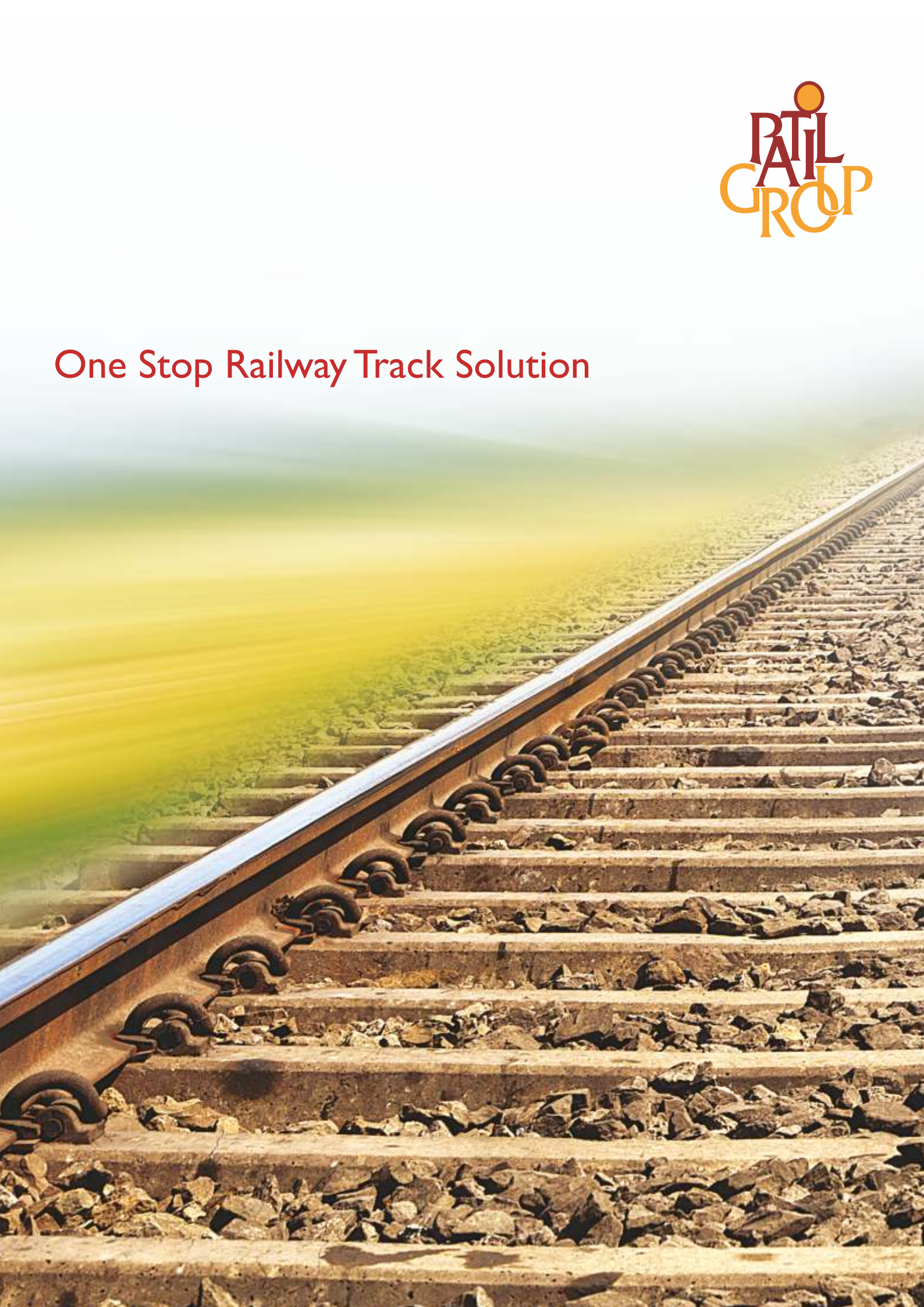
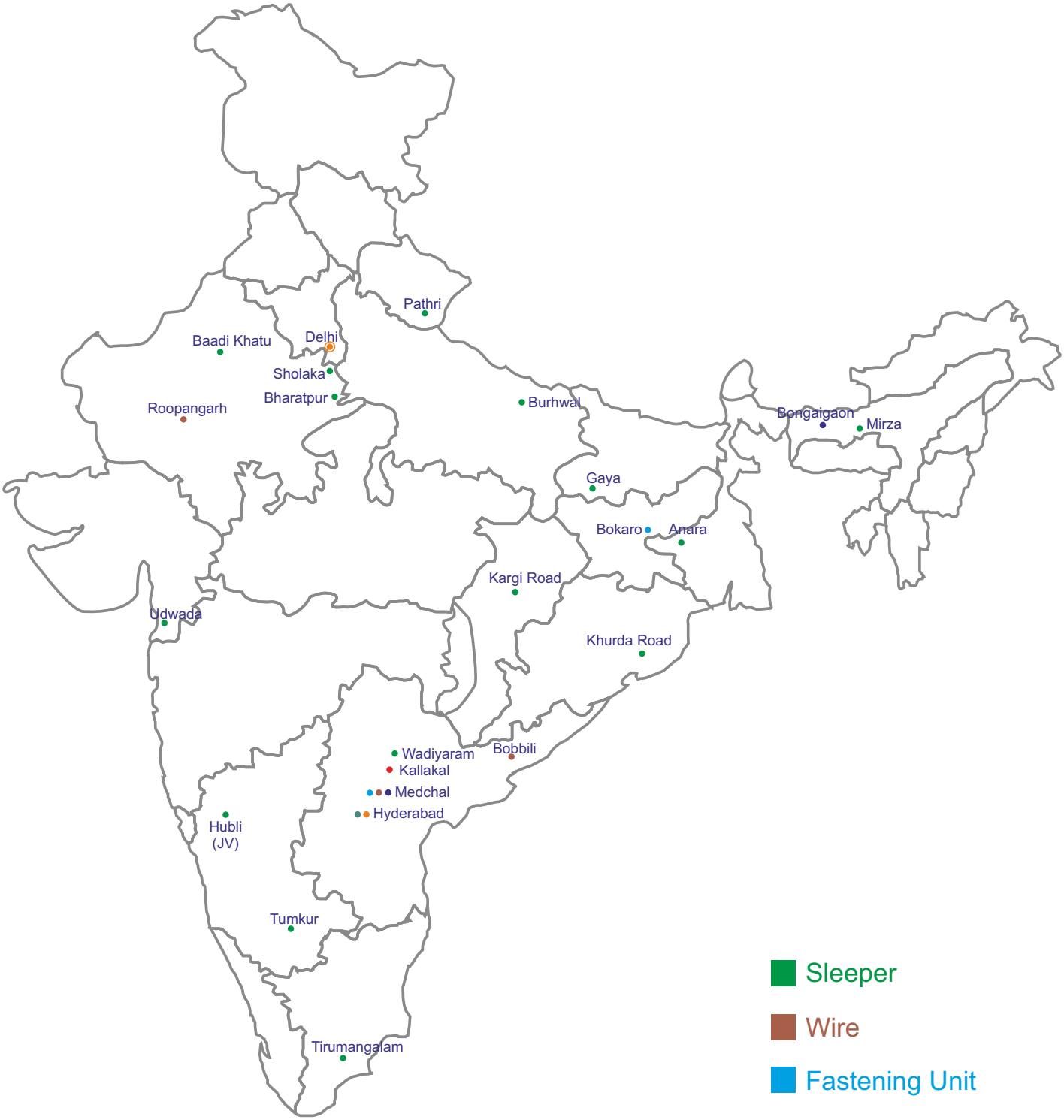
PATIL GROUP

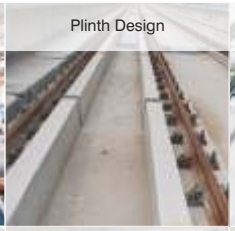
# One Stop Railway Track Solution

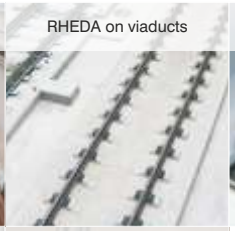


# Patil Group Pan India Presence

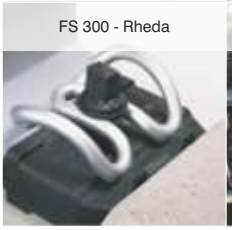












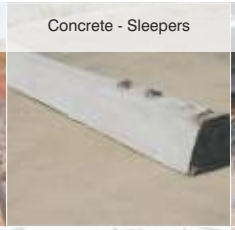


# Urban Metro

## One stop shop for all Urban Metro Track Solutions

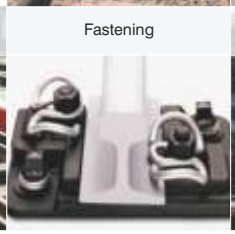
# Ballasted Tracks

## One stop shop for Main Line and Heavy Haul Ballasted Track

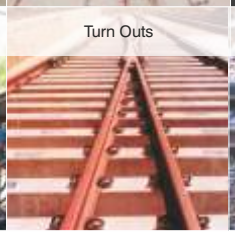





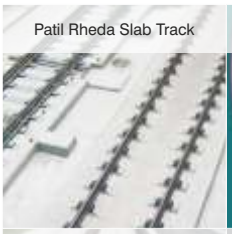


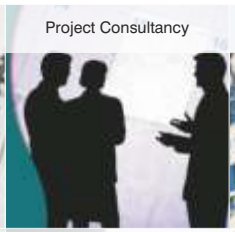








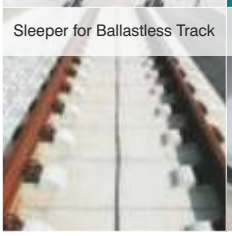


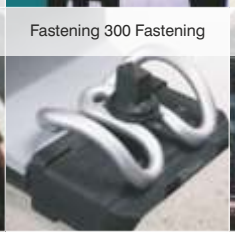





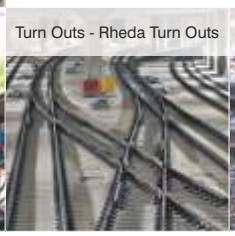
# Ballastless Tracks

## One stop shop for High Speed and Heavy Haul Ballastless Track








# About Patil Group

## Patil group ready for BULLET TRAIN - NEW REVOLUTION IN INDIA

Patil Group is an established business house engaged in developing pioneering and innovative Railway Track Engineering Solutions. It started its journey in 1971 by setting up its first sleeper plant to supply concrete sleepers to the Indian Railways. Today it has 20 manufacturing locations with an annual capacity of 5 million sleepers and a Design & Competency Centre in Delhi, catering to the needs of all balastless track solutions for metros and high speed lines The adoption of modern technology and major infrastructure upgrade by the Indian Railways has poised the group for a leap into a fast growth trajectory.

Patil Group supplies ballast from its nine crusher units spread across the country and has more than 200 acres of prime mining land under its control. Today, the group is the one-stop solution provider for all railway track needs – heavy haul, high speed or urban metro and also one of the largest manufacturers of HTS wires

It has several firsts to its record - the first indigenous manufacturer of modern turnouts to RVNL (Railway Vikas Nigam Ltd.) for heavy haul track, first alternate material developed in lieu of steel channels sleepers for girder bridges, first to offer ballastless track solutions and the first to provide alternate designs for railway station aprons thus reducing maintenance time and improving cleanliness.

With rapid growth of infrastructure in India availability of man-power is becoming a big challenge and technology will play a big role in the growth of infrastructure. Precast is one such enabler bringing in world-class pre-cast technology for various products in any infrastructure project is our key Goal. Whether it is water supply or drainage project or a Bridge and Viaduct project or a complete building and town-ship, we have pre-cast solutions for every application, thereby reducing dependency on labour and depending more on automated technology thereby meeting quality of the product, adding speed and efficiency to infrastructure projects.

## Railway projects executed by the group till date

- Fastening system 336 & 300 selected for Delhi Metro project
- Supply to Sri lanka Railways for various projects
- Major supplier for Konkan Railway, DFCCIL
- Largest Supplier for Bangladesh Railways
- Railway Welding Yard Management with South Central Railway, North East Frontier Railway
- Ballastless Track Selected for Jammu-Kashmir Railway Line
- Delhi Airport Metro Express line from Delhi International Airport T-3 to Connaught place
- Supply of Sleepers for Dhaka Metro, Bangladesh

## Key Partnerships

- Rail Welding: SMH, Malaysia
- Turnouts from Alegria, Spain and Ganapathi Industries
- Composite sleeper: Tie-Tek, America
- Slab Track: PORR, Austria

# Concrete Sleepers


Patil Group is the country's largest supplier of concrete sleepers to the Indian Railways. The company manufactures these pre-stressed concrete (PSC) sleepers across its nine existing and two new automatic production plants across the country with a total installed capacity of 5 million sleepers per annum.

The design for concrete sleepers had been constantly undergoing change in conjunction with the R&D of Indian Railways to suit the changing requirements. With the adoption of M60 grade concrete, the life of these sleepers increased. With the base width increased, the ballast pressure came down by 10% leading to proportionate savings on ballast and maintenance costs.

Indian Railways has plans to go for higher axle loads in coming years and the new design for concrete sleepers will suit future requirements of the railways. The company also envisages the use of special strand wire with higher UTS by which the overall weight of steel per sleepers will be brought down by 25%.

## The sleepers manufactured by the company are suitable for the following:

**New Wider Base Sleeper**

1. Normal Broad Gauge: This sleeper has a trapezoidal cross section having a width of 180 mm at the top and 280 mm at the bottom and a height of 230 mm at rail seat.
2. Points & Crossing: These specialized sleepers are used to hold switches, CMS crossings and lead rails for main line and turnouts. High speed trains can run on these PSC layouts with utmost safety.
3. Guard Rail: These are used on girder bridges to prevent a derailed train from capsizing.
4. Switch Expansion Joints: These are PSC sleepers for switch expansion joints (with 120 mm maximum gap) for long welded rails for 52 kg & 60 kg rails using corresponding chairs.
5. Check Rail on Curves: Check rails are absolutely essential to offer an inner side for sharper curves, which are more than $5^0$ to prevent derailment.
6. Level Crossings: This is formed at various points where a road crosses a railway track at the same level and sleepers used here are made with 60 kg UIC or 52 kg check rail.
7. Dual Gauge: The unique pre-stressed concrete dual gauge sleepers have been designed to cater to handle meter and broad gauge trains so that both trains can run on the same track. All the sleepers are manufactured under stress bench system with very strict quality control measures.

# HTS Wire

Patil Group has the distinction of being the country's largest HTS wire manufacturer for the concrete sleeper industry. In line with the group's backward integration strategy, the company manufactures 3ply 3mm and 9.5mm x 7ply strand wires for track sleepers and turnout sleepers from its factories located at Bobbilli (Andhra Pradesh), Ajmer (Rajasthan) and Patna (Bihar).

The total production capacity of the three ISO 9001 certified manufacturing plants is 60000 MTPA. This capacity has helped the group emerge as one of the single largest suppliers of steel wires to ports, tunnels and major bridges being developed across the country.

The wire division of the Patil Group has exported steel wire to Iraq Railways besides having executed the single largest order for Indian Railways.

## Product Description & Specifications

- 3ply 3mm High Tensile Steel Stranded Wires as per IS 6006-2014 (Un-coated) used in Pre-stressed Concrete Industry
- 9.5mm x 7ply mm High Tensile Steel Stranded Wires as per IS 6006-2014 (Un-coated) used in Pre-stressed Concrete Industry. This is used in large bridges, Flyovers, Ports and Road Dividers.
- 4mm Wire (Indented) as per IS 6003-2010 Hard Drawn Stress Relieved Wire for use in Pre-stressed Concrete Industry. This is used in manufacture of Poles & Spun Poles for electrification and telecommunication
- 2.50-8.00 mm as drawn wire as per IS 1785-Part I of 1983-Plain Hard Drawn Steel Wire for Pre-stressed Concrete Industry
- 2.50-5.00 mm as drawn wire as per IS 1785-Part-II of 1983-Plain Hard Drawn Steel Wire for Pre-stressed Concrete Industry (Stress Relieved)
- Shutter Spring Wire for manufacturing of Rolling Spring as per Customer specifications

# SGCI Insert

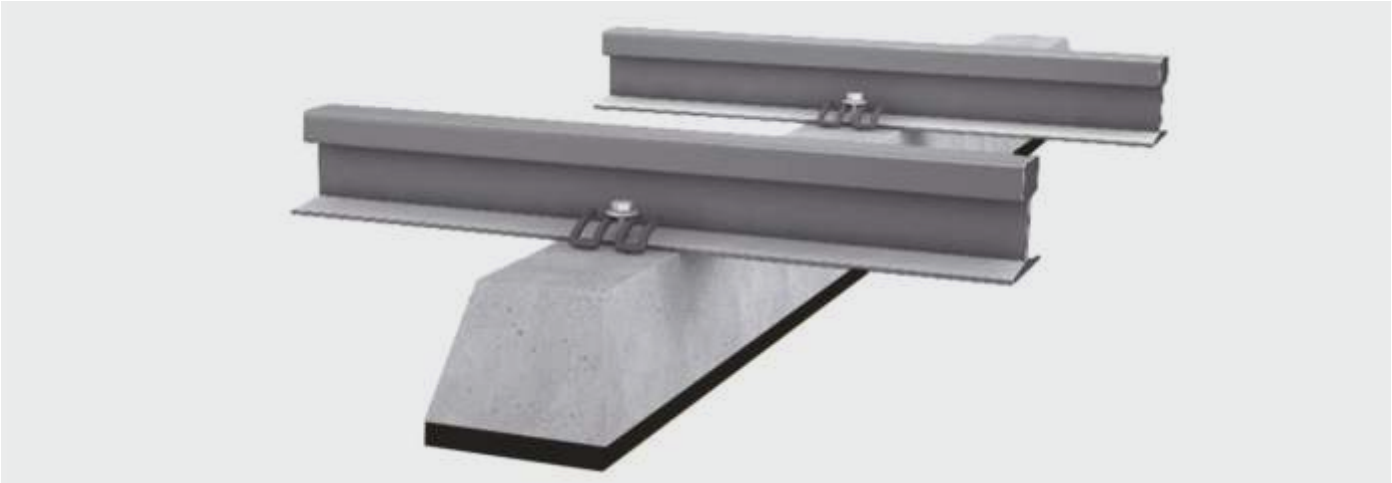
In continuation with its long-term strategy to be a one stop provider of all Rail Track and Metro Rail track related components Patil Group has achieved another milestone. We have recently established a Foundry near Kallakal, Hyderabad & Bokaro, Jharkhand for manufacturing of Base plates, SGCI Inserts.

Insert is a metallic part which is kept in the sleeper used to insert the clip that connects Concrete sleeper with Rail track. We manufacture Inserts in our foundry at Kallakal near Hyderabad. Insert production involves steps like preparation of molten metal, Mould formation in Dies by pouring molten metal, De-gating , Shot blasting and final grinding to remove excessive metal formation. The factory has been established with State of art manufacturing facilities and modern techniques like Robotics and Internet of things (IOT) are being implemented.

This unit has recently received approval from QA- RDSO( Drg. RT 381 Alt9) and started full scale manufacturing. At Kallakal Foundry (KFCPPL) we will very soon also start manufacturing of SGCI insert for the wider base sleeper, which is the latest sleeper product that can enable increased speed of locomotive with high axle capacity. Base plates for Metro Rails are another critical component that we manufacture in this foundry.

We are proud to announce our continued association with Indian Railways and happy to be a part of Make in India philosophy.

# Patil Paul Muller Under Sleeper Pads



Patil Paul Muller have been supplying Under Sleeper Pads for over 20 years. These were originally developed as soft pads in order to reduce ground borne noise being transmitted through the ground to adjacent building structures. New techniques have been successfully developed for integrally fixing Under Sleeper Pads during the production of concrete sleepers, producing a composite sleeper/pad solution.

Research undertaken in Europe on mixed mode and heavy rail tracks has established that resilient Under Sleeper Pads with a relatively high stiffness have a significant positive effect on track quality with a significant reduction in the costs of maintenance. The payback period for the increased cost of sleepers has been estimated to be between 3 and 7 years.

For heavy haul lines the use of Under Sleeper Pads to improve track quality will give a quick pay back by reduction in the frequency of rewinding, less frequent ballast tamping and cleaning. Additional benefits include reduced wear on wheels and it is anticipated that there will be lower incidents of rail breakage.

## Reduced dynamic loading of ballast

It is possible to reduce the static and dynamic loading between the sleeper and the ballast. In a conventional track, the sleeper is supported by a series of point contacts from the ballast. The dynamic loads then cause wear and breakdown of the ballast, so called "ballast attrition", which results in more dust, and greater deflection of the track.

It has been proven that by fitting a resilient pad to the sleeper soffit face, the ballast stones embed themselves into the pad and as a result there is a greater surface area now supporting the track load thus reducing the loads transmitted to the ballast. The resilient pad acts as a spring to reduce the level of dynamic impact reducing the peak loading on the ballast. This combination of effects significantly reduces the track deterioration and increases the time between grinding and ballast cleaning and tamping.

Where there are transition zones from ballasted track to slab track or bridges there will be an abrupt change of track stiffness which can result in deterioration of track quality. Therefore it is necessary to have a transition zone with an intermediate stiffness. This can be achieved using different grades of under sleeper pads provided by Patil Paul Muller

Indian Railway is proposing to use Under Sleeper Pads(USP)/ Under Ballast Mats(UBM) The UBM/USP when provided in the track, should be able to substantially reduce the ballast thickness requirement on Indian Railway tracks from existing 300/350mm without compromising or adversely affecting the functional, safety and structural performance of track for supporting/carrying passenger traffic (axle load of 21T) for a maximum speed of 160 kmph as well as freight traffic (axle load of 25T) at 100 kmph.The proposed system can preferably be either UBM or USP or a combination of both or any other proven material on any world Railway system

## NOISE & VIBRATION MITIGATION:

Patil Paul Muller can also offer Under Sleeper Pads, ballast mats or structure protection mats for use on concrete and steel bridges.These tend to be purpose designed to take into account axle loads, track speeds and local environmental conditions.

Whilst most USP's are now fitted at the time of the sleeper manufacture, USP's can also be fitted to wood or concrete sleepers at a later stage.This applies to new sleepers as well as to reusable sleepers.

Rather than buy new sleepers, this facility allows older rail sleepers to be re-used in less heavily used lines.

## Our R&D and manufacturing capability

Patil Paul Muller USP's are designed and manufactured to the requirements of National rail authority specifications globally. This may involve the bespoke design and manufacturer of specialist products.These can be made for use with wooden or concrete sleepers (Mono-bloc or bi-bloc).

Our in-house design team, technical support and the flexibility of our 1S09001 accredited manufacturing plant makes Patil Paul Muller the ideal supplier of your rail product requirements.

# Canted Turnout & Switches

## Brief advantages of Canted Turnouts

- Minimum entry and exit jerks and therefore higher speeds attainable
- Considerably lengthens the life of a switch
- Low maintenance inputs

## Modern Turnouts

A modern turnout is a track structure composed of a switch, a frog and closure rails permitting a train to leave given track for branching or parallel track. The turnout systems can be applied for different traffic applications like:

- Heavy Haul
- High Speed
- Mass Rapid Transit Systems in urban areas
- All required gauges
- All track systems as slab track and ballasted track
- All required rail fastenings

The benefit of the turnout systems is based on minimized life cycle costs on account of lower maintenance, higher reliability and shelf life. Most importantly, turnout systems can be tailor-made for specific requirements.

## Switches

The diverging path geometry of the switches is optimised according to the principles of vehicle dynamics. These cuts induce forces and thereby improve travelling comfort and service life.

# Composite Sleepers

Patil Group has obtained technology and manufacturing license for composite sleepers from Tie Tek, USA. These sleepers are manufactured using recycled materials. The group developed composite sleepers as an alternative material in lieu of steel channel sleepers for girder bridges.

Indian Railways have begun laying of composite sleepers in 10 railway zones across the country after successful testing at its laboratory and also at the partner's manufacturing plant in USA.

With an expected shelf life of over 40 years, composite sleepers score over wooden sleepers due to usage of recycled materials like HDPE, crammer rubber, glass reinforcement and fillers. Also, these sleepers are not susceptible to rupture, decay or insect infestation and drive down the overall operating costs for Indian Railways besides being easy to maintain as well.

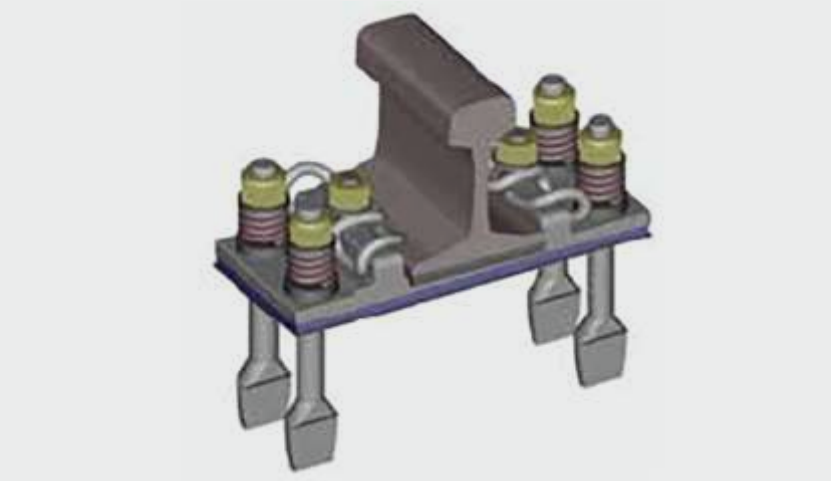
Being environmentally friendly since it keeps a check on deforestation, composite sleepers help keep sound pollution low and offer 100% insulation. Even its fasteners are similar to those of wooden sleepers. One of the biggest advantages of these sleepers is that it is 40% cheaper than cost of steel channel sleeper used in girder bridges.

With its R&D team working in conjunction with Tie Tek, USA – Patil Group has brought a product which has found wide acceptance even for the exacting standards set up by the Indian Railways.

The ability to recycle these sleepers due to its composition has won approval from railway boards across countries. Even as the functional properties are similar to wooden sleepers, these are not subjected to corrosion and don't need insulation since they are self-insulated.

Composite sleepers have less components than steel channel sleepers, hence rendering inspection and maintenance easier. Painting is also not required on composite sleepers and it possesses the additional benefit of reduced noise pollution due to the natural dampening effect of the product.

# Fasteners



Fasteners are link systems that hold the track to the sleepers. Different types of fasteners are used for different railway tracks. Patil Group has long standing association with world leaders in fastening and excelled in developing, manufacturing and marketing of various types of Fastening Systems.

With Indian Railways deciding to upgrade railway infrastructure in line with requirements of global standards and safety of passengers, a change was required in the fastening systems for railway tracks. Patil Group supplied slab track Fasteners (fastening system 336) to Delhi, Chennai, Bangalore, Jaipur, Mumbai and Hyderabad Metro Track Projects and other fasteners (fastening system 300-1 and 300-1U) of Station aprons and various main line tunnels to Indian Railways

## Key advantages:

- Cost effective as the majority of the components are manufactured locally
- Full fledged technical team for support
- Maintenance free, fit-and-forget system
- Systems available to suit various toe loads up to 18 KN.

## Various Types of Patil Fastening Systems

W 14 for Normal Tracks

It is reliable, safe and maintenance free with long spring deflection, high tensioning force, high creep resistance and effective protection against tilting. Fully automatic track-laying is possible through pre-assembly of all components in the sleeper works.

System 300 for Ballastless Track

Slab tracks meet all the requirements for combined highspeed and heavy load traffic. The rail fastening System 300, which can be pre-assembled, is suitable for all methods of slab track installation.

System 336 for Ballastless Track

These are rail fastening systems for ballastless concrete and steel structure. They ensure an effective reduction in vibration emission by means of an elastically supported rail. This system is suitable for standard-gauge railways as well as for urban light railways and can be adapted to local conditions as a result of their high flexibility. It reduces transmission of vibration to the concrete and structure and therefore reduces noise to the foundation of adjacent buildings.

System W 14 HH for Heavy Haul

This fastening system on concrete sleepers for ballasted tracks is primarily used for heavy haul. It has rail tilting protection by a middle bend of the tension clamp and special design of the angled guide plate. It helps reduce maintenance costs due to permanent elastic tensioning of the rail with tension clamps.

# PATIL RHEDA System

Patil Group of Industries has introduced a complete Ballastless track solution for urban metro rail on viaducts and underground tunnels. PATIL RHEDA Solutions are being used in many places and guaranteed under single point responsibility wherein the complete track, fastening and turnouts are integrated and delivered on a single source making it cost competitive and hassle free for customers and clients.

The advantages of using PATIL RHEDA Ballastless track systems include long life cycles, high speeds ride comfort and great load-carrying capability. Practically maintenance free, ballastless track systems ensure 100% availability over many years. In many cases, a maintenance-free track system is indeed the more cost-effective solution over the long run.

With Indian Railways still undertaking trial runs with these sleepers, implementation of PATIL RHEDA sleepers has not been widespread. The advantage of these sleepers is its use where ballast cannot be used and especially in tunnels, elevated tracks and station aprons.

The use of PATIL RHEDA sleepers is ideal for laying washable aprons at railway stations thereby improving the cleanliness of the station yards. The station aprons where the PATIL RHEDA sleepers have been implemented include Bhubaneshwar, Kacheguda and many other stations.

However, as the requirements of these sleepers is not in very high quantities, bulk production is not very economical or a viable option. Sensing a potential in small quantity manufacturing, Patil Group worked to set up mini mobile production plants - these can reach the station where the apron is required. Once there, the required design can be programmed, manufactured and once the same is laid out, the production van can move to the next location eliminating the need for setting up bulk manufacturing plants and transportation of these sleepers to their destination.

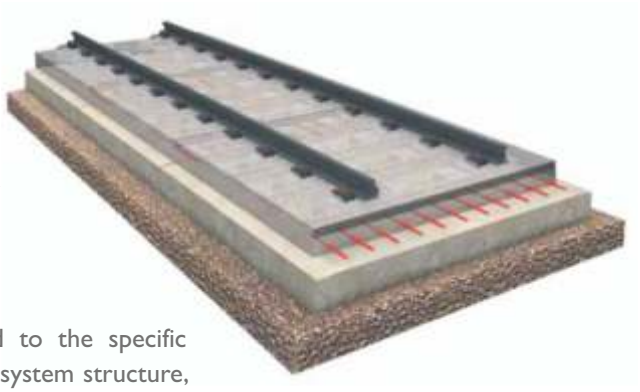
PATIL RHEDA Ballastless track was selected for the Jammu-Kashmir railway line. The company has also introduced complete ballastless track solutions for urban metro rail on viaducts, underground tunnels as well.

## The country's first ballastless track system

PATIL RHEDA is an in-house design and development based on RHEDA system designed in Germany. Our R&D team has customised this for the requirements of the Indian market. It was used in Jammu & Kashmir and for Delhi airport. Ballastless track system can be integrated optimally into traffic flow and the urban landscape whether for tram systems, underground railways or surface commuter train lines.

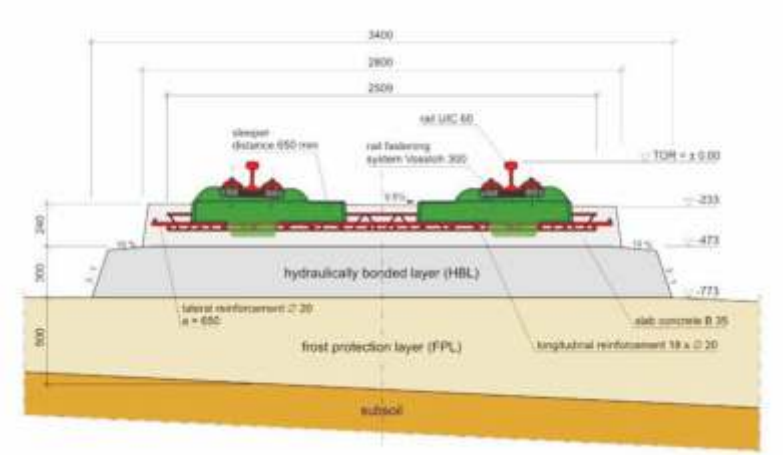
## Patil RHEDA -
## a proven system with worldwide reference

Maximum reliability and safety in planning, construction, and operation
Over the past 40 years, ballastless railway track has developed from a niche product to internationally proven standard technology in the new construction of railway lines with special requirements. One of the most influential systems for application of ballastless track with main-track sleepers is the Patil RHEDA family of ballastless tracks.



## System design and components

Patil RHEDA is a flexible system that can be individually adapted to the specific requirements and the individual constraints of each project. The basic system structure, however, always consists of modified bi-block sleepers which are securely and reliably embedded in a monolithic concrete slab. Highly elastic rail fastenings are essential to achieve the vertical rail deflection required for load distribution and for smooth train travel.




## Unified systems engineering and low track structural height

From the very beginning, Patil RHEDA technology - as system solution for the most demanding of user requirements - has confirmed the advantages of monolithic track design. The crucial modifications of Patil RHEDA with respect to the original system consist, first, of the employment of an especially integrated bi-block lattice-truss sleeper. Second, the latest version combines in situ concrete and a reinforced concrete trough slab that are produced in one working step. The non prestressed reinforcement bi-block sleeper, with optimized concrete elements, likewise forms a monolithic structure with the surrounding concrete of the track concrete layer. This structure can be uniformly implemented with extremely low structural height, on all kinds of suitable track substructure.

# Pre-cast Plinth System

The Plinth Type Ballastless Track is a well proven design used in more than 10 metro train projects across the world and in different gauges. This design has been developed by Patil Group in co-ordination with leading international design consultants.

The continuous plinth track system is a continuously supported rail with discrete shoulders retained by rail clips.

## Pre-cast Plinth

Patil Rail Infrastructure Pvt. Ltd and ITD Bangkok together developed an innovative modification to the existing plinth type track structure adopted with fastening system.

In this system, we bring in the plinth as a pre-cast element, same as the existing plinth structure to be used 300-1 fastening system.

Such a system brings in the following advantages:

- Cost effectiveness
- Better quality of work
- Time saving
- Lesser quantum of work on site

Due to the above advantages, many Metro authorities are showing keen interest in this system and are willing to adopt it in their upcoming projects.

### The Plinth Solutions can be implemented in the following situations:

1. Elevated track
2. Depots
3. Tunnels & viaducts.

Plinth system of Urban Metro is meant for speeds up to 110 kmph.

Our varied references in this product make us hopeful to aspire for further forthcoming urban metro projects in various cities.

# Precast Track Plinth

## Precast track plinth

Reduce materials and equipment handling before and after concrete casting

Disturb less road traffic and shorter period during construction

Better quality control from factory. Less finishing work is required and less pollution will construction. be created.

## Testing Procedures for Quality Assurance

### Material Test

- Compressive Strength Test
- Test Flow Ability Test
- Shrinkage Test

### System Test

- Rail Seat Vertical Load Test
- Repeated Load Test
- Shear Resistance Test
- Pull out Test

### Installation Test

- Mock – up Test

### Control Test

- Coring
- Ultrasonic Test

# Flash Butt Welding


## Important advantages of flash butt welding compared with other joining methods

- Reduces maintenance costs
- Saves track time
- Eliminates corrugation
- No weld filler material
- Smaller heat affected zone
- Smaller annealed zone
- Consistent hardness
- Highest fatigue resistance
- Average life equal to the rail

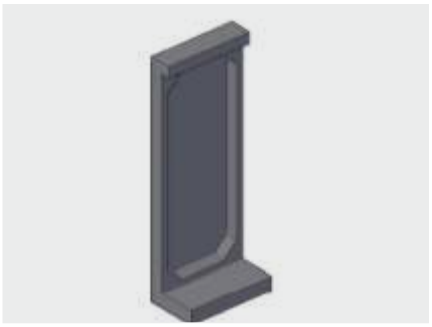
Patil Group has proved its presence in the field of Flash Butt Welding for Railway through its Flash Butt Welding plants. Patil Group has constructed India's largest welding depots in Moulali secunderabad and in New Bongaigaon Assam India for Indian Railways. Adequate infrastructural facilities have been provided in these plants to facilitate the welding of 20 Rail panels. These Plants have facilities for mechanised unloading of free rails, movement of welded panels on rollers, loading and unloading of welded panels by motorized gantries. We have imported an advance Flash Butt Welding Machine from USA and deployed in New Bongaigaon Assam FBW depot.

## Introduction

In Flash Butt welding process of rails, rails are welded by the heating, using the Flashing Technique with the help of Hydraulic Control System, Rail ends are heated as a result of their Electrical resistance using current with high amperage at low voltage and forging them at an appropriate temperature and upset force. No foreign material is needed and welding process is continuous. The heat-effected zone is limited to the smallest possible area. The pre-selected configuration best suitable for a particular type of rails in accordance to its metallurgy ensures high quality weld. The welding cycle take place by the lateral compression of the rail ends by the means of the two pairs of jaws. The jaw clamped rail ends also act as electrodes for flow of high intensity current.

The individual rails of 13 m/ 26 mtr. length received from steel rolling plants are initially sent to Flash Butt Welding Plant. The individual rails are then welded into rail panels of 10-rail length by flash butt welding technique Flash butt joints have very high fatigue strength and are preferred to other types of welds. The rail panels of 10-rail length and 20-rail length formed by flash butt welding are transported from the Flash Butt Welding Plant to the field locations by loading into specially designed railway flat wagons. These panels are unloaded at the site through specially designed end unloading chutes fitted to the rearmost wagon.

# Precast Manufacturing



## What is Precast Concrete?

Precast Concrete is concrete manufactured offsite into a specific shape & then transported to site and erected in the service position. The concrete is placed into a typical steel formwork & steam cured for achieving early strength.

India' s vision to grow rapidly endorse Infrasturture, Real Estate and Power Industries for planned delivery of project in limited timelines and optimized cost without any compromise in quality standards.

The Precast technology being now present for over 10 decades provides an intelligent solution to the problem by ensuring that all the parameters related to raw material, quality & safety are ensured.

The finished products can be transported & installed at site eliminating the hinderances offered at site during concreting at site like height, atmosphere, etc..

## Why Precast Concrete?

- Design Flexibility ensuring Precise Engineering
- High Performance Concrete ensuring High Compressive Strength
- Strict Quality Control ensuring No Wastage
- High Durability & Conform to IS Standards
- Pre installed MEP services ensuring Efficient Thermal Insulation
- Skilled Workmen ensure Best Workmanship
- Modular Structures can be more Cost Effective than cast in-situ
- Mechanical Connectors ensure Easy & Quick Installation
- Less Congestion at Site ensures More Safety at site.

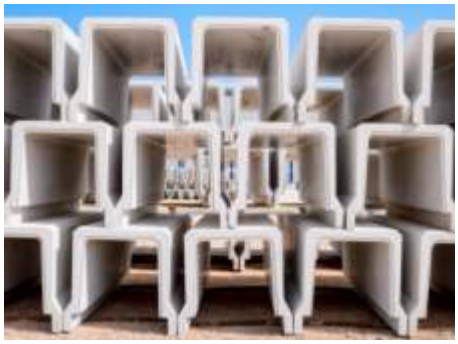
## Strength of Patil Group

- PAN India Presence with daily production capability of 2500 Cum through 12 units.
- Expert CME team ensures around the clock montioring of Concrete Products through our STR system to exceed the expectations of our clients.
- Complete Backward & Forward Integration ensuring the delivery of products within scheduled timelines.
- In-house training centers for labour to improve workmanship for concrete production.
- Efficent SCM Team to ensure best quality of raw materials, logistics & others.

## Precast Products by Patil Group












# Key Customers

L&T

TATA

GMR
Creating tomorrow today

Gammon

LANCO

Aditya Birla Group

ESSAR

RELIANCE

Indian Railways

SAIL
सेल SAIL

रेल विकास निगम लिमिटेड
(भारत सरकार का उपक्रम)
Rail Vikas Nigam Limited
(A Government of India Enterprise)

नालको NALCO
National Aluminium Company Ltd.

vedanta

RELIANCE

adani

namma metro
Bangalore Metro Rail Corporation Limited

SEW

एनटीपीसी
NTPC

Hyderabad Metro Rail

IRCON
IRCON INTERNATIONAL LIMITED

adventz
KALINDEE

डेडीकेटेड फ्रेट कॉरीडोर
Dedicated Freight Corridor Corporation of India Ltd.

दिल्ली मेट्रो रेल कॉरपोरेशन लिमिटेड
Delhi Metro Rail Corporation Limited

मुंबई मेट्रो
एमएमआरडीए
Mumbai Metro
MMRDA

KALPA-TARU

RITES
THE INFRASTRUCTURE PEOPLE
A Government of India Enterprise

KEC
KEC International Limited

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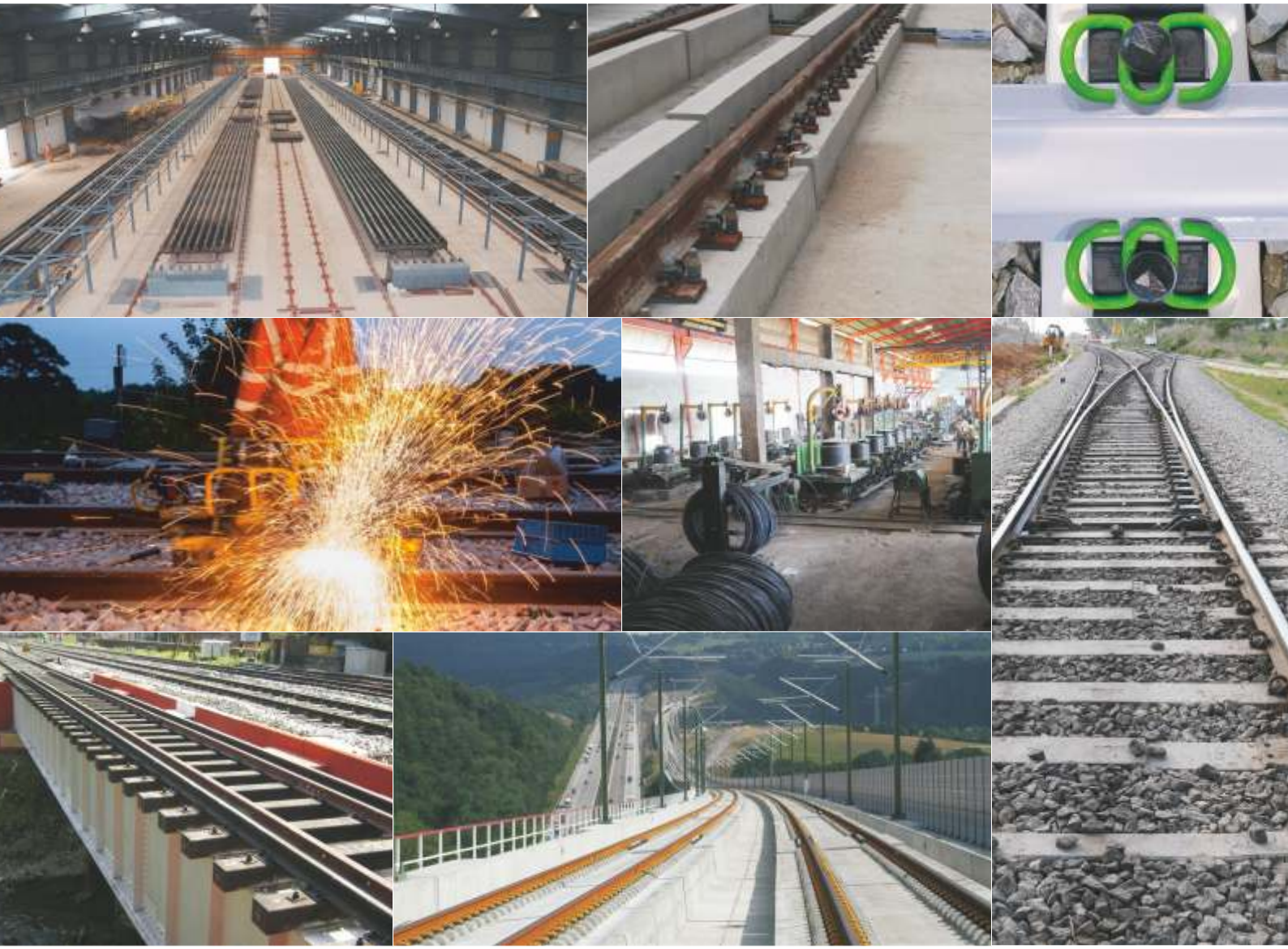

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