

HELMET

 Environment  Health  Safety

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OUR SAFETY OUR RESPONSIBILITY

Safety is all about
making our workmen
more enlightened and
empowered!

- SNS





Rajeev Jyoti

Chief Executive (Railway SBG - TIIC)

Foreword

“ Safety is a key priority for our leadership team. Besides, the project organization structure is evolved to provide significant autonomy to the safety function. ”

At the Railway SBG, safe work practices are paramount to our business.

Railways projects, being linear in nature, are typically spread across hundreds of km with a multitude of discrete risks that are both location and task specific. Therefore, risk identification and mitigation are continuous processes involving multiple teams across various stretches of the project.

Such challenges make Safety a key priority for the leadership team. Besides, the project organization structure is evolved to provide significant autonomy to the safety function.

Ensuring Safety in internationally funded mega projects through mechanization

The Railway SBG is one of the pioneers in deploying large scale mechanization in track laying and Overhead Electrification (OHE) that includes New Track Construction (NTC) machines, track stabilizing machines, UTVs, specialized augering machines, multi-axis mast grabbers, overhead wiring trains, to name a few. All of these have increased productivity and, at the same time, significantly reduced safety risks that are typical of conventional methods.

Leveraging systems and digital technologies

Across projects, EHS methodologies are continuously monitored and improved with regimented protocols and systems through Quarterly Audit Rating Scores (QARS) – a 20-point comprehensive process to evaluate EHS performance and identify thrust areas. This is further benchmarked through cross project reviews during periodic Safety Conclaves. Such methods allow us to update project specific requirements.

A case in point is one of our railway EPC projects in the Western Ghats that involves OHE installation in over 70 tunnels and 125 bridges over a stretch of 428 km (90% single line). This brings in numerous challenges in the implementation of safe work practices while working amidst highly restrictive ‘block sections’ involving significant material handling and unique erection methodologies.

Our Safety team has been at the forefront to harness digital technologies that include Virtual Reality based training and the implementation of Safety App ‘PREPS’ for critical safety checks that allow multilevel authorizations at work fronts.

- Monitoring the movement of multitude of Track and OHE construction machines in WDFC through first its kind deployment of a GPS-based Central Command Centre that tracks all the Track machines.
- Deployment of Train Warning Systems (TWS) across all mainline projects that are adjacent to live trunk routes - a radio-based system that is a significant upgrade to a traditional flag man based approach.

Safety Accolades

WDFC EMP-4 project has bagged the British Safety Council (BSC) ‘Sword of Honour’ award 2019 which is a coveted accolade at the global level recognizing meritorious performance and effective implementation of Health & Safety management systems by an organization.

Our Safety performance have won us prominent National & International

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accolades. WDFC CTP 1 - 2 project has won the prestigious ‘Sarvashreshtha Suraksha Puraskar’ Golden Trophy Award in the construction segment for the year 2017 - the highest honor instituted by the National Safety Council of India (NSCI). We have won this Trophy twice in the last 4 years.

The ‘OPGC Rail link project’ has thus far received INR 3.75 Cr as Safety Bonus from the client – ‘OPGC - American Energy Services’. The project has also won NSCI’s ‘Shreshtha Suraksha Puraskar’ in 2018.

International front

At the Mauritius Metro project, our Safe work practices establishes us at par with

world class SHE practices. The Phase 1 of the project is in commercial operation now in a record time of 2 years and we are the first Indian Company to have executed an Integrated LRT project overseas.

At the Riyadh Metro Line 1-2, the project has withstood the test of stringent global safety norms and has received multiple awards and recognition adjudged through Bechtel’s stringent Project Management Systems.

Despite all these accolades, challenges continue to remain to create a high level of Safety awareness and improve our safety performance – towards ‘Mission Zero Harm.’



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OUR SAFETY. OUR RESPONSIBILITY.

January is observed as 'Safety Month' at L&T Construction and it was no different this year as 'Safety Month 2020' was inaugurated at the HQ Manapakkam campus by Mr. S N Subrahmanyam, CEO & Managing Director, L&T, in the presence of the senior leadership of L&T Construction and some 2000 employees on the morning of January 4th 2020.

"Safety is all about being enlightened and empowered," declared SNS in his keynote address, stressing the importance of training and empowering workmen who were both the last

as well as the most important link in our delivery chain. "A small mistake by a workman can result in a serious incident endangering the lives of many and hence it is extremely important to sensitize our workmen to proper EHS methods to ensure that they act and remain safe at sites." Acknowledging the fact that our workforce is largely unskilled and migratory in nature, he said, "While, on

one hand, we need to continuously train and re-train our workmen, on the other, we must think differently to address this issue: perhaps by getting larger gangs who will remain together longer with us and by improving their habitations as well."

The rising number of fatalities has been a growing concern for our senior management and SNS minced no

words when addressing it. "It is getting increasingly difficult to explain some of these incidents at the apex level," he lamented. "What's disturbing is that the same kind of mistakes are being repeated. Time has come and the management may be forced to take sterner steps going forward if this trend continues. It is great that we have introduced so many new EHS initiatives, new systems, processes



and digital solutions to improve our safety, but these,” emphasized SNS, “are only worth if we are able reduce the number of fatalities and incidents at site.”

The event, aptly themed ‘Our Safety. Our responsibility’, to drive the thought that safety was a shared responsibility and that it was imperative to ‘be safe’ for all to ‘remain safe’, began with Mr. S Kanappan, Chief Executive, L&T GeoStructure leading everyone by administering the Safety Pledge, after which Mr. M V Satish, Whole Time Director & Senior Executive Vice President, Buildings, Minerals & Metals, took the podium to deliver this welcome address. “We received a total of 11 Sword of Honor awards,” he began on a positive note quickly adding that 10 of them had been won by B&F to loud applause. “We have also won 62 RoSPA Awards – 22 by PT&D and 11 each by WET & B&F ICs,” he shared, but immediately sobered by sharing the chilling details about the quantum increase in the number of fatalities in 2019 compared

to the previous year. “Safety works when people work together. We had been talking about bringing a positive culture to the workplace to take our EHS management practices to meet global best practices. But culture can only be changed when we change our way of working and that too consistently over a longer period. There is no short cut to this!”

MVS pointed out that one of the basic EHS problems faced at site was the “momentary unsafe behavior of people leading to accidents,” acts that were difficult to monitor and control. “We are therefore empowering our workmen to intervene when they observe unsafe behaviors of fellow workmen, speak to them and convince them to correct their ways. We have requested all our project managers to put up signboards at all conspicuous places at sites to authorize workmen to “stop work”, if they feel that the workplace is unsafe. To start with, we introduced this practice at the sites that were nominated for the five-star audit of the British Safety Council but



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S. N. Subrahmanyan
Chief Executive Officer & Managing Director,
Larsen & Toubro

have now started to implement it across all our project sites,” he elaborated.

An important aspect raised by SNS was about maintaining safety at the campus which was addressed by Mr. K P Ravinath, Head - Environment



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M V Satish,
Whole Time Director & Senior Executive Vice President, Buildings, Minerals & Metals

Health & Safety (EHS), L&T Geo Structure IC, when sharing the list of activities that have been planned during the Safety Month. “We shall form an action committee to conduct a comprehensive risk assessment for all the critical activities at HQ including traffic control, defensive driving initiatives and fire-fighting training for the canteen and security staff and take corrective steps,” he promised before referring to the other EHS activities that includes a blood donation camp, an eye check-up camp and a beach cleaning exercise.

The short and focused event that was ably compered by Vivek Rai, Senior Engineer (Civil), WET IC, ended with Mr. S.L. Mahajan, VP & Head, Sub-station BU, PT&D IC according the vote of thanks.

We do hope that everyone who attended the event will take cognizance of what our senior management had to share on safety, remain ever alert to following safety practices because at end of the day, our safety is our responsibility. ■



The L&T Construction EHS team with SNS



BUILDING A NUCLEAR POWER PLANT WITH AWARD-WINNING SAFETY STANDARDS!

Kakrapar Nuclear Power Plant Units 3&4 - The 2019 Safety Award winner!

Building a nuclear power plant is not everybody's cup of tea. Very few Indian organizations even attempt them but with our capability and expertise, L&T has built most of the country's nuclear power plants to scale and quality and are in the process of constructing India's largest and first indigenous nuclear facility – the Kakrapar Nuclear Power Plant Units 3 & 4 (2 x 700 Mwe). "Size and scale describe this project," shares Project Manager, S A Subramanian (SAS), glancing out of his project cabin at the beehive of activity that is his site, reeling off a few numbers to support his statement. "We will use some 9 lakh cu.m of concrete, 8 different grades of concrete types, and some 1.5 lakh tons of steel, enough to build about 16 Eiffel Towers." Along with size and scale, comes the added responsibility of maintaining a high EHS standard and the fact that the site has already clocked 29.8 million safe manhours with Zero LTI and fatalities speak volumes of the efficiency of Manager EHS, S Sairam and his team. "We don't do things very differently at KAPP 3 & 4," says Sairam, very unassumingly, "but what we do, we do well which is perhaps why we are proud to have won the Safety Award 2019."

Keeping safe during critical activities

To construct the complex 166 m Natural Draft Cooling Tower shells, the team evolved several in house improvements in the jumpform system to successfully erect four of these towers without any incident. Individual bracket shoes were introduced for the inner and outer jumpforms with additional wire rope slings to interconnect them, safety nets with mono filament layers and metal walkways instead of wooden ones.

Another critical activity was the erection and dismantling of tower cranes inside the NDCTs that involved raising them up to a height of 193 m with nine levels of guying arrangements. It was important to ensure that the concrete was strong enough to hold the towers from all directions, to maintain the plumb of the tower crane right from the raft to the swing unit with a tolerance of just 40 mm. Dismantling the main jib was equally critical: reducing the height of the tower in reverse order by carefully releasing the guying rope one by one.

Specialized work like those of electricians, riggers, crane operators, scaffolders, signalmen, etc. were authorized by a specially formed committee that screened all workmen before deployment and issued separate



S A Subramanian
Project Manager

Size and scale describe this project. We will use some 9 lakh cu.m of concrete, 8 different grades of concrete types, and some 1.5 lakh tons of steel, enough to build about 16 Eiffel Towers.



Construction of the reactor building in progress

authorization cards with photo IDs to prevent unauthorized work.

4174 workmen trained in 2019 alone!

At a site where the strength of the workforce is about 1,400 at peak, the statistic that in 2019 alone, 4174 workmen were trained and retrained for induction reflects the issue that most construction sites face of a migratory and unskilled labour force. "We have a well-organized induction training system at KAPP 3 & 4," assures Sairam, "and every person entering the site premises must undergo a 4-hour induction programme that includes training and a quiz on safety training in the language of their

preference." A green passport permitting entry into the site bearing the person's name, name of organization, validity, type of training undergone, etc. is issued only after the person has successfully completed the quiz. "The validity of the permanent gate passes for all employees and sub-contractors are linked to the validity of the Green Passport which is for a maximum of 6 months," adds Sairam, "and everyone has to undergo refresher induction training every 6 months." Since a bulk of the work was occurring at heights of up to 166 m, vertical stretchers and man baskets were made readily available and emergency exercises and mock drills were conducted every three months to



S Sairam
Manager, EHS

We don't do things very differently at KAPP 3 & 4, but what we do, we do well which is perhaps why we are proud to have won the Safety Award 2019.



assess the response time for evacuation during an emergency.

To do exactly what is expected of you

Risk and potentially hazardous situations can be pre-empted to a large



Workmen fixing the individual panels of the prefabricated ring liner



extent with proper and in-depth pre-job briefings especially at a nuclear plant site that help plan people's daily activities and even to arrange for resources. "Every day is a new day at site and work dynamics always throw up new work and EHS challenges which are often addressed at these pre-job briefings," says Sairam who points out that 8,249 briefings were done during 2019.

Know risk, no risk

SAS is particularly happy about the robust risk assessment system instituted at site whereby all perceivable work associated risks are systematically and thoroughly assessed with effective

control measures formulated and implemented. "We prepared 122 risk assessments and subsequent SWMs in our four packages," he shares, referring to the diversity and varying nature of work involved. "All these were conducted by a team of people associated with the work right from section in-charges, supported by department In-charges, site engineers, supervisors, technicians, operators, workmen and other stakeholders." It is only after the approval of the risk assessment that a job inspection checklist is prepared for any activity listing the vital risk control measures as checkpoints that are ensured during pre-start verification.

Work permits: a simple but sure route to safety

The several high-risk activities were carried out with proper work permits. "We have a well reinforced work permit system involving 4-stage verification including the final approval by the NPCIL ENC." In fact, the work permit for tasks in confined spaces requires an additional approval from NPCIL, only granted after the competence of workman involved is ascertained. Approximately 75 different work permits have been issued at KAPP 3 & 4 after thorough inspection and then continuously monitored daily.



Mr. S.N. Subrahmanyam, Chief Executive Officer & Managing Director, L&T, along with Mr. D.K. Sen, Whole Time Director & Senior Executive Vice President (Infrastructure), Mr. S.V. Desai, Senior Vice President & Head (Heavy Civil Infrastructure) and Mr. R. Anbalagan, Executive Vice President & Head - Hydel, Tunnels, Nuclear and Special Bridges SBG presents the Annual EHS Trophy to Mr. S.A. Subramanian, Project Manager - KAPP 3&4

Training and counselling create the right mindset

Following safe procedures, practices and standard protocols at site is a matter of having the right mindset and, training is that vital enabler. "Apart from normal training, under our strategic EHS Plan, we conduct rigorous job-related training for the relevant workforce to disseminate Safe Work Methods," mentions Sairam who elaborates, "If a

workman is found guilty of an unsafe act at site, we counsel him of the possible harmful consequences of his act and how he should have ideally acted in that situation." The details of the counselling are registered both in a counselling register and the safety induction card for monitoring. "If a person commits 3 violations, stringent action is taken that can even mean termination or monetary penalty on the sub-contractor," says Sairam, sternly. Monthly building-wise

meetings involving the EHS Engineer, EHS Supervisors, EHS Stewards and the Section In charge are conducted to plan and pre-empt unsafe situations.

The rewards of man-to-man marking

There is one EHS Steward for every 100 workmen and one EHS Supervisor for every 500 workmen to maintain EHS standards. "They jointly inspect workplaces with a person from the

relevant department on a monthly basis that are reviewed daily apart from weekly meetings to share alerts, if any." Sairam's EHS procedures are robust and the 49 reported near misses reflect a culture of fearlessly sharing bad news. "Our EHS Stewards conduct daily illumination surveys too across work areas and any inadequacy in illumination is communicated at once to the site engineer for immediate action. These illumination surveys are then reviewed and concurred by safety professionals from the client."

Managing sub-contractors to ensure safety adherence

Sub-contractors can either make or break an EHS system at site and therefore high on Sairam's priority list is sub-contractor management. "Our Section and EHS In-charges have scheduled monthly meetings with the sub-contractor at which all safety-

related aspects are addressed. Activities are reviewed, major and minor incidents at site discussed and deficiencies evaluated. We even recognize the best performing sub-contractor of the month with an award," he smiles.

A slew of sustainable initiatives

While SAS and his team strive to significantly enhance the country's nuclear power capacity, they have not forgotten the society they are part of and have kicked-off several sustainability initiatives. Taking cognizance of the frequent road accidents recorded on the highway leading to the site, the team organized a Road Safety programme as part of the National Road Safety Week from 4th to 10th February 2019 during which a drawing competition themed 'Road Safety - Life Safety' was organized for local high school students, who participated enthusiastically. At a diabetes awareness campaign, workmen

over the age of 40 were examined and medicines prescribed wherever required while 116 units of blood were donated after a blood donation camp that was organized in collaboration with the local blood bank centre.

"If a family member of any of our workmen requires blood, they can contact us, and we can arrange it for them through our contacts with the local blood bank. One more way to build bridges with the workman," nods Sairam.

Managing an impeccable EHS record at such a huge and challenging site is an equally demanding task and the team at KAPP Units 3 & 4 are worthy winners of not only the Safety Award for 2019 but also a surfeit of other awards including rousing accolades from the client. Here is wishing SAS, Sairam and team all the very best to keep their wonderful EHS record intact till handover! ■



- Undesignated pathway
- Loose materials over the beam
- Trailing cable
- Unsecured platform
- No railing for the pathway
- Protruding bolts





Building high-rises by maintaining very tall EHS standards

Oberoi Sky City -
A much-awarded site!

The Oberoi Sky City project taking shape in Mumbai's Borivali (Western Suburbs) is a group of 5 high-rises that will tower to 61 storeys though the more remarkable aspect of this project is the number of Safety awards it has already mopped up and undoubtedly a matter of great pride for Project Director, Vinayak Vilasrao Bhosale and his EHS team led by EHS Manager, Sharad Dattatray Mutkule. In 2017, it achieved a **'5-star rating in the BSC FSA Audit 2017'** (as one of auditees in a Cluster Level Audit). In 2018, the project bagged the **'Annual EHS Trophy'** in the **'Major Category'**, achieved a **'4-star BSC (British Safety Council) FSA Audit'** and received an **'Appreciation Certificate from the National Safety Council of India (NSCI)'** during their Safety Awards. In 2019, Vinayak's project set fresh benchmarks winning the **'Annual EHS Trophy 2019'** among residential buildings, bagging the

'RoSPA Gold Award', picking up **'NSCI's Prashansa Patra'** as part of their Safety Awards, winning a **'special mention at the L&T Construction's Annual Safety Awards'** for 2019 and, the icing on the cake, being a **'5-star rating along with BSC's 'Sword of Honour'** award. "Of course, our intent has not been to win awards," smiles Vinayak, "but to keep the EHS flag flying in our project and we are happy that we have succeeded thus far." Oberoi Sky City has also completed 15 million safe man hours in the process.

"We have evolved a project specific EHS policy that is in sync with the requirements stipulated in the BOCW Act 1996," explains Sharad, "and remain committed to maintain excellent EHS standards at site with a detailed plan to drive our EHS objectives and functions.

Our EHS Management System Manual conforms to the requirements of ISO 14001:2015 & ISO 45001:2018." The migration from OHSAS 18001:2007 to ISO 45001:2018 was critical as Vinayak shares. "There were key areas of improvement such as leadership & worker participation, opportunities to eliminate hazards or reduce risk during the HIRA process, address external hazards, manage change, etc. but with the guidance of our top management and with guidance at various levels, we demonstrated, implemented, sustained and managed EHS requirements at site as a team that is always ready to seek opportunities for improvement with agility," he adds confidently. He specially mentions the "positive and motivational support" he received from Cluster Project Manager Pankaj Suraj

Lalla, Cluster EHS Manager Shailesh Patel & other departments i.e. CMPC, P&M, Formwork at cluster as well as HQ levels in his endeavour to keep the site's EHS slate clean.

Communication.
Consultation.
Participation.

Vinayak's approach to drive safety is very simple. "To make every individual safety conscious, we have to demonstrate that we are serious about safety and my team and I never lose a single opportunity to do so." Apart from a project specific EHS Policy, the team commits adequate resources to implement high EHS standards, set stringent EHS objectives and regularly review them for proper compliance. "We have integrated our





Mutkule Sharad Dattatray
EHS Manager

One of most important management decisions we took was to make HIRA available in Hindi to reduce the language barrier. It was a very good move for it motivated workmen to be safety conscious, it changed their perceptions towards safety and convinced them that the management meant business when it came to EHS.

EHS requirements to the organization's business processes," explains Vinayak that include formwork & rebar inspections, concrete pour clearances, daily ACS & safety screen inspections, ACS & safety screen climbing permits, P&M SOP compliances, WO/PO processes, recruitment, screening and competence processes.

Sharad's EHS strategy sits on a tripod of Communication, Consultation and Participation. "Under 'Communication', we have EHS induction, on-the-job and in-house training, daily toolbox and pep talks, instant safety alerts, careful recording and action-oriented monthly EHS committee meetings and, of course, the Safety app." His mandate under 'Consultation' includes communication of the EHS Policy to all stakeholders, EHS considerations in WO & LOI, EHS and workmen habitat satisfaction surveys and the formation of project sub-committees. Participation is perhaps the most important aspect for the team that involves EHS walk downs, monthly committee & sub-committee meetings, incident investigations, EHS training & campaigns and participation in the HIRA process.

The issues of size and control

Driving a work force of 1,400+ to observe and maintain safety is no mean task. "One of most important management decisions we took," shares Sharad, "was to make HIRA available in Hindi to reduce the language barrier. It was a very good move for it motivated workmen to be safety conscious, it changed their perceptions towards safety and convinced them that the management meant business when it came to EHS."



Mr. Vinayak Bhosale, Project Manager receiving the Sword of Honour from Mr. Mike Robinson, CEO of British Safety Council

Another challenge facing Vinayak, Sharad and team was the involvement of multiple stakeholders in the project all of whom were not under their control, though their EHS adherence was the team's responsibility. They addressed this situation by implementing work permits, having dedicated pathways and deploying flagmen to control their influence.

All project managers have the responsibility to maintain the pace of construction to meet their business targets but those can never be at the cost of safety. To keep up with the asking rate, Vinayak and team have evolved some smart construction methods. "We found a cost-effective solution for peripheral fall protection during block work activity by replacing the conventional safety net system with a steel mesh," he mentions. "It was fabricated at site



Mr. Vinayak Bhosale and Mr. Sharad Mutkule, EHS In-charge receiving the Annual EHS Trophy from Mr. M.V. Satish



Vinayak Vilasrao Bhosale
Project Manager

We found a cost-effective solution for peripheral fall protection during block work activity by replacing the conventional safety net system with a steel mesh. It was fabricated at site using scrap material and since it could be easily fixed, removed and shifted by the masons themselves, it saved us the need for dedicated workmen for this purpose.

using scrap material and since it could be easily fixed, removed and shifted by the masons themselves, it saved us the need for dedicated workmen for this purpose." Another initiative was the introduction of fall protection inside the lift shafts during finishing activities. EHS performance is regularly monitored on a digital dashboard and "workmen satisfaction surveys regarding their camp are displayed," adds Sharad.

Change management is a leader's sternest test and for Vinayak and team, change has been constant adding to their list of challenges but thus far, they have held their own and as the various towers have grown taller, so also has their EHS performance.

Here is wishing Vinayak Bhosale, Sharad Mutkule and team the very best in their pursuit of EHS excellence and, of course, lots more awards and recognition. ■

CLOSE CALL

Safe working with machines & tools

Scenario

A Rail-cum-Road Vehicle (RRV) Concrete shifter was shifting pit covers during a night shift. When reversing, the left rear wheel de-railed as fish plates were not fixed in the rail joints of the DFCC tracks.

What was the cause?

Fish plates were not welded in the rail joints of the DFCC tracks.

What are the precautions to be taken to prevent reoccurrence?

1. Route survey to be conducted before marching the vehicle on the track
2. Sufficient illumination to be ensured during night hour working
3. Signaller / flagman should sound timely alerts about the movement of RRVs to ensure safety.



PHEW!



Driving to stay safe on the highway!

Yadgiri to Warangal Road project - A 99-km EHS challenge

As part of the plan of the National Highways Authority of India (NHAI) to enhance connectivity in the young state of Telangana, L&T has been contracted to convert a 99 km 2-lane stretch from Yadgiri to Warangal on NH 163 running across two districts into a modern 4-lane highway to meet the growing demand for the movement of people and goods. The challenge facing Project Head, V B S P K Chakravarthy, EHS Head, M Pedda Minnella and team is to evolve plans to keep men, material and machinery safe next to a buzzing highway. That they have clocked 12.36 safe million man hours since the inception of the project till date, have no recorded LTI or fatalities at site and have won a special

mention at the Annual Safety Awards of L&T Construction reflect their rousing success.



V.B.S.P.K. Chakravarthy
Project Head

A lot of our success is thanks to our strategy of dividing our safety initiatives into various buckets for flawless implementation and regular monitoring like roadside works, structures, P&M, administration and housekeeping.



The project is already in an advanced stage of completion with the team having executed several challenging tasks like 34 km of flexible and 133 km of rigid pavements, two Rail Over Bridges, a flyover, three OHE lines of 132 & 220 kV, 10 RE walls and a toll plaza and a lot of our success as Chakravarthy shares, "is thanks to our strategy of dividing our safety initiatives into various buckets for flawless implementation and regular monitoring like roadside works, structures, P&M, administration and housekeeping."

Diverting 'live' traffic to work safely

Roadside works are undoubtedly the most critical as one hazard all road

projects face is to remain safe while working next to heavy, 'live' traffic. "Our well-planned and carefully implemented traffic diversions are as per IRC SP55 to prevent work zone incidents," elaborates Minnella, joining the discussion and mentioning that the VECT initiative, that has been introduced in TI IC, has been successfully implemented as per IMS, again to prevent traffic accidents. A frequent incident that occurs at road projects is of rollers toppling over, "so we constructed high embankments," he explains, "and procured permits for RE wall edge compaction that has prevented even a single incident from happening." Minnella's smile says a lot. Whenever work is carried out close to 'live' OHE lines, clear goal posts and barricades pre-empt incidents.

Following safety norms in construction

RE panels at site are always lifted with double wire rope slings, chemical anchor fasteners used as end girder lateral supports in consultation with EDRC & Hilti teams while strengthened spreader beams are used to lift and erect girders. Wheel choke blocks, delay & safe starters have been employed in rollers & graders and stoppers for wheel loader buckets during maintenance. Regular sprinkling of water has kept the dust down at the crusher plant while all the blasting at site has been well controlled to prevent noise pollution and keep the work zone safe. "It was observed that drivers of transit mixers were working



RCC girder erection



M Pedda Minnella
EHS Head

While VR training has simulated real life situations for the workmen to understand better, the Safety RtR app was a huge success. In fact, in October 2019 alone we had 224 RtRs raised and approved by ESHO.



continuously for 12 hours which was hazardous," mentions Minnella, "hence a second shift was introduced to ensure that accidents did not happen due to driver fatigue."

Administrative control

Workmen camps organized close to the work locations have significantly minimised the stress of transporting workmen to and from the site every day. Apart from rest sheds at work locations

provided with drinking water, first aid facilities are readily available at site and weekly health checkup camps are conducted by the Government's ESI Department.

Digital initiatives

Digital initiatives like VR training have gone a long way to keep EHS standards high. "While VR training has simulated real life situations for the workmen to understand better, the Safety RtR app

has been a huge success," says Minnella. "In fact, in October 2019 alone we had 224 RtRs raised and approved by ESHO." ETICS is another digital initiative that has gained traction with the project team.

"A good indication of a sound safe work culture at site is near miss reporting," shares Subhamoy Maitra, EHS - Head, RREC SBG, "and the fact that there have been as many as 46 reported near misses at the Yadgiri-Warangal site is encouraging because for me, these were 46 potentially dangerous situations that were addressed because they were timely reported by site personnel." There have also been 4850 EHS Observations which is a mere 0.4% of the safe million safe hours clocked by the site.

For Chakravarthy, Minnella and team, although the absence of LTI and fatalities have obviously been highpoints in



Traffic diversion



Steel girder erection



Subhamoy Maitra
EHS - Head, RREC SBG

A good indication of a sound safe work culture at site is near miss reporting and the fact that there have been as many as 46 reported near misses at the Yadgiri-Warangal site is encouraging because for me, these were 46 potentially dangerous situations that were addressed because they were timely reported by site personnel.

their EHS performance, client appreciation has been even sweeter, especially the two awards that they won from NHAI for completing 6 million and 10 million safe man hours respectively. "We have also implemented 72% of the Golden Rules," adds Chakravarthy, with satisfaction. ■



THE SECRET TO CREATING MORE ENGAGED AND EMPOWERED WORKMEN

"Engage and empower workmen for them to drive our Vision Zero Harm," emphasised our CEO & Managing Director, Mr. S N Subrahmanyam, during his keynote address at the Safety Month – 2020 inauguration. At first consideration, it seems an obvious solution to tackle the menace of increasing fatalities and incidents at various L&T Construction project sites. Several studies have revealed how 'engaged' workmen are more productive, more committed, more willing to go the extra mile and, most importantly from our perspective, less inclined to leave a project. Most project managers and EHS Heads at L&T Construction struggle with the

migratory and unskilled nature of our labour force but the inescapable fact is that making workmen feel 'wanted' and 'a part of the project' go a long way to improve the safety of a site because at the end of the day, "everyone wants to return home safe after every shift," points out K N Sen, EHS – Head, MMH SBG.

"The difference between an engaged and a disengaged workman is obvious," remarks Stephen Phillip Storey, Head – EHS, Heavy Civil IC. "In fact, you even see it amongst our employees. Some who come in 10 minutes early eager to start work every morning are far more committed, productive and engaged than those who literally drag themselves

to work doing nothing more than what they are told. The same is the case with workmen. Some are more involved than others and the secret is to motivate those chaps to spread their positivity to the other workmen at site." The million-dollar question, however, is how to make this happen and there are some basic thumb rules that project managers and EHS Heads could follow to work towards creating a more engaged and empowered workforce.

Why am I doing what I am doing?

Clarity of role is perhaps the most important aspect of engaging a workman. Often, either due to lack of time or patience or a host of other reasons, managers and supervisors are seen directing workmen to do some seemingly disconnected work for that day alone without explaining to them why they are doing it or how what they are doing will help overall project delivery. "This is the perfect recipe for disengagement," warns M Kamarajan (MK), EHS – Advisor, B&F IC. "Without sharing with workmen the importance of what they are doing, they will remain disconnected and uninvolved in what the project

team is trying to achieve. They start to move about aimlessly and disinterestedly from one day to another, from one task to another and are prone to leave sites at the drop of a hat or helmet," he smiles at his pun. There is nothing of interest or value to hold them back. It is the onus of the senior management at site therefore to seek and find the early adopters who can be the prime drivers to make others appreciate the importance of their work and take pride in what they are doing. It is a gradual shift starting with a few that expands as leadership demonstrates care for and trust in their workmen which in turn get translated into creating and maintaining a safe work culture.

How am I contributing to the success of my project?

"One important message that we used to engage workmen at the Statue of Unity site was to impress upon them that they were actually involved in creating history by building the world's tallest statue," shares Santhosh Bhaskar, the successful EHS Head at SoU. While daily pre-job briefings and tool-box



Welding demonstration to workmen



Mobile training program to workmen

talks are essential, it is equally important for workmen to be made aware of the big picture, the larger project objectives and how they are contributing to building vital infrastructure. "Actually, sharing the big picture is an excellent way to instil pride in workmen," agrees P Nagarajan, EHS – Head, B&F IC, "and this is one big advantage that we at L&T enjoy because almost every project that we do involves nation-building and by explaining this, gives workmen a larger purpose than just doing some unimportant work at some site."

"I am somebody at site!"

"At Heavy Civil IC, because of the size and scale of our projects and the huge

number of workmen involved, it is very easy for workmen to be treated as 'invisibles' at site," shares Stephen. "Just imagine the pride of a workman if he is addressed by his name!" What Stephen is referring to is the law of reciprocity that if you recognize a person, he or she will be more inclined to give back more which is how relationships are built. It creates and enhances perceptions of fairness amongst workmen; more importantly, it drives other workmen to want to be similarly 'recognized.' "Recognition has a very positive multiplier effect," says Subhamoy Maitra, Head – EHS, RREC SBG, "they become more receptive to our safety messages; they become our ambassadors to spread the safety message amongst the rest of the workforce." Rewards are undoubtedly



P Nagarajan,
EHS – Head, B&F IC,

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Subhamoy Maitra
Head - EHS, RREC SBG

important, but recognition weighs heavier and, "recognition can even be in the form of better habitation for the workmen," mentions K P Ravinath, EHS - Head, L&T GeoStructure. "When they are better rested and contented, they are more enthused to work that, needless to say, will improve overall productivity." Satisfied workmen attract more of their

ilk which has two advantages for the site: bigger, like-minded gangs who are more likely to stay longer.

Training and counselling

"Training makes a workman feel wanted," shares KPRn, "makes him feel that the organization is serious about him and values his contribution." Training is a continuous affair due to workmen coming and going so Santhosh and his team would have trained some 20,000 although even at peak time, the size of workforce at the SoU site would have been about 4,000. WISA, the new digital system of workmen induction, is going a long way to help K S Sudheesh Kumar, EHS - Head, WET IC and team to train workmen better. "Today by maintaining records, we are able to provide unique training to workmen rather than retraining them the same



K P Ravinath,
EHS - Head, L&T
GeoStructure

Training makes a workman feel wanted, makes him feel that the organization is serious about him and values his contribution.



trades if they re-joined us." Counselling also helps in inculcating a safe work culture as S Sairam, Manager - EHS at Kakrapar Nuclear Power Plant site explains. "If a workman is found guilty of an unsafe act at site, we counsel him of the possible harmful consequences of his act and how he should have ideally acted in that situation and if a person commits 3 violations, stringent action is



Workmen being trained to remain safe in water



Gas cutting demonstration



K S Sudheesh
Kumar
EHS - Head, WET IC

Today by maintaining records, we are able to provide unique training to workmen rather than retraining them the same trades if they re-joined us.



taken that can even mean termination or monetary penalty on the subcontractor."

Empowerment

When all these factors work in concert, workmen feel empowered to actively contribute to the success of a site. In fact, M V Satish, Whole Time Director & Senior Executive Vice President (Buildings, Minerals & Metals) during his welcome address at the Safety Month inauguration mentioned an important initiative. "We have empowered workmen to intervene and stop another workman if the latter is committing an unsafe act," he said. "Such empowerment along with their

'right to refuse to work in an unsafe condition' is bringing extremely positive results among the workforce," he added.

"Near miss reporting is another strong indicator of workmen empowerment at site from an EHS perspective," points out Subhamoy, "because it shows that they are fearless about raising the flag if they see an unsafe act or an unsafe situation, confident in the knowledge that there will be no retribution if they do so. That, to my mind, is the best situation to have at any site."



A dramatic briefing of an electrical hazard



We have empowered workmen to intervene and stop another workman if the latter is committing an unsafe act. Such empowerment along with their 'right to refuse to work in an unsafe condition' is bringing extremely positive results among the workforce.

M V Satish
Whole Time Director & Senior Executive Vice President (Buildings, Minerals & Metals)

Very often, due importance is not accorded to our labour force although they are the ones at the firing line doing the work; their wellbeing, their sense of belonging and their commitment can make or break a project – a fact that is not always acknowledged. It is high time that we do so. ■

Top 10 Signs that Worker Engagement is supporting a positive shift in Safety Culture

- There is visible leadership commitment to safety at every level of the organization.
- All the workforce throughout the organization exhibit a basic working knowledge of safety and are risk aware.
- There is visible evidence of a financial investment in safety that is viewed and perceived as an investment, not a cost.
- Opportunities for improvement in safety are dealt with in a timely and efficient manner before issues or problems escalate which may cause accidents or incidents if ignored.
- Workforce communication on safety is clear, regular and transparent so the transfer of safety knowledge is successful.
- All levels of the workforce from top to bottom of the organization demonstrate meaningful involvement in safety.
- Leaders or Managers regularly visit worksites and engage one to one with the workforce to discuss problems to understand safety issues, make decisions and initiate quick action to prevent potential accidents or incidents. "Visual Safety leadership Observed by the Workforce"
- Safety is the first item in the agenda of every meeting to send out a loud & clear message that safety is important, and the organization is not just paying lip service.



Proving their mettle ... safely!

Hot Strip Mill Project at Rourkela for SAIL

The MMH SBG has constructed a state-of-the-art 3 MPTA Hot Strip Mill – II for Steel Authority in India Limited at Rourkela, which also happens to be L&T's first EPC project in collaboration with Mitsubishi Corporation, Japan. For Project Head, R Uma Sathiyam, the mandate is clear: live up to the trust reposed on L&T by a long-term client, meet the stringent Japanese requirements and, of course, build an infrastructure that makes India proud. With a labour force of close to 5,400 in tough conditions at a project that is spread over 0.58 sq. km, both Sathiyam and EHS Head, R Uma Shankar, had the added responsibility to maintain high EHS standards. As of November 2019, the

site has clocked 37.5 million safe man hours and Uma Shankar is quick to add that they have had no incidents "due to accidents, environmental pollution, fire, explosions, uncontrolled waste water or oil discharge, spillages and the like that are typical of a steel plant project." The site enjoys a clean record too regarding fatalities though there have been 7 reported near misses.

This safety performance is even more creditable when one considers the variety of critical operations that the project team has already executed including the erection of two 112 m tall stacks, an overhead tank 48 m high,



R. Uma Sathiyam
Project Head

Leadership plays a very important role in keeping high safety standards at site and therefore we lead from the front in identifying hazards, defining EHS targets, ensuring a safe and healthy system, using safe equipment, improving qualifications and, most importantly, investing in people. We want them to drive our EHS initiatives and if we have thus far succeeded in our Vision Zero Harm, it is really thanks to their efforts.



scale pit and ROT structures involving depths of 23 m and 18 m respectively, successful installation and charging of a 220 kV transmission line (also the first executed by MMH SBG) and installation of a 33 kV GIS that is India's largest single board GIS with a sectionalizer, 2 bus couplers and 37 bays.

"Leadership plays a very important role in keeping high safety standards at site," remarks Sathiyam, "and therefore

we lead from the front in identifying hazards, defining EHS targets, ensuring a safe and healthy system, using safe equipment, improving qualifications and, most importantly, investing in people. We want them to drive our EHS initiatives and if we have thus far succeeded in our Vision Zero Harm, it is really thanks to their efforts." He is visibly proud of his team's achievements. While empowerment is fine, reasonable control is necessary to keep things on

track that are in the form of consequence management, counselling repeated violators and violation memos or even show cause notices in extreme cases. "We have had 13,451 EHS Observations and 17 audits of which 5 have been by external agencies," says Uma Shankar, adding with a smile, "We are sure that we are doing a good job but it is nice to be told so by external parties once in a while." The taste of success for Uma Shankar and his team is even sweeter as they must comply with certain extremely stringent requirements from both the client, SAIL, and the government of Odisha.

He ticks off several safety routines that are strictly followed at site like daily morning stand down meetings, monthly mass meetings, recognizing safety promoters, and other steps like clearly designated parking zones, defined areas



Uma Shankar
Project Head

We are very conscious of the environment too and regularly monitor the quality of ambient air, noise created and illumination at site apart from planting saplings and increasing the green cover.



for vehicle and people movement and events promoting safety initiatives such as quizzes and sports competitions. A slew of digital initiatives like the i-INS System, the app-based EHS observation system, app-based rigging permit and



PTW systems have helped enormously to improve the site's safety performance.

An encouraging sight at the project site is the number of large and colourful display boards that keep reminding everyone the importance of safety in everything they do.

"We have already conducted some 650 training programmes including VR modules and have trained over 13,000 workmen although at peak our strength has been about 5,400," says Uma Shankar, alluding to the migratory nature of his workforce. "We



Mr. Ranjan Roy-Project Director, Mr. Umasathiyam-Project Manager and Mr. Umashankar-EHSM receives the Annual EHS Trophy from Mr. Anupam Kumar-SBG Head-MMH. Also in the picture: Mr. T.Kumaresan-M&M BU Head and Mr. K.N. Sen-Head EHS



are very conscious of the environment too and regularly monitor the quality of ambient air, noise created and illumination at site apart from planting saplings and increasing the green cover." The quality of workmen camps is of a high order with clean, well-maintained toilet facilities, hygienic drinking water and paramedical services in attendance 24x7.

For such impeccable EHS work, the accolades and awards are only to be expected. "We won FICCI's Quality Systems Efficiency Platinum Award in 2018 and the RoSPA Gold Award in 2019," shares Uma Shankar proudly, "apart from the awards from our client for achieving milestones in completing safe million man hours. We were among the most digitally enabled sites in MMH

last year," he says. In addition, both workmen and employees are recognized with monthly safety awards and the Best Safety Conscious award.

As the project proceeds rapidly towards completion, here is wishing Sathiyam, Uma Shankar and team to keep their safety record intact and deliver an excellent project. ■

SPOT THE HAZARDS

If you have spotted the hazards, rush them to gdivakar@Intecc.com



**23 CRORE PEOPLE.
0 INCIDENTS!**

Prayagraj Smart City Project -
A winner in keeping people safe!

Normally, projects that win Safety Awards are those that score heavily on maintaining high EHS standards without LTI. The Prayagraj Smart City project has won plaudits not only for the project team's sterling EHS performance but also for keeping some 23 crore people safe during the Kumbha Mela or the festival of the sacred pitcher, that witnesses the world's largest and densest congregation of pilgrims within a two-month window. Such mammoth gatherings, the world over, are prone to stampedes and fatal incidents and therefore it is not without reason that Project Manager, Jignesh Dube, EHS In-Charge Chetan Dambhare and the UP police are all an extremely



As we discussed, our list of deliverables kept increasing and our deadline shorter.

Jignesh Dube
Project Manager



relieved and happy lot. Together, they successfully managed (if it can be termed that!) this monstrous influx of people into the city of Prayagraj and ensured their safe return after a holy dip!

Expanding list of challenges

The challenge facing the UP government and police was to evolve measures to ensure that the Kumbha event passed off peacefully without any major incident. After much research, studies

and brainstorming, they concluded that the answer lay in employing smart digital solutions for better surveillance, crowd control and prevention of untoward incidents. The tough mandate was awarded to L&T's Smart World Communication (SWC) business unit along with a crushing deadline to install, test and certify the smart solutions well ahead of the commencement of the festival on 5th January 2019.

"As we discussed, our list of deliverables kept increasing and our deadline shorter," shares young Jignesh, for whom the project was almost like a snowball: getting bigger as it progressed! His final list of deliverables included 1,000+ surveillance cameras across 250 locations, integration of these to the existing set of cameras, adaptive traffic control systems replete with automatic number plate recognition cameras at 18 junctions, an Integrated Command &

Control Centre (ICCC), multiple viewing command centres, video management & real time video analysis, a data & disaster recovery centre, variable messaging boards (VMD) at some 40 junctions, smart bins, Aadhar-based biometric devices and a help desk manned 24/7. "Then, we had to ensure last mile network connectivity," adds Jignesh, mentally ticking off items, "provide training and lay some 350 km of optic fibre network." SWC also has a 5-year maintenance contract for IT and non-IT infrastructure.



Chetan Dambhare
EHS Incharge

I believe in keeping things simple, meticulously following the systems and processes which to my mind is why our EHS management was so successful at site.



Integrated Command & Control Centre, Prayagraj



Surveillance cameras

The safe mantra: Keeping things simple

The installation of each asset be it a camera or a VMD, a command centre or a smart bin, was a unique challenge for Chetan. "Every installation was different because although we had initially



R Srinivasan
Executive Vice President & Head - Smart World & Communication

Artificial intelligence has been around for a while but a sub-field called Deep Learning has emerged into prominence in recent years which when applied to voice, video, image and text went a long way to help us solve the issue of crowd management.



surveyed and identified the locations for installation, at ground level, things were very different – varying topographies, various types of 'roadblocks' like infringing structures and, of course, the public." Being a short, action-packed project, Chetan's track record of 18 and a half lakh safe hours, with only 4 near-misses and zero fatality is praiseworthy echoed by his client, the UP Police, in their letter of appreciation. "I believe in keeping things simple," shares Chetan,

"meticulously following the systems and processes which to my mind is why our EHS management was so successful at site," he nods with a smile. Online EHS observations, NC audits, continuous training, mock drills, issuance of safe execution cards were all followed diligently that are reflected in his high safety scores. As good corporate citizens, the project team planted some 5,500 saplings and donated 25 bottles of blood during a blood donation camp.



40 Variable Message Displays

Crowd Density Estimation at Strategic Locations

(Crowd density estimation at 20 strategic locations with 41 CCTV Cameras)



Camera Name	Sangam Nose
Camera IP	10.125.180.57
Crowd Count	451
Person Per SqMtr	1.80 Per SqMtr
Last updated	01:37:21 2019-01-15

Keeping the city safe

Crowd control: “Artificial intelligence has been around for a while but a sub-field called Deep Learning has emerged into prominence in recent years,” informs R Srinivasan, Executive Vice President & Head – Smart World Communication BU, “which when applied to voice, video, image and text went a long way to help us solve the issue of crowd management.” Overcrowding

was studied with threshold levels and created benchmarks while crowd management analytics were based on online counts (number of people crossing the line for a dip at the Sangam area) and density (or number of heads scanned). “Normally, 5 people per sq metre is a stampede situation,” warns Jignesh, “so a soft alert was triggered when density reached 3 people per sq. metre and evacuation was ordered if the number touched 4.” A dashboard

“**Normally, 5 people per sq metre is a stampede situation, so a soft alert was triggered when density reached 3 people per sq. metre and evacuation was ordered if the number touched 4.**”
 Jignesh Dube
 Project Manager



for monitoring with graphical representation of crowd levels of the area under coverage was available for the police that provided trend analysis of peak and off-peak days, trigger alerts in the case of excessive crowds and generate daily, weekly, monthly reports.

Controlling criminal activity: Crime is an expected menace at such huge gatherings and the hands of the UP Police were strengthened in their effort to detect and deal with criminal activities by the 1000 odd surveillance cameras that included face recognition ones. “The police were able to apprehend a serial killer through our face recognition cameras,” remarks Jignesh.

Controlling traffic: 13 data analysis Adaptive Traffic Control Systems (ATCS) ensured that traffic flowed freely in the city. Traffic signals at several locations were reconfigured into various ATCS modes to meet the dynamic demand of traffic in different operating conditions along with a coordinated signal plan for junctions in sync with the area-wide signal plans. ATCS, in conjunction with well-engineered signal timing, receives and processes data from strategically placed sensors and the adaptive signal control technology adjusts the timing of the red, yellow and green lights to accommodate changing traffic patterns to ease traffic congestion. The city scored high on achieving ‘Maximum green’

which is a measure of the average time required by traffic from all approaches to clear a junction during respective rights of ways. “At an average, ATCS can improve travel time by about 10% and up to 50% when it replaces outdated systems,” adds Jignesh.

KumbhaMela2019 is only a nice memory for Jignesh, Chetan and team but the holy city of Prayagraj will continue to enjoy the benefits of smart digitalization. “Yes, we are extremely proud that we contributed to this success thanks to our smart digital solutions,” enthuses Jignesh though he adds humbly, “but what is even more satisfying is that we achieved our mandate of Zero Harm to the pilgrims!”. ■



Driving operational efficiency to execute safely!

IKEA Project - A front runner in out-of-the-box thinking

IKEA, a European multinational group that designs and sells ready-to-assemble furniture, kitchen appliances and home accessories, is one of the world's largest furniture retailers. Having set foot on Indian shores with their first store in Hyderabad, IKEA has mandated L&T to build their second in Navi Mumbai spread over approximately 96,250 sq. m that will feature two levels of retail stores, one level of double height warehouse with a separate section for Food & Beverage, two levels of parking, all of which will sit over a total built-up area of 12.45 lakh sq. feet. "The standards of delivery are set in stone," shares Project Manager, Rajesh Srinivasan, "and we have to live up to international standards. Our EHS performance, touch wood," he taps his head, "has been excellent because we have successfully pre-empted hazards by identifying and mitigating them." Their strategy has paid rich dividends thus far for they have been able to achieve efficiency across a range of operations including handling and erection of structural columns, trusses and connecting members, handling of hollow core panels, facades, table formwork and rebar, lifting, shifting and fixing roof panels.

Collaborate to eliminate

"We collaborate to eliminate," declares Dr Sanjai Kumar Srivastva, EHS Head – North, B&F IC, who till recently was the EHS Head at the project, having since handed over the mantle to Ventaka Ramaraju Potuuri. "By involving as many people from the project as possible, we evolved an inherently safer thinking that helped us especially during the developmental stage to put together a sound method statement, identify hazards, assess risks and select the right, most convenient and safest method of work." The question posed to everyone at site was: *Can I eliminate risk by adopting*



Rajesh Srinivasan
Project Manager

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the right tools and processes? While sky was the limit to suggest controls, the basic ground rules were that they should be simple, easy to adopt and not impede work progress. Sanjai and his team have successfully eliminated several hazards, in some cases smartly substituting with less hazardous equipment and tools, in others, putting in place well-designed engineering controls to achieve best results.

Smart solutions to handle huge and tricky erections

Lifting 3523 MT of heavy, structural steel members is a Herculean task with several attendant dangers. To lift these steel members of different sizes and



Dr Sanjai Kumar Srivastva
EHS Head – North, B&F IC

By involving as many people from the project as possible, we evolved an inherently safer thinking that helped us especially during the developmental stage to put together a sound method statement, identify hazards, assess risks and select the right, most convenient and safest method of work.



dimensions, the team designed special lifting brackets. A detailed methodology covers all activities involved, lifting plans are prepared for each lifting sequence and permits are mandatory for all lifting activities. "Apart from the normal checks, we only use boom lifts to fix nuts and bolts or welding work for the structure," informs Sanjai, "we do not allow tandem lifts and the tower

operations are allowed only with an anti-collision device in place while to monitor tower crane activities, a ground monitoring system has been established in the computers of the safety office to see live operations and ensure safe functioning of the devices. It has helped a lot to prevent unsafe practices and promptly notice any unsafe condition during operation," elaborates Sanjai.



Erection of structural steel



Hollow core erection

The deployment of signalmen with Walky-talky was another administrative control to further reduce the risk.

Special lifting brackets were designed to lift, shift and erect 16 span size hollow core slabs, precisely fix them between two beams and place them on a projection of 150 mm. After the erection was complete, the edges were immediately protected by specially designed 'L' brackets and handrails to avoid fall from heights.

To fix structural members to support MEP equipment, at a height of approximately 12 m, the team fabricated special arrangements with a provision to rotate 360° mounted on scissor lifts that directly lift and align the members to the required height and location to fix

them. Thus, the risk of fall of structural members or workmen from height was eliminated. "This has also helped us to avoid massive use of working platforms or scaffolds that both reduced cost and speeded up work," Venkata chips in.

Façade erection was another challenge considering the 16 m span size and height of fixing. "The conventional method of tying and lifting the façade with web slings was risky while using scaffoldings was both time-consuming and a drain on our resources," remarks Sanjai, "so we introduced, 'Clad Boy', a special, hydraulically operated lifting tool that once charged, could work for 8 hours at a stretch. The whole process was mechanized, human interaction was minimized resulting in greater efficiency and safety," beams a satisfied

Sanjai. Clad Boy was employed to erect façade panels too with similar excellent results.

The 12 m span size roofing panels posed some challenging questions due to their length, weight and height of fixing. After studying the task, the team decided to carefully lift each sheet, one by one, using a tower crane and web slings with only 3-4 trained workmen allowed to work at heights equipped with retractable fall arrestors and provision of separate wire rope lifelines for each workman based on design calculation to take the load in case of an accidental fall. "We had dedicated supervisors and safety inspectors throughout the activity to closely monitor the movement of the workmen, by adopting access controls at the roof top," adds Sanjai.

Handling table formwork & rebar cage

To address the hazard of both conventional and large area tables toppling while shifting or de-shuttering, Sanjai and team instituted a SOP that ensured that all shuttering works were only carried out as per approved schemes, method statements and HIRA with workmen given on-the-job training. Apart from a host of other regulations, a safety inspection checklist is meticulously followed right through the exercise.

Handling of rebar was another demanding task for as Venkata shares, "not only was there a massive amount of reinforcements for us to handle at site but it is always a fast track job so we have the added pressure to do it a lot quickly and safely which we succeeded by using special lifting brackets to lift the steel cage tied at the ground to reduce massive rebar handling and speed up work. This innovation has not only enhanced productivity but has tremendously reduced agronomical / handling risk to workmen."

That the site has already clocked 6.5 safe million man hours is obviously a matter



Hollow core handling

of great pride for Rajesh, Sanjai, Venkata and team and also are the several awards the site has won for its impeccable EHS performance. The site was recognized as the 'Best Commercial Project of the Year 2019' by National Infrastructure & Construction; it won the Global Safety Award (Platinum - the highest category) from Energy & Environment Foundation for 2019, the CIDC Vishwakarma Award for Construction, Health, Safety & Environment - 2019

(Code 1), the Diamond Award in the Fame Safety Excellence Awards 2019 for 'Safety Excellence', the RoSPA Gold Award for Construction, Health, Safety & Environment 2019, the IISSM Security & Safety Excellence Award 2019 in the 'Construction Safety' category, the Shreshtha Suraksha Puruskar 2019 (Silver Trophy - National level; construction sector) from the National Safety Council of India (NSCI) and an appreciation award, again from NSCI - Maharashtra Chapter for a 'meritorious performance in industrial safety.' "We also won the first prize in the Annual EHS Awards among all CBA projects (medium size category) for 2019-2020," adds a proud Sanjai.

As the team gallops towards finishing the project to hand over in the next couple of months, here is wishing them all the very best to keep both their efficiency and safety quotients soaring. ■



Venkata
EHS Head - North, B&F IC

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CLOSE CALL

Excavator touching a live wire

Scenario

Excavated earth was being dumped into an existing excavated pit located around 12 to 15 m from the edge of the excavation area. A 440 V-LT line passes through the dumping area, at approx. 9 m high on one side and about 4 m high on the other. When the spoil pile accumulated over the area, the excavator operator approached the dumping area to spread the pile. When levelling the surface near the pole, since the soil was loose, the excavator skidded towards the LT line and its bucket touched the earth conductor which tripped the MCL (Mahanadi Coalfield Limited) power line.

What was the cause?

- Hazard was not identified
- Poor planning
- Poor supervision

What are the precautions to be taken to prevent reoccurrence?

- Identifying the OHE line status with the tracking record
- No materials to be stacked under the OHE line
- Erection of a goal post near the vehicle/equipment crossing locations
- Display of caution boards / signage near the OHE line
- EHS Department to keep track of the OHE line shifting work
- No work to be carried out under the OHE line unless all precautionary measures are taken
- Work permit for working near/under OHE lines to be implemented at site
- Daily monitoring to be carried by both EHS & site execution teams



PHEW!



IS YOUR SCAFFOLDING SAFE?

Scaffolds, temporary platforms to hold workmen, material or both, are perhaps the most common place and recognizable aspects at construction sites. Regrettably, though, they are also the most neglected from a safety perspective with nearly 40% fatalities in the construction industry the world over occurring due to falls from scaffolds. Over the past decade, scaffolding has ranked from No. 1 to No. 3 in OSHA's list of Top 10 violations clear enough a warning that scaffolding can only be ignored at one's peril. "Poor scaffolding can be easily spotted," points out M Kamarajan, EHS – Advisor, B&F IC, a veteran EHS professional. "Either the guard rails are missing, or the planking is unstable, the joints are not

properly connected, or the workman is not harnessed. However, the problem is easily solved with a little extra investment and better training," he assures.



B Rajalingam
Head – Scaffolding,
B&F IC

It all starts with selection of the right system for the job so that it can be used safely and efficiently and if some components are unavailable, it is important not to make do with what's available. That's asking for trouble.





M Kamarajan
EHS-Advisor, B&F IC

Poor scaffolding can be easily spotted, Either the guard rails are missing, or the planking is unstable, the joints are not properly connected, or the workman is not harnessed. However, the problem is easily solved with a little extra investment and better training.



Training is key

Starting with their procurement to surveying ground conditions to erect scaffolds, erecting them faultlessly and equipping them with the right safety measures to ensuring proper usage

are all an expert's job. "It all starts with selection of the right system for the job so that it can be used safely and efficiently," shares B Rajalingam, Head - Scaffolding, B&F IC, "and if some components are unavailable, it is important not to make do with what's available. That's asking for trouble," he warns.

Ideally, a scaffolding should only be erected by trained professionals under the supervision of a competent person and thoroughly inspected before start of work. Needless to add, every workman should be equipped with proper protective equipment and trained on safe work practices of working on a scaffold that must include the correct use of the scaffold, how to handle materials when on a scaffold, how to assess the load capacities of the scaffold (both live and dead loads), how to erect, dismantle,

alter or move the scaffold.

Some aspects that need to be considered during scaffolding are:

- The cumulative weight of workmen, material and equipment on the scaffold and to ascertain whether it is within the 'safe workload' limits
- Site conditions
- Height to which the scaffold has to be erected
- Type of work to be performed on the scaffold - masonry, welding, sandblasting, painting, metal sliding, mechanical - because each has to be planned for differently

"Our training plan is fairly robust to erect scaffolds wherein we share the basics of scaffolding," shares P Nagarajan, Head -

EHS, B&F. "It is working well because LTI in B&F due to injuries from fall from scaffolds is almost negligible. Our success is because we keep this training 'live': it is reiterated at toolbox talks, it is refreshed frequently and our induction also has a section on safe scaffolding." G Divakar, Senior Manager - EHS adds that, Heavy Civil IC gives special training from Scaffold Training Institute (STI), USA, a world recognized institute for train the trainer courses.

Be 'alive' to the hazards

Training prepares both supervisors and workmen to identify potential hazards and therefore be better prepared to handle 'shaky' situations. A potentially dangerous time is when scaffolds need to be either altered or moved at which point it is imperative for experts to be extra vigilant for anything going amiss. One sure shot method of assessing the safety and stability of scaffolds is to continuously speak to workmen working on them, according to Nagarajan. "This way, not only do we prepare our workmen to anticipate problems but also

it also alerts us for corrective action whenever they find any unsafe conditions in the scaffolds."

A common sight at sites is of workmen carrying out welding activities on scaffolds. OSHA prescribes several strictures for this activity like a grounding connector connected from the scaffold to the structure that is at least the size of the welding lead, the grounding conductor should not to be attached in series with the welding process or the work piece; an insulating material has to cover the suspension wire rope that extends at least four feet (1.2 meters) above the hoist that requires an insulated protective cover and each suspension rope needs to be attached to an insulated thimble that is also insulated by being grounded.

Some basic boxes to tick

- **Safe access and exit points:** When scaffold platforms are more than 2 feet above or below the ground, a point



Scaffolding training





Legal requirements:

As per the legal requirement under section 188-205 of BOCW Central Rules:

- Every scaffold and every component thereof is of adequate construction, made of sound material and free from defects and is safe for the purposes for which it is intended for use
- All metal scaffolds used in building or other construction work conform to the relevant national standards (IS 2750 – 1964). Specification for Steel Scaffoldings
IS: 3696 (Part I) – 1987 SAFETY CODE FOR SCAFFOLDS AND LADDERS

of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or a similar surface needs to be provided. Cross braces cannot be used as a means of access. "Access or exit are critical points," observes MK, "the tendency to climb through the ledger pipes or to access the scaffold from a permanent floor through unauthorized openings in the wall is often observed. Many with grievous injuries have realized that such improvisations were unwise, if they were lucky to survive the fall," he says gravely.

- **Sound planking:** Every platform at every working level should be adequately planked with proper supports. There are enough instances of planks toppling, workmen falling through faulty planking, losing their footing or even tools or debris dropping through gaps onto workmen working below. The strength of the

scaffold and its structural integrity must be checked and certified at the pre-start inspections at which point all debris must be removed from the plank.

- **Safe guards:** Guard rails, mid rails and personal fall arrestor systems are essential especially if the work station is more than 10 feet off the ground. In addition, toe boards prevent tools falling to lower levels. The height of toe boards should be at least 150 mm and the main guard rails at least 910 mm above the working platform.
- **Safe grounding:** The base of the scaffold must be properly grounded for it can be calamitous for it to either sink into the soil because of excessive weight or even tilt when workers are on it. Base plates need to be used where the ground is not adequately stable. OSHA prescribes that counterweights used to balance adjustable suspension scaffolds must be able to resist at least four times the tipping moment imposed by the scaffold operating at either the rated load of the hoist, or one-and-a-half (minimum) times the tipping moment imposed by the

scaffold operating at the stall load of the hoist, whichever is greater.

- **Safe distance:** Scaffolds should be away from power lines, away from places of regular human or vehicular traffic or any other impediments.
- **Safe tagging:** Nothing works at a construction site than a tag system and a world of benefits can be enjoyed if a responsible person is entrusted with colour-tagging scaffolds. A green tag signifies that a scaffold has been inspected and safe for use, a red one warns against occupancy either because of issues with the equipment or in the environment while the yellow allows workmen to work under certain conditions using adequate fall protection.

"Scaffolds seem simple structures, but not appreciating their complexity can cost us dearly," warns MK. "Proper training, frequent inspection and re-inspection are imperatives to ensure safety during work on scaffolds. After all, a little extra attention can pay very rich dividends," he states with conviction. ■

Safety

Roll of Honour

Helmet congratulates the following sites for achieving million and more LTI free safe man-hours

BUILDINGS & FACTORIES

- 29 **Wipro IT SEZ Project, Bengaluru**
Million Safe Man Hours
December 2016 to December 2019
- 27 **Crescent Bay Project, Mumbai**
Million Safe Man Hours
January 2016 to December 2019
- 25 **Emami City Project, Kolkata**
Million Safe Man Hours
January 2013 to December 2019
- 24 **DLF Cyber Park project, Gurgaon**
Million Safe Man Hours
December 2015 to December 2019
- 19 **One ICC and Two ICC Bombay Realty**
Million Safe Man Hours
November 2017 to December 2019
- 19 **Orchid Crown Project, Mumbai**
Million Safe Man Hours
April 2010 to December 2019

- 19 **Cricket Stadium Project, Motera**
Million Safe Man Hours
January 2017 to December 2019
- 18 **ICC Dwarka Project**
Million Safe Man Hours
February 2018 to December 2019
- 16 **TATA Housing Project, Kolkata**
Million Safe Man Hours
September 2014 to December 2019
- 15 **Prestige Song of the South Project, Bengaluru**
Million Safe Man Hours
April 2016 to December 2019
- 15 **Oberoi Sky City Project, Borivali**
Million Safe Man Hours
June 2016 to December 2019
- 15 **ESIC Hospital Project, Joka**
Million Safe Man Hours
November 2009 to December 2019
- 14 **IGH Dwaraka Project, Delhi**
Million Safe Man Hours
September 2014 to December 2019

Safety

Roll of Honour

- 13** **Raintree Boulevard Project Bengaluru**
Million Safe Man Hours
September 2016 to December 2019
- 11** **Statue of Unity Project**
Million Safe Man Hours
March 2018 to December 2019
- 11** **DAICEC Project, Mumbai**
Million Safe Man Hours
June 2017 to December 2019
- 10** **APTIDCO Bhimavaram Project**
Million Safe Man Hours
July 2017 to December 2019
- 10** **Oberoi Eternia Mulund Project, Mumbai**
Million Safe Man Hours
January 2017 to December 2019
- 10** **HMRL Metro Station Project, Hyderabad**
Million Safe Man Hours
March 2018 to December 2019
- TRANSPORTATION INFRASTRUCTURE**
- 20** **Delhi Agra Road Project**
Million Safe Man Hours
July 2016 to December 2019

- 13** **Yadgiri Warangal Road Project**
Million Safe Man Hours
June 2016 to December 2019
- 12** **Dholera SIR - Road and Other Infra Works**
Million Safe Man Hours
July 2016 to December 2019
- 8** **Hospet Chitradurga Road Project**
Million Safe Man Hours
May 2017 to December 2019
- 7** **BIAL Runway**
Million Safe Man Hours
December 2018 to December 2019
- 7** **Baharagora Singhara Road Project**
Million Safe Man Hours
November 2017 to December 2019
- 7** **Mukkola - KL/TN Border Road Project**
Million Safe Man Hours
June 2016 to December 2019
- 7** **MANWATH TO BEED ROAD PROJECT (EPC)**
Million Safe Man Hours
December 2014 to December 2019

- 7** **Bijapur Gulbarga Homnabad Road Project**
Million Safe Man Hours
March 15 to December 2019
- 6** **Mumbai Nagpur Expressway MNEP**
Million Safe Man Hours
November 2018 to December 2019
- 6** **Villukuri Kanyakumari Road Project**
Million Safe Man Hours
September 2016 to December 2019
- 6** **Bidkin Industrial Area (Package - I)**
Million Safe Man Hours
July 2017 to December 2019
- 5** **Bar Bilara Jodhpur Road Project**
Million Safe Man Hours
April 2017 to December 2019
- 5** **Raipur Bilaspur Road Project-Pkg-II**
Million Safe Man Hours
September 2016 to December 2019
- 4** **Pragati Maidan (Package - I)**
Million Safe Man Hours
December 2017 to December 2019

Safety

Roll of Honour

- 4** **Veer (Wadpale) to Bhogaon Khurd section**
Million Safe Man Hours
July 2017 to December 2019
- 4** **Chandigarh Kharar Elevated Corridor**
Million Safe Man Hours
August 2016 to December 2019
- 3** **Aurangabad to Karodi**
Million Safe Man Hours
October 2018 to December 2019
- 3** **Dwarka Expressway PKG 03**
Million Safe Man Hours
November 2018 to December 2019
- 3** **Delhi Airport II (TI IC)**
Million Safe Man Hours
April 2019 to December 2019
- 3** **Mumbai Vadodara Expressway**
Million Safe Man Hours
August 2018 to December 2019
- 2** **Dwarka Expressway PKG 4**
Million Safe Man Hours
October 2018 to December 2019

Safety

Roll of Honour

- 1 **Ghoshpukur Salsalabari Road Project**
Million Safe Man Hours
September 2019 to December 2019
- 11 **OPGC MGR Project**
Million Safe Man Hours
July 2015 to December 2019
- 9 **Riyadh Metro Project**
Million Safe Man Hours
December 2015 to December 2019
- 6 **Mumbai Monorail**
Million Safe Man Hours
June 13 to December 2019
- 6 **Barpali-Bolangir RC Project**
Million Safe Man Hours
April 2014 to December 2019
- 5 **Sambalpur-Barapali RC Project**
Million Safe Man Hours
April 2014 to December 2019
- 5 **Hospet-Harlapur RC Project**
Million Safe Man Hours
January 2013 to December 2019

- 5 **Lucknow-Sitapur RC Project**
Million Safe Man Hours
November 2012 to December 2019
- 4 **Rewari-Manheru RC Project**
Million Safe Man Hours
September 2012 to December 2019
- 4 **Hyderabad Metro Rail**
Million Safe Man Hours
June 2012 to November 2019
- 3 **Bolangir-Titlagarh RC Project**
Million Safe Man Hours
April 2014 to December 2019
- 3 **Roha Verna Railway Electrification Project**
Million Safe Man Hours
May 2017 to December 2019
- 2 **DMRC CE-07**
Million Safe Man Hours
July 2013 to December 2019
- 2 **WDFC EMP - 16**
Million Safe Man Hours
May 2016 to December 2019
- 2 **WDFC EMP-4**
Million Safe Man Hours
May 2015 to December 2019

- 2 **EDFC CP 204**
Million Safe Man Hours
June 2016 to December 2019
- 1 **Delhi Core Project**
Million Safe Man Hours
July 2018 to December 2019
- 18 **Western Dedicated Freight corridor corporation CTP - 1**
Million Safe Man Hours
August 2017 to December 2019
- 13 **R1048/1- Improvements of Expo2020 Roads Network**
Million Safe Man Hours
July 2017 to December 2019
- 11 **P015 Al Wakrah Bypass road project**
Million Safe Man Hours
May 2014 to June 2019
- 10 **RTA-R 1028/1 Extension of Tripoli road & Improvement of Algeria ROAD(Dubai- U.A.E)**
Million Safe Man Hours
March 2017 to December 2019

Safety

Roll of Honour

- 10 **WDFC CTP-14**
Million Safe Man Hours
February 2017 to December 2019
- 9 **Construction of Batinah Road and Infrastructure in Doha Industrial Area. QS001-P06 (LNT-ASTC JV)**
Million Safe Man Hours
August 2015 to December 2019
- 7 **Expressway – Package 4 Project**
Million Safe Man Hours
October 2017 to December 2019
- 6 **EDFC - CP-303**
Million Safe Man Hours
March 2018 to December 2019
- 6 **MTC Airside Construction -Abu Dhabi**
Million Safe Man Hours
December 2016 to December 2019
- 5 **Al-Sharqiyah Expressway Section-II Part-1, Ibra to Al kamil**
Million Safe Man Hours
October 2018 to December 2019

Safety

Roll of Honour

5 **R1048/5- Improvements of Expo2020 Roads Network.**
Million Safe Man Hours
April 2019 to December 2019

5 **LRT Mauritius**
Million Safe Man Hours
May 2019 to December 2019

1 **WDFC CTP 3R**
Million Safe Man Hours
November 2019 to December 2019

L&T GEOSTRUCTURE

3 **JSW - Paradip**
Million Safe Man Hours
January 2017 - December 2019

2 **TANGEDCO – Uppur**
Million Safe Man Hours
May 2018 - December 2019

2 **IWAI - Sahibganj**
Million Safe Man Hours
December 2016 – December 2019

1 **NTPGC**
Million Safe Man Hours
May 2015 - December 2019

1 **Kalinga**
Million Safe Man Hours
April 2018 - December 2019

1 **BHEL – Ennore**
Million Safe Man Hours
November 2017 - December 2019

1 **JSW- EQ1-EQ2- Paradip**
Million Safe Man Hours
January 2018 - December 2019

POWER TRANSMISSION & DISTRIBUTION

12 **NFS MoD OFC BSNL Pkg E**
Million Safe Man Hours
October 2014 to December 2019

6 **250MW ACEPL SPV Plant MP**
Million Safe Man Hours
January 2018 to December 2019

5 **ERSS-TL01 for 765 kV D/C Ranchi - Medinipur**
Million Safe Man Hours
November 2017 to December 2019

5 **ODSSP Erection- Phase II Package-4-OPTCL-5**
Million Safe Man Hours
January 2016 to December 2019

5 **ODSSP Phase-III Package-4**
Million Safe Man Hours
August 2016 to December 2019

4 **NFS MoD OFC BSNL Pkg D-Maharashtra**
Million Safe Man Hours
February 2015 to December 2019

4 **Trans Scheme-Consulancy Serv-JSEB-PCGIL**
Million Safe Man Hours
April 2013 to December 2019

3 **IPDS KANPUR-KESCO**
Million Safe Man Hours
November 2016 to December 2019

3 **TW 10 for 800kV HVDC Raigarh Pugalur TL**
Million Safe Man Hours
August 2017 to December 2019

3 **Rural Eltrl Work DDUGJY WESCO Pk 4 - OPTCL**
Million Safe Man Hours
January 2016 to December 2019

3 **Saubhagya - RE works at asti Sant Kabir Nagar**
Million Safe Man Hours
May 2018 to December 2019

3 **132kV D/C JUSNL NIT-42**
Million Safe Man Hours
April 2017 to December 2019

2 **220 KV & 132 Kv TL - WBSETCL Pkg- I**
Million Safe Man Hours
March 2013 to December 2019

2 **Saubhagya RE works Gorakhpur Deoria-PUVVVNL**
Million Safe Man Hours
May 2018 to December 2019

2 **2x10MW-NLC Solar PV Power Project with 8MWhr BESS**
Million Safe Man Hours
January 2019 to December 2019

2 **100MW(AC) SBE SPV Plant Bhadla**
Million Safe Man Hours
March 2018 to December 2019

2 **220KV DC SRGTL PKG 1 PTCUL**
Million Safe Man Hours
April 2018 to December 2019

2 **220/132kV- WBSETCL Package AB-WBSETCL**
Million Safe Man Hours
December 2015 to December 2019

2 **ERSS-Transmission Line Package TL02**
Million Safe Man Hours
November 2017 to December 2019

Safety

Roll of Honour

- 2 **RGGVY Jammu - PGCIL**
Million Safe Man Hours
April 2018 to December 2019
- 1 **220kV D/C JUSNL NIT-43**
Million Safe Man Hours
April 2017 to December 2019
- 1 **220kV / 132kV lines -NIT15 -
PKG D-BSPTCL**
Million Safe Man Hours
August 2015 to December 2019

HEAVY CIVIL INFRASTRUCTURE

- 85 **Riyadh Metro JV**
Million Safe Man Hours
- 51 **Doha Metro JV**
Million Safe Man Hours
- 17 **Kakrapar – Main Plant**
Million Safe Man Hours
- 15 **Medigadda Barrage Project**
Million Safe Man Hours
- 11 **Vizag vessel**
Million Safe Man Hours
- 10 **Kalpakkam - WMP & Allied**
Million Safe Man Hours

- 7 **CMRL UG-02**
Million Safe Man Hours
- 6 **Kudankulam Main Plant 3&4**
Million Safe Man Hours
- 6 **Kakrapar – IDCT**
Million Safe Man Hours
- 6 **Kudankulam HTS Project**
Million Safe Man Hours
- 6 **WDFC 15 A Bridge**
Million Safe Man Hours
- 6 **Barapullah Bridge, Delhi**
Million Safe Man Hours
- 5 **AFA - Hyderabad**
Million Safe Man Hours
- 5 **Punatsangchhu HEP, Bhutan**
Million Safe Man Hours
- 5 **Kakrapar – NDCT**
Million Safe Man Hours
- 4 **VIH Project**
Million Safe Man Hours
- 4 **CTP-14 Project**
Million Safe Man Hours

- 4 **Kalpakkam - FRP**
Million Safe Man Hours
- 4 **Kachchi Dargah Bridge**
Million Safe Man Hours
- 4 **RAPP Rajasthan**
Million Safe Man Hours
- 3 **Durgam Cable Stayed Bridge**
Million Safe Man Hours
- 3 **Sea Bird Project**
Million Safe Man Hours
- 3 **Mandovi Bridge, Goa**
Million Safe Man Hours
- 3 **ZF Shillong project**
Million Safe Man Hours
- 3 **Kochi Dry Dock Project**
Million Safe Man Hours
- 2 **ISWAR GUPTA**
Million Safe Man Hours
- 2 **Kakrapar – CSP**
Million Safe Man Hours
- 2 **WDFC 15 B Bridge**
Million Safe Man Hours

Safety

Roll of Honour

- 2 **Singoli Bhatwari HEP**
Million Safe Man Hours
- 2 **MTHL Pkg1**
Million Safe Man Hours
- 2 **WDFC 15 C**
Million Safe Man Hours
- 2 **Khulna Mongla Bridge**
Million Safe Man Hours
- 1 **Mumbai metro UGC07**
Million Safe Man Hours
- 1 **ZH1 Port Blair project**
Million Safe Man Hours
- 1 **ZB Ambala project**
Million Safe Man Hours

WATER & EFFLUENT TREATMENT

- 16 **Jebel Ali**
Million Safe Man Hours
- 12 **Sumail Industrial Estate**
Million Safe Man Hours
- 9 **LAYING OF SEWERS AT
CUTTACK**
Million Safe Man Hours

Safety

Roll of Honour

9	BHATPARA SEWER NETWORK AND WASTE WATER TREATMENT Million Safe Man Hours
7	Bansujara Irrigation Scheme Million Safe Man Hours
6	KHARKAI BARRAGE WITH GATES AND ITS ALLIED WORKS Million Safe Man Hours
6	SEWERAGE SCHEME IN VARANASI CITY Million Safe Man Hours
6	BANSWARA DISTRICT & PRATAPGARH DISTRICT SS Million Safe Man Hours
6	Integrated Sewerage Work - Pali (Design and Build) Million Safe Man Hours
5	DHOLERA SIR Million Safe Man Hours
5	INTEGRATED WS AND WW works Jhunjhunu PROJECT (DB) Million Safe Man Hours

4	DWSP Million Safe Man Hours
4	O AND M FOR SRI SATHYA SAI WATER SUPPLY ANANTAPUR Million Safe Man Hours
4	Nellore UGDS Million Safe Man Hours
4	Water Supply scheme to Erode corporation Million Safe Man Hours
4	WS scheme- balasore bhadrak/keonjhar/puri/ bolangir Million Safe Man Hours
4	Water Supply to Khammam-TDWSP Million Safe Man Hours
3	Pune ESR and GSR Million Safe Man Hours
3	9NOS LIS IN CLUSTER-VI IN CUTTACK DIST Million Safe Man Hours
3	Rourkela WWS Million Safe Man Hours

3	Infrastructure Works in Bidkin Million Safe Man Hours
3	Chhaigaonmakhan LIS Million Safe Man Hours
3	Development Of IT City Million Safe Man Hours
3	Bawsher to Seeb Transmission Pipeline Million Safe Man Hours
3	Ranchi Urban Water Supply Scheme Million Safe Man Hours
3	Barrackpore Sewerage Integration Work Million Safe Man Hours
3	WTP for NMDC Million Safe Man Hours
3	Execution of Lift Canal System of UIIP Kalahandi Million Safe Man Hours
3	PROVIDING SEWERAGE FACILITY IN MOHAN GARDEN Million Safe Man Hours

Safety

Roll of Honour

3	VIJAYAWADA SWD Million Safe Man Hours
3	MLIP Cluster XII Million Safe Man Hours
3	HOGENAKKAL - PKG V - O AND M Million Safe Man Hours
3	Tanzania Water Supply Scheme Dept Code Million Safe Man Hours
2	Koppal WSP Million Safe Man Hours
2	Water Supply and Distribution to GHMC Million Safe Man Hours
2	Sikar Alwar Bhiwadi Cluster Sewerage Project Million Safe Man Hours
2	IMT Rohtak Phase III Million Safe Man Hours
2	Kundalia Irrigation Project-Left Bank Million Safe Man Hours
2	SSNNL-SBC PS 4-5 Million Safe Man Hours

Safety

Roll of Honour

- 2 **CUDDALORE PH.I**
Million Safe Man Hours
- 2 **Utilities Works at Amaravati Pkg 11**
Million Safe Man Hours
- 2 **MORADABAD SEWERAGE SCHEME**
Million Safe Man Hours
- 2 **Cuttack Water Supply Project**
Million Safe Man Hours
- 2 **Rehab Works at Colombo**
Million Safe Man Hours
- 2 **CUTTACK SEWER SCHEME PHASE-2 CONSTRUCTION**
Million Safe Man Hours
- 2 **HOGENAKKAL - PKG III O AND M**
Million Safe Man Hours
- 2 **Kakrapar LIS**
Million Safe Man Hours
- 2 **Water Supply to Karimnagar and other Municipalities**
Million Safe Man Hours

- 2 **Beur Sewerage Network- Patna**
Million Safe Man Hours
- 2 **Alirajpur LIS**
Million Safe Man Hours
- 2 **O and M East and West Godavari**
Million Safe Man Hours
- 2 **MLIP CLUSTER IX**
Million Safe Man Hours
- 2 **12 NOS LIS IN CLUSTER-XI IN JAJPUR AND KENDRAPARA**
Million Safe Man Hours
- 2 **ISP - KALISINDH Ph I MLIS**
Million Safe Man Hours
- 2 **Water Supply facilities to Bommanahalli Zone**
Million Safe Man Hours
- 2 **Bharatpur Gangapur Hindaun Sewerage Project**
Million Safe Man Hours
- 1 **VSP Reservoir**
Million Safe Man Hours

- 1 **RRWSFMP - Package 7 (Nagaur CDS-04)-Degana**
Million Safe Man Hours
- 1 **Improvement of Water Supply To Greater Berhampur**
Million Safe Man Hours
- 1 **BDA NPKL PACKAGE 1**
Million Safe Man Hours
- 1 **Int Passavant JV Dept Code**
Million Safe Man Hours
- 1 **Udaipur Integrated Infrastructure Project**
Million Safe Man Hours
- 1 **Kundalia Irrigation Project- Right Bank**
Million Safe Man Hours
- 1 **RRWSFMP-Package 6 Nagaur CDS-03-Deedwana**
Million Safe Man Hours
- 1 **Allahabad Sewerage Network**
Million Safe Man Hours
- 1 **HPCL Vizag - ETP**
Million Safe Man Hours

Safety

Roll of Honour

- 1 **13NOS LIS IN CLUSTER-VIII IN ANGULDEOGARH SUNDERG**
Million Safe Man Hours
- 1 **24X7 Water Supply to Tumakuru City**
Million Safe Man Hours
- 1 **CHHATARPUR WSS**
Million Safe Man Hours
- 1 **RRWSFMP-Package 5 (Nagaur CDS-02)-Makrana**
Million Safe Man Hours
- 1 **Nuapada Water Supply Project**
Million Safe Man Hours
- 1 **O AND M FOR BHAGIRATHI WTP,DELHI**
Million Safe Man Hours

CONGRATULATIONS!

11 projects of L&T Construction won the prestigious 'Sword of Honour' Award from the British Safety Council

The winners....

- 
- TI WDFC EMP 4 - Railway SBG
 - B&F Grasim Project - Factories
 - B&F IICC Project - PS
 - B&F AIIMS Guntur Project - Health
 - B&F WIPRO Hyderabad Project - IT & OS
 - B&F L&T Business Park Project - IT & OS
 - B&F Emerald Isle Project - Ph1, EH
 - B&F Oberoi Sky City Project - EH
 - B&F Rustomjee CROWN Project - EH
 - B&F Salsette 27 Peninsula Project - EH
 - B&F APTIDCO Project - AMH

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