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TECHNOLOGY

S N Subrahmanyam, CEO & MD, L&T: Automation and digitalisation is the new normal

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Mumbai Trans Harbour Link (MTHL) that L&T is constructing which will be the country's longest sea bridge is one of the best examples of the extent of digital technology has been adopted. The team surveys the site using drone photogrammetry to monitor progress, and digital solutions for project monitoring, P&M & material tracking. **S N Subrahmanyam, Chief Executive Officer & Managing Director, Larsen & Toubro** shares his thoughts on latest technologies in demand today.

What are the latest technologies in demand in the Indian heavy civil infrastructure sector?

Specialised technologies are fast-tracking progress at mega projects. L&T Construction has a business vertical that specialises in building heavy civil infrastructure like bridges (normal & special), hydel, ports, dams, nuclear power plants, metro rail systems, tunnels & Defence installations. All these areas require specialised skills and technologies to build to speed & scale.

TBMs: With an increase in demand for underground infrastructure, L&T is involved in a variety of such construction for which Tunnel Boring Machines (TBMs) are critical that deliver end-to-end tunnels including segment laying. In fact, the largest TBM in India with a 11.2m diameter has been employed at the Mumbai Coastal Road Project. TBMs with diameters of 5.8m are being used to bore tunnels at the metro projects in Mumbai, Bangalore, Ahmedabad and Chennai. At the extremely challenging RVNL project Package 2 where L&T

is laying a new 125-km broad gauge line between Rishikesh & Karanprayag in Uttarakhand, Hard Rock TBMs are tunnelling into the Himalayas whereas special Slurry Type TBMs are being used for the Mumbai Metro due to the geological conditions. The comparatively difficult NATM (New Austrian Tunnelling Method) is being used across all L&T projects.

Full span launching girders: At the challenging High Speed Rail Project, L&T will be doing more than 200 Kms of Full Span Launching with these girders.

Precast material: Across several projects, precast technology is helping to speed up construction, maintain quality and achieve a high degree of standardisation. Since construction involves thousands of precast elements, tracking them becomes critical. Digital solutions track the items and provide real time updates on movement, location; identifying and locating these are also easier.

Project- Mumbai Trans Harbour Link (MTHL)

MTHL leads the way in comprehensively embracing digitalisation

The iconic Mumbai Trans Harbour Link (MTHL) that L&T is constructing which will be the country's longest sea bridge is also the best example of the extent of digital technology adopted. The team surveys the site using drone photogrammetry to monitor progress, and digital solutions for project monitoring, P&M & material tracking, workmen management and customer interactions. In fact, there are a bouquet of digital solutions for material tracking alone. WISA (Workmen Induction, Skills & Availability) is an efficient workmen management solution that has rendered workmen induction a breeze and enabled the project to screen and onboard some 17,000 workmen till date.

Do you think Indian construction industry is slow in terms of digital adoption? What according to you are major problems/hurdles for the slow adoption rate?

Digitalisation brings transparency, objectivity and thereby operational efficiency. When compared to certain other sectors like banking or financial services or even FMCG, it is true that globally, the construction industry has been late adopters to digitalisation perhaps due to the very nature of the work involved which is extremely labour-intensive. However, the tide is changing. L&T embarked on a journey of digital transformation in 2016.

Today there are 50+ digital solutions that are in production and widely used by thousands of L&T's operating staff at hundreds of project sites. Over 11,000 construction equipment are connected providing real-time visibility into the operations of these machines at remote project sites. This visibility enables improvements in productivity and utilisation of these machines, better maintenance and uptime, better fuel efficiency all leading to faster completion of work and savings in costs. Mobile Apps have digitalised every process relating to Safety, Quality, activity completion and material tracking enabling real-time information flow from the sites to monitoring offices. Geospatial technologies using drones, LiDAR, 3D scanning, photogrammetry etc. now provide accurate geographic information quicker and more economically making engineering and estimation more accurate and competitive.

Safety plays critical role in every construction project. What are the latest technologies to ensure high level safety in your projects?

The area of Safety has seen the introduction of several new technologies to help L&T achieve its goal of Mission Zero Harm.

Safety App: Rolled out in different forms across all businesses and project sites, the Safety App, covers almost every aspect of the safety process and ensures that everything is recorded at the source on the field in real-time, with online verifications and approvals for complete safety process compliance.

Computer Vision: Using the surveillance cameras already installed at sites, the Computer Vision Technology, based on Artificial Intelligence, has improved the detection of unsafe acts and situations. By feeding hundreds of different images into the system, it gets trained to recognise 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. Currently the system is designed to identify unsafe acts and situations 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 even detects if a person is not wearing a mask or is not sufficiently socially distanced.



Virtual & Augmented Reality: Focused, immersive and customised VR & AR-based training modules are leaving a deep & lasting impact on workmen. The modules simulate real life hazards & incidents and by being able to experience them without suffering the pain of physically going through it is a hugely influencing tool. Overall, VR & AR training modules have been rolled out to nearly 475 sites across L&T Construction and nearly 500,000 workmen have been trained with this digital intervention. RFIDs and remote sensors track personnel by continuously checking their body functions when involved in hazardous work and keep them safe by preventing them from wandering into 'no-go' or dangerous zones.

BIM and 3D structural techniques are being evaluated by a lot of construction companies What are the advantages it offer? Do you think this technology will gain momentum in coming years in India?

The advantages of Building Information Modelling (BIM) are enormous for design, engineering, execution & delivery making them smarter, more precise and more economical. BIM creates greater synergy between design & construction, resolves clashes between the various disciplines before actual construction and transforms project management into a fully integrated exercise in a complex ecosystem. BIM carries a digital repository of a project that enables designers, architects & engineers to collaborate virtually, even across geographies. BIM even throws up answers to various 'What if' scenarios that would not have been possible in the conventional 2D regime. BIM also covers within its ambit material requirements, scheduling & costs. Various projects across businesses within L&T have already adopted BIM and it is certainly the future of smart construction.

How can the slab cycle time/construction time and cost be further cut down with the use of technology and advanced equipment and by how much?

Building efficiently to speed & scale on the back of frontier technologies

As projects become more complex and client timelines more demanding, companies like L&T are keen to speed up the pace of execution, deliver more economically, while at the same time, maintain the highest standards of safety & quality. Precast engineering is one construction method that cuts construction time by reducing construction activities by as much as 35%, labour by 30%, cuts costs, improves quality and precision. Material tracking, equipment monitoring, project progress monitoring, ensuring safety of employees & workmen are all helping to improve productivity and enhance efficiencies.



Do you believe, Covid-19 have pushed this industry to embrace technology more than ever?

One of the major disruptions in the Indian construction industry due to COVID-19 has been the labour migration forcing contractors to make do with new, 'raw' labour with little orientation to construction activities. The lack of skilled manpower has been in any case a perennial problem for the industry. Both these factors working in concert along with the need for faster and more efficient execution, have led to greater adoption of automation, mechanisation and digitalisation across projects. Remote Factory Acceptance Tests (RFATs) is a first-of-its-kind initiative in the EPC segment with significant value advantages of zero cost, enhanced safety, transparency and flexibility at a considerably reduced delivery time. By adapting the right mix of technologies, RFATs ensure improved customer service and experience with minimum physical interaction in accordance with the new normal. Another is the introduction of Virtual Audits since travel and movement are restricted due to the pandemic. At L&T, quality, internal control, financial and EHS audits are all being conducted virtually using digital tools like mobile devices, drones, site sensors, surveillance cameras, virtual & augmented reality and other wearables like Smart Glass.

Collapse of buildings are a great concern to sea-side structures today. What technologies could be used to avoid this?

Ensuring the safety of structures built in a marine environment is less dependent on the use of any one technology and more on the construction methodology adopted. Working in such an environment calls for special care to ensure the strength and structural integrity of structures. L&T have capabilities to construct oil rigs, special bridges, and such structures while L&T GeoStructure possesses the experience & expertise to build sophisticated foundations works on a turnkey basis, construct riverfront structures, intake well structures, lift irrigation structures, deep foundation-supported bridges, water retaining structures and deep shafts.

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