Case Study Title: Readiness First Digital Dashboards Integrating Programme and Quality Data to Improve Production Certainty

Company Overview | McHugh Lean Construction | mace

Mace is a global consultancy and construction company delivering complex projects across infrastructure, commercial, life sciences, and data centres. It provides integrated services across the project lifecycle and routinely works in highly regulated environments where safety, quality, and delivery certainty are critical.

McHugh Lean Construction is a specialist consultancy focused on Lean production system design and the practical integration of digital tools in complex construction environments. The firm embeds Lean thinking within existing management systems so that Lean principles shape day to day, on site decisions.

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Overview & Background to the Lean Initiative

Complex construction and commissioning—particularly on data centre projects—depends on strict sequencing and tightly coupled system handovers. When prerequisites slip, or when missing quality evidence is discovered late, teams experience disruption that quickly cascades across trades and systems.

In this case study, production planning was supported by a detailed master programme and short term planning tools. In parallel, inspections, test records, and quality sign off were managed through dedicated quality and commissioning platforms. While each system was strong on its own, they were not routinely viewed together when making commitments. As a result, an activity could appear "planned" (or even "complete") in the programme while still missing essential prerequisites—such as inspections, approved documentation, access clearance, or dependency resolution.

This fragmentation drove recurring non productive work. Crews were mobilised to areas that were not fully ready, leading to stoppages, rework, and reactive replanning—especially during commissioning critical stages. From a Lean perspective, the issue was not a lack of planning, effort or technical competence, but a lack of reliable visibility of readiness at the point of commitment.

The following initiative addressed this gap by bringing programme demand and quality evidence into a single, actionable visual system. This enabled teams to base weekly commitments on verified readiness which is supported by evidence rather than assumptions.

Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

Lean Diagnosis of the Production Control System

The Lean initiative began with a diagnosis of how production control was functioning in practice rather than how it was intended to function. The project formally operated a Last Planner System® (LPS), supported by a Digital Last Planner System (DLPS) using VisiLean. Weekly Work Plans, lookahead planning, and coordination meetings were in place, and planning participation from key trades was generally strong. Despite this, production outcomes, particularly during commissioning critical phases were inconsistent.

A recurring pattern was identified where activities entered Weekly Work Plans and were committed to by trade teams, but execution was frequently disrupted by missing prerequisites. These included incomplete inspections, unavailable test records, unresolved system dependencies, late documentation and access constraints linked to preceding trades. When work could not be completed, the causes were often discovered after crews had mobilised, resulting in stoppages and re planning.

From a Lean perspective, this pattern indicated a weakness in the make ready process. While access, labour, and sequencing constraints were routinely discussed, quality and commissioning prerequisites were not consistently verified before commitments were made. In effect, work was being released into production based on schedule position rather than system readiness.

This had two consequences. First, Planned Percent Complete (PPC) became volatile, not because of poor execution, but because commitments were unsound at the point they were made. Second, learning conversations focused on "why work failed" rather than "why work was allowed to start when it was not ready". This misdirected attention away from system design and towards execution symptoms.

The diagnosis concluded that the production control system lacked a shared, visible definition of readiness that integrated programme intent, short term planning, and quality status.

Reframing Work Release: From Activity Status to Readiness

The core Lean shift was to redefine the basis on which work could be committed. Instead of asking whether an activity was scheduled or planned, the system needed to answer a different question: Is this work truly ready to be executed without interruption?

To support this, the team defined explicit Conditions of Readiness for production tags and system elements. These conditions represented the minimum set of prerequisites that must be satisfied before work could responsibly enter a Weekly Work Plan. Typical conditions included:

- Approved and released design and technical documentation
- Completed inspections and test records relevant to the work scope
- Verified completion and sign off of preceding trades
- Confirmed access and workface availability
- Clearance of commissioning and system level dependencies

Importantly, these conditions were not new requirements; they already existed within project systems. What was new was the decision to treat them as non negotiable make ready criteria rather than downstream checks.

This reframing aligned directly with a core principle of the Last Planner System®: commitments should only be made when work is sound. However, in practice, soundness had previously been assessed implicitly and inconsistently. Making readiness explicit created a shared language for planning conversations and reduced reliance on assumptions or personal judgement.

Integration of Programme, DLPS (VisiLean), and Quality Data

A key enabler of the readiness first approach was the integration of data from three previously disconnected domains:

1. Programme demand, representing what the master schedule required to happen
2. DLPS planning data (VisiLean), representing what teams had committed to in the near term
3. Quality and commissioning systems, representing what had been verified and approved

Rather than replacing these systems, the project developed a Power BI dashboard that acted as an integration and translation layer. Data from each source was aligned against common identifiers for systems, tags, and locations. Where possible, automated data connections were used; where not, disciplined manual updates were implemented.

This integration exposed several previously hidden conditions. Activities that appeared "green" in programme views were sometimes "red" from a readiness perspective due to missing inspections or incomplete test records. Conversely, some systems were fully ready but not planned in DLPS, indicating missed opportunities to improve flow.



Figure 1: Equipment visualisation from status on QACx platform.

The dashboard made these conditions visible without judgement. Its purpose was not to rank performance, but to identify mismatches between what was needed, what was planned, and what was ready.

To support the integration of programme, DLPS, and quality data, advanced analytical logic was developed within the Power BI data model using DAX (Data Analysis Expressions). Microsoft Copilot was leveraged as an AI assisted development aid to accelerate the creation and refinement of complex, context aware DAX queries.

These queries aligned live task inputs from the Digital Last Planner System (VisiLean) with Power BI model parameters, enabling dynamic filtering, prioritisation, and aggregation of construction workflow data. Key outputs included the identification of latest task statuses, planned dates, and priority levels across systems and tags.

The use of AI assistance supported faster iteration and improved consistency as project and client requirements evolved. Rather than replacing engineering judgement, Copilot acted as a productivity enhancer, allowing the development team to test logic variations, validate filter context, and refine calculations more efficiently. This strengthened the reliability of analytical outputs and ensured alignment between live site inputs and reporting views.

Visual Management and Focus on Constraints

Lean theory emphasises the importance of focusing attention on constraints that limit flow. Prior to the initiative, planning meetings often reviewed large volumes of activities, making it difficult to distinguish between critical constraints and background noise.
The readiness first dashboard supported visual filtering so that teams could focus on:

- Systems affecting near term commissioning milestones
- Tags whose missing pre-requisites posed critical path risk
- Readiness trends across the six week lookahead window

High level views allowed leadership teams to see where programme demand exceeded readiness capacity, while detailed views enabled trade teams to drill into specific constraints. This helped shift conversations from general status updates to targeted problem solving.

By narrowing attention to what truly constrained progress, the dashboard supported better prioritisation of engineering effort, inspections, and commissioning resources. This reduced the tendency to start work "just to keep people busy" and reinforced the Lean principle of protecting flow over maximising activity.

Embedding the Dashboard into LPS Routines

A critical design decision was to embed the dashboard directly into existing LPS routines rather than introduce it as a separate reporting process. The dashboard was used consistently during:

- Lookahead planning, to identify readiness gaps weeks in advance
- Make ready reviews, to verify constraint removal before commitment
- Weekly Work Plan meetings, to validate the soundness of commitments
- Commissioning coordination sessions, to align construction and testing sequences

Initial rollout included hands on demonstrations and short workshops to ensure that teams understood how to interpret the information and how it should inform planning decisions. Importantly, the dashboard did not make decisions on behalf of the team. It provided clarity on system conditions, leaving responsibility for commitments with the Last Planners.

This approach preserved the social, conversational nature of LPS while strengthening it with objective, shared information. Over time, teams began to anticipate readiness discussions and proactively clear prerequisites before meetings, improving the overall quality of planning inputs.

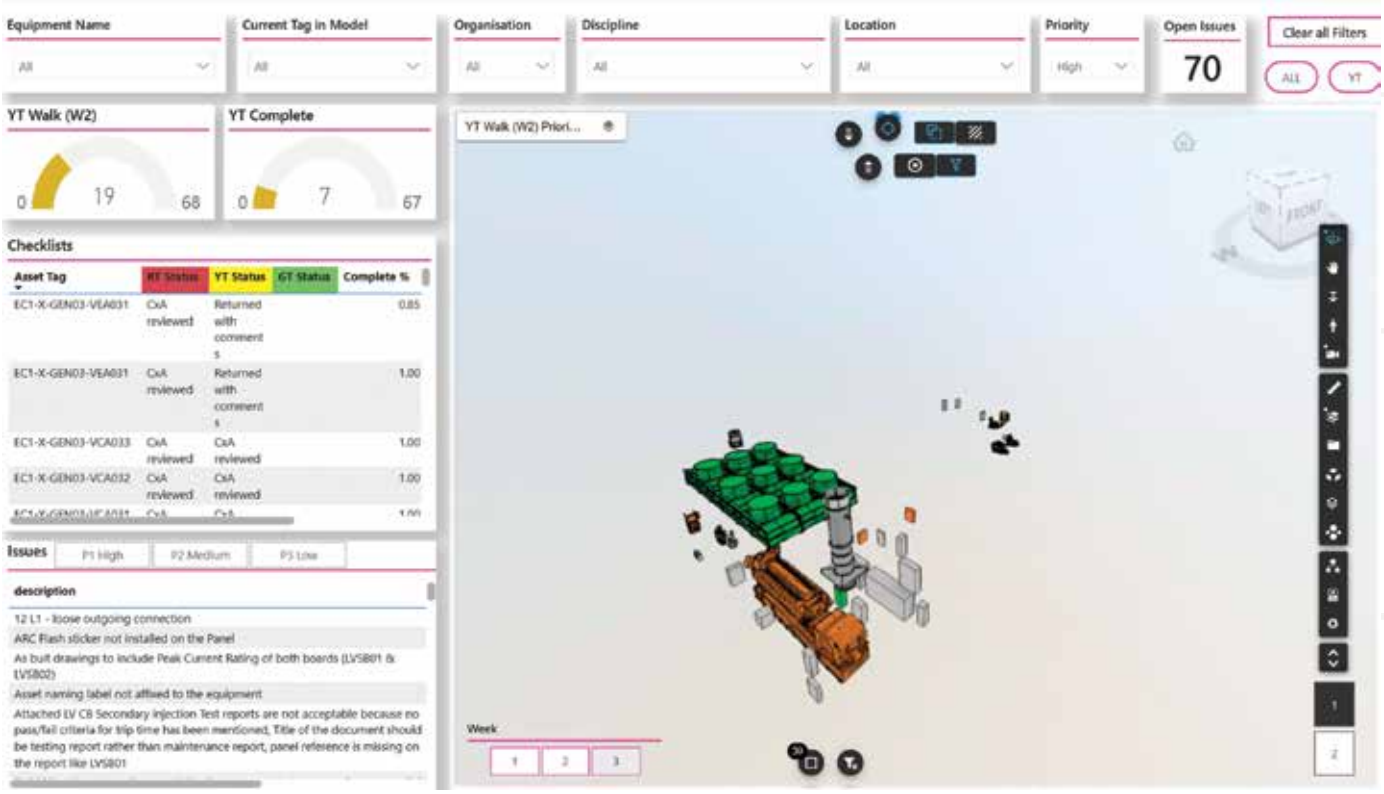

Figure 2: View of priority equipment status.

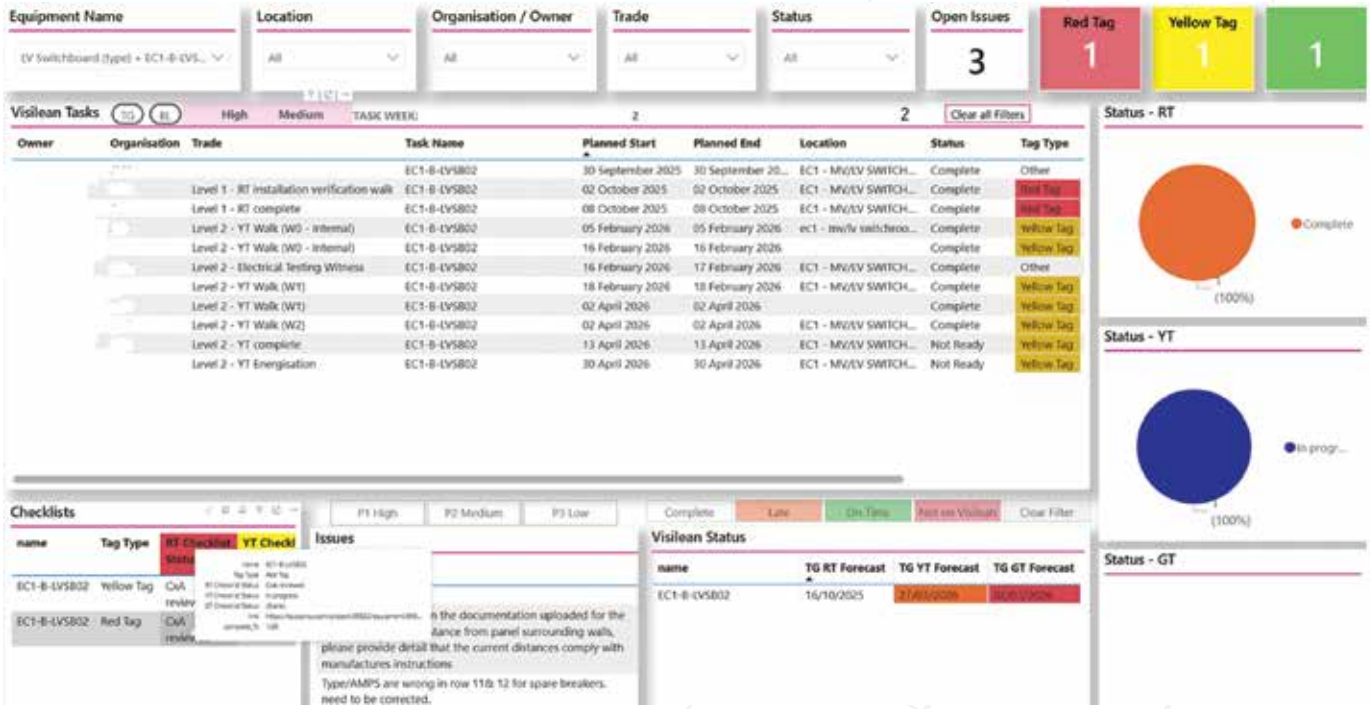

Figure 3: Specific equipment availability status.

Interaction with PPC and Learning Cycles

As readiness discipline improved, changes in PPC were observed. PPC stabilised and increased, not because targets were imposed, but because commitments were made on a more reliable basis. Missed commitments, when they occurred, were more likely to be linked to genuine uncertainty rather than overlooked prerequisites.

This shifted PPC discussions from defensive explanations to learning conversations. Teams began to ask why readiness conditions were not met in time and how make ready processes could be improved. PPC thus functioned as intended within LPS: a signal of planning system quality, not a measure of individual performance.

Implications for Commissioning and System Integration

The readiness first approach was particularly valuable during commissioning critical stages. Commissioning activities are highly interdependent and sensitive to missing prerequisites. By explicitly linking construction completion to verified quality and readiness conditions, the dashboard reduced late stage surprises and protected testing sequences.

Commissioning teams gained earlier visibility of system readiness and could plan specialist resources with greater confidence. Construction teams gained a clearer understanding of what was required for handover to be accepted. This improved alignment between construction and commissioning and reduced friction at system boundaries.

Summary of Lean Contribution

In Lean terms, the initiative did not introduce new processes; it re designed the production control system to make readiness explicit, visible, and shared. By integrating programme, DLPS, and quality data into a readiness first visual management system, the project strengthened make ready planning, improved commitment reliability, and supported better learning across planning cycles.

The dashboard's value lay not in the technology itself, but in how it reinforced Lean behaviours: sound commitments, early constraint removal, focus on flow, and collective learning.

Lean Initiative Improvements & Impact

The readiness first approach delivered measurable improvements in both production performance and planning behaviour. The most immediate impact was a reduction in non productive work. Crews were no longer routinely mobilised to areas that were missing inspections, documentation, or pre-requisite trade completion. By preventing work from entering Weekly Work Plans unless readiness conditions were satisfied, stoppages caused by late discovery of constraints reduced significantly, particularly during commissioning where rework and disruption had previously cascaded across systems.

Planning reliability improved as a direct consequence of stronger make ready discipline. Weekly commitments were based on verified readiness rather than optimistic assumptions, resulting in a more stable Planned Percent Complete (PPC). Importantly, PPC improvement was not driven by pressure or target setting but emerged naturally from better preparation. PPC discussions shifted away from defending missed commitments towards understanding why readiness conditions were not met in time and how the planning system could be improved. This reinforced PPC's intended role within the Last Planner System® as a learning indicator rather than a performance metric.

The Digital Last Planner System (DLPS), supported by VisiLean, became more effective once readiness data was integrated into planning conversations. Previously, DLPS outputs reflected what had been planned but not necessarily what was viable. With the readiness first dashboard in place, DLPS plans could be validated against quality and commissioning status, reducing the gap between planned and executable work. This alignment improved confidence in short term

plans and reduced the frequency of mid week replanning.

Management attention also shifted in a constructive way. Rather than expediting activities to recover lost time, leadership discussions focused on identifying and removing readiness constraints earlier. Bottlenecks related to inspections, test records, system dependencies, and access were surfaced weeks in advance through lookahead reviews. This allowed engineering, quality, and commissioning resources to be prioritised where they would most effectively protect flow and commissioning milestones.

Culturally, the initiative supported more objective and collaborative dialogue. Because readiness data was transparent and shared across construction, quality, and commissioning teams, issues were framed as system problems rather than individual failures. This reduced defensiveness and improved trust between functions. Teams became more proactive in clearing prerequisites ahead of planning meetings, improving the quality of inputs into the Last Planner System®.

Overall, the initiative strengthened production control by aligning planning, execution, and quality around a common definition of readiness. The result was improved workflow reliability, more stable PPC, and greater confidence in commissioning readiness—outcomes that are particularly critical in data centre delivery environments where late surprises carry disproportionate risk.

Summary and Lessons Learned

This case study shows that certainty in complex construction depends less on activity volume and more on readiness. Integrating programme and quality data into a readiness focused dashboard strengthens Lean control and Last Planner System® behaviours.
The initiative showed that digital tools deliver value when they support Lean conversations rather than replace them. By making prerequisites explicit and visible, the dashboard reduced non productive work, improved planning reliability, and ensured quality was built into production rather than inspected afterwards.

Several key lessons emerged:

- Readiness should be treated as the primary condition for commitment.
- Quality and commissioning prerequisites must be integrated into make ready planning.
- PPC improves because of better preparation, not pressure
- Transparency improves behaviour when data is used for learning rather than blame

This approach is applicable to other complex project environments characterised by significant interdependencies and quality requirements. When readiness determines commitment, production systems achieve greater reliability and predictability. Teams across sectors and project scales can adapt the readiness-first dashboard to their specific contexts. For instance, smaller projects may employ simplified manual tracking or lightweight digital tools, focusing on the most critical readiness criteria. In sectors such as healthcare, energy, or manufacturing, dashboard conditions can be tailored to reflect sector-specific quality and regulatory standards. The essential step is to identify and make visible the critical prerequisites for success in each context. By promoting experimentation and adaptation of the dashboard framework, organisations can facilitate broader adoption and realise the benefits of readiness-focused planning across diverse projects.