

Gleeson scores perfect 10 with one-piece continuous flow

Client: Yorkshire Water
Contractor: M J Gleeson Engineering Division

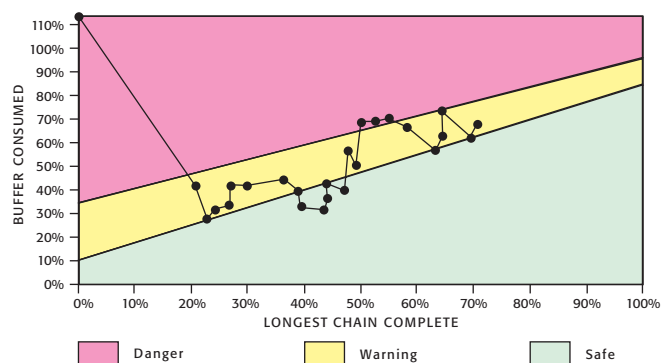
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To borrow an IT expression, everyone loves a ‘killer ap’. It’s one application that fits the need and beats all competition to the winning post. Water specialist Gleeson Engineering Division has adopted ‘lean’ working principles with spectacular results. It costs very little, even with initial training and support, yet it cuts time and cost, reduces the likelihood of accidents and boosts quality. And it does all these things immediately and simultaneously.

Gleeson trialled ‘one-piece continuous flow’ (that is working continuously on each ‘piece’ of the plant, such as a reactor cell, until it is finished) in Yorkshire Water’s £4.3m biological aerated flooded filter (BAFF) plant at Knostrop near Leeds. Stripping out waste from the ‘tight’ 52-week programme ensured that they finished on time and within budget, despite a major equipment failure five weeks from the end. There were no reportable accidents and the delighted client awarded 10/10 in all respects.

Benefits

- The project achieved the required time, cost, quality and safety standards simultaneously, a rare achievement in construction.
- It is a showcase of how to create continuous flow by eliminating waste.



Buffer History example

Engineering Division profile

Gleeson’s innovative Engineering Division has enjoyed sustained success in the UK Water Industry over the past decade. An extensive portfolio of partnering alliances and individual contracts sets them apart. The £180m annual turnover division, employing 760, is based in London with regional offices throughout the UK. Most of their work is under design and construct frameworks using partnering, collaboration and an open-book philosophy.

Lessons learned

- Creating continuous flow, one of the five lean principles, is the foundation for improving all key project outcomes.
- Determination to find and root out waste is the vital ingredient for success.
- Make sure all suppliers understand the benefits and implications, and are committed to achieving continuous flow.
- Other contributing factors include working back from the client objectives, good communication and transparent processes, having an open-book attitude to problem-solving, involving the client’s operational staff in key design issues as early as possible, focusing on ‘right first time’ and rectifying defects immediately.

Knostrop BAFF

Gleeson used simple but effective techniques to measure and monitor progress. Yorkshire Water was entirely satisfied when the plant was handed over defect-free and without any reportable accidents. It was also profitable for the supply chain, which included the designer (George Hutchinson Associates), concrete contractor (Statusforce) and process plant specialist (Brightwater Engineering Limited).

The works comprised tertiary nitrification filter (BAFF plant), interstage pumping station, flow control and measurement, interconnecting process pipework, wash-water system, control building and power supply infrastructure. The BAFF structure had four reactors (each with four cells) and a dirty water tank.

Continuous flow and lean processes

Gleeson’s Regional Director, Mike Robinson, went to a lean awareness seminar and came back so enthused that he nominated Knostrop for a trial. They engaged Ali Mafi and Neil Butterill of Magna Business Solutions to run a workshop for the team to learn the underlying principles.

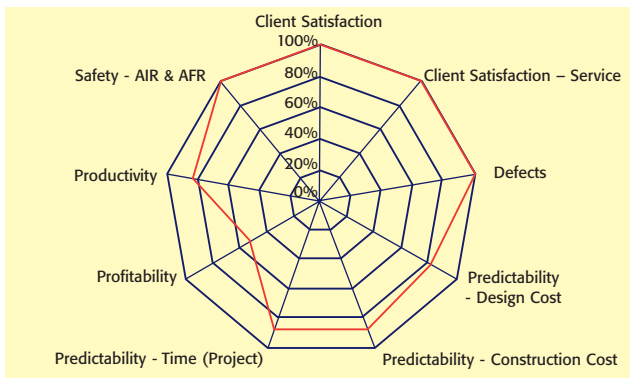
Mafi explains one-piece continuous flow with an example of stuffing envelopes for a mail shot: “Many people would assemble all the

leaflets, then pack all the envelopes, then put on the labels, then the stamps and finally pack them for posting. But they would be stockpiling along the way and double handling. The more efficient way is to do each envelope (piece) in one continuous process from start to finish. The really clever thing is how it boosts all four key outcomes – time, cost, quality and safety. There are fewer processes so it is quicker. It needs less human resource so it is cheaper. The quality is better because you pick up defects along the way, rather than discovering some fundamental flaw towards the end like having the wrong size envelopes. And it is safer because there are fewer manual handling operations. But you only get continuous flow if you get rid of unnecessary activities.” It is this astonishingly simple ‘one-piece continuous flow’ model that underpins much of what Magna teaches constructors to do.

Applying continuous flow at Knostrop BAFF

Gleeson decided to apply this idea to the concrete BAFF structure. It is almost instinctive behaviour to construct all the bases, then recycle the formwork in all the same height walls, then the other walls, then the suspended slabs and so on. But, to give subsequent activities the earliest possible start, each reactor was completed through the various stages (base, outer walls, inner walls, and so on). Statusforce needed no convincing and, despite the formwork costing a bit more, they maintained emphasis on completing whole structures and progressively handing over to the M&E team.

“We learned some valuable lessons at the start of the M&E installation,” says Richard Sandford, Project Manager. “We needed to communicate more clearly with our supply chain to enable the M&E deliveries to keep pace with the structures.”



Techniques for removing waste

The first actions were to strip out waste from the tender programme and remove the contingency, leaving the minimum time needed to construct the project. The contract period minus the minimum time is the project buffer.

Then they used Critical Chain Scheduling to monitor the buffer and initiate corrective actions (see diagram, page 1). While the buffer is in the green zone, continue as planned, but when the buffer strays into the amber zone, make plans to bring it back. Once into the red zone, implement the action plan.

Next steps

■ About getting ‘lean’:

- Read the Fact Sheet *Lean Construction* at www.constructingexcellence.org.uk.
- Read *Lean Thinking* by Womack and Jones, ISBN 0 7432 3164 3, and *The Lean Toolbox* by John Bicheno, ISBN 0 9513 829 9 3
- Enjoy the ‘business novel’ *Critical Chain* by E M Goldratt, a light read on how to achieve continuous flow by managing buffers, ISBN 0 88427 153 6
- Ask Magna Business Solutions (info@magnabs.co.uk) about tools for lean techniques, in particular continuous flow.

■ About KPIs and continuous improvement:

- Visit the KPIZone at www.constructingexcellence.org.uk.
- Read the fact sheet *Benchmarking* at www.constructingexcellence.org.uk
- Attend a KPI Masterclass. Book via the Constructing Excellence Events Team, T 020 7592 1100.
- Measure your progress with *The Construction Industry KPI Pack* or *The Housing KPI Toolkit*. Order from Rakusen Design, T 01702 393200.
- Download KPI wallcharts from www.constructingexcellence.org.uk.

■ Constructing Excellence has:

- a network of consultants to help you
- fact sheets on a range of best practice business topics
- a Constructing Excellence club near you.

■ The Construction Productivity Network holds workshops on best practice business topics, T 020 7549 3300, www.ciria.org.uk.

Gleeson also used a bi-weekly work schedule and percentage complete chart that requires supervisors to look ahead, measure progress and identify causes of delay to continually improve site activities and productivity.

Key performance indicators

Gleeson uses nine of the Construction Industry KPIs to monitor standards and benchmark against other projects and competitors. Kevin Smith, Yorkshire Water’s Solutions Manager, awarded the team a perfect 10 score for all 18 questions in Gleeson’s customer satisfaction survey. “The introduction of lean principles has been a showcase demonstrating the benefits of minimising waste,” he says.

What happens next

“We didn’t roll lean far enough down to the supply chain”, says Tony Dryden, Contracts Manager. “On our next job, we brought the suppliers in right at the start. Also, although we collected data on many types of delays, we didn’t act on it all. We saw how lean methods yielded huge benefits and there is scope for even more improvement on future projects.”

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