



JINDAL  
**PANTHER**<sup>®</sup>  
TMT REBARS

**SAFER HOMES FOR A  
STRONGER NATION**



JINDAL  
**PANTHER**<sup>®</sup>  
TMT REBARS



**UNMATCHED STRENGTH  
WITH FLEXIBILITY**

**Fe 550D**

A PRODUCT OF JINDAL STEEL & POWER LIMITED

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**Fe 550D**



## INDIA'S LARGEST PRODUCER OF Fe 550D GRADE TMT REBAR

### WELCOME TO THE FUTURE OF BUILDING SAFETY AND LONGEVITY

As we look to the future, we have anticipated what will be required for our country to achieve lean steel structure that is yet the strongest and brings value for money.

Steel offers the widest range of strength compared to other metals giving it significant advantage in construction. There are more than 200 grades of steel globally, and we take pride in offering JINDAL PANTHER® Fe 550D - the strongest grade in TMT Rebars so far in practice.

This grade of steel is produced using a technology such that it has two desirable properties simultaneously, higher strength and higher ductility, thereby making it most suitable for earthquake resistant structures. Higher strength is achieved by the addition of certain alloying elements, keeping the percentage of carbon lower, thereby ensuring that the steel remains sufficiently ductile.

Ductility is the degree of plastic deformation before fracture or simply how much strain a material can hold before fracture.

JINDAL PANTHER® Fe 550D has enhanced physical, chemical and mechanical properties as compared to the bars in other strength grades. This is achieved by highly controlled and advanced manufacturing processes at JSPL's own manufacturing plants, which gives:

- Enhanced Strength
- Minimum 5% Saving on Steel\*
- Rich Chemistry
- Superior Properties
- Cleaner Steel
- World Class Technology

\* Subject to Design

## WELCOME TO THE FUTURE OF TMT REBARS

# UNMATCHED BENEFITS OF Fe 550D

JINDAL PANTHER® Fe 550D TMT Rebars offer 32% higher strength than conventional steel (415 MPa vs 550 MPa)

### HERE'S HOW STRONGER STEEL AFFECTS YOUR CONSTRUCTION

#### REDUCTION OF STEEL CONSUMPTION

Designing structures with Fe 550D reduces the steel consumption by 12-15% with optimisation using consistent primary steel.

#### REDUCTION IN BAR CONGESTION

Using stronger grade steel means reduction in bar diameter that results in increased bar spacing as fewer rebars are needed.

#### REDUCTION IN LABOUR COST

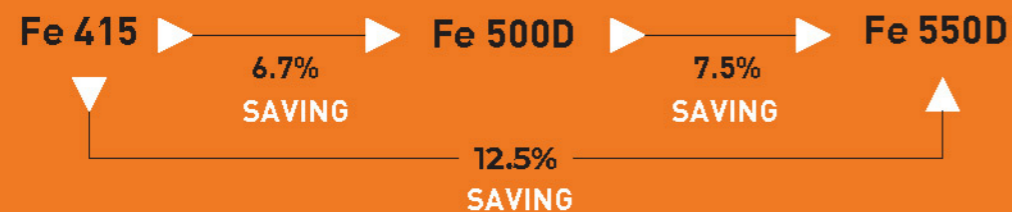
Using lesser steel requires less labour which saves on labour cost.

#### FASTER CONSTRUCTION

Less time is wasted on placing/tying of bars. And less weight on cranes improves construction efficiency.

#### BIGGER SAVINGS

When the same structure is constructed with 3 different grades of steel, there will be remarkable saving in case of use of Fe550D.



# Fe 550D

6mm - 40mm range



\*can be reduced further on request

## RIGHT TMT REBAR = HIGHER SAVING

### DID YOU KNOW, BY USING BETTER QUALITY STEEL TMT REBARS YOU CAN ACTUALLY SAVE MONEY?

Steel TMT rebars are used in every RCC construction, be it for residential or commercial purpose, and account for roughly 25% of the total cost of construction.

With some smart thinking you can not only make your construction stronger and longer-lasting but also make a saving.

All thanks to the superior grade steel TMT rebars like JINDAL PANTHER® Fe 550D.

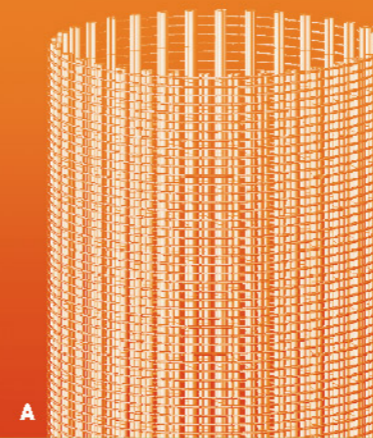
Read on to know how this happens.



### HERE'S HOW HIGHER GRADE FE 550D TMT REBAR SAVES YOUR MONEY.

- Higher grade steel TMT rebars like JINDAL PANTHER® Fe 550D has higher load bearing capacity while maintaining the same ductility as per BIS 1786.
- Better load bearing capacity of Fe 550D means lesser number of rebars required in total.
- It also translates into using TMT rebars with lesser diameter so less congestion.

DENSE CLUTTERED USE OF  
Fe 415



LESS CONGESTED USE OF  
Fe 550D



**COLUMN A USES MORE Fe 415 TMT REBARS  
AND IS CONGESTED**

**COLUMN B USES LESSER NUMBER OF Fe 550D  
TMT REBARS GIVING LESS CONGESTION\***

### THUMB RULE

**10% INCREASE IN STRENGTH = ½% REDUCTION IN CONSUMPTION**

**JINDAL PANTHER® Fe 500D & Fe 550D REBARS  
CONFORM TO BIS STANDARDS AND ARE EVEN BETTER  
ON MANY PARAMETERS**

| Parameters                                | BIS Fe 500D | Jindal Panther Fe 500D | BIS Fe 550D | Jindal Panther Fe 550D |
|---|-------------|------------------------|-------------|------------------------|
| % Carbon                                  | 0.25        | 0.20-0.25              | 0.25        | 0.22-0.25              |
| % Silicon                                 |             | 0.15-0.25              |             | 0.15-0.25              |
| % Manganese                               |             | 0.90-1.00              |             | 0.95-1.05              |
| % Sulphur (max)                           | 0.040       | 0.030                  | 0.040       | 0.030                  |
| % Phosphorus (max)                        | 0.040       | 0.030                  | 0.040       | 0.030                  |
| % Sulphur + Phosphorus (max)              | 0.075       | 0.055                  | 0.075       | 0.055                  |
| % Carbon Equivalent (CE)                  | 0.50        | 0.35-0.40              | 0.61        | 0.35-0.41              |
| Yield Stress (N/mm <sup>2</sup> ) min     | 500         | 525                    | 550         | 575                    |
| % Elongation min                          | 16.0        | 18                     | 14.5        | 18                     |
| Tensile Strength (N/mm <sup>2</sup> ) min | 565         | 600                    | 600         | 645                    |
| UTS/YS Ratio (min)                        | 1.1         | 1.15                   | 1.08        | 1.15                   |

**SHIFT FROM LOWER GRADE TMT TO HIGHER GRADE TMT = SAVE UP TO 22%**

| Size of TMT Bar (mm) | Per Mtr. Weight of bar |
|----------------------|------------------------|
| 8                    | 0.396                  |
| 10                   | 0.617                  |
| 12                   | 0.88                   |
| 16                   | 1.58                   |
| 20                   | 2.47                   |
| 25                   | 3.85                   |
| 28                   | 4.83                   |
| 32                   | 6.32                   |
| 36                   | 8                      |

**Comparative summary for  
Slabs, Columns and Beams using  
Fe 415, Fe 500 and Fe 550D**

Average savings for Slabs: 13% - 19%  
Average savings for Columns: 8% - 22%  
Average savings for Beams: 12% - 22%

**SLAB**

| Combinations             | Designed In Fe 415      | Designed In Fe 500      | Designed In Fe 550       | Saving from 415 to 550 | Saving from 500 to 550 |
|--------------------------|-------------------------|-------------------------|--------------------------|------------------------|------------------------|
| 3mX3m slab (125mm thick) | 58Kg                    | 49Kg                    | 45Kg                     | 19%                    | 8%                     |
| Reinforcement            | 8mm at spacing of 200mm | 8mm at spacing of 225mm | 8mm at spacing of 250mm  |                        |                        |
| 4mX4m slab (125mm thick) | 100Kg                   | 92Kg                    | 78Kg                     | 22%                    | 15%                    |
| Reinforcement            | 8mm at spacing of 185mm | 8mm at spacing of 200mm | 8mm at spacing of 250mm  |                        |                        |
| 5mX5m slab (150mm thick) | 181Kg                   | 158Kg                   | 130Kg                    | 15%                    | 16%                    |
| Reinforcement            | 8mm at spacing of 175mm | 8mm at spacing of 185mm | 8mm at spacing of 225mm  |                        |                        |
|                          |                         |                         | Average cost saving upto | 19%                    | 13%                    |

**COLUMN**

| Size                  | Designed In Fe 415      | Designed In Fe 500     | Designed In Fe 550       | Saving from 415 to 550 | Saving from 500 to 550 |
|-----------------------|-------------------------|------------------------|--------------------------|------------------------|------------------------|
| 230X350 Reinforcement | 46Kg<br>4-20mm+ 4-12mm  | 38Kg<br>8-16mm         | 35Kg<br>4-16mm + 4-12mm  | 22%                    | 8%                     |
| 230X450 Reinforcement | 58Kg<br>4-20mm+ 6-16mm  | 48Kg<br>10-16mm        | 43Kg<br>8-16mm+ 2-12mm   | 26%                    | 10%                    |
| 230X600 Reinforcement | 88Kg<br>12-20mm         | 72Kg<br>8-20mm+ 4-16mm | 67Kg<br>4-20mm+ 8-16mm   | 23%                    | 7%                     |
| 300X350 Reinforcement | 58Kg<br>4-20mm+ 6-16mm  | 48Kg<br>10-16mm        | 44Kg<br>8-16mm+ 2-12mm   | 24%                    | 8%                     |
| 300X450 Reinforcement | 89Kg<br>10-20mm+ 2-16mm | 72Kg<br>8-20mm+ 6-16mm | 67Kg<br>4-20mm+ 8-16mm   | 19%                    | 7%                     |
| 300X600 Reinforcement | 113Kg<br>6-25mm+ 8-20mm | 103Kg<br>14-20mm       | 93Kg<br>10-20mm+ 4-16mm  | 17%                    | 9%                     |
|                       |                         |                        | Average cost saving upto | 22%                    | 8%                     |

| BEAM                        |                                  |                           |                        |                        |
|-----------------------------|----------------------------------|---------------------------|------------------------|------------------------|
| Designed In Fe 415          | Designed In Fe 500               | Designed In Fe 550        | Saving from 415 to 550 | Saving from 500 to 550 |
| 28Kg<br>6-16 dia            | 26Kg<br>4-16 dia+ 2-12dia        | 22Kg<br>2-16 dia+4-12 dia | 21%                    | 15%                    |
| 52Kg<br>4-20 dia+ 2-16dia   | 48Kg<br>4-16 dia+ 2-20 dia       | 40Kg<br>6-16 dia          | 23%                    | 16%                    |
| 60Kg<br>3-20 dia + 3-16 dia | 53Kg<br>2-20 dia+3-16dia+1-12dia | 46Kg<br>6-16 dia          | 23%                    | 13%                    |
| 26Kg<br>4-16dia +2-12dia    | 22Kg<br>4-12dia+2-16dia          | 20Kg<br>5-12dia+1-16dia   | 23%                    | 9%                     |
| 38Kg<br>6-16dia             | 35Kg<br>4-16dia +2-12dia         | 29Kg<br>4-12dia+2-16dia   | 23%                    |                        |
| 56Kg<br>4-16dia+2-20dia     | 50Kg<br>6-16dia                  | 46Kg<br>5-16dia+1-12dia   | 17%                    | 8%                     |
| 7Kg<br>6-16dia              | 25Kg<br>4-16dia +2-12dia         | 22Kg<br>4-12dia+2-16dia   | 16%                    | 12%                    |
| 38Kg<br>6-16dia             | 34Kg<br>4-16dia +2-12dia         | 29Kg<br>4-12dia+2-16dia   | 23%                    | 14%                    |
| 57Kg<br>4-16dia+2-20dia     | 50Kg<br>6-16dia                  | 43Kg<br>4-16dia +2-12dia  | 23%                    | 14%                    |
| 27Kg<br>6-16dia             | 25Kg<br>4-16dia +2-12dia         | 22Kg<br>4-12dia+2-16dia   | 18%                    | 12%                    |
| 40Kg<br>6-16dia             | 35Kg<br>4-16dia +2-12dia         | 30Kg<br>4-12dia+2-16dia   | 25%                    | 14%                    |
| 57Kg<br>4-16dia+2-20dia     | 48Kg<br>6-16dia                  | 43Kg<br>4-16dia +2-12dia  | 24%                    | 10%                    |
| Average cost saving upto    |                                  |                           | 22%                    | 12%                    |

### REMEMBER Fe 550D IS HIGHER LOAD BEARING

- ✓ LOWER NUMBER OF REBARS
- ✓ LOWER DIAMETER
- ✓ LESSER CONGESTION
- ✓ REDUCED LABOUR/TIME

### THUS BIGGER SAVINGS!!

### LIVE PROJECT WITH Fe 550D FOR LUCKNOW DEVELOPMENT AUTHORITY UNDER PRADHAN MANTRI AWAS YOJNA



| DESCRIPTION                                   | DIA-WISE STEEL CONSUMPTION |          |           |           |          |       |       | WEIGHT (In kg.) | STEEL CONSUMPTION (In kg.) | CONTRIBUTION Per SQ.FT (In kg.) |         |
|---|----------------------------|----------|-----------|-----------|----------|-------|-------|-----------------|----------------------------|---------------------------------|---------|
|   | 6                          | 10       | 12        | 16        | 20       | 25    | 32    |                 |                            | Fe 500D                         | Fe 550D |
| FOOTING                                       | 658.475                    | 3193.080 | 246.145   | 332.332   | 381.630  | 0.000 | 0.000 | 4811.661        | 4907.895                   | 0.300                           | 0.269   |
| 2% extra for lap & chairs                     |                            |          |           | 96.233    |          |       |       | 96.233          |                            |                                 |         |
| COLUMN  |                            |          |           |           |          |       |       |                 |                            |                                 |         |
| Fe 500D                                       | 4972.583                   | 3756.887 | 8841.8    | 2803.99   | 0        | 0     | 0     | 18374.82        | 18374.82                   | 0.97                            | 0.919   |
| Fe 550D                                       | 4768.016                   | 3943.333 | 7982.592  | 712.552   | 0        | 0     | 0     | 17406.493       | 17406.493                  |                                 |         |
| BEAM  |                            |          |           |           |          |       |       |                 |                            |                                 |         |
| Beam-500D                                     | 5443.664                   | 0        | 6414.108  | 7267.568  | 1549.037 | 0     | 0     | 20674.378       | 20674.378                  | 1.092                           | 0.914   |
| Beam-550D                                     | 5546.293                   | 0        | 7798.414  | 3865.914  | 0        | 0     | 0     | 17310.621       | 17310.621                  |                                 |         |
| SLAB  |                            |          |           |           |          |       |       |                 |                            |                                 |         |
| Slab-500D                                     | 13256.32                   | 0        | 0         | 0         | 0        | 0     | 0     | 13256.32        | 13256.32                   | 0.7                             | 0.7     |
| Slab-550D                                     | 13256.32                   | 0        | 0         | 0         | 0        | 0     | 0     | 13256.32        | 13256.32                   |                                 |         |
| STAIRCASE                                     | 284.064                    | 0        | 2651.264  | 0         | 0        | 0     | 0     | 2935.328        | 2935.328                   | 0.155                           | 0.155   |
| Typical (G+3rd Floor area (In sq. Ft.))       |                            |          | 440       |           |          |       | 4     | 16937.6         |                            |                                 |         |
| Total Steel consumption                       | 46281.948                  | 10893.06 | 31934.123 | 15082.357 | 1930.667 | 0     | 0     |                 |                            |                                 |         |
| OVERALL STEEL CONSUMPTION AVERAGE PER SQ. FT. |                            |          |           |           |          |       |       |                 |                            | 3.22                            | 2.947   |

5% - 8% average steel/cost saving in a building when using higher grade Fe 550D Jindal Panther TMT Rebars.

# COMPARE AND SEE HOW JINDAL PANTHER® TMT REBAR IS SUPERIOR TO SCRAP BASED REBAR PRODUCTION IN INDIA

| YOU GET (JINDAL PANTHER)  |   | VERSUS OTHERS  |  | YOU GET (SCRAP ROUTE)  |  |
|---|---|--|--|--|--|
| Surpasses minimum specified levels of Bureau of Indian Standards (BIS)  | ▶ More value for money with upto 6% - 8% savings ✓  | <br><b>SURPASSES STANDARDS</b>                              | <br><b>INCONSISTENT IN QUALITY</b>      | Less value for money and no savings  | Barely qualifies the minimum requirements of BIS   |
| Uses virgin iron ore and deploys state-of-the-art steel making and refining processes   | ▶ Highly clean & homogenous steel quality ✓   | <br><b>IRON ORE</b>   | <br><b>SCRAP</b>                        | Uncertain chemical and mechanical properties due to inclusion of tramp elements                | Use scrap or ingots for steel melting without any secondary refining process                                       |
| <b>Steel is made using BF / DRI → EAF / BOF / NOF → LRF → Concast route</b>   | ▶ A highly controlled steel chemistry with very low levels of sulphur & phosphorus ✓            | <br><b>BF / DRI → EAF / BOF / NOF → LRF → Concast Route</b> | <br><b>INGOT</b>                        | Variations in chemical composition leading to structural instability                           | Follow the melting process of secondary steel through induction furnace route leading to no control over chemistry |
| Rebars are manufactured using High Yield Quenching and Self Tempering (HYQST) Technology perfected by Siemens of USA / QST from SMS Meer of Germany | ▶ High strength and ductility due to fine grain multiphased composite structure ✓               | <br><b>UNIFORM MICROSTRUCTURE</b>                         | <br><b>NON-UNIFORM MICROSTRUCTURE</b> | Non-uniform grain size and inconsistent steel quality  | Use outdated rolling process & technology  |
| Provides precise and uniform parallel rib pattern engraved through computer controlled notch making machines  | ▶ Excellent bond strength with concrete ✓   | <br><b>UNIFORM RIB PATTERN</b>                            | <br><b>NON-UNIFORM RIB PATTERN</b>    | 'X' rib/non-uniform pattern which has low fatigue life and reduces bond strength with concrete | Use conventional machines for engraving ribs   |
| Meets UTS/YS (Ultimate Tensile Strength to Yield Strength) ratio and high percentage elongation   | ▶ Superior earthquake resistant qualities due to high capability of absorbing energy ✓          | <br><b>EARTHQUAKE RESISTANT</b>                           | <br><b>NOT FOR SEISMIC ZONES</b>      | Much lower resistance to cyclic loading which is not recommended for seismic zones             | Use old technology leading to high variation in elongation   |
| Has predefined and transparent pricing  | ▶ Fixed and uniform rates evidenced through a well-displayed price list at our dealers' shops ✓ | <br><b>UNIFORM PRICES</b>                                 | <br><b>FLUCTUATION IN PRICES</b>      | Daily fluctuations in rates  | Costs are linked to raw material movement like scrap & ingot   |
| Is a National Brand   | ▶ World-class quality ✓   | <br><b>TRUSTWORTHY</b>                                    | <br><b>QUESTIONABLE</b>               | Average quality  | Are local/regional brands  |

## THE TECHNICAL DETAILS

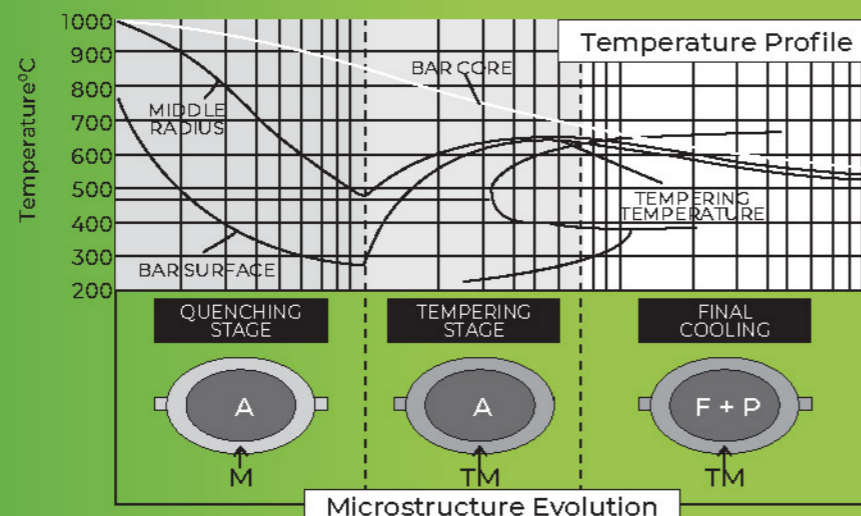
JINDAL PANTHER® Fe550D Rebars are Thermo Mechanically Treated (TMT) Steel Bars produced through advanced HYQST (High Yield Quenching and Self Tempering Process) /QST (Quenching and Self Tempering) process.

HYQST/QST process includes hot rolling of the billets in the most modern bar mill followed by water quenching, self tempering and atmospheric cooling. During quenching, the temperature of the rebar drops at a faster rate at the periphery leading to a harder surface, while the high temperature core gets cooled slowly. The thermal stresses generated during quenching are relieved by the heat released from the core during the next step called self tempering. Finally atmospheric cooling at the cooling bed leads to a strong casing and a soft core in the rebars giving it significant strength and ductility.

The reason behind such unique combination of strength and ductility is that at a higher cooling rate, the surface attains a hard phase of steel known as Martensite while the core will have soft phases like Ferrite and Pearlite.

### Metallurgical Aspect:

Steel can attain a wide variety of properties by altering its microstructure, which depends on its chemical composition as well as the thermal treatment it is subjected to. Rebars have a combination of different microstructures which provides it both strength and ductility.

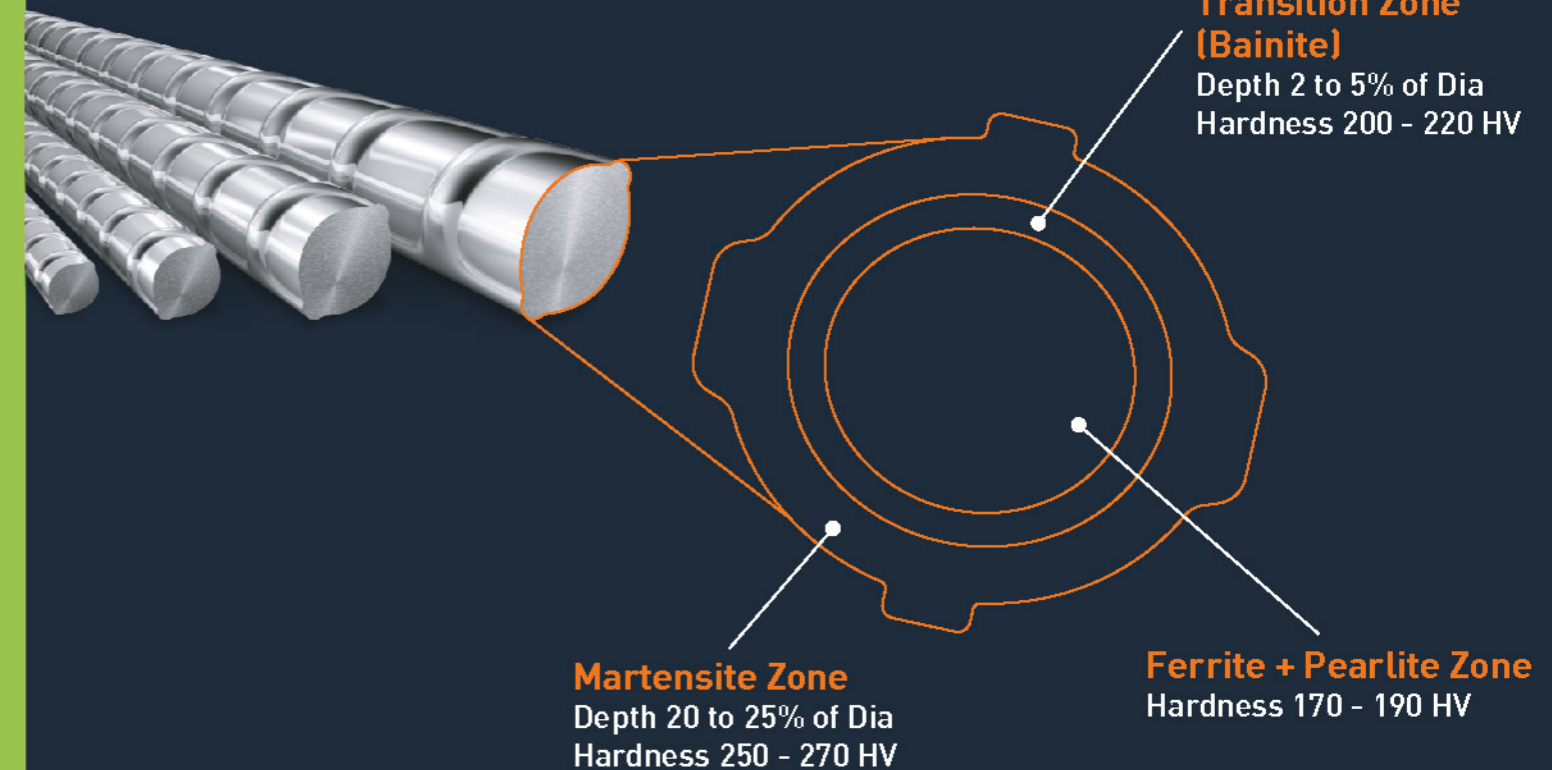


At the periphery, it has a hard phase called Martensite. Although the outer layer is quenched, the inner core of the cross section is still hot and it is in Austenitic Phase at higher temperature. As the bar cools, heat flows from the centre of the bar to its surface, leading to varying cooling rate across its cross section, the process known as self tempering. Thus it exhibits a variation in microstructure in the cross section, having strong and tough Martensite in the surface layer of the bar, an intermediate layer of Martensite and Bainite, and the core attains a soft Ferrite and Pearlite microstructure. Any thermal stress generated in Martensite during quenching is relieved in this process. Once this process is over, the TMT bars are subject to atmospheric cooling. This is done in order to equalise the temperature difference between the soft inner core and the tough exterior. The inner core remains soft giving the TMT bar superior ductility. This unique manufacturing technique and the absence of Cold stress make the rebar corrosion-resistant and boost its weldability.

Thus we can see high level of engineering and equipment with sophisticated controls are required to produce Thermo-Mechanically Treated (TMT) Bars to achieve the above properties.

This HYQST/QST process delivers greater tensile strength to the rebars as well as higher elongation. This improves the bend/re-bend properties of the rebars, thus making it safe from natural calamities such as an earthquake. The special ribbed design of the TMT bars form a stronger bond with the concrete or cement. We can achieve higher mechanical properties with low alloying. It helps to reduce the steel weight.

JSPL is having level 2 automation systems for achieving the above microstructure and the desired mechanical properties. The advanced control systems in mills also help in attaining dimensional accuracy and consistency of the desired level.





# MECHANICAL PROPERTIES:

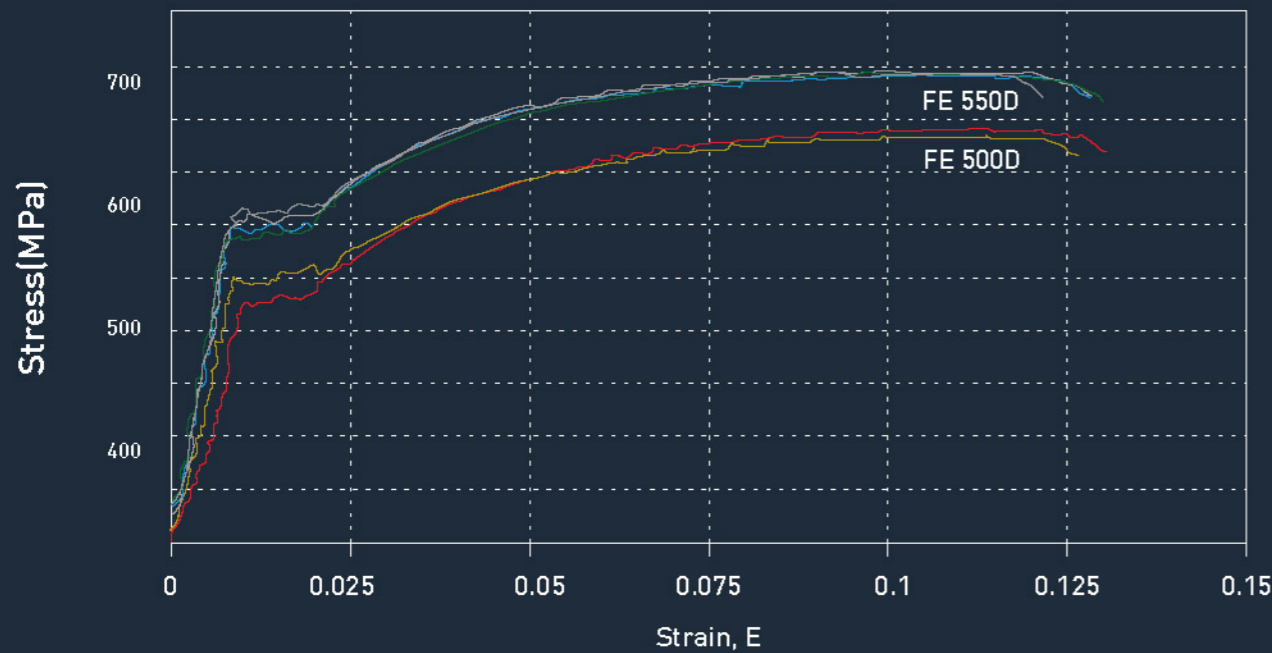
- YS (YIELD STRENGTH): MIN. 550 MPA
- UTS (ULTIMATE TENSILE STRENGTH): MIN 600 MPA
- ELONGATION: MIN 16%
- UTS/YS: MIN 1.10

JSPL is a primary and integrated steel producer. Thus it ensures clean steel with very low levels of detrimental Sulphur and Phosphorous, and low ppm of gaseous contents. Thus the TMT produced have negligible internal defects and impurities.

Our Jindal Panther TMT Rebars can be used in extreme environments like marine, coastal and saline conditions as well as in the high seismic zones.

## Stress Strain Curve Comparison of Fe 500D & Fe 550D

STRESS STRAIN CURVE JSPL TMT REBARS FOR IS 1786 FE 550D AND FE 500D



|  |                     |                  |
|--|---------------------|------------------|
| Fe 550D, Yield Strength (N/mm <sup>2</sup> ) | Min - 550 MPa (BIS) | Actual - 575 MPa |
| % Elongation (Min)-                          | Guarantee - 18%     | Actual - 21.75%  |
| Fe 500D Yield Strength (N/mm <sup>2</sup> )  | Min - 500 MPa (BIS) | Actual - 530 MPa |
| % Elongation (Min)-                          | Guarantee - 18%     | Actual - 21.60%  |

# DUPLICATE SE SAVDHAAN

## ASLI JINDAL PANTHER TMT REBAR KI PEHCHAAN

### PANTHER KA NISHAN

| JINDAL PANTHER TMT REBAR                         |  |
|--|--|
| ORIGINAL   | DUPLICATE  |
| ✓ Will have Panther face embossing               | ✗ Will not have such embossing                               |
| ✓ Will have only Fe 550D grade                   | ✗ Come mostly in Fe 415 & Fe 500                             |
| ✓ Will have prominent & even rib pattern         | ✗ Have uneven or missing pattern                             |
| ✓ Will always have ISI mark & license no.        | ✗ May or may not have these                                  |
| ✓ Available at authorised Jindal Panther dealers | ✗ Available at untrustworthy sources                         |
| ✓ Manufactured only at Angul, Patratu & Raigarh  | ✗ Produced by smaller mills illegally at different locations |



## APPLICATIONS OF Fe 550D

Due to changing applications such as high rise buildings and long span structures, it has become imperative for innovative and conscientious steel makers to commercially produce grade Fe 550D - a grade vastly superior to the existing grade.



Modern Tall Buildings

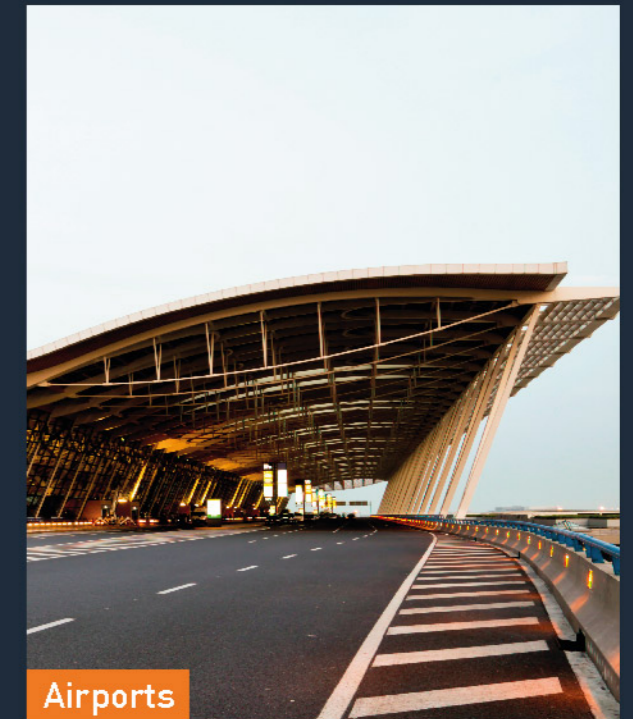
JINDAL PANTHER® Fe 550D TMT Rebar has been made to impart strength and superior ductility for construction of a stronger India.

This is achieved by using enhanced steel quality, superior chemical properties and better rolling techniques.

With an ever growing demand for stronger infrastructure, JINDAL PANTHER® Fe 550D TMT Rebar finds extensive use in a variety of modern construction.



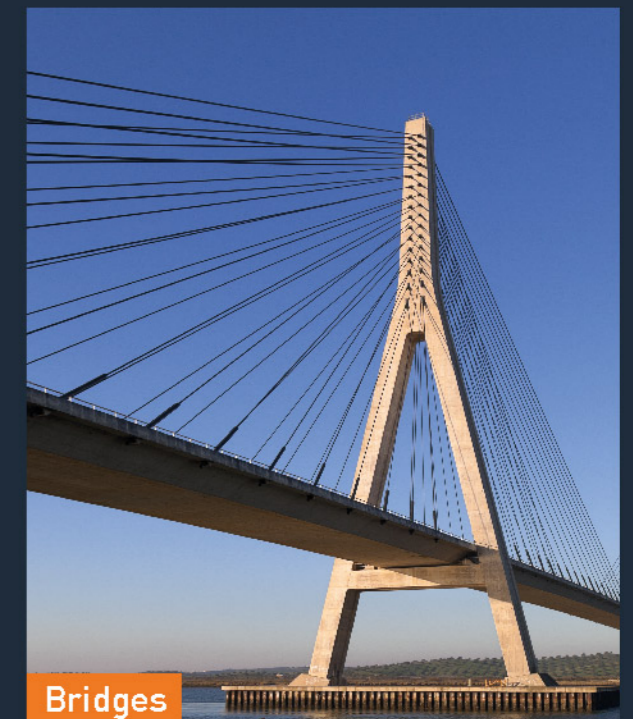
Ports



Airports



Rail & Metro networks



Bridges



1.4 MTPA Rebar Mill  
Angul, Odisha, India  
Technology – SMS Meer, Germany

## OUR PLANTS

### SOHAR



1.4 MTPA Rebar Mill  
Sohar, Oman  
Technology – Danieli, Italy

### PATRATU



1.0 MTPA Rebar Mill  
Patratu, Jharkhand, India  
Technology – Morgan, USA




## KEY HIGHLIGHTS OF OUR PLANTS AT PATRATU, ANGUL, OMAN

Our plants are amongst the most modern plants across the world. Equipped with the latest technologies and infrastructure, they produce the finest quality steel and TMT rebars.

Some of the key features of our plants are:

- Walking beam type reheating furnace
- High pressure water de-scaling facility
- High speed continuous rolling mill with Housing Less (HL) stands in combination of horizontal & vertical arrangement
- Interstands tension control rolling
- Online rapid water quenching unit
- Production of HYQST/QST TMT rebars in straight length
- Cooling beds with movable rack design
- Uniform air-cooling of TMT rebars
- Transporting in a phased manner from the entry of the cooling bed to the discharge side
- Automatic mill shears for head/ tail cropping dividing, sampling or scrapping, and cutting-to-length
- Automatic bundling & tying facilities for rolled product in straight length
- Level 2 mill automation and control



**WE CREATE BEST-IN-CLASS PRODUCTS AND SERVICES WITH SUPERIOR SKILLED MANPOWER, LEVERAGING STATE-OF-THE-ART TECHNOLOGY.**

# OUR PROCESS

JINDAL PANTHER® Fe 550D TMT Rebars are manufactured using the unique iron-making, steel-making and rolling process, which makes them stronger, safer and more ductile than any other TMT rebars, thus ensuring utmost quality.

## A REBAR IS NOT A REBAR IF IT IS NOT TMT

Thermo-mechanical processing, also known as Thermo-Mechanical Treatment (TMT), is a metallurgical process that integrates work hardening and heat treatment into a single process, while the quenching process produces high strength bars from low carbon steel. The process presses the surface layer of the bar, which pressurises and deforms the crystal structure of the intermediate layers, and simultaneously begins to temper the quenched layers using the heat from the bar's core.

## HIGH QUALITY OUTPUT FROM HYQST TECHNOLOGY FOR PATRATU AND QST FOR ANGUL

Our rebar mill in Patratu is from Morgan, USA having High Yield Quenching and Self Tempering (HYQST) technology which is an internationally renowned Thermo-Mechanical Treatment Technology. The rebar mill in Angul is from SMS MEER, Germany with the QST (Quenching and Self Tempering) technology. Both the mills are with state-of-the-art technology ensures a robust process.

These techniques employ a special split style nozzle cooling process for producing fine grain multiphase composite rebar with superior strength and ductility.

## STEP 1: QUENCHING

The hot rolled bar from the finishing mill at 1050° Celsius is rapidly quenched by special split style nozzle cooling process. The quenching converts the bar surface layer to martensite, which causes it to shrink. The shrinkage pressurises the core helping it to form the correct crystal structures, while the core remains hot and austenite.

## STEP 2: SELF TEMPERING

The bar leaves the quench box with a temperature gradient through its cross section and as the bar cools, heat flows from the bar's centre to its surface and the bar heat and pressure correctly tempers an intermediate ring of martensite and bainite.

## STEP 3: ATMOSPHERIC COOLING

Finally, the slow cooling after quenching automatically tempers the austenite core to ferrite and pearlite on the cooling bed, that now has a strong and tough, tempered martensite on the surface layer of the bar, an intermediate layer of tough martensite and bainite and a refined, ferrite and pearlite core, giving it the ductile property.



## A LOOK AT OUR LAB TESTING FACILITIES

JSPL has a state-of-the-art NABL accredited testing facility having latest testing equipment to ensure an almost zero-defect product. The facilities include:

- Optical Emission Spectrometers
- Metal Analysers
- X-Ray Fluorescence & X-Ray diffraction analysers
- Leco Analysers for Carbon, Sulphur, Oxygen, Nitrogen and Hydrogen
- Linder Test Apparatus for characteristics of Iron ore/Pellets
- Gas Chromatographs
- Universal Testing machines
- Hardness Testers
- Bend and Rebend Testing machines
- Impact Testing machines
- Wet Analysis Laboratory
- Optical microscopes

This helps in having a proper quality check as well as ensures continual Research and Development for product upgradation.

Besides the latest computerised machines, our employees are trained and skilled to monitor the quality 24 x 7 to produce the finest TMT bars.

JSPL mills are accredited with latest integrated management systems ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018. We are serving the premier quality Jindal Panther™ TMT rebars for Infrastructures – Airports, Roads, Bridges, Buildings, Refineries, Power Plants, Metros, Ports, Dams etc.

Sohar Plant is approved by UK CARES and DCL(Dubai Central Laboratory).

Angul Bar Mill is approved by BIS IS1786, UK CARES BS4449, Hongkong CS2, Singapore SS560, Australia AS/NZS 4671.



# JINDAL STEEL AND POWER LIMITED, SALES & MARKETING

The presence of JINDAL PANTHER® is across the country through its network of stockyards, plants, distributors and dealers.

Additionally, our products are available online at <http://shop.jindalpanther.com> and can be accessed from the remotest areas of India.

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