PYRAMID ENGINEERING
*Engineering Excellence*

**CASE STUDY**
Network Site Visit

POWERED BY
CallaghanInnovation
New Zealand's Innovation Agency

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INDUSTRY 4.0 Network

A Learner's Guide to Lights Out Machining

## About

Pyramid Engineering are an innovative specialist precision manufacturing organisation based in Silverdale, north of Auckland. With capabilities in CNC machining, Metal Presswork, Robotic and Precision Welding and contract assembly, their high-profile clients operate in a range of industries demanding the highest levels of quality, traceability and delivery.

## Background

Pyramid Engineering has invested heavily in automated CNC machine tools in the past two years. In particular, 5-axis machines with capability to run dozens of components unmanned, covering multiple days at a time.

This case study explores some of the lessons learnt and advice that Pyramid can share on their continuous improvement journey using the rapidly emerging technology.

## The lessons

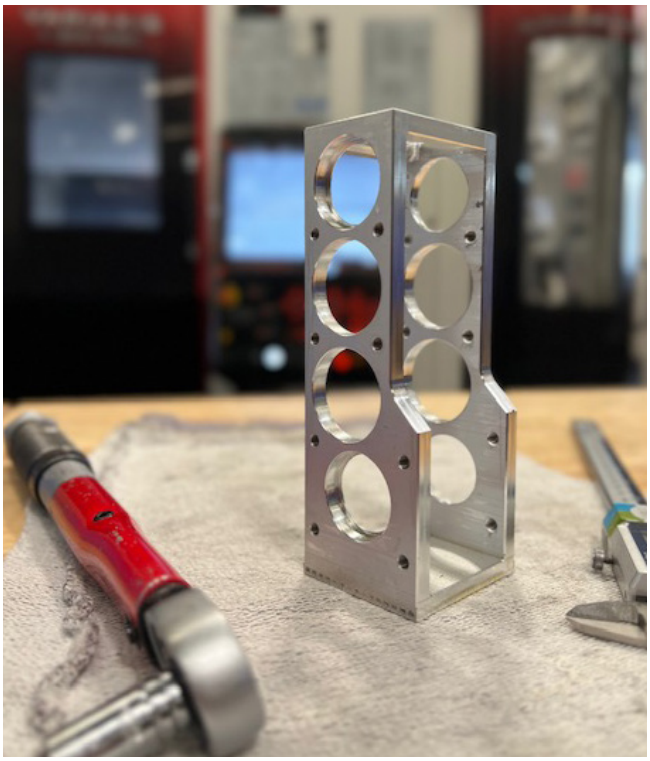
**1. Smart Trade-offs**

Paul, a very experienced machinist, talked through his experience on how to make the most of Lights Out Machining. One of his key takeaways was how to trade off between risk and time. Historically with manned machining the cycle time of components is critical, especially for larger runs. Removing 30 seconds from a programme over hundreds of components is a huge time and cost saving. Lights Out Machining may require a slightly different perspective. Where more complex programs and tool paths to save time may be worthwhile while operators are monitoring, the potential impact on unmanned operations is huge. In some cases, an event caused by using more novel or unproven programs could cause the loss of several hours (or even days) of machining time. The key message from Paul is 'Repeatability'.

Think about the type of jobs you want to run overnight or through the weekend. Is it a proven method and set-up that has rarely caused failures? (The value of data in assessing this is not to be underestimated!) Or, is it a new novel part? Even if the simulations on the CAD software look fine, the reality can always be different.

**2. Smart Tooling**

Machine tool operators will regularly assess dimensional accuracy through the lifecycle of a job. As tools wear, certain features may move close to or out of tolerance, signaling a need for tool changes. Modern machines are now able to deploy probes to assess dimensions at a sample frequency, from this making judgements as to whether tool changes are required. Understanding machine capability in this space could be the difference between dozens of conforming and non-conforming parts.



**3. The Value of Time and Measuring Productivity**

Lights Out Machining requires a rethink on the value of machinists' time and productivity. Taking Paul's example, he could spend eight hours producing only a handful of parts across three different machines which on face value might seem like poor productivity, but all this time is spent preparing multiple machines to run Lights Out. Over the course of the 12 hours following Paul's shift, the machines are hugely productive. Spending time assessing part quality on the CMM as the ultimate measure of conformity takes up time and resource in the QA department as well, but goes towards assuring the next 12 hours (on three machines) produce parts right first time.

This rethink of how to measure productivity will become more important in the years to come as more Lights Out Machining takes place.

**4. What's in it For Me?**

Because a greater value can be achieved from a single hour of work from an experienced machinist using Lights Out capabilities, the need for more flexible working situations is arising in machine shops around the world. Machinists traditionally would be left out of the flexible working discussion because their productivity was tied solely to operating machines. In situations where all machines might be set up running without operators, those operators could be deployed doing new programmes or continuous improvement activities. Similarly, one hour of work at the weekend might equate to huge value to the business, if it means the machine is reset and can keep producing for another 24 hours without an operator. As such, incentive schemes to be in work for as little as 30 minutes, that are win-win for operators and the business, are becoming more common.

Retention – with more attention being placed on retaining good staff, Lights Out Machining offers opportunities to engage staff in new technologies and opportunities to learn and test themselves, while potentially enabling some more flexible or win-win working patterns.

## Key Takeaways

- The trade-off between risk and time.
- Understand your machine's capabilities with regards to tool wear (and use it!)
- Be open to new ways of working with your team, including rethinking what productivity means.

## About the site visits and Industry 4.0

The purpose of the Demonstration Network is to drive uptake of Industry 4.0 technologies among New Zealand manufacturers with the aim of increasing their productivity and global competitiveness. The Network of Site Visits (NSV) are part of the Industry 4.0 Demonstration Network, which also includes a mobile showcase and smart factory showing cutting-edge Industry 4.0 technologies in action. The NSV takes selected companies through a fully-funded assessment process to help them accelerate their own journey towards Industry 4.0, and sees them share their knowledge with other manufacturers.

## Further questions?

To find out more please contact

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