Focus

The spectacular Wankhede Stadium in Mumbai which played host to the grand finale of the 2011 ICC World Cup Cricket, now sports a new look after completion of the re-construction and renovation works by L&T. The new look stadium features colourful bucket seats with an array of lifts, staircases and other facilities for spectators including an architecturally unique, suspended structural steel cantilever roof covered by Teflon fabric. All these embellishments and amenities were designed and built to meet ICC’s world-class standards, specifications as well as comforts of the Indian spectators. In the nail biting finale held on April 2, 2011 India beat Sri Lanka and lifted the World Cup, for the second time in history. While India created history by becoming the first host country to clinch cricket’s biggest title in front of a packed house at the refurbished Wankhede Stadium, Larsen & Toubro (L&T), shares its joy for having created the historic venue for the historic victory of the Indian cricket team. In this issue of ECC Concord we bring to you an in-depth article on the stadium “Sporting a Modern Look” carrying complete details of the reconstruction works executed by L&T.

Apart from being a major player in building the Mumbai International Airport, L&T is also building a unique and dedicated elevated access way to the airport forecourt. The Sahara elevated road is perhaps the only bridge with the superstructure or the deck spanning the entire breadth of the at-grade road below measuring an expansive 27.6 m. An interesting technology using precast cantilever wings has made this amazing access way a reality.

Towards the northern part of India, L&T is commissioning one of the toughest transmission line projects in the rugged terrains of the mighty Himalayas. This 155 km long TL is in the advanced stage of commissioning and will evacuate power from the Karcham Wangtoo hydropower project in the Himachal Pradesh. Braving the rough weather and rugged terrain L&T’s staff and workmen are at full swing with execution of the project. An insight in to the article “Transmission lines that traverse the Himalayan heights” reveals interesting technical details, apart from the hardships encountered. This issue also covers the extensive modernization cum expansion activities of SAIL at their IISCO Steel Plant in Burnpur, West Bengal.

The Kaleidoscope is replete with many events especially on the corporate social responsibility front. In addition, it offers glimpses of several other corporate happenings in L&T. We hope you will find the site insights covered in this issue interesting amidst myriad mini corporate events and other stories.

Happy reading.

- Editor

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The Wankhede Cricket Stadium in Mumbai built by Mumbai Cricket Association (MCA) in 1975 originated as a result of constant disputes between the Cricket Club of India (CCI), which owns the Brabourne Stadium and MCA over the allocation of tickets for test cricket matches. The disputes took a serious turn during the test between India and England in 1973, when MCA decided to build a stadium of its own. At the instance of Mr. S. K. Wankhede, politician and then Secretary of the Mumbai Cricket Association, construction of a new stadium was proposed in South Mumbai near the Churchgate station. And, the stadium came in to being in six months just in time to host the final test between India and the West Indies in 1975. Since then Wankhede stadium has become the main cricketing venue in the city and found its place on the world-map of cricketing venues.

The stadium has the capacity of 32000 spectators with stands, entrance gates and dressing rooms in the name of prominent personalities as follows:

- Vijay Merchant Stand : West Stand
- Sunil Gavaskar Stand : East Stand
- Sachin Tendulkar Stand : North Stand
- Vithaldas Divecha Stand : South East Side

Redevelopment

When the International Cricket Council (ICC) decided to host the World Cup Cricket-2011 in the Indian sub-continent, Mumbai was selected to host the final match including some league matches. At this juncture, MCA decided to redevelop the Wankhede Stadium and give it a brand new look with modern facilities and comforts to spectators.

Accordingly, the Managing Committee invited bids from reputed Architects and shortlisted Shashi Prabhu & Associates and PK. Das & Associates to jointly draw up the plans for redevelopment of the Stadium. Shrikhande Consultants
were appointed as the Project Management Consultants.

While redeveloping, major thrust was focused on providing better seating facilities and other comforts to spectators like bucket seating, food courts, improved and spacious toilet blocks etc., on the North and the South Stands conforming to world-class standards. All these were aimed at improved crowd management and circulation including designing a cantilevered structural steel roof covered with Teflon fabric to provide an unobstructed view.

This also featured construction of ramps, staircases and installation of lifts. The number of exit gates went up to 11, as the restrooms and toilets were redesigned to accommodate a large crowd including ladies and kids who otherwise had to wait in long queues. 57 new air-conditioned boxes were constructed for guests and VIPs. Three huge replay screens were installed in strategic locations for better visibility. The players are facilitated with glitzy dressing rooms, provided with a spacious balcony and bath rooms. Large glass panels installed on southern side of the pitch gives the non-players of the match, the facility to have a clear view of the game, while sitting in comfort inside their rooms. In addition, large and spacious media boxes have been constructed for journalists and photographers.

The Project

The reconstruction of Wankhede Stadium conforming to International Standards for Cricket was planned with a view to host the World Cup-2011 matches including the grand finale on April 2, 2011. MCA thus entrusted the contract for ‘Wankhede Stadium Reconstruction’ to Larsen & Toubro on 15th June 2009 and L&T commenced the construction of work on 22nd June 2009.

The reconstruction work involved a wide spectrum of operations such as civil, mechanical, electrical, plumbing, cladding and interiors works. The stadium has a total area of 44086 sq.m column free space covered by a structural steel tubular roof with a tensile PTFE fabric membrane supported on 45trusses and compression rings.

Scope of Work

- Compete civil, RCC, structural and allied works for the reconstruction of south basement and superstructure of North & South stands and refurbishment of East & West Stands.
Strengthening of East & West stands by means of jacketing/ fiber wrapping, epoxy treatment, polymer treatment including reconstruction of toilet blocks including associated plumbing services.

Engineering, supply, fabrication, assembly and erection of high strength M.S. tubular steel structure with associated roofing system made of composite tensile membrane and its supporting structures for all the four stands.

Waterproofing treatment to basement, underground structures, toilets, balconies, chajja, etc.

Public Health Engineering services including plumbing services, construction of U.G and O.H tanks as well as associated sanitary / drainage networks for all 4 stands beside storm water and field drainage system.

Fire protection system complete with pumping and distribution network.

Electrical system with H.T and L.T distribution networks, sub-stations and lighting systems.

Area development with road paving, installation of gates, street lighting etc.

Interior finishes covering flooring, painting, cladding, skirting etc., including railing for staircases and galleries.

Exterior finishes with dry cladding and structural glazing and painting complete as per architectural design.

**Civil Works**

The scope of RCC civil works for the new look North & South stands involved construction of basement, columns, beams, seating gallery including the roof structure. Consisting of three tier galleries, the North and South Stands are built as framed structures, each having a width of 25m and a height of 29m from the ground level and they are located beyond the 73m radius of the ground fencing or the playing arena. The super-structure of these stands rest on 452 cast in situ piles of 600 mm diameter having a depth of 15m (Piling work not executed by L&T). However, micro piles of 300 mm diameter and 15m depth were executed by L&T for the East & West stands, around its existing foundation to strengthen the structure, but no changes were made in the two tier seating gallery. L&T formwork was extensively used for concreting the structures with the help of a batching plant installed at site. The entire structure is covered by an
aesthetically designed roof, which has the following dimensions:

<table>
<thead>
<tr>
<th>Name of Stand</th>
<th>Width in meter</th>
<th>Height in meter from Ground Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Stand</td>
<td>30.13</td>
<td>29.0</td>
</tr>
<tr>
<td>South Stand</td>
<td>30.13</td>
<td>29.0</td>
</tr>
<tr>
<td>East &amp; West Stand</td>
<td>13.65</td>
<td>29.0</td>
</tr>
</tbody>
</table>

**Tubular Structural Works**

Building the structure with its unique shape involving bending of pipes, profile cutting and 20m cantilever involved several challenges and engineering expertise. The precision of the steel roof structure, and its connection to the concrete bowl required close co-ordination between the design, fabrication and assembly teams. The complex three-dimensional structure combined with high level of assembly tolerance, required very close co-ordination and understanding of all elements from design and structural loads, to constructability and erection sequence. Proper communication between the structural designers, contractor and fabricators became vital to the success of the project, and through extensive reviews and workshops, teams went on challenging each other’s assumptions until everyone was fully satisfied that the correct solution has been found.

The architecture of the tubular steel structure consists of 45 trusses connected with 90 compression rings, 45 pergola members and 60 curved members involving a total of 4200 tons of tubular pipe structures including the tensile plates and the gutter plates. The 45 trusses were connected to the concrete columns through insert plates and bolts. The scope involved complete detailing, bending, fabrication and erection of the fabricated components. The design for the connection of the truss with different members was proposed in such a way to increase the speed of erection.

**Construction Methodology**

The entire roofing structure was divided in terms of trusses and compression rings. Further, each truss was divided into three parts considering the fabrication, transportation and erection capacity of the crane. The movement materials during fabrication were done in a sequence from the storage yard to bending yard and then to fabrication. The pipes were ordered as per required cut length to avoid...
wastage and the fabrication/erection of the roofing structure was done as per the availability of the civil front. The connecting systems were designed by a structural consultant in close coordination with the site team for increasing the speed of the construction.

**Erection**

The erection methodology of the truss with 20m cantilever was prepared by L&T’s construction methods planning cell (CMPC) and approved by the Structural Consultant. To begin with the 20m cantilever portion of the truss was supported onto the heavy trestles. A total of 370 truss members had to be erected and erection was planned with 250t Crane for heavy members and 110t Crane for light members. Trusses were also used as intermediate supports for the resting of 20m span cantilever and the same was removed after completion of the loop of the compression ring.

**Fabrication**

Although the fabrication was planned to be carried out in a workshop, the agency could not perform and permission was granted by the client for fabrication at site. Approximately 400 tons of fabrication was done at the workshop and the balance fabrication was taken over and done at site by L&T. L&T took up the task by dividing the total scope of work in terms of different Stands and they were released as per availability of construction fronts. The erection was planned with West stand first, North stand second, East stand third and finally the South stand.

The truss fabrication involved tubular pipes as main cord with bracing members and plates for gutter system including tensile fabric connections. There were 16 trusses to be fabricated and supplied for erection in the North stand, 7 in the West stand, 7 in the East stand and 15 in the South stand. For ease of fabrication, the total truss was divided into two sections i.e., truss with longer cantilever span and truss with shorter cantilever span. There were 27 trusses with longer cantilever spans and 18 shorter cantilever spans. The total weight of each longer cantilever truss was 60 tons and that of the shorter cantilever truss was 45 tons. The longer cantilever truss was further divided into three sections in terms of vertical portion, bend portion and cantilever portion after considering the weight to be handled by crane and erection scheme. The total detailing of the truss was done in terms of erectable components. The truss was connected at 6 levels with RCC by means of 11 connections having 9 connections in vertical portion and 2 connections in bent portion. The insert plates were cast along with RCC. The built up readings for the insert plates were taken and the connecting plates...
were fixed to the truss as per these readings. The truss was erected as per approved erection scheme with erection of vertical portion first, bent portion in the second and finally the cantilever portion. The cantilever portion was supported on temporary trestles. The erection of the truss was done by means of 250t crawler mounted crane.

**Compression Rings**

The compression rings were divided into two parts with 45 outer compression rings and 45 inner compression rings. The radius of the compression rings was in the order of 75-80m. The connections of the compression rings which were proposed as welded joints were changed to half sleeve connection to increase the erection speed. The total weight of outer compression ring was 11 tons and inner compression ring was 9 tons. The erection of the outer compression ring was done with 250 ton crane and inner compression ring was done with 110 ton capacity crane.

**Strengthening**

The strengthening of the East & West Stand columns was done by FRP (Fibre Reinforced Polymer) composite system and structural system with beams and plates. The brief methodology for the FRP system involved:

- Proper Surface preparation by removal of paint, wall paper, cladding, tiling, loose plaster, etc.,
- Exposed concrete surface having hack marks were filled with skim coat of polymer modified mortar.

![Particulars](https://example.com)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Structure</th>
<th>Approx. Built-up area in Sq. m.</th>
</tr>
</thead>
</table>
| South Stand | Basement, ground, foyer, 1st Level, 2nd Level, 3rd Level Balcony (4 upper level) | *Basement - 2500  
*Ground - 2455  
*Tiers - 4216  
*Enclosures - 7670 |
| North Stand | Basement, ground, foyer, 1st Level, 2nd Level, 3rd Level Balcony (4 upper level) | *Basement - 600  
*Ground - 2260  
*Tiers - 6000  
*Enclosures - 14750 |
| West Stand  | Ground, balcony including the existing structure refurbished and strengthened. Toilet block demolished and reconstructed | *Strengthening - 1920 |
| East Stand  | Ground, balcony including the existing structure refurbished and strengthened. Toilet block demolished and reconstructed | *Strengthening - 1920 |

The redevelopment covered an area of 40450 Sq. m. Total strengthening – 3635 sq. m.

- After the surface preparation, fibre-wrap is done by cutting the fibre to required size as per fibre orientation and number of layers.
- Mix the resin component in the ratio specified by the manufacturer and the prepared surface is primed with mixed resin and the fabric is then wrapped around the prepared surface as per the fibre orientation and number of layers as specified.
The main truss supporting column was thus encased in concrete up to 21.6m height by means of bend plates.

**Interiors**

The interior decor package was awarded to L&T in the month of September 2010 and the scope of works involved interior finishes for President’s lounge, corporate boxes, players room, ICC lounges, banquet hall, commentator box, press box, umpire’s room, medical room, ex-cricketer’s lounge, etc. This involved Interior works as follows:

- **False Ceiling:** Acoustic aluminum false ceiling and gypsum board false ceiling, Armstrong Mineral fiber board, POP works, etc.
- **Carpet:** Machine made, roll form loop pile carpet, etc.
- **Painting:** Lusture paints, acrylic emulsion paints, oikos paint, etc.
- **Timber & Furniture Works:** Flush door shutters, fully glazed shutters, frosted film of 3m glass partitions, door closers, mirrors, wooden paneling, veneer paneling, dhurrie paneling, buffet counters, wardrobes, roller blinds, etc.,
- **Loose Furniture:** Sofas for banquet hall, entrance foyer, medical room, corporate boxes, chairs for corporate boxes, president lounge, ICC lounge, etc.,
- **Interior toilets Plumbing:** Wall hung type E.W.C, China flat back urinal, Sensotronic concealed type urinal flush valve, Kohler make for president lounge, floor mounted E.W.C, White glazed vitreous wash basin round table top, central hole basin maker, Paer holders towel rings, soap dispenser etc.

**Plumbing**

Plumbing package involved plumbing system for the general toilets and interior toilets. There were a total of 55 general toilets in all stands put together including 84 for Interior toilets. Plumbing system involved construction of UG/OH tanks, supplying and fixing of E.W.C, wash basins, rain water pipes, etc.,

The redevelopment of the stadium covered a total area of 40450 sq. m (435252 sq. ft.) for four stands including strengthening of structures to the extent of 3635 sq. m as per details below:

- The major quantities of work are as follows:

**Electrical**

The Electrical package included installation of electrical and automation
control panels, distribution boards, cabling, earthing, point wiring etc.

The illumination of the entire stadium is supported electrically by LT distribution system with a capacity of 2.7 MW power during flood lighting of the match and 310 KW during no-match. There is one main panel room and three distribution rooms for taking care of the distribution of power. This houses 19 distribution panels (Main LT Panel, Lighting, Power, Emergency, PCC, Standby DG panels, etc.) in upstream and is taking care of 121 Distribution Boards in the downstream and with 53 earth pits for keeping the system healthy.

The power to all four High-Mast lighting poles of 224 x 4 KW capacity is supplied through these panels by drawing power from the Bombay Electricity and State Transport (BEST) and the back-up from five standby DG sets each of 500 KVA capacity for use during the Day-Night match. These DGs ensure supply during power failure and support each individual High-Mast and the other one is kept as a common as standby.

**Cabling**

Cabling work involved extruded cables with XLPE insulation running to a total length of 40 km and the cables sizes ranging from 4.0sq. mm to 400sq.mm. 1.4 km of Hume pipes are laid externally in the circumference of the stadium with around 53 manholes en route and the internal cables are laid on cable trays.

**Lighting**

All light fixtures were made of Low Loss (THD <10%) Electronic Ballast type and there were a total of 2755 light fixtures in 9 different types covering the entire project including passages, toilets, drive-ways, snack-bar counters, lounges, etc. One new type of light fixture called corner light fixture (A quarter circular shape fixture with a diffused acrylic type magnetic cover) was designed exclusively for this project and later on was regularized and standardized by the vendor in their catalogue. Nearly 17.5 km of wires were consumed for connecting light points including power sockets, etc.

**Quality**

Quality management plans and techniques were implemented during construction of the Project by adopting the following measures:

- QAP & ITP was prepared for the tubular structure, approved by structural consultant and witnessed by the Third Party
Inspector appointed by the client. All the circular joints were checked for 100% efficiency by ultrasonic testing in the presence of the third party Inspector.

- An additional third party Inspection was appointed specially for the inspection of the welded joints and testing.
- All civil quality checks were carried out by the Project Management Consultant.

Safety (HSE)
To meet the tight construction schedules under safe working environment, the project team took the following measures:
- Strict use of (100 % use) personal protection equipment by all.
- Induction (through E-learning) and screening of workmen at site.
- Induction of a full time doctor for the workmen at site.
- Separate labor camp for workmen including transportation arrangement.

Beside the above, L&T implemented various measures like locking arrangement for lift shaft opening, floor edge protection, proper staging arrangement for protection of workmen at heights, etc. The site, thus achieved 10 million accident free hours which speaks testimony for the safe working methods and the impeccable safety culture established at site.

The construction of the Project which began on June 22, 2009 was to be completed in 15 months (including 6 months of monsoon) was actually completed by L&T in 19 months by January 31, 2011 considering the additional scope in Basement and Interior works.

At the peak of construction more than 80 staff and 2500 workmen were employed at the project and the site clocked more than 10 million injury free man–hours as safety record.

**Major Challenges**

**Change in scope of work**
Initially, the project was to be completed in a tight frame schedule of 15 months. However, delay in the release of design drawings and construction fronts from the clients led to time over runs. In addition, a portion of the North and south Stands were under hold by client on account of Railway clearances and the same were released in the month of June 2010. Also there was considerable increase in scope of work on account of the additions like basement works of South and North Stands leading to increase in structural and reinforcement quantities. During construction, the project team came across several variations in the drawings with respect to given tender documents in the Retrofitting scope of East & West Stands resulting in time over runs. Moreover, the package for Interior works was awarded to L&T in the final stages of completion of the project, thus giving little time for planning and procurement. Hence, completion of the project on account of the above factors with fixed deadlines was one of the biggest challenges and L&T had to race against time mobilizing material and manpower resources to complete the project within the stringent time-frame.

**Skilled Manpower**

Another critical challenge faced was the shortage in the availability skilled manpower due to construction boom in the real estate market in Mumbai and elsewhere. Thus, retention of workmen was a critical challenge. This was overcome by providing workmen with proper labour camps and transportation facilities apart from leisure and entertainment.

**Shortage of Sand**

The project also went through the worst phase of shortage of sand for construction in Mumbai affecting the progress of work.

**Space Availability**

The most critical problem every one faced during construction of the project was the availability of working and storage space. There was only one approach road for entry and exit of vehicles. Handling multidisciplinary activities like structural fabrication, erection, movement of heavy cranes,
batching plant, concrete mixers within the limited space was one of the biggest challenges and this was mitigated by proper planning, logistics management, space management and interdepartmental coordination. Moreover the ground was also supposed to be handed over in stipulated time as this was the only space available as working space.

Noise restrictions

Since the project was located in the close vicinity of prime residential areas of the marine drive, generation of noise, pollution and the threat of communicable diseases were seriously viewed by residents, which affected the progress of works to a great extent. The residents’ association at marine drive and local social workers took objection to work being done during nights, causing frequent stoppage of construction work. Thus working during night shifts with noise reduction was a challenge. These problems were tackled by properly programming the tasks and communicating with the residents as well as liaising with local authorities.

Monsoon

Monsoon season in Mumbai during 2010 was unusually long and witnessed continuous spells for longer periods than expected. Delay in release of the drawings and handing over construction fronts by the client resulted in the project peak works getting shifted to the monsoon period. Also, the early onset of monsoon aggravated the problem. The movement of heavy cranes and all heavy erection works during rainy days with slushy ground conditions was yet another challenge. In order to overcome this, proper actions were taken for increasing the soil bearing capacity in select locations by area compaction with small boulders or debris etc.

This also delayed handing over of the ground and playing arena to the client in view of the movement of heavy crane, fabrication yard, storage of fabricated components, batching plant etc., stacked on the field. In order to meet this urgent requirement, clearing and handing over the ground was planned in a phased manner by negotiating with the client on a continuous basis.

Temporary Trestles

Temporary Trestles were used to support the 20m cantilever of the truss. These trusses were supported with spindle jack arrangement which got corroded and jammed over a period of time. Originally, it was planned to release the trestles uniformly through spindle jack, however with the jammed spindle jack it became difficult to release the trestles. Therefore, the matter was discussed with the structural consultant and proper methodology was framed by incremental cutting of supports to avoid the sudden jerks in the system and thus the trestles were released.

Transformation

The magnificent stadium with its colourful seating gallery, its spectacular architecture and design involving the structural steel tubular cantilever frames and pergola looked massive in size and awe inspiring. Racing against time with fixed deadlines, the project team gave their best in terms of performance. The time and the pace with which the work was carried out exposed each staff to a professional culture that was totally different, where increased responsibility and increased labour did not frighten them, instead provided them with more strength and synergy with a single purpose of achievement. In addition, the project being of national importance, was under continuous media focus. Accordingly, the project was given the topmost attention and support by L&T’s top management.

On the whole, the renovated Wankhede stadium in Mumbai has drawn nothing but praise and kudos for L&T team from every cricket lover (national and international), visiting the facility. Added to this, team India emerging the champions in the grand finale and lifting the world cup 2011 has made every Indian proud of our team and L&T-ites feel all the more rejoiced for having been a part of the team that provided the historic venue for a historic victory to the Indian Cricket team.

K. Sridharan - CCD
with inputs from
N.G. Mahajan
Project Manager
Ashok Hemnani
Manager (Mechanical)
Handling close to 40 million passengers per annum, the Chhatrapati Shivaji International Airport in the country’s financial capital Mumbai has hordes of travellers flying in and out of the city every day. Mumbai is perhaps the only major metro city in India that can boast of an airport located in the suburbs of the city while having an easy access off one of Mumbai’s arterial highway called ‘Western Express Highway’.

Despite having such enviable locational advantages, a traveller to the swanky Mumbai International Airport would have a harrowing experience merely reaching from the Highway to the airport forecourt. In order to mitigate this traffic bottleneck Mumbai Metro Region Development Authority (MMRDA) under the Mumbai Urban Infrastructure Project (MUIP) scheme with Jawaharlal Nehru National Urban Renewal Mission (JNNURM) funding of Government of India (GOI), Government of Maharashtra (GOM) & MMRDA envisaged establishing a dedicated, direct elevated corridor. Since the project is dedicated to Mumbai International Airport Limited (MIAL), MIAL is also contributing a major share of the project cost. This elevated corridor runs between the Western Express Highway near Hanuman Mandir to the airport’s forecourt thereby removing the need of passing through the much crowded Chakala, Sahar Road and Jog flyover.

**Scope of work**

The Sahar Elevated Corridor, MMRDA project scope includes construction of 1050 m of elevated road, 98 m of vehicular tunnel and 261 m of ramps for vehicular tunnel, three vehicular underpasses each of 48, 22 & 30m and one 48 m pedestrian underpass, including a 641 m of 6 lane at Grade Road. The MIAL project scope includes elevated road and four ramps measuring 2200 m.

**Resources at peak period**

| Staff   | :65 |
| Workmen | :650 |

**P&M**

SR 100 Piling Rig
Leibher crane (90 t)
Unique 27.6 m span

The Sahar elevated corridor features some of the best-in-class technology to create a landmark in its own making. The most attractive feature of the elevated road is that the superstructure or the deck spans the entire breadth of the at-grade road below measuring an expansive 27.6 m. The superstructure comprises a precast central spine of 9 m and two 9.3 m cantilever wings on either side. The cantilever wings are connected to the central spine through a unique technology of ‘concrete stitch’ and ‘transverse pre-stressing’. The deck of the superstructure also features planters on the fascia sides and attractive water bodies and shrubs in the median.

Construction methodology

The elevated road includes 30 spans of 35 m segments that are constructed on bored in-situ piles of 1200 mm diameter. The piles feature a distinctive flaring substructure of 2.5 x 2.8 m base width and a 7 m top width to support the 27.6 m wide superstructure. A specially fabricated launching girder and strand jack was instrumental in the erection of both the running spine segments weighing 58 t each and the diaphragm segments weighing 75 t.
Sahar Elevated Corridor - Highlights

Total length: 1050m (30 spans of 35m each)

Carriageway: Dual carriageway of 6 lanes - 3 incoming plus 3 outgoing. Each carriageway is 11m wide with 1m centre median with water bodies and planters, crash barrier and walkways on both sides (2x1.55m).

Carriageway width: 27.6 m (Precast central spine 9m and 2 x 9.3m cantilever wings)

Deck slab topped with: Bituminous concrete wearing course

Foundation: Pile foundation with bored cast in-situ piles of 1200mm DIA

No. of Piers: 31 uniquely shaped piers

Superstructure construction: Central Spine erected using launching girder, glued, temporary stressing is applied, longitudinal and prestressing is done.

Cantilever segments are erected using separate launching girder, stitch concreting between spine and cantilever segments and transverse prestressing is done and later stitch concreting between cantilever to cantilever is done completing one span of construction.

No. of segments: 360 spine segments and 720 cantilever segments

Spine segments: 360 Segments each of 3m length, 9m width and Running segment weighing 58t & diaphragm segment weighing 75 t

Cantilever segments: 720 nos. each having a length of 3m, width 9.3 m and weight 20 t.

Underpass: The pedestrian underpass including two / three wheeler underpass is constructed with precast box cells of size of 2m length x 4.5m width x 2.5 m height each. This enabled completion of the construction faster on the busiest Western Express Highway. Approaches on either sides were done with Reinforced Earth wall.

Vehicular underpass (Tunnel): Construction is proposed using cut and cover method with concrete contiguous piles. The length of the closed box is 98m and there are two ramps on either sides totalling a length of 261 m.

At Grade roads: Six lane roads of Rigid Pavement with Pavement Quality Concrete (PQC)

Construction methodology - Stitching: The precast spine segments are erected in position, levelled, aligned over the piers and glued together using Epoxy glue including temporary pre-stressing. Then longitudinal pre-stressing is applied from end to end of individual span segments. Cantilever segments are erected in position on both sides of individual spine segments and after alignment stitch concrete is applied between the spine and cantilever segment. Once the stitch concrete achieves the desired strength, transverse pre-stressing is done and the segments are released from launching girder. After moving the launching girder, stitch concreting between the cantilevers is taken up. Thereafter, the span to span deck continuity is done.

Other features:
1) Deck side facia is precast at yard with side liner and erected at location and stitched with the kerb.
2) Friction slab crash barrier on the RE wall approach of Pedestrian Underpass was precast to save time and for faster completion.
3) Provision for future prestressing is provided in the cantilever segments
4) MS Hand rail, architectural street lights, sign boards etc., are also being provided
5) Pot Cum PTFE bearings, strip seal expansion joint are provided
6) Water proofing membrane is proposed on deck top between concrete surface and bituminous layer
7) Protective coatings are done on the surfaces exposed to atmosphere and in contact with earth

Project commencement: January 2008

Project completion: Though the elevated road is completed, it could not be put to use for want of construction front of approach ramps. The land for approach and at grade road is getting delayed due to the slum clearance and rehabilitation. Project is expected to be completed by April 2012.
Challenges faced

The elevated corridor passes through one of Mumbai’s busiest roads and hence carrying out construction activities with minimum interference to the traffic was by itself a major challenge. Added to this is the fact that the deck width of the bridge is as wide as the road width below thereby leaving no opportunity for diversion of traffic. This challenge had further been aggravated due the regular VIP movement accessing the airport. Apart from this, the project location passes through some of the city’s most noted star hotels and residential colonies. There were apprehension from these quarters during the piling stage which were mitigated through negotiations and environ-friendly construction practices. Mumbai city is known for its space constraint and L&T faced the same at the pre-cast yard. The wide precast segments and the cantilever segments were designed in such a manner so as to stack them in two piers.

L&T faced yet another important challenge during the construction of pedestrian and the vehicular underpass on the Western Express Highway which is one of the lifelines connecting Mumbai to the west of country. The underpasses were constructed in planned phases such that there was least disturbance to traffic. This activity had helped complete the project in record time and it has even received appreciation from the public at large.

Sanjay Sharma
Project Manager

Tiruvuri SRM Srinivas
Planning Engineer
Literally meaning ‘Land of snowy mountains’ Himachal Pradesh is a north Indian state with craggy mountains and perennial rivers. The mighty Himalayas is cut across by many rivers and rivulets thereby giving this state an excellent potential to harness hydel power. The state Government too had recognised this opportunity early on and had focused on building power generating capacity. Today, hydel power is the largest revenue earner to this state which perhaps has the largest per capita in the entire country. Himachal is said to have so far tapped 6,470 MW of the total potential of 23,000 MW which is expected to be tapped by 2024-25.

Among recent hydro projects in the state of Himachal, the Jaypee Group’s run-of-river project on the river Satluj in Kinnaur district, the 1000 MW Karcham Wangtoo Hydro Electric Project takes great significance. The project utilises the head available between the tail waters of Baspa-II hydroelectric project in Kinnaur and the head waters of Nathpa - Jhakri hydroelectric project. For power evacuation Jaypee envisaged construction of a new transmission line from Wangtoo to Abdullapur in the state of Haryana. Jaypee Powergrid Ltd—a 74:26 joint venture between Jaiprakash Hydro Ltd and Power Grid Corporation of India Ltd awarded two packages of this order to Larsen & Toubro for constructing a 155 km transmission line associated with the 1,000 MW Karcham Wangtoo hydropower project.

Much of this TL project passes through some of the country’s toughest terrain that crosses alpine, snow covered mountains and rugged valleys. L&T was awarded two out of three packages – A1 and A2 which is 400kV Double circuit (Quad Bundle) Transmission Line.

- Package A1 – approximately 70 km of 400 kV Double Circuit (Quad Bundle) Karcham Wangtoo - Abdullapur line & LILO of 400 kV Double Circuit
Detailed scope of work

- Detailed survey, profiling, tower spotting and optimization of tower locations, soil resistivity measurement, geotechnical investigation and check survey
- Fabrication and supply of all types of transmission line towers as per owner’s design including all types of tower accessories
- Supply of earth wire, hardware fittings, conductor and earth wire accessories
- Selecting type of foundation for different types of tower and casting of foundation for tower footings, as per owner’s foundation design
- Erection of towers, fixing of insulator strings, stringing of conductor and earth wire along with all necessary line accessories
- Providing protection of tower footings as per necessary site conditions
- Testing and commissioning of the erected transmission lines

With 8,00,000 cu.m of excavation, 40,000 cu.m of concreting in 350 locations, 20,000 tons of steel for tower that involves 160 km of stringing all done on a terrain with an average altitude of 2200 m, the Karcham Wangtoo Abdullapur TL project can easily become one of the most challenging and toughest ever project commissioned by L&T till date! The decade-old 54 km 400 kV D/C Triple Bundle, Bhaspa-Jhakri transmission line commissioned earlier in the same area stands as a testimony to the quality work executed by L&T.

Major Quantities

Check survey : 160 km
Detailed survey : 70 km
Contouring : 360 locations
Earthwork
(Benching & Excavation) : 8,00,000 cu.m
Concreting M-20 : 60,000 cu.m
Supply fabrication and placing of reinforcement bars : 6000 t
Supply and erection of tower : 25,000 t
Hoisting of insulators :
160KN+ > 4 Lakh
120KN+ > 11000
Supply and installation of hardware fittings : 4300 sets
Conductor stringing (24 conductors per span): 3800 km
Protection of tower footings (RRM): 1,25,000 cu.m
Construction of reinforced cement concrete wall: 3000 cu.m

**Plant & Machinery**
- Hydra cranes – for material loading and unloading at store yards
- Drilling machines – for benching and excavation activity
- Hydraulic joint compressor – for conductor and earth wire jointing
- Specially designed puller machine for hilly terrain – for tensioning conductor and earth wire
- Mechanised topeways for transportation of construction and line material across deep valleys and remote locations.

**Peak Manpower**
- Staff: 65
- Workmen: 12200

**Challenges faced**

**Terrain**
With an average height of 2200 m, the entire stretch of 155 km of the project passes through some of the toughest terrain imaginable. Due to the alpine heights, some tracts of the stretch offers itself for working conditions only for about a quarter of the year with the remaining seasons of heavy rainfall followed by snowing. Apart from the inhospitable climatic conditions, the craggy steepness of the ravines and valleys pose another dimension of challenge to the construction team. Such steep terrain requires a detailed analysis of the geo-technical qualities in order to come out with the most suitable foundation and design for the tower.

Since most locations along the TL path do not have road access the project team had to plan and map routes suitably for carrying head load of material, even during the initial survey stage itself.

In order to completely understand the terrain, the contours of the hills are taken and the data is converted into a 3D format through the ‘Global Mapper’ software. Based on this software inputs optimum bench cutting conclusions are made, sometimes using unequal tower leg extensions or chimney extensions for placing the tower in a stable position.

A typical tower foundation of the 400 kV D/C transmission line requires an area of 900 sq.m to 1600 sq.m. Getting an even area of such dimensions in the rough hilly terrain is not possible and would therefore involve a lot
of earth work. Going in-line with the sustainability initiatives of the Company and in order to avoid disturbances to Nature and the green surroundings, advanced techniques were used for planning tower foundations without compromising on the stability of the tower structure.

The team devised mathematical formulae such as ‘Trapezoidal formula’ which indicates the approximate volume of muck for every foundation. Based on this a suitable forecast is made for the appropriate disposal of muck through revetment in order to prevent seepage to lower parts of the terrain. Another difficulty faced due to terrain is the difficulty in carrying out blasting activities in hilly regions. Blasting for the foundation works warranted meticulous planning and precautionary measures and approvals need to be taken in order to prevent any hindrance to the inhabitants around.

**Right of way (RoW)**

The Karcham Wangtoo Abdullapur transmission line passes through many forest reserves that belong to various districts of HP, such as Kinnuar, Rampur, Theog, Rajgarh and Nahan. Adequate permissions and RoW were procured from the relevant authorities and rerouting options were done to accommodate the concerns of the forest officials. The route also pass through some of the internationally renowned dense cultivation tracts of Apple, Cherry and Peach orchards of the state which are all privately owned lands. The RoW progress being a joint exercise with the client, local contractors were employed and were groomed to act as an interface between the Company and the land owners. This initiative proved very successful and helped in creating a positive climate during negotiations while paving way for the speedy progress of the project. Keeping in view the concern for the environment, agriculture and aiming at minimum felling of trees, many alternatives such as re-routing, using angle towers, etc., were worked out. Though such alternatives sometimes worked out more expensive than the actual compensation for the orchards and trees, it was taken up as a green initiative.
**Logistics**

Planning logistics in tough terrain such as the Himalayas has its own challenges. With only limited road access to most of the tower locations, material needed to be transported using mules and manual head loading only. Since the terrain involves steep slopes, steps were cut in the ground to provide safe footing for workers involved in head loading activities. Such measures greatly helped in reducing accidents due to slipping and skidding on the slopes. The provision of better access route had also resulted in reduction of time consumed for the shifting of material.

Even accumulating material at the tower location becomes a problem due to lack of availability of space and the inclement weather conditions. Through proper planning, shifting of material is carried out only 15 days ahead of the activity. The logistics are planned in such a manner that materials are shifted according to the progress of activity without accumulation at locations.

Transportation of material is another big challenge in hilly area as roads are not stable and motorable for bigger trailers and trucks. The roads are also prone to frequent landslides during monsoon periods and are closed due to snowing during the winter months bringing the project activities to a grinding halt for a good part of the year. In order to overcome this challenge the stores were strategically located for both A1 and A2 packages and the cost of logistics was also thereby greatly optimised.

**Training**

The location of the project being inhospitable for almost half the year, getting staff and workmen acclimatised to the work site...
and job requirements posed a major challenge. New joiners, whether staff or workmen had to be adequately trained on the job before being deployed to their actual job sites. The training team ensured proper orientation of the entire workforce and even went to the extent of identifying and creating talent pool to suit future project requirements.

**Workmen welfare**

About 12000 odd workmen were involved in the project during peak period of construction. The inclement weather conditions prevalent at most of the job sites made it difficult even for carrying out daily chores. The Company ensured the comfort of workmen by providing them with winter clothing, blankets and firewood for heating up their dwelling area. Wherever proper residential units were unavailable in rural and far flung areas, comfortable tents were pitched for the benefit of the workmen. Apart from this, all harness and equipment that complies with the safety regulations were provided in plenty to all the workmen. In dry seasons when water becomes scarce, a dedicated team was created exclusively to supply potable water to the project sites regularly. Apart from these, workmen also benefitted from the free health camps that were conducted by L&T under its CSR initiatives.

**Innovative methods of construction**

During stringing process the construction team encountered many challenges as the heavy

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**LIL of 400 kV Double Circuit (Triple Bundle) Baspa- Nathpa Jhakri line at Karcham Wangtoo**

2 LILO Lines (In & Out) parallel to each other were constructed to connect the existing Baspa-Nathpa Jhakri Transmission Line with 1000 MW Karcham Wangtoo Hydro Electric Project. Both Lines have 6-6 towers and a route length of 2.5 km each. 2 spans each of both the lines involves Satluj River crossing and 1 span of both line involves Bhawa River Crossing. LILO lines were completed and energized with rated voltage in the month of February 2011.
conductor cables had to cross steep valleys and ravines. In order to avoid damage to the conductor as well as orchards and trees in the vicinity, an innovative and modified steel-wire rope was used as a bridge.

Using this steel wire bridge and a modified S-roller that was designed to carry both single and double conductor above ground from one tower to another, stringing was made possible in a safe manner which also ensured quality without any damage to the conductor or the environment.

Another implementation which greatly reduced the work load of manual head loading was the creation of conventional ropeway for transportation of materials to project locations. The ropeways used were both motorized and of gravitational type which could be operated manually. Apart from reducing work load these ropeways helped reduce time consumption due to manual head loading without causing any damage to the material.

Tower Profiles

L&T’s EDRC team constantly supported the Karcham Wangtoo TL Project by providing tower profiles based on the detail
survey done by the project team. New designs of foundation and tower footing protections were provided in accordance to the variable features of the undulated hilly terrain and as per client’s requirement. Special techniques included concrete built-up, RCC walls & RRM walls above 5 m height, unequal leg extensions from -3m to +9m, raised chimney from +1.5m to +15m and sag chart for stringing activity.

The Karcham Wangtoo Abdullapur Transmission Line project has provided the much needed fillip to boost the economy of rural Himachal Pradesh. With the rising shortage of manpower, workmen were brought from neighbouring states such as Jammu & Kashmir, Jharkhand, Bihar and West Bengal. With a project of this scale, the 400 kV Transmission Line is specially designed as a D/C Quadruple Bundle Conductor which is 2 times more than a normal Twin Bundle 400 kV D/C Line. This TL project is developed under the ‘Open Excess’ policy of Government of India, keeping in view of transmitting additional capacity from upcoming Hydro-Electric Projects in the Up and Downstream of River Sutlej that is to be commissioned in the Best interest of National Development.

Gopi Kannan. S - CCD
with inputs from
Nitesh Arora
Project Manager
The alloy called steel made predominantly from iron with varying amounts of carbon has completely revolutionised the industrial world ever since its manufacturing began as early as 4000 years ago. Today one cannot imagine a world without steel. Right from the safety pins to the cars we drive, steel has become an integral part of everybody’s life. A nation’s advancement towards industrialisation is benchmarked in terms of the amount of steel that is consumed. This global appetite for steel has over the last decade grown 88% and the projected global consumption for 2011 stands at a whopping 1.45 million tonnes.

What was founded by James Erskine in 1870 as Bengal Steel Works with open top furnaces using raw coal, Indian Iron and Steel Company today stands as the second integrated steel plant in the country with the annual capacity to produce 4.26 lakh tonnes of saleable steel and 2.54 lakh tonnes of pig iron. With the demand for steel increasing in the global market, SAIL, in order to capitalise on this immense opportunity initiated massive investment plans for the modernisation of the various plants under its hold. A good part of this investment has been allocated to IISCO for its modernisation drive. After the slated modernisation programme the steel plant is expected to enhance capacity to 2.5 million tonnes of hot metal.

L&T has been an integral part of this mammoth project of Steel Authority of India Limited - IISCO Steel Plant (SAIL-ISP) and was entrusted with four key contracts:

**I. Coal & Coke Handling**

This EPC package involved design & engineering, civil, structural, equipment, utilities, electrical, automation, and commissioning including performance guarantee for conveying, processing and handling coal & coke for blast furnace including associated pipe conveyors.
II. Base Mix Handling

EPC package involving design & engineering, civil, structural, equipment, utilities, electrical, automation, and commissioning including performance guarantee for base mix preparation for sinter plant with emergency sinter storage and transportation of sinter to BF stock house.

III. Sinter Plant

EPC package executed in consortium with Outotec-Germany, design & engineering, civil, structural, equipment, utilities, electrical, automation, and commissioning including performance guarantee for 2X204 sq.m Sinter Plant.

IV. Additional Civil Works

Item rate contract for 23000 cast in situ piles and 60000 c.um RCC works for BOF, CCP, WRM and LDCP area.

Coal Handling System

Coke is the solid carbonaceous material that is used as a fuel and as a reducing agent during smelting process of iron ore in the Blast Furnace. Coke is produced through destructive distillation of bituminous coking coal at coke oven battery at temperatures as high as 2000 degree Celsius. In addition, coal of CDI (Coal Dust Injection) grade is also used in blast furnace burners through the coal dust injection system. Coal is usually sourced from domestically available mines or is imported and transported through railway wagons. Both Coking and CDI coal on arrival at the plant location is unloaded using Wagon Tipplers. The scope of work for Coal Handling System starts right from the construction of wagon tippler complex onwards.

Once coal is unloaded using the wagon tipplers it is conveyed either in stockyard for stacking and future reclaiming, or induced into onward process based on the production requirements. There are four stock piles each measuring 330 m long and 32 m wide. Out of these four, one stock pile is for CDI coal and the rest are for coking coal. While CDI coal is conveyed to CDI bunker for feeding into coal dust injection system, coking coal is conveyed to coal blending silos. The blending silo is a process building
where different types of coal are proportionally blended to obtain the acceptable levels of volatility before the coking process begins in the coke oven, leading to reduction in by-product and enhancing the superiority of coke.

**Major Achievements**

- 136 BCIS piles have been cast in a single day and 2839 piles in a month
- 21538 piles completed in 12 months and total 31000 piles completed
- 45000t fabrication and supply of building and technological structures in 24 months
- 489 (10.7 km) conveyor gallery has been assembled and erected within 12 months

**Major scope - RMHS**

- Conveyors: 146
- Conventional trough conveyor: 110
- Pipe conveyor: 2
- Shuttle conveyor: 15
- Belt feeder: 8
- Reversible conveyor: 11
- Length of conveyors: 228 km
- Length of pipe conveyor: 2.8 km
- Junction houses: 53
- Process buildings: 15
- Conveyor galleries: 487
- Structural bridges: 3
- Conveyor trestles: 407
- Cable galleries: 192
- Stock piles: 7
- Electrical sub-station buildings: 10
- Administration office building: 2
- Other auxiliary buildings: 35
- Utility systems: 6 systems

**Largest Bulk Material Handling System**

The modern blast furnace uses an array of raw materials viz. coke, sinter, iron ore, flux, flue dust, mill scale etc., for production of pig iron. The Raw Material Handling System (RMHS) in a steel plant is one of the most critical to production and is designed to cater to various raw materials. All these raw materials are carried to the Blast Furnace through an intricate process of loading, unloading, stacking, reclaiming, blending, crushing, screening and finally conveying and feeding these materials to the Blast Furnace. The entire RMHS system at IISCO comprises of four packages such as Coal & Coke Handling, Base Mix Handling, Ore Handling and Yard machines. Out of these four packages, L&T has been entrusted with two major packages i.e. Coal

![View Pipe Conveyor- a first of its kind in SAIL](image)
Electrical and Instrumentation plays an important role in the safe operation of Coal and Coke handling plant (CHP) and Base Mix preparation plant (BMP). The entire RMHS project under L&T’s scope is equipped with 10 Load Centre Sub-Stations (LCSS) out of which CHP houses 6 LCSS with an overall maximum capacity of 32 MVA and BMP houses 4 LCSS with an overall maximum capacity of 20 MVA.

The entire plant is automated by ABB’s PLC system ACS800M Level-2 automation. The specialty of this system is that it interfaces with equipment of other packages such as Ore Handling Plant, RMHS Yard Machines, Sinter Plant and LBDS which are not in L&T’s scope through RC 485/MOD BUS communication protocol. To prevent loss of data for link failure, Level-1 will be capable of storing the data logs at least for 15 days and will retransmit the same to purchaser’s ERP system (Level-3) after communication link resumes operation. 4 Central Control Rooms/Despatcher rooms have been created for effective plant automation. On the whole, 8276 Digital and Analog I/O signals are employed for the automated operation of the plant. The automated operation and control for CHP is carried out in 23 paths and BMP in 21 paths. Energy efficient VVVF drives are used in the project for effective control of material transportation and protection of the system along with energy savings.

All the drives utilized in this job are used in auto-mode which will be controlled by PLC, and also in manual mode which will be controlled by operators in case of emergency. 20 HT motors and 250 LT motors were used in the project for the conveyor operations having a maximum rating of 550 kW in BMP and 500 kW in CHP. The job includes cable tray erection and cable laying as this job employs more than 80 km of Cable Trays as well as more than 1600 km of Cable laying for interconnecting the equipment with the automation system. The cables used in this project are Armored XLPE type PVC & FRLS cables.

Power and Control circuit requirement is fulfilled by HT and LT Panels. 2 HT switch gear boards comprising 43 verticals and LT panels with 837 verticals are commissioned in this job for the normal operation of the plant. Another feature of the job is its earthing system for the protective, safe and reliable operation of the plant. More than 600 earth pits (electrical and electronic) have been used for protection of the plant during faults and also during normal operation. Instrumentation system of the plant, in general is SMART-HART type with 4-20 mA DC output interfaced with automation system through hardware input/output modules. 9900 light fixtures are used throughout the job to achieve the illumination level from 15 LUX to 300 LUX in various areas.

CCTV system is commissioned for comprehensive round the clock surveillance, for control and supervision of technological process at points which are difficult to be observed directly or which require monitoring from remote control centre. Loud Speaker Talk Back (LSTB) system is used for the plant communication.

Coke Handling System

The scope of works for coke handling system starts after the CDCP (Coke Dry Cooling Plant). Coke, coming out of the coke ovens is air quenched in the CDCP, discharged through conveyors and conveyed through Coke De-dusting Unit (CDU). In the CDU the hot and un-burnt coke particles are sucked away through the dust extraction systems. Coke is then conveyed to the Coke Crushing Unit (KCS), where -250mm size coke is crushed below -80mm through two 250 tph double role crusher. The output coke from the KCS is further conveyed to Coke Sorting Plant or Coke Screening Station (CSS).

The CSS has been envisaged for a capacity of 250tph, where coke will be sorted into four fractions of sizes 60-80mm, 30-60mm, 15-30mm and 0-15mm after passing through a series of roller screens. Coke of size -30mm fraction is conveyed to two RCC bunkers after screening them into two parts 0-15mm and 15-30mm through vibrating screens. This building is called Coke Breeze Bunker Building.
(CBB). These two fractions of coke from CBB are conveyed to Base Mix Circuit for preparation of base mix. The other two fractions of CSS (i.e. 60-80mm and 30-60mm) are conveyed separately to the Blast Furnace stock house. A separate and dedicated facility to store these two fractions in emergency coke storage yard through travelling tripper mechanism has also been created. Coke from emergency coke storage may be reclaimed through pay loader and despatched to Blast Furnace stock house as per requirement.

Pipe conveyors

In order to cater to the additional need of coke for the new stream Blast Furnace, coke from existing coke oven plant is transported through a 150tph pipe conveyor that measures 1.8 km in length. Coke received from the existing plant is conveyed to a building called New Coke Crusher House (NCCH) consisting of roller screen and 250tph double roll crusher. The conveyed coke is crushed to -80mm size and fed to the pipe conveyor. The crushed coke is later discharged into two RCC bunkers called Coke Bunker For Coke (CBFC) each having an effective capacity of 100 t. From CBFC the coke is conveyed and merged into the regular stream at CSS. Another additional stream to convey iron ore lump and limestone/dolomite from this new plant to existing Blast Furnaces has been integrated through another pipe conveyor of 1200 tph. Both the pipe conveyors run side by side in the plant at IISCO and these pipe conveyors are one of the unique features implemented for the first time in any SAIL plant.

Base Mix Handling System

The Blast Furnace is essentially a counter current gas-solid reactor, in which the solid charge materials move downwards while the hot reducing gases flow upwards. The best contact between solids and the reducing gases is obtained with a permeable burden which permits a high rate of gas flow with minimum channelling of the gases. This is the primary reason for agglomeration of ores and fluxes and conversion into sinter and thus increasing the efficiency of the Blast Furnace. Moreover, having a homogeneous furnace burden improves the furnace’s stability, operation and reduces coke rates. Base Mix is nothing but the raw materials for Sinter Plant consisting of iron bearing fines and solids e.g. iron ore fines, recycled sinter fines, flue dust, mill scale,
### Dust from basic oxygen furnace and other furnaces, limestone, dolomite, coke breeze, lime dolo fines, etc. The scope of works for L&T for the Base Mix Handling Packages at ISP comprises two out of three distinctive phases of sintering process i.e. raw material processing and product sinter processing.

#### Lime Dolo Circuit

The sinter plant grade limestone and dolomite is reclaimed from the ore handling plant and is conveyed to the Flux Bin Building (FB). There are eight steel bunkers of effective storage capacity of 200 m³ each for limestone and dolomite. Two bunkers out of the three are used for lime dolo fines received from Ore Handling Plant. From each bunker Limestone & Dolomite are mixed in the desired proportion through belt weigh feeders and the same is conveyed to Flux Crushing Bin Building (FCB). Three hammer crushers (2W+1S) of capacity 150 tph, acts as primary crushers and screens the material for conformity to -3mm size. Material above+3mm size is fed back to the FCB and three secondary crushers (2W+1S) are utilised to crush the flux further. Mills scale/flue dust is collected from the existing plant and is stored in Mill Scale Building (MSB). The same is loaded by means of pay loader and ground hoppers and conveyed to Mixing Bin Building.

#### Fuel (Coke) Circuit

Coke of size - 30mm from Coke Handling System or the coke fines generated from Blast Furnace Stock House can either be conveyed for storage to Coke Breeze Fines (CB) bunkers or directly be sent to Coke Crushing Building (KCB).

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### Major Quantities RMHS and Sinter Plant

<table>
<thead>
<tr>
<th>Civil and Structural</th>
<th>Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation           : 760520 cu.m</td>
<td>UG Piping : 12.20 km</td>
</tr>
<tr>
<td>RCC                  : 134000 cu.m</td>
<td>AG Piping : 20.40 km</td>
</tr>
<tr>
<td>Piling               : 78520 nos</td>
<td>Wrapping/Coating : 5700 sq.m</td>
</tr>
<tr>
<td>Structural Steel     : 42150 t</td>
<td>FDA System : 13 sets</td>
</tr>
<tr>
<td>Sheeting             : 353000 sq.m</td>
<td>Inergen System : 12 sets</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td>MVWS System : 8 lots</td>
</tr>
<tr>
<td>Equipment            : 24584 t</td>
<td>Passive Fire Protection : 130 lots</td>
</tr>
<tr>
<td>Belt                 : 28.2 km</td>
<td>Ventilation Ducting : 7000 sq.m</td>
</tr>
<tr>
<td>Gear Box             : 191 nos</td>
<td>Ventilation Fans (Centrifugal) : 12 nos</td>
</tr>
<tr>
<td>Crusher              : 14 nos</td>
<td>Ventilation Fans (Axial) : 103 nos</td>
</tr>
<tr>
<td>Rod Mill             : 3 nos</td>
<td>Air Washer : 9 nos</td>
</tr>
<tr>
<td><strong>Architectural</strong></td>
<td>Plant &amp; Machinery deployed for Execution</td>
</tr>
<tr>
<td>Vitrified &amp; Ceramic Tile : 125181 sq.ft</td>
<td>Tower Crane (40 t) : 2 nos</td>
</tr>
<tr>
<td>Kota, Terrazzo Tile  : 88367 sq.ft</td>
<td>Batching Plant 60 m³/hr : 2 nos</td>
</tr>
<tr>
<td>Ironite Flooring     : 208337 sq.ft</td>
<td>Boom Placer36 mtr : 1 nos</td>
</tr>
<tr>
<td>False Flooring       : 11840 sq.ft</td>
<td>Heavy Duty Crane 230t : 1 nos</td>
</tr>
<tr>
<td>Aluminium False Ceiling : 53152 sq.ft</td>
<td>Crawler Crane75/80 t : 14 nos</td>
</tr>
<tr>
<td>Under Deck Insulation : 47365 sq.ft</td>
<td>Crawler Crane35 t : 3 nos</td>
</tr>
<tr>
<td>Aluminium Work       : 35665 sq.ft</td>
<td>Crawler Crane18 t : 3 nos</td>
</tr>
<tr>
<td>Painting             : 205965 sq.ft</td>
<td>Hyd Crane 40 t : 4 nos</td>
</tr>
<tr>
<td><strong>Dry Fog Dust Suppression (DFDS)</strong></td>
<td>Hyd Crane 18 t : 2 nos</td>
</tr>
<tr>
<td>UG Piping            : 1 km</td>
<td>Hydra Crane 14-8 t : 3 nos</td>
</tr>
<tr>
<td>AG Piping            : 31 km</td>
<td>Hyd Piling RigSR40 : 1 nos</td>
</tr>
<tr>
<td>Wrapping/Coating     : 200 sq.m</td>
<td>Convention Piling Rig : 45 nos</td>
</tr>
<tr>
<td>Compressor           : 16 sq.m</td>
<td>Welding M/c : 412 nos</td>
</tr>
<tr>
<td>Flow Control Assembly : 392 nos</td>
<td>DG Sets250/125/180 KVA : 17 nos</td>
</tr>
<tr>
<td><strong>Dust Extraction</strong></td>
<td><strong>Passive Water Dust Suppression</strong></td>
</tr>
<tr>
<td>Equipment            : 95 t</td>
<td>UG Piping : 1 km</td>
</tr>
<tr>
<td>Chimney              : 1 nos</td>
<td>AG Piping : 31 km</td>
</tr>
<tr>
<td>Bag Filter           : 1 set</td>
<td>Wrapping/Coating : 600 sq.m</td>
</tr>
<tr>
<td><strong>Paint Water Dust Suppression</strong></td>
<td><strong>Flow Control Assembly</strong></td>
</tr>
<tr>
<td>UG Piping            : 2.30 km</td>
<td>: 392 nos</td>
</tr>
<tr>
<td>AG Piping            : 3.90 km</td>
<td><strong>Compressor</strong></td>
</tr>
<tr>
<td>Wrapping/Coating     : 600 sq.m</td>
<td>: 16 sq.m</td>
</tr>
</tbody>
</table>

- **UG Piping** : 1 km
- **AG Piping** : 31 km
- **Wrapping/Coating** : 200 sq.m
- **Compressor** : 16 sq.m
- **Flow Control Assembly** : 392 nos
- **Passive Water Dust Suppression**
  - **UG Piping** : 1 km
  - **AG Piping** : 31 km
  - **Wrapping/Coating** : 600 sq.m
- **Compressor** : 16 sq.m
- **Flow Control Assembly** : 392 nos
Emergency Sinter Storage Building (ESSB) or directly to BF Stock House. ESSB consists of 20 steel bunkers each having a volume of 350 m³ meant to store sinter as emergency stock. All the bunkers, silos and chutes pertaining to both packages are lined with 22 types of various grades of liners depending upon the materials used.

**Major Challenges**

Despite acute crisis for skilled manpower, adverse atmosphere due to slag filled construction zone, following points are worth a special

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**Pipe Conveyor – a first of its kind in SAIL**

Pipe conveyor is a pipe formed out of a flat conveyor belt but using all other components that are used in a standard trough conveyor. This pipe is of trough profile at feed end, folded into pipe at the middle, and again opening up at discharge end. L&T is executing 2 pipe conveyors running side-by-side of length 1.8km each. One conveyor of 600tph rated capacity carries iron ore/lime stone/dolomite from new plant to existing plant with belt speed 2.5m/sec. The other conveyor of 200 tph carries coke from existing plant to new stream expansion with belt speed of 2.75 m/sec. These pipe conveyors have been installed for the first time in any SAIL steel plant.

**There are many advantages and reasons for using pipe conveyors in material handling industry:**

- This type of conveyor is used to have longer flight
- Does not require any transfer houses, drive stations, etc.
- Has the ability to negotiate vertical, horizontal and combination curves
- It can take desired route, by-pass obstacles due to flexibility of pipe
- Conveyors can also pass through a congested route between existing structures and over plant roads
- It gives protection of material against rain, dust, temperature, wind etc.
- Does not require a covered gallery
- Provides civil and structural economy
- Width of structural gallery is lesser than standard conveyor and does not require any sheeting or hood
- No belt sway, no manpower training problem –total ease of operation
- It is also environment friendly. No spillage or loss of material. No dropping from dirty return side
- It provides ability to carry fines and dusty material without pollution
- It can climb in steeper angle. Maximum upward inclination also can be as high as 20-25 deg. Steep declination of 30-35deg.is also possible in special cases
- Overall power consumption lesser than standard conveying system due to elimination of intermediate drives

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**Base Mix Formation and Transportation Circuit**

Mixing Bin Building (MB) is the heart of Base Mix Handling plant comprising of 20 steel bunkers to store fuel (crushed coke), flux (crushed limestone & dolomite), iron ore fines, sinter fines, mill scale/ flue dust to cater to 16 hours base mix requirement of the sinter plant. Various material from MB is discharged in desired proportions through VFD operated belt weigh feeder to produce base mix and conveyed to 2 stock yards each measuring 220 m x 32 m. Here blending is done through bed blending mechanism with the help of stacker and barrel reclaimers. (Stacker & barrel reclaimers are not in the scope of L&T). The base mix is reclaimed through barrel reclaimer and conveyed to the Sinter Plant.

**Finished Sinter & Emergency Sinter Storage**

Finished sinter received from Sinter Plant can be either conveyed to
mention, which posed a major challenge to shape up the project.

**Volume** - The unique feature of this project is the sheer volumes that were handled. Handling of such enormous volumes within stringent time schedules had poised tremendous challenges to all corners of execution starting from design, procurement, manufacturing, inspection, supply, storage, erection, and upto trial run and testing. It was L&T’s age-old culture, dedication and meticulous planning that made everything possible.

**Space constraint** - The entire ISP plant is located in a campus of 900 acres having facilities of 2.5MTPA pig iron and various finishing mills like BOF/CCP, universal section mill, wire rod mill and bar mill. This made the campus cramped for construction and engineering activities that warrant large amounts of space for storage as well as for working and commissioning. The space constraint made activities such as logistics, storage and construction vulnerable and a potential threat to safety and security. However, meticulous work methods, administration, planning, safety and quality management helped to overcome all the hurdles.

**Availability of resources and utilities** - Readiness of downstream plants and availability of commissioning utilities such as power, raw materials etc., was very crucial for the timely completion of the job. Through diligent project management this challenge was mitigated.

The twin sinter plant project was awarded to a consortium led by L&T and with consortium partner M/s. Outotec GmbH, Germany. This contract includes process design, procurement & supply of equipment, delivery, installation supervision, commissioning, performance guarantee test and handing over to the client. Larsen & Toubro is involved in the design and detail engineering of complete civil and structural works, fabrication and supply of structural steel, construction of civil works, supply of equipment, erection of structural and mechanical equipment works. M/s Outotec GmbH will provide the basic technology for operation of the sinter plant and supply some of the proprietary equipment.
Technology of sintering

Sintering is a technology for agglomeration of iron ore fines into useful Blast Furnace burden material. Presently more than 70% of hot metal in the world is produced through sinter. In India, approximately 50% of hot metal is produced using sinter feed in Blast Furnaces.

The raw materials used in the sinter plant are as follows - iron ore fines (-10 mm), coke breeze (-3 mm), lime stone and dolomite fines (-3mm) and other metallurgical wastes. The mix is obtained from the RMHS and fed into large bins through conveyor lines for loading on the sinter machine. The mix is later rolled through segregation plates so that the coarse materials settle at the bottom and the fines surface to the top.

The top surface of the mix is ignited through stationary burners at 1200 degree Celsius by using Mixed/CO gas fired refractory lined ignition furnace. As the pallet moves forward, air is sucked through a wind box situated under the grate. A high temperature combustion zone is created in the charge-bed due to combustion of solid fuel of the mix and regeneration of heat of incandescent sinter and outgoing gases. Due to forward movement of pallet, the sintering process travels vertically down. Sinter is produced as a combined result of locally limited melting, grain boundary diffusion and re-crystallisation of iron oxides. On the completion of sintering process, finished sinter cake is further crushed and cooled.

Functional units

Raw Material System

The raw material system consists of conveyors at the height of +29 m and receives material such as blended mix, coke and limestone from the junction houses. The materials are then fed to proportioning unit through shuttle belt conveyor which fills up raw material in individual bins up to a pre-determined level. These operations are controlled by level indicating system automatically.

Proportioning Unit

This unit comprises of 13 proportioning bins which consists of 5 blended mix bins (500 m³ each), 2 limestone bins (300 m³ each), 2 coke bins (300 m³ each), 2 calcined lime bin (100 m³ each), 1 return fines bin (200 m³) and 1 dust bin (50 m³) in sinter machine building. Each bin has been equipped with a level monitoring device by means of load cells which are arranged in the supporting structure of the respective bin. After receiving the material in bins, all the substances are automatically controlled and fed to belt conveyor in required quantities through a dosing belt weigher system and conveyed to Mixing and Nodulising drum unit.

Mixing & Nodulising Unit

This unit consists of the mixing and nodulising drum that is aligned in 1.570 inclination and rotates at 5.51 rpm for mixing and making nodules of materials. Base mix, coke and lime are homogeneously mixed in this drum and is nodulised. The nodulisation of the feed to the sinter is required to percolate the heat. One third part of the drum is fitted with lifter blend and water system which helps to mix the feed and homogenise various materials. The remaining parts of drum are flat bars where the mix is re-rolled for granulation (converted into micro sphere). Due to inclination of drum the materials are discharged atomically by centrifuging process. Then the nodulised materials are fed into the feed-end of the sintering units.

Sintering Unit

This unit is the hearth of sinter plant. The agglomeration of iron particles takes place in this unit. Sintering Unit consists of three stages: 1) Feeding, 2) Travelling Grate and 3) Discharge
Feeding: In this section the hearth layer hopper receives some portion of the product sinter form screening unit through side wall conveyor. Underneath the hopper outlet is a vertically arranged discharge cone. This cone can be height adjusted in order to set the desired hearth layer thickness (30-60 mm). The sinter mix feed hopper is installed on a combination of movable bearings and load cells in order to determine the bin filling volume. The material is discharged using a cylindrical feed drum. Between the hopper outlet and the drum an opening is provided in order to discharge the sinter mix. This gap between hopper and drum can be opened and closed over the entire length by means of 6 flaps that can be individually adjusted in height and depth. These flaps are equipped with electric servo-drives and also serve to adjust and control the bed height on the sinter machine.

Travelling Grate: The travelling grate is composed of an endlessly revolving chain of pallets. The drive is arranged at the lifting station. The necessary feed forward power for the chain is transmitted by the toothed segments of the lifting wheels to the pressure rollers of the pallets. The transversal seal consists of a sealing plate in one piece, resting on two spring-steel plates covering the entire machine width. These sealing plates are installed at the beginning and at the end of the suction area.

Discharge: The lowering station is to be regarded as part of the discharge station, designed similar to the lifting assembly, but with the pallets being transported from the upper to the lower rail guides. At this point, the pallet chain will open in order to minimize wear. The sinter discharged from the pallets is directly routed through a crush-deck lined with fused corundum stones to the spiked roll breaker. The breaker will reduce the sinter to pieces that measure 200 mm maximum.

The sinter produced on the travelling grate is discontinuously discharged pallet by pallet. As the downstream cooler runs continuously and requires a defined filling degree for optimal cooling, a purpose-designed chute is installed between the travelling grate discharge end and the feed end of the cooler.

Sinter Cooler

Sinter cooler is a circular dip rail cooler. The cooling air is blown underneath the cooler by three cooling air fans through concrete cooling air channels. The cooling air fans have been dimensioned such that in the event of failure of one fan the sinter cooler can still be operated at about 66 % of the feed rate. The top of the cooler is closed by a hood. In the first section of this hood the hot air is returned to the ignition furnace as combustion air. In the second section of the hood hot air is returned to the annealing hood. The rest of the hood is provided with connections for in-plant dust collection. The cooler discharge area is directly connected to the in-plant dust capturing system.

Crushing and Screening

From the sinter cooler, the cooled sinter is transferred through conveyors to the cascade chute. When heterogeneous materials are
discharged, natural segregation will invariably set in. This effect has been put to good use in the cascade classifier to separate the material into fractions. The sinter is discharged onto a saddle where part of the fines is separated from the rest of the material through natural segregation. This separation process can be intensified by arranging several saddles in cascade succession. The coarse fraction (> 40 mm) dropping from the front edge of the saddles is routed to the double roll crusher, whereas the fine fraction (< 40 mm) flows over the saddle ridge into the collecting chute bypassing the crusher. In normal operation, however, the separated coarse material (> 40 mm) is passed through the double roll crushe and is reduced to < 40 mm. In the collecting chute both the fines are reunited and transported on belt conveyor to the hearth layer screen. The deck comprises two sections with different openings. The first section has an opening of 10 mm through which the fraction 0 –10 mm passes.

The opening in the second section has a dimension of 20 mm. The sinter passing through this section has a size range of 10 – 20 mm. The overflow has a size range of 20 – 40 mm. All size fractions which jointly constitute the sinter product are sent to belt conveyor where it is weighed to measure the amount of sinter product produced.

**Waste Gas Processing**

The waste gas system starts with the waste gas collecting main beneath the travelling grate and ends at the stack. In the waste gas collecting main the waste gas proceeding from the individual wind boxes is united. This gas is laden with dust and spillage. Negative pressure prevails in the complete waste gas system so that it is sealed against the outside atmosphere. The spillage which settles in the waste gas collecting main and in the dust chambers has to pass through this seal. For this purpose, double cone valves are provided to ensure that no air leaks into the waste gas system and no dust particles are sucked back into the system.

After passing through waste gas main the dust-bearing waste gas is cleaned in the electrostatic precipitator. The precipitator consists of a large casing in order to reduce the waste gas velocity from about 15 to about 1 m/s. The inside of the casing is divided into two tandem-arranged electric fields. Each field is equipped with rows of plates which are arranged parallel to the direction of flow of the waste gas. The plates are the collecting electrodes and...
are suspended from electric insulators. Frames with wires are located in the middle between the rows of collecting electrodes. These wires act as discharge electrodes. Rectified high voltage is applied between the discharge and collecting electrodes (distance approx. 400 mm) and an electric field is generated called the corona. The dust particles are electrically charged in this field and then deposited on the collecting electrodes. The collected dust falls into the two dust chambers arranged longitudinally at the bottom of the precipitator which transports it to ESP Dust Bin trough chain conveyors.

**Waste Gas Fan**

The gas outlet of the precipitator is fitted with the intake nozzle of the waste gas fan. The waste gas fan motor (8400 kW) is equipped with a speed-controllable drive for each sinter machine. It is synchronised in such a manner that when the travelling grate stops, the speed of the fan has to be reduced stepwise in order to allow the material on the travelling grate to be completely sintered and to avoid a rise of the waste gas temperature in the gas collecting main beyond 200°C. As soon as the whole material is sintered and the waste gas temperature starts falling, the fan can be shut down after a temperature level of about 80°C is reached. Moreover, the following ancillary systems are also installed:

- Cooling water system for cooling the motor and the frequency converter
- Locating brake for the fan impeller

On the discharge side of the fan a silencer is installed for noise abatement. This silencer is part of the clean gas duct which ends in stack. Finally the cleaned waste gas is discharged to the atmosphere through this stack.

**Electrical, Instrumentation and Automation**

The Electrical & Instrumentation system design and the layout plans represent the latest state-of-the-art sinter technology and material handling. The design incorporates numerous innovations in iron ore sintering, some of which are:

- The level-1 of automation system is provided with intelligent field-bus compatible field instruments with the corresponding control system up to the local power circuit breaker with
instrumented control and field-bus connections. All control circuits are according to the operational philosophy that after activation all operating conditions are automatically controlled by the system and not by the operator.

- The I&C system structure is based on an integrated distribution system with inherent open type architecture. The scope of instrumentation shall be sufficient to monitor and control all significant variables in accordance with the process requirement, provide all operating requirements and necessary sequencing, interlocking and safety functions including alarms for abnormal conditions of the proposed sections of the sinter plant.

**Instrumentation & Control**

The foundation field bus system is used worldwide for metallurgical plants. This technology helps reduce engineering efforts during the design phase and reduces multi-pair cabling which is replaced to maximum extent by single pair cable along with fewer control system hardware component.

Nucleonic instrument is provided to the Sinter plant’s coke bins to measure the online moisture percentage in solid fuel. This data is fed to automation control system to increase / decrease the solid fuel in raw mix ore to achieve the best sinter quality. Microprocessor-based control equipment is supplied for the weighing system and quantity measurement of solids.

**Advanced burn-through control**

An advanced system of closed circuit video monitoring has been offered for the sinter plant. The cameras are remote controlled for Pan, Tilt and Zoom operations from the control room. In the Control room two 22” video display unit displays the live video of the selected operating areas. The control room is equipped with loud speaker communication system.

**Additional civil works**

It was a challenge entrusted upon L&T by the client (SAIL-ISP) for executing 22929 cast in-situ piles for its downstream projects that includes Basic Oxygen Furnace, Continuous Casting Plant and Mills Area. Execution of 22929 cast in situ piles calls for mammoth mobilization of Plant & Machinery and resources. Hydraulic rigs were identified as a key to the success and as many as 35 hydraulic rigs were mobilized for the execution of job.

During the planning stage, after detailed study, the site team realised that the land is filled with metallic steel boulders, scraps and hard mass dumped/formed over the past 90 years. In order to start piling, this needed to be cleared. Therefore the contract was later on amended suitably including the scope for clearing and backfilling the entire area and then carrying on with the

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**Plant Road**
Pilling work with Hydraulic Rigs in progress

Awards and accolades

Besides being a committed partner in creating infrastructure for the steel plant, L&T has also been a responsible corporate citizen involving in itself various initiatives that benefit the underprivileged in the community. The project team has also won various safety awards including the coveted RoSPA GOLD award, British safety Council Award, National Safety council Prshansa Patra, and letter of appreciation from the client for conformance to the highest safety standards.

GopiKannan, S - CCD
with inputs from
A. K. Ghosh
Project Manager
Viswajeet Pandey
Planning Manager – SP & ACW
Sourav Das & Atanu Saha
Planning Managers RMHS

Major quantities - Additional Civil works

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Soil Excavation</td>
<td>7,30,000 cu.m</td>
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<tr>
<td>Hard Rock Excavation</td>
<td>8,73,000 cu.m</td>
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<td>Metallic Bolder Removal</td>
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<td>Piling</td>
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<td>RCC</td>
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<td>Reinforcement</td>
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<td>Formwork</td>
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Plant and Machinery

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<th>Equipment</th>
<th>Quantity</th>
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<tbody>
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<tr>
<td>Dumper</td>
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<tr>
<td>Vibro Earth Compactor</td>
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<tr>
<td>Hydraulic Piling Rig</td>
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</tr>
<tr>
<td>Conventional Piling Rig</td>
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<tr>
<td>Crawler 18 ton Cranes</td>
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<tr>
<td>Crawler 75 ton capacity Cranes</td>
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<tr>
<td>Hydra cranes</td>
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<tr>
<td>40 ton Capacity Trailer</td>
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<tr>
<td>Hydraulic Pile Breaker</td>
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<tr>
<td>Batching Plant</td>
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<tr>
<td>Transit Mixer</td>
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<tr>
<td>Concrete Pump</td>
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<tr>
<td>Boom Placer</td>
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<tr>
<td>Welding Machine</td>
<td>35 nos.</td>
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</table>
Construction Skills Training Institute at Pilkhua in Ghaziabad inaugurated

Mr. K.V. Rangaswami, inaugurated the main building of the first Construction Skills Training Institute in Northern Indian at Pilkhua, Ghaziabad District in the National Capital Region of Delhi on March 2, 2011 in the midst of senior executives of L&T. Mr. B. Ramakrishnan inaugurated the Staff Quarters while the Solar Power System and the Hostel Buildings were inaugurated by Mr. K.P. Raghavan and by Mr. S. Natarajan, respectively. The new institute, set in lush green surroundings of approximately 13 acres at a cost of Rs.25 crore has capacity to impart training 500 to 600 workmen at any point of time.

The solar power project is expected to cost around INR 2.5 crores and involves commissioning at the Institute and Hostel buildings through a 95 KW Off-Grid PV system. The solar power plant will be involving efficient poly-crystalline PV cells and standalone inverters. When fully installed, the system will produce approximately 136,600 units of electricity per annum; would result in a saving of nearly 33,459 liters of oil i.e. Rs. 13 lacs/annum (approx.). Apart from the energy savings, solar power will considerably minimize CO² emission levels thereby benefitting the society at large.

LT Panels Energised at ITC Chennai

LT Panels at ITC Grand Chola Hotel Site, Chennai were energized by Mr. Noronha – EVP, ITC Hotels along with Mr. Prakash Kumar – MEP Head, ITC Hotels on 10th March 2011. Mr. Jawahar – Project Manager PT&D, Mr. V. Ramanathan – JGM PT&D along with the project team were present during this occasion which is said to be the first such milestone achievement for the Electrical Package, in India’s largest seven star hotel project.
Two substations at NDMC Project New Delhi, were inaugurated by the Honorable Chief Minister of Delhi, Smt. Sheila Dixit on 14th January.

A 33 KV GIS Raja Bazaar Substation and a 66 kV GIS B. D. Marg Substation was inaugurated by the Chief Minister along with Mr. Parimal Rai IAS-Chairman (NDMC), Mr. S. K. Chaturvedi-Chairman & Managing Director (PGCIL), Mr. O.P Gupta - Chief Engineer (NDMC) and Mr. I.S. Jha-Director Projects (PGCIL).

Ground Breaking ceremony at CSTI- Attibele- Bangalore

“Ground Breaking” ceremony function for putting up new CSTI & Depot / P&M facilities was performed at Regional Depot Premises at Attibele Bangalore on 8/4/11. S. Natarajan - Head Construction Skills Training – ECC Chennai along with S.Raghunath – Regional Manager Bangalore participated in the function and performed the pooja. The new facility will have independent CSTI block, Depot / P&M Block and some auxiliary structures with overall total built-up area of 9200 sq.m. The facility is expected to be ready by the next financial year.
Technology Centre III (TC-III) at L&T’s HQ Campus in Chennai was inaugurated by Mr. K.V. Rangaswami (KVR) and S.N. Subrahmanyan (SNS) in the august presence of Mr. A.M. Naik, Mr. Y M Deosthalee and Mr. R. Shankar Raman on 28th March 2011.

KVR inaugurated Tower B while SNS inaugurated Tower A. The management team thoroughly enjoyed the sky-walk experience – a glass floor that connects both the towers.

TC – III is yet another outstanding structure in the 27 acre Manapakkam campus at Chennai. These ground plus eight storied towers measure 534454 sq.ft (267227 sq.ft per tower) and can seat 4900 staff. The three levels of basement can accommodate 703 cars and 932 two-wheelers. In the huge dining area, 1056 staff can dine at a time and the multi-purpose hall has a seating capacity of 417 people. Other construction features include 8200 sq.m of structural glazing; 10,500 sq.m of ACP cladding and 1060 sq.m of sky-walker glazing.
NEW ORDERS

Rs.1103 Crore Orders in Railway Sector

The Railway Business Unit of Larsen & Toubro (L&T) has secured a slew of orders aggregating Rs.1103 crore from various power plant developers for the construction of ‘Merry-Go-Round’ Systems and construction of dedicated railway lines to link power plant sites to the main line rail network.

The orders include the following: A Rs.365 crore order from Maithon Power Limited, a JV of Tata Power and Damodar Valley Corporation, for construction of a 21 km dedicated rail link to their power plant at Maithon in Jharkhand. Nabha Power Limited, a wholly owned subsidiary of L&T Power Development Ltd., has placed an order valued at Rs.270 crore for construction of a 13 km dedicated, double-track electrified rail link to its power plant at Rajpura in Punjab. BALCO has awarded L&T a Rs.151 crore order for augmenting and strengthening its existing railway facilities at Korba in Chhattisgarh.

L&T’s Railway Business Unit has also secured orders worth Rs.317 crore from Sterlite Energy Limited for further enhancement of its dedicated railway facilities that are already under implementation at Jharsuguda in Orissa.

The orders will be executed by the Rail Infra Division – a part of L&T’s Railway Business Unit, Faridabad – on a design, build and Lump Sum Turnkey basis. The scope of the projects encompasses carrying out detailed layout and structural designs, obtaining statutory approvals from Indian Railways, construction and commissioning of integrated railway facilities, execution of activities like earth work in embankment, construction of various types of bridges including rail and road flyovers, track laying, railway signalling and overhead electrification.

L&T Metro Rail (Hyderabad) Limited achieves Financial Closure for Hyderabad Metro Rail Project

L&T Metro Rail (Hyderabad) Limited, the SPV incorporated to implement the Hyderabad Metro Project, has achieved financial closure for the project. The financial closure has been achieved in a record time of 6 months and is the largest fund tie-up in India for a PPP (Public Private Partnership) project till date.

A consortium of banks led by State Bank of India has sanctioned the entire debt requirement of Rs.11480 crore for the project. The equity component for the project, expected to be around Rs.3440 crore, would be infused primarily by the L&T Group. The project will get a viability gap grant of Rs.1458 crore from the Central Government through the Government of Andhra Pradesh.

A total of ten banks have participated in the funding for this prestigious project. Leading banks which will be associated with the project, in addition to State Bank of India, include Canara Bank, Indian Bank, Indian Overseas Bank, Jammu & Kashmir Bank, Punjab & Sind Bank, State Bank of Hyderabad, State Bank of Mysore, State Bank of Patiala and Syndicate Bank.

The Hyderabad Metro Project was announced by the Government of Andhra Pradesh (GoAP) on PPP mode under the Design, Build, Finance, Operate and Transfer (DBFOT) basis and the bidding process was as per the guidelines specified by the Government of India (Ministry of Urban Development, Planning Commission and Ministry of Finance). L&T emerged the lowest bidder in the face of stiff competition (the bid winning criteria was Minimum Grant quoted by the bidder) and signed the Concession Agreement through its SPV, L&T Metro Rail (Hyderabad) Limited, with the Government of Andhra Pradesh on September 4, 2010.

L&T Metro Rail (Hyderabad) Limited has already submitted a Performance Guarantee for Rs.360 crore to GoAP underlying its clear intent to execute the prestigious project in the stipulated time frame. As per the Provisions of Concession Agreement, construction will have to be completed in 5 years. The concession period for the project is 35 years (including 5 years of construction period) and is extendable by an additional 25 years.
World Plumbing Day was celebrated at the Headquarters and project sites of L&T on 11th March 2011. At HQ, a special lecture was organized and Padma Shri C.N Raghavendran, Partner M/S C R Narayana Rao, spoke on “Importance of Plumbing in Finishing”. In his address, he stressed on the importance of this day and how engineers and technicians can play a greater role in making our society and environment cleaner and a healthier place for future generations.

Dr. S Sundaramoorthy – Mentor of Creative Environmental Consultant gave a technical presentation on the appropriate selection of treatment plant for Airports which was the need of the hour today and it was well received by design and execution engineers. Various awards were given out to young engineers for their technical paper presentations. At project sites pep-talk and presentations were organised on Public Health Engineering.

As part of the World Plumbing Day celebrations L&T’s Public Health Engineering and Finishing team had also organized a drawing competition among children to create awareness on plumbing. Sketches reflecting effective usage of water and good plumbing procedures were distributed among the children to make it more colourful using crayons. This coloring competition for children was conducted at Emmanuel Nursery and Primary School, Manapakkam, Chennai, and nearly 300 orphanage students from LKG to 5th standard participated in it. Sweets, gifts and sports kits were distributed to all children who participated in the event.
World Water Day 2011 was celebrated at L&T by the Water and Effluent Treatment Business Unit on 22nd March 2011 at Manapakkam Campus. Mr. D.R. Ray, Executive Vice President and Head MMH-IC, inaugurated the programme and emphasized on the importance of water. Mr. D. Roy, Vice President and Head EDRC-MMH IC, highlighted the importance of “Water for cities: Responding to the Urban Challenge”.

The keynote address by Mr. R. Sethuraman, Former Adviser – CPHEEO, Ministry of Urban Development, Government of India was on “The water scenario in Indian context”. A special address was given by Mr. M. Dhanabal, General Manager, Fichtner India, on “Innovative technologies in water management”. To create awareness about water an in-house e-water quiz was organized on 19th of March.
A thoughtful gesture towards Special Children

TISCO – Jamshedpur project of L&T extended a helping hand in support of special children at ‘School of Hope’. L&T’s team led by Mr. S Mohan, Cluster Accounts Manager along with Mr. S. Madhan Kumar, Mr. A K Poddar, Mr. V. Devrajan, Mr. K P Srinivas and Mr. Mukund Rao donated 15 sets of benches and chairs for a classroom along with a television, DVD player, PA System with mikes and speakers, educational CDs and DVDs and different types of indoor & outdoor games for the children at ‘School of Hope’ on 30th March. Mr. Rajnish Kumar, Sr. Manager Tata Steel was also a part of this event, organized at the school premises. The school’s management appreciated the support extended by L&T in enhancing the learning facilities for the special children.

AVMRP site provides road safety training for school children

As a part of L&T’s CSR efforts, the Ahmedabad Viramgam Maliya Road Project organized a road safety training programme for children in various schools near the project site. Quiz competitions on road safety were conducted for the students and prizes were distributed to the winners. The school Management appreciated L&T’s efforts towards road safety and the children were delighted to learn from the project site team.

APML Tirod project reaches out to Mendipur village school

L&T’s CHP-Tirod (M/s Adani Power Maharashtra Ltd) site at Gondia in Nagpur has supported the Jillaparishad Madhyamik School at Mendipur village which is situated at a distance of 2kms from the project site. L&T donated the complete set of furniture for classes III, IV & V of this Gram panchayat School which lacked basic amenities for the children to study.

BMH BU’s helps develop school infrastructure

L&T’s MMH IC’s Bulk Material Handling Business unit - Delhi Cluster has reached out to the children of Sonebhadra District in UP by developing the infrastructure of Vidyut Parishad Junior Basic Vidyalaya school. L&T has been involved in the EPC package of CHP at 2x 500 MW Anpara Thermal Power Project and this site is located in one of the backward areas of UP which is the Sonebhadra District. The local people are deprived of quality education due to lack of infrastructure in the school. In order to enhance the quality of education near the project site, L&T enhanced the school’s infrastructure by constructing structures including boundary walls, renovation of auditorium etc. and also installed hand pumps for water supply apart from the distribution of school bags and uniforms to students. L&T’s support has not only enabled the school in imparting quality education but also in promoting cultural activities in school premises. Over 500 children benefited from this noble task.
Chhapra Site extends support to a primary school

L&T’s staff at Cast Wheel Plant- Chhapra Site initiated the distribution of school bags at Rajakiya Prathamic Vidyalaya, Pirganj, Dariyapur as a part of the organization’s CSR efforts. Over 240 bags were distributed among the students of Classes-I to V on 11th February 2011. Also, a 23 X 1.7 meter boundary wall with a gate and a toilet was constructed by L&T for this school.

Godrej Waterside & Genesis Project team supports 260 children

The staff at Godrej Waterside & Genesis Project in Salt Lake, Kolkata reached out to the children of Mohishbathan Jatio Vidyalaya – Sector-5, Salt Lake by adding to the school’s infrastructure.

On 17th February, the project team distributed 20 sets of wooden benches for the children of Class-I along with school kits for all the children. L&T also renovated the buildings of this School. Over 260 students benefited from L&T’s contribution and the school management thanked the project team for this support.

ITC Sonar II Project reaches out to underprivileged children

L&T renovated the Hatgachhia Vidyasagar Primary School and distributed school kits including study materials to the children. on 4th February 2011. Over 40 students benefited from L&T’s contributions and the school officials appreciated and thanked L&T for this support.

KCP project team donates furniture to Government Primary school at Mukthyala

L&T’s KCP project team donated Tables & Alamirahs to the Government Primary school, Mukthyala, Jaggaiahpet on 31st January. Over 210 students & 20 teachers benefitted from this contribution and the school management thanked L&T for this support that will help them in the long run in terms of developing the school’s infrastructure.

PBEL City Project Site, Hyderabad provides stationery kits to primary school children

As a part of L&T’s CSR efforts, on 29th January the staff at PBEL City Project Site reached out to the students of Govt. primary school, Peerancheruvu at Hyderabad. Stationary items and sweets were distributed to all the children. Over 150 children benefited from L&T’s contribution.
The staff at Dhamra Port Project site once again reached out to the students of Binapani Hellen Keller Special School for Blind, Deaf and Dumb girl children at Charampa, Bhadrak in Orissa on 18th January. L&T distributed school kits including reading materials, walking sticks & hearing aids to these special children. Over 75 students benefitted from L&T’s contributions.

NTPC Simhadri site reaches out to school children

NTPC Simhadri Site, Vizag distributed educational kits to the students of MPP School Vennelapalem on 21st February 2011. At the event held in the school premises, Mr. D.V. Rao Project Manager & Mr. Bandaru Satyanarayana (Ex.Minister) distributed school bags, stationery kits, notebooks etc., to the children. L&T also supported the school with furniture including tables, chairs & almirah for the children and the staff.

Reaching out to a village school

L&T’s staff at HY-GMR VPGL II CCPP power project reached out to the children of Mandala Praja Parishat Primary school at Vemagiri Village, Rajahmundry on 22nd February. L&T provided infrastructure support to the school by donating desks, tables, chairs and ceiling fans for the class rooms. Over 130 students were benefitted.

Reaching out to the neighbourhood

L&T’s Chennai Regional Office and CSTI Chennai jointly supported the Villivakkam Panchayat Union Elementary School at Eswaran Koil Street, Ramapuram by constructing toilets at the school. Nearly 200 girls and boys will be benefiting from this CSR effort.

During the inaugural event on 28th February 2011, the school authorities were also presented the CII and L&T’s Environmental Series CD ‘Stop in the Name of Earth’
Blood donation camps

As part of the safety month celebrations, many project sites across the country and abroad organised voluntary blood donation camps, the details of which are as follows:

- **8th December 2010, PT&D IC’s, RLQP Project, Qatar**: 49 Units
- **22nd December 2010, 17th and 18th January 2011, Rajkot Jamnagar Vadinar Road Project**: 501 units
- **25th January 2011 Bhushan Steel Project, Angul**: 501 units
- **2nd February 2011 Sahar Elevated Access Road Project, Mumbai**: 94 units
- **17th March 2011 A-3938.1, A3900.1 projects at Al Ain, UAE**: 47 units
- **8th January 2011 MIOT International project site, Chennai**: 65 units

**SAIL-RSP Site Rourkela reaches out to primary school children**

On 15th January 2011, L&T staff at SAIL-RSP Site Rourkela sinter plant-III reached out to the students of Dharamdihi Primary School, Sonaparbat at Rourkela. School bags, uniforms, stationary kits and sweets were distributed to over 90 children.

**Vedanta township project supports special children**

The staff at Vedanta Township Project Site reached out to the hearing impaired and mentally challenged children at Barundamal in Orissa. On 26th January, L&T distributed school kits including study materials, specifically designed tables & chairs for these special children. Over 65 students benefited from this initiative.

**Maternity Unit at Kavarpetti village**

Chennai Tada Six Laning Project team is actively involved in various community development programs.

Recently L&T constructed a Public Health Building (Maternity Unit) for the populated rural area of Kavarpetti village, Chennai. The maternity unit covering an area of 900 sq.ft. accommodating labor rooms, in-patient ward and wash rooms were inaugurated by Shri. C.Sankaralingam, Vice President & Head BMP-BU on February 12, 2011 in presence of village panchayat administration. This effort by the site team was appreciated by the villagers.
Dhamra Port Project going Green

As many as 300 saplings were planted at L&T’s Dhamra Port project in Orissa on 16th February by the Project Director Mr. S. Raja along with Mr.M.T.Ganesh Babu, Mr.R.N.Tripathy, Mr. I.Chakraborty, and other staff. Declaring it as a gift to Mother Nature, Mr.Raja said that more saplings will be planted at site in the days to come.

Go Green

The Chennai MMHIC Cluster’s ‘Go Green’ initiative with a target of planting 1,00,000 saplings in the current financial year, the staff at L&T BWSSP project in Bengaluru conducted an environmental conservation programme on 8th January 2011 at Vidya Jothy Government Higher Sec. School in Bengaluru. The programme included quiz contests and other interactive sessions like JAM (Just a Minute). In order to instil the thought of preserving the environment through the adoption of eco-friendly practices. Over 1000 saplings were planted in the surrounding areas by the children as a part of this environmental conservation initiative.

A similar programme was held at the Government HSS, Muthanai Village in Neyveli on 12th January. Over 400 students and villagers participated in tree plantation and, some students enthusiastically volunteered to identify other barren lands surrounding their village for sapling plantation by L&T. L&T’s NLC O&M site was involved in developing the infrastructure of the Panchayat Union Middle School in Neyveli by renovating the buildings that were in need of repair. Stationery kits and sports equipment were also donated to the students of the school and over 45 children benefited from this activity.

A Green weekend

The nursery initiated at L&T campus in April 2009 has grown over 16,000 saplings which have been nurtured and planted in various places including schools, colleges, hospitals, L&T Project sites and local townships. Further, the staff at L&T decided to celebrate ‘Green birthdays’ by planting a tree either at the campus or a location of their choice on their birthdays. Called the Janmotsav-Vanmotsav programme, this initiative has gained immense popularity among the staff. In order to support this green programme, staff at Manapakkam campus is motivated to spend their weekends in the nursery.

Free eye check-up camp at Eden Park project site, Chennai

L&T Eden Park, South City Project Site in collaboration with Vasan Eye Care conducted a free eye checkup camp in which over 250 people benefitted. In the same function, 20 staff members took a pledge to donate their eyes.
Beach clean-up at Oman

As part of corporate social responsibility Larsen & Toubro (Oman) LLC had organised cleaning of Qantab Beach on Friday, January 28, 2011. More than 50 volunteers, including the family members of Staff gathered for this noble cause, covering the entire beach where trash and debris was removed.

Most of the trash and debris consisted of dried leaves, twigs, coconut husks and items left by beachgoers like cigarette butts, soft drink cans, barbecue skewers and empty bottles. Complementing the initiative, several beach regulars expressed that this initiative conveys a message to the visitor for proper disposal of debris during their beach activities.

Health and Green Camp at Arpakkam Village in Kancheepuram

L&T conducted a health and green camp on January 29, 2011 at Arpakkam Village in Kancheepuram. Both camps were inaugurated at a small event organised under the shade of village trees. Mrs Athankarai Natarajan, Village President of Magaral, Mrs Sophia Chelladurai, Founder Director of Love Care Centre, Mr Ramesh Aravamudhan, Regional Manager – Chennai, L&T participated in the inaugural function.

After highlighting the importance of a sound body and mind for a healthy living and threats caused due to global warming, the speakers and guests planted saplings in the 12 acre Love Care Centre premises. Mrs. Chitra Rangaswami, President and Mrs. Jayashree Ramana, Trustee of Prayas Trust along with Mr.V.S. Ramana, Head – Corporate Communications, L&T presented gifts to the children and also planted saplings. Nearly 350 saplings will be planted soon and nurtured by the children of Love Care Centre.

Dr. Manjunath Ramesh from L&T Medical Centre, Chennai spearheaded the health camp in association with Chennai’s leading Agarwal Eye Hospital. As a part of this health camp, general health check, blood sugar, ECG, bone density test, H1N1 vaccination, eye examination were conducted by the Doctors and paramedical professionals. Over 150 children at Love Care Centre and around 100 people from the nearby villages (Magaral and Arpakkam) in the age group of 55 - 70 years were benefitted. Prescribed calcium tablets and iron tonics were distributed free of cost. Spectacles were distributed and free eye surgeries were also proposed to be done for the needy at Dr. Agarwal Eye Hospital.
Hindalco Mahan Project, Singrauli reaches out to District Govt. Hospital at Waidhan

The Hindalco Mahan Project, Singrauli donated Out Patient Rest Sheds for the District Govt. Hospital at Waidhan. Earlier, waiting for their treatment or medical aid under the open roof was very tough for patients & their attendants at District Government Hospital, Waidhan. Thanks to the efforts of the team at HIL (MAP & CHP) Project sites who realized the agony of these patients and proposed to build a waiting cum rest shed for the Hospital.

A waiting shed designed out of Pipes & Transparent sheets was inaugurated on 17th December 2010 by Dr. G. S Soni (Civil Surgeon – Dist Govt. Hospital, Waidhan) & Mr. J. Suresh (Project Manager, HIL MAP) – Mahan, Singrauli. Over 100-150 patients will be benefited each day from this initiative.

NTPC Barh site extends support to physically challenged people

The staff at NTPC Barh site supported the differently abled people at ‘Viklang Sahayata Sibir’, a camp organized for the differently abled people by Jyotirlok Sewa Sansthan between 13th and 15th February. The site team participated in this camp and donated tricycles, artificial limbs and crutches to the physically challenged individuals. In the three day program 90 crutches, 82 Calipers, 30 artificial limbs, 44 sticks, 1 wheelchair and 1 tricycle were distributed to the needy. Also, over 250 physically challenged individuals benefited from the free medical check organized by L&T.

PRAYAS Trust conducts free comprehensive Eye Screening Camp

Over 200 people living in and around CRR Puram near Virugambakkam, Chennai benefited from a free comprehensive eye camp conducted jointly by L&T’s PRAYAS Trust and Sankara Nethralaya Eye Hospital on January 29th, 2011. A team of 25 optometrists headed by Dr. Sheila John, Head Tele Ophthalmology, screened the patients all through the day.

A detailed audio-visual presentation on eye awareness was given to all patients during the initial screening. The camp included Diabetic Retinopathy where diabetic patients undergo intensive screening and further treatment through laser photo coagulation. Twelve cases were identified to be operated for a cataract surgery and over hundred people were recommended spectacles.

An eight year old boy was detected of eye hemorrhage and had been recommended for free immediate treatment at Sankara Nethralaya. The patients were fortunate to benefit from free Intra-Ocular Lens Fixation (IOL) follow-up which will be done at the PRAYAS Medical Centre by Sankara Nethralaya staff and further reviews will take place at Sankara Nethralaya.

Inaugurating the camp at Narayananababu Vidyalaya School, Mr. K.V. Rangaswami, Member of Board & President (Construction), L&T, said that L&T has been involving itself in many significant CSR activities through its PRAYAS Trust. He also told the audience
about the newly proposed Medical Centre that is being constructed by L&T at Virugambakkam, at an expense of over two crore rupees with the aim of providing advanced health care services to the less privileged people. He reiterated the importance of eye care and appreciated Sankara Nethralaya immensely for their philanthropic service to the society. Dr. Sheila John thanked L&T for the opportunity to collaborate for the second time and appreciated L&T’s service motto.

Going places with Prayas Trust, Bengaluru

On 30th January, 40 children of St. Andal Girls Home, Rajaji Nagar, Bangalore were taken on a one day picnic to visit the Big Banyan Tree and Manchanabele Reservoir in Bangalore. As a part of CSR initiatives, the ladies of Prayas Trust ECC/UIL took the children and the caretakers to the Big Banyan Tree tourist spot which is spread across a picturesque area and is said to be the fourth largest Banyan Tree in India. The enthusiastic crew then proceeded to Manchanabele Reservoir, a large water body and a beautiful place located 45kms from Bengaluru.

The children thoroughly enjoyed their day’s outing with the Prayas team – the long bus drive with rounds of anthakshari, the serene atmosphere at the Big Banyan Tree spot where they were engaged in throw ball, frisby, tug-of-war, singing, dancing etc. and the delicious lunch after experiencing the chill breeze from the Manchanabele dam was a joyful experience for the kids. While the children returned back in the evening with fond memories, this day brought in immense satisfaction to the Prayas team for having brought cheer to the lovely children.

Prayas Ahmedabad extends help to an orphanage

The Prayas Ladies Society – Ahmedabad Chapter is actively involved in social activities supporting the poor, disabled and aged people. As a novel gesture this time the women managed to collect woollen clothes along with toys, crockeries and eateries for VishvaJyoti Ashram, an orphanage and old age home in Ahmedabad.

There was an overwhelming response from the staff and families for this initiative taken by Prayas. The glint in the eyes of the kids while Mrs.Poonam Balachandar, Mrs.Sonal Solanki and Mrs.Digamber Dalal from Prayas Trust handed over L&T’s contributions to the ashram, clearly indicated their excitement and gratitude.

Prayas Trust – Delhi Chapter conducts painting competition

Prayas Trust – Delhi Chapter organized a painting competition for the students of Nagar Nigam Vidyalaya, Delhi as part of its social service activities. Over 60 children enthusiastically participated in this painting competition and won prizes. Topic for painting was given to the children according to their age category and rewards were presented based on the creativity of the kids. Several consolation prizes were given to motivate all the kids.

Prayas Delhi Chapter has always been supporting school children in terms of providing infrastructure for the government schools as well as through volunteering in teaching lessons for the less privileged children.
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NTPC Farakka Site receives Safety Excellence Award

NTPC Farakka Site of PT&D IC has been awarded the Safety Excellence Award 2011 by the client NTPC Farakka, WB for maintaining best practices in safety at site. The site has also been recognized for its working environment and housekeeping standards in the year 2010-11. Mr. T. K. Nath, Site In-Charge, NTPC-Farakka received the Safety Excellence Award 2011 from the General Manager, NTPC, Farakka on 4th March 2011 (National Safety Day).

1000-207 MV Power System Project, Abu Dhabi achieves One million safe man hours

PT&D IC UAE’s 1000-207 MV Power System Project, Abu Dhabi achieved one million safe man hours without any reportable lost time injuries on 21st March. This remarkable milestone was achieved under challenging circumstances and a demanding schedule.

Mr. Norman Black, HSE Manager, M/S Bechtel presented the certificate of recognition to the L&T team for the outstanding safety performance by exceeding 1,000,000 work hours without Lost Time Injury/ Illness from the beginning of the contract up to 9th March 2011.

Union Minister for Power appreciates Subansiri Hydel Project

The Hon’ble Union Minister for Power Mr.Sushilkumar Shinde visited Subansiri Hydel Project on 1st March and reviewed the progress made at site. Along with Mr.Shinde senior ministers like Mr.P.Uma Shankar, Secretary (Power), Mr.Sudhir Kumar, Joint Secretary (Hydro), Mr.A.B.L.Srivastava, CMD (NHPC) and Mr.J.K.Sharma, Director Projects (NHPC) also visited the site.

The team of Ministers also visited the Surge Tunnel and Power House and appreciated the work being done by L&T. They expressed their trust and confidence in L&T and its team.

AWARDS

Mr. T. K. Nath, Site In-Charge, PT&D, L&T receiving the Safety Excellence Award from Mr. K.K. Sharma, G.M., NTPC, Farakka, West Bengal

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Mr. T. K. Nath, Site In-Charge, PT&D, L&T receiving the Safety Excellence Award from Mr. K.K. Sharma, G.M., NTPC, Farakka, West Bengal
KKNPP project receives CII’s EHS award

L&T’s Kudankulam Nuclear Power Project site received CII’s award for excellence in Environmental health and safety in the construction sector for the year 2010.

The CII Excellence in Environment Health and Safety Awards 2010 was presented to the EHS team in recognition of their continuous efforts to achieve excellence in the field of Environment Health and Safety, at a ceremony that was held on 4th Feb 2011 in Hotel Rain Tree, Chennai.

L&T emerged as a proud winner from amongst 2400 applicants and 52 shortlisted firms.

DIAL’s C10 package receives certificate of appreciation from DMRC

The L&T team at DIAL site received a certificate of appreciation from DMRC for completing ‘Two million man hours’ without any reportable incident in the Contract Package C10 of Airport Metro Express line at the L&T’s IGI Airport project.

Adani Power awards CHP Tiroda team

CHP Tiroda Project, Ahmedabad received the Best Housekeeping Award from Adani Power Maharashtra for its best practices in safety at site. The project site along with the office establishment has been adjudged the ‘Best Housekeeping Area’ among 17 other agencies who are engaged in the construction of this power plant.

The award was presented to the Project Manager, Mr.T.B.Krishniah by Mr. O.P. Bharadwaj, VP Civil APML Tiroda on 22nd March at an event held at the site. Staff and workmen were also presented with prizes for various competitions organized by APML during the National Safety Day Celebration during this occasion.
National Safety Council (Karnataka Chapter) organized a two day safety exhibition at JSW Steel Limited, Toranagallu on 4th & 5th March, 2011.

The L&T project team which is involved in erecting 10 mtpa Blast Furnace had exhibited various safety initiatives implemented at the project site. This included Fall Protection System, Flashback Arrestors, Excavation safety procedures for different soil types, L&T Scaffoldings and L&T Stair Tower. Live demonstration of preventing electrical shock using isolation and centre–tapped transformers by L&T engineers was lauded by the visitors.

L&T bags awards for safety standards and best safety exhibits

Dr. Vinod Nowel, Director & CEO of JSWSL inaugurated L&T’s stall and appreciated the splendid display of equipment & models. He also congratulated the entire team for achieving 25 million safe man-hours. From among the 32 exhibitors from 30 Corporates across India, L&T ECC was adjudged the best exhibitor in terms of quality, innovation and presentation.

The two day exhibition was concluded by an award function presided over by Shri. B N Bachegowda, Hon. Minister for Labour & Sericulture, Govt. of Karnataka.

Dr. Vinod Nowel being welcomed by Mr. H N Vinaya Kumar, Project Manager

L&T wins “Safe Contractor Award” from JSPL

Larsen & Toubro has won the Safe Contractor award for December, 2010 from JSPL. L&T had the lowest composite score when considering key safety metrics such as fatalities, lost lime accidents, first aid cases, and near misses. Safety is infused into L&T’s culture, this fact is apparent when walking into either the site office, lay down yard or Power Plant jobsite.
L&T Bags ‘India Shining Star Award’ for Outstanding CSR

The award ceremony was a part of the Wockhardt Foundation’s CSR Thought Leadership Conclave 2011, which saw the presence of stalwarts like Nobel laureate Prof. Muhammad Yunus, Bangladesh-based economist and founder of the Grameen Bank. The India Shining Star CSR Award is an initiative by the Wockhardt Foundation to acknowledge the role and contribution of leading organizations to sustainability across India’s corporate sector. The award jury unanimously chose L&T over several other nominees in the heavy engineering category for the social impact, innovation and sustainability that characterized its business. Earlier, L&T’s CSR efforts had also won recognition from the Asian Centre for Corporate Governance & Sustainability.

Utkal Alumina job site, Rayagada awarded Best Safety conscious agency

The team at L&T’s Utkal Alumina job site, Rayagada has been awarded as the “Best Safety conscious agency” by the client UAIL & won the UAIL Safety Trophy 2011 during the 40th National Safety Week celebrations. The Trophy with a citation was presented jointly by the Chief Guest Mr. A.K. Nanda, Asst Director of Factories & Boilers, Rayagada-Orissa and Mr. S.K Mishra, CEO & MD-UAIL on 10th March. Also, the workmen at site participated in various competitions organized during the week.
Mr. A.M. Naik Ranks among Top News Makers in Indian and Global Media

Mr. A.M. Naik, L&T’s Chairman & Managing Director, has emerged as among the most high profile of India’s corporate leaders in the Indian and the global media.

A recent survey of press citations saw Mr. Naik’s rankings soar among the country’s news makers. He was ranked Number 10 in the Indian media, having seen a rise of 157 per cent. In the survey of global media, Mr. Naik is ranked 12th. These findings establish that Mr. Naik’s varied accomplishments are increasingly gaining media recognition.

Visibility and ‘share of voice’ are widely regarded as a barometer of influence. The findings were published by the leading financial daily, Mint. The Mint Influencers Index is a monthly objective measure based on media analysis by Dow Jones Insight. The Dow Jones team tracks corporate and public leaders by taking into account the volume of media citings about them.

Mr. A.M. Naik Honoured With CHEMTECH Hall of Fame Award

In recognition of CMD, Mr. A.M. Naik’s stellar contributions to the industry and nation, the Mumbai based CHEMTECH Foundation has conferred on him its prestigious Hall of Fame - Leadership & Excellence Award 2011.

The award was presented on the occasion of the silver jubilee of CHEMTECH World Expo in Mumbai on February 24, 2011. Mr. K. Venkataramanan, Member of the Board and President (Engineering & Construction Projects), received the award on behalf of Mr. Naik from Mr. K. Sankaranarayanan, Governor of Maharashtra.

CHEMTECH Foundation is a leading industry association, which has been serving the Indian chemical and process industry since 1975. Instituted by the Foundation, the Hall of Fame Award seeks to recognise stellar contributions of industry leaders to Indian industry, R&D, and the environment.
ICAI Bestows Top Honour on YMD

The Institute of Chartered Accountants of India (ICAI) – the country’s apex body of Chartered Accountants – has bestowed its highest honour, ‘Business Achiever – Corporate’ for the year 2010 on L&T’s CFO, Mr. Y.M. Deosthalee. The award was presented to Mr. Deosthalee at a glittering function held at Kolkata on January 30, 2011. Mr. Deosthalee was honoured by the ICAI for his outstanding contribution to business leadership as a finance professional. The institute saluted his role in providing strategic direction to the business of development projects and Information Technology at L&T Group. The award was decided upon by a high powered jury chaired by Mr. Adi Godrej.

TCS Phase 1 bags honours from INSDAG

Institute for Steel Development & Growth (INSDAG) has awarded the first prize to L&T’s TCS Project-Phase 1 for its Design & Construction as an outstanding steel structure in India - 2009-10. This award was presented to L&T during the function held at New Delhi on 18th February. The structure has been adjudged as the best on the basis of time duration, quality, safety and complexity.
L&T’s Chairman & Managing Director, Mr. A. M. Naik, was featured among an elite group of business leaders who are giving thrust, direction and momentum to the process of change that is transforming India’s economic landscape. The book “In Search of Change Maestros” has been co-authored by management guru and former director of IIM – Lucknow Prof Pritam Singh along with Dr Asha Bhandarker – a member of the senior faculty at the Management Development Institute, Gurgaon. The volume was released at a gala launch function at the National Centre for the Performing Arts, Mumbai on Monday, March 7, 2011.

Inspired by the desire of the authors to seek out role models among India’s business leaders, the book is based on extensive interviews across different levels in several organizations. The authors said that Mr Naik embodied each of the five critical attributes of true leadership, viz., Credibility, Courage, Self-awareness, Ability to Operate in Adversity and People orientation. Another characteristic of Mr Naik was his constant desire to excel. Appropriately, the chapter on Mr Naik is titled ‘Towards the Next Orbit’.

The book launch was followed by a lively discussion where Mr Naik’s passionate views on nation-building and inclusive growth were applauded by the large gathering of top-flight executives and thought leaders.
L&T Wins Top Honours in Business world’s ‘Most Respected Company - 2011’ Rankings

Leading business magazine, Business world’s rankings of ‘Most Respected Companies’ saw stellar honours for L&T. In the sector-wise survey, L&T was ranked ‘India’s Most Respected Company’ in the Infrastructure category. In the overall rankings, L&T emerged second. The Award was presented by Union Finance Minister, Mr. Pranab Mukherjee, at a function in Delhi on February 08, 2011 to Mr. K. Venkataramanan, President (Engineering & Construction Projects) and Member of the Board.

Citing L&T’s recent achievements, the magazine said that many of the country’s most prestigious projects had L&T’s imprint. It quoted Mr. A.M. Naik, Chairman & Managing Director, saying: “We see a huge upside in being part of the India growth story. All our businesses have been formed with a vision of making them leaders in their segments with global benchmarking.”

Business world’s rankings are based on a rigorous peer group survey. The magazine had surveyed senior corporate executives of the rank of directors, vice-presidents, general managers. Short listed companies were ranked by an eminent jury.

The award affirms the respect that L&T enjoys among its peers in India Inc.