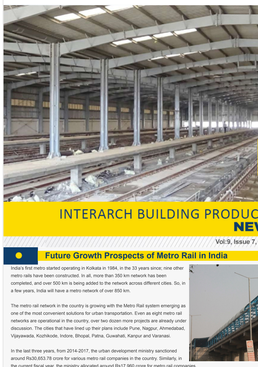
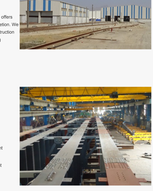


INTERARCH BUILDING PRODUCTS
NEWSLETTER

Vol.9, Issue 7, July 2018

Future Growth Prospects of Metro Rail in India



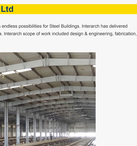
India's first metro started operating in Kolkata in 1984, in the 33 years since, nine other metro rails have been constructed. In all, more than 300 km network has been completed, and over 500 km is being added to the network across different cities. So, in a few years, India will have a metro network of over 850 km.

The metro rail network in the country is growing with the Metro Rail system emerging as one of the most convenient solutions for urban transportation. Even as eight metro rail networks are operational in the country, over two dozen more projects are already under discussion. The cities that have lined up their plans include Pune, Nagpur, Ahmedabad, Vijayawada, Kochikode, Indore, Bhopal, Patna, Guwahati, Kanpur and Varanasi.

In the last three years, from 2014-2017, the union development ministry sanctioned around Rs20,653.78 crore for various metro rail companies in the country. Similarly, in the current fiscal year, the ministry allocated around Rs17,960 crore for metro rail companies.

The Overall cost of expansion of Metro operations and under implementation approved metro projects is going to support the order books of construction companies & allied industries. This is expected to boost the order book of construction companies and boost overall economic scenario

Possibilities of Interarch Life for Metro Rail Facilities



Interarch LIFE, a lifestyle concept for developing modern & elegant infrastructure in steel. Interarch LIFE is focused on enhancing the lifestyle, and creating state-of-the-art facilities & amenities in steel construction. Interarch Life uses the latest technology for turnkey construction of steel buildings in rural and urban development in India.

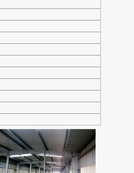
Interarch LIFE, provides a customized structural steel system for Metro Rail Facilities, offers engineering & designed Pre-engineered Steel Building Solution from concept to completion. We take innovation in engineering, and strive to go beyond the realm of conventional construction with our team of leading engineers, quality manufacturing and efficient project handling capabilities.

Application Possible for Metro Rail

- Metro Structure
- Manufacturing Plans
- Metro Stations
- Station Platforms
- Bridge Girders
- Metro Depots

Advantage of using a structural steel system;

- Steel structure is faster to erect, as compared to RCC frames being lighter in weight & offers speed in construction and time saving resulting in an overall cost saving
- No site storage or site fabrication space is required on site, so it is more convenient to build stations in the urban landscape
- Large clears span of station building can be easily made in pre-engineered steel, aiding functionality and aesthetics for Metro Rails applications
- Steel is 90% Recyclable and IGBC compliant material, which helps in acquiring IGBC certificate
- Low lifetime maintenance cost and durability
- Earthquake & Fire resistant structure & Buildings



Project Spotlight: J Kumar Infra Projects Ltd

Interarch, India's leading Turnkey Pre-Engineered Metal & Steel Construction Company offers endless possibilities for Steel Buildings. Interarch has delivered project for J. Kumar Infra Projects Ltd.(Mumbai Metro Depot Building) at Taloja in Maharashtra. Interarch scope of work included design & engineering, fabrication, supply and erection of five Pre-Engineered steel Metro Depot Building.

Project Name	J. Kumar Infra Projects Ltd
Project Location	Taloja, Maharashtra
Total Project Area	20770 Sq.M
No.of Building	5
Length	192 m
Width	43 m
Height	11 m
Design Code	IS 800 2007
Seismic Zone	III
Roofing	0.55 mm Tracdek SS-2000
Wall Cladding	0.50 mm Tracdek Hi-Rib

Interarch Industry Spokesperson - Mr. M.P. Naidu, L&T-Metro Rail (Hyderabad) Limited

Mr. Naidu has over 42 years of professional experience in the design and execution of various medium, large and Mega projects in India and abroad. At present, Mr. Naidu is the Project Director of L&T Metro Rail (Hyderabad) Limited, the world's largest PPP Project in the metro sector, being executed on Design, Built, Finance, Operate & Transfer (DBFOT) basis with an investment in excess of Rs.16,000 crs.

Prior to this Mr. Naidu was the Project Director for Delhi International Airport, Terminal-3, a project worth of Rs.9,000 Crs. Mr. Naidu graduated from REC, Bhopal, in 1972 in Civil Engineering and did his Post Graduation M Tech (Hydraulics & Water Resources) from Regional Engineering College, Warangal, in 1974.

As per him the growth prospects of Metro are excellent in India as it acts as a catalyst for the city's economic & functional development and business opportunities. Metro has proven to be the best mode for intra-city transportation as it is the fastest and greenest transit system with the flexibility of connecting to various nodes of the city.

On adoption of latest metro infrastructure trends, he suggests Metro stations are to be seen as the hub of transit systems and not as a standalone system. Stations may be strategically positioned for connecting to various other transit systems like Bus stations, Railway Stations and suburban railway stations for seamless commute. Stations may be connected by a sky walk to the retail, residential, institutional and commercial developments for better experience & comfort to commuters. All these concepts are being implemented in Hyderabad Metro along with 18.5 million Sq. Ft.of Transit Oriented development.

As per Mr. Naidu, Design philosophy of Metro station should be sustainable and should give better comfort levels during & after construction. In Hyderabad Metro, innovative design concepts like Spine and Wing concept, sleek station boxes for maximum natural ventilation & daylighting at street level, open station concept at concourse and platform level for 100% day-lit, solar panels on station roof are implemented. The roofs of the stations were selected with the high SRI value to reduce heat island effects. In addition, locally available materials, rainwater harvesting, eco-friendly chemicals, LED fixtures, native species plantation, materials with recycled content etc. are employed as a part of green initiatives while designing and constructing the metro structures.

Clear span for any Metro project depends on various factors like location of the project, challenges with regards to traffic movement, road junctions, location of heritage & landmark structures and non-routable underground services. For Hyderabad Metro Viaduct, the most economical span is 31M.

As per Mr Naidu, type of structural frames or system to be employed depends on the complexity and site constraints of the project. In Hyderabad Metro, Piers for Stations & Viaduct are planned at middle of high traffic density roads. To minimize inconvenience to public, precast post-tensioned, pre-tensioned cast in-situ and steel structures are planned. Chijhenta Rail-over-Bridge has been installed under his guidance. It's an engineering feat. Length of this steel bridge is 82 m and is to be aligned with a steep curve of 129m radius. The total weight of the girder is about 1100 MT. Girder is assembled on top of the trestles of height 20m. Hydraulic jacks of 100 MT capacity and Hilman rollers of 300MT and 500 MT capacities were used for launching the operation. This task was completed in 6 hrs. time given by Railway authorities.

Focusing on the challenges faced during the Hyderabad Metro project, he suggests designs shall be innovative and shall take into consideration of public convenience, construction timings underground utilities etc. as these will have impact on project duration. Steel structure can become a suitable alternative in the near future with increasing space and time constraints for executing projects.

Under Mr. Naidu's guidance, Hyderabad Metro has obtained the prestigious IGBC Platinum rating for its technical innovations and adoption of green initiatives.

IBPL Experience for Metro Rail Facilities

Interarch caters to some of the most diverse steel building construction projects in India ranging from clients like **DMRC, Namma Metro** and many more. Interarch has emerged into a large EPC player providing critical Project Management Consultancy to its clients.

Sl. No.	Client Name	Solution Provided/Application	City
1	Delhi Metro Rail Corporation	Bridge Girder	New Delhi
2	Mumbai Metro Rail Corporation	Metro Depot	Navi Mumbai
3	Namma Metro	False Ceiling	Bengaluru
4	Delhi Metro Rail Corporation	False Ceiling	New Delhi

Project Won

- TAL Manufacturing solutions Ltd in Maharashtra
- HT Media Limited in U.P
- Goodyear South Asia Tyres Pvt. Ltd in Maharashtra
- GEDIA India Automotive Components Pvt Ltd. in Maharashtra
- Kech Motors Pvt Ltd in Madhya Pradesh

Project Completed

- SMCC Construction India Limited in Rajasthan
- BASF India Ltd. in Karnataka
- Seabird Marine Services Pvt. Ltd. in Haryana
- Murugi Kirlo Industries Pvt Ltd in Gujarat
- Gram Tarang Employability Training Services Pvt Ltd in Odisha

Training at Interarch:

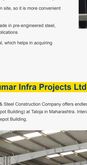
Interarch Building Products conducts regular and effective training program for employees. Training was conducted on "Problem solving skill & seven QC tools" at Interarch Kichha plant on 07/06/18 by faculty from Six Sigma Institute for HODs, Managers, Engineers and Office staff.

Events at Interarch:

Interarch Building Products Pvt Ltd participated in India Warehousing Show in New Delhi from 21st June'18 to 23rd June'18

PR Coverage

Interarch received Press Coverage in B2B Purchase Magazine in June 2018.



New Trends in Metro Rail System - Driverless Metro Trains

The first line to be operated with automatic operations was in the U.K. which opened in 1967, however the driver was present in the cabin during transit. Now days many rails operate using an ATO system, with an objective of making the frequency of the service more efficient. Since then, ATO technology has been developed to enable Metro trains to operate even without a driver: either with an attendant roaming within the train, or with no staff on board.

Degrees of Automation

Grade-of-Automation 4 (GoA4)
In this system, Metro trains are capable of operating automatically at all times, including door closing, obstacle detection and emergency situations. On-board staff may be provided for other purposes, e.g. customer service, but are not required for safe operation

Grade-of-Automation 3 (GoA3)
In this system, trains run automatically from station to station but a staff member is always in the train with responsibility for handling of emergency situations. In a GoA3 system, the train cannot operate safely without the staff member on board

Grade-of-Automation 2 (GoA2)
In this system, trains run automatically from station to station but a driver is in the cab, with responsibility for door closing, obstacle detection on the track in front of the train and handling of emergency situations.

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