolling mills.

Roll's Casting Method – Directional Solidification Statically Tangentially Gate Bottom Single Pouring System (Vertical) –



Moulding Method





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Punjab (INDIA)

Products Profile:

1. Metal Rolls (Rolling Mill's Rolls) – Alloy Cast Steel / Adamite, S.G. Iron – (Ferritic, Pearlitic & Bainitic Accicular), Alloy Indefinite Chilled Cast Iron, Bainitic Chilled Cast Iron, Forged Steel – EN 8, EN 9, EN – 31 & EN 42.
2. All Types of Steel Rolling Mill's Machineries & Spare– Parts.
3. All Types of Steel & Iron Castings.

Website: www.indianironandsteel.com