

## Company Overview | COLLEN CONSTRUCTION | collen.com

Collen Construction is a family-owned company, with a history dating back over 200 years and a reputation for building quality and excellence. The firm is an international construction company with operations in Ireland, Germany, and Sweden. Collen is currently ranked in the top 5 main building contractors in Ireland, and has experience in private and public-sector projects, as design and build contractor; management contractor; and joint venture partner. The company's portfolio includes commercial office fit-outs, data centres, life sciences, industrial warehousing, retail, and conservation and refurbishment projects, ranging in value from under €1 million up to €700 million.

### Author



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Privately owned by seven generations of the Collen family, and founded over 200 years ago, Collen Construction is supported on a firm foundation of experience, knowledge, commitment, and pride in its achievements. The company's success and expansion over the last decade is due to committed team members and highly-qualified management and technical staff. The management teams operate in partnership with client representatives, design consultants, and subcontractors to ensure delivery of projects to the highest standards on time and within budget.

## Overview & Background to the Lean Initiative

The culture of continuous improvement within our day-to-day operations at Collen Construction means that our organisation continuously strives to exceed our clients' expectations through the adoption of new and innovative Lean practices. The successful delivery of large, complex builds depends largely on the rigorous and systematic approach to scheduling – a tactic that Collen embraces from project initiation stage right through to project hand-over. This culture empowers our project delivery teams to challenge the status quo and make the best plans even better.

At Collen, we believe that collaboration is a fundamental tool for

problem solving, and the partnership approach that we adopt with our subcontractors supports a working environment of trust and transparency to get to the right solutions fast. Our decision in Q4 of 2020 to invest heavily in Snychro 4D meant we could make further enhancements to our planning processes, taking us and our supply chain to the next step with immediate improvements across safety, quality, productivity, and efficiency. The 4D planning allows us to combine our 3D models with the project schedule, thus enhancing the way we visualise project information in comparison to Gantt charts that, for certain types of projects, cannot provide a complete view of all interactions and sequences of activities.

## Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

Over the past five-year period, Collen has successfully completed a number of fast-track, hyperscale data centres across Europe. These projects are complex in nature and require an exceptional level of detailed planning across multiple engineering disciplines. The schedules associated with these projects have become more and more demanding, forcing us as an organisation to look beyond the traditional methods of construction scheduling and leverage the latest software and digital tools to support a leaner and more efficient way of planning our projects. Furthermore, our clients' business needs often hinge around schedule certainty, thus pushing us to find an effective solution to creating more accurate programmes that ultimately minimise the risk of delays to the typical mission-critical milestones associated with data centre delivery.

Over the years, Collen has embedded a very effective platform for collaborative planning across all projects in the form of weekly last planner sessions. Our commitment to the Kaizen philosophy means that we are constantly in pursuit of operational excellence, striving to find possible areas of improvement to further enhance our Lean

Construction tools and techniques. As useful as these sessions are for validating and enhancing the project schedule, we found it increasingly difficult to get a complete view of all subcontractor interactions and sequence of activities. We also needed a tool that could enable better communication between the various parties and therefore reduce any misunderstandings from the start. Progress monitoring too in terms of schedule and cost can oftentimes become extremely challenging on these hyperscale projects; and truly understanding our actual progress versus our planned progress on site involves a significant amount of administrative work across multiple team members on a weekly basis. Furthermore, creating an environment of certainty and transparency underpinned our partnership approach to project delivery and any improvement in schedule reporting was fully supported by all stakeholders. Also, the proper coordination of multiple contractors in the field is a critical factor in site safety and the implementation of 4D scheduling for logistics planning was going to be a convincing step forward to a safer work site.

In Autumn 2020, Colleen took the decision to strategically invest in Synchro, a 4D software platform that would ultimately deliver a more consistent and concise means of scheduling on our projects.

During this period, we worked closely with our clients to develop a 4D Scheduling specification that would meet the needs of all stakeholders, from our subcontractor partners right through to the end user. After some market analysis, it quickly became apparent that the Synchro software had the following critical capabilities to meet our needs.

### Model to Schedule Linkage

- The Software had to be able to establish links between the modelled elements and the scheduled tasks.
- The links between the modelled elements and their associated scheduled tasks had to be persistent over the course of the model, schedule updates, and revisions.
- The methods of updating and linking had to be incorporated into the overall workflow to minimise the resources required and maximise throughput and transparency to authorised stakeholders.

### Model Imports and Updates

- The 4D software had to be able to read, store, coordinate, and update multiple files from the various design teams and GC models.

### Free Viewer Application

- Access to the 4D model had to be available to all stakeholders without the need for additional licencing. A freely-available viewer that could easily be downloaded and installed was the preferred choice.
- This application had to have review and mark-up as well as reporting functions available, including the ability to save, print, and export as required.



Figure 1. Benefits of 4D

During these early stages of evaluation, we could immediately anticipate the benefits that 4D could bring to multiple facets of project delivery, from design development right through to the project hand-over phase.

## Lean Initiative Improvements & Impact

Once the decision to adopt 4D was made, we immediately set about an implementation plan to ensure a smooth on-boarding of the software and upskilling the members of our BIM and Planning departments over a three-month target period. At this particular time, we had just secured the contract for a 50MW Data Centre in the Nordics region, which proved to be an ideal opportunity to fully leverage the benefits of 4D planning.

### Logistics Planning

During the initial phases of this project, it became clear that a number of logistical challenges existed between the extensive underground infrastructure scope and the parallel task of steel frame installation works. The nature of these fast-track projects involves the mobilisation of large quantities of plant and materials to specific work zones and laydown areas which cause significant congestion and workflow delays if not planned ahead in detail. The implementation of 4D scheduling allowed us to look ahead in great detail and visualise the work fronts weeks in advance in order to optimise and streamline the workflows between the groundworks contractor and the steel and cladding contractors. Laydown areas for steel and crane set-up locations, for example, were agreed weeks in advance at our weekly last planner sessions where our 4D planner stepped through the various scenarios and options available in the field with the relevant subcontractors. Rather than presenting the construction teams with lengthy schedules and detailed Gantt charts, we could now present an immersive 4D model that could be navigated and manipulated on demand. Within these collaborative settings, we could see the natural tendency for the subcontractor supervisors to rely on these visual outputs, prompting a more active involvement in

schedule development and coordination resolution. From the outset, we were laying the foundations of successful project delivery and providing the support to all project members to get it right first time.

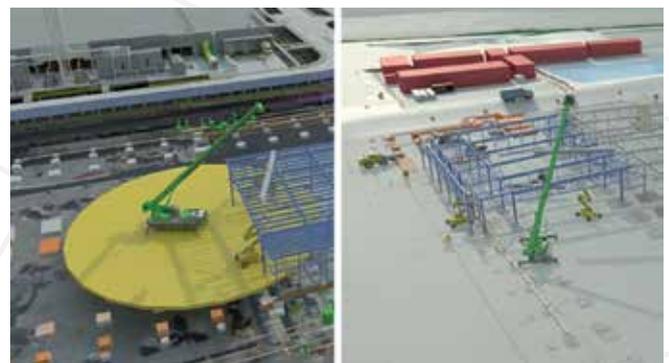


Figure 2. Logistics Planning in Steelwork & Groundworks Coordination

Most importantly, we found that our 4D planning initiative has helped improve project safety performance by instilling a collaborative approach to problem solving amongst all stakeholders. On a weekly basis, we were actively identifying high risk activities (HRAs) prior to and throughout the construction process. Teams are now equipped to implement preventative measures to avoid incidents and accidents well in advance. Fundamentally, we can now further support our supply chain partners in carrying out more detailed risk assessments and ensure that all tasks can be fully executed in the safest possible manner.

### Planned Vs Actual

As part of our weekly reporting mandate, we have now incorporated a Planned Vs Actual Visualisation procedure whereby our 4D Planner along with the Project Manager produces a graphical representation of actual construction progress versus the progress that should have been achieved in accordance with the baseline schedule. All stakeholders can quickly assess if the project is on schedule or not. Critical areas can also be filtered in isolation to truly evaluate the schedule performance of the critical path tasks. During the construction phase of data centres, early access to critical white space areas is often a key milestone for our clients and progress monitoring of these specific areas can be enhanced through 4D modelling. This offers real-time transparency as the traditional methods of progress reporting through detailed Gantt charts can sometimes be confusing and misinterpreted. If required, mitigation measures are easier to develop as 4D offers a platform that can promote collective problem solving and helps unlock the range of experience and expertise within our delivery teams to drive more predictability into the schedule.

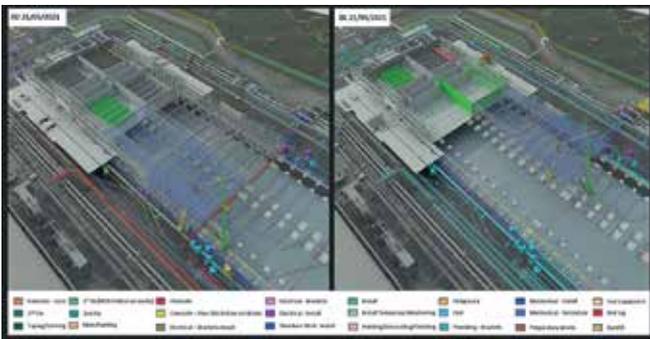


Figure 3. Planned Vs Actual Progress

### Scenario Planning & Clash Detection

Fast-track scheduling can bring enormous challenges, especially at the CSA and MEP fit-out interfaces where an over-reliance on field coordination can lead to costly rework and schedule delays. On our data centre projects, the plant yards typically consist of multiple AHUs and generators that are accessed and serviced via extensive steel gantries and walkways. At the project initiation stage, we ran several scenario animations using the Synchro software to determine the most suitable means and sequence for the equipment, steel, and cabling installation in these critical work zones. This rigorous front-end planning proved to be extremely beneficial in the long-run, leading to a schedule performance improvement of 30% within these critical work fronts. This right first time approach has led to less fire-fighting in the field, thus increasing morale and confidence for those at the coalface. Validation of access routes for the mobilisation of AHUs to their final position also proved to be an extremely useful exercise. Taking the time to animate such construction activities allowed us to highlight the potential clashes in advance and determine the optimum amount of containment and cabling that could be installed before the AHUs were guided through a maze of pre-installed equipment and associated infrastructure.

At Collen, the implementation of 4D allows our project teams to create more realistic programmes and break down any miscommunication between what is planned and what is actually executed. We believe that high-quality BIM-based design and staff training is a worthwhile investment that will provide significant benefits throughout the project lifecycle. BIM and 4D planning is not a trend, but a way of working that is here to stay.