ILCE CONNECT

VOL.15 Oct to Dec 2023

THE NEXT FRONTIER CONSTRUCTION WITH AI

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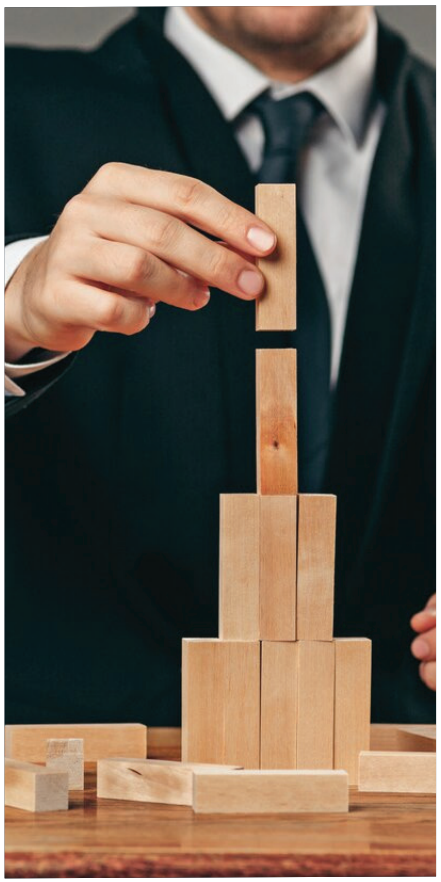
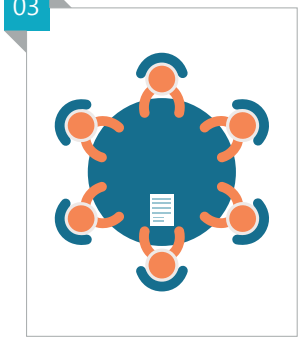
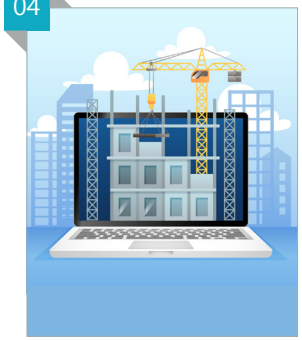
VOL.15 Oct to Dec 2023

CONTENTS

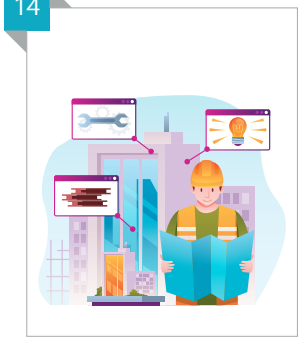


03 
CHARTERED MEMBERS & BOD

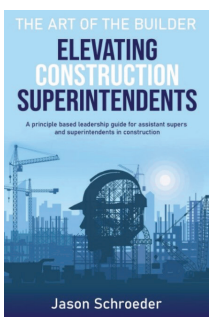
04 
LEAN MINDSET

09 
WISDOM CORNER

11 
CASE STUDIES

14 
EVENTS IN PAST QUARTER

22 ILCE INSTITUTE FOR LEAN CONSTRUCTION EXCELLENCE
UPCOMING EVENTS

23 

READERS CORNER

24 
CONTACT US

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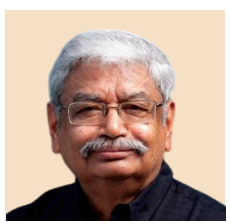

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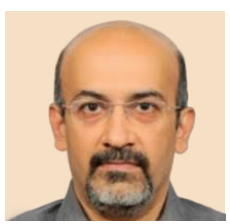

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Artificial Intelligence & Analytics in Construction Industries

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Abstract
In the past decade, we have witnessed a surge in the digitization of the corporate processes. The concepts of digital technology, artificial intelligence & analytics, are recognized as an essential entity within this paradigm of transformation. In a large conglomerate, like ours, we were quick to recognize this surge, and were all ready to ride on the same. Being associated with Construction Industry, we had a fair share of challenges in looking at digitization and the use-cases were intriguing.
Our tasks include,

1. Processes lacking the ability to churn consistent ready-to-use data;
2. Decentralized project execution & deployments driven by individual project managers; and
3. Having to live with a perception that each project is unique.

Overcoming these challenges would, also, mitigate the traditional issues such as cost and time overruns, health and safety, productivity and labor shortages.
With a belief that investment in digitization has the Potential to realize value throughout the construction project life cycle and solve its greatest challenges like cost, safety, and overruns. And can transform the construction project, from inception, bidding, design, financing, logistics, and operation to asset management. We started the digital transformation journey nearly a decade ago, which is now matured enough to take up the next frontiers, Artificial Intelligence & Analytics.

In this article, we touch upon the passage crossed, the benefits realized and the preparedness to embark on the AI & Analytics disruption.

Setting Things Up
A typical project in a Construction Industry have traditionally faced several hurdles that, hindered the execution and thus contributing to lower levels of efficiencies.

As a matter of fact, construction projects were one of the least digitized in the industry and most stakeholders acknowledge the age-long culture of resistance to change. This had contributed to the complexity of an overly manual nature of project execution. The absence of digital technology solution within the construction projects had led to cost inefficiencies, project delays, poor quality performance, uninformed decision-making and poor performance in terms of productivity, health and safety.

At our organization, we looked towards Digital Transformation to resolve the traditional challenges faced, & thus setting up a platform for the future technology disruptions to seed in.

Looking at structured, consistent & ready-to-use data as a by product of Digitization, we identified and generated options to conceal this thought process in our digital transformation methods.

The workflow involved in bringing Digital Transformation across the organization includes:

1. First identifying operational changes that would improve performance. The process involved in identifying these

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>> Artificial Intelligence & Analytics in Construction Industries

changes was broken into smallest possible chunk & looked at as a change in the existing process to mitigate a pain point. Loads of such cases were consolidated, studied, and categorized into groups with a common objective. Each such group was picked up to the next stage of building a digital entity.

2. In tandem, **for each change identified, the operational impact were assessed in details.** This included, defining the process change & capabilities, identifying the required enablers for data & technology solutions, changes in rules, roles & responsibilities, legal & contractual compliance, and defining the degree of measure for implementation. This process-centered approach helped focus each use case on a real business need while suppressing the impulse to chase technology trends.

The digital entity varied from being a stand-alone micro solution to an integrated off-shoot of a platform. All these with a common intention to **digitize the data from its current manual / physical form to digital data which can be stored and categorized.**

The **Digital solutions** running on the ground churning out data, initiated the process of **sanitizing the data and storing them in the most relevant order**. These data elements were further analysed by adding context to them towards extracting information. This process involved several versions of information being generated. Data looked at by applying the context of: procedure, time, location and reviewer; generated relevant & suitable set of information.

Indicators identified for refinin the data

As a process of refining information, and consolidating them, various key indicators were identified and defined.

These key indicators were to ensure various contextual entities having a common form of information extracted from the data elements and thus have a common view on the information generated.

Thru the digital journey, we have identified 4 key factors which has brought us to where stand today. These include,

1. **Widespread data strategy**, based on value generation for the company that helps support the choice of applications, infrastructure and tools.
2. **Bucketing the data based on its relevance**, working on the unstructured data generated from various solutions to extracting structured relevant & actionable data for process performance & aiding decision making.
3. **Involve the last-mile workforce** , development of new solutions based on real needs of the company at the last-mile workforce, leveraging the expertise of the construction managers whose insights help identify the key areas of opportunity.
4. **Secure management buy-in, from the outset, push the initiative from top-down.** This contributes in getting a business perspective and an organization wide buy-in.

With data being generated from various solutions and them getting consolidated into a structured set, we are now well set to tie together with the disruption vowed by artificial intelligence & analytics. The data sets which are picked up include:

Structured, consistent & ready-to-use data can be a byproduct of Digitization.
This sets the groundwork for Digital Transformation journey of the organisation.

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>> Artificial Intelligence & Analytics in Construction Industries

- Workmen Demography: Data from enrolments, attendance, health records, safety records and perfomance details including productivity & quality of work.
- Project Safety: This data set included: recorded safety incidents, audits & routine checks, visual feeds from CCTV, progress reports & nature of work being executed, hazard & near-miss incidents logged.
- Project Quality: Includes sanitized data from quality inspections, non-conforming check-points, root-cause analysis archives & supervisor performance registers.
- Subcontractor Ecosystem: Large chucks of transactional data from vendor pay-outs, billing cycles, contractual performance analysis, records disputes & resolutions, and resource supplied along with its associated parameters.

Taking on Artificial Intelligence (AI) & Advanced Analytics (AA)

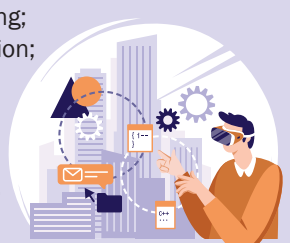
With the advent & successful penetration of digital technology across various levels of the organization, we have been able to achieve significant contributions to the improvement of business operations, service processes and efficiency in recent years. With the base set, we are now looking towards the adoption of AI techniques to enhance automation and to provide better competitive advantages as compared to conventional approaches.

The subfields of AI such as machine learning, natural language processing, robotics, computer vision, optimisation, automated planning and scheduling, are being explored to tackle complex problems and support decision-making for real-world problems.

The advent of AI in other industries, specifically the manufacturing industry, Industry 4.0 is geared towards automation, data-driven technologies and the application of advanced AI techniques. **Data has shown that this revolution has led to significant process improvements, cost-efficiency, reduced production times, improved safety and helped to achieve sustainability goals.** We are at the right time to harness the AI in the construction industry now, because of advances in computing power, algorithms that follow precise steps, the large sets of data the industry produces, and innovations in the systems that combine these advances.

Some Key Use Cases for Artificial Intelligence & Analytics in a construction industry

i) Design, bidding and financing;
ii) Procurement and construction;
iii) Operations and asset management; and
iv) Business process reinvention/transformation.



Investing on artificial intelligence & analytics, in a construction industry has the potential to solve its greatest challenges and realize value throughout the project lifecycle. Which includes, not limited to, i) design, bidding and financing; ii) procurement and construction; iii) operations and asset management; and iv) business process reinvention/transformation.

We have taken on from this lead, and furthered it up with solutions on the ground to get a footing into the AI / AA journey. Various solutions have been used across various verticals to find a right blend of digital & predictive data / information, aiding real-time decision making capabilities.

On The Ground & Beyond

Theoretically, AI can be used in the pre-construction activities. By analysing the historical data collected from various project execution cycles, AI, which is trained on past

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>> Artificial Intelligence & Analytics in Construction Industries

datasets, can examine data meticulously to make well-informed decisions. Like, the data the algorithms can sort through are project type, downtime averages, scope of work, delivery methods.

Every construction project goes through several stages. AI has the potential to assist in every aspect. It can classify the progress of different sub-projects, like having a virtual project manager keeping tabs on everything. This means it can spot potential issues early on. Instead of reacting to problems, we'll be able to prevent them.

Some of the practical solutions where we could put the AI / AA to use are listed below. We have touched up a few where we are on the journey and yet to reap the benefits. None the less, we have taken a measured approach to get the intended result out of each solution; ranging from

1. Safety & quality alerts for proactive actions,
2. Targeted training for safety, quality & construction methods,
3. Efficient resource allocation & distribution, including staff, subcontracted workforce & machinery.

Planning & Design

Building Information Modelling (BIM) process is helping architecture, engineering, and construction professionals build models to plan, design, build, and repair the buildings and infrastructures. AI with BIM, further enhances the experience by providing multiple variations of the design. Each iteration significantly better the previous based on the chosen criteria. This iterative approach is continued until an optimal flawless design is achieved. All this with highest accuracy, optimal resource utilization & fraction of the time taken in conventional designing methods.

This can further be extended to collaborate with architects, engineering teams, electrical & plumbing functions, to ensure there are no clashes within designs of the each team & the schedule of the sub-teams. Thus mitigating the risk of rework & quality of the project.

Asset Monitoring

Owing to the advancements in the connected device technology, we have ensured all the assets across projects are enabled with IoT based monitoring devices. By leveraging AI-driven metrics, IoT enables real-time location tracking, fuel and power monitoring. By integrating the devices, we are able to efficiently predict equipment breakdowns and address issues, resulting in significant time and cost savings.

Predictive Maintenance & Analytics

By monitoring the use of the plant & machinery equipment across the projects, we are able to use advanced analytics to better manage asset allocation, & have a robust maintenance rigor on the assets to mitigate breakdowns & have enhance the health of the asset with utmost uptime.

Site / Workforce Safety

Computer Vision is put into use to assess the CCTV feeds from the project site to identify anomalies in normal functioning. The solution is equipped to monitor the video feeds based on various AI algorithm to identify potential safety hazards and alert the relevant teams on the potential danger. This data is further used to churn out predictive

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>> Artificial Intelligence & Analytics in Construction Industries

analytics on safety parameters contributing to prevention of unsafe activities / events.

Quality Control

Using the 3600 cameras, we are able to scan the constructed object and build a digital twin of the entire scope. Further with the help of AI algorithms we are able to identify the possible quality issues and pinpoint the same on the digital model. This can be further validated with the on ground checks and issues sorted, thus avoiding reworks and schedule slippage.

Contract Management & Bidding Process

A combination of AI algorithms like the GenAI & NLP are being explored to read the contract / tender documents. The solutions are used to summarize the usually long contract documents, identify important clauses, distribute the details to various functions based on their relevance and identify possible clarifications needed on the contract documents. The bidding process being the most critical activities of the organization, AI is explored to play a supporting role under the existing teams to aid them with options to search and skim thru the documents swiftly without compromising on the reportage.

On The Job Training & Education

With AR/VR technologies, the training / education process involved in the project life-cycle has been completely transformed. We now have the entire process involving, training, evaluation, regrouping & growth path identification, fully digitized and powered with advanced AI methods. AR/VR help us guide the work-force with near real-time feel of the project scenarios. The workforce get a feel of the entire project execution cycle before stepping on the ground. This has immensely helped in maintaining a safe site with well-informed workforce to handle daily work challenges.

Final Words

Not limiting to these solutions, and with the targets set high, we have started the journey by penetrating into the each function and making the AI presence felt. There were several hits and misses on the way, and after overcoming several trails, here are a few practical solutions put in place in out organizations. These are evolving and changing by the day, but we are on course for a disruptive decade ahead of us.

While investments in AI/AA can generate value, success is not about simply acquiring and integrating new technologies, it's about developing an organizational strategy and culture that integrate an insights-driven approach to key decisions at the right time and for the right reasons. The next big challenge we envision is building & maintaining the human-technology relationship. This will become the decisive factor to harvest potential benefits.

Integrating Lean principles and tools with Digital Solutions

Contributed by :
Mr. Ashish Kumar Sinha
Asst. Manager

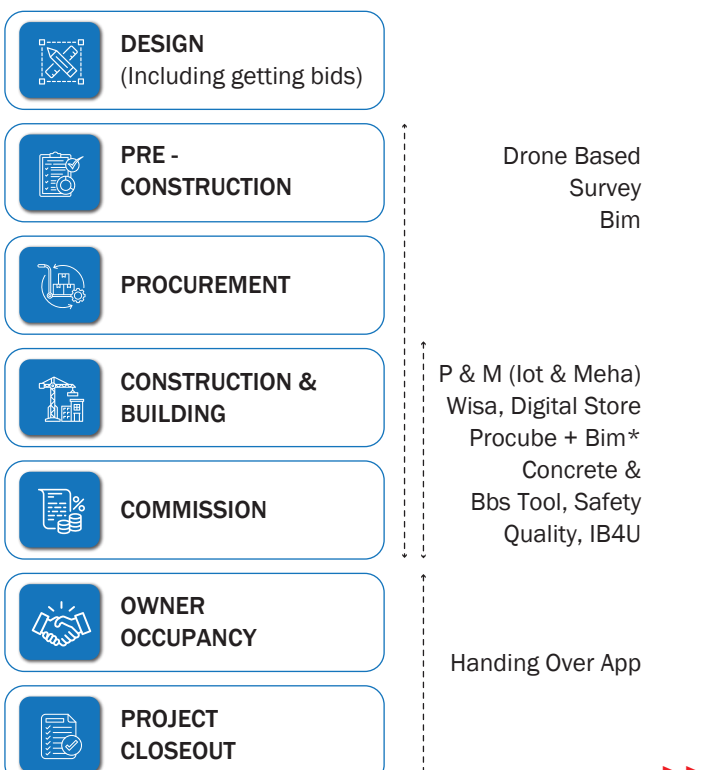
Lean management principles can be highly beneficial when applied to construction projects, as they aim to eliminate waste, increase efficiency, and improve overall project outcomes. In an era defined by rapid technological advancement and heightened competition, businesses are continually seeking ways to enhance efficiency and optimize processes. While traditional lean management principles or methods have been effective in streamlining operations and reducing wastes, integrating digital technologies can further enhance these principles and drive even greater efficiencies.

Digital Lean is a concept that merges the fundamental principles of lean methodology with cutting-edge digital technologies to drive efficiency, agility, and innovation across organizations. In today's hyper-connected world, where data reigns supreme and customer expectations are ever- evolving, Digital Lean offers a transformative approach to the Operational Excellence.
As it's core, Digital Lean revolves around leveraging digital tools and technologies to identify inefficiencies, streamline processes, and empower teams to deliver value more effectively. From automated workflows and real-time data analytics to collaborative platforms and digital twins, the possibilities are virtually endless.

One of the key pillars of Digital Lean is data-driven decision-making. By harnessing the power of data analytics and artificial intelligence, organizations can gain invaluable insights into their operations, enabling them to make informed decisions and optimize processes in real-time. Whether it's predicting demand fluctuations, identifying production bottlenecks, or optimizing supply chain logistics, data - driven approaches lie at the heart of Digital Lean.

Many of the tools have been developed that cater to identification and eliminating/minimizing the waste.

One such application is "Project, Progress, and Productivity or ProCube". Procube helps in the recording of physical progress at a construction site and compares against the plan to provide progress related insights to the management. Procube consists of a Mobile App and a Web portal.



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>> Integrating Lean principles and tools with Digital Solutions

Contributed by :
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Asst. Manager

The app enables the site engineers to record physical progress for various construction related activities at site (even when offline) and uploads to portal through a scheduler. This eliminates a multiple Lean wastes such as Movement, Waiting, Excess Processing.

Digital Stores

The app assists the project team in tracking and requesting material from the site store for consumption. It removes the time consuming task of going across project site for approval of material, provides precise inventory count and helps in reconciliation of material at fixed intervals.

WISA

A one stop solution for workmen management. The solution is used for workmen database management, onboarding, training, appraisal, feedback and attendance monitoring.

Moreover, Digital Lean emphasizes the importance of continuous improvement and agility. Unlike traditional lean methodologies, which often follow a linear improvement cycle, Digital Lean embraces iterative, data-driven optimization. Through rapid experimentation, feedback loops, and agile methodologies, organizations can adapt and evolve their processes at a pace never before possible.

Collaboration and transparency are also central to the ethos of Digital Lean. Digital tools and platforms facilitate seamless communication and collaboration across teams, departments, and even entire supply chains. Whether it's virtual Kanban boards, collaborative project management tools, or digital communication platforms, these technologies enable teams to work together more efficiently and effectively, breaking down silos and fostering a culture of transparency and accountability.

Furthermore, Digital Lean enables organizations to embrace innovation at every level. By providing teams with the tools and autonomy to experiment, iterate, and innovate, companies can unlock new opportunities for growth and differentiation. Whether it's implementing new technologies, exploring alternative business models, or reimagining customer experiences, Digital Lean empowers organizations to stay ahead of the curve in an increasingly competitive landscape.

However, while the benefits of Digital Lean are undeniable, its successful implementation requires a strategic approach and a commitment to change. Organizations must invest in the right technologies, foster a culture of experimentation and learning, and ensure alignment across teams and departments. Moreover, they must be willing to embrace failure as an opportunity for learning and improvement, rather than a setback.

In conclusion, Digital Lean represents the next evolution of lean methodology in the digital age. By harnessing the power of digital technologies, data-driven insights, and collaborative approaches, organizations can drive efficiency, agility, and innovation like never before. As the pace of digital transformation accelerates, embracing Digital Lean will be essential for organizations looking to thrive in an increasingly competitive and dynamic marketplace.

Digital technologies enable the collection and analysis of vast amounts of data in real-time. By leveraging data analytics and predictive modeling, businesses can make more informed decisions, identify opportunities for improvement, and optimize processes to minimize waste and maximize efficiency.

Digital Lean represents the next evolution of lean methodology in the digital age.

Reducing Cycle Time by Implementing Lean At MAHSR C6

Contributed by :
Mr. Rahul Gulabrao Sangole
Senior Engineer

The case studies focusses on the implementation of Lean principles and tools to reduce the cycle time of concreting activities at Mumbai–Ahmedabad High Speed Rail Corridor 6 (MAHSR- C6) which is one of the part India's first high-speed rail line, connecting India's economic hub Mumbai with the city of Ahmedabad. Specifically, the study focusses on the actions taken at Anand/Nadiad station which is the 10th station out of the 12 which are planned in this corridor.

To provide further context, the project consists of Construction of Station (53120 Sq.mt BUA), Maintenance Depot (75750 Sq.mt BUA), and a Distribution Sub-Station (DSS-3375 Sq.mt BUA). With such a large project scope the scalability of lean implementation was massive, and the project team could achieve significant benefits if the implementation came to fruition.

The primary concern in the megaproject was the delays caused due to productivity deficiencies when compared to the initial estimates, this was caused by a multitude of issues which will be discussed further. In addition the columns and slabs had to be planned sequentially, to ensure that there was continuous front available and delays in either of these activities caused cascading delays in the above floors. Due to less productivity the Column & slab cycle time were increasing, & it become challenging to complete casting of mega pour Concourse level slab (1000 cum) & track level Slab (1500 Cum) each in 9 Zone within the stipulated schedule.

To ensure further delays did not occur the following challenges had to be addressed at the project.

- Improving the productivity for the CSR activities through continuous monitoring & push planning strategy.
- Upgrading the sequence plan at site level to improve the column's cycle time and achieve daily 2-3 column casting along with slab activities.
- Identifying the key areas where the investment in time could reduce, so as in larger picture the cycle time would reduce by innovating & culturing new practices, adopting new techniques of works.
- Systematic allocation of crane & logistics as per activity planned, and adherence to the schedule.
- Standardizing the work by implementing 5S systems and tagging systems which reduce work prolongation.
- Encouraging feedback system & mind mapping session for resolving problems by daily morning meeting.

Throughout the process the primary objective of implementing lean tools and principles was to ensure that the project milestones and targets were met. To ensure this objective the delays had to be addressed and the cycle time of slabs, which was 65 days in the initial pours were targeted to 45 days to catchup to the baseline schedule.

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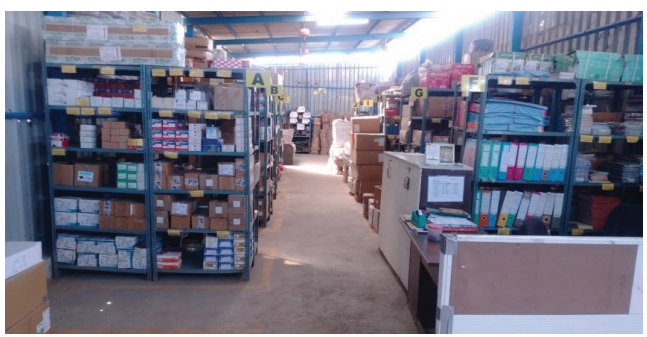
>> Reducing Cycle Time by Implementing Lean At MAHSR C6

Contributed by :
Mr. Rahul Gulabrao Sangole
Senior Engineer

Additionally, to ensure delays did not occur in the other areas or activities of the project a robust monitoring and tracking process had to be established. This would ensure an ecosystem that targets progress and provides targets to the individual teams after addressing the constraints to ensure no wastage of resources occurred.

In order to address the challenges lean principles and tools were utilized and the a systematic approach was taken to address the issues. These steps are:

- Implementing constrain analysis to resolve any issue in swift manner and generate automatic mechanism to resolve any issue by smooth flow of coordination.
- Monitoring PPC & mapping productivity activity-vendor wise on daily basis to meet target. Push planning at site for better control of schedule.
- Variance analysis & RCA to identify recurring challenges for CSR activities.
- Work sampling to identify more time taking activity, and plan logistics accordingly.
- Development of sequence chart for monitoring the sequence of casting.
- 5S implementation for maintaining better material identification.
- Daily basis morning meeting for taking collaborative action with all stakeholders.



Action Plan

- The first dissection for the problem was taken to improve the coordination was conducting daily basis morning meeting, in which discussion initiated from safety, Quality, RFI's, and Progress. In which improvision in works were discussed.
- Monthly basis Constraint analysis is performed, the highlighted problems are resolved and if required a specified head for activity is nominated. E.g., Daily basis concrete coordination was nominated by the planning Department.
- Monitoring Plan for Column & Slab were developed to expedite the completion of the targeted works.
- Daily Basis Activity-Vendor-wise tracking was done to improve productivity.
- Designated staff from planning itself was deputed to take charge of improvising productivity & better coordination.
- Tagging System was adopted on site for R/f stacking & formwork shutter board for unique identification.
- Daily Basis crane schedule allocation activity wise to increase the lifting cycle from 20 Nos/day to 33 Nos/Day.
- Suggesting innovation idea to use & joint walers at GL &

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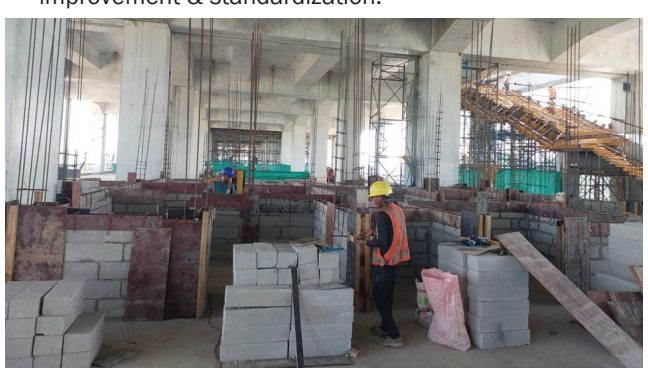
>> Reducing Cycle Time by Implementing Lean At MAHSR C6

Contributed by :
Mr. Rahul Gulabrao Sangole
Senior Engineer

then mass lifting by crane that reduces 2-3 man-days. and improvising productivity of shuttering.

- Implementing Good practices on site by adopting bags system for Khalasi for small items that makes staging activity organized.
- Reducing Wastage & saving Cost by identifying areas where saving can be made in reinforcement & concrete.
- Organizing & planning root level pour Plan for casting of mega slab.
- Formation of 5S Committee consisting of Department Heads. The committee took a regular walkdown through the project site and evaluated different areas for improvement & standardization.



Results

- Improvement in Cycle time of column casting from 0-1 to 2-3 per day.
- Improvement of cycle time for CI slab from 45 to 20 days & TI Slab 65 to 23 days.
- Improvement of productivity of Staging from 8-9 m3/md to 35-40 m3/MD.
- Reduced burden on cranes and other logistics equipment for critical value-adding activities during daytime.
- Standardization helps in better organization of activity & leads to reduce which to reduce time if placed in haphazard manner.

ILCE BOD Quarterly Meet

FY 2023-24: Q3, Oct-Dec

Contributed by :
Dr Marimuthu K
Technical Secretary, ILCE

The quarterly BOD meeting was held on November 21, 2023. This meeting was a virtual meeting where the Board members met to review the progress made on various initiatives in the last quarter and plan ahead.

Points under discussion

- **Update on ILCC (Indian Lean Construction Conference) 2023, SPA Delhi:** ILCC 2023 will be conducted by the School of Planning and Architecture (SPA), Delhi, by the end of November 2023. Updates and directions on these have been discussed.
- **Update on ILCE Lean Maturity Model (ILMM):** Briefed the status of ILMM and plans for further work. A pilot study was performed at the URC and Afcons sites and a summary will be presented at the ILCC 2023 Conference.
- **Update on ILCE Newsletter (FY 2022-23, Q1 and Q2):** Godrej Construction & L&T Construction will prepare the next newsletters Vol 14 and Vol 15, respectively.
- **Update on Integrated Lean Training & Implementation Programme (ILTIP):** The Closure session of this programme was conducted on 27 Oct 2023 in Chennai. This training programme is expected to transform the Participants from Enthusiast to Learner to Practitioner to Trainer (teaching to others), i.e., capacity building, and they will do better project delivery.

The future interaction of Artificial Intelligence and Lean Construction

We need to let go of our antiquated thought patterns and, in some respects, take a leap of faith into the unknown. Artificial intelligence can maximize effective communication and networking of people, information and machines and optimize processes and projects. Lean provides the basis for futuristic technologies and fosters optimization. Lean is also key to achieving standards and stability – and stability is the basis for general digitalization. Only stable and recurring processes can be digitized.

Digitized processes provide the foundation for the main AI topics, such as:

- **Machine Learning (ML):** uses math and statistics to learn from data; improves with experience.
- **Deep Learning (DL):** uses artificial neural networks to solve complex tasks.

In the context of takt planning as a common scheduling method in lean construction, the potential of these two emerging technologies can be leveraged as follows:

1. With ML, takt plans can be generated autonomously based on previously collected empirical data. However, humans are still needed in the loop for validation.
2. With DL, takt plans for projects are created entirely autonomously with no humans in the loop.

Lean principles are increasingly supported by applying larger, more complex datasets, which is why the future of lean and big data is connected. The ability to evaluate data correctly, to derive measures, and to improve processes will be decisive for the future competitiveness of companies in the construction and real estate sector.
~by Selim-Tugra Demir

See full article here → https://leanconstructionblog.com/The-future-interaction-of-artificial-intelligence-and-lean-construction.html

Indian Lean Community Online Meet (ILCOM): Involve and Evolve – Community of Practice (CoP)#11

The Indian version of the Lean Community of Practice (CoP) meeting with Lean Practitioners and Academicians/ Researchers, the Indian Lean Community Online Meet (ILCOM), has been systematised. The tenth communities of practice meeting happened on 20 Oct 2023, between 4 pm to 5:30 pm (IST), to exchange initial ignite in embarking on the Lean journey, Lean learnings, challenges in implementation and sustenance, benefits expected and realised, meet and say hi to the likeminded community, make new Lean connections to go onboard for kaizen in your personal and professional voyage and what not!.

Many notable industry practitioners, academicians, and researchers joined this community meeting.
Participants (11): Manish, Ramasamy, Hitarthi, Yagnesh, Praneta, Lakshmi V Sai Prudhvi, Ajay, Praveen, Raviteja, Er Johncy K, and Yadhnesh.

Broadly, these were the points shared/ discussed:
Implementations of Lean Practices in Process waste management (construction industry)

- Difficulties faced when Higher management is partially Interested in applying Lean at site level
- What are the challenges in effectively implementing Lean principles in projects? How can we successfully Overcome challenges when applying Lean Methodologies in construction projects?
- Research areas in lean construction
- Discuss Specific Strategies and Methodologies for Lean Implementation
- Digital Transformations: Explain the role of technology in Optimizing and reducing construction process waste. Examples of digital tools and software used in lean implementation in construction projects.

Webinar #15 – Experience in Implementing Lean Practices at the Redevelopment of Railway Station Project, Bhubaneswar

ILCE organized this webinar on 17 Nov 2023, between 4:00 pm to 5:30 pm (IST). In this webinar, eminent personalities from academia and industry walked us through why, what, and how to apply Lean principles and embark on a Lean journey, followed by an interactive Q&A session. ILCE technical team also shared the details about many initiatives to create value for the construction industry by enabling its stakeholders to develop and internalize Lean Concepts and Culture.

EXPERT SPEAKERS

URC Construction, BBSR Project Team
Mr. Vijayakumar, GM Projects
Mr. Kandasamy, DGM Projects
Mr. Rohith Raj R, Planning
Mr. Karunian, Planning

Notable Participants (32): Abhinav Vardhan, Manish Suthar, Krishnanandh Balaji, Praveen Patange, Tony Jacob, Vatsal Gupta, Rhijul Sood, Piyush Pandey, Sahimol Eldhose, Vignesh V P, Senthilkumar V, Sarat Shroff, Er Balu Gadage, Dr. Gyanendra Kumar, Imandi Jaya Vikrama Virupaksha Prasad, Pallab Goswami, KAMARAJ N, Er Johncy K Sam, AKIL SALMANI, Abhishek Gaurav, Yadhnesh Udas, SHASHIKANT GOSAVI, vaidehi Dakwale, GUNASEKAR S, Kannan Winson, MAHESH SAVANT, Omkar H, Lakshmi Narayana Meka, Yadunandan Chafekar, John B, AMALENDU BHUYAN, and Suresh Muntha.

Interactive Questions:

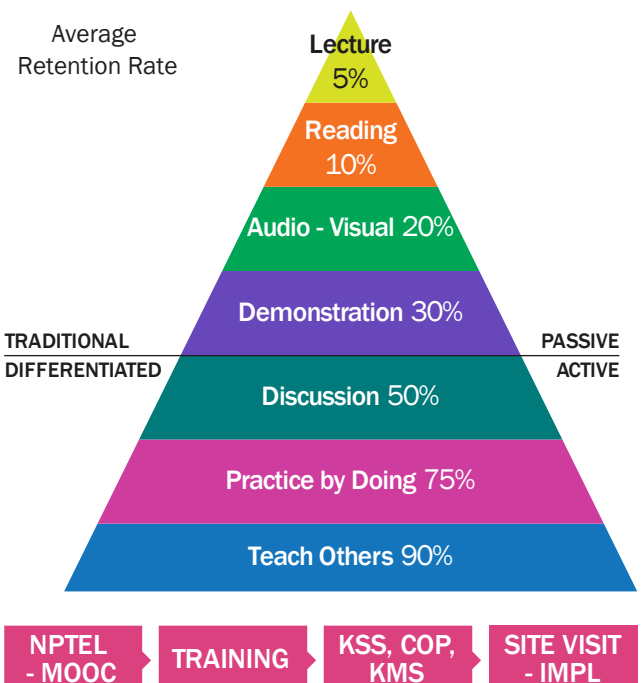
1. How is Lean implementation in that site presently, and how has it changed project uniqueness? Would like to understand which key concepts of LC were successfully implemented on the Project. Were the advantages gained in the form of reduction in wastage, enhancement in productivity or some other form
2. How to make my project team believe that the lean implementation is worthwhile, and what baby steps should I take for its implementation? What are all the challenges we have to face in this journey?
3. How is Lean strategy not hampering services for ongoing railway operations during redevelopment construction? How does the redevelopment implementation differ from new development Projects?
4. Specific cost and time savings for the contractor and client: Can you share specific examples of how lean principles were applied in the project and the impact they had on efficiency and cost-effectiveness?
5. What would be the best approach to start implementing Lean philosophy across projects?
6. Is the Lean concept applicable to small projects? If yes, how effective is it?
7. I think Lean Construction can't be possible unless the Client and Consultants are also in the same line of thinking.
8. What are new innovative construction technologies used?

Integrated Lean Training and Implementation Programme (ILTIP 2023) – URC Construction

Institute for Lean Construction Excellence (ILCE) has contributed much to the charter member companies and members through Lean training, implementation, and handholding through major initiatives in 2013 and 2018-19. Since then, industry practitioners have been reaping many tangible and intangible benefits, which have been disseminated through Indian Lean Construction Conferences (ILCCs). This training programme has been designed to spread Lean thinking and practising capability among the multiple stakeholder(s).

The scope and objective of this training programme are outlined below:

1. To provide Transformation for the Participants from Enthusiast to Learner to Practitioner to Trainer (teaching to others)
2. To reinforce the Lean Concepts and Principles through Simulation-based training
3. To ensure sustainable Lean Practices by involving Mentors from the HO/ RO
4. To provide Relentless Learning (Hansei) and Continuous Improvement (Kaizen) through close Contact with the Project Sites
5. To assess the degree of Lean Maturity improvement at the Project Site throughout the Programme.



Closure Session (27th Oct 2023), Chennai

Lean Academic Conclave 2023

ILCE and IIT Madras jointly initiated this great initiative With the support from URC Construction, Lean Academic Conclave, to systematise the teachings and learnings of Lean Project Delivery in Academic and Research Institutions.

The meeting was held on 28th October 2023, ICSR IIT Madras to introduce everyone and set the objectives of this new initiative and discuss the immediate the requirements. Later, focus group discussions on the dedicated topics were conducted.

Notable Participants: Dr Albert Thomas, Dr. Prasanna Venkatesan R, Mr Aswin Bharath A , Ragavi Prabaharan, Charan, Dr Venkata Santosh Kumar Delhi, Dr Nikhil Bugalia, Dr Parul Patel, Soundarya Priya M G, Sindhu Vaardini U, Prof Koshy Varghese, Dr Ganesh Devkar, Dr S. Purushothaman Srinath, Prashanth Kumar Sreram , Dr Marimuthu K, Mr C Devarajan, Dr Murali Jagannathan, Sahimol Eldhose , Mukesh Kumar D, Kalyan (Bentley), Vignesh (Urcc), Dr Senthilkumar, Annie Sonia Xavier, Dr Sakthivel T, Dr. K. S. Anandh, Dr.venkatesan Renganaidu, And Dr. S. Gunasekar.

Focus Group Discussion:

1. Fundamental concepts: what lean concept shall be covered; how do we do it? Challenges?: Team#1 – ICSR Hall 2
2. Fieldwork Assignments & Workbooks: Team#2 – ICSR Hall 2
3. Simulations & Tools: Team#3 – ICSR Hall 2
4. Internships, Research & Projects: Team#4 – Annex Dining Hall
5. Student Awareness; Teaching Teachers/ Industry Consultancy: Team#5 – Annex Dining Hall

Participants were from institutions: IIT Madras, IIT Bombay, NICMAR (Hyderabad), CEPT, Nirma University, IIT Palakkad, SRM IST, Vellore Institute of Technology (VIT), Kongu Engineering College, Kumaraguru College of Technocology, TIST, L&T IPM, PSG iTech, Mahendra Engineering College and ILCE.

ILCE Engagement Plan

1 **Faculty/ Student Development Programs (FDPs/SDPs):** Mentoring by esteemed local institutes such as IITs or alike for curriculum support; Training sessions and workshops by experts; Student Chapters

2 **Industry Connection & Industry Advisory Board:** Each Institution will be engaged with one local company for

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>> Lean Academic Conclave 2023

collaboration for industry guest speakers, internships, projects, and PPOs

3 **Research and Skill-Development:** 2 people from each Institution will be engaged in a Kaizen mode for Lean Teaching and research works; A&RI will engage in Applied Research work to help the companies standardize the process, thereby establishing industry best practices leading to a positive impact at the economic and social developments.

4 **Lean Academic Conclave: Annual LAC event:** (In-personmonth of May – June) concessional rates

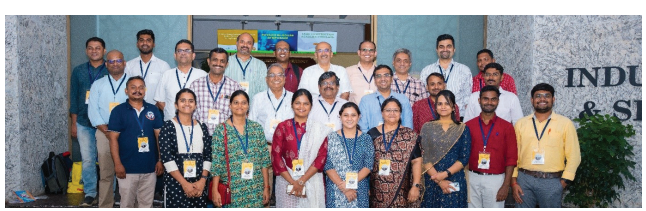
5 **Lean Synergy with other domains:** BIM, IT, Automation, Green and sustainability, Quality and Safety.

6 **Networking Opportunities** with A&RIs and Industry Practitioners!

7 **ILCE Apex Body:** Opportunity to be a part! (consulting + lean maturity assessor)

8 **ILCE Target 2025:** Active engagement of 100 Institutions across the country (where Lean is part of Their curriculum and continuous collaborative works are In place between Academia and Industry)

9 **We (ILCE) propose** that the institution contribute an Annual Premium of 1 Lakh to Start and Sustain the aforementioned initiatives.



Indian Lean Construction Conference 2023 (ILCC 2023)

Readers would be familiar with the Lean Construction concept practised widely in India and well publicised by Construction World issues and through a Special Edition in November 2022. For the 2023 event, ILCE tied up with SPA Delhi. The event was organized in their beautiful, architecturally rich campus in Delhi and India Hbaitat Centre. The Conference Theme was “Lean Design, Design Management with Lean Construction and Digital Technology for Decarbonizing Built Environment” to give some ideas to the Construction industry about the integration requirements.

Industry day

EVENTS OVER THE YEARS

- 2015 ILCC Mumbai
- 2017 ILCC Chennai
- 2018 IGLC Chennai
- 2019 ILCC Pune
- 2019 LIPS New Delhi
- 2021 ILCC Ahmedabad
- 2022 ILCC Hyderabad
- 2023 ILCC and LIPS New Delhi
- ILCC and LIPS 2023 4-DAY EVENT

Attended by: Lean enthusiasts from all over the country from the construction industry as well as the academia & research institutions

Format: both speakers & delegates attended in person

Day 1: Workshop Day

Hackathon Challenge Scenario the new edition of the Hackathon Event was conducted with the support of following experts, and the event was very well received by both the academic and industry communities in the making reliable decisions on the basis of the data set: Mr Micah Piippo, Schedule Manager Intel & Beyond Deadlines Host, Oregon, USA

Mr Dermot Callaghan, Global Strategic Estimating Manager, Google California, USA.

Day 2: Industry Day

Industry Day started with an inaugural address, then packed with highly intellectual 6 sessions, 2-panel discussions, and a Concert at the Ravishankar Centre.

Highlight: Two Panel Discussions on “Decarbonisation of Indian Infrastructure and Built Environment sector through Lean Construction” and “Lean Thinking in Design Management”.

Workshop day (Hackathon Challenge Scenario)

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>> Indian Lean Construction Conference 2023 (ILCC 2023)

Day 3 & 4: Technical Conference

Industry Day started with an inaugural address and with Union Minister Shri Nitin Gadkari's address. Featured several international keynotes, invited talks, and technical paper presentations on Lean construction applications and how to apply Lean gainfully. Parallelly the Lean in Public Sector (LIPS) training workshop was conducted by the Experts Dr Zofia and Mr Amr from the LIPS Community. Speakers @ Tech Conference Senior professionals from the Construction Industry from premiere organisations such as Afcons Infrastructure, URC Constructions, Godrej Construction, Tata Realty, Turner Construction, KPMG India, Bentley Systems, VisiLean, Vconstruct, Gleeds, Intel Corporation, Google, CPWD, LIPS Community, ARUP, Autodesk, KMV Projects, Capricot Technologies; Leading academics from IIT Madras, IIT Bombay, Texas A&M, Wayne State Univ, Galgotia University, NICMAR Pune, Hyderabad, and Amity University- RICS SBE.

30 TECHNICAL PAPERS

This Conference was a great milestone in the development of Lean practices in the Indian Construction industry, bringing together leading Lean practitioners and enthusiasts from the Industry and Academia and sharing efficient Lean paradigms and practices.

ILCE | INSTITUTE FOR LEAN CONSTRUCTION EXCELLENCE

Webinar#16 Lean Construction and Building Information Modelling Integration
Lean Construction and Building Information Modelling Integration

Organised by: ILCE

February 16, 2024 | 04:00 pm – 5:30 pm IST

ILCE | INSTITUTE FOR LEAN CONSTRUCTION EXCELLENCE

Indian Lean Community Online Meet (ILCOM): Involve and Evolve – Community of Practice (CoP)#12
Lean Journey: initial buy-in for lean implementation, training, sustenance, benefits and challenges, success and failures instances and learnings, etc.,

Organised by: ILCE

January 19, 2024 | 04:00 pm – 5:30 pm IST

ILCE | INSTITUTE FOR LEAN CONSTRUCTION EXCELLENCE

Indian Lean Community Online Meet (ILCOM): Involve and Evolve – Community of Practice (CoP)#13
Lean Journey: initial buy-in for lean implementation, training, sustenance, benefits and challenges, success and failures instances and learnings, etc.

Organised by: ILCE

March 15, 2024 | 04:00 pm – 5:30 pm IST

LeanConstruction Blog

Foundations of Theory of Constraints (TOC): Leveraging Operations Excellence for Speed and Agility in Construction Environment
Foundations of Theory of Constraints (TOC): Leveraging Operations Excellence for Speed and Agility in Construction Environment

Organised by: Lean Construction Blog

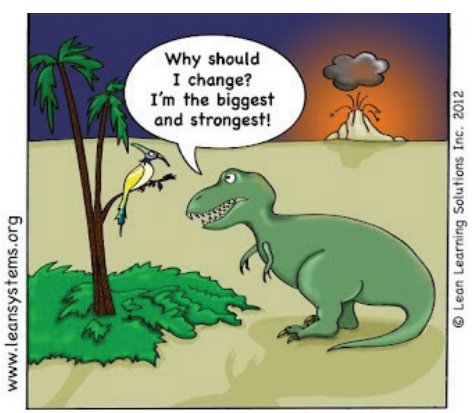
February 21, 2024 | 08:30 pm – 10:00 pm IST

LEAN CONSTRUCTION IRELAND LCI

Lean Process Implementation
Lean Process Implementation

Organised by: Lean Construction Ireland

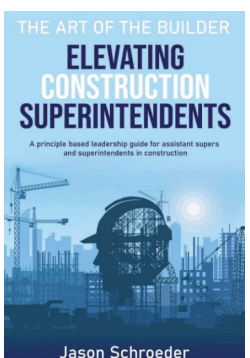
February 29, 2024 | 03:00 pm – 4:30 pm IST



GOOD READS FOR LEAN

Contributed by :
Dr. Marimuthu K, PhD,
Technical Secretary, ILCE

As the construction industry across India warms up to Lean principles, it is essential to find ideas and concepts that are practical and project-driven. Our reading recommendations this quarter revolve around the real-world application of lean principles. Do take the time to explore these great reads.

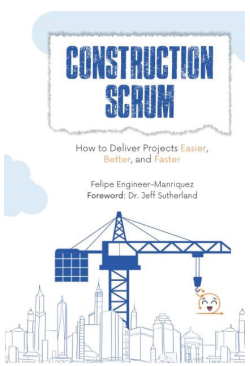


To be a great superintendent, you need training. Without this, you may become defensive, learn to accept waste and low standards, or even espouse false concepts that will lead to certain failure. However, with proper fundamental training, learning from the best builders throughout history, and effectively using the modern concepts of lean, we can guide superintendents to have the best trained role in construction.

Right now in our industry, project managers and project engineers are better trained, better paid, and are becoming leaders of the entire team. The positions of superintendents and project managers should be equal, but to be equal, we need to step up and take our place as the driving force of the project. This book will help you to do that and bring respect back to field positions everywhere.

Before writing Elevating Construction Superintendents - The Art of the Builder, I had never found a book available for the art and form of being a superintendent. Yes, there are books about lean; yes, there are books about construction management; and yes, there are books about the skills of a superintendent, but there are none that cover the art of the builder in construction and the back-to-basics fundamental attributes of a true leader in the field. This is the first revision of the book we need and want for our wonderful builders in the field of construction. This book is filled with principles and actionable steps for assistant superintendents.

I invite you to learn these, take massive



Construction Scrum: How to Deliver Projects Easier, Better, and Faster is the first practical guide for construction professionals to implement the Scrum framework in the construction industry.

The book is organized into three parts:

Part one is a series of short stories that illustrate how Scrum works in design and construction.

Part two is Felipe's Scrum story including the Scrum values and pillars.

Part three is an invitation for construction professionals to create their own Scrum playbook with the author's insights and commentary.

"My vision for this book is to bust the myths and assumptions around Scrum and to simplify the life of construction project managers, superintendents, and field engineers. This book is dedicated to all the people in our industry who take action and make project delivery easier and better for construction today," Felipe Engineer-Manriquez said.

"With Felipe's partnership in Scrum Inc, a new Scrum team focusing on Scrum in construction was formed to serve the millions of men and women working to build our world. His generous contributions to this team and the growing community of Scrum practitioners continue to have an outstanding impact on transforming people's work and lives," Jeff Sutherland, co-creator of Scrum and CEO of Scrum Inc., said.

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