HELMET

Environment Health Safety

EHS journal of L&T Construction

Volume - 7, Issue - 2

April - June 2017

BEWARE

Before your share

Foreword

The colour of a person's helmet at any of our jobsites may be white, blue, green or yellow; but the blood that runs in all of us is red. Safe behaviour is therefore a shared imperative irrespective of cultural backgrounds, positions in hierarchy, personal beliefs, urgency of the task, constraints, limitations, etc. There is no way of undoing a loss and there's no such thing as right amount of compensation.

Awareness creation and training are important aspects of behaviour modification and technology can be leveraged to make it more effective. Virtual Reality modules give an immersive experience simulating real time environs across nine important activities in Transmission Line construction viz. ascending and descending towers, horizontal movement on towers, soil collapse foundation activities, transportation of materials and workmen, tower backstay, stub setting and concreting, final sagging, LC shutdown activities and lifting of derrick poles and heavy panels. In all probability, we are the only EPC organization in the transmission line business to implement all this.

To augment our crew of competent EHS professionals, we have inducted the 1st batch of 30 Diploma Engineers. These fresh DETs, exclusively for EHS, will receive world class training on site operations, site safety and personality development through classroom inputs, practical demonstrations, site visits, industrial visits, and rigorous BU-specific on-the-job training with continuous monitoring and assessment of proficiency.

Given the cross country nature of our jobs, effective monitoring and control of safe behaviour poses challenges. We have implemented the buddy system. With the use of geospatial techniques, we are putting in place an effective mechanism to ensure the presence of safety watchers wherever construction activity is going on.

With roads becoming increasingly dangerous, it is imperative for all to exercise extreme caution when traveling. The increase in cross country jobs and usage of 2-wheelers has necessitated stricter compliance to road safety norms. In this context, it is heartening to note that our BSNL taskforce job has clocked 15 Million Safe Man Hours.

Concerned stakeholders are timely alerted about every incident at site right from a dog bite to a dengue outbreak thanks to an escalation mechanism that has been institutionalized.

We have also gone beyond the established safety system certifications and subject ourselves to multistage rigorous systems like FICCI Safety Systems Excellence Awards.

We cannot let a few incidents cast a shadow over our achievements. There cannot be any tolerance towards violations of the cardinal rules viz. 'harnessing the hook always' and 'Lock Out Tag Out' (LOTO) Work Permit System even if it is unintentional. Given the big churn the subcontractor labour pool undergoes these days, we have to be extra careful in imparting training to each and every one of the newly joined workers. We are also in discussion with a leading PPE manufacturer to improvise - by relaying an audible alarm or message should the workmen unhook the lanyard while working on a tower.

Many of our customers consider safety performance when awarding contracts which is set to increase. More importantly, the societal license for a company to operate comes also from its EHS performance. Irrespective of the external pressures or the customer 'push', zero unsafe behaviour is an intrinsic core value we strive to maintain.

A construction site is an edifice of labour, interplay of engineering disciplines, actualization of meticulous plans and unfolding of a vision – undoubtedly not a death trap. This is what we endeavour to demonstrate always!

T Madhava Das
Executive Vice President & Head – PT&D

Contents

12.30 MILLION SAFE MAN HOURS AND COUNTING!

For Santhosh Bhaskar, Head – EHS, Project Statue of Unity, it has been a baptism by fire. Fresh from an overseas assignment in United Arab Emirates and hardly a month and half at L&T, he has been placed in a remote part of Gujarat to spearhead the safety initiatives at a tough and demanding project that has set a record of sorts having already achieved 12.30 million safe man hours. Every professional at site realizes that he never has the luxury of gradually 'breaking into' a site, he is expected to hit the board running. Things are no different in Santhosh's case; the only addition being that he has to understand, learn and start climbing right away.

"The biggest challenge is that we are venturing into the unknown and the unpredictability of the situation is what gives me sleepless nights," starts Santhosh, "and the other is the composition of the work force. Illiteracy, on one hand, and with the majority being school drop outs who are seldom acceptable as per regulatory requirements, are extremely difficult propositions. Now, to make them understand and appreciate the importance of safety and then to make them adhere to safety norms is as tall a task as the statue itself," he offers with a tight smile. He feels that it is very hard to come up with integrated and collective engineering control

measures during the construction phase. The floating nature of the workmen population can be well understood by the fact that although the site has only about 3,000 workmen, some 14,000 have been trained thus far. “But one thing that I must say is that safety is fully supported by the site management starting from Mr. Raval at the top and that is primarily why we have such a fine safety track record.”

The site has several safety challenges: the steep river bank, the river, the reptilian danger in the form of the crocodiles, the list is long “but we have developed and followed the safety procedures very stringently considering the geographical condition as well as the complex nature of construction phase to attain ‘Goal Zero’ which is why we have had no such incident rather sighting them on our way or lost any time in our construction due to injury,” says Dadapeer Sayed, EHS Manager, who was holding fort till Santhosh came on board. “We have a very elaborate induction process and no one can even enter our project site without undergoing the safety induction programme,” says Sayed with energy and force. “The whole thing is about coordination because various operations are going on simultaneously so we have to ensure that everyone knows exactly what the other is doing so that each person is also ensuring the safety of others. Our first target is the FLSs – Front Line Supervisors - because as you know, they are the critical link between the workmen and the senior supervisors. We also believe in full empowerment and our Safety Inspectors are given the authority to even stop work in extreme cases if all other methods have not rectified the situation.”

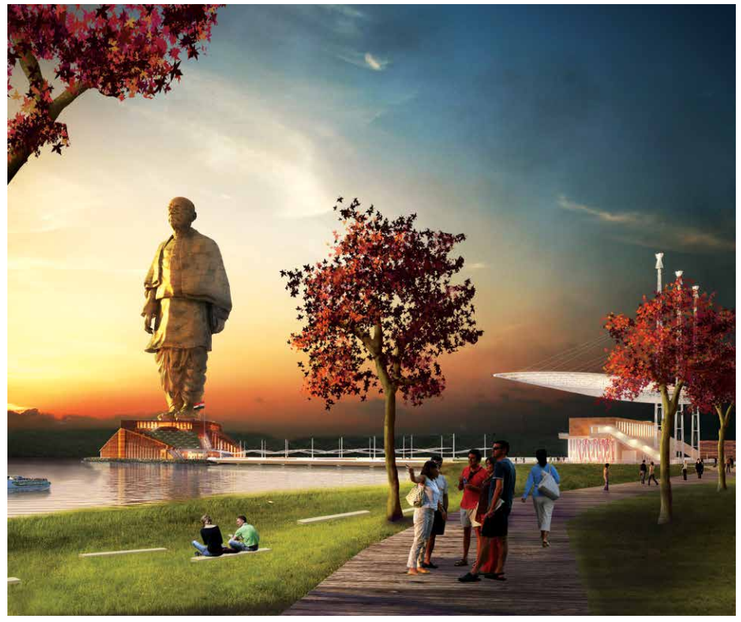
“I have initiated a single-window system,” interjects Santhosh, referring to a system whereby all permits are passed through one window to regulate the critical construction process which is considered to be an essential part of the upcoming construction scenario. “Accountability is the key,” he asserts, “and with strict monitoring we will have a definite control over the process as we enter the most crucial phase of the project.”

Working at heights is easily the biggest challenge as parts of the statue start rising to touch the sky and the training, collective rather than individual protection, fire safety and orientation of workmen to handle such heights is going to be Santhosh’s main focus in the days to come.

“We follow a thorough risk assessment process before we allow work to start,” says Sayed, returning to the discussion. “We have cameras installed at strategic locations to capture any dangerous activity and our security personnel are well trained to address any emergency that might arise. So far it hasn’t,” he adds with a smile. Santhosh immediately expands that the number of medical officers or ‘First Aiders’ have been increased substantially so that in case of injury or any abnormal occurrence, aid can be administered immediately.

“Lifelines are provided and no one is allowed on to the site without proper equipment and, most importantly, we have a good system of near-miss reporting,” says Sayed with a quick glance at Santhosh, who smiles as if this is a subject that they have discussed in the past and adds, “but we need to be more vigorous in our reporting of near-misses which are all in the area of falling of material to learn from such incidents and be suitably prepared to prevent their recurrence in the future.”

The normal safety procedures of Orange helmets for newcomers for a period of 1 – 3 months depending



on seniority, daily pep talks, periodic motivational sessions with workmen and staff, house-keeping drives, fire protection measures, emergency management and constant checking of safety equipment, even imparting the last recourse in risk management before start of work are all being practiced rigorously and assiduously.

It is obvious that the site is preparing for the huge amount of work that is in the offing. Apart from the sheer quantum of work, the complexity and the added pressure of work happening simultaneously on various fronts is going to put a huge strain on the safety fabric of the site. Work on the super structure, the concreting, the structural steelwork, the bronze cladding, the MEP works are all going to be done at the same time and at an increased pace and that's the big safety challenge in front of Santhosh and his team.

"At the end of the day, despite the best systems and procedures, safety really lies in the hands of the individual," concedes Santhosh. "We can give all the training possible but to have an orientation towards safety, to possess a mindset of 'being safe' in all that you do and to be a part of the safety culture of the site and organization really depends on the individual. Our objective is to make each one at the site a Safety Manager. That's when we can say our job has been successful," concludes Santhosh, with another of his tight smiles.

HOW SAFE ARE YOU ONLINE?

The rising stocks of e-commerce companies like Amazon and Flipkart is reflective of a new frenzy in consumerism. In fact, buying principles are being turned on their heads with purchases happening not to fulfil needs but because of attractive offers! And, the advent of new and frontier digital technologies have made it all possible.

The transformation of the phone into a multi-purpose, multi-utility handheld device is the most tangible representative of the transformation we see around us. The freedom to shop or transfer funds or make payments or even order a cab online is so intoxicating that one hardly gives a thought to the risk one is exposed to while making such transactions. It is an accepted reality that for every decent programmer there is a smarter hacker and hence it is extremely important to be constantly looking over your shoulder ... or rather, in this case, looking carefully at your screen to ensure that you or your personal information is not getting compromised.

Perhaps, it is time to stop for a moment and do a risk assessment as to how safe you are online.

Being the latest isn't good enough. Staying latest is. Your personal information is your castle and it is imperative to keep it secure and firewalled from unwarranted external

intrusions. Perhaps, the best form of defence is an antivirus software which can effectively ward off attacks but the secret is not in using such a software but keeping it constantly updated which means it has to be reloaded at frequent intervals. This keeps your system safe from fresh and emerging dangerous malware.

http v/s https – a small difference with a big impact. The next time you are preparing to conduct an online banking transaction, do check if the internet protocol or url has a 's' (that stands for security!) in it. The absence of it means that you are exposed and ideally you should immediately abort the transaction. 'The 's' is the encryption that protects your personal data. Be vigilant also for a closed padlock icon in the right corner of the screen.

A good password is strong and ever-changing. Your spouse may have a long, complicated name and the net may have congratulated you on a very strong password but such passwords are easy meat to a hacker. A glance at your profile will reveal your spouse's name or favorite dates and then cracking the code is child's play. Create passwords that cannot be deduced from your profile which is in the public domain and keep changing it often so that it becomes difficult for some to track you online. A password can even be cracked by the keys you punch on a keyboard! Use the virtual keyboards that some sites offer which can avoid keyboard phishing. Even for security questions, use information unrelated to your personal details. The only catch is that you shouldn't trip yourself by being too clever and enter information that you cannot recall later!

Where's the digital certificate? We are vigilant at checking expiry dates, dates of manufacture, details of composition, MRPs, et al on packaged goods then why aren't we sharp to check the digital certificate of an online retailer or merchant before commencing our transactions? This certificate authenticates the website as a genuine one. VeriSign, for example, is a popular independent authentication service provider. So the next time if you don't find a digital certificate, don't proceed with the transaction however sugar-coated the offer may be else you could pay a heavy price for your negligence!

Cash is still king. Cash on delivery is still the best option especially if it is offered at no extra cost and surely better than an online payment. Even if you do opt for the online payment option, do ensure to log out of the bank, credit card or merchant sites after your transaction is complete. It is also safer to use only one credit card for all online transactions to limit the damage in case of a fraud or breach of security. Again, a pre-paid debit card is better than a credit card according to experts.

Being private is better than going public. It is infinitely safer to conduct your online transactions from secure systems either from home or from your work place. Public computers or networks can easily compromise your details! If you are left without an option but to use a public computer/network, ensure that it does not store any of your information. Do a thorough clean up job before logging out such as clearing cache memory. Always use a wifi connection that is secured by a password; public wifi is extremely unsafe and prone to attacks.

Stick to reputed sources. Just as we are careful to shop in reputed stores or eat in good restaurants, similarly it is important to only deal with reputed merchants and e-commerce platforms online. Smaller vendors often lack the requisite security mechanisms and thereby put your information at risk. A transaction is not complete until you receive a confirmation that the money has reached the merchant. Leaving your transaction incomplete could also burn a hole in your pocket!

Be alert. Be vigilant. One can never be too careful. Just as on a construction site where danger lurks around every corner and it is critical to be careful and prepared for every and any emergency, similarly online transactions are also fraught with dangers and traps and it pays to remain alert and vigilant during every transaction. One slip can prove to be costly so it pays to *never take your eyes off the ball!*

Channelizing a secure waterway

How often do you come across a project that is brought alive after a gap of almost three decades? And, when it is all about benefitting farmers, there is added joy to the cause which is what the Water & Effluent Treatment IC has just achieved by completing the strategic Kharkai barrage in Jharkhand that will irrigate 24,388 hectares and meet the water requirements of the neighboring villages and industrial belts. Here's a vivid account on how this vital water infrastructure scheme was realized within a short span of time by team L&T adhering to the highest standards of safety and quality.

Making a conscious start

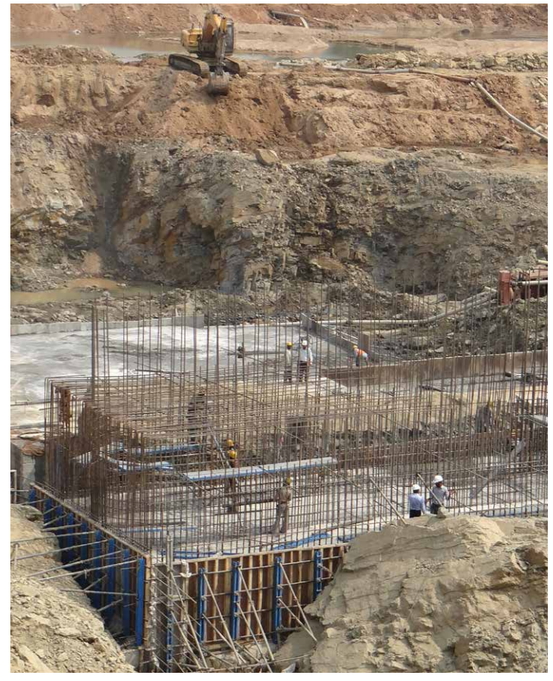
An initial delay of close to 3 months due to local interference was an agonizing period for the team highlights Subhra Ranjan Khandual, the Safety Engineer. "We plunged into action taking a calculated approach and straight away took up the core drilling works which were originally in the client's scope. However, the task was not as simple as it seemed due to the high water level in the river and called for in-depth analysis of the flow pattern subsequent to which a customized floating platform was procured for the drilling works with a crew well-versed in off-field procedures." The samples were provided to the Geological Survey of India, Kolkata, in January 2014, following which the soil investigation report was submitted to the Central Water Commissions (CWC) Department in May 2014. Based on the CWC report, the first set of civil drawings, including the excavation layout, were finalized on 22nd May 2014."

Holding fort at either banks

For Khandual and his team, a delayed start called for shifting gears immediately. "Simultaneous fronts along both the banks were taken up as independent sites, dedicated teams were allocated for each section and a number of safe operating procedures were put in place." This dual set-up fostered a healthy competitive spirit among the units and every time a milestone was achieved across other side, it provided the stimuli for the rest of the team to raise the safety bar and go one step ahead.

Perfecting the art of controlled blasting

On ground it was clear for Khandual and his safety team that there were on a tough wicket and it meant doubly hard work, "The risk of mistiming a blast was always on our minds as the site was accessed as a thoroughfare by the locals. With no other alternative, we planned and took this test 63 times with a foolproof modus operandi which can now become a safety rule book for any team involved in blasting activities for excavation." The dynamics are simple but revolves around effective man and team management reveals Khandual: "A dedicated crew comprising the safety in-charge, construction managers and engineers was formed to look into the entire blasting process while creating continuous awareness in the nearby areas a day prior to the activity which was slotted strategically during the lean movement hours between 12.30 pm and 2 pm. During the blasts, the whole team was divided into four groups with two units deployed to block any unlikely movement 500 m before the site area on both the sides, while the other teams carried out the risk inspection works across the entire site area. Continuous sirens were played for 15 minutes before the start of the activity and proper coordination was ensured for safely carrying out the blasts." The team also stood guard for additional excavation works which were necessitated due to the design changes proposed by the client especially with regard to the



left abutment, foot width which was increased from 10 m to 23 m.

Banking on inherent strengths

We are at our best when we do what we are really good at beams Khandual, without much let up, he discloses, "As masters of concreting it was natural for us to take on the bulk of the requirement which was close to 2,27,000 cu.m along with associated tasks such as 109,000 sq.m of shuttering and 5800 t of reinforcement in our own way by establishing state-of-the-art batching plants on both sides of the river along with a customized fabrication shop within the site." Well, everything was within our range including all additional responsibilities, exclaims Khandual. A concreting chilling plant was installed at site too for producing pre-cooled concrete during summer when the temperature rose above 35° C to prevent excessive hydration.

For critical mechanical works, a unique rolling shed with an adjustable roof was built to facilitate work even during adverse weather conditions. The safety team interfaced constantly with the civil and execution units especially during the critical mechanical installation of the barrage components and constantly reviewed site conditions before the casting of every concrete lift as it called for negligible tolerance limits. The erection process was staged phase wise and rounded off with a final combined inspection before clearing the front for concreting.

Avoiding risks through process simplification

Playing it safe and straight was not only the safety team's objective but also the overall guiding factor across works indicates Khandual, "We always looked for safe options and through brain storming came up with a range of innovations that actually made working across critical sections a safe bet." Citing a few major value additions at site, he shares, "A novel formwork scheme was developed for constructing the flared out wall with a varying slope across the banks while heavy materials were securely lifted through a climbing bracket system and, in certain cases, we even convinced the vendor to customize the size of MS plates to eliminate the fabrication scope."

Safely surpassing milestones

Having done the hard and safe work, team L&T have a lot cheer about "The site has clocked more than 4 million safe-man hours, bagged the prestigious 'British Safety Council' award and, most importantly, has won the goodwill of the locals," concludes Khandual with a satisfied smile.

VIRTUALLY SAFE

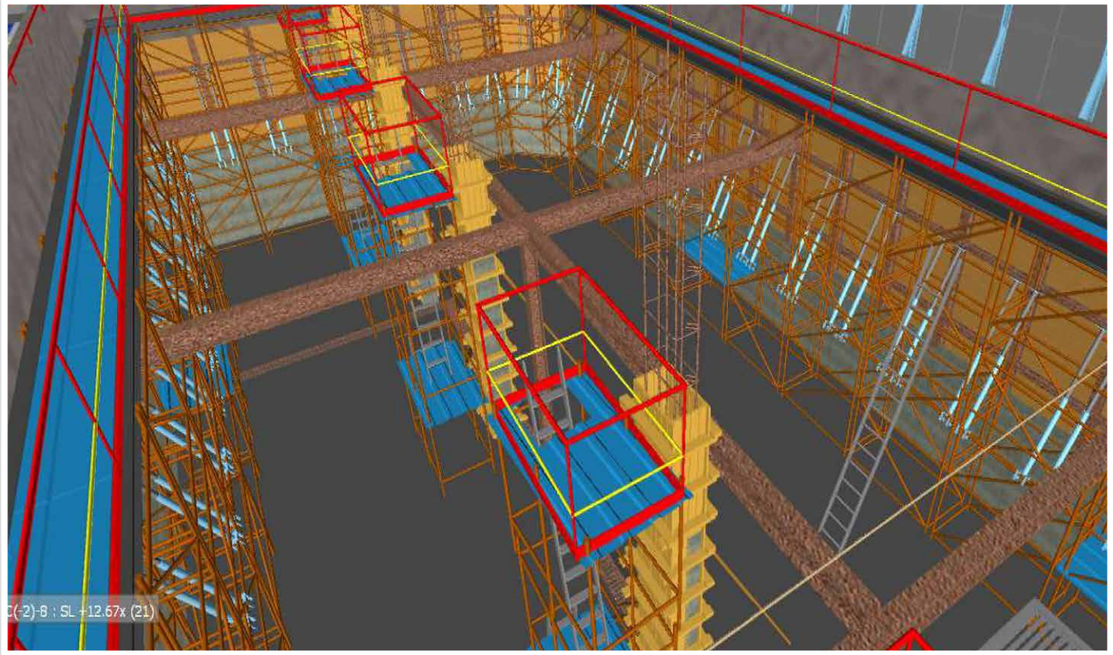
BIM for Safety

The construction industry is presently at a point of inflexion. With brick and mortar transforming into smart technologies, the way a project shapes up is changing dramatically, or is it virtually? Right from the RFID tags that track every single material coming into a site to the advanced geospatial techniques and the mother of all things smart - Internet of Things, digitalization is empowering engineers by eliminating mundane activities and helping them focus on progressive and more productive areas. The recent and most significant of these smart initiatives is the 'BIM for safety' which is transforming the way EHS functions!

While BIM, as 3D models embedded with data and information, has been an excellent platform for sharing resources and improving coordination, the usage of this path-breaking technology to enhance safety at work sites through identification and mitigation of risks has made a paradigm shift to EHS performance. "There can be hazards and risks at every point of a project site and with BIM we are now able to identify risks even at the modeling stage and make safety critical information as part of the overall data which helps the EHS team plan better," says Gurusamy, Project Manager, CMRL, adding that at L&T, BIM for safety was launched with a three pronged mission of reducing incidents through BIM tools, empowering EHS personnel and effectively engaging with other project stakeholders to improve safety on a daily basis.

Prevention through creation

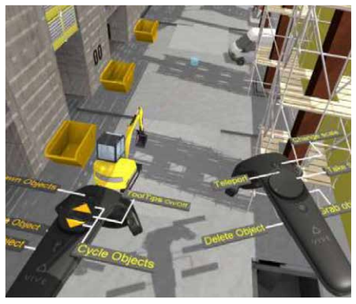
At its nascent stage, BIM is still considered 'technobabble,' while some, with a more



"This is yet another first in the country initiative and it is very heartening that technology will help save lives making the project sites a safer place to work. Safety has always been our top priority for our business but with the recent focus on digitalization, our safety team has been empowered with such phenomenal tools that has further strengthened our company's commitment to safety."

S V Desai
EVP & Head
Heavy Civil Infrastructure

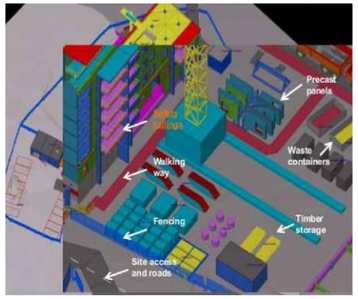
conservative perspective, even consider it 'too advanced to be of any practical implementation'. But the fact remains that the world is fast evolving and BIM is certainly the direction the construction industry is headed towards. Considering is vastness, complexity, comprehension and acceptance right from the grass root levels, BIM for safety needs implementation in a phased manner as it is at L&T, implementing one step at a time for better focus and acceptance across the value chain.



As the first initiative, the BIM for safety team plans to empower site EHS teams with their 'prevention through design' approach, whereby preconstruction Hazard Identification and Risk Assessment (HIRA) will be implemented. By being graphic, the design of the sites will now clearly indicate areas of risk so that the site EHS engineer can prepare safety instructions, evolve mitigation strategies and prepare even method statements using these BIM models.

At the next level, the BIM team plans to leverage 4D to include hazard symbols in construction sequencing, enabling site EHS engineers with training videos for specific activities. By the third phase, cloud and mobile based data sharing will become common place. With cloud technology, access to safety records and reporting on EHS will not only become seamless but also real-time enabling extremely fast decision making where it matters the most! With sharper data and more incisive analytics, there will be a greater sense of ownership and thereby better efficiencies.

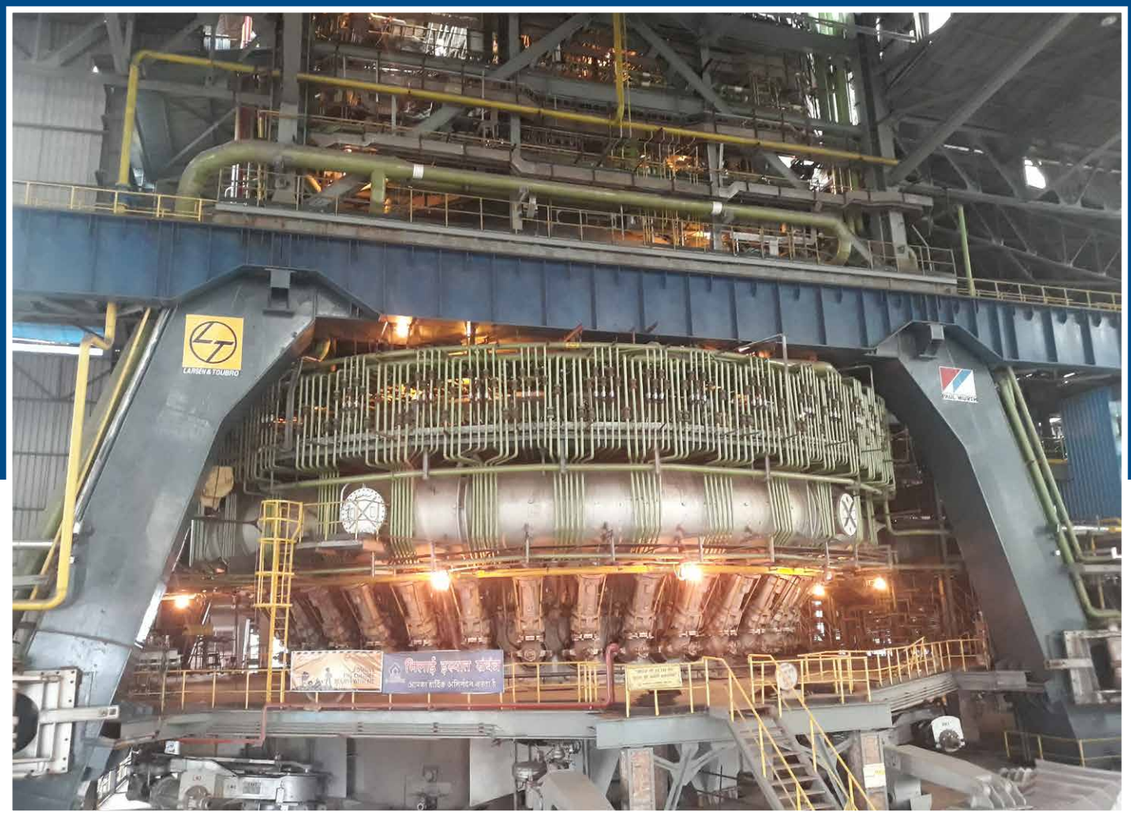
The aspect of engagement with the project stakeholders will begin at initiative level four by leveraging VR (Virtual Reality) technology. Designers will simulate various real world scenarios offering the site execution team to experience potentially unsafe situations and be forewarned and thereby better prepared. At the fifth stage of implementation, the BIM for



safety team plans to deploy drones or UAVs (Unmanned Aerial Vehicles) to monitor safety performance at project sites thereby reducing the hazards involved in safety inspections apart from dramatically improving efficiency in terms of viewing angles. What's more, archived data can also be used for better safety.

"The sixth initiative is perhaps the most interesting of all for by that time, we hope to arrive at a stage where we will be creating 3D games based on safety parameters," smiles Rahul Shah, Head – BIM Strategy. "We intend to make safety training more exciting and interactive while at the same time use it to analyze unsafe behavior and understand deep down why people behave the way they do. BIM for safety will empower the EHS team to digitally review installations and identify potential hazards apart from working out ways to mitigate them even before the actual construction begins. The fact that various facets of construction such as logistics, access & enabling infrastructure, staging & scaffolding can get integrated into one BIM construction model makes spotting hazards a lot easier," sums up Rahul.

For a safety head's perspective, Stephen Phillip Storey, Head EHS – Heavy Civil Infrastructure IC offers, "We are really excited about this new age tool and are confident that safety management will get deeper insights and make every moment a safe moment."



Charting a safe path amidst a steely domain

Working inside a functioning plant is always a challenge that gets even more complicated when working in the plant of a steel major with most of the work revolving around fabrication and erection of steely components. This is what L&T's Metallurgical and Material Handling (MMH) Strategic Business Unit achieved at Bhilai by executing a state-of-the-art 2.8 MPTA Blast Furnace (BF-8) complex which is also the country's largest free standing blast furnace. Let's find out how team MMH made safety their top priority for achieving the milestones, one after another by implementing a range of value additions and sustainable constructive initiatives from the custodian of EHS at site, Subhash Chandra Jha.

Beginning with a safety walk down

Jha and his team were one of the first to assess on-site conditions before taking up the works, "Our initial challenge was to chart out a secure demolition schedule considering the operational factors inside a running plant as the task called for pulling down a whopping 15,000 cu.m of concrete across various fronts which included existing client owned buildings, underground RCC structures, and utility & communication systems."

Streamlining the essentials

As a major portion of the works involved material integration, the EHS team formulated a secure strategy to deal with the multitude of handling challenges, "A huge number of issues had to be addressed: management of critical resources and scant space for assembly and storage of materials; adherence to bureaucratic procedures and submission of technical requirements at every stage of the project. Security was another grave concern as the site was situated close to areas infested by Maoists and hence it was critical to thoroughly verify workmen details before engaging them and ensure that the colonies of close to 4000 workmen engaged at site during peak operations were put in safe zones." The team opted for a new generation pick and carry crane to facilitate rudimentary works, "It was customized with a delay start mechanism which triggered the equipment into live mode by blowing a siren after a 3 minute waiting process there by giving sufficient warning to the crew around the site before commencing operations." Work processes were also simplified as much as possible by using readily available materials such as slag cement and locally available fly ash bricks for soling, diversion of construction debris, construction of open vats for faster curing, installation of are Enhanced Dust Control System along with a range of monitoring equipment to assess the various compounds generated across the plant.

24/7 monitoring through GPS

A 'Global Position System' (GPS) was integrated across the fleet of vehicles at site to receive actual status of each vehicle. Another initiative of the EHS team: "At any given point of time, we could get a status on speed of a vehicle, parking position and details of any breakdown. In fact, most of the movement within the site was scheduled along the determined access way thereby eliminating any untoward accident." The task of removing the existing equipment and moving the debris on vehicles was safely handled with minimum hindrance to the daily operations of the existing plant.

Reinforcing where it mattered

Jha insists that in addition to the safe operation procedures, the team came up with a slew of value additions that ensured that no doors were left open, "All rotary parts of conveyors were guarded with pull chords, rigid hand railings were provided for tail pulley openings, hooters were installed across locations to warn the workmen during commissioning activities, beam clamps were provided for ladders, safety nets were installed across all formwork staircases and a special drum bin system was installed to remove debris from heights."

Further, critical tasks were lined up after a detailed review and executed phase wise, "The foundation works were scheduled over three stages which involved establishing a firm footing for a large girth that formed the base of BF-8 which was accomplished within three and half days. Stage 2 invovled around 1030 cu.m of concreting for shaping the rectangular structure of 23 x 21 x 2.131 m size with two CP 30 batching plants achieving an averge of 30 cu.m/ hour output. The pour was done with a boom placer and a static pump within two days. The final phase of works was across the circular 17.35 m dia pedestal of the blast furnace that involved around 632 cu.m of concreting and was accomplished within 42 hours."

A range of special precautions

It is to the credit of the EHS team that several special precuations were taken for very ordinary tasks considering their frequency, "Like the builder hoist, a daily neccesity across sites, was equipped with a shed, power lock and key arrangment with the wire rope and bucket plaform also securely covered. As a foolproof measure, a gate limit switch was installed across all such equipment making accessibility accountable at all times." In addition, rebar caps were fitted on all iron rod projections and compact testing of soil was done before deploying heavy equipment through the penetrometer test while all trailers were fitted with head boards for stability of materials while in transit. No visitor could enter the site without going through an exclusive safety induction and crew movement was restricted based on their relevant tasks.

Vigilantly integrating the hefty elements

Integrating the steely portion of the job was always a trying task acknowledges Jha, "For the first time in the history of L&T we had the onus of fabricating the sturdy shells of the blast furnace which were customized at our workshop in Kancheepuram through a state-of-the-art automatic bending machine with the entire control assembly done at the fabrication shop to facilitate seamless integration at site. The segments were transported on trailiers and assembled as circular rings weighing close to 1030 t at the pre-setup assembly beds close to the furnace location and subseuently made into sub modules and lifted using a 600 t heavy duty crane."

The huge base plate of the structure with a girth of more than 210 mm had to be machined and fabricated only at site which called for special preacautions such as use of fire blanket and spatter arrestor tray along with ceremic cloth cut pieces to minimise the spatter near the work spots. Another daunting task was putting in place two 62 t hoppers at a height of 60 m with a 50 t outrigger crane by precisely calculating the additional load capacity as well as by reducing some weight by removing the manhole covers, enablers, etc. while ensuring all safety parameters were adhered to. Team MMH also made extensive use of L&T's in-house formwork systems to customize the framework for a range of civil structures.

36 million safe man-hours and more

This is huge moment for L&T as this is the first time an entire new generation blast furnace has been built from scratch and it augurs well to reinforce our credentials as masters in building modern steel plants. With the trail runs successfully conducted and approvals in place, the site has been acknowledged with a slew of domestic and international awards including the Best Safety Performing Agency, RoSPA Gold award and National Safety Council of India accreditations. Truly, team MMH has raised the safety bar several notches!

ON THE HIGH ROAD TO SAFETY

The Al Wakrah Bypass is an 11-km north-south freeway featuring five interchanges that connects with the East-West Corridor in the north and the Qatar Economic Zone 3 in the south and intersects the Wukair and the Mesaieed Roads. Conceived as a continuation of the Doha Expressway, it is designed to connect the existing AI Wakrah-Mesaieed road southwest of Wakrah to directly road-link the cities of Mesaieed and Wakra to Doha by-passing the bustling town of Al Wakrah. The scope includes 10 lanes (5 in each direction) with additional collector/distributor roads, frontage roads and ramps; the mainline section features a provision for adding two more lanes in each direction totaling to a whopping 14-lane mainline section.

Sketching the path

With workmen from several nationalities braving extreme climatic challenges and the high risks involved, creating a safety culture was an uphill task. The first critical step was to draw up an inclusive and robust safety plan involving all stakeholders from day one that clearly detailed out safe work practices, method statements and risk assessments. A dedicated team worked on preparing induction and training modules that could be easily understood and consumed by people across nationalities apart from developing training modules for special requirements. A safety hand book was developed during the early project stages which proved to be extremely useful in bringing on board and syncing every single workman into the EHS culture.

The warm up

Apart from tool box and PEP talks that mark the beginning of each productive day, the EHS team devised a 'Flex and Stretch' program, an early morning exercise schedule that was embraced by all workgroups. Lasting ten minutes daily, it promoted and institutionalized a short and simple routine of stretching and flexing muscles prior to a strenuous work shift that improved agility, balance, coordination, circulation and flexibility. Employees also felt less tense and stressful.

Starting with STARRT

A typical day typical day began after the flexing and stretching with STARRT (Safety Task Analysis Risk Reduction Talk) where the Site Engineer and Supervisor huddled up with the workmen in their respective locations to discuss the activities planned for the day; associated hazards were identified and preventative or mitigating measures were arrived at.

A double high five to housekeeping

Termed the 'Take 10' initiative, workmen from all job locations were encouraged to take 10 minutes at the start and end of every shift to carryout housekeeping activities. The Supervisors in turn contributed with proper material management ensuring free access routes that were free of any trip hazards, obstructions or cables. Material storage areas were clearly segregated with appropriate signage and barriers. This simple initiative that was drilled down from day one of the project commencement ensured that there was not a single incident owing to poor housekeeping.

Beat the heat

It is not uncommon for temperatures to soar above 40 °C with humidity above 50% at the project site and therefore it was imperative to sensitize workmen on the heat-related harms. The EHS team established a flag

HELMET, April - June 2017

system that alerted the team about high temperatures with data from monitoring gadgets fixed across the project. ORS drinking stations were installed along the worksite apart from staggering working hours to cooler hours of the day.

A drive to safety

The EHS team in co-ordination with the Qatar Police organized periodic awareness campaigns for safe driving for the project teams. Designed to highlight the danger of reckless and careless driving and using mobile phones while driving, this initiative proved very helpful to the expats. The project command area too was fitted with speed guns to monitor internal traffic and regulate any over speeding. All vehicles entering the project site were fitted with beacon lights and drivers were checked for alcohol consumption prior to shift hours.

"We focused a lot on conducting several third party awareness training programs for Construction Managers, Site Engineers and Supervisors which were role specific which is why we have maintained such an impressive EHS record," beams Danilo Acosta who heads EHS. "In fact," he adds, "they were encouraged to undergo IOSH Safety training to boost their EHS knowledge and create a positive safe work culture that could be cascaded down the line!"

IF YOU ARE ALONE, WHO WILL WATCH YOUR BACK?

It is a well-established fact that safety is a shared responsibility and most safety procedures and mitigation strategies have been evolved targeting the safety of groups of workmen. Now imagine a situation: it is the end of a night shift at the construction site of a high-rise tower. Workmen are wearily leaving when suddenly one of them stops realizing to his dismay that he has not fully completed a task to his satisfaction. He knows that leaving it undone could create problems for the incoming work force so he instantly decides, without informing his fellow workmen or supervisor, to return to the high floor where he was working to quickly complete the task. He is tired and angry with himself for his oversight but wills himself forward. In the midst of his solitary work, he suddenly he slips in his haste and careens to the edge. Fortunately and thanks to his presence of mind, he regains his balance in the nick of time and saves himself. Rest assured, that this is a near miss that will never be reported. But the larger issue is how can the safety of this solitary workman be guaranteed?

This example is of a workman venturing out on his own, admittedly with the right intentions but there will be occasions during the construction process when workmen are not surrounded by their colleagues and working alone on assignments either at a remote location or at night or on a day or time when the rest of the team is not working; or if they are not within calling distance. While most work is detailed eliminating the need for 'solo workers', there could arise instances when a workman is asked to go solo and the dangers that he could be exposed to are several – falls,

electrocution, being caught between moving machinery or equipment, sudden illness like dizziness, and luck like. The added problem is that since they are working alone, away from the others, getting to know about an accident and reaching medical help to the affected can take time which could be the difference between saving a life and losing it. Hence, it is imperative to develop policies and create awareness to promote lone worker safety.

Of course, inculcating the right safety culture, creating an atmosphere that puts safety at the top of the priority list and making each person at a site responsible and accountable for overall safety is a great beginning. Ensuring each and every time that the workman's PPE is in perfect condition is another important box to be ticked. However, these alone may not save the day.

Conducting a risk assessment to determine if the work that has to be carried out by lone workers is safe is a crucial mitigation step. Training them on emergency responses, having a clear action plan in case of an emergency and setting limits to what is permissible for a lone worker will definitely help matters. Leaving those working alone to their own devices for long periods of time is asking for trouble therefore periodic visits by supervisors, regular contact through phone or even walkie-talkies or even automatic warning devices on the workmen are other ways to ensure safety. Ideally, after a lone worker completes his task and returns to safety, a message to all concerned that all is well is a sound SOP to follow.

Several safety professionals still feel that ultimately the onus of a workman's safety rests on the other workmen and supervisors but what can help is a constant evaluation of the environment, people, processes, equipment, etc. Changes in these could lead to fresh threats that need to be detected and mitigated. The

larger a project site, the greater the danger for solo workers 'getting lost' as supervisors and fellow workmen could forget about them amidst hectic activity or just lose sight of them!

The great benefits of digitalization and modern technology are beginning to prove a great 'friend' of solo workers. RFID tags either on the person or attached to his PPE equipped with GPS technology will keep the workman connected at all times: his 'digital' trail can be followed: information about where he is, what is he doing, how long has he been at it, is he in a dangerous zone are all available online real time. Therefore, if any danger is detected or if the workman is in trouble, help can be reached to him far more quickly than before.

"The essence of a safe work culture is to concentrate on prevention rather than cure and the 'wiring' of employees is proving to be a big help at several of our sites," says M Kamaraj (MK), Head – Safety, B&F IC. "Although initially, embracing new technology is not easy or cheap, the cost, in the larger scheme of things, is really nothing compared to the possible consequences of a lone worker collapsing with a heart attack and we remaining unaware about it or even someone getting severely injured and us not knowing about it and unable to get help to him in time. Now, It is easy to instantly find out if workmen are venturing into dangerous areas or 'no go' zones and preventive action can be taken immediately," says a much relieved MK. "We can even monitor the health of the PPE he is wearing. All this should help us reach our ultimate goal of zero-injury."

The message is clear: if an organization has good workmen then it makes eminent sense to keep them safe and perhaps 'covering' solo workers is one of the strongest messages that can be sent out that an organization truly cares for its workmen.

CLOSE CALL

Arresting a leak

Scenario

Leakage of LPG was detected by workmen while gas cutting was in progress. The process was stopped immediately and it was noticed that the gas cylinder was continuously leaking at the nozzle. The cylinder was disconnected, isolated at a secure location and later returned to the store.

What was the cause?

1. Poor quality of cylinder which resulted in leakage from the valve cap area
2. No inspection of gas cylinders during receipt from agency
3. Risk control measures not implemented

What are the precautions to be taken to prevent recurrence?

1. Inspection of cylinders before being accepted into the store area
2. Training of workmen for hot work and fire safety
3. Testing of leakage to be done for all cylinders before beginning of any work
4. Risk control measures to be implemented

PHEW!

Safety Roll of Honour

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

BUILDINGS & FACTORIES

39 **NISER Project, Bhubaneswar**
September 2011 to June 2017

33 **The Address Wadhwa Project, Mumbai**
April 2010 to June 2017

33 **DLF Capital Green Project, Moti Nagar**
June 2014 to June 2017

33 **Hyderabad Metro Rail Project**
August 2015 to June 2017

30 **ITC Sonar Hotel Project, Kolkata**
August 2009 to June 2017

26 **Shell NTCB Project, Bengaluru**
February 2014 to June 2017

20 **Emami City Project, Kolkata**
January 2013 to June 2017

18 **DLF Crest Project, Gurgaon**
January 2016 to June 2017

18 **L&T Realty, Sanofi Tower Project, Powai**
February 2013 to June 2017

17 **RIL Township Project, Jamnagar**
May 2014 to June 2017

16 **Omkar Worli Sales Project, Mumbai**
December 2012 to June 2017

16 **UP Awas Vikas Basement Project, Ghaziabad**
August 2012 to June 2017

15 **IIT Project, Hyderabad**
August 2014 to June 2017

Safety Roll of Honour

14 **ESIC Hospital Project, Joka**
November 2009 to June 2017

14 **ESIC Hospital Project, Coimbatore**
March 2011 to June 2017

13 **L&T Realty Bhoiwada Sales Project, Mumbai**
January 2016 to June 2017

12 **BARC Trombay Project**
June 2012 to June 2017

11 **TATA Housing Project, Kolkata**
September 2014 to June 2017

11 **AIIMS Project, Bhubaneshwar**
October 2011 to June 2017

11 **Seawoods Ph-II Project, Mumbai**
November 2015 to June 2017

10 **Statue of Unity Project, Gujarat**
December 2014 to June 2017

10 **King Fisher Tower Project, Bengaluru**
July 2013 to June 2017

10 **ITC Green Centre Project, Bengaluru**
July 2013 to June 2017

10 **Prestige Ferns Project, Bengaluru**
January 2015 to June 2017

10 **HILL Crest Project, Bengaluru**
July 2012 to June 2017

TRANSPORTATION INFRASTRUCTURE

58 **Western Dedicated Freight Corridor Project (CTP 1&2)**
October 2015 to June 2017

Safety Roll of Honour

21 **Kandla Mundra Road Project**
April 2011 to June 2017

15 **MH-KNT Border to Sangareddy**
December 2015 to June 2017

12 **Rewa Katni Jabalpur Lakhnadon Road Project**
June 2015 to June 2017

12 **Development of Unnao to Lucknow Expressway**
June 2015 to June 2017

7 **Delhi Agra Road Project**
July 2016 to June 2017

7 **Kannur International Airport Project**
December 2015 to June 2017

7 **Chennai Metro Track works**
February 2011 to June 2017

7 **Hyderabad Metro Track & OETS**
January 2013 to June 2017

5 **BBT Flyover Project**
November 2014 to June 2017

5 **Mumbai Monorail**
June 2013 to June 2017

5 **Manwath Beed Road Project**
December 2014 to June 2017

4 **Ghoshpukur Salsalabari Road Project**
December 2015 to June 2017

4 **Sindhudurg Airport Project**
February 2013 to June 2017

4 **Vriddhachalam-Ariyalur RC Project**
December 2011 to June 2017

Safety Roll of Honour

4 **Hospet-Harlapur RC Project**
January 2013 to June 2017

POWER TRANSMISSION & DISTRIBUTION

5 **HMRL Power Supply & Scada-Stage 3 to 6**
May 2012 to July 2017

4 **B-SS-R-APDRP KOZHIKODE-KSEB**
February 2015 to September 2017

3 **765 kV D/C TL from Raipur to Jharsuguda (SRSTL) - SPGV**
February 2016 to July 2017

3 **400 kV Maheswaram Maiza nagar TL & Nizamabad to Maileram TL - Sterlite**
March 2016 to June 2017

2 **765 BCTL Project**
December 2015 to August 2017

2 **ODSSP Phase-II Package-4 under OPTCL**
January 2016 to May 2017

1 **ODSSP Phase-III Package-4**
August 2016 to April 2017

1 **765 kV WARORA - PARLI - PGCIL**
May 2016 to May 2017

1 **220 kV BSPTCL NIT 03**
July 2015 to April 2017

1 **220 kV ADTL**
June 2015 to June 2017

1 **UG Cabling works under ADVANCE SCRIPS Project**
November 2016 to September 2017

Safety Roll of Honour

1 **400 kV CUDDAPPAH to MADHUGIRI TL - TW 03 Package**
July 2016 to August 2017

1 **400 kV OPGC-Jharsuguda - Sterlite**
July 2016 to July 2017

1 **220 kV and 132 kV Pkg-TW02 Bihar-BGCL**
May 2015 to July 2017

1 **DDUGJY Project, Lakhimpur**
September 2015 to July 2017

HEAVY CIVIL INFRASTRUCTURE

24 **Vizag Vessels**

13 **DMRC CC 28**

13 **Narmada**

10 **KAPP-MP**

9 **Kolkata RVNL**

9 **KAPP- NDCT**

8 **CMRL UG 04**

4 **CMRL UG 03**

4 **KAPP-IDCT**

3 **DMRC CC 77**

3 **Kochi KC-03**

3 **Singoli HEP**

Safety Roll of Honour

3 Kalpakkam (FRFCF)

2 Punatsangchhu HEP

2 CMRL UG 02

2 Lucknow CC-01

2 Kalpakkam - WMP

2 HMRL

2 Delhi Bridge

1 RAPP Project

1 KAPP-CSP

1 WDFC 15 A

1 Hyderabad AFA

WATER & EFFLUENT TREATMENT

7 O AND M For Sri Sathya Sai Water Supply Anantapur

7 Bhatpara Sewer Network and Waste Water Treatment

6 RDA-Pakage-1 Development Works of Kamal Vihar

6 Laying of Sewers at Cuttack

6 River Front Development Project, Patna, Bihar

5 Porbandar UGD

Safety Roll of Honour

5 Dahej Water Supply Project-N and Intake - 25 MGD

5 Sewerage Scheme in Varanasi City

5 Ratangarh Sujangarh WSP

5 Kharkai Barrage with Gates and its Allied Works

4 Junagadh UGD

4 Surface Water Based WTP at Kulpi N 9 Blocks @ S24P

4 15 Nos LIS in Cluster XV @ Bolngir Subrnapur Boudh

4 Udaipura WSS

4 UFW D2A

4 Godavari Drinking Water Supply Project

4 Jamnagar UGD

4 CETP

4 Dhanbad Water Supply Project

METALLURGICAL & MATERIAL HANDLING

14 Coal Handling Plant, RRVUNL, Chhabra

12 Blast Furnace No. 8, BSP, Bhilai

7 Coke Oven, JSW, Dolvi

Safety Roll of Honour

7 **EGA Projects, Abu Dhabi**

5 **Coal Handling Plant, LPGCL, Lalitpur**

3 **Pet Coke Evacuation Project, IOCL, Paradip**

3 **Coal Handling Plant, NCL, Nigahi**

3 **Coal Handling Plant, Khandwa**

3 **Hot Strip Mill, RSP, Rourkela**

2 **Coal Handling Plant, Lingaraj**

2 **Coal Handling Plant, NCL, Khadia**

2 **Kansbahal Works**

1 **LSAW, Abu Dhabi**

1 **Coke Dry Quenching Project, TSL, Jamshedpur**

1 **Wagon Tippler, DB Power, Raigarh**

1 **Material Handling System, RIL, Jamnagar**

CLOSE CALL

Suspended animation!

Scenario

While loading precast panels onto a trailer, the crawler crane boom's brake bush broke down resulting in gradual lowering of the boom. The operator, sensing danger controlled the lowering to reduce the impact and averted any injury.

What was the cause?

1. Periodic inspection of equipment was not done

What are the precautions to be taken to prevent recurrence?

1. Daily inspection of crane, especially boom
2. Testing of equipment such as cranes for a short duration before beginning of every shift.

PHEW!

DON'T OVEREXERT!

Protect yourself from excessive weights

Edited by Vinod Jacob Chacko for L&T Construction from L&T Construction Headquarters, Manapakkam, Chennai - 600 089.
Editorial team: Gopi Kannan. S | Ashwin Chand, Photography: V. S. Natanavelu | R. Vijay Kumar
Process Owners: M. Kamarajan | K. N. Sen | Malay Kumar Mahanta | Stephen Philip Storey | Ramachandran N | K. S. Sudheesh Kumar
Technical Associates: P. Nagarajan | Gabrial Fernandez | Sudarsan Rajendran | Kavin. S | Vinoth. A | Sathyanarayana Seelamanthula Murali Krishnan | Minhaj Ahmed Ansari | Mathivanan Palaniappan | S. Anantha Prasanna Venkatesh
Design & layout: Global Print Design, Chennai, Printed at Quadra Press Pvt. Ltd., Chennai.