



Import Substitution (Value added & Special Steel) *-Technology driven*

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Presentation Flow

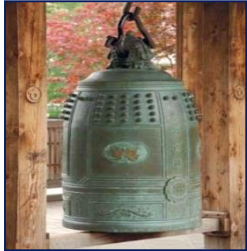
- **Past to the present**
 - **Major Technological breakthroughs**
 - **21st Century India**
 - **JSPL at the forefront**
 - **Major Import Substitute Products developed**
 - **Way Forward**
-

Past to the Modern World

Steel- The Only Constant



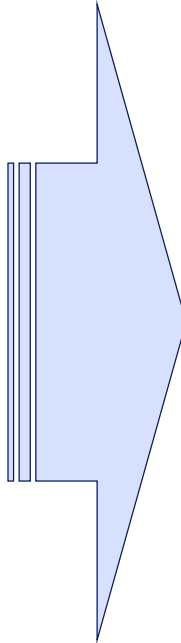
Damascus Sword (Wootz Steel)



Buddhist bell in Temple



Eiffel Tower



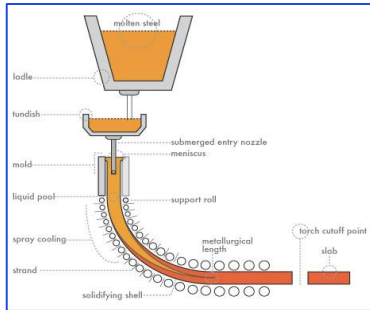
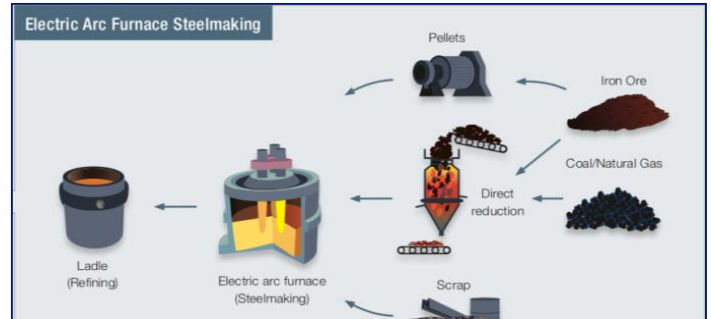
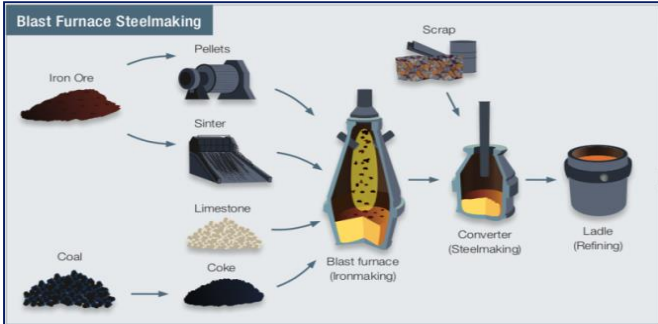
High Rise Building



Armour Tanks



Submarines



Iron Making Technological Evolution

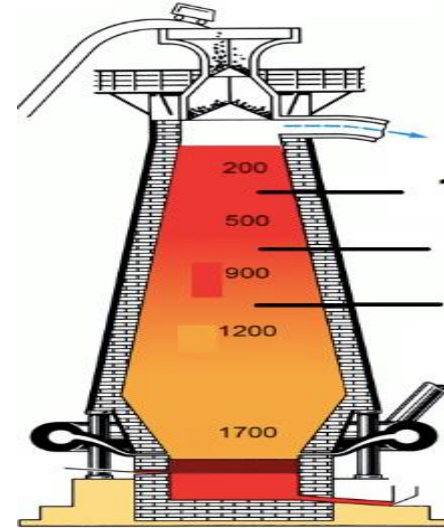
Inception

- Small Blast Furnace of volume 64m^3 , 425m^3 with productivity of 25, 450 THM/day
- High Reducing Agent Rate (RAR), Coke Rate (CR)
- Slower production with inferior quality (High S, High P)



Advancements

- High Capacity Blast Furnace of volume $>4000\text{m}^3$ with productivity $>10,000$ THM/day
- High PCI, Low RAR, Low Coke Rate, O₂ enrichment, Superflux Sinter, Controlled Raw Material Quality
- Aggressive production with high quality molten Pig Iron having low S, low P & low Si content.

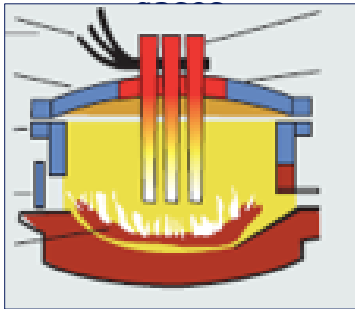


- **India's Largest Blast Furnace at JSPL**
Total Volume: 4554m^3 &
Working Volume: 3803m^3
- **Designed Maximum Production rate of 12,000 THM/day**

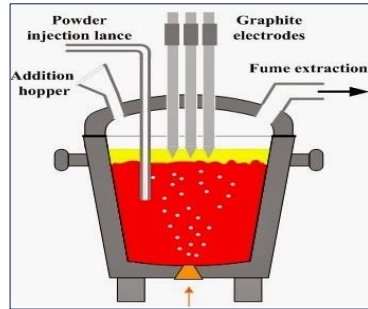
Steel Making Technological Evolution

DEVELOPMENTS

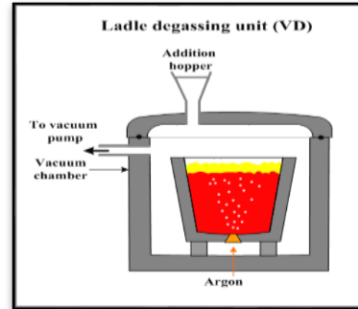
- In 18th Century, Blister Steel/Crucible Steel using Puddling Furnace/Clay Crucibles.
- In 19th Century, Bessemer Steel & Open Hearth Steel using Oxygen in molten iron to reduce C%.
- In 20th century, with Electric Arc Furnace (EAF) & Basic Oxygen Furnace (BOF) to achieve low C, Low P with high productivity.
- Hot Metal Desulphurization and Dephosphorization before primary steel making in torpedo/ladle while transferring from Blast furnace to Steel making Shop to reduce processing time and achieve high quality steel. Automation in alloying element addition to achieve close chemistry with narrow range.
- Refining of Steel in Ladle refining furnace as well as Vacuum Degassing Units (VD, RH) to minimize the inclusion level and produce high quality steel.
- Control on gaseous content by VD and RH units to achieve Low PPM levels of O₂, H₂ and N



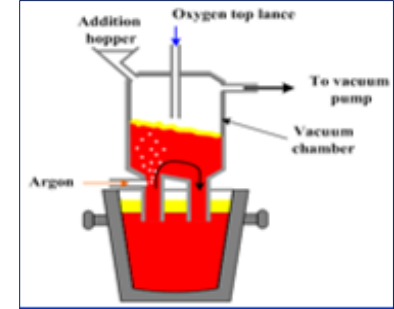
EAF



LRF



VD



RHD

Ingot Casting

- Very low productivity of 1-2 days
- Low Yield 80-90%
- High energy consup.
- Labor intensive
- Poor Quality Casting



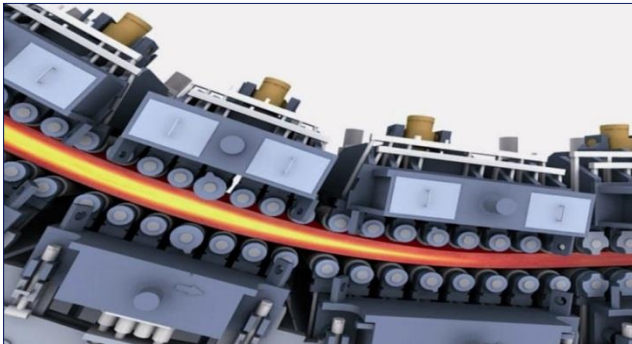
Continuous Casting

- Increased Productivity of 30-60 min.
 - High Yield of 96-99%
 - 1/4th Energy Consup.
 - High Automation & Less Labor
 - High Quality Casting
- Soft Reduction Technology at **JSPL** to minimize the Central line Segregation, Improving internal Soundness by reducing Porosity.
(Max. 300mm thick Slab Casting @JSPL)



Advancements

- High speed casting with temperature control through simulations
- Quality improvement with:
 - Auto Mould Level Controller (AMLC),
 - Breakout Prevention System (BOPS),
 - Electromagnetic Stirrer
 - Soft Reduction technology
 - Auto variable width mould





2004

- Fully Integrated Steel Plant:
 - Blast Furnace
 - EAF/BOF
 - LRF
 - VD/RH
 - Continuous Caster
 - Rolling Mill
 - Heat Treatment Process
- Slabs upto 250mm thickness
- Wider width plates 3.6m ~ 4m
- Rail Rolling

- Fully Integrated Steel Plant:
 - High Capacity Blast Furnace
 - EAF/BOF – Low P steel
 - LRF – Low S steel
 - VD/RH – Superior Inclusion Control
 - Continuous Caster – Superior Internal Homogeneity
 - Rolling Mill – Higher capacities
 - Heat Treatment Complex
- Slabs upto 300mm thickness
- Wider width plates 5m
- MULPIC/ADCO/HV Q&T upto 100mm
- RSF ~ 10,000 MT
- Advanced Rail Rolling with HT
- Universal Rolling
- High Speed Rebar Rolling mills

1. Integrated Steel Value Chain

- Iron ore to final end product
- Value Addition through fabrication & Construction solutions

2. Latest Steel Manufacturing Technologies

- Thick slab caster
- High Powered Mills, Head Hardening, Universal rolling

3. Unique & wide range of products

- Heavy Plates, Wider-width, advanced QT
- Head Hardened rails, Universal beams & Columns
- High Strength TMT rebars

4. Significant Presence in Niche Market segments

- Defence, High Rise, Railways, Nuclear
- Wind, Mining Construction, Power

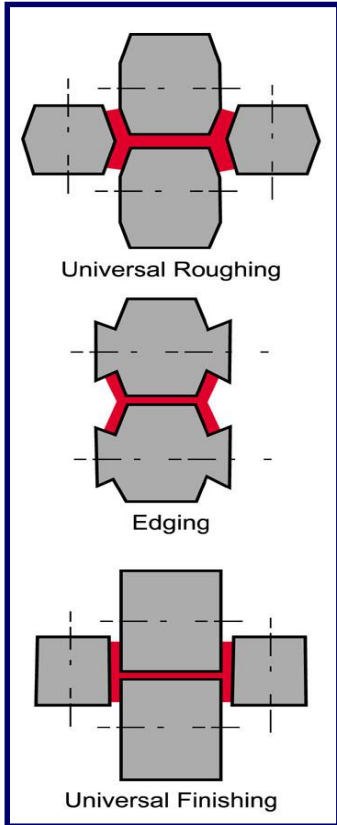
Import Substitution

Heavy Plates in India		
Yield Strength, Mpa	Before C 2000 (Year)	>= C 2000 (Year)
250	80mm Max, beyond imported	Complete range up to 150mm available with complete guarantee of properties
350	> 70mm imported	Complete range up to 150mm available
410	Imported	Fully range upto 120mm available
450	Imported	Upto 100 mm available
550	Imported	Up to 100mm available
BQP 515/516/SA 387-12 , ASTM 537 Cl 1 & 2 and 22/P355/SA 204	Imported	Full range currently available in India
Abrasion & Wear Resistant Steel	Imported	Complete Range for this segment available in India.

Import Substitution

Beams & Columns		
Yield Strength, Mpa	Before C 2000 (Year)	> C 2000 (Year)
250	Depth only up to 600 in obsolete technology (ISMB)	Full range of UB/UC/WPB/HEA/W sections available
350	Imported	Full range of UB/UC/WPB/HEA/W sections available
450	Imported	Full range of UB/UC/WPB/HEA/W sections available
Rails		
Gr. 880 Rails	Limited Availability	Available in various profiles
Gr. 1080 Rails	Imported	Complete range available
R 260/R 350 HT Rails	Imported	Complete Range available

Universal Rolling Technology

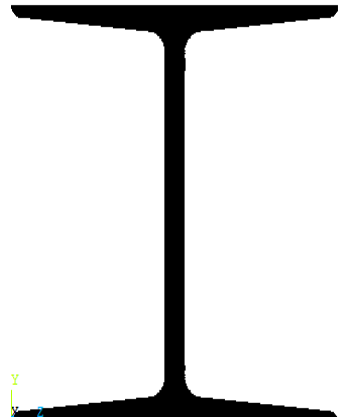


- *Universal rolling technology supplied by SMS MEER Germany for the production of Parallel Flange sections*
- *Hydraulic roll balancing, inter-pass descaling ensures proper control and excellent surface finish of the final product*
- *Online process control ensures better control of dimensional properties.*
- *9-ROLL HORIZONTAL & 9-ROLL VERTICAL straightening from SMS MEER, Germany*
- *Variable pitch for controlled residual stress removal in Finished Products*
- *Produces perfectly straight products in the finished state*

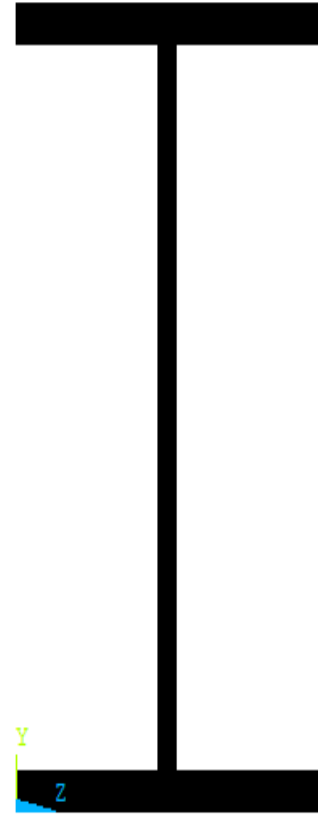
Product Range

Depth, mm

200
300
400
500
600
700
800
900



Flange width, mm
Up to 210mm

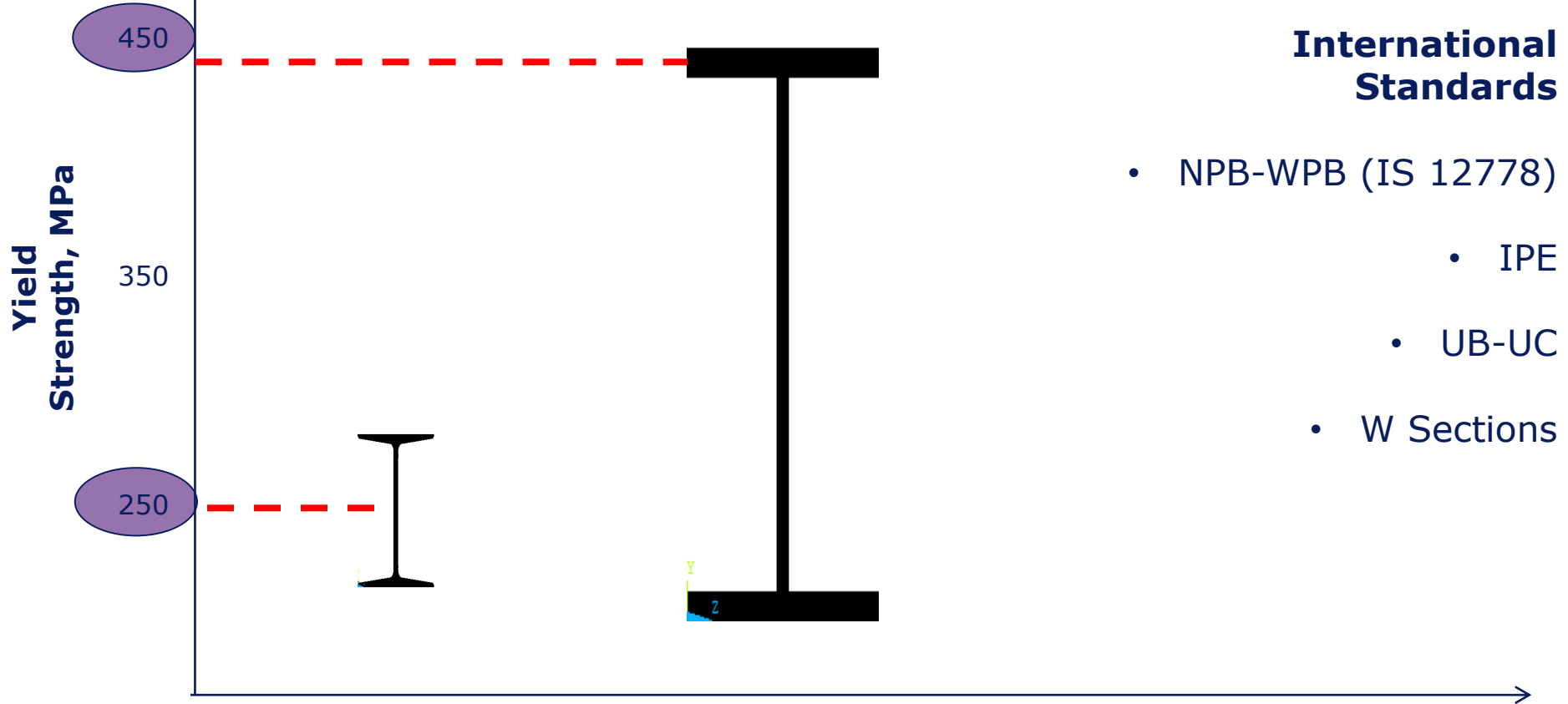


Flange width, mm
Up to 300mm

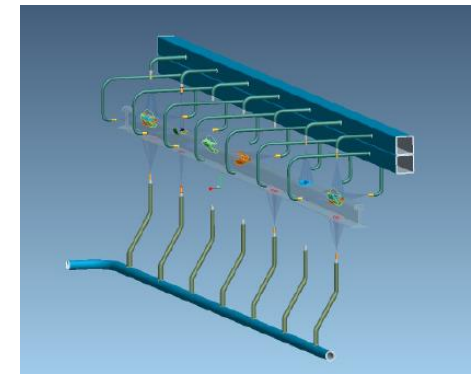
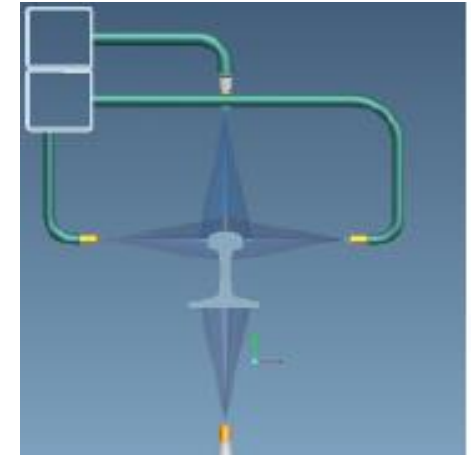
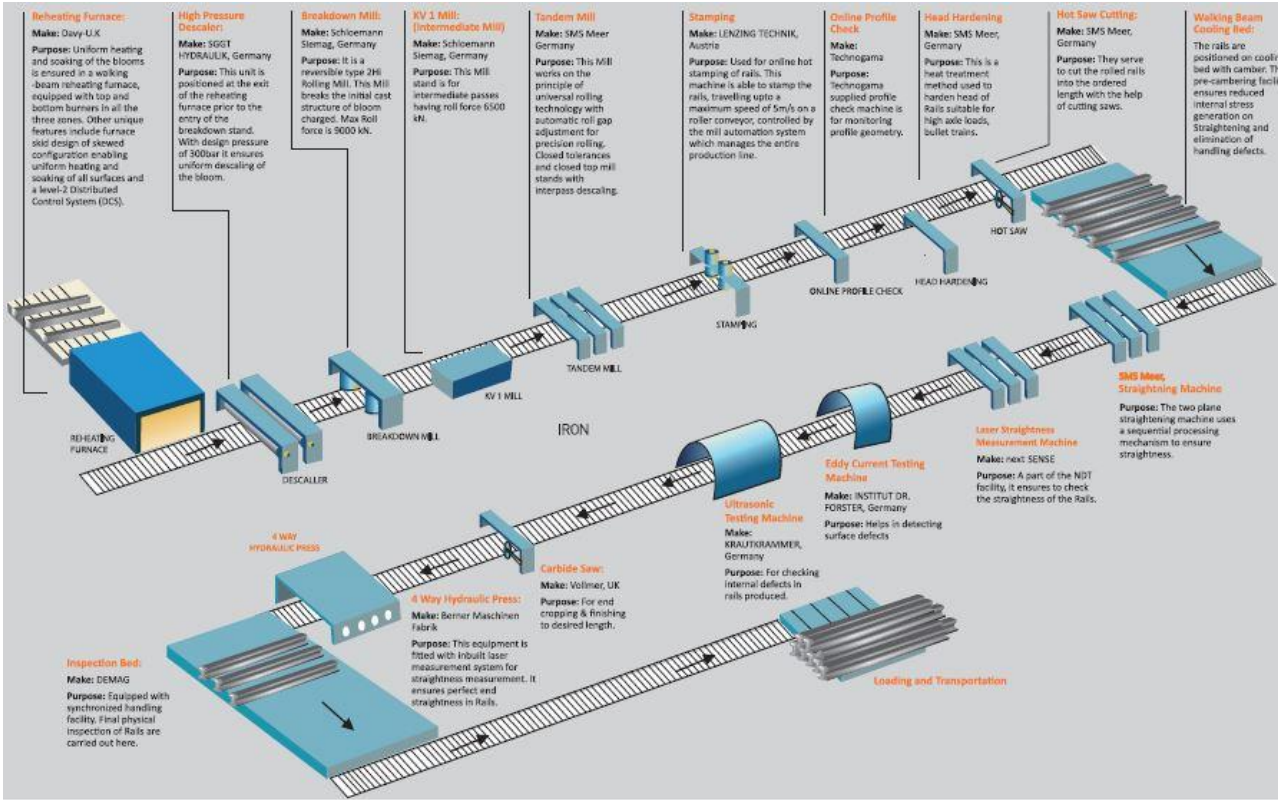
International Standards

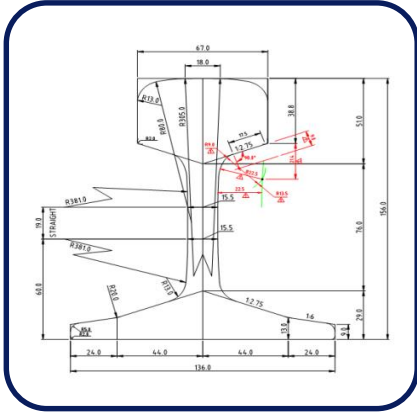
- NPB-WPB (IS 12778)
- IPE
- UB-UC
- W Sections

High Strength Steels

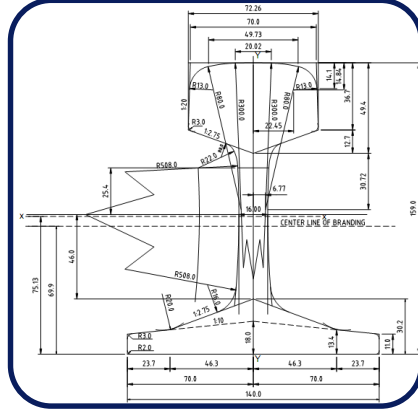


Rails

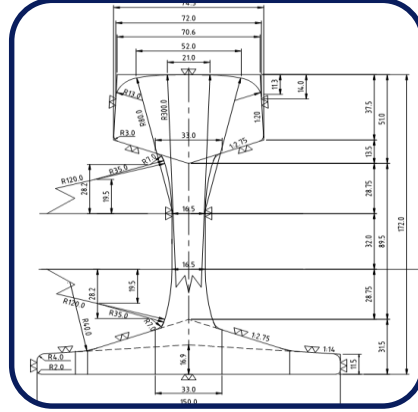




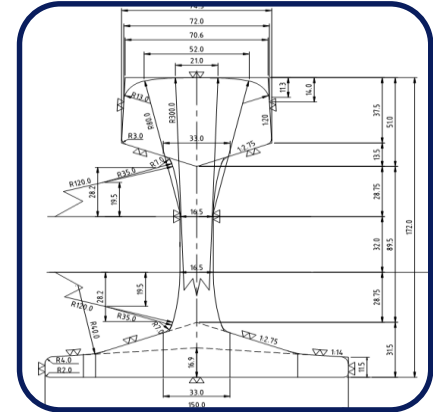
IRS 52



UIC 54



UIC 60



60 E1 & E2

Specifications

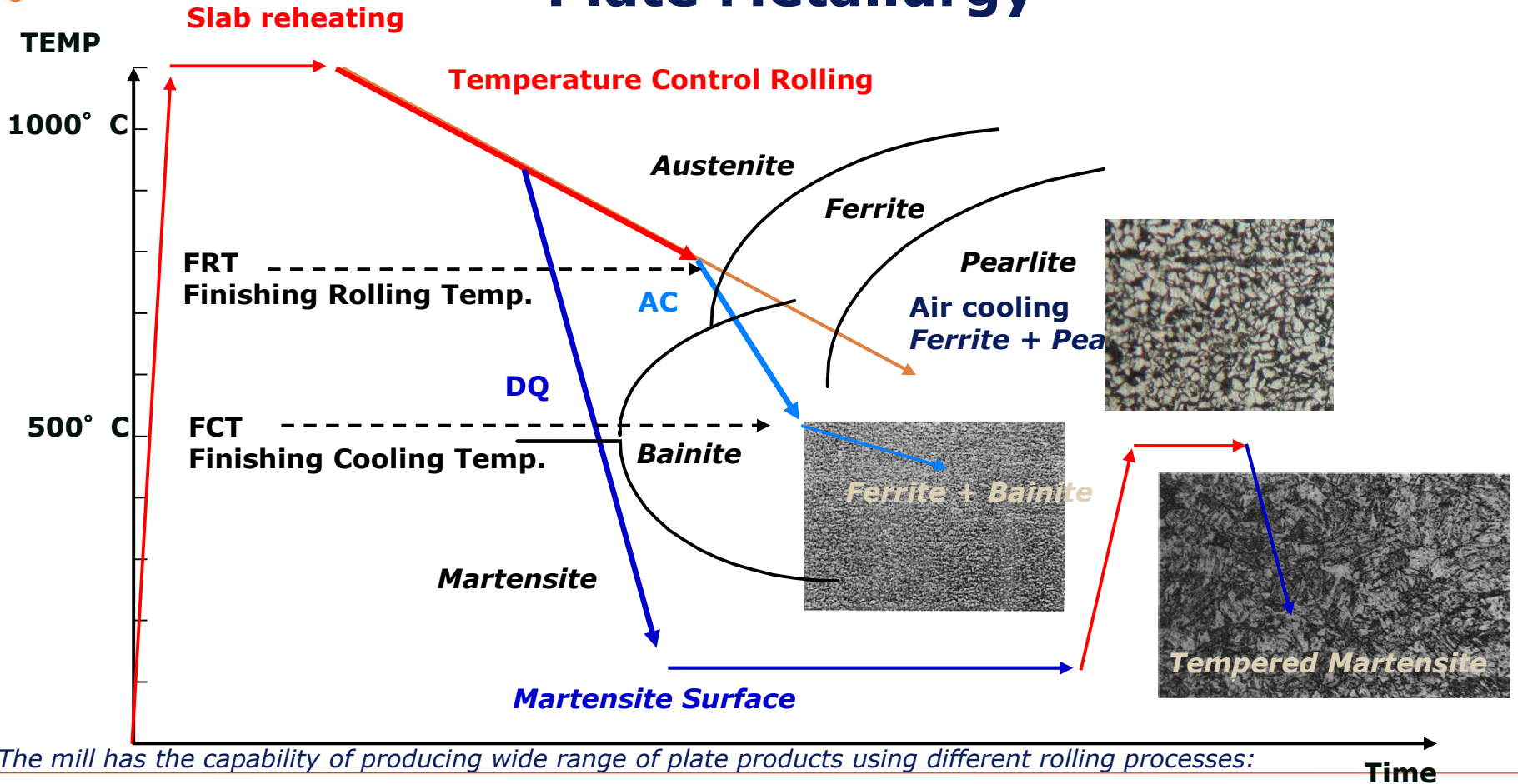
IRS T-12 (2009)
 Grade : Gr 880 & 1080 HH
 Profile class : Prime & Industrial Use (IU)
 Straightness class: Class A, Class B & IU

EN 13674-1
 Grade: R 260, R350HT
 Profile class: X & Y
 Straightness class : Class A & Class B

UIC 860 R
 Grade: 900 A
 Profile class: UIC 860 R
 Straightness class: UIC 860 R

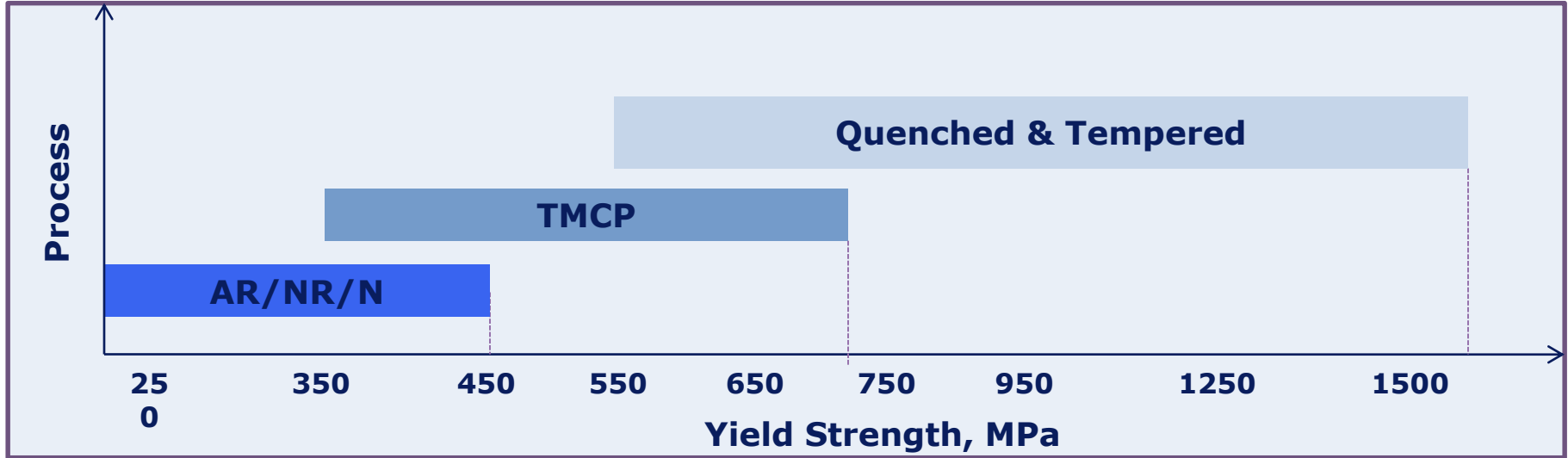
Value added Long Rails: Integrated flash butt welding plant to produce 484 meter rails with only 3 welds using as rolled long rail of 121 meter.

Plate Metallurgy



The mill has the capability of producing wide range of plate products using different rolling processes:
As rolled/Normalized rolled, thermo mechanical controlled rolled, Direct Quenched etc.

Product Capabilities



* AR-As rolled, NR- Normalized Rolled, N-Furnace Normalized,
TMCP- Thermo-mechanical controlled rolled(Process)

Import Substitute Products developed

Heavy Plates

- High Strength steels for structural applications up to 690 Mpa Yield
- Abrasion and Wear resistant steel plates
- Steels for ballistic applications
- Z-quality plates, TMCP Plates, Corten grades etc
- HIC plates, Plates for Penstocks etc

Beams and Columns & Rails

- High Strength steels for structural applications up to 690 Mpa Yield
- Development of Head Hardened rails for the first time in India
- India's longest welded panel rails

THANK YOU
