

HELMET

 Environment  Health  Safety

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SAFETY ALL WAYS. SAFETY ALWAYS.



Foreword

How ESG compliant are we?

Change, though constant, is never easy and considering the enormous disruption that we have faced over the last 12-15 months due to the pandemic, life has been both a huge unlearning and learning experience for all of us. It has created new paradigms. It has urged us to re-evaluate and re-orient our lives and forced the entire world to focus on how we, as mankind, respect our world. At a different plane, questions are being raised as to how companies govern their businesses and how they measure and manage the impact of their businesses on the environment.

The term ESG has assumed significant relevance and importance as Financial Institutions and Investors are increasingly challenging companies in the key areas of Environment, Social Responsibility, and Governance and seeking to invest in companies that actively manage their operations responsibly. Safety is a key component of ESG.

L&T is under the same scrutiny too as to how we manage our Safety Management Systems (SMS) in our operations to prevent accidents? What we are doing to reduce, or eliminate loss of life and reduce

injuries at the workplace? How do we select and manage our Supply Chain and our Subcontractors?

Our SMS is comparable to that of any company in the world and are an accredited International Standard ISO 45001 organization. However, a company is not measured merely by its accreditation under ESG but by demonstrable action as to how safety is managed across all its operations. It is the company's responsibility to ensure against any injury or loss from their operations.

Every accident is recorded, and ESG investors are keen to understand why the accident occurred and what steps the company has taken to prevent a recurrence; how we measure our incidents at projects and what actions are being taken by the management to eliminate such incidents; what proactive steps are taken and how are managers engaged to proactively manage safety at our various project sites. They would like to know about our safety initiatives that encourage positive safety behaviour; about whether workmen are engaged in safety training, whether there are safety committees,

THE TERM ESG HAS ASSUMED SIGNIFICANT RELEVANCE AND IMPORTANCE AS FINANCIAL INSTITUTIONS AND INVESTORS ARE INCREASINGLY CHALLENGING COMPANIES IN THE KEY AREAS OF ENVIRONMENT, SOCIAL RESPONSIBILITY, AND GOVERNANCE AND SEEKING TO INVEST IN COMPANIES THAT ACTIVELY MANAGE THEIR OPERATIONS RESPONSIBLY. SAFETY IS A KEY COMPONENT OF ESG.

OUR SAFETY COMMITMENT IS ESPOUSED IN MISSION ZERO HARM AND ITS IMPLEMENTATION IS DRIVEN FROM THE VERY TOP BY THE EHS COUNCIL UNDER THE CHAIRMANSHIP OF MR SUBRAMANIAN SARMA, WHOLE TIME DIRECTOR & SENIOR EXECUTIVE VICE PRESIDENT (ENERGY) TO CREATE AND SUSTAIN A UNIFIED AND COHESIVE SAFETY STANDARD ACROSS BUSINESSES.

what is the level of commitment to improve safety and how or what have we done to improve safety?

Our safety commitment is espoused in Mission Zero Harm and its implementation is driven from the very top by the EHS Council under the chairmanship of Mr Subramanian Sarma, Whole Time Director & Senior Executive Vice President (Energy) to create and sustain a unified and cohesive safety standard across businesses.

Safety Managers have the responsibility to conduct safety inspections and meetings to demonstrate a 'Top Driven' approach complemented by a 'Bottom Up' approach of safety committees raising safety issues



MICHAEL SANDERSON
Head – EHS,
Heavy Civil IC

to the senior management. Similarly, the competence and performance of our subcontractors are evaluated to ensure that they meet, adhere, and embrace our shared safety value of Mission Zero Harm.

Behavioural safety is a challenging aspect that must be addressed. It is the responsibility of every employee and workman to behave safely without endangering oneself or putting others at risk which is why Managers and Supervisors are key to the success of Mission Zero Harm. Unsafe Acts and Unsafe Conditions are warning signs of potential danger and it is imperative to not only manage and measure these but implement SOPs and take proactive steps to eliminate an incident before it occurs. Every person has the right to a safe place of work, and it is important to communicate that unsafe behaviour is unacceptable and safe behaviour rewarded.

“ EVERY PERSON HAS THE RIGHT TO A SAFE PLACE OF WORK, AND IT IS IMPORTANT TO COMMUNICATE THAT UNSAFE BEHAVIOUR IS UNACCEPTABLE AND SAFE BEHAVIOUR REWARDED. ”

Managing identified risks, ensuring the proper maintenance of P&M and equipment to eliminate accidents are essential too.

In these pandemic times, after the labour migration, project sites have had to make do with 'raw', new labour with no orientation to our Quality and EHS standards to push progress. Training this new breed of workmen is critical for continued safe operations.

Going forward, as we continue to grow, we will have to execute bigger, more complex projects that will undoubtedly sternly examine our EHS systems and processes. Our SMS will have to be sharp enough to close the gaps between strategy and execution and transform Safety into an excellence-oriented discipline.

ESG is challenging us, and we must have the right answers to remain competitive and profitable.

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“WE HAVE MOBILIZED SUFFICIENT LABOUR BUT ARE THEY THE RIGHT KIND THAT WE REQUIRE?” – SNS



“Are they are similarly trained or equipped with the right skill sets? Do they understand our value systems, our safety processes, and standards?”

S N Subrahmanyam (SNS)
CEO & Managing Director, L&T

Celebrating Safety Month 2021

Following tradition, the new year kicked off with the celebration of January as the Safety Month and the inaugural function was conducted on MS Teams on January 2nd, 2021 replete with a digital flag hoisting and virtual speeches.

In his keynote address, Mr S N Subrahmanyam (SNS) CEO & Managing Director, L&T praised the workmen remobilization effort but inquired whether the labour mobilized was the right kind of workforce that projects were seeking. “Are they are similarly trained or equipped with the right skill sets? Do they understand our value systems, our safety processes, and standards?” Serious questions that project leadership and teams across the organization should take cognizance of and address.

A year of challenges & positives
Setting context to the programme, Whole Time Director & Senior Executive Vice President (Buildings), Mr M V Satish (MVS) described Year 2020 as one that was full of challenges. “It tested our resilience



and our capability to respond to sudden disruption,” he remarked, congratulating the site teams for their exemplary handling of the workmen reverse migration and remobilization efforts. “The new year is as good a time as any for us to recommit to Mission Zero Harm,” he shared on a positive note.

“2020 tested our resilience and our capability to respond to sudden disruption. The new year is as good a time as any for us to recommit to Mission Zero Harm.”

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



I look at Year 2020 for some of its positives, first was the massive churn of resources that we witnessed through the year in terms of numbers, composition, etc, then the quick adoption to the new COVID-19 SOPs and protocols and thirdly, the deployment of the latest technologies.

Subramanian Sarma
Whole Time Director & Senior Executive Vice President (Energy)

A surprising but appropriate speaker at the event was Mr Subramanian Sarma, Whole Time Director & Senior Executive Vice President (Energy) who in his role of Chairman of L&T’s EHS Council, brought in a wider perspective. “I look at Year 2020 for some of its positives,” he said brightly, “first was the massive churn of resources that we witnessed through the year in

terms of numbers, composition, etc, then the quick adoption to the new COVID-19 SOPs and protocols and thirdly, the deployment of the latest technologies.” He reiterated that Safety was everyone’s responsibility and that it was imperative to drive safety in one’s sphere of influence and control. “Good EHS leads to good productivity that makes good business sense,” he said, signing off on a high.

A bagful of awards

Both SNS and MVS congratulated the Project and EHS teams for the surfeit of Safety awards that L&T Construction had mopped up during the year including 8 ‘Sword of Honour’ Awards from the British Safety Council all for B&F projects, 86 RoSPA Awards (including 53 ‘Golds’), 5 American Society of Safety Awards, one ASSP HSC Excellence Award and two projects that won the Golden Peacock.



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Citing its success in Hydrocarbon, SNS said that he found a direct correlation between rewards and accidents; the more the awards the lesser the number of safety incidents. "I think it's a good method to follow. For some reason, we at L&T Construction, have not institutionalized the reward system restricting ourselves to certificates, trophies, gifts, and such like," he remarked, urging the senior leadership to consider it seriously, implement and institutionalize it at the earliest.

EHS is a good habit to cultivate

"Although there have been no directives to the effect, I find people more disciplined at site these days," observed SNS, on a lighter note. "I find the staff wearing all the proper PPE, the hoardings at site are all painted and well kept, and I see more vigour all around. There is also less dust around and it seems we have become more green friendly,"



he said, all praise for efforts at the various project sites. "I also find that the ecosystem of our subcontractors and vendors are following the same discipline and, at many sites, I understand they have adapted our safety procedures and even modified them to be tougher and more elaborate than what we have," he pointed out.

Whole Time Director & Senior Executive Vice President (Development Projects), Mr D K Sen opined that the pandemic had made us more mature from the perspective of safety & health. "Safety has become more inclusive and with the increase of digitalization, safety had no boundaries." He stressed on increased accountability to keep people safe and the importance of

Safety has become more inclusive and with the increase of digitalization, safety had no boundaries. Safety should be on auto mode.

D K Sen
Whole Time Director & Senior Executive Vice President (Development Projects),



We are looking at implementing ISO 14005 and going forward, data analytics is going to play a huge role in effective risk management.

S V Desai
Whole Time Director & Senior Executive Vice President (Civil Infrastructure)

upgrading the subcontractors to the company's EHS levels. "Safety should be on auto mode," he declared.

Whole Time Director & Senior Executive Vice President (Civil Infrastructure), Mr S V Desai touched upon the role of the EHS Council. "We are looking at implementing ISO 14005 and going forward, data analytics is going to play a huge role in effective risk management." Referring to the importance of behavioural safety, T Madhavadas, Whole Time Director & Senior Executive Vice President (Utilities) said, "All kinds of research and studies have revealed that it takes 66 days for old habits to die and learn new ones." He emphasized the need for personal commitment towards safety and the task of training new workmen to gradually upgrade them to more critical tasks." He, too, spoke about the fruits of digital interventions to improve EHS standards mentioning the use

of an OTP in PT&D IC for shutdowns and simple Bluetooth technology to communicate when working at heights.

"We need to improve our safety record by improving our working style and working life," urged SNS in conclusion, "we are probably standing at the cusp of one of the

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T Madhavadas
Whole Time Director & Senior Executive Vice President (Utilities)



largest backlogs and a huge amount of work has to be done over the next two years at least. As we move forward many more orders will come, so it is imperative to improve our operations, be more friendly towards the environment, work situations, be more careful about our attitude to safety, how we take care of our people and ourselves including labour and staff."

In his closing remarks, Dr K N Sen, Head – EHS, MMH SBG, praised the enormous efforts of the Company's leadership "to help us overcome the daunting challenges with various proactive, preventive and innovative measures through micro-panning and regular reviews to successfully navigate through these difficult times."

The Vote of Thanks was accorded by Mr K P Ravinath, Head EHS – L&T GeoStructure while the event was very professionally and flawlessly anchored by Ms V Monika, Assistant Manager – Engineering Support, Smart World Communications. ■

Old habits, they say, are hard to break. Projects of B&F IC have made it a good habit of regularly winning the British Safety Council's 'Sword of Honour' awards, widely regarded as the pinnacle of EHS success. In 2020, as the rest of the world was busy combatting the pandemic, 8 B&F projects won the award marking a new high in EHS performance. "We were among 65 establishments (35 organisations) worldwide that won the Sword of Honour awards this year," shares a proud P Nagarajan, Head – EHS, B&F IC. "Each of the winning projects demonstrated to the auditors and an independent adjudication panel that they had a proven track record and culture of best practice for excellence in health and safety management that runs throughout the business."

The difference lies in EHS leadership

The onus of creating and promoting a positive safety culture starts at the very top. The seriousness and intent of the senior management to drive EHS as an imperative is clearly reflected in the EHS record of an organization, business, cluster, or project. "It is essential that every employee and workman sails in

B&F projects win 8 'Sword of Honour' awards in 2020!

Keeps a good habit by winning for the 5th consecutive year!



targets to participate in walkdowns, EHS committee meetings & reviews, make behaviour-based safety observations, achieve benchmarking scores in leading indicators such as audits, inspection compliances and ensure that their direct reports are given adequate EHS training. "One of my goals is to obtain a SOP score of above 90% in Critical Area Safety audits and ensure a workmen happiness index of above 90%," states H S P Shukla, Project Director, IIT Hyderabad project, another winner, pointing to the poster on his cabin wall revealing his EHS objectives for the year. Chandran Annamalai, Project Manager of the Raheja Project again in Hyderabad, is thrilled at winning the award for he had, right at the outset, set a benchmark of obtaining a score of 95%+ in the BSC 5-star audit. Driving a focused programme for risk reduction at site, regular visits to workmen habitats and attending EHS training programmes are some of the other personal objectives set and being followed.

Integrated work platforms

"We identified the need for temporary work platforms at the planning stage itself," shares Project Director,



J K Shivaraj
Project Director - BIAL,
T-2 Airport Project

It is essential that every employee and workman sails in the same boat in our journey towards Mission Zero Harm. Safety is an integral part of project implementation right from the planning stage and we need to continuously focus on the 3Es – Education, Engineering & Enforcement to succeed.



Syamprasad Vishnubatta at his award-winning RAMCO Line 3 project at Jayanthipuram. "which we designed based on the structure and integrated it before erection in coordination with the Construction Methods & Planning Cell." His EHS In-charge, Peerimiya Khan elaborates. "The maximum works are done at the ground level itself and integrated to the structure that is lifted. This initiative has greatly reduced the risk of working at height as these temporary work platforms are completely boarded with handrails, lifeline arrangement for anchorage, etc."



P Nagarajan
Head - EHS, B&F IC

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the same boat in our journey towards Mission Zero Harm," declares J K Shivaraj, Project Director – BIAL, T-2 airport project, one of the eight winning projects. "Safety is an integral part of project implementation right from the planning stage and we need to continuously focus on the 3Es – Education, Engineering & Enforcement to succeed," he emphasizes.

With their personal EHS objectives and goals, Project Heads set an example for their entire team to follow that include



H S P Shukla
Project Director,
IIT Hyderabad Project

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Compressor Guard Machine

At the Chennai International airport, Project Director, Anup Chulliyil had to complete complex structural works over a live flyover for which he and his award-winning team provided fall protection measures like safety nets, lifelines. "Every platform is numbered and inspected daily before start of work," Anup confirms.

Improving guarding standards

Standards related to guarding are undergoing constant improvements

internationally as part of continual improvement and benchmarking though unfortunately some of the equipment being manufactured and supplied currently in the domestic market do not meet stringent standards like 360 degree guarding in a few areas. G Krishna, Project EHS Head at IIT, Hyderabad points out that they "conducted specific gap analysis and identified areas for improvement in guarding standards to meet the latest international standards." Although these additional guards are not yet being manufactured domestically,



both Krishna and Project EHS Head, T Bhuvaneshwaran at the Raheja project, have taken the initiative to either source or fabricate them at site like 360-degree end guards on conveyors for batching plants; self-adjusting guards for wood cutting machines and 360-degree guards in bar cutting machines.

Improving fall protection

Working at heights has become a breeze thanks to the innovative Automated Climbing System (ACS) (integrated with safety screens) implemented by Project Director, Sundaram Somasundaram and his EHS In-charge, A V Muruganatham at the Piramal Aranya project site that has the distinction of winning the 'Sword of Honour' award twice. "We can simultaneously proceed with wall construction as well as dry finishing, grouting and other finishing wall activities after casting over the bottom platforms," informs Chandran Annamalai from the Raheja site where ACS has been implemented too. Bhuvaneshwaran adds, "We can perform multi-level work such as slab construction surrounding the core wall since it is fully covered with plywood decking, sheet barriers and safety catch nets." Crane and manual handling of the wall shutter board are completely avoided increasing safety when working at heights.

Crane activity is an area of prime focus for Project Director, Prestige Jindal City, Kamala Kannan Ravichandran as he constructs five buildings each with 3 towers for which five tower cranes of intersecting operating radius have been deployed.



A vertical safety net around a circular building

In addition to the catch net system to arrest the fall of materials and people at the working level and at the ground floor, IIT Hyderabad has introduced a vertical safety net system by completely enveloping the floors below the casting level with a safety net before deshuttering. It avoids fall of materials and provides additional protection during de-shuttering, fixing edge protection systems, finishing works near the edges and other such activities.

Staying safe during roofing

EHS In-charge, R V Sudhakar, at the BIAL project, is committed to keep his people safe during the erection



Roof work - Fall restraint systems

and construction of the massive and impressive terminal roof. "We planned for it meticulously and managed it very well," he says enumerating the several steps taken to ensure 100% safety. "We had a roof induction for anyone who wanted to enter the roof right from the MD to the workmen with entry only against roof passes with mandatory harness." The team installed a dedicated & controlled access system to monitor entry, lifeline and fall arrestor systems for workmen and installed anti-slippery mats. Mock drills for the emergency rescue systems were regularly conducted and a foreign object debris control system was instated and monitored daily. Technology also helped Sudhakar to maintain safety with the use of Mobile Elevated Working Platform (MEWP) systems like boom & scissor lifts instead of scaffolds.

The winners and those who made it happen!



CHENNAI AIRPORT

Anup Chulliyil, Project Head
V Satish, Project EHS Head

BIAL T2

Shivaraj J Kubsad, Project Head
R V Sudhakar, Project EHS Head

IIT, HYDERABAD

H S P Shukla, Project Head
G Krishna, Project EHS Head

RAMCO LINE 3, JAYANTHIPURAM

Syamprasad Vishnubatta, Project Head
Peermiya Khan, Project EHS Head

RAHEJA, HYDERABAD

Chandran Annamalai, Project Head
T Bhuvaneshwaran, Project EHS Head

PRESTIGE JINDAL CITY, BENGALURU

Kamala Kannan Ravichandran, Project Head
R Vadivelu, Project EHS Head

PIRAMAL ARANYA, MUMBAI

Somasundaram Sundaram, Project Head
A V Muruganantham, Project EHS Head

CRESCENT BAY, MUMBAI

Chandan Kumar Jana, Project Head
D G Patil, Project EHS Head



Over the five years, audits have been conducted at all types of projects ranging from mega task force projects to medium & small sized projects; clients varying from government to multinationals; across urban & rural geographies; from cement plants, hospitals, residential, IT complexes, hotels, public spaces, airports, etc. and success demonstrates the resilience and uniformity of the EHS management system implemented.



Managing traffic efficiently

One of Anup's key concern areas was traffic management at his Chennai airport project site and as his EHS Incharge, V Satish says, "it was completely managed by us, including all the internal roads and bifurcations for passenger, employee and vehicular movements that included providing barriers, traffic marshals, convex mirrors at appropriate locations, and our effort was well appreciated by the client."



An acoustic enclosure around a concrete pump to arrest noise

Having to construct a tower bang in the middle of 5 others that have already been handed over and are occupied is a challenge without precedent which Crescent Bay's Project Director, Chandan Kumar Jana and his EHS In-charge, D G Patil are battling with. The other major concern for them is mobilizing men & material in the congested confines of Mumbai. "We have bifurcated people and vehicular movement," explains Satish, "prevent fall of material from heights, control dust and noise generated apart from having the safety screen system."

EHS In-charge, R Vadivelu at the Prestige Jindal City project site shares how they have developed an acoustic enclosure placed around the concrete pump to

arrest noise. "We have fitted all our tower cranes with Anti Collision Devices so that a crane can be stopped if there is danger of jibs colliding," he adds.

Being amongst the best, globally

B&F's recognition has been the result of a 5-year-long, well thought out and executed benchmarking process, "that has helped us to align our existing practices to international benchmarks," says Nagarajan, "in various areas of risk profiling and prioritization of action towards high risk, monitoring organisational culture, employee wellbeing, controlling hazardous substances at work and benchmarking

technical standards including traffic management." Over the five years, audits have been conducted at all types of projects ranging from mega task force projects to medium & small sized projects; clients varying from government to multinationals; across urban & rural geographies; from cement plants, hospitals, residential, IT complexes, hotels, public spaces, airports, etc. and success demonstrates the resilience and uniformity of the EHS management system implemented.

B&F projects have set the benchmark; now it is for other projects across L&T Construction to do all the running to catch up.

Hats off to all the winners! ■

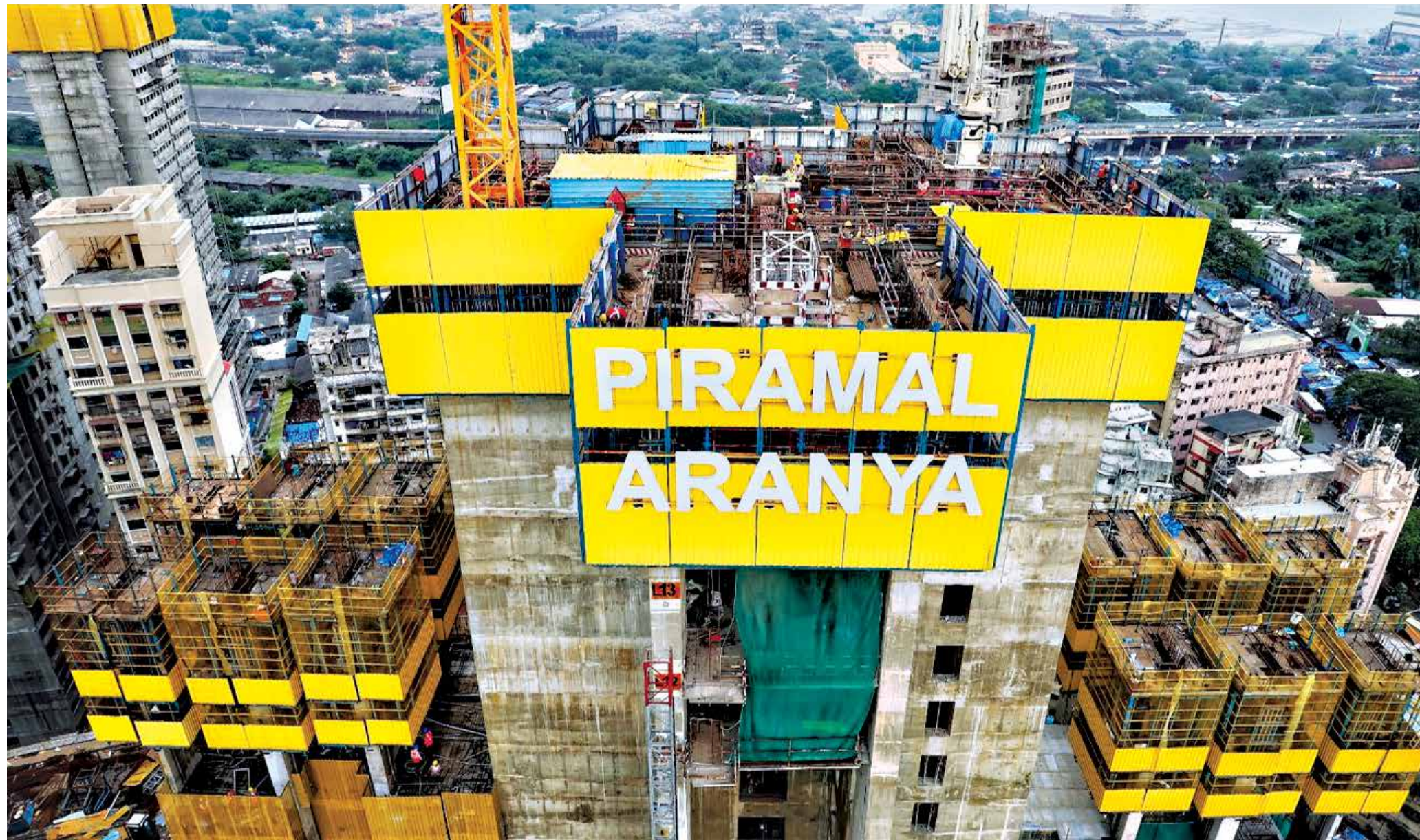
For its EHS performance, Piramal Aranya rises above all

B&F IC's Piramal Aranya residential project has been awarded the much coveted 'Sword of Honour' from the British Safety Council twice! Their sterling EHS performance has also won them the L&T Construction Safety Award - 2020, a RoSPA Gold, and certifications from the National Safety Council for consecutive years. It is therefore not surprising that Project

Director, Sundaram Somasundaram (SS) considers his project a role model for its EHS performance. SS's EHS success is not surprising either, having won similar accolades at a couple of his previous projects - Kohinoor Towers and Omkar 1973. In fact, both SS and his EHS In-charge, A V Muruganantham (AVM) have reason to cheer having won the 'Sword of Honour' for their Omkar 1973

project too. "I firmly believe that if a team works in unison, all the targeted tasks can be accomplished," says SS, with quiet confidence.

Situated in Byculla, adjacent to Mumbai's zoo, the Jijamata Udyan or the erstwhile Victoria Gardens that has the largest green cover in South Mumbai, Piramal Aranya is a group of three high-rise towers, the tallest rising to 88 stories. Once completed, flat owners will enjoy some sumptuous views of the city, though presently SS and his team have chosen 'meticulous risk assessment and pre-planning' to execute this logistically constrained high-rise project that is posing Construction Head, N Sriram several tough questions. "In-situ logistics is a huge challenge, especially in Mumbai, but with proper short- and long-term planning, we have successfully avoided logistical bottlenecks that has helped in timely formwork system erection, P&M asset erection/dismantling as well as creating an overall healthy and safe work-place."



Project Director Sundaram Somasundaram receiving the Sword of Honour



I firmly believe that if a team works in unison, all the targeted tasks can be accomplished.

Sundaram Somasundaram
Project Director



All smiles! Project Director, Sundaram Somasundaram & EHS In-charge A Muruganantham receiving the Sword of Honour Award from Whole Time Director & Senior Executive Vice President (Buildings), M V Satish

Keeping safe at heights

“A proactive approach is essential to successfully implement EHS culture at site,” points out AVM, “and I am positive that all high-risk activities that are likely to occur can be mitigated prior to confronting them.” With construction at Piramal Aranya rising to 280 m and more, working at heights has been one of the team’s biggest challenges. “We have adopted the Autoclimbing Formwork System (ACS) for our columns and core walls that has speeded up construction to achieve an average 6-day cycle time,” AVM explains, “while with the specially designed Safety Screens, our workmen are never made to feel that

they are working at heights of 200 m plus. In fact, the double safety layers have reduced the phobia as they feel that they were working at ground level. This is in addition to every workman being vetted for ‘work at height’ prior to the safety induction.”

Keeping the risk of fire at bay

To address the threat of fire that high-rises often face, the team has designed and implemented an in-house automatic fire fighting system that can be operated from ground level and is extended with every ‘jump’ or after completing one level of



A V Muruganantham
EHS In-charge

A proactive approach is essential to successfully implement EHS culture at site and I am positive that all high-risk activities that are likely to occur can be mitigated prior to confronting them.



concreting. “This system is a first-of-its-kind implemented in India,” enthuses AVM, “as general fire-fighting systems of Fire Stations or industry standards do not reach beyond 165 m.”



Aerial view of the Autoclimbing Formwork System



Workmen feel safe at heights behind our specially designed Safety Screens

Keeping workmen happy and productive

A best-in-class camp for their 850-odd workmen, designed considering natural ventilation, with facilities like recreation rooms, auto-sprinkler systems, gas detectors in the kitchen, storage rooms for food grains (which came in extremely handy during the pandemic times) and more have helped improve workmen productivity and retention. “We have made their camp very similar to their home,” remarks Accounts and Admin Head, Babu Mathrathan. “After all, workmen are our best assets and once they are confident that they have been well looked after, they are more productive and ready to implement the new initiatives taken by our team.”

A revealing fact that their MO is working is that their workmen have been returning to site after visiting their hometowns. The team has signed

Keeping P&M smooth and efficient

A matter of pride for the P&M team led by U Vinod Kumar is the recognition for Piramal Aranya as the Best P&M-enabled site based on a variety of parameters including very few incidents, higher productivity, timely maintenance, maximum audit compliance, efficient movement of spares, care of equipment, adherence to fuel norms and such like. “Timely and safe erection of the P&M assets is a huge task especially with limited logistics,” observes Vinod Kumar. “Timely maintenance ensures smooth operation, and any major breakdown is avoided by meticulously scheduling maintenance to avoid any adverse impact on site progress.”



The only view that matters!



sprinkler system for suppression of particles), to name a few.”

Keeping innovations rolling

The team innovatively developed an ‘indigenous M80 slurry mix’ that eliminates the use of conventional cement slurry, which being temporary does not form a part of the permanent structure. It saves cost, reduces safety risks as contact as well as activity time are considerably reduced and avoids generating waste which would have only led to landfill.

Piramal Aranya rides on efficient project planning for which Planning Manager, Sushanta Bhowal and his team must be credited. “With new requirements from stakeholders and new EHS initiatives available, it is extremely important to do cost-benefit analysis and we have achieved multiple goals apart from setting new benchmarks within the available financials.” SS adds, “We have developed many initiatives at this project which I am sure will be assimilated at different project sites to create better working environments across the organization.”

At the end of the day, for an EHS professional, a ‘Sword of Honour’ is something worth celebrating and AVM has had three such occasions already at L&T Construction. “Even the 5-star audits are a learning experience,” he shares excitedly. “Here, at Piramal Aranya, our first audit was conducted by BSC’s Mr. Chris McDermott physically at site and our score was 93.82%. The second was a virtual audit by Mr. Bob Wallace and we scored 92.93%.”

Here is wishing SS, AVM and their team more sterling EHS accolades going forward. ■



Sushanta Bhowal
Planning Manager

With new requirements from stakeholders and new EHS initiatives available, it is extremely important to do cost-benefit analysis and we have achieved multiple goals apart from setting new benchmarks within the available financials.



an MoU with the MCGM (Municipal Corporation of Greater Mumbai) to provide free daily lunch to 300 workmen. In addition, they are given a minimum protein diet of 175 g to ensure their health in a stressful and demanding environment. “We have looked at the occupational and environmental aspects too,” adds AVM, “like routine doctors’ visits to assess workmen health, using acoustic enclosures for concrete pumps to check the emission of fine cement, sand, dust and other particles, control mechanisms at batching plants and aggregate bins (with an automatic



HE TREATS SUCCESS AS STEPPINGSTONES TO GREATER EHS SUCCESSES!

It would only be fair to assume that after having been an EHS professional for a quarter of a century, Senior Manager, V Muruganantham (AVM, as he is more popularly known) would know a thing or two about EHS. The multiple awards and recognition he has won certainly bear out that assumption for, as he describes, “protecting human life at work.” Looking back at his decade and a half journey with L&T, he shares excitedly, “my most memorable moment was when L&T gave me the opportunity to receive the ‘Sword of Honour’ award in London for Omkar 1973. I was the first person from L&T to be given that privilege and when I handed it over to our CEO & MD, SNS Sir’s words, “Keep up the effort and achieve more milestones” is still ringing in my ears.” AVM has the rare distinction of winning the ‘Sword of Honour’ award thrice: for Omkar 1973 and two for Piramal Aranya, his present assignment which is his sixth.

AVM’s association with L&T began with two projects in Hyderabad, Microsoft and ICICI, after which he moved to Mumbai in 2010, and has worked at the Orchid Crown, Omkar 1973, Oberoi Skycity and Piramal



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V Muruganantham (AVM)
Senior Manager, L&T



AVM receiving the ‘Sword of Honour’ in London for Omkar 1973

Aranya projects. Awards have found a way of following him starting with the National Safety Council Gold award he won at his first project followed by NSC’s Prashansa Patra and the OSH Gold award for Omkar 1973, the three ‘Sword of Honour’ awards in addition to a bagful of internal awards for his projects and B&F IC.

“Managing workmen is my biggest challenge due to language barriers and culture differences,” he remarks. “Meeting high expectations from reputed clients is another and the new challenge is to be competent with technology as we adapt more digital solutions to improve EHS standards.” Having spent half his career in high-rise constructions, he flags off Automatic Climbing System,

firefighting systems, logistic management considering Mumbai’s space constraints as some EHS innovations he has helped introduce. “Controlling fires in a high-rise construction is critical for which I introduced a fire hydrant system for the first time in L&T involving the ACS system. Another, is a fall protection system I’ve implemented by installing safety fan nets around buildings more than 250 meter tall.”

On the softer side, AVM acknowledges his seniors for their support and encouragement specially mentioning P Nagarajan, Head – EHS, B&F and Prakash Pai, CPM – Mumbai region. Appreciating the value of long and deep relationships, AVM is grateful for his 7-year-plus association with his present Project Director, S Somasundaram, “who has guided and played a big role in my development. I am thankful to my subordinate of more than six years, Nallasivam, who has also contributed greatly to my success.”

Hailing from Elappakkam in Tamil Nadu’s Kanchipuram district, AVM spends his free time watching the news, practicing yoga, and involving himself in activities to serve God. “I have my daily schedule that I strictly adhere to,” he signs off, the true professional.



AVM is married to Sathiya, a postgraduate in commerce but now a homemaker and they are blessed with two children, Durgaprasath, who is in 12th and Sharan, who is in 7th standard

Lighting up the world's largest cricket stadium required safety of a high order



A stern examination of safety standards & processes

Since the day he saw the design of the stadium and understood the client's desire to have FOP (Field of Play) lighting to be placed on the stadium roof, EHS In-charge, Santhosh Bore started to plan for the exercise. "We were attempting something new and so we had to plan everything meticulously from a safety perspective," he says earnestly. "The challenges were many: we had workmen working on platforms attached by a rope suspended high up over the stadium, shifting material from the ground to the platform had to be handled very carefully and our biggest issue was that cranes had no access to the roof over a finished ground."

Known for his methodical approach, Santhosh diligently applied all the required safety norms right from the start of deployment to the handing over of the system. "Firstly, we prepared a work procedure and HIRA after consulting all the stake holders, considering all the hazards that could arise, and prepared the necessary mitigation plans by applying control measures." The EHS team introduced an access control system to reach the top platform from the terrace level to control unauthorized entry of



Santhosh Bore
EHS In-charge

The challenges were many: we had workmen working on platforms attached by a rope suspended high up over the stadium, shifting material from the ground to the platform had to be handled very carefully and our biggest issue was that cranes had no access to the roof over a finished ground.



Working at a height of 52 m on a platform attached to a rope on top of a wide stadium is certainly not for the weak-kneed or those suffering from vertigo, but that is how skilled workmen put up 580 LED lights to illuminate the world's largest cricket stadium at Motera. The brilliantly lit stadium played host to

the first day-night Test Match on Indian soil between England and India, and TV viewers the world over were awed by what they saw.

The Narendra Modi Stadium, a lot like L&T, has several 'firsts' to its credit one of which is that it is the only cricket stadium in India to be LED-lit

meeting the ICC (International Cricket Council) Broadcasting standards for sports illumination. The lights placed on the steel roof have been exclusively designed for sports and multi-purpose venues that offer outstanding light quality, higher energy efficiency, effective thermal management, and a longer lifetime.



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personnel. An independent line was provided on the platform, running all around the stadium, to hook the harness of the workmen working on it for them to move freely in all directions. There were two points to access the work spot at the top for workmen to be swiftly evacuated in case of an emergency.

A rope and pulley system lifted the material from the ground to the platform. Before start of work, the pulley was inspected by a competent person and during work, the area below was cleared of people, cordoned off with security posted to stop anyone entering without reason. "A challenge the installation team faced was to drill holes on some platforms," says Santhosh, which was addressed by tying the drilling machine to the platform with a blanket hanging below the drilling area to arrest sparks or fires. "We also had special type of wheelbarrows to shift material on the platform from one place to another that reduced the risks involved in manual material handling at height," remarks Santhosh.

From an overall safety perspective, a safety height simulation with BIM 360 modelling was developed to monitor and control the height at which work was happening at the upper bowl while fall protection was installed at a height of 30 m that was monitored through CCTV. Fire load calculations were done at all facilities with independent assessment and fire-fighting equipment installed as per the fire load. "The entire site was monitored with CCTV cameras," shares Santhosh, "and the footage helped the team to monitor safety measures by zooming into certain sections to check safety railings, safety nets on the staging and other aspects"



The unique ring lighting solution on the canopy meets the requirements of vertical illumination, uniformity ratios, glare calculations, shadow-free play and spill-over light.



LED lights – a bright green statement

The lighting system features high wattage LED light fixtures instead of the conventional metal halide lamps, distributed in a ring arrangement against the conventional high mast structures that reduces harsh shadows. The shadow of the canopy on the field of play is avoided by placing the fixtures in front of the canopy and the entire assembly is aesthetically far more appealing as it is mounted on the roof and blends with the structure without disturbing the aesthetics of the surrounding atmosphere. The unique

ring lighting solution on the canopy meets the requirements of vertical illumination, uniformity ratios, glare calculations, shadow-free play and spill-over light. With the fixtures mounted on the edge of the roof, the team was saved the trouble of procuring clearances from the aviation department as there are no obstructions in the flight path.

"To see the stadium bathed in light with an exciting one-day match in progress was a truly fantastic sight," sums up Project Director, Subrata Datta and Santhosh nods in agreement, happy that he has safely completed a particularly tough assignment. ■



CV spots personnel who are not sufficiently socially distanced

Computer Vision is upping the ante by putting sites under 24/7 safety surveillance

A source of perennial concern for most EHS heads and personnel are Unsafe Acts (USAs) and Unsafe Conditions (USCs) that carry the threat of becoming safety incidents. Many of these remain undetected by the human eye no matter how diligent and thorough the inspection is and when dealing with project sites that either stretch several hundreds of kilometres or are spread



Michael William Sanderson
Head - EHS, Heavy Civil IC

Predominantly, compliance with any safety or environmental requirements require human interaction and like most things human, they are prone to errors, intentional or otherwise.



over many acres, that involve working at heights or in a marine or similar challenging environment, better safety vigilance is an imperative. "I was seeking to challenge and improve the existing safety requirements," remarks Michael William Sanderson, Head - EHS, Heavy Civil IC, wrestling with this concern. "Safety and Environment are based on individuals' legal requirements that are fundamentally aligned to historical common law development. However, predominantly, compliance with any safety or environmental requirements require human interaction and justification and like most things human, they are prone to errors, intentional or otherwise."



S Anantha Sayana
Chief Digital Officer, L&T

Computer Vision (CV) is an aspect of AI that gives the system cognitive capabilities. By feeding hundreds of different images into the system, it gets trained to recognize and classify images that have elements of unsafe acts or unsafe conditions and there are a variety of Machine Learning techniques and algorithms used to achieve this.



Reducing dependence on the human factor

Just as in the game of cricket the introduction of technologies like the DRS, Ultra Edge and ball tracking are reducing on field human errors, it was felt that the answer to the concern of EHS managers to early detect USAs and USCs lay in a technological intervention. The problem was presented to the Digital team led by S Anantha Sayana, Chief Digital Officer, L&T to study and find a suitable digital solution.

"We already have cameras installed at our project sites that are 'seeing' the site 24/7," points out Anantha. "The question was how to put intelligence into the system to detect unsafe acts and unsafe conditions that the camera could 'see'? Computer Vision (CV) is an aspect of AI that gives the system cognitive capabilities. By feeding hundreds of different images into the system, it gets trained to recognize and classify images that have elements of unsafe acts or unsafe conditions and there are a variety of Machine Learning techniques and algorithms used to achieve this." Once

the system is trained with the first set of images, it is configured to recognize and alert the appropriate staff about them and it keeps learning from every new image that it processes. "We thus have a system that monitors 24/7 without any human interaction using AI, ML and Computer Vision," explains Anantha. "We have currently trained the systems about USAs and USCs about whether a workman is wearing his proper PPE like helmet, jacket and shoes or not. In fact, in the present post pandemic phase, it



Krithika Venkatesh
Senior Manager - Digital

CV empowers them (EHS personnel) to conduct root cause analyses to prevent USAs and USCs from reoccurring and even helps in behaviour-based training.



even detects if a person is not wearing a mask or is not sufficiently socially distanced. We are working with the Safety teams to train the system on more conditions.”

Select project sites are now under the constant eye of CV to detect safety anomalies, alert the EHS personnel concerned to act and rectify. “It empowers them (EHS personnel) to conduct root cause analyses to prevent USAs and USCs from reoccurring,” chips in Krithika Venkatesh, Senior Manager – Digital, “and even helps in behaviour-based training.”

AI detects faster, more accurately and ‘sees’ much more

AI picks up what humans do not or cannot. It is not distracted. It does not sleep, rest, or take time off. It does not suffer from the lack of risk knowledge. For a machine, it is always black or white, right or wrong. For Michael and his ilk, it is a 24/7 ‘third eye’ that is constantly working for them. “We have developed models that can recognize if an excavated pit is barricaded properly or not,” explains Krithika. “CV can detect oil spillages and the platform triggers alerts for immediate action. In a controlled environment, we have used CV to even identify

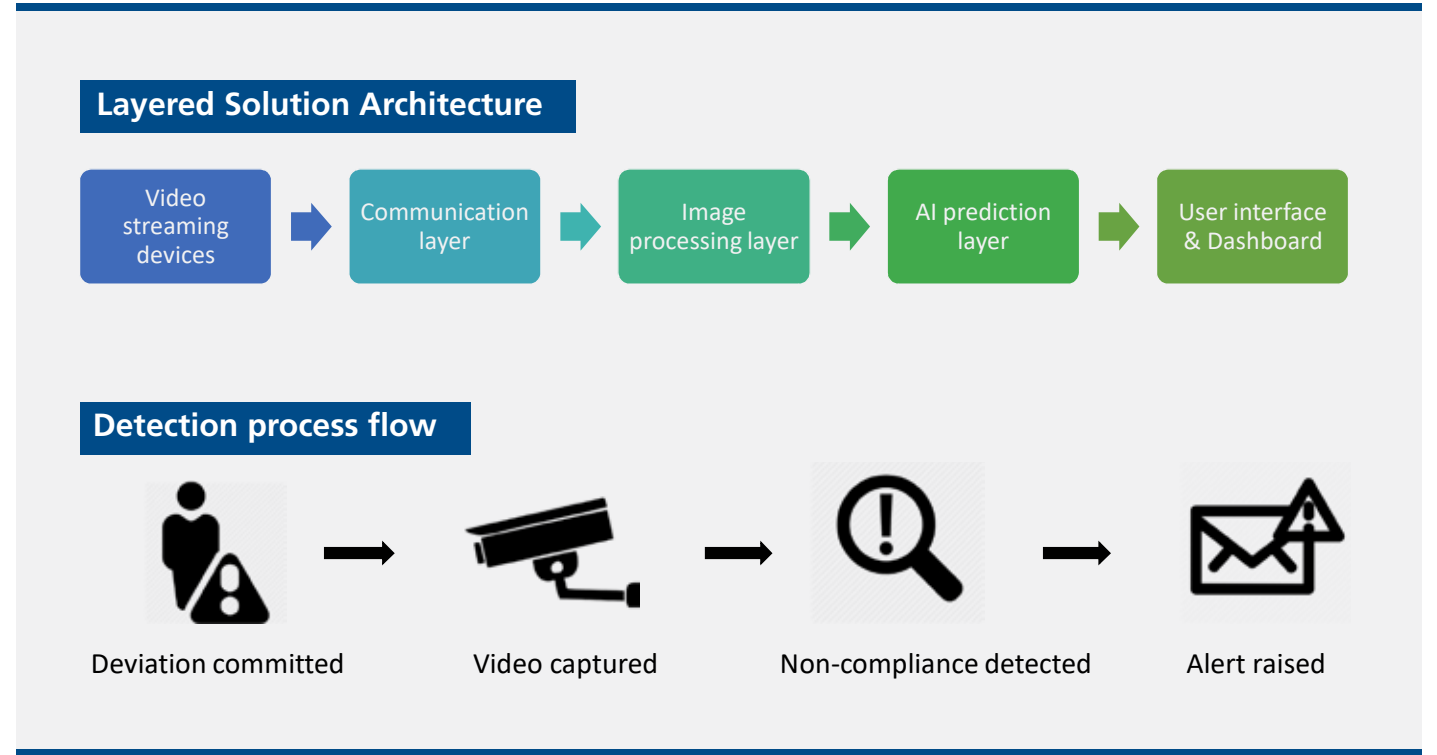


trespassers on designated walkways.” A recurrence or similar mistakes could reveal a serious lacuna, nudging EHS personnel to relook and realign their systems and processes.

Early detection is heaven sent for EHS Heads like Michael for it can significantly reduce incidents. “If a notification is not closed, AI will keep notifying, until corrected. Unlike human beings, it does not give up!” remarks Krithika, with a smile.

The proof of the pudding is at the sites

With Michael’s urgings and the Digital team’s efforts, CV was ready for implementation and rolled out at select Heavy Civil and B&F sites starting with a pilot at the Cochin Dry Dock project site. The results have been more than noteworthy. For EHS In-charge, Deiveegam Murugesan, at the Cochin Dry Dock site, the revelation has been both exciting



CV observations from 1/11/20 – 28/02/21	
Cochin Dry Dock project	
PPE related	: 1202
Face mask	: 413
Social Distance	: 2284
Kachhi Dargah project	
PPE related	: 999
Face mask	: 12
Social Distance	: 562

Managers, it is also putting a far bigger responsibility on us to act quicker and more decisively once we have been alerted. This is sure to vastly improve our EHS performance,” he affirms. CV helps to significantly reduce the gap between detection to resolution that can enormously improve safety performance.

“Computer Vision has greatly improved EHS visibility,” declares Michael, who with the support of Project Managers and EHS teams, has driven its implementation at other Heavy Civil project sites like Mumbai Metro and Kachhi Dargha with B&F following suit by adopting CV in a few of their sites that are enabling projects to target areas CV has detected to manage risk levels through focused re-education or additional training of workmen and thereafter monitor improvements that are translated into lesser detection by CV.

as well as disturbing. “For the month of December 2020, Computer Vision made 1,642 Safety Observations pertaining to PPE – helmets, jackets, shoes and even masks – as against a mere 221 human observations,” he shares. “While it has certainly made our lives easier as Safety

For the month of December 2020, Computer Vision made 1,642 Safety Observations pertaining to PPE – helmets, jackets, shoes and even masks – as against a mere 221 human observations.

“CV opens up a whole world of predictive analysis too,” sums up Anantha Sayana. “EHS managers can now detect trends, identify those safety lapses that occur more frequently than others and take pre-emptive measures because in the final analysis when it comes to safety, prevention is always and infinitely better than cure!” ■



AI picks up what humans do not or cannot. It is not distracted. It does not sleep, rest, or take time off. It does not suffer from the lack of risk knowledge. For a machine, it is always black or white, right or wrong.



EHS & employee wellbeing remain top priority at Mumbai Metro Line 3, UGC – 07



Although the project team at Mumbai Metro Line 3, Underground Package – 07 missed winning the L&T Construction Safety Award 2020 by a whisker, their robust EHS programmes have won them the accolades of being 'close contenders.' That, however, has not deterred Project Director, H Jayarama (HJ) and Chief OHS&E Manager, Rajesh Krishna Bhandary



Rajesh Krishna Bhandary
Chief OHS&E Manager

We identified 'raw' workmen, marking all of them with a 'N' on their reflective jackets. They were specially trained, and their work strictly and regularly supervised till they were able to perform their tasks well.



from continuing their efforts to keep EHS and employee & workmen wellbeing top priority at workplaces, offices and their three labour camps. "We are managing the wellbeing of 237 staff and 2,091 workmen in the overcrowded city of Mumbai and we seem to be doing a good job of keeping our safety record intact," mentions HJ with a smile. Both he and Rajesh have more reason to

for the first time at a construction site. "A large number of our new workforce were from villages with an agricultural background taking up construction jobs to run their families in the off season when they were not harvesting their crop in their native places," informs Rajesh. "We identified such 'raw' workmen, marking all of them with a 'N' on their reflective jackets. They were specially trained, and their work strictly and regularly supervised till they were able to perform their tasks well." This ploy stood the team in great stead especially post the unlock when they had to mobilize a lot of fresh labour.



An interesting initiative was to use the expertise of OEMs and their knowledge of their equipment to conduct regular training sessions by them at site. Equipment manufacturers like M/s. Messer held sessions on the safe usage of the gas cutting set, M/s. Hilti on

the safe usage of electrical equipment, M/s. Peri India and CSTI on safe scaffolding.

smile for their project has already clocked 9 million safe man hours and counting.

Training is key, for both new and experienced

Right from the initial stages of the project, statistics revealed that most of the injuries were occurring due to the deployment of new workmen, working





H Jayarama
Project Director

A project is successful when there is participation from all levels of the workforce and a commitment from the top management to drive the team to achieve the goal of 'Zero Harm'.



Rewards and softer support for better results

"We believe in a reward and not a penalty culture," remarks HJ. "We implement our OHS policy in spirit at site that has even improved the behavioural impact." Staying true to that sentiment, the team encourages people to do good work with weekly and monthly awards and appreciation like the Safest Workman or Employee for the month. Rajesh emphasizes that,



Vaccination for workmen and staff

"an assertive and committed approach by our top management towards Occupational Health and Safety assures a definite and continual improvement of the system." This is one of the few sites to have a cell phone zone at workplaces, a counselling centre for those violating EHS systems and a fingerprint authentication system on the bar bending machines to prevent unauthorized usage.

A healthy site is a more productive one

On the health side, the project has successfully undertaken free HIV testing at site. Till date, 10,375 workmen have been tested of which 14 tested positive who have been treated by the Maharashtra State AIDS Control Society. "Initially, there was resistance from those who tested positive," mentions Rajesh, "being unwilling to take medication, suffering from lack of awareness, fear of losing their jobs and living with the stigma but they have been satisfactorily managed." Programmes to promote



Bar bending machine equipped with fingerprint authentication

awareness of HIV and human trafficking are held every month by the NGO, 'Purnata'.

325 million people worldwide live with hepatitis as per a World Health Organization report, though 80% of them have no access to testing and treatment. The project's execution & admin teams have organized hepatitis testing & vaccination for all workmen free of cost and has achieved 80% participation without any positive cases.

Building a team of safety champions

"A project is successful when there is participation from all levels of the workforce and a commitment from the top management to drive the team to achieve the goal of 'Zero Harm,'" says HJ. To create a sustainable safety culture, HJ and his team initiated a programme of identifying one workman from a group of 20 to monitor their work at ground level. "They were our 'Safety Champions,'" says Rajesh, "and till date we have identified 190 such safety champions at our project. Not only are they motivated to work with more vigour and commitment, but they provide a different perspective

outside of an individual's viewpoint." The team discovered several other benefits especially in terms of improved monitoring and reporting of unsafe acts and conditions that further improved the site's EHS performance.

Keeping the 5 'S's top of mind and action

Adherence to the 5 'S's of Sort, Set in order, Shine, Standardize & Sustain is a part of SOP that is diligently monitored. "We conduct weekly and monthly inspections and monthly audits," adds Rajesh. "We have introduced the Best Housekeeping Award scheme given away every month during the OHSE meeting."





Small nicks and cuts are common at a construction site but if left unattended there is always the danger of tetanus for which regular vaccination campaigns are being conducted as also testing for malaria. "We have also initiated a full body

medical check-up for all workmen to check for blood pressure, cholesterol and critical diseases by an external agency," informs Rajesh and although each test costs INR 10,000, it is free for the workmen with the company bearing the cost.



Efforts to keep the environment clean

Several steps have been taken to sustain the environment like an automated wheel wash bay for uniform washing of the wheels without human intervention, an ETP plant to treat wastewater from the tunnel, noise barriers around compressors & ventilation ducts to control the noise and reuse waste concrete to fill potholes, tree protection zones and other works. "We have installed a reclamation tank too at the casting yard," adds Rajesh, "to segregate aggregates from wastewater. Both are then reused: aggregates for concreting and the wastewater in sprinklers to control dust." Used paper is also disposed of to an NGO for recycling.

As Mumbai continues to remain a hot COVID-19 zone, HJ, Rajesh and his team remain committed to keep their men safe and healthy so that work proceeds as planned. ■

TI IC spurs excellence in Safety with LIFE Awards

TI IC took a significant step to enhance their safety culture by instituting the **LIFE AWARDS - Loss and Injury Free Environment** to recognize and reward project teams that demonstrated excellence in safety practices, espoused L&T's safety values and aligned with the organisation's mission of Zero Harm.

The award evaluated the best practices and safe work innovations implemented at sites, the use of digital technologies to enhance secure work processes, alignment of EHS functions with global standards and the individual's commitment towards the organization's EHS goal.

The projects that qualified were those that had zero reportable Loss Time Injury for the assessment period. After self-assessments, these projects were audited by teams comprising senior Project and EHS Heads from a different project and the audit reports were then evaluated by a committee of senior executives drawn from the Business Unit, Operational & Technology Services, EHS and HR before the winners were decided who were felicitated at their respective SBG town hall event. In addition to the project trophy award, the individual staff members were awarded a Plaque.

The Winning Teams

RBG		RREC	
Platinum	: Mauritius Metro	Platinum	: DIAL Airport
Gold	: Western DFCC EMP-4	Gold	: Ghoshpukur Salsalabari Road
Silver	: EDFC PKG 204	Silver	: WDFCC CTP 3 R
Bronze	: Dhaka Metro	Bronze	: Bidkin Industrial Area
Diamond (1st Prize)	: WDFC EMP-4	Diamond (1st Prize)	: Mumbai Nagpur Expressway
Diamond (2nd Prize)	: WDFC CTP3R	Diamond (2nd Prize)	: Pragati Maidan
Diamond (3rd Prize)	: WDFC EMP 16	Diamond (3rd Prize)	: WDFC CTP 1&2





At about 10 am one Sunday morning on February 7th, a huge chunk of what is suspected to be a glacier in the Nanda Devi landscape broke and fell into the river Dhauliganga, one of the tributaries of the Ganges near the village of Raini in Uttarakhand's Chamoli district.

WET IC keeps Delhi's drinking water safe despite the Uttarakhand glacier break

Who would have ever imagined that such a natural calamity high up in the Himalayas would have a severe adverse impact on the drinking water needs of the national capital, located several hundred kilometres away! As the flash flood swept down the mountain taking all with it, the turbidity (the presence of suspended particulates – debris, silt, algae, plants, sawdust, wood ashes, chemicals) of the water in the Upper Ganga Canal, which is one of the main sources of Delhi's drinking water, rose alarmingly. Against the normal seasonal

turbidity levels of around 25-50 NTU (Nephelometric Turbidity Units) and a permissible level of 100 NTU, the raw water reaching the L&T-built 110 MGD Bhagirathi Water Treatment Plant, one of Delhi's largest WTPs, was around 3,300 NTU by the 13th that increased to 8,200 NTU the next day and even higher thereafter. The client, Delhi Jal Board (DJB), suggested drawing water from the river Yamuna to maintain plant production. However, the water in the Yamuna carried high levels of pollutants like ammonia at 1.2 to 1.9 PPM levels that had to be diluted.

Preparing for the challenge

Even as households across South, East & North East Delhi started to experience disruptions in their water supply by the 13th, the challenge before L&T's Project Head, Ravinder Singh and his team at Bhagirathi was to maintain plant production. "We quickly reviewed our chemical stock and lined up the treatment process as the turbidity began to increase. All maintenance works were put on

hold." Getting the right chemical mix was crucial to the treatment process and in this scenario, it was even more challenging, indicates Santosh Kumar, Chemical In-charge, "Around 1 lakh litres of Ferric Alum solution was prepared anticipating a rise in turbidity while all standby PAC tanks at the clarifiers were filled to their maximum for the chemicals to be gravity fed in case the dosing systems failed. This ensured that the plant activities remained normal, and the outlet water quality was as per safety standards."

Marrying the waters of the Ganga & Yamuna

On 14th February, the turbidity crossed 7000 NTU, recalls Ravinder, "It was an alarming situation as all the bar screens



Mr. Raghav Chadha Honorable Vice Chairmen Delhi Jal Board explaining plant status to the media along with Chief Engineer Mr. M K Hans, Executive Engineer, Mr. S P Gautam and other DJB officials.

started to choke and despite frequently cleaning the settlements and deposition of silt, the risk of plant operations stalling

was high." They decided to cut the raw water output by 30% and lift raw water from the Yamuna as per the client's





The task before us was to marry the waters of the Ganga and the Yamuna ensuring that the proportions were just right in the 2:1 ratio.

Ravinder Singh
Project Head



direction. However, there was still a lot to be done from the processing point of view as Santosh mentions and immediately confirmed the status of pollutants to the Delhi Jal Board Chemist which was 5 times more than their treatment capacity.

“The task before us was to marry the waters of the Ganga and the Yamuna,” remarks Ravinder, grimly, “ensuring that the proportions were just right in the 2:1 ratio,” fully aware that any error in his calculations could result in several parts of Delhi going without clean drinking water.



Overview of the plant with the Ganga and Yamuna inlet channels

Arriving at the right solution

Taking the challenge head on, the team worked out a practical and secure approach with spot chemical

dosing as the raw waters were mixing largely inside closed conduits with only minor surface areas available for assessment. “As all the inlet channels of the clarifiers had different raw water characteristics, it was very clear that one single dosage would



Santosh Kumar
Chemical In-charge

We had to think on our feet for instance, when the jar tests indicated a higher variance across any of the channels, we had to accordingly align the dosage, which continued till the turbidity returned to normalcy over the next couple of days.



not work,” points out Himanshu Bhardwaj, O&M Head. While the jar test was a convenient mode to assess the optimum chemical dosage, it was a time-consuming process, so the team used it only at intervals to check on the dosage while relying on the available data that was further ratified through samples sourced from flash mixtures, floc formation to arrive at the right dosage.

“We had to think on their feet,” Santosh remarks. “For instance, when the jar tests indicated a higher variance across any of the channels, we had to accordingly align the dosage, which continued till the turbidity returned to normalcy over the next couple of days.” The outlet parameters were secured with additional chemicals prepared and maintained as per the dosages derived from the jar tests. Some of the initiatives that facilitated the process included transferring excess concentration of sludge to additional sludge drying beds instead of putting it through a further thickening process. The effectiveness of the chemical dosage was closely monitored to maintain the consistency of the treated water turbidity within 1.0 NTU.

Fulfilling a vital mission

The efforts bore fruit as DJB proudly declared in the media on February 16th that production at the Bhagirathi Water Treatment Plant was back to 100%, appreciating the collective efforts of the WET IC O&M team to speedily restore Delhi’s drinking water supply.

Ravinder Singh is thankful for the enormous and timely support of his teammates: Himanshu Bhardwaj,



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Santosh Kumar, Paramjeet, Sourav Sain, Varathan, Chiranjit Ghosh, Santhosh S., the guidance, extending of resources by WETIC - O&MBU, Regional In-charge Santhakumar R and Aher

Vijaykumar Shivram to save their client some blushes and achieve their objective of ensuring that Delhi kept drinking clean water, despite the Chamoli disaster. ■

MTHL, the Best Digitally Enabled site, has ticked all the boxes even for its EHS initiatives



The iconic Mumbai Trans Harbour Link (MTHL) project team that is rapidly building India's longest sea bridge owes a lot to a slew of digital solutions for its impressive

progress and efficiencies that has won the project the distinction of being recognized as the Best Digitally Enabled site across L&T Construction for 2020. "To decide our winner, we

considered the number of functions or processes that digitalization had touched across the project," explains Chief Digital Officer, L&T, S Anantha Sayana, "the width & depth of adoption, the benefits accrued both qualitative & quantitative, and the measures taken to improve digital awareness. MTHL came through them all with flying colours!"

Digitally, a cut above

Truly, the task for Anantha and his awards committee must have been relatively easier considering that



S Anantha Sayana
Chief Digital Officer, L&T

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Waseem Akram
Mittygar
Digital Officer

For Material tracking, we used a number of digital solutions, 75% of all concrete sourced has been routed through ConEase, fabricated materials are tagged & tracked using E-Tap, we have tracked almost 450 precast segments, procured material is tracked as well as 100% of our OSD panels.



MTHL has adopted almost every digital solution on offer relevant for the project. The team conducts regular drone surveys while the GIS portal is updated every 3 months with the results of drone photogrammetry; they have adopted 3D BIM for design, Procube for project monitoring, Asset Insight for P&M, WISA for workmen management and Cynergy for customer interactions. "For Material tracking, we used a number of digital solutions," informs Digital Officer, Waseem Akram Mittygar. "75% of all concrete sourced has been routed through ConEase, fabricated materials are tagged & tracked using E-Tap, we have tracked almost 450 precast segments, procured material is tracked as well as 100% of our OSD panels."

"MTHL is one of the few sites that adopted digital Health Screening under WISA," points out Krithika Venkatesh, Senior Manager – Digital, "which is a fool proof method of screening workmen as the data is picked up from the platform itself. Till January 1st, 2021 they had already screened some 17,000 workmen." This solution came in extremely handy during the workmen mobilization effort post the unlock.





The project team has adopted 3D BIM for design, Procube for project monitoring, Asset Insight for P&M, WISA for workmen management and Cynergy for customer interactions. The safety digital solutions adopted include VR, extensive use of the EHS app to record near misses & work permits and IB4U for P&M.



Virtual Reality – for a real feel of hazards

VR gives workmen a real feel of workplace hazards without the pain of having to experience them. “VR is an important part of our workmen induction schedule,” shares Waseem, “and we have also developed a marine



Safety with a digital edge

The aggressive digitalization ‘push’ by Project Director, Dr Yungmook Na, Deputy Project Director, Sanjay Digambar Patil, EHS In-Charge Anand Kumar Upadhayay, Waseem and the digital team included several EHS-related solutions too that have helped improve their safety quotient at this particularly challenging site. “We take care of health and safety even before we start construction,” shares Sanjay, “for not only are they important to avoid injury but there are several other long-term benefits for the organization – happier, more satisfied people are better motivated, less inclined to leave us and less illness and injury result in better productivity,” he smiles. The safety digital solutions adopted by the team include VR, extensive use of the EHS app to record near misses & work permits and IB4U for P&M.



Sanjay Digambar Patil
Deputy Project Director

We take care of health and safety even before we start construction for not only are they important to avoid injury but there are several other long-term benefits for the organization – happier, more satisfied people are better motivated, less inclined to leave us and less illness and injury result in better productivity.



PPE demonstration case that is specific to MTHL.” Post the unlock, when sites across the country were struggling to induct new labour that had little orientation to construction sites & methods, VR came in handy. “As of date, we have inducted nearly 5,000 workmen using our VR gear,” he informs.

Recording safety observations digitally

Site engineers use the EHS App to record prestart talks, report near misses and obtain work permits. “A typical day at MTHL



Anand Kumar Upadhayay
EHS In-Charge

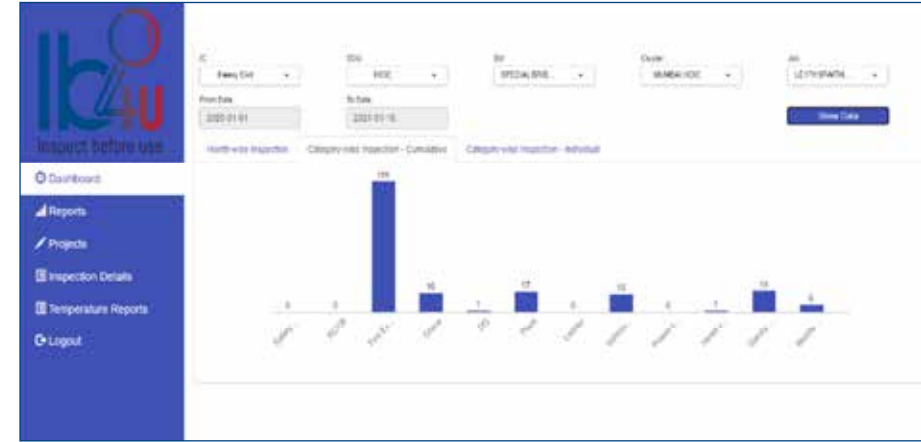
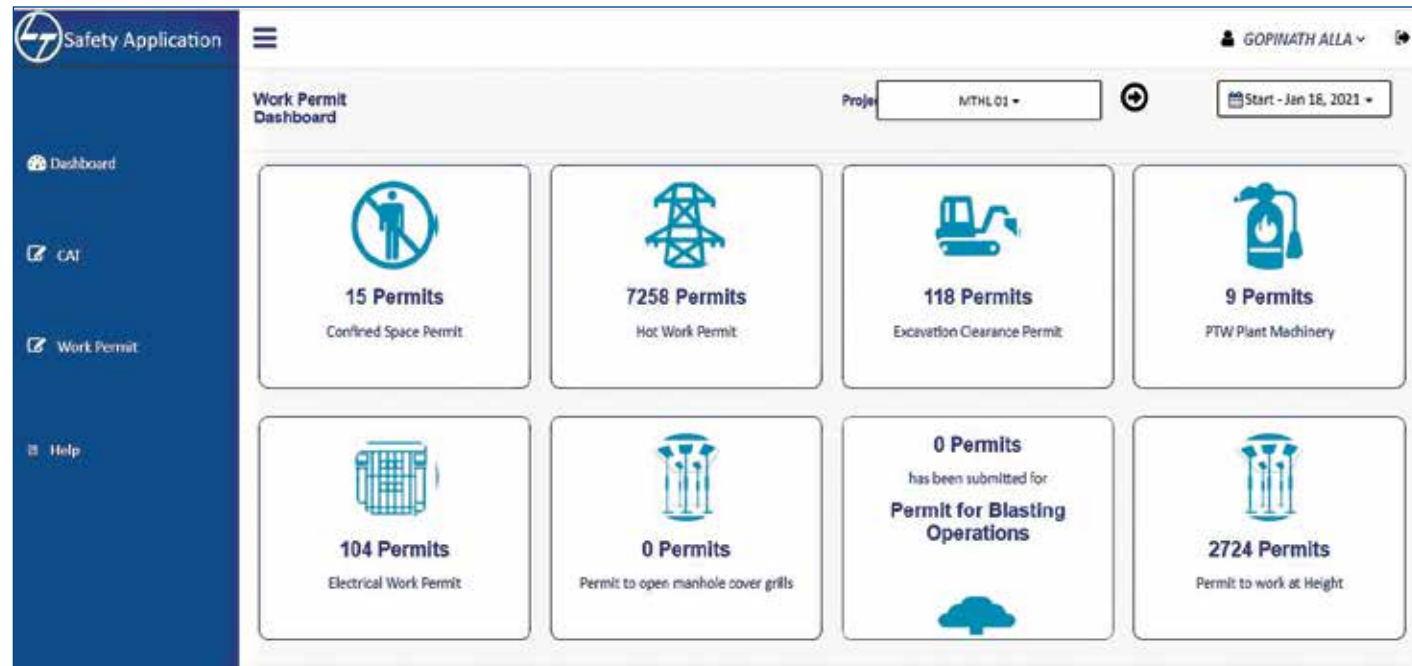
A typical day at MTHL starts with prestart briefings to workmen in their respective areas that are recorded on the EHS App for the management to see that the right safety culture is being followed right down the line.



starts with prestart briefings to workmen in their respective areas that are recorded on the EHS App for the management to see that the right safety culture is being followed right down the line," says Anand. "It ensures that site engineers assess the EHS risks involved in their

day-wise tasks, have successfully verified the site conditions, have taken applicable control measures and assured compliance." After submission, the EHS in-charge can either approve or reject the form based on the details. The Site Engineer receives a push notification

accordingly. All site engineers fill the forms daily in their respective areas that are monitored by the respective section heads/in-charges. "As of date, we have 278 active users of EHS App and 3949 prestart forms have been recorded," shares Anand.



“We have our own set of digital champions for each of our functions with the responsibility to both keep digitalization top priority and drill digital awareness right down the line.”
Sanjay Digambar Patil
Deputy Project Director

Near misses & work permits

Near miss reporting is an excellent EHS habit to prevent safety incidents. The EHS App has a defined flow of escalation to report and ensure prompt subsequent corrective action. There have been 171 near miss cases at the site registered on the EHS app, for which corrective measures are being taken.

Work permits are generated using the EHS App before start of works to obtain which, a thorough inspection of the

work area is conducted and a predefined check list filled by the respective site engineer. "This process has substantially reduced delays," observes Waseem. "A predefined flow ensures that work permits are sent to the concerned as a pdf file that can be downloaded as and when required. Notifications regarding the work permits are sent through push notifications in the app & mails to the concerned for timely action. As of date, we have 10,172 work permits and 278 active users."

Inspection Before Use

IB4U or Inspection Before Use is being used by the P&M and EHS departments to ensure good & safe condition of assets, tools & tackles deployed at site. "IB4U helps to ensure timely inspections with prompt reminders," says Waseem. "Presently, 184 registered assets & inspections are being carried out as per schedule."

“We are digital, but our people make the difference!”

Sanjay proudly shares the organizational chart of his digital team headed by Waseem supported by Site Digital Coordinator, Ms Soumee Burman. "We

Type of Inspections

- P&M Asset**
- Crane
 - DG
 - Passenger Hoist
 - Plant
 - Hired Vehicle
 - Rope Suspended Platform
 - Tower Crane
 - Vehicle & Earth Moving Equipment
 - RCCB
 - Small Tools/Machines
 - Builders Hoist
 - Gantry Crane
 - Mobile Crane

- Other Inspections**
- Fire Extinguisher
 - Ladder
 - Safety Harness
 - Scaffold
 - Electrical Safety Inspection
 - Earthing Inspection

- Facilities Inspection**
- Canteen
 - Office
 - Stores
 - Workmen Camp

have our own set of digital champions for each of our functions with the responsibility to both keep digitalization top priority and drill digital awareness right down the line." He specially mentions Ms Saranya Srinivasan, Ms Prakriti Suri and Ms Priyanka Singh KM, the digital champions for interchange, inter tidal and EHS, respectively. "Thanks to the terrific efforts of the entire Digital team, our up-to-date project status is available on a dashboard for all to see and understand. Yes, we are truly a digitally enabled site," he smiles with satisfaction. ■

Elephants posed a mammoth problem to the PT&D project team in Botswana

Botswana is a landlocked country in Southern Africa bordered by its more illustrious neighbour, South Africa to the south, Namibia to the west and Zimbabwe to the northeast. Largely topographically flat, 70% of the country is the Kalahari Desert. Botswana is one of the world's most sparsely populated countries with 10% of its population of just over 2.3 million people living in the capital city of Gaborone, that is also its largest. Formerly, one of the world's poorest economies, Botswana has radically transformed itself into an upper middle-income country and is presently regarded as one of the world's fastest growing economies and one of the highest in Africa.

This has spawned opportunities for infrastructure development riding on which our Power Transmission & Distribution business successfully executed the 400/220/132/33/11 kV Mawana Substation, a key power distribution hub, under Phase 1 of Botswana's North West Transmission Grid Connection Project. PT&D constructed seven bays each of 400 kV, 220 kV & 132 kV and two bays each of 33 kV & 11 kV, a Control Building of 875 Sq. m, two transformers each of



Hari Krishana Panga
Project Manager

The Mawana Substation is located 20 km south of Maun, an area frequented by elephants that could be seen from their large footprints left behind or when they vandalized our perimeter fence.



125MVA & 60MVA and two reactors each of 60MVA & 25MVA.

Addressing an elephantine problem

Project Manager, Hari Krishana Panga (HKP), is a happy and satisfied man, having successfully delivered

his project in December 2020, working through the rigours of the pandemic during the latter part of execution but in his estimate, while COVID-19 posed its unique brand of issues, what was a bigger safety issue for him and his team throughout the duration of the project was the threat of elephants, as the country has

perhaps the highest concentration of African elephants.

"The Mawana Substation is located 20 km south of Maun, an area frequented by elephants that could be seen from their large footprints left behind or when they vandalized our perimeter fence," observes a worried



While COVID-19 posed its unique brand of issues, what was a bigger safety issue for Project Manager, Hari Krishana Panga and team throughout the duration of the project was the threat of elephants, as the country has perhaps the highest concentration of African elephants.



looking HKP. Apart from the safety of his men, material, and machinery, this situation created an attendant problem for him as the movement of elephants created a path for other animals such as cows to walk on and accidentally wander onto the site. "This had cost implications for us as we would be forced to compensate the affected farmers in case their livestock fell into our excavation pits despite having danger nets and tapes." Then there was the danger of elephants falling into the deep excavations pits that could attract national scrutiny from the Wildlife authorities to the project. Initially, a temporary orange net was used to patch up the damaged parts of the perimeter fence to prevent further encroachments especially by livestock but both HKP and his EHS In-charge, Patrick Galani Oleseng, realized that it

was only a stopgap arrangement and that they had to evolve something more permanent and safer.

Fencing or floodlighting – that was the question

Aware of the pitfalls involved, they set about considering their options to keep the site and the animals safe. "Basically, we had two options," shares Patrick, "to either put up electric fences around the site or install floodlights." Fencing the project area involved using a single strand electrified fence that carried pulses of constant high voltages (>5kV) but low ampere electric current, of short duration passing through the wires every 1-2 seconds. If an animal standing on ground touched the wire, it received a non-lethal shock like a sharp sting

to ward it away. The other option was to put up bright lights as had been adopted by similar projects in areas with high elephant presence around Botswana or light fires. The issue was that elephants quickly habituated themselves to fires and put them out by stamping or dousing with water.

Electric fences could be effective over a wide area and solar-powered ones free from power cuts though on the flip side, electric fences were costlier requiring more initial capital and the voltage required regular monitoring and maintenance across several kilometres at above 5 kV levels; anything less would not deter elephants. It required expensive equipment and expertise to detect the level of power supply. The batteries of solar-powered fences had to be periodically maintained



After weighing all the pros and cons we finally decided to go for IP65-make floodlights as our elephant deterrent system.

Patrick Galani Oleseng
EHS In-charge



and connections kept clean and dry. "Floodlights, on the other hand, had more going for them," points out Patrick, "as they were easier and more economical to install, more reliable, consumed less power and were easier to maintain. But to be effective they had to be constantly bright enough to intimidate the animals."

To take a final call, it was equally important for them to understand elephant behaviour. Normally, elephants move in search of food and water sources and are prone to

destroy and trample down anything that comes in their way. Chances were high that a poorly maintained fence would soon be destroyed by an irritated and determined elephant while an annoyed one could resort to breaking the trees near the electric fence to destroy it. HKP adds that elephant movement was observed from the far southern part of the project to the eastern part and that their movement was usually in the evenings. "During the day, they

were repelled by the movement of machinery at the site," he adds.

"After weighing all the pros and cons we finally decided to go for IP65-make floodlights as our elephant deterrent system," concludes Patrick, 200W x 2 floodlights on a 6 m gum pole that were placed around the perimeter fence, 100 m apart. In addition, the site offices had a 1.8 m high, single strand electric fence and 200W x 4 lights in the centre arena reflecting into the office premises. The lay down area was also fenced separately using galvanized iron sheets of approximately 2 m in height to deter elephants, while two security officers guarded each premise.

The efforts of HKP and Patrick proved extremely effective as the project has been completed and handed over without a single incident involving elephants. Also shows how intelligent those huge pachyderms are! ■



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

BUILDINGS & FACTORIES IC

- 35** Wipro IT SEZ Project, Bengaluru
Million Safe Man Hours
December 2016 to February 2021
- 29** Crescent Bay Project, Mumbai
Million Safe Man Hours
January 2016 to February 2021
- 21** Rustomjee Crown Project, Mumbai
Million Safe Man Hours
April 2010 to February 2021
- 21** Cricket Stadium Project, Motera
Million Safe Man Hours
January 2017 to February 2021
- 20** One ICC and Two ICC Bombay Realty
Million Safe Man Hours
November 2017 to February 2021
- 17** BIAL T2 Airport Project, Bengaluru
Million Safe Man Hours
August 2019 to February 2021

- 17** Prestige Song of the South Project, Bengaluru
Million Safe Man Hours
April 2016 to February 2021
- 17** Oberoi Sky City Project, Borivali
Million Safe Man Hours
June 2016 to February 2021
- 16** TATA Housing Project, Kolkata
Million Safe Man Hours
September 2014 to February 2021
- 15** Raintree Boulevard Project, Bengaluru
Million Safe Man Hours
September 2016 to February 2021
- 15** IGH Dwarka Project, Delhi
Million Safe Man Hours
September 2014 to February 2021
- 12** Oberoi Eternia Mulund Project, Mumbai
Million Safe Man Hours
January 2017 to February 2021

- 11** Grasim Vilayat Expansion Project, Bharuch
Million Safe Man Hours
December 2018 to February 2021
- 11** CAPFIMS Project, Delhi
Million Safe Man Hours
July 2019 to February 2021
- 11** Prestige Jindal City Project, Bengaluru
Million Safe Man Hours
June 2018 to February 2021

TRANSPORTATION INFRASTRUCTURE IC

- 24** WDFC CTP-1
Million Safe Man Hours
August 2017 to February 2021
- 21** Delhi Agra Road Project
Million Safe Man Hours
July 2016 to February 2021
- 20** Hospet Chitradurga Road Project
Million Safe Man Hours
May 2017 to February 2021



- 17** EDFC - CP-303
Million Safe Man Hours
March 2018 to February 2021
- 16** WDFC CTP-2
Million Safe Man Hours
December 2019 to February 2021
- 16** Mumbai Nagpur Expressway MNEP
Million Safe Man Hours
November 2018 to February 2021
- 15** Delhi Airport II (TI IC)
Million Safe Man Hours
April 2019 to February 2021
- 14** Yadgiri Warangal Road Project
Million Safe Man Hours
June 2016 to February 2021
- 12** Baharagora Singhara Road Project
Million Safe Man Hours
November 2017 to February 2021
- 12** OPGC MGR Project
Million Safe Man Hours
July 2015 to February 2021

Safety

Roll of Honour

- 11 **BIAL Runway**
Million Safe Man Hours
December 2018 to February 2021
- 9 **Riyadh Metro Project**
Million Safe Man Hours
December 2015 to February 2021
- 9 **Mukkola - KL/TN Border Road Project**
Million Safe Man Hours
June 2016 to February 2021
- 8 **Bar Bilara Jodhpur Road Project**
Million Safe Man Hours
April 2017 to February 2021
- 7 **Aurangabad to Karodi**
Million Safe Man Hours
October 2018 to February 2021
- 7 **Bidkin Industrial Area (Package - I)**
Million Safe Man Hours
July 2017 to February 2021
- 7 **Villukuri Kanyakumari Road Project**
Million Safe Man Hours
September 2016 to February 2021

- 7 **Al Sharqiyah Expressway, Section II Part 1, Ibra to Al Kamil**
Million Safe Man Hours
October 2018 to February 2021
- 6 **Roha Verna Railway Electrification Project**
Million Safe Man Hours
May 2017 to February 2021
- 6 **Chandigarh Kharar Elevated Corridor**
Million Safe Man Hours
August 2016 to February 2021
- 6 **Pragati Maidan**
Million Safe Man Hours
December 2017 to February 2021
- 5 **Ghoshpukur Salsalabari Road Project**
Million Safe Man Hours
September 2019 to February 2021
- 5 **Dwarka Expressway PKG 03**
Million Safe Man Hours
May 2020 to February 2021
- 4 **LRT Mauritius**
Million Safe Man Hours
May 2019 to February 2021

- 3 **Dept Code - Central Office TI -Rkjlrp (Jabalpur MP)**
Million Safe Man Hours
January 2019 to February 2021
- 3 **Dwarka Expressway PKG 4**
Million Safe Man Hours
June 2020 to February 2021
- 3 **Mumbai Vadodara Expressway**
Million Safe Man Hours
September 2020 to February 2021
- 3 **WDFC EMP-16**
Million Safe Man Hours
May 2016 to February 2021
- 3 **EDFC CP 204**
Million Safe Man Hours
June 2016 to February 2021
- 2 **Veer (Wadpale) to Bhogaon Khurd Section**
Million Safe Man Hours
March 2020 to February 2021
- 2 **Helwak-Patan-Karad Road**
Million Safe Man Hours
May 2019 to February 2021

Safety

Roll of Honour

- 2 **MP Expressway P22 (Ratlam)**
Million Safe Man Hours
November 2020 to February 2021
- 2 **WDFC CTP-14**
Million Safe Man Hours
December 2020 to February 2021
- 2 **Dhaka Metro Project**
Million Safe Man Hours
July 2018 to February 2021
- RAILWAY SBG**
- 12 **OPGC MGR Project**
Million Safe Man Hours
July 2015 to February 2021
- 9 **Riyadh Metro Project**
Million Safe Man Hours
December 2015 to February 2021
- 6 **Roha Verna Railway Electrification Project**
Million Safe Man Hours
May 2017 to February 2021
- 3 **WDFC EMP-16**
Million Safe Man Hours
May 2016 to February 2021

Safety

Roll of Honour

- 3 **EDFC CP 204**
Million Safe Man Hours
June 2016 to February 2021
- 2 **Dhaka Metro Project**
Million Safe Man Hours
July 2018 to February 2021
- 1 **Mailani Pilibhit Gauge Conversion Project**
Million Safe Man Hours
September 2012 to February 2021
- 1 **MEGA Ballast less Track Work Project**
Million Safe Man Hours
June 2017 to February 2021
- 1 **Maithon Power**
Million Safe Man Hours
December 2018 to February 2021
- 1 **EDFC MGS - SEBN**
Million Safe Man Hours
November 2018 to February 2021
- 1 **CORE EPC 07**
Million Safe Man Hours
June 2020 to February 2021
- 1 **WDFC STP 17**
Million Safe Man Hours
August 2016 to February 2021

- 1 **WDFC EMP-4**
Million Safe Man Hours
May 2015 to February 2021

POWER TRANSMISSION & DISTRIBUTION IC

- 6 **250MW ACEPL SPV Plant MP**
Million Safe Man Hours
January 2018 to September 2020
- 5 **ODSSP Phase-III Package-4**
Million Safe Man Hours
August 2016 to February 2021
- 5 **Erection Job for ODSSP PH II PKG 4**
Million Safe Man Hours
January 2016 to February 2021
- 4 **Replace Electrical Equipment at Southern Area GOSPs**
Million Safe Man Hours
April 2016 to February 2021
- 4 **UG Cabling works under Advance Scrips Project**
Million Safe Man Hours
October 2016 to February 2021
- 4 **Rural Electrical Work under DDUGJY (WESCO) PK-4**
Million Safe Man Hours
January 2017 to February 2021

Safety

Roll of Honour

- 3 **V-UPD-Saubhagya-RE works Ghazipur Chandauli-PUVVNL**
Million Safe Man Hours
June 2018 to February 2021
- 3 **UPD-Saubha2 Saharanpur/ Muzaffarnagar/Shaml PUVVNL (Saubhagya Cluster-2)**
Million Safe Man Hours
May 2018 to February 2021
- 3 **Saubhagya - RE Works at Basti Sant Kabir Nagar**
Million Safe Man Hours
May 2018 to February 2021
- 3 **UPD-IPDS Kanpur-KESCO**
Million Safe Man Hours
November 2016 to February 2021
- 3 **RGGVY Jammu - PGCIL**
Million Safe Man Hours
April 2018 to February 2021
- 3 **PHASE-11 Addendum Package, GTC/488F/2012**
Million Safe Man Hours
May 2016 to February 2021
- 3 **Erection Job for ODSSP PH II PKG 3**
Million Safe Man Hours
February 2017 to February 2021

- 3 **Al Dhafra 400KV Switching Station and Allied Works**
Million Safe Man Hours
May 2018 to February 2021

- 3 **V-UPD-Saubhagya RE works Gorakhpur Deoria-PUVVNL**
Million Safe Man Hours
May 2018 to February 2021

- 3 **K-SS- DDUGJY Birbhum (WBSEDCL)**
Million Safe Man Hours
February 2018 to February 2021

- 3 **K-SS- DDUGJY Paschim Midnapore (WBSEDCL)**
Million Safe Man Hours
January 2018 to February 2021

- 2 **K-SS- DDUGJY North 24 Parganas (WBSEDCL)**
Million Safe Man Hours
January 2018 to February 2021

- 2 **K-SS- DDUGJY Hooghly (WBSEDCL)**
Million Safe Man Hours
July 2017 to February 2021

- 2 **BH-UPD-Electrification Works IPDS Scheme-OPTCL**
Million Safe Man Hours
November 2017 to February 2021

Safety

Roll of Honour

2 **IPDS Works in PESU(West)- SBPDCL**
Million Safe Man Hours
February 2018 to February 2021

2 **K-SS- DDUGJY Nadia (WBSEDCL)**
Million Safe Man Hours
July 2017 to February 2021

2 **400/132kV RACECORS Substation Project**
Million Safe Man Hours
December 2018 to February 2021

2 **DDUGJY RE Works in Madhubani - NBPDCL**
Million Safe Man Hours
March 2018 to February 2021

2 **K-SS- DDUGJY Purba Midnapore (WBSEDCL)**
Million Safe Man Hours
August 2017 to February 2021

2 **Construction of 380kV Double Circuit Overhead Transmission Line between Qassim-2 BSP#9025 and Madina East (MDE) BSP#21900**
Million Safe Man Hours
December 2017 to February 2021

2 **765 kV D/C Line from Lakadia PS - Banaskantha**
Million Safe Man Hours
February 2020 to February 2021

2 **ADAC MTC Airside Project**
Million Safe Man Hours
September 2013 to February 2021

2 **UPD-Saubhagya Lakhimpur Kheri Dist-MVVNL**
Million Safe Man Hours
April 2018 to February 2021

2 **MPPTCL KFW TR101**
Million Safe Man Hours
October 2017 to February 2021

2 **Rural Electrification in Meerut District DDUGJY**
Million Safe Man Hours
October 2017 to February 2021

2 **200MW Atha SPV Power Plant TN**
Million Safe Man Hours
April 2019 to September 2020

1 **100MW(AC) NLC SPV PLANT TN**
Million Safe Man Hours
December 2018 to September 2020

HEAVY CIVIL INFRASTRUCTURE IC

134 **Riyadh Metro JV**
Million Safe Man Hours

19 **KAPP-MP**
Million Safe Man Hours

17 **Vizag Vessel**
Million Safe Man Hours

15 **KKNPP Main Plant 3&4**
Million Safe Man Hours

12 **Kalpakkam - WMP & Allied Structures Package**
Million Safe Man Hours

9 **Mumbai Metro UGC07**
Million Safe Man Hours

8 **WDFC 15 A**
Million Safe Man Hours

7 **Barapullah Bridge, Delhi**
Million Safe Man Hours

7 **VIH Project**
Million Safe Man Hours

Safety

Roll of Honour

7 **Punatsangchhu HEP, Bhutan**
Million Safe Man Hours

6 **Hyderabad AFA Project**
Million Safe Man Hours

6 **Kakrapar – NDCT Project**
Million Safe Man Hours

6 **MTHL Pkg1**
Million Safe Man Hours

6 **KAPP-IDCT Project**
Million Safe Man Hours

6 **Kalpakkam - FRP Package**
Million Safe Man Hours

5 **Iswar Gupta Bridge Project**
Million Safe Man Hours

5 **Dry Dock - Cochin**
Million Safe Man Hours

5 **Seabird Phase II**
Million Safe Man Hours

4 **Khulna Mongla Bridge**
Million Safe Man Hours

Safety

Roll of Honour

- 4 **RAPP**
Million Safe Man Hours
- 4 **ZF-Shillong Project**
Million Safe Man Hours
- 3 **Kudankulam HTS Project**
Million Safe Man Hours
- 3 **Mandovi Bridge, Goa**
Million Safe Man Hours
- 3 **BMRCL RT-03**
Million Safe Man Hours
- 3 **GMRC UG 02 Metro, Ahmeadabad**
Million Safe Man Hours
- 2 **Kakrapar-CSP**
Million Safe Man Hours
- 2 **Kachchi Dargah Bridge**
Million Safe Man Hours
- 2 **Mumbai Coastal Road Pkg-01**
Million Safe Man Hours
- 2 **WDFC 15 C**
Million Safe Man Hours

- 2 **ZH1 - Port Blair**
Million Safe Man Hours
- 2 **Mumbai Coastal Road Pkg-04**
Million Safe Man Hours
- 2 **WDFCC CTP 14**
Million Safe Man Hours
- 2 **RVNL-PKG2 Project**
Million Safe Man Hours
- 1 **Mumbai Metro UGC01**
Million Safe Man Hours
- 1 **RRTS LOT 2 Project**
Million Safe Man Hours
- 1 **RRTS LOT 1 Project**
Million Safe Man Hours
- 1 **Kalpakkam - FRFCF Package**
Million Safe Man Hours
- 1 **Dabhol Breakwater Project**
Million Safe Man Hours

WATER & EFFLUENT TREATMENT IC

- 11 **Laying of Sewers at Cuttack**
Million Safe Man Hours
- 9 **Bhatpara Sewer Network and Waste Water Treatment**
Million Safe Man Hours
- 8 **Integrated Sewerage Work - Pali (Design and Build)**
Million Safe Man Hours
- 6 **Sewerage Scheme in Varanasi City**
Million Safe Man Hours
- 6 **O&M for Sri Sathya Sai Water Supply Anantapur**
Million Safe Man Hours
- 6 **Banswara District & Pratapgarh District WSS**
Million Safe Man Hours
- 6 **DHOLERA SIR**
Million Safe Man Hours

Safety

Roll of Honour

- 6 **ISP - KALISINDH Ph I MLIS**
Million Safe Man Hours
- 5 **Water Supply Scheme to Erode Corporation**
Million Safe Man Hours
- 5 **Infrastructure Works in Bidkin**
Million Safe Man Hours
- 5 **WS Scheme - Balasore/Bhadrak/Keonjhar/Puri/Bolangir**
Million Safe Man Hours
- 5 **Kundalia Irrigation Project-Right Bank**
Million Safe Man Hours
- 5 **DWSP**
Million Safe Man Hours
- 4 **Udaipur Integrated Infrastructure Project**
Million Safe Man Hours
- 4 **Nellore UGDS**
Million Safe Man Hours

Safety

Roll of Honour

- 4 Execution of Lift Canal System of UIIP Kalahandi
Million Safe Man Hours
- 4 Pune ESR and GSR
Million Safe Man Hours
- 4 Tanzania Water Supply Scheme Dept Code
Million Safe Man Hours
- 4 Rourkela WWS
Million Safe Man Hours
- 4 Koppal WSP
Million Safe Man Hours
- 4 MLIP Cluster XII
Million Safe Man Hours
- 4 Ranchi Urban Water Supply Scheme
Million Safe Man Hours
- 4 Barrackpore Sewerage Integration Work
Million Safe Man Hours

- 4 9 Nos LIS in Cluster-VI in Cuttack Dist
Million Safe Man Hours
- 4 Industrial Area STP Qatar
Million Safe Man Hours
- 3 Narmada Kshipra Multipurpose Project
Million Safe Man Hours
- 3 Chhaigaonmakhan LIS
Million Safe Man Hours
- 3 Cuttack Water Supply Project
Million Safe Man Hours
- 3 L&T Passavant JV Dept Code
Million Safe Man Hours
- 3 Alirajpur LIS
Million Safe Man Hours
- 3 Sikar Alwar Bhiwadi Cluster Sewerage Project
Million Safe Man Hours
- 3 Vijayawada SWD
Million Safe Man Hours

- 3 Hogenakkal - PKG V - O&M
Million Safe Man Hours
- 3 BDA NPKL Package 1
Million Safe Man Hours
- 3 Rehab Works at Colombo
Million Safe Man Hours
- 3 Athikadavu-Avinashi LIS
Million Safe Man Hours
- 3 Nagaur CDS-04
Million Safe Man Hours
- 3 WTP for NMDC
Million Safe Man Hours
- 3 Kundalia Irrigation Project-Left Bank
Million Safe Man Hours
- 3 Providing Sewerage Facility in Mohan Garden
Million Safe Man Hours
- 3 MLIP Cluster IX
Million Safe Man Hours

Safety

Roll of Honour

- 3 Integrated WS and WW Sri Ganganagar Project(DB)
Million Safe Man Hours
- 3 O&M for Adilabad Project
Million Safe Man Hours
- 3 HPCL Vizag - ETP
Million Safe Man Hours
- 3 RRWSFMP-Package 7(Nagaur CDS-04)-Degana
Million Safe Man Hours
- 3 Improvement of Water Supply To Greater Berhampur
Million Safe Man Hours
- 3 Moradabad Sewerage Scheme
Million Safe Man Hours
- 3 Kakrapar LIS
Million Safe Man Hours
- 2 Satna MVRWSS
Million Safe Man Hours
- 2 IMT Rohtak Phase III
Million Safe Man Hours

Safety

Roll of Honour

2 **Cuttack Sewer Scheme Phase-2 Construction**
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 **12 Nos LIS in Cluster-XI in Jajpur and Kendrapara**
Million Safe Man Hours

2 **O&M For Khammam Project**
Million Safe Man Hours

2 **O&M East and West Godavari**
Million Safe Man Hours

2 **RRWSFMP-Package 6 Nagaur CDS-03-Deedwana**
Million Safe Man Hours

2 **13 Nos LIS in Cluster-VIII in Anguldeogarh Sunderg**
Million Safe Man Hours

2 **RRWSFMP-Package 5 (Nagaur CDS-02)-Makrana**
Million Safe Man Hours

2 **Hogenakkal - PKG III O&M**
Million Safe Man Hours

2 **Keonjhar Water Supply Project**
Million Safe Man Hours

2 **O&M for Khammam Project**
Million Safe Man Hours

2 **Mohanpura MVRWSS**
Million Safe Man Hours

2 **Faridabad Smart City**
Million Safe Man Hours

2 **Water Supply facilities to Bommanahalli Zone**
Million Safe Man Hours

2 **O&M for Bhagirathi WTP, Delhi**
Million Safe Man Hours

2 **Jawai Cluster - IV WSS (224 Villages)**
Million Safe Man Hours

2 **Moga WSS**
Million Safe Man Hours

2 **Saidpur Sewerage Network**
Million Safe Man Hours

2 **Payli MVRWSS**
Million Safe Man Hours

2 **Kirulapone-WWS**
Million Safe Man Hours

2 **Allahabad Sewerage Network**
Million Safe Man Hours

2 **Coimbatore UGSS Phase-II**
Million Safe Man Hours

2 **KPCL-WSP**
Million Safe Man Hours

2 **VSP Reservoir**
Million Safe Man Hours

1 **UGD 110 Villages - RR Nagar Dasarahalli Zone**
Million Safe Man Hours

Safety

Roll of Honour

1 **Indore-UWSS**
Million Safe Man Hours

1 **Chhatarpur WSS**
Million Safe Man Hours

1 **Boudh Water Supply Project**
Million Safe Man Hours

1 **Surya WSS**
Million Safe Man Hours

1 **24X7 Water Supply to Tumakuru City**
Million Safe Man Hours

1 **20 MLD CETP Dholera**
Million Safe Man Hours

1 **Tirunelveli UGSS - Phase II**
Million Safe Man Hours

1 **Keonjhar-III WSP**
Million Safe Man Hours

1 **Mallanna Sagar Reservoir L&T - Prasad-RK Infra JV**
Million Safe Man Hours

Safety

Roll of Honour

- 1 **Ranchi WSS Phase-1**
Million Safe Man Hours
- 1 **BHIMA LIS**
Million Safe Man Hours
- 1 **Mukkombu Upper Anaicut**
Million Safe Man Hours
- 1 **O&M - CWSS to Dindigul**
Million Safe Man Hours
- 1 **Tikamgarh WSP**
Million Safe Man Hours
- 1 **Nandawadagi LIS**
Million Safe Man Hours
- 1 **Dungarpur WSP Package 01**
Million Safe Man Hours
- 1 **Construction of Sewers for Bhubaneswar**
Million Safe Man Hours
- 1 **Damoh Multi VRWSS**
Million Safe Man Hours

- 1 **Dhadhusan Redlaxmipura**
Million Safe Man Hours
- METALLURGICAL & MATERIAL HANDLING SBG**
- 43 **Hot Strip Mill, RSP, Rourkela**
Million Safe Man Hours
- 12 **Coal Handling Plant, Khargone**
Million Safe Man Hours
- 9 **Slab Caster, Bokaro**
Million Safe Man Hours
- 6 **New Fabrication Yard, Kansbahal**
Million Safe Man Hours
- 5 **Mansourah Massarah Gold Project, KSA**
Million Safe Man Hours
- 4 **Civil and Structural Works, UAIL, Rayagada**
Million Safe Man Hours

- 3 **Maintenance of Machines, NLC, Neyveli**
Million Safe Man Hours
- 3 **Coal Handling Plant, Tanda**
Million Safe Man Hours
- 2 **JSW, Dolvi**
Million Safe Man Hours
- 2 **Coal Handling Plant, MCL, Bhubaneswari**
Million Safe Man Hours
- L&T GEOSTRUCTURE**
- 3 **TANGEDCO - Uppur**
Million Safe Man Hours
May 2015 to February 2021
- 3 **IWAI - Sahibganj**
Million Safe Man Hours
December 2016 to February 2021
- 3 **JSW-EQ1 & EQ2**
Million Safe Man Hours
January 2017 to February 2021

Safety

Roll of Honour

- 2 **NTPGC- Nabinagar**
Million Safe Man Hours
November 2017 to February 2021
- 1 **BHEL - Ennore PK1**
Million Safe Man Hours
January 2018 to February 2021
- 1 **MTHL - Mumbai**
Million Safe Man Hours
May 2018 to February 2021
- 1 **BHEL - Ennore PK 2**
Million Safe Man Hours
September 2018 to February 2021
- 1 **BHEL - Kanpur**
Million Safe Man Hours
September 2018 to February 2021
- 1 **CMRL – Cut and Cover**
Million Safe Man Hours
March 2019 to February 2021

SNS Appointed Chairman of National Safety Council



L&T's CEO & MD, Mr S N Subrahmanyam, has been appointed Chairman of the National Safety Council (NSC) for three years by the Union Ministry of Labour & Employment. SNS will guide the NSC, which has a major role to play to ensure safety in workplaces under the new Occupational Safety, Health and Working Conditions Code, 2020 (OSH Code, 2020).

In its Press Release announcing the appointment, the Ministry described SNS as 'an eminent engineer who has spearheaded the infrastructure business of L&T for several years, making it the country's largest construction organisation and 14th in the world'. The NSC will assist Directorate

General - Factory Advice Service & Labour Institutes in re-writing the regulations governing OSH in India, which have not been updated for over 50 years.

The NSC will also be involved in framing the scheme for third-party audit and certification under the OSH Code. This prestigious appointment affirms the commitment of the L&T top management to all aspects of the crucial area of safety. Last year, to further L&T's Environment, Health & Safety (EHS) philosophy across the Company, SNS had set up an EHS Council, focusing on *Mission Zero Harm*.

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