How to begin your Lean journey (PART ONE)

A practical guide to Lean Construction techniques that can be implemented on your project this week.

By Stéphane Denerolle

“A bad system will beat a good person every time.”

- W. Edwards Deming - Professor at NYU
Introduction

Lean Construction is a journey that takes time and can call into question traditional construction management delivery. This paper is intended to help your organization take the first step of this journey by illustrating a few Lean tools and techniques that can be implemented on your project(s) over the next couple of weeks.

There is plenty of academic literature covering the concepts and guidelines of lean yet little on how to get started. This series of articles flips the framework on its head by introducing Lean concepts through simple actions that can be taken right away. Think of this as a training program that an athlete would follow to prepare for a competition. The key is to start with small, actionable steps that will generate quick successes in a short timeframe. These first results will help you build habits and, as you become more familiar with the Lean culture, set you up for long term success.

This first article presents five quick practices that support the key concepts of Lean Construction:

1. Use visual displays to increase transparency
2. Start daily huddles to improve reliability
3. Hunt down double data entry to eliminate waste
4. Use floor markings to improve workplace organization
5. Implement Plus/Delta to encourage continuous improvement

About the author

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Prior to joining Fieldwire, Stéphane implemented lean methodology and deployed technology at DPR and Bouygues Construction.

Stéphane holds an engineer’s degree from the École Polytechnique, as well as a M.S. in Civil and Environmental Engineering from UC Berkeley, with a focus on Lean Construction.
Lean Construction promotes a production system view of the construction project, with a focus on optimizing the project as a whole rather than its individual parts. By looking at the project as a production system, the Lean approach emphasizes flow, continuous improvement, the elimination of waste, and the generation of value for the customer throughout the project lifecycle.

Origins
The origins of Lean lie in the Toyota Production System, which is credited with driving vehicle prices down and vehicle quality up during the 1980s and 1990s [1]. Since then, Lean thinking has been applied to various industries beyond automotive, including healthcare, software development, light manufacturing, and construction.

How is construction different from manufacturing?
The construction industry is, at its core, very different from the other industries. It is project-centric, which means bringing together dozens of organizations (each with their own culture, long term goals, and technology choices) for the duration of a project, before starting all over again from scratch on the next project.

What also sets this industry apart is that labor efficiency and productivity has decreased in construction, while the productivity of all other non-farming industries has more than doubled since the 1960s [2]. This losing trend inevitably calls for a change in how construction projects are delivered.

Key Concepts
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Outcomes
When implemented well, a Lean Construction system can deliver radical performance improvement in the form of faster projects, less rework or change orders, and a higher quality finished product. When implemented poorly, it may result in resistance, team objections due to perceived additional work, and even sabotage or gaming of the system.
1. Use visual displays to increase transparency

One of the key concepts of Lean thinking is the **optimization of the project as a whole**. The danger of optimizing a process in isolation is that it can sometimes result in a worse performance at the project level. **Knowledge, work, and effort are traditionally confined within “project silos” - site areas, companies, trade packages, field vs. office, etc.** Lean methods seek to break down these silos for the betterment of the project, creating an **integrated project team** in the process. Making individuals feel like a true part of the team will help them develop a sense of accountability and align their goals with those of the project.

- Place **visual displays** in high-traffic areas (by the site gates or the construction trailer entrance) where teams have daily huddle meetings. Make sure to update the information frequently so that the current status of the project can be understood at a glance by everyone involved.

**Information updated daily:**
- Weather information
- Safety issues
- Contact details of safety personnel
- Key activities for the day (such as crane picks or concrete pours)
- General announcements
- Improvement suggestion

**Information updated bi-weekly or monthly:**
- Project milestones schedule
- Safety performance indicators (accident rate, near misses, etc.)
- QA/QC metrics, such as open issues by trade
- Metrics on RFI and Submittals (number of open RFIs, weekly average turnaround, etc.)
- Metrics on work in place (WIP) of major project components (planned vs. actual)
- Color-coded floor plans showing work areas of each trade
- Data from the **Last Planner® System**

Visual displays will help your team identify the workflow and create awareness of action plans on the job site. They will also facilitate **continuous improvement** by offering a system that displays key performance indicators to encourage accountability and motivation.

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One key prerequisite of team integration is to **increase transparency** among the project team. People can only make decisions based on the information they have at their disposal, without it they might as well use a crystal ball to produce the answer. The need to have a system in place to efficiently share project documents, directives, and metrics therefore becomes clear. While deploying **construction management software** can play a key role in this, implementing virtual displays is an efficient first step toward increasing transparency and fostering team spirit on your project.

**Visual displays** are useful for placing key project information in plain view of the project team. They are typically wall-mounted pin boards used in combination with white boards. This allows regularly reported information, normally updated on a weekly or monthly basis, to be displayed alongside more dynamic information that gets updated daily [3].
2. Start daily huddles to improve reliability

Traditional project management assumes that inconsistency in work flow is either small or outside of management’s control. As a result, rather than attempting to fix the problem, management implements various contingency plans and buffers to keep variability within the limits of budgeted time and money.

Studies across a wide range of projects have shown that 54% of assignments on Weekly Work Plans are not completed as planned [4]. This translates into schedule delays and cost overruns, which are unfortunately quite commonplace in the industry.

Contrary to popular belief, most of these failures are not due to external circumstances and are well within the contractor’s control.

Focusing on the reliability of commitments between site teams, engineering teams and suppliers can lead to significant productivity improvements, decreased inventory, and reduced rework. Our third article will present the Last Planner® System (LPS), a comprehensive planning method trademarked by LCI aimed at improving reliability and adding value to your project.

Implementing regular daily huddles with a precise agenda represents the first step towards improved reliability on your project.

Daily huddle meetings

Daily huddles are regular, often mandatory team meetings. They should not exceed 15 minutes in duration and should be held every morning at a set time (ie. 7AM). Huddles should ideally include the entire project team (PM’s, PE’s, Superintendents and Foremen), but they can be split up and held at the workgroup or site zone level if the team exceeds 30 people.

What’s a good daily huddle agenda?

1. Review metrics and team progress (led by supervisor)

2. Team updates: today’s commitments, any obstacles/issues (all). All team members should take turns giving a brief update addressing the following questions [3]:
   - What did I do yesterday?
   - What I am doing today?
   - What obstacles are preventing me from making progress?

3. Identify obstacles or areas for improvement (led by supervisor)

These meetings strive to establish two-way communication between the office and the field, and between upper management and the rest of the team. They bring the team together and give everyone an opportunity to contribute and to get more familiar with the big picture. Each team member is asked to reflect on whether commitments from the previous day were met and what he/she can commit to today. This reminds everyone of their responsibilities and helps foster a problem solving attitude.

Having daily huddle meetings goes hand-in-hand with visual displays. Visual displays are a great start, but they only provide a passive, one-way flow of information (from the wall to the viewer). Holding the daily huddles in front of the visual display ensures that the teams will interact with it on a regular basis.
3. Hunt down double data entry to eliminate waste

Studies show that the time spent on actual construction work represents less than 30% of a worker’s day [5]. The rest of their day is spent on activities that don’t directly add value to the project or the customer:

- Supporting activities do not directly generate value to the project output, but they are needed to carry out operations: logistic activities, accounting, estimating, coordination, clean-up, etc. While they cannot be eliminated, they should be minimized.

- Unproductive activities (ie. waste), on the other hand can be eliminated without diminishing the value of work.

The seven wastes referenced by the Lean Construction Institute [2] consist of:

1. Defects: Rework, errors & punch lists.
2. Overproduction: Fabricating material too soon or ordering extra material because of poor quality.
3. Inventory: Material stored on-site or at the yard, work in process, and unused tools & parts.
4. Unnecessary processing: Organizing field notes into a report, redundant or unnecessary reporting, multi signatures on forms, and double-handling.
5. Motion: Looking for files, drawings, and poor layout of work area.
6. Transportation of goods: Moving material, tools or parts.
7. Waiting: Crews waiting for equipment, information, or material; scheduler waiting for progress updates from the field.

Hunt down data double entry

Anyone who has worked for a construction company would agree that a significant part of his/her day is spent filling out forms - change order requests, billings, RFIs, submittals, timesheets, extra work authorizations, quality and safety inspections, etc. While all of these documents are needed to support the project, they are typically associated with a ton of unnecessary processing. The data is too often typed into an information system by an admin flipping through hundreds of barely legible forms filled out in the field. Project Engineers spend hours filling out tracking logs, double entering the data into multiple systems or forwarding drawings and RFIs to their field teams.

Here are a couple of suggestions to get started:

- Deploy an online file sharing platform and use live links – Emailing instances of a specific document (RFI response, blueprint, approved shop drawings, etc.) is very wasteful. Forwarding emails back and forth takes time, and even worse, your team might be working off of outdated documents, which could lead to rework. Instead, you should favor an online file sharing platform that anyone can log into and search to find the file they need. If you need to email a document out, use a “live” link that will point to the latest version of that document.

- Get a mobile app to track and report your punch items – A few years ago, a Project Engineer facilitating the punch list process would typically do a walkthrough with the architect, taking notes and photos to document each punch item. He/she would then spend hours compiling these notes and photos in an Excel log and updating it as the punch list develops. Such an outdated process should not be necessary nowadays. There are advanced punch list mobile solutions that will allow you to create punch items as you are doing a site walkthrough, attach photos and relevant information or notes, and generate reports and analytics as soon as you are back at the office.
4. Use floor markings to improve workplace organization

Born at Toyota in the 1960s, the 5S methodology is a disciplined approach to maintaining order in the workplace, with “a place for everything and everything in its place” as its guiding principle.

It is one of the most widely adopted techniques from Lean manufacturing, and can be applied to a job site, an offsite facility, or even an office space. This technique is a good one to start because it sets the stage for several key Lean concepts: standardized work, waste removal and continuous improvement. It also contributes to increasing employee morale, teamwork and safety.

The 5 steps of this methodology will be comprehensively covered in the next article. This section will present a couple of floor marking techniques inspired from one of the 5S steps: Seiton (Set in Order).

- **Floor Marking**
  One technique stemming from 5S is to add markings on the concrete floor slab throughout construction to help keep the site organized:

- **Use red floor markers (carpet, tape or paint) to define the circulation aisles.** Those should be laid out in safe zones and at a distance from congested work areas. This helps ensure that workers will leave an unobstructed path in their work zone, which should improve speed of circulation during construction or in case of emergency. This will also help the people passing by the work area stay away from hazards in order to reduce interference and safety issues.

- **Use tape to delineate material laydown and equipment storage area.** This helps contractors minimize their inventory (third type of waste) so that it doesn’t get in the way for other trades. Having designated locations for equipment and tools (trash bin, ladder, hand truck, forklift, etc.) also helps to keep the jobsite clean and organized. Your team will be spending less time looking for the tools or equipment they need.
Recent studies in the USA, Scandinavia and this country [UK] suggest that up to 30% of construction is rework, labor is used at only 40-60% of potential efficiency, accidents can account for 3-6% of total project costs, and at least 10% of materials are wasted... The message is clear - there is plenty of scope for improving efficiency and quality simply by taking waste out of construction.” [6]
References


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