

Company Overview | CFIELD CONSTRUCTION | cfield.ie

CField Construction is a Building & Civil Engineering contractor with operations in Ireland and the UK. We have extensive experience in a wide range of sectors, including Pharmaceutical, Residential, Healthcare, Leisure, and Commercial. Since our formation in 2011, the company has experienced significant growth, with turnover reaching approximately €80m in 2018. Our goal is to deliver all projects to the highest quality, in a safe, cost-effective, and timely

Author



Seán O'Sullivan

manner. We aim to form lasting relationships with clients by delivering excellence in a friendly, engaging, and professional manner, and see this as a key measure of the success of our business. Our team has a diverse range of skills and is committed to working closely with our clients, professional teams, and supply chain to develop pragmatic, innovative, and cost-effective solutions to achieve maximum value on each project.

Overview & Background to the Lean Initiative

CField had targeted the pharmaceutical sector as an area of the construction sector that we wanted to increase our presence in and to grow and develop our business whilst adding diversity to the company at the same time. CField had successfully completed several small-scale pharmaceutical projects in the past, and in May 2019 CField was successful in the tender process and awarded the contract for a new production building for a Multinational Pharmaceutical Company within their existing live plant. This was the first large-scale contract for us that included the full Civil Structural & Architectural (CSA), Mechanical, Electrical and Process (MEP) scope of works as project supervisor construction stage (PSCS). This project is circa €40m capital investment for the client, and a huge stepping-stone opportunity for CField to progress within the pharmaceutical sector.

We have significant CSA experience, and there was a strong degree of confidence with that scope of work; however, the project management and execution of the MEP scope were risk areas that needed to be mitigated. Awareness of these risks to the project is where our Lean initiative began.

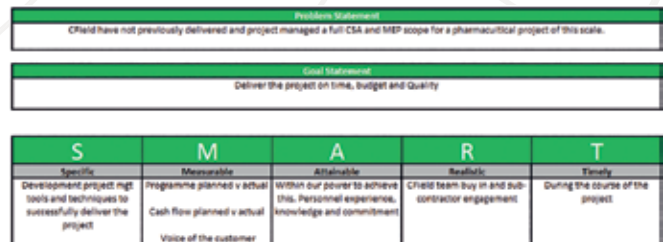


Figure 1. Problem Statement, Goal Statement, SMART Goals

Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

Within our team, we had identified the key personnel with individual knowledge and experiences to execute the project on time, on budget, and deliver quality. The task to be undertaken was to capture the experience and knowledge to create the end-to-end process to successfully deliver this project. Whilst we had a very comprehensive quality management system (QMS), this project required a high level of project management tools and techniques to be developed and incorporated into our QMS. The success of the project largely depended on these project management tools and team buy-in and ability to implement them during the different stages of the project. The following is a list of the primary project management processes we developed and implemented.

Master Programme – MS Project

This is now a common tool in the construction industry, but for this project the challenge was to create an integrated master programme to incorporate the CSA and MEP contractor scopes of work in the desired timeframe. The MEP contractors were novated

and developed separate programmes at tender stage based on unencumbered access to the building from which they built their man-hours and preliminaries. We facilitated workshops between key personnel from CSA and MEP contractors to coordinate a fully integrated programme to deliver the project within the agreed contracted timeframe for all parties. The initial stage was to build trust and start to work together as a team. By creating the programme together, all disciplines were fully bought into the delivery sequence and had a high-level view of the delivery plan, resource requirements, and the interdependencies of other trades.

Last Planner System (LPS)

LPS was tailored to suit our project and client requirements. This was where we mapped out the day-to-day and room-by-room work activities for site works. All sub-contractors populated the LPS spreadsheet to identify their proposed tasks, number of resources, location, and duration. All sub-contractor plans were then compiled into one document and reviewed collectively to ensure

that tasks could proceed and that work was aligned with the master programme. The combined plan was then reviewed with the sub-contractors and shared with them for full transparency. Our weekly traffic management plan was generated from the agreed last planner and shared with the site-wide team for the following week. As part of this planning process, we conducted weekly 6-week look-ahead master programme reviews so as to plan ahead for upcoming work and to trigger the requirement for any information or long lead-time equipment and materials, like, for example, drawings, specifications, samples, and queries.

Daily Coordination Meeting

Every morning we held a work coordination meeting to review planned work from the previous day and to resolve any roadblocks that might cause a delay going forward. This is aligned with the LPS planned progress, and it proved to be the essential communication platform to quickly update progress. This was a short meeting lasting approx. 15 minutes, and all sub-contractors, the design team, and the client attended and worked together to maintain progress.



Figure 2. MEP Approach to Clash Detection

Model Review & Clash Detection

For the MEP works, the BIM model was used as the primary source for all details, setting-out, and general construction. Pre-commencement, and during the MEP works, we facilitated model reviews and clash detection workshops to further develop the model and identify clashes on the model before they became an issue on site. All clashes were recorded on a tracker sheet, and assigned owners and close-out dates. This process also involved the client, design team, and all contractors.

Commissioning, Qualification, Validation (CQV) – White Tag, Green Tag, Blue Tag

This process was developed to track progress from start to finish, and to get MEP systems available (turned-over) for the client within the planned timeframe, meet quality requirements, and guarantee minimum punches for the final client walk-down.

Systems Completion Schedule

Upon completion of mechanical and electrical first fix (bulk

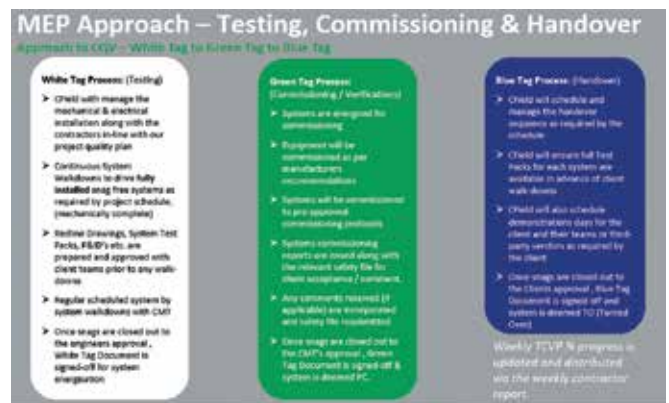


Figure 3. MEP Approach to CQV

install), the programme changed focus from meters of pipe and valves installed to systems percentage complete. This was driven by the client's requirements and the need to prioritise certain systems. This was developed in the master programme and further broken down in the systems completion schedule to plan walk-downs and punches. It includes scheduling each of the following for every system from each trade:

- White tag system walk-down between Sub-Contractor and Main Contractor.
- Generate, issue, and close punches.
- Green tag system walk-down between Main Contractor and M&E Consultant.
- Generate, issue, and close punches.
- Blue tag system walk-down between Main Contractor and M&E Consultant and Client.
- Generate, issue, and close punches.

Note that all punches are given an owner and planned close-out date that are tracked to completion.



Figure 4. Systems Completion Schedule

Lean Initiative Improvements & Impact

Time

This project was time critical as we were constructing a production facility and the key driver was our commitment to our client to

facilitate their product to market. We delivered on that commitment and that was largely due to the Lean tools and processes we developed and implemented. In this case study, our newly-developed

project management techniques enabled us collect and collate data on MEP project work. This empowers us to set KPIs and norms for similar future projects. The impact is that this gives greater assurance and confidence in our capability as CField PSCS team to deliver MEP projects on time. We have also developed a new suite of Lean project management tools that can be shared across the business to better manage complex projects. It is worth noting that this project implemented all CIF Covid-19 requirements as they were rolled out and as we collaborated with the client to meet their key programme milestones.

Quality

Our trackers and punch list were able to identify trends in quality issues at an early stage. This allowed us to further develop our inspection test plans (ITPs) and hand-over packs to quickly reduce punches and get the work right first time. The following processes were introduced on site:

- Project quality plan.
- Product samples for approval.
- Workmanship samples for approval.
- Drawings submittals for approval.
- First of kind samples submitted for approval.
- Material data sheets for approval.
- BCAR ancillary certs for quality workmanship.
- BCAR hand-over file.

These provided the client with enhanced transparency and understanding of what the product would look like, as well as clarity for our team that we were proceeding with approval.

Costs

Managing cost is a critical component of the project delivery, and in particular during the Covid pandemic which was unprecedented for everyone involved in the project. We worked closely with the client and design team to mitigate and design-out problems that presented by following the sequence below which was developed through Lean thinking:

- Using our 6-week look-ahead programme to identify needs and wants in a timely manner.

- Offer value engineering solutions to mitigate scope changes.
- Issue cost estimates for early warning on variations.
- Open book approach for additional cost.
- Weekly cost review meeting.
- No additional work proceeded without client instruction.

Health and Safety

Health and Safety is always a key deliverable for CField on every project, and this project was no exception. Our target as PSCS was to deliver the project with no lost time incident and work to CField's motto of "Plan Safe, Work Safe, Home Safe". As the project progressed, we collaborated with all the design team, sub-contractors, and client to implement a safe and practical workplace with a particular focus on the option of the trades in the field. Coordination and information sharing was key as we discovered early on, and we categorised areas, identified problems, and developed solutions to lead to Lean improvements (see Figure 5).

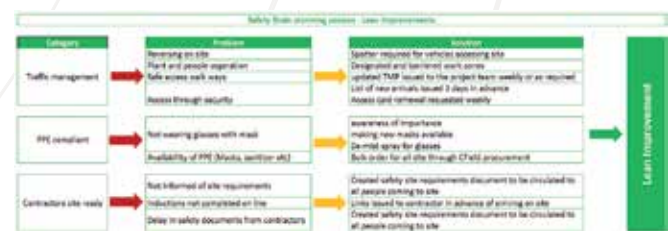


Figure 5. Safety Brainstorming Session – Lean Improvements

During the project, we held daily site briefings with safety input, weekly site safety meetings with sub-contractors and stakeholders, monthly meetings with the client steering group, and put in place an effective and actionable SOR system to listen to the voice of the workforce. Everyone on site was empowered to stop un-safe work activity.

Whilst on the face of it one might think that all these safety processes would cost time, the reality is that they greatly assisted in having no downtime due to incidents or accidents, and they facilitated good planning and provided clear understanding of site requirements.