

Callaghan Innovation Te Pokapū Auaha

Case Studies

Real-world results from real New Zealand manufacturers.



Across Aotearoa, manufacturers are transforming how they work – improving visibility, streamlining production, and building more resilient, competitive businesses. But what does digital transformation actually look like on the factory floor?

This case study collection brings together real stories from New Zealand manufacturers who have taken the leap. It shows processes and measurable results from businesses who have embraced the principles of Industry 4.0 by investing in areas such as:

- » Smart factory systems and digital tools
- » Data visibility and real-time insights
- » Workforce upskilling and cultural change
- Automation, connectivity, and MES implementation
- » Product lifecycle and supply chain integration
- Environmental, Social and Governance (ESG) improvements

These case studies are drawn directly from businesses who have completed the Smart

Factory Assessment and turned the insights from that assessment into real-world results.

They reflect a diverse range of industries, business sizes, and digital maturity levels - all sharing a willingness to evolve, experiment, and take tangible steps toward smarter, more futureready operations.

For manufacturers at any stage of the digital journey, from early assessment to system implementation, this collection offers valuable insight into how transformation is playing out on the ground. You'll find practical examples, lessons learned, and inspiration to help shape your own next steps.

Industry 4.0 isn't a one-size-fits-all solution. But the principles are universal, and these businesses are showing what's possible.

Directory

AH Gears	4	Griffin's Food Company	68
BRANDPARTNERS.	6	Gyro	70
Daiken	9	Hansa Products	72
Fleur Foods	11	Howard Wright	74
Goodnature	13	Independent Doors	76
Grayson Engineering	15	Longveld	78
IPL	17	Metco Engineering	80
Lawter	19	MJH Engineering	82
RD Group	21	Myriad Engineering	84
Rinnai	23	Northpine	85
Saito Labels	25	Oasis Engineering	87
Windowmakers	27	Pan Pac	89
30 Seconds	29	Plazmax Technologies	91
Action	31	Pyramid Engineering	93
Argus ManuTech	32	Red Steel	95
Ballance	34	RML	97
BA Pumps & Sprayers	36	Rocklabs	99
Bonson	38	Southern Spars	101
Bostock	40	Stake Glass	102
Breadcraft	42	Switch Lighting	103
Bremworth	43	Tait Communications	105
Comvita	45	Tasman Bay	107
Convex	47	Tumblar	109
Custom-Pak	48	United Machinists	111
Danone	50		
D&H Steel Construction	52		
Douglas Pharmaceuticals	54		
Enatel	56		
ENI Manufacturing	58		
ES Plastics	60		
Fabrum	62		
Fi Innovations	64		
Gallagher	66		



AH Gears

Getting the right tools for the job

BACKGROUND

For Auckland company AH Gears a new system to keep track of the tools in its workshop has helped reduce costs and increased productivity.

AH Gears designs and manufactures high-performance gears. A recent tooling stocktake found large quantities of worn or replicated tools in the workshop. This created problems such as unnecessary repairs and delays because the wrong tools were chosen or faulty ones had to be replaced.

Since introducing Matrix Solutions, an automated tooling dispenser system, it's much easier for staff at AH Gears (which is owned by the Dodson Group) to find the right tool for the job.

The company has now undertaken a Smart Factory Assessment to help map out the next steps for its digital transformation. It is in the process of developing a factory-of-the-future strategy to further streamline its processes and produce more productivity gains.

THE CHALLENGE

Following an in-house tooling stocktake, the team at AH Gears came across large quantities of worn and replicated tools in the workshop. In a precision engineering shop, tooling issues can lead to costly repairs such as machine downtime while searching for the correct tool, as well as scrapping and reworking. Malfunctioning tools cause production delays and potential safety hazards, while having too many tools wastes storage space and capital. Admin staff can also end up spending time placing emergency orders for new tools and

processing receipts for payment. A usage study found that tool consumption was higher than it would have been if the machinist had made the proper tooling selection.

THE SOLUTION

An automated tooling dispenser solution, Matrix Solutions, was selected to manage the challenge of too many worn and replicated tools. It can automatically reorder, streamline purchasing / receipt, optimise stock levels, control operator use and ensure only the correct tools are used for the job. Matrix Solutions connects internal systems directly with suppliers and is also linked with accounting software, which saves administration time.

KEY BENEFITS

The automated tooling dispenser offers significant benefits to AH Gears. Key advantages include:

- Optimised tool access: The right tools are now automatically reordered in the minimum available quantities, reducing admin time spent purchasing tools and the risk of the wrong tools being ordered.
- Cost savings and cash flow: Tracking usage and controlling inventory reduces tool wastage, loss and overstocking.
- Improved productivity: Speeding up tool retrieval allows workers to focus on production rather than searching for tools.
- Enhanced guality and precision: Only calibrated and approved tools are used, reducing defects and reworking.



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SMART FACTORY ASSESSMENT

Recognising the need for a structured approach to digital transformation, AH Gears and the other companies within the Dodson Group completed a Smart Factory Assessment. This assessment was designed to:

- » Identify and implement enablers for future a digital transformation project.
- » Develop a strategic roadmap for a factory-of-the-future solution.
- » Establish visibility of operations and supply chain through and outside of the business.

"The government has an ambitious goal to double exports over the next 10 years. We believe the Dodson Group is well positioned to do our part, and that the manufacturing sector in general is a major pillar of the overall plan. In order to achieve this within resource constraints, productivity across the sector has to improve substantially. The good news is that increased productivity means increased standard of living for all Kiwis, along with high paying, rewarding careers that attract talent to our sector. Industry 4.0 is the cornerstone of this progress which will unleash the potential of New Zealand's SME manufacturers. We have done a lot of work in the past years to physically ready our shop floor for the digital transformation, our SIRI assessment was the first step in this next phase of our journey."

- David Sweas, CEO & Managing Director, Dodson Group

CURRENT TECH STACK

Function	Software Tool
ERP	n/a
Accounting	Xero
CRM software	n/a
Production scheduling	Tricorn
Work Order Management	Tricorn
Quality & compliance management	One Factory
Warehouse management - Stock management - MRP	Excel
Product traceability	Paper-based with Excel
Performance analysis / KPI tracking (such as OEE and reporting)	Excel
PLM or document management	ТВС
Supply chain coordination	Emails
Payroll	iPayroll
Design Software	Solidworks / Onshape

NEXT STEPS

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With the tooling solution implemented, AH Gears are now looking ahead with plans to:

- » Streamline the operation of their gearbox production and assembly line.
- » Investigate the ability of their manufacturing execution system to plan shop-floor operations, including complex / bespoke industrial gearbox-refurbishment, and to overhaul operations.
- » Develop a factory-of-the-future strategy aligned with their group of businesses and third-party services (eg heat treating).
- » Roll out a group-wide ERP / MES system that replaces most of the piecemeal tech stack.

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BRANDPARTNERS.

Developing an innovative system to manage digital signs

BACKGROUND

A home-grown content management system called GEM has helped solidify Auckland company BRANDPARTNERS position as an industry leader in digital signage. GEM allows their clients to efficiently manage signage across all their devices from a single, easy-to-use interface.

BRANDPARTNERS developed GEM when they realised that things such as manual content uploads and limited remote control were no longer cutting it with the clients who use their high-quality signage solutions. The challenge was clear: the businesses they worked with needed a centralised, efficient and scalable way to sync and manage their digital content.

Now, following a Smart Factory Assessment, BRANDPARTNERS is looking at ways they can continue their digital transformation. The assessment helped clarify and prioritise the technological strategies that would help them achieve their growth objectives.

THE CHALLENGE

Clients of BRANDPARTNERS were facing significant hurdles with digital signage management. These included:

» Manual content uploads: Updating images and videos on digital screens often required USB drives, local network uploads, or complex third-party tools, leading to unnecessary cost and inefficiencies.

- » **Inconsistent branding:** Lack of centralised control resulted in outdated or mismatched content across multiple locations.
- » Limited remote control: Businesses struggled to update signage remotely, making it difficult to respond to real-time promotions or messaging needs.
- » **Time consuming maintenance:** Multiple screens in various locations meant managing and troubleshooting content was a resource-heavy process.

BRANDPARTNERS realised that they needed to create a seamless, cloud-based system that would allow their clients to efficiently manage their digital signage across all their devices from a single easy-to-use interface.

THE SOLUTION

To solve these problems the BRANDPARTNERS team developed GEM, an innovative content management system (CMS) designed to centrally sync and distribute images and videos to digital screens installed in their signage solutions.

The project also included developing a range of GEM Vision Players to suit all applications and to deliver high-quality content to the screen of choice, from external LED pylons to instore screens and LED walls.

The GEM Vision Player supports a wide range of communications to suit all applications, including cellular, WiFi, ethernet and UHF/VHF.

KEY FEATURES

1-Ease of use

Commissioning a new screen is incredibly simple:

- » Plug in the GEM Vision Player.
- » Wait 60 seconds while it automatically registers with the CMS.
- » Log into the CMS and assign your content to your desired schedule to the new player.
- » Done.

2 - Options for customised industry solutions

The GEM product range can be easily customised to suit specific customer requirements. For example:

- » Transmission of fuel prices from forecourt controllers to pylons.
- » IOT sensor monitoring and data integration into digital signage.

3 - Hardware designed for reliability

The GEM solution is built using proven hardware (developed locally by TMD Consultants and Obvious Implementations) and features automatic firmware updates, strong security, high fault resilience, automatic registration, and video-stream caching functionality.

4 - Flexible screen compatibility

GEM supports displays ranging from \$600 flat screens to \$50,000 outdoor, pylon-mounted LED units, ensuring a wide range of options based on budget and branding needs.



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Argon&Co

5 - Centralised content management

GEM provides a cloud-based platform where businesses can upload, schedule, and distribute content across all screens instantly.

6 – Creation and scheduling of presentations

GEM allows users to build video presentations and promotional offers, then schedule them for automatic deployment.

7 - Screening and auditing system

GEM tracks which screens display specific content, providing a clear record of broadcast history.

8 – Remote access and control

GEM enables businesses to manage their signage content from anywhere, making on-the-fly updates possible.

9 – Automated scheduling

GEM allows businesses to plan content deployment in advance, streamlining marketing campaigns and promotions.

10 – Secure and scalable

GEM is built with enterprise-grade security, able to handle deployments of all sizes, from a single storefront to multiple national locations. For a closer look, check out this overview of GEM.

TECHNICAL CHALLENGES

The development of GEM required overcoming several technical challenges to ensure reliability, ease of use, and scalability:

Real-time syncing across multiple locations

- Implemented a robust, cloud-based content distribution network (CDN) to minimise latency and enable real-time updates.
- Developed smart caching mechanisms to ensure offline func-» tionality in case of network interruptions.

User-friendly interface for clients

- Designed an intuitive dashboard with drag-and-drop content » management to eliminate the need for technical expertise.
- Integrated AI-powered recommendations to help users opti-» mise screen content based on engagement data.

Seamless hardware integration

- Created a universal API allowing GEM to work with a wide range » of digital display hardware.
- Partnered with hardware manufacturers to ensure plug-and-» play compatibility of different screen types.

Security and data protection

- Implemented end-to-end encryption to protect sensitive con-» tent from unauthorised access.
- Integrated role-based access control (RBAC) to ensure that » only authorised users can modify content.

Variety of communications platforms

GEM needed to support a wide range of communications » options to deliver content to the players.

KEY BENEFITS

With the implementation of GEM, BRANDPARTNERS has delivered transformative benefits to its clients, significantly enhancing their ability to manage digital signage efficiently:

Time and cost savings »

Eliminates the need for manual updates, reducing operational costs and freeing up staff resources.

Brand consistency »

Ensures uniform and up-to-date content across all locations, strengthening brand identity.

Increased engagement »

Enables businesses to react quickly with targeted, dynamic content, boosting customer interaction.

Remote and scalable management Allows multi-location businesses to manage all screens from a

single dashboard, ensuring complete control.

» Future-proof solution

Built with flexibility in mind, GEM can easily scale and adapt to new digital signage trends and technologies.

NEXT STEPS

BRANDPARTNERS is committed to continuous innovation, with future enhancements to GEM including:

- Al-driven content personalisation based on audience demographics and engagement data.
- Integration with IoT sensors for interactive and responsive » signage experiences.
- Expanded analytics and reporting tools to provide businesses » with deeper insights into content performance.

By embracing digital transformation in signage, BRANDPARTNERS has solidified its position as an industry leader, offering a futureready solution that enables businesses to elevate their branding, engagement, and operational efficiency.



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SMART FACTORY ASSESSMENT

As part of their digital transformation journey BRANDPARTNERS recognised the need for a structured approach to digital transformation and undertook a Smart Factory Assessment. This comprehensive evaluation helped them clarify and prioritise the technological strategies most critical for achieving their growth objectives.

"The Smart Factory Assessment provided the clarity and direction we needed to develop a robust, future-focused digital strategy—one that not only strengthens our foundations but also reinforces our leadership position in the market. The clear, engaging, and fun workshops made it easy for us to see our next steps and will help as we solidify our reputation as true innovators."

- Antony Lawler ACA, CGMA, BRANDPARTNERS



CURRENT TECH STACK

Function	Software Tool
ERP / Finance	Hub (built in-house) & Xero
CRM software	n/a
Production scheduling	Hub
Work order management	Hub
Quality & compliance management	Hub
Warehouse management - Stock management - MRP	Hub
Product traceability	Hub
Performance analysis / KPI tracking (such as OEE and reporting)	Hub
PLM or document management	Hub
Supply chain coordination	Hub
Maintenance tools	Hub

To find out more, head to www.industry4.govt.nz



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Daiken

Shaking things up with a predictive maintenance transformation

BACKGROUND

A new predictive maintenance system has reduced unplanned downtime and provided the maintenance team with instant access to data about the health of the machines in Daiken New Zealand's Rangiora plant.

Daiken is a premier manufacturer of Medium Density Fibreboard (MDF) and operates from factories in Rangiora and Mataura. Unplanned downtime caused by machinery failure can cause production delays, missed orders and increased maintenance costs. Daiken had been doing weekly vibration monitoring but it wanted a way to continuously monitor its machines.

To meet this need it implemented a predictive maintenance system called Moneo at the Rangiora plant. As well as reducing unplanned downtime Moneo also identifies potential problems early, reducing the likelihood of having to carry out expensive repairs.

Daiken has now carried out a Smart Factory Assessment to identify the next steps it should take as it continues its digital transformation.

THE CHALLENGE

In the highly competitive MDF manufacturing sector, unplanned downtime is a major cost driver. Machinery failures can lead to production halts, missed orders, and increased maintenance costs. To mitigate this, Daiken had implemented weekly vibration monitoring across their motors, using portable vibration analysers to capture periodic snapshots of equipment health. However, this approach had limitations:

- » **Gaps in monitoring:** Failures could develop between inspections, leading to unexpected breakdowns.
- » Lack of real-time alerts: Maintenance teams had no immediate visibility of performance issues.
- » Reactive rather than proactive approach: Repairs were often made after faults were detected, rather than before failures occurred.

To move toward a true predictive maintenance model, Daiken needed a solution that provided continuous condition monitoring and real-time insights.

THE SOLUTION

To bridge the gap between periodic monitoring and predictive maintenance, Daiken implemented the Moneo predictive maintenance system. The transition involved upgrading their sensor infrastructure to provide real-time, high-resolution machine data. Key aspects of the solution included:

1-Upgrading to real-time sensor technology

- » Installation of smart vibration sensors to provide continuous monitoring of motor and bearing conditions.
- » Integration of temperature sensors to track overheating, an early sign of component failure.
- » Automated alerts & trend analysis enabled through Moneo, allowing operators to detect issues long before failure occurs.

These upgrades are assisting Daiken in its goals to further reduce and control unplanned downtime, improve maintenance efficiency, and extend the lifespan of its equipment.

2 - Future-proofing with multi-parameter condition monitoring

Recognising the long-term benefits of predictive maintenance, Daiken is now gradually upgrading to multi-parameter condition monitoring sensors, ensuring a more sophisticated and resilient monitoring system. These advanced sensors combine:

- » Vibration monitoring: Detects early-stage bearing wear, misalignment, and imbalance.
- » Temperature tracking: Identifies potential overheating issues in motors and rotating equipment.
- » Acceleration and shock detection: Provides insights into mechanical stresses that could lead to long-term failures.
- » Wireless connectivity (where applicable): Reduces installation complexity and allows monitoring of remote or hard-to-reach assets.

By implementing multi-parameter sensors, Daiken is future-proofing their predictive maintenance system, ensuring it remains scalable and adaptable to new equipment and operational challenges. This transition will provide even greater visibility, enabling their maintenance teams to make data-driven decisions with increased confidence and precision.

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KEY BENEFITS

- » Reduced unplanned downtime: Early detection of issues on critical motors prevented unexpected failures and production stoppages.
- » **Real-time visibility and alerts:** Operators and maintenance staff gained instant access to data about the health of the machines, with automated alerts enabling early intervention.
- » **Optimised maintenance schedules:** Shifted from time-based to condition-based maintenance, reducing unnecessary interventions.
- » Extended equipment lifespan: Early identification of wear and misalignment prevented long-term damage and costly repairs.
- » User-friendly and customisable interface: These can be tailored to the needs of each specific user, and as a result, has markedly increased the level of access and engagement with tool due to the simplicity of its use.

SMART FACTORY ASSESSMENT

Recognising the need for a structured approach to digital transformation Daiken completed a Smart Factory Assessment.

This assessment:

- » Provided clear priorities and benchmarks for measuring progress.
- » Validated existing strategies.
- » Introduced new opportunities to leverage advanced manufacturing technologies.

"The Smart Factory Assessment was instrumental in uniting our team towards our common goals. It has highlighted key areas where technology could significantly enhance our operations and helped us to build a clear technology roadmap for our site. The assessment participants enjoyed being involved in such a key strategic project that presents an opportunity to make meaningful improvements to our organisation. The techniques and technologies used in the assessment process to ensure all stakeholders were actively involved in the process made it both fun and engaging for all."

- Duncan Ward, Operations Director

NEXT STEPS

Building on their success, Daiken plans to:

- » Extend their vibration monitoring capabilities to cover additional critical machinery.
- » Expand the use of multi-parameter sensors to gain deeper insights into machine health.
- » Develop a comprehensive Industry 4.0 roadmap, integrating predictive maintenance with broader digital transformation initiatives.

By continuing to leverage cutting-edge technology, Daiken New Zealand is reinforcing its position as an industry leader—one committed to quality, efficiency, and technological advancement.

CURRENT TECH STACK

Function	Software Tool
ERP	SAP
CRM software	Excel
Production scheduling	System built in-house
	SAP (Sales and Maintenance Orders)
Work order management	MES (Wonderware) for order management through Production
Quality & compliance management	MES (Wonderware)
Warehouse management - Stock management - MRP	SAP
Product traceability	MES (Wonderware)
Performance analysis / KPI tracking (such as OEE and reporting)	MES and Excel
PLM or document management	M-files
Supply chain coordination	EDI
Maintenance tools	Moneo, SAP

To find out more, head to www.industry4.govt.nz

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Fleur Foods

Increasing quality and reducing costs through a digital transformation journey

BACKGROUND

For Fleur Foods, it's crucial that they consistently produce quality products with as little waste and downtime as possible.

The Tauranga-based company makes hand-crafted, value-added food products such as crumbed camembert and vegan patties. However, its performance on the shop floor is currently captured by paper which causes a significant lag in monitoring and scheduling production. The company also has problems accessing the data it needs to identify and deal with problems as they arise.

To help address these challenges Fleur Foods has been exploring the possibility of introducing a Manufacturing Execution System (MES). It has also completed a Smart Industry Readiness Index (SIRI) assessment. This has already led to some quick wins and the company is now looking at introducing new technologies at their factory.

THE CHALLENGE

In a fast-moving consumer goods (FMCG) business like Fleur Foods, process and product quality are critical performance indicators. Process variability can lead to raw materials being wasted, lower outputs and, potentially, product recalls. However, Fleur Food's current ERP system has limited functionality for managing manufacturing and quality, and many of its processes are still recorded manually. The three major challenges are:

- » Lack of real-time performance: Production outputs, waste metrics and machine downtime are currently captured manually (and often not at all).
- » **Reactive rather than proactive approach:** Data to identify problems and look for opportunities is not easily accessible, leading to a reactive problem-solving approach.
- » **Quality control and traceability:** Batch control and the use of raw materials is managed using paper systems.

THE SOLUTION

To move towards better vertical systems integration, Fleur Foods has begun investigating whether it should implement a Manufacturing Execution System (MES).

SELECTING AN MES

Choosing the right MES for a food manufacturer requires evaluating multiple vendors based on key criteria. A weighting scale matrix is a structured method to compare solutions based on their importance to the business.

The criteria include:

- » Traceability and compliance Ability to track ingredients, batches, and meet BRC standards.
- » **Quality management and control** Automated checks, reporting, and deviation handling.
- » Integration capabilities Compatibility with Cin7 and critical machinery.
- » Cost and ROI Licensing, implementation, and maintenance costs.

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Potential benefits of an MES:

1 – Enhanced product safety and traceability

With full visibility into the supply chain, an MES would ensure that the root cause of any quality issue is rapidly analysed. If contamination occurs, affected batches can be guickly identified and isolated, preventing widespread recalls and protecting brand reputation.

2 - Improved quality and consistency

By enforcing standardised processes and automated quality checks, the MES ensures that every batch meets strict food safety and taste standards, reducing variability and increasing customer trust in the product.

3 - Cost reduction and waste minimisation

MES optimises material usage and machine performance, which minimises human errors and cuts down on raw material waste. This leads to lower operational costs while improving sustainability.

THE SIRI ASSESSMENT

Recognising the need for a structured approach to digital transformation, Fleur Foods completed a Smart Industry Readiness Index (SIRI) assessment. This assessment was designed to:

- Educate the leadership team on what a smart factory looks » like.
- Help management decide where to start investing. »
- Define the roadmap for implementation. »
- Introduce new opportunities to leverage advanced » manufacturing technologies, from which the need for a quality focussed MES was identified.

"Ethan did an excellent job of breaking down the SIRI assessment in a way that was clear, relatable, and easy to understand. The assessment highlighted key opportunities where technology can drive significant improvements across our operations, providing valuable insight into the direction we need to take at Fleur Foods. The facilitation was engaging, ensuring our team remained actively involved while fully grasping the key concepts. As a result, we are alreadv implementing some quick wins and have initiated plans to introduce new technologies over the next 3 to 6 months. We also look forward to a further assessment as we continue our digital transformation journey."

- Jordan Dennett, Supply Chain Manager

NEXT STEPS

Building on their success, Fleur Foods plans to:

- Further invest in operational excellence tools such as continuous improvement / lean management.
- Develop a digital version of the shop floor to help mimic the impact of shopfloor automation investments (particularly on the packing line).

CURRENT TECH STACK

Invest in shop-floor monitoring tools to support MES data collection.

Function	Software Tool
ERP	Cin7
Accounting	Xero
CRM software	Excel
Production scheduling	Excel (Built in House MRP)
Work order management	Cin7
Quality & compliance management	Paper / Excel
Warehouse management - Stock management - MRP	Cin7
Product traceability	Cin7 / Paper / Excel
Performance analysis / KPI tracking (such as OEE and reporting)	Cin7 / Nielson IQ
PLM or document management	Excel
Supply chain coordination	EDI
Maintenance tools	None

To find out more, head to www.industry4.govt.nz

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Goodnature

Evaluating the feasability of implementing smart manufacturing

BACKGROUND

Goodnature, a purpose-led New Zealand company designing humane pest control solutions, is preparing for significant global growth. As demand increases, the business has started looking at whether smart manufacturing technologies could support its expansion.

At present there is little integration between departments and little automation: shop-floor activities are largely manual.

To help it decide how to tackle these limitations Goodnature undertook a Smart Factory Assessment. The company is now exploring the feasibility of transitioning to a more connected and digitally enabled operation.

THE CHALLENGE

Goodnature's current operating model has supported its product innovation and ethical positioning. However, operational constraints are becoming more apparent as the company grows, prompting questions about the right next steps for scaling effectively. At this stage, the business is exploring whether adopting aspects of Industry 4.0 – such as automation, system integration, and digital intelligence – would be appropriate and viable.

Goodnature faces a number of key challenges including:

» Siloed processes: Most departments operate independently, with integration largely limited to finance and export sales.

- » Manual data capture: Performance data is tracked by hand and disconnected from broader systems, complicating insights and planning.
- » Limited system integration: Some platforms are integrated, but overall system connectivity is inconsistent and narrow in scope.
- » **Operational knowledge reliant on individuals:** Many tasks are managed through spreadsheets and individual expertise, limiting scalability.
- » Informal collaboration structures: Coordination between teams is ad hoc, especially on initiatives related to digital innovation.
- » Awareness without application: Team members are aware of smart factory concepts, but there's little formal discussion on how –or if – they should be applied.

THE SOLUTION

Rather than prescribing a definitive direction, Goodnature undertook a Smart Factory Assessment that provided it with a structured reflection of where the business stands and what capabilities would be needed to pursue a smart manufacturing approach in future.

The assessment has allowed the leadership team to consider several potential areas of focus including:

1-Understanding systems gaps

- » Conducted a review of current digital tools and system workflows.
- » Identified potential improvements through MRP, MES, or ERP systems to replace manual spreadsheets.
- » Outlined a capability roadmap that could support scalable system integration if the business chooses to proceed.

2 - Investigating organisational readiness

- » Highlighted the need for more structured education on smart manufacturing benefits.
- » Identified opportunities for improved internal collaboration and project coordination.
- » Outlined a possible process for prioritising digital initiatives based on return on investment.

KEY BENEFITS

- » The business now has a clearer understanding of its current capability gaps.
- » Leadership has a framework for discussing what a future operational model might look like.
- » Any move toward Industry 4.0 will be grounded in a clearer understanding of business value and readiness.

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SMART FACTORY ASSESSMENT

"The Smart Factory assessment gave us the structure and space to come together as a team, challenge our current state, and align on where we're heading. Furthermore, it was a hugely valuable opportunity to upskill our people on what best-in-class manufacturing looks like — and to clearly identify where investment and focused change could deliver the greatest impact for Goodnature. The learnings from this assessment have formed the backbone of our revised operations strategy."

- Hannah Vaatstra, Chief Financial Officer

NEXT STEPS

- » Explore the business case for digital system upgrades.
- » Identify where automation may yield the most value with minimal disruption.
- » Continue internal conversations about operational capability and long-term growth goals.

Goodnature remains in the consideration phase, using this opportunity to reflect on whether smart manufacturing technologies align with its values, scale and aspirations.

To find out more, head to www.industry4.govt.nz

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Grayson Engineering

A long-term commitment to reducing construction waste pays off

BACKGROUND

Construction waste is a significant challenge for the construction industry. It's estimated that construction and demolition waste is responsible for 40% to 50% of New Zealand's total waste to landfill.

As one of New Zealand's leading steel fabricators Grayson Engineering are aware of this problem and are strongly committed to reducing their environmental impact. They are an active member of the Sustainable Steel Council. They have also achieved Enviromark Gold certification and more recently ISO14001 for their environmental management system.

Grayson Engineering have taken a number of steps to reduce their environmental impact including implementing an enterprise resource planning (ERP) system called Strumis. This has reduced their waste, improved their efficiency and led to cost savings.

Following a Smart Factory Assessment Grayson Engineering is now looking at ways they can continue their digitisation and sustainability journey.

THE CHALLENGE

Grayson Engineering knew they could make a big impact by finding ways of reducing their levels of construction waste. However, they needed to find a way to do this while maintaining high-quality standards and meeting the demands of large-scale projects.

THE SOLUTION

To be able to understand your environmental impact and measure improvements, you need data. Grayson Engineering had already implemented the Strumis enterprise resource planning (ERP) system. Strumis incorporates MRP (material requirements planning) functionality so from this, the amount of steel that goes into jobs versus offcuts can be measured.

Grayson Engineering identified several areas where they could make meaningful improvements:

1-Reducing waste in fabrication

By designing and detailing all their work in their CAD package (Tekla), the exact quantities and lengths of steel are known. Depending on the quantity of steel and project timeline, material can be ordered either from steel merchants or on indent, directly from the mill. Material ordered on indent can be specified at the specific lengths required (to within 15-20mm). The jobs are then nested to maximise the use of each piece of steel across their projects when sent to one of their automated cutting, coping or beam-welding machines.

2 – Utilising offcuts

Inevitably, there are useable lengths (>1m) left over from projects. The key to enabling the use of offcuts on a consistent basis is accounting for offcuts in the inventory in Strumis. While this requires some additional administration and diligence from the team, Grayson Engineering's experience is that it's well worth the effort in terms of material saved.

3 - Re-using temporary works steel

Another opportunity area was reusing temporary works steel. Grayson Engineering has an inventory of temporary works that is provided to designers at the start of projects to look for opportunities to reuse and repurpose this steel where possible.

4 - Recovering demolition waste

Grayson Engineering also offer a service to take back steel from demolition activities to reuse (as part of temporary works) and recycle it on behalf of the customer. As part of their holistic sustainability strategy, fuel usage of their vehicle fleet is also considered, so demolition material is only returned to their yard on return journeys to avoid additional mileage.

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KEY BENEFITS

Through the diligent use of their ERP system Strumis and the focus on waste reduction, Grayson Engineering has delivered several tangible benefits:

- Reduced waste: By effectively utilising offcuts and recovered or reused steel, Grayson Engineering significantly reduced the amount of waste generated during their projects. In the last year they recycled around 800T of steel and at any one time they have around 100T of steel in their yard being continuously rotated and reused.
- » **Improved efficiency:** The streamlined processes and better inventory management provided by Strumis improved overall efficiency, allowing the company to complete projects quicker and with fewer resources.

SMART FACTORY ASSESSMENT

As part of their commitment to continuous improvement, Grayson Engineering underwent a Smart Factory Assessment. The assessment provided valuable insights into their current processes and identified areas for further improvement. The assessment identified a number of key areas to focus on:

- » Vertical integration: Whilst digital systems are used for most office-based (enterprise) processes, there are some key functions still managed via analogue tools (such as MS Excel). This limits future opportunities to further optimise the business through the integration of enterprise and shop-floor processes.
- » **Shop-floor intelligence:** The assessment highlighted the need for better data collection and analysis to optimise shop-floor processes. This should in turn support sustainability and productivity improvements through greater visibility of real time data.
- Enterprise intelligence: The assessment recommended improvements in the efficiency of office-based processes through better use of dashboards, notifications and curated exception reports based on role.

"The Smart Factory Assessment was a valuable exercise for our management team to go through together. It opened our eyes as to where we can garner efficiencies out of the business, hand in hand with the environmental side. By benchmarking ourselves against the framework and other businesses, it showed where we're doing well but also highlighted areas for improvement. Doing the assessment as a team was worthwhile as it's engaged everyone in looking at improvement opportunities."

- David Moore, Managing Director

» **Cost savings:** The implementation of efficient sustainable practices not only decreased their carbon emissions by around 15% but also led to leaner operating profile through a 2% reduction in total operating cost.

NEXT STEPS

Grayson Engineering plans to continue building on the success of their digitisation and sustainability journey by:

- » **Expanding the use of Strumis:** Utilising more of the functionality and modules available in Strumis to further improve scheduling and shop floor job tracking. This should enable higher utilisation of staff and reduced rework, reducing fabrication waste.
- » **Implementing new technologies:** Exploring new technologies and tools such as robotic welding to automate more fabrication steps and improve quality control.
- » **Continuous improvement:** Regularly reviewing and updating their processes to ensure they remain at the forefront of sustainability and efficiency in the construction industry.

CURRENT TECH STACK

Function	Software Tool
ERP, MRP	Strumis
Payroll & invoicing	Xero
Cost control & reporting	МҮОВ
Timetracking	MyTimesheets
Engineering design	Tekla

To find out more, head to www.industry4.govt.nz

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IPL

Cost-effective upgrade of plywood manufacturing plant delivers significant benefits

BACKGROUND

A seven-year programme to systematically modernise its Greymouth plant has paid off for plywood manufacturer International Panel and Lumber (IPL).

IPL is known for its high-quality products, versatile product mix, and excellent customer service. However, historic underinvestment was making it difficult for the company to remain competitive.

By introducing changes such as replacing or upgrading equipment and upgrading their programmable logic controllers (PLCs) and automation network they have increased through-put, reduced the cost-per-unit and improved their production planning and decision-making. These changes were made on a modest budget and were introduced without excessive plant downtime.

A Smart Factory Assessment provided a chance to reflect on what they have done well over the last few years, as well as looking at changes they can make in the future.

THE CHALLENGE

The site was established in 1965 and has had several owners since then. Successive underinvestment in the past had left the site in a position where it was difficult to remain competitive due to a range of issues including:

» High manual labour input (and associated health and safety challenges)

- » Machine reliability and equipment obsolescence
- » Sub-optimal utilisation of logs
- » A lack of visibility on shop-floor performance.

The nature of wood products is that each log is different. Maximising the value of each log relies on both using as much of the log as possible and on making each veneer peeled from the log as high-grade as possible. Rising energy costs were also putting pressure on margins.

One of the key challenges was upgrading the plant within the modest capital funding available and implementing the changes (and subsequent disruption) while still running the facility.

THE SOLUTION

IPL implemented a programme to systematically modernise the plant. Over the last 7 years the team have replaced or upgraded several key pieces of equipment. Their focus has been to stick with proven, well-built equipment from reputable suppliers. Existing equipment that has 'good bones' has been upgraded with modern control systems and instrumentation. Where there is a business case for improved through-put or functionality, they have looked for opportunities to buy second-hand equipment that's like new or can be modernised.

In parallel, they have upgraded their PLCs and automation network with a view to standardising their equipment with a modern, secure and scalable shop-floor network. Having this network in place means they can seamlessly collect data on existing equipment and new equipment. Plant performance data is then collected and displayed to users using Grafana, an open-source data-management platform, and operational data is managed through another software platform called 4Ops.

KEY BENEFITS

The implementation of these solutions has delivered significant benefits to IPL including:

- » **Greater through-put:** The various upgrades made throughout the plant have increased production capacity, decreasing cost-per-unit-produced.
- » Improved log utilisation: By leveraging the latest log veneer-positioning system IPL get more volume and higher-quality veneer out of each log.
- » Better production planning: Having live data on the quantity of each veneer grade and a finished-goods inventory enables the production team to make more informed decisions on which products to make and how to maximise the value of the veneers in stock.
- » **Better decision making:** Having data on the performance of each machine enables the team to make more informed decisions on the next improvement project and the benefits this will provide.

PROGRAMME PARTNERS

- » **Simpler integration:** Having a modern automation network makes integrating new equipment more straightforward, reducing upgrade costs and commissioning timelines.
- » Faster stock keeping: Previously, the sales team needed to go to the factory floor daily to check the warehouse stock. This was slow and labour-intensive. Now, they can give customers immediate feedback on stock available and lead times, even when they're on the road.

SMART FACTORY ASSESSMENT

For IPL, the Smart Factory Assessment was not only a good opportunity to identify their gaps but also a chance to reflect on what they have done well in the last few years. As they develop their strategies for what's next it's important to not forget what has helped their success. Another key takeaway for them was the value in developing a formal strategy and roadmap.

"The assessment reaffirmed that we're on the right track. At the same time there are some areas that haven't been given the same attention, such as the human side and office functions which are worth incorporating into our thinking."

- Michael Duggan, Director of IPL

"It was good to sit around and debate the relative importance of different areas amongst the management team. Involving the wider team gets a perspective from the shop floor that is really valuable."

- Robert Dumelow, GM Operations

NEXT STEPS

Building on their success, IPL plans to:

- » Continue to upgrade software and control hardware in the factory.
- » Add more data into their data acquisition tool Grafana to further improve decision-making.
- » Upgrade the camera and logic on the second-hand (but likenew) patching line they bought following the assessment so they can use utilise artificial intelligence (AI) for control optimisation.

Continue their efforts to become more energy-efficient and reduce their emissions with the goal of replacing almost all the coal they use with wood waste. This work is being supported with partial funding from the Energy Efficiency Conservation Authority (EECA).

ADVICE

For other manufacturers who are early in their Industry 4.0 journey, Michael and Rob have the following advice:

"Just start, even if you're behind (or particularly if you're behind!). Be open to new technologies and ways of doing things." – Michael Duggan

"Production comes first so managing change and the amount of change you try to push through in one go is important to balance. Not everything will go smoothly so persist and work through the problems. For our team some changes have been straightforward but some changes, they've taken 6 months to 3 years to get new equipment up and running correctly. Make sure you do your due diligence and specify equipment correctly. Invest time up front." – Robert Dumelow

By continuing to leverage cutting-edge technology, IPL is reinforcing its position as an industry leader committed to quality, efficiency, and remaining financially, socially and environmentally sustainable, enabling them to continue to be a positive contributor to their community into the future.

CURRENT TECH STACK	
Function	Software Tool
Financial system	Xero
Production/inventory man- agement	40ps
Manufacturing Execution System (MES)	Grafana (machine data), 40ps (production data)
Network protocol	Modbus TCP/IP (preferred)
Automation platform	Allen Bradley (preferred) plus vendor supplied
Network security	WatchGuard VPN

To find out more, head to www.industry4.govt.nz

PROGRAMME PARTNERS

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Saving hundreds of thousands with two new digital tools

BACKGROUND

Two new digital tools have led to significant cost savings for Mount Maunganui company Lawter NZ.

The company estimates that the two tools – an internet of Things (IoT) LoraWAN gateway and an analytics tool called TrendMiner are saving them hundreds of thousands of dollars every year.

Lawter, which is based in Mount Maunganui, processes the by-products from the pulping process at nearby paper mills, turning them into a variety of compounds and chemical products. Most of these compounds and chemicals are exported.

However, plant efficiency was becoming an issue for the company, particularly in terms of overall equipment effectiveness (OEE) and energy efficiency. Introducing the new digital tools successfully addressed these two problems.

As part of their commitment to continuous improvement, Lawter underwent a Smart Factory Assessment. It provided valuable insights into their current processes and identified areas for further improvement.

THE CHALLENGE

As a producer of intermediary products, plant efficiency is a key focus for the site, both in terms of overall equipment effectiveness (OEE) and energy efficiency. Two specific challenges the site had were:

- The team suspected there were issues with condensate return, leading to inefficiencies in steam production.
- There were some regular process excursions where the cause was not well understood.

THE SOLUTION

Energy use

To address the steam condensate issue, Lawter implemented an Internet of Things (IoT) LoraWAN gateway and 12 temperature sensors on the condensate system to detect passing steam traps. They integrated the IoT system with the existing process historian, AVEVA OSIsoft PI, to aggregate the data in one place. This identified that several condensate valves were in fact passing steam and needed repair.

Process excursions

Lawter utilised an advanced analytics tool called TrendMiner to investigate the process issue. This tool trawled all the data available in the process historian across all parameters to identify a shortlist of potential correlations. This gave the team a concise list of parameters to investigate further. The team then developed a control solution and used TrendMiner to simulate the proposed software changes and interlocks before implementation, validating that they would not cause nuisance trips.

What they found was that the planned changes would result in 12 additional plant trips over the last year's process data. While this wasn't the end of the world, they wanted to understand why this was going to be the case.

Upon further investigation they identified that these simulated nuisance trips were, in fact, legitimate trips which required operator or maintenance intervention to resolve. This guided Lawter in putting additional alarms into the controls system, augmented with guidance to the operator mentioning potential root causes to investigate.

"The benefits of the IoT system interfaced to the existing process historian paid for the installation cost in less than one year. We are grateful to IQNexus for their leadership and development of the IoT interface to the OSIsoft PI historian."

- David Pugh, Process Automation Engineer

KEY BENEFITS

Cost savings: Implementation of the IoT system and Trend-» Miner have led to significant cost savings, estimated to be in the order of several hundreds of thousands of dollars annually.

PROGRAMME PARTNERS

- » Low-cost implementation: The IoT system provided a low-cost alternative to traditional automation for process measurement. Now that the IoT gateway is setup, adding additional sensors costs in the order of hundreds of dollars per sensor, rather than thousands. This enables data to be collected on systems that was previously uneconomic to measure.
- » Scalability: The IoT system's scalability allowed for easy addition of new sensors and integration with existing infrastructure, while TrendMiner enabled continuous improvement through advanced analytics over the already established process historian dataset.
- » **Operational improvements:** TrendMiner reduced the risk of nuisance trips and smooth implementation through simulated software changes applied to historical data, enabling a true digital twin of their process.
- » Enhanced decision-making: The advanced analytics capabilities of TrendMiner provided valuable insights into process performance, enabling data-driven decision-making and continuous improvement.

SMART FACTORY ASSESSMENT

As part of their commitment to continuous improvement, Lawter underwent a Smart Factory Assessment. The assessment provided valuable insights into Lawter's current processes and identified areas for further improvement. Key findings from the assessment included:

- » Vertical integration: While the plant is reasonably automated, many office-based processes are managed by analogue means such as paper-based batch sheets and Excel-based production plans. The downside of these tools is that they result in a lot of administrative effort and poor data visibility. The Excel tools also rely on tacit company knowledge to enable them to be used effectively. This means the business is highly reliant on a few key longterm staff.
- » Enterprise intelligence: The Smart Factory Assessment highlighted that while the Lawter team gathers a significant amount of data, there is an opportunity to develop more robust methods for creating automated alerts when that data falls outside of predetermined limits, providing the team with actionable insights to diagnose and respond to issues.

"The Smart Factory Assessment enabled our team to take a holistic view of our whole operation and understand our current state across process, technology and organisation. Post-assessment we received a bespoke roadmap aimed at enhancing efficiency and productivity, future-proofing our organisation."

- Tony Clark, Manufacturing Manager

NEXT STEPS

As a result of the Smart Factory Assessment process, the Lawter team is considering several opportunities to increase data visibility and reduce administrative work. Some examples include:

- » **Strategy and governance:** The Smart Factory Assessment provided a great foundation for the team to develop an Industry 4.0 strategy and governance framework for the site.
- » **Digitised batch sheets:** The IoT implementation showcased the value of gathering process data. An area to expand this thinking was identified in the batch sheets, currently being done in a paper-based format. Digitising the batch sheets will improve efficiency and provide timely data flow, which the team will be able to build on in data analysis.
- » **Dashboards:** There is an opportunity to develop dashboards to give visibility across the business of the key metrics that drive business outcomes for the site such as OEE, energy use, training status, etc.
- » Increase use of TrendMiner and IoT: Based on the success of the initiatives described above, Lawter plan to continue to look for opportunities to deploy these technologies to save cost, reduce emissions and improve OEE.

CURRENT TECH STACK

Function	Software Tool
ERP, Supply chain management	SAP, Microsoft Excel
Payroll	МҮОВ
HRmanagement	HR Bamboo, KnowBe4
Project management	Microsoft Project, Microsoft Excel, SharePoint
Health & safety	Sphera - RIVO
Document control	SharePoint
Automation, SCADA	DeltaV Distributed Control System, DeltaV Batch
Process historian	PIProcessBook
Engineering design	Autodesk AutoCAD
Computerised Maintenance Management System (CMMS)	Elecosoft UK Ltd - ShireSystem

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RD Group

Streamlining the quote-to-design process with a new digital portal

BACKGROUND

RD Group's clients move fast and they rely on their partnership with RD Group to quickly bring design and branding ideas to life. That means RD Group must move fast too. Time lost through the quoting and design process can be the difference between winning or losing the job.

RD Group works with some of New Zealand's best-known brands and retailers to design, fabricate and install engaging, innovative environments, installations and products. It's a competitive market and RD Group realised they needed to find ways to maintain their edge.

To meet this need they developed RD Connect, a customer quoting portal and workflow management system. This has streamlined their processes and reduced their costs.

Following a Smart Factory Assessment, RD Group is now planning to develop a comprehensive roadmap to Industry 4.0 so they can build on their success with RD Connect and keep improving their performance and capability.

THE CHALLENGE

For RD Group it's vital to have a seamless integration between the sales team scoping a job with a client to generating a robust quote and translating this into a design that meets the brief. This is key to reducing delays caused by things such as refinements, clarifications or scope creep.

RD Group recognised that it needed a simple, streamlined solution to:

- » Reduce the time from job request to design sign-off
- » Ensure quote and design accuracy through complete information.

It also needed to be able to optimise the workflow to the design team based on capacity, expertise and job timeframe.

THE SOLUTION

To streamline this front-end process, RD Group developed RD Connect, a customer quoting portal and workflow management system to supplement their ERP system's core functionality.

Key features of RD Connect include:

- » Simplified user interface to standardise data collection for job / project set-up, design instructions and quotation inputs.
- » Semi-automated quote builder based on standardised inputs collected through the portal.
- » Queue management to streamline allocation of resource based on expertise and capacity.
- » Integrated project set-up, pulling data from input form to ERP for project / job set-up (tracking and reporting).
- » Enhanced CRM which will streamline the sales funnel and facilitate improved financial reporting and greater transparency in tracking the outcomes of the quoting process.

By implementing an integrated quoting portal, RD Group have been able to streamline their front-end process (RFQ-to-acceptance) and optimise their industry-leading design team resource to win and deliver more work by being responsive to their clients' requirements.

PROGRAMME PARTNERS

KEY BENEFITS

- » Streamlined RFQ-to-quote process: Standardised front-end ensures the data required for design and accurate quoting is collected before resources are committed.
- » **Improved quote accuracy:** Complete job information means the quote is accurate and complete before the client accepts it, and it also updates pricing assumptions for future projects.
- » **Optimised utilisation of the design-team resource:** Integrated queue management helps optimise the allocation and balancing of resources in the design team based on expertise and capacity.
- » Reduced RFQ-to-production time: Streamlining the RFQ-todesign process shortens the end-to-end project time through integrating management of the workforce and production.
- » Reduced 'sunk' costs: Reducing the time and effort required to design and quote a concept for approval means lower 'sunk' costs.
- » **Improved budget vs actuals reporting:** Integrating the frontend-to-finance system results in greater visibility and reporting of planned vs actual costs and revenue by project.

SMART FACTORY ASSESSMENT

Recognising the need for a structured approach to digital transformation and end-to-end system optimisation, RD Group completed a Smart Factory Assessment.

This assessment:

- » Provided clear priorities and benchmarks for measuring progress.
- » Validated existing strategies.
- » Introduced new opportunities to leverage advanced manufacturing technologies.

"We recognised the value of the Smart Factory Assessment as a pivotal opportunity to stay ahead in manufacturing excellence. It has enabled us to identify how our systems and processes can be continually optimised while providing a structured approach to readily identify areas for improvement. With clear benchmarks and actionable plans, we've gained a deeper understanding of the opportunities available to enhance current capabilities. Often, it's the unknown insights that surprise you and open doors to elevate performance and capability."

- Byron Waring, Chief Financial Officer

NEXT STEPS

Building on their success, RD Group plans to:

- » Develop a comprehensive Industry 4.0 roadmap to support delivery of the organisation's strategic ambitions.
- » Increase productivity through the development of AI agents to solve complex and time-consuming technical challenges.
- » Deliver quick-win productivity improvements through the embedding of best practice tools and systems.

By applying Industry 4.0 tools, integrating their systems and workflows and automating complex tasks through agentic AI, RD Group are continually striving to push the boundaries of creative, functional design.

CURRENT TECH STACK	
Function	Software Tool
ERP	MYOB Acumatica
Quoting	RD Connect
Design workflow	RD Connect / DRQ
Production scheduling	Spreadsheet
Work order management	MYOB Acumatica (sales orders) Empower (labour hours tracking against jobs)
Warehouse management - Stock management - MRP	MYOB Acumatica
Performance analysis / KPl tracking (such as OEE and reporting)	MYOB Acumatica, Velixo, Excel
PLM or document management	M-files

To find out more, head to www.industry4.govt.nz

PROGRAMME PARTNERS

Rinnai

Rinnai

Leveraging the value of robust enterprise resources planning

BACKGROUND

Rinnai New Zealand, a subsidiary of Rinnai Corporation of Japan, is a leading manufacturer and distributor of hot water cylinders, gas fireplaces, wood burner fireplaces, and hot water heat pumps based in Mangere, Auckland.

With a significant presence in the New Zealand market over the last 50 years, Rinnai New Zealand has established a proud reputation for quality and reliability in the market. A significant portion of Rinnai's revenue comes from locally manufactured products, with the balance coming from the import, sale, and distribution of related heating and cooling products from Rinnai Corporation and others.

THE CHALLENGE

The complexity of Rinnai's operation is immense and includes:

- » Managing over 10,000 active SKUs, many with 6–12-month lead times.
- » Supplying products to over 1,000 New Zealand businesses and coordinating with numerous third- party logistics providers to deliver on time.
- » Managing distribution hubs on both the North Island and South Island and exporting manufactured products to multiple countries.

» Managing complex bills of materials (BOMs) for manufactured products, many of which include several hundred parts, multiple customisation options, and critical components.

Craig Davidson, GM Operations, points out that "Manufacturing is an exercise in logistics. People pay attention to value, but a 3-cent Oo-ring can stop a line just as much as a more expensive part such as a \$200 PCB."

To effectively manage this amount of data and integrate the majority of its business processes, Rinnai understood it would need a robust enterprise resources planning (ERP) system.

THE SOLUTION

About 25 years ago, Rinnai New Zealand implemented an ERP system called Baan, which later became Infor LN. Infor LN has become the backbone of Rinnai's operation – the sales, marketing, and finance teams all rely on its data and forecasting and the warehousing and engineering teams rely heavily on it to manage inventory levels and keep track of complex bills of materials for their assemblies. In this way, the ERP system keeps the entire Rinnai team aligned around a single source of truth.

Just a few examples of how Rinnai's ERP streamlines their business functions include:

- » The majority of sales orders are received as Electronic Data Interchanges (EDIs) that interface directly with Rinnai's ERP, allowing pick lists to be automatically generated and the product dispatched (as long as the client account is current) with minimal manual intervention.
- » Based on sales forecasts and set levels for safety stock, the ERP system automatically generates recommended purchase orders for restocking that can be easily reviewed and approved.

KEY BENEFITS

- Realtime visibility on inventory levels: With employees taking part in daily cycle counts to promote inventory accuracy, the Rinnai team has achieved 100% inventory accuracy across the last seven years of external audits. This means the team can trust the ERP data, which allows automatic order fulfilment for in-stock inventory.
- » Reduced time managing third- party logistics companies: When orders are received, Infor LN determines the most appropriate distribution warehouse based on the customer location and assigns to third party logistics providers by issuing an outgoing EDI.
- » **Robust reporting tools:** The Rinnai team utilises PowerBI to develop custom dashboards and reporting to allow their teams to have visibility on the data that really matters.
- » Fewer errors and quicker order processing: By automatically processing orders through EDI and barcode scans in the warehouse, orders are processed faster with less manual intervention or data entry, and fewer errors

PROGRAMME PARTNE

SUCCESS FACTORS

The Rinnai team had the following advice for other businesses to get the most out of their ERP:

- » **Involve everyone:** Ensure that all relevant departments, such as sales, marketing, product management, operations, and logistics, are involved in the forecasting process. This helps in gaining buy-in from everyone and ensures accurate forecasting.
- » **Maintain accurate data:** Emphasise the importance of having accurate bills of materials (BOM) and maintaining data accuracy. This includes having a tight engineering change process to ensure that any changes are reflected in the BOM.
- » **Regular reviews:** Conduct regular reviews and cycle counts to maintain inventory accuracy. Each Rinnai warehouse team member conducts daily blind-counting inventory audits. They have a strict rule where any error in a location result isn a zero accuracyzero-accuracy score for that location.

SMART FACTORY ASSESSMENT

Rinnai New Zealand had set digitalisation of some of their broader business processes as one of their strategic focus areas. To help them develop a roadmap for their digitisation journey, they completed a Smart Industry Readiness Index (SIRI) assessment. This assessment:

This assessment:

- » Provided clear priorities and benchmarks for measuring progress toward Industry 4.0.
- » Validated existing strategies.
- » Introduced new opportunities to leverage advanced manufacturing technologies.

"While our team is incredibly knowledgeable about our own business, the SIRI assessment was a good opportunity for our team to look at our operations through a new lens. As the saying goes, 'Y"you don't know what you don't know." With all the quick fixes being marketed, it was helpful to sit down with a team who didn't have the ulterior motive of selling a product, but were open to exploring different possibilities and opportunities with us. It also felt like the process changed our outlook, making potential solutions feel more achievable, and understand the steps we would need to take to progress them. By coming together to discuss how we increase the use of smart technology at Rinnai in ways that serve our business and customers, it feels like we're setting a strong foundation from which future initiatives will be more likely to succeed."

- Craig Davidson, GM Operations

- » Use reporting tools: Utilise reporting tools like Power BI to highlight "red flags", ask questions and gain insights from the data. This allows for better decision-making and identifying areas for improvement.
- » **External assessment:** Consider having an external assessment to gain a fresh perspective and identify opportunities for improvement that may have been overlooked internally.

NEXT STEPS

Based on the outcomes of the SIRI assessment, Rinnai New Zealand is considering some of the following opportunities to make further progress toward Industry 4.0:

- » Formalise and digitise learning and development (L&D) tools: Although Rinnai maintains skills matrices, they've identified an opportunity to increase employee access to work instructions, instructional videos and other learning content through digitisation of existing tools.
- » Increasing access to digital content for manufacturing lines: Rinnai is considering introducing digital access throughout the workshop to allow the fabrication team to access digital copies of assembly drawings rather than relying on paper copies. This would also lend itself to digital tracking of key manufacturing metrics, like takt times for different process steps.
- » Increase shop-floor intelligence: Integrating flexible solutions like predictive pick-to-light systems would help ensure model-specific critical components are installed correctly, eliminating the need for highly manual paper tracking.

CURRENT TECH STACK

Function	Software Tool
ERP, Stock management (MRP)	Infor LN
CRM software	Microsoft Dynamics
Production scheduling, work order management	Infor LN & Basic Microsoft tools
Quality management system	Promapp
Document management system	Promapp
Supply chain management	Infor LN & Demand Solutions
Finance administration	Power Automate & Infor LN
Reporting	Microsoft, Power Bl

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PROGRAMME PARTNERS

Saito Labels

Putting sustainability at the core of their business

BACKGROUND

Saito Labels doesn't just pay lip service to sustainability. It's embedded in everything they do from the premises they work in to how they deal with waste. And that commitment is paying off, both with staff - who feel proud of the company they work for - and with customers who are drawn to Saito's innovative practices.

Saito produces labels and tags for a wide range of industries including food and healthcare. The company is based in the Waikato with a small satellite office in Auckland.

Following a Smart Factory Assessment Saito is now looking at how it can improve its digital processes and start taking steps towards implementing Industry 4.0, uniting around that process in the same way it has united around sustainability.

THE CHALLENGE

Labels and tags are inherently disposable, making it a difficult to identify ways of significantly improving sustainability. For Saito Labels, sustainability extends beyond a mere compliance requirement. Their business purpose encompasses making positive contributions across the environmental, social, and financial dimensions of sustainability.

For small businesses (Saito Group has fewer than 25 staff) allocating resources to sustainability initiatives can be particularly burdensome. However, the team did not want this to be an excuse for not making meaningful change.

THE SOLUTION

The relocation from Auckland to Kerepehi (in the Waikato) in 2022 was a significant decision for the business. The lower cost of land in Kerepehi allowed them to incorporate several sustainable features into their new facility. These features include:

- » A solar array for electricity
- Rainwater harvesting
- Sustainable building materials (for example SaveBoard wall » linings and Nucleer polycarbonate windows)
- An intelligent system for heating and cooling the building, and for treating for harmful pathogens

Additionally, they have actively sought out like-minded businesses and looked for innovative solutions to address other challenges. For instance, they are exploring vermicomposting (worm composting) as a way of disposing of some of their higher-volume fibre waste. They are also working with SaveBoard to prevent plastics from heading to landfill and creating microplastics.

KEY BENEFITS

The benefits of Saito Labels' sustainability initiatives are multifaceted. When you walk into the factory in Kerepehi it becomes clear that sustainability is more than a buzz word for them. There is a congruence between their approach to sustainability, the factory environment, their company values and the way they work.

Moving out of Auckland resulted in significantly lower rent costs and shorter commutes for staff who relocated to Kerepehi, leading to increased employee satisfaction and reduced transportation expenses. Flexible working has been standard practice at Saito for 20+ years so the adjustment for Auckland staff (and the Covid pandemic) was straight forward.

The investment in solar energy allowed the company to control energy costs, reducing their exposure to electricity prices and to fuel prices in the case of staff and company electric cars. They have even created their own virtual grid and share excess solar generation with local staff and their Auckland site.

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Furthermore, their commitment to sustainability has attracted new business opportunities as customers are drawn to their genuine efforts and innovative solutions. The company's approach to sustainability is fostering a positive work environment, with staff feeling more engaged and motivated by the company's values.

Saito has achieved Toitū Enviromark Gold certification, which demonstrates its dedication to making sustainability a core focus of its operations and its robust environmental management system. However, achieving this certification was simply a recognition of their efforts and the way they work rather than being a goal in itself.

ADVICE

Saito Labels Director, Sarah Spencer, offers valuable advice for other manufacturers looking to embark on a sustainability journey:

- » **Involve your staff:** Engaging employees in the sustainability process is crucial: those who plan the fight don't fight the plan. Involving staff ensures that everyone is onboard and committed to the company's sustainability goals.
- » View sustainability as a core business model: Sustainability should be an integral part of the business model. It involves continuous improvement and celebrating small achievements along the way.
- » **Be open to innovation and networking:** Actively seek out like-minded businesses and innovative solutions. Networking and collaboration can lead to new opportunities and help overcome challenges.
- » **Focus on genuine efforts:** Avoid greenwashing and focus on genuine, impactful sustainability initiatives. Trust your gut. This builds trust with customers and creates long-term benefits.
- » Adapt and evolve: Recognise that sustainability is an ongoing journey. Be flexible and open to new ideas and continuously seek ways to improve and adapt to changing circumstances.

SMART FACTORY ASSESSMENT

The team applied for a Callaghan Innovation-funded Smart Factory Assessment to objectively evaluate their progress in digital technology (Industry 4.0) and sustainability. This assessment provided valuable insights into their current state and future steps.

> "While perfect Industry 4.0 implementation may be unattainable, it is important to continue progressing with a clear goal. The assessment prompted the team to rethink their approach, sparking new ideas and discussion."

- Sarah Spencer, Director

NEXT STEPS

Saito Labels plans to continue building on their success by exploring opportunities around each of the key findings from their Smart Factory Assessment, including:

- » **Strategy and governance:** In the same way Saito has united around sustainability, Saito's journey toward Industry 4.0 would benefit from a unified approach.
- » Vertical integration: Mapping key business processes has helped identify the processes that will have the greatest positive impact from digitisation or automation. In this way, resources can be prioritised by implementing smart technology where it would have the greatest positive impact on quality or efficiency.
- » Shop-floor intelligence: The Saito team identified some straightforward and interesting opportunities where capturing live data from the shop floor would enable further efficiency gains and better decision-making.

CURRENT TECH STACK		
Function	Software Tool	
ERP	Sage 300	
CRM	Hubspot	
Inventory management	Sage 300 ERP + custom automated reports	
Production order management	Prism MRP	

To find out more, head to www.industry4.govt.nz

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THE DIFFERENCE IS CLEAR

Windowmakers

New digital tools help maintain position as a market leader

BACKGROUND

Two new digital tools have helped Auckland company Windowmakers maintain their position as a leader in the aluminium joinery market.

A lack of real-time data was making it hard for Windowmakers, which is based in Wainui, Auckland, to address operational inefficiencies and respond proactively to emerging challenges. There was also a lack of strategic alignment between different parts of the organisation.

Two tools, KPI Works and Strety, have allowed Windowmakers to address these problems head on.

Windowmakers recommends that companies considering doing something similar should start small and scale. They should also engage teams early and undertake continuous training.

Now, following a Smart Factory Assessment, Windowmakers is developing a clear, practical roadmap to Industry 4.0 to help cement the company's reputation as a genuine leader in its field.

THE CHALLENGE

Operating in the highly competitive aluminium joinery market, Windowmakers has constantly sought opportunities to optimise productivity and streamline operations. Despite their reputation as a market leader providing high-quality products, the management team identified opportunities to further push forward their position and their industry-leading standards. In particular, they faced challenges in harnessing accurate, real-time data and aligning strategic objectives throughout the organisation. Without clear, timely performance insights, they struggled to rapidly address operational inefficiencies and respond proactively to emerging challenges. These challenges led to delays, higher operational costs, and occasional inconsistencies in delivery timelines.

The challenges included:

- » Lack of real-time performance insights: Limited access to real-time performance metrics hindered timely decision-making.
- » **Poor strategic alignment:** High-level objectives weren't consistently used to create actionable day-to-day tasks.
- » **Data silos:** Fragmented information across departments made it difficult to analyse both performance and quality

THE SOLUTION

Recognising the need for enhanced visibility and strategic alignment, Windowmakers implemented two tools designed to tackle these challenges head-on – KPI Works and Strety.

These two tools enabled comprehensive, real-time insights and improved strategic deployment, enabling teams to better understand their roles in achieving company objectives and swiftly address operational opportunities when they were identified.

1-KPI Works

KPI Works is a data monitoring and benchmarking tool. It works with existing systems to collect and display key performance indicators, providing actionable insights into productivity, efficiency, and quality. The benefits of KPI Works include:

- » Tracking of hours quoted vs hours to manufacture, providing insights into teams' productivity.
- » Automated alerts from production to key stakeholders and out-bound customer communication.
- » Production managers receive alerts on efficiency dips, enabling quick corrective actions There are automated alerts built around manufacturing QA and DIFTOS.

2-Strety

Strety is a paperless management and strategic deployment system. The team have implemented Strety to clearly articulate and track strategic objectives across all organisational levels. By providing a structured framework, it ensures alignment, visibility, and accountability in executing strategic goals, driving consistent progress and results. The benefits of Strety include:

- » Provides a seamless, paperless IT systems for all users.
- » Supports regular meeting cadence, with individuals reporting on their accountability measures.
- » Has significantly improved the speed at which strategic initiatives are implemented.

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KEY TAKEAWAYS

- » Start small and scale: Initially focusing on critical KPIs and gradually expanding creates manageable adoption and measurable results.
- » **Engage teams early:** Involving teams in the setup process ensures buy-in and improves system usability.
- » **Undertake continuous training:** Ongoing training maximises the benefits and keeps teams engaged with the tools.
- » Regularly review and adjust: Regular assessments help refine objectives and maintain alignment with evolving business goals.

For manufacturers considering similar solutions, these systems are most effective when adopted incrementally, are aligned clearly with strategic goals, and fully integrated into daily workflows.

SMART FACTORY ASSESSMENT

As part of its commitment to continuous improvement Windowmakers undertook a Smart Factory Assessment to help lock in a clear, practical roadmap top Industry 4.0 and cement the company's reputation as a genuine pacesetter in the industry.

> "After 12 months of sharpening our processes the assessment crew arrived at exactly the right moment. It's an awesome springboard for what's next. It brought the whole team – 'from the floor up' – into the discovery phase, first through one-on-one chats and then with a hands-on workshop. This built real understanding and buy-in. Many of our people hadn't seen this style of learning before, but the mix of quick-fire online quizzes, punchy videos, and the SIRI Framework mapping kept everyone engaged and eager to contribute. We're now ready to roll. The timing's bang-on, the energy's high, and we're geared up to push Windowmakers to the next level."

- Heidi Johnston, Managing Director

NEXT STEPS

Building upon their current success, the next steps for Windowmakers are to:

- » Expand ESP to an open-source platform to draw out real-time data reporting and communication and to harness Al.
- » Integrate KPI Works and their strategic deployment systems more seamlessly with other operational platforms.
- » Implement an effective automated stock and competency management system. Windowmakers as a manufacturer has a high direct materials cost / direct labour. Efficiencies in this area will reduce errors and reliance on individuals.
- » Continuously invest in team training to sustain a robust, data-driven organisational culture.

By leveraging both strategic and operational technologies, Windowmakers is positioned to drive ongoing growth and innovation within their sector.

CURRENT TECHSTACK		
Function	Software Tool	
ERP	ESP (Estimate Sell Pro- duce)	
CRM software	Outlook	
Production scheduling	ESP	
Work order management	ESP	
Quality & compliance management	Conqa & Code Mark	
Warehouse management - Stock management - MRP	Excel Spreadsheet	
Product traceability	ESP	
Performance analysis / KPI tracking (such as OEE and reporting)	KPIWorks	
PLM or document management	Teams / Sharepoint	
Supply chain coordination	ESP	
Maintenance tools	ESP	

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30 Seconds

Leadership Competency – knowing what's possible and what questions to ask.

BACKGROUND

30 SECONDS Limited is a manufacturer and marketer of task specific cleaning products. They manufacture in Matamata, New Zealand and export to a number of countries globally.

Their range of chemical cleaning products target both outdoor and indoor cleaning tasks with the highest efficacy standards and are used by both private customers and commercial cleaners alike. 30 SECONDS manufacture a highly effective range that includes solutions for outdoor cleaning of decks, driveways, houses, paths, roofs and windows, and indoor cleaning of kitchens, bathrooms, showers, windows and mould, and the degreasing and cleaning of BBQ's, grills, tools and workshops, and have been operating in New Zealand since 1993.

30 SECONDS believes in improving lives by making cleaning easy and effective, through manufacturing affordable, innovative, accessible, task specific cleaning products that do the job well for all their customers!

THE OBJECTIVE

James Pearson took over 30 SECONDS as CEO less than three years ago and quickly established a vision of a data driven enterprise. Having seen in previous roles what this approach could deliver, the aim was to ensure the right members of his team had access to accurate data, when they needed it, to support decision making and continuous improvement. Previously, communication in the team had centred on challenging the accuracy of the data rather than on the opportunities for continuous improvement it was highlighting. As a business with significant growth opportunities in export markets and with ambitious strategic goals, it was important that James could remove himself from daily operations to spend time focussed on delivering these objectives. James didn't want to put pressure on his team to deliver ever increasing production outputs without first providing them with the tools that would allow them to succeed i.e clear performance data.

James' first objective therefore settled on establishing this data driven approach.

THE CHALLENGES

There were two specific technologies on which the data driven approach would centre, the ERP system and real time performance data from the manufacturing line.

The 30 SECONDS ERP system was rolled out relatively recently, but wasn't providing suitable visibility to the team of production plans or shipping requirements. The relevant reports and screens were not available to provide timely insights, and the functionality was causing significant manual input to achieve reliable production and procurement plans.

The second technology was the deployment of real time data and dashboards for the production team, which also experienced numerous difficulties. With legacy controlling equipment on the shopfloor restricting data flow to the cloud, it became a time consuming and distracting task to achieve the original objectives.

WHY DID THEY FACE THESE CHALLENGES?

In both cases a significant transformation of processes and thought patterns was essential to deliver the outcome. To understand where challenges occur in these transformations, it can be valuable to use change management models to help exemplify where these obstacles occurred. Although there are numerous change management models – the classic model below is the most illustrative option here.

Ultimately 30 SECONDS was trying to deploy new technologies in their business to increase their Industry 4 maturity, however they were missing some of the key ingredients to implement a successful and sustainable change. In particular, the resources and skills to deliver the desired outcome.

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In both the ERP deployment and the real time dashboard project, 30 SECONDS can now reflect and identify that they didn't have all five ingredients required to deliver successful change. In both cases, although a high-level vision of a data driven enterprise was established – a more detailed vision for each individual project and what it would specifically deliver was not clearly defined. Coupled with the specific skills lacking from the project teams (including solution providers), it was unlikely the desired outcome would be achieved.

A couple of specific examples at 30 SECONDS help to illuminate why they had challenges in their deployment.

In trying to establish a real time data feed from their machine to provide insights to the production team 30 SECONDS didn't clearly communicate an action plan with the initial solution provider to detail specific deliverables and timeframes required – meaning both internal and external stakeholders weren't clear on exactly what they were trying to achieve, leading to the knock-on effect of over complicated solutions.

On reflection a clear vision for what was required, and resources needed was missing from the ERP implementation project, leaving gaps in their process and integration which are now filled by manual intervention by the administrative team. In addition, the necessary level of experience and resources from relevant previous implementations was missing, all contributing to a suboptimal outcome for the package.

THE SOLUTION

When deploying technologies in their business, 30 SECONDS have taken learnings from their previous experiences and now have some standard practices they use to ensure that future deployments are successful.

The first of these methods is to Go.Look.See. Identifying a business who has deployed a similar technology, or that has similar challenges to understand the approach they followed, the success they had and most importantly the lessons learnt that could benefit the roll out. It can be difficult to identify a business that is not a direct competitor and has similar technologies, which is why tapping into business networks can be essential. In particular the Network of Site Visits programme and the Industry 4 Demonstration Network as a whole are endeavouring to connect as many businesses as possible during the face to face site visits, webinars and case studies. All these resources are available to view or sign up for on the Industry 4. Demonstration Network 4. Demonstration Network members to enquire about suitable businesses can be an easy way to connect with possible comparative companies (with approvals from all required parties).

Where it isn't possible to Go.Look.See to understand the optimum deployment of a technology, taking part in the Mobile Showcase or Network Site Visits could help to close this gap by interacting with technology experts from the associated organisations that run these events, or by meeting business leaders facing similar challenges.

Another key aspect to ensuring any changes are successfully deployed is to have a clear vision – in 30 SECONDS case the high-level vision of a 'Data Driven Enterprise' was established, however this clarity wasn't projected on to each technology deployment. In short, all team members (including external service/solution providers) were not clear on the specific outcomes expected from each technology. To resolve this, as with any significant continuous improvement project, developing a brief or scope the details the objectives and key deliverables in a specified timeframe is invaluable. SMART objectives are a good starting point for writing a good brief.

Finally following a formal vendor process to get multiple comparative quotes for delivering a specified outcome, can shed light on what different solution providers deem as critical and can highlight gaps in your own scope. In particular it can also provide opportunity to be challenged on why you wish to deploy a certain technology. Often as business leaders, our understanding of what is possible through technology can become quickly outdated – meaning exposure to communication with solution providers can broaden our perspectives ultimately leading to a better outcome. In short, it may be that new technology makes it simpler or cheaper to achieve a specific outcome than originally thought.

Overall, 30 SECONDS have identified a series of opportunities to improve their readiness and leadership approach to deploying technology, and generally how they manage change.

KEY TAKEAWAYS

- » Setting a clear vision of the outcomes can be supported by Go.Look.See, individually or through the Industry 4 Demonstration Network, at companies facing similar challenges.
- » A SIRI Assessment can provide a common language to communicate with solution providers.
- » A formal vendor process can widen your perspective on how to achieve the project objectives and act as a gap analysis for your original scoping.
- » Setting a vision and specification for the desired outcomes and agreeing these with any providers upfront is essential to give clarity around the expected deliverables.

To find out more, head to www.industry4.govt.nz

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Action Network Site Visit

BACKGROUND

New Zealand owned and operated, Action is the largest vehicle specialiser in Australasia. As we've grown over 75 years, we've gained strength from being under the same umbrella as two iconic partners: Tourism Holdings Ltd (THL) and Kea Manufacturing.

Our unique advantage is both scale and flex; a combination of proven volume manufacturing capability, coupled with a well-embedded design-led culture and relentless attitude towards quality.

THE OPPORTUNITY

Action Manufacturing have built their business on a solid foundational understanding of the importance of robust processes in manufacturing.

The team have leveraged efficiencies through the application of continuous improvement and standardisation of their products and workflows. A robust process serves as the foundation for successful technology or software deployment because it ensures that operations are streamlined, risks are mitigated, quality is maintained, and users can adapt to the changes more easily. Starting with a solid process framework sets the stage for a smoother and more effective implementation of technology solutions.

James' first objective therefore settled on establishing this data driven approach.

KEY BENEFITS

1-Efficiency and Effectiveness

A well-defined and robust process ensures that tasks and activities are carried out efficiently and effectively. When deploying new technology or software, you want to make sure that the underlying processes are optimised to take full advantage of the new tools. Otherwise, you may automate inefficient or ineffective processes, which can lead to wasted resources and suboptimal results.

2 – Standardisation

Robust processes provide a standardised framework for carrying out tasks. Standardisation is crucial when implementing technology because it helps ensure consistency in operations. This consistency is particularly important when multiple individuals or teams are involved in using the technology or software.

3 – Risk Mitigation

Robust processes often include built-in checks and controls to mitigate risks. When deploying technology or software, there are inherent risks such as data security, system failures, or process disruptions. A well-defined process can help identify and address these risks proactively.

4 – Quality Assurance

A robust process includes quality control measures. Ensuring the quality of outputs or outcomes is essential, especially when technology or software is involved. Without a robust process, there's a risk of producing subpar results or introducing errors into the system.

5-User Adoption

When employees or users are introduced to new technology or software, having a clear and well-structured process can make the transition smoother. Users are more likely to embrace and adopt new tools if they understand how the tools fit into their workflows and how to use them effectively.

6-Scalability

As organisations grow or as the usage of technology or software expands, having a robust process in place ensures scalability. It allows organisations to handle increased workloads and complexities without major disruptions.

7 – Measurable Outcomes

A well-defined process provides a basis for measuring the outcomes of technology or software deployment. It allows organisations to set clear benchmarks and key performance indicators (KPIs) to assess the success of the implementation.

8-Continuous Improvement

A robust process encourages a culture of continuous improvement. With a well-structured process in place, organisations can regularly evaluate and refine their procedures to optimise efficiency and adapt to changing circumstances or technology updates.

To find out more, head to www.industry4.govt.nz

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Argus ManuTech

Wired for Success

BACKGROUND

Argus ManuTech is an innovative manufacturing company in Christchurch, New Zealand, supporting various Argus Group companies with R&D, manufacturing, and logistics. Their modular manufacturing operation adapts to diverse industry requirements, producing high-quality products using advanced lean principles.

With a focus on innovation, Argus ManuTech's R&D engineers lead the way in driving industry innovation and designing custom products for clients. Their agile production facility and manufacturing engineering support enables an efficient response to customer demands.

Argus ManuTech prioritises quality, exceeding industry standards and ensuring compliance with regulations. Their dedicated logistics team ensures seamless supply chain management and reliable product delivery.

As an integral part of the Argus Group, Argus ManuTech delivers top-notch manufacturing solutions and technical support to meet diverse client needs, setting new standards in the industry.

THE OPPORTUNITY

Recognising the importance of product quality, the team at Argus ManuTech identified an opportunity to improve the availability of test information for one of their key products. They believed that by doing so, they could achieve significant quality improvements. The introduction of a new IBC foil heater gave them the opportunity to design and implement a connected quality test system. This product required manufacturing to a new world-class specification, rendering the original quality test procedures and equipment inadequate.

The team also saw this as a chance to enhance productivity and ergonomics in the manufacturing area dedicated to these products.

A prototype test solution was designed and implemented but it was unsuitable for full production due to several issues, including non-intuitive operation for production staff, a lack of adaptability to process changes, and insufficient guarding. Additionally, the associated electrical safety tester did not possess the required data capturing capability that was mandated by the new requirements and desired by the team for process improvement and product quality feedback.

THE SOLUTION

A cross-functional team came together to develop a robust connected quality test system that incorporated Industry 4.0 principles to enhance product quality as well as redesigning the line to improve productivity and ergonomics.

The solution incorporated a custom software interface, durable industrial build quality, improved safety features, an adaptable design, and the capacity to enable advanced data analytics.

The key features of this solution were as follows:

Custom Software

Hardware is controlled via a user-friendly interface developed in National Instruments LabView that also captures data from the Electrical Safety Tester and stores it as a CSV file. This simplified testing by automatically initiating tests when the interlocked guard closed, displaying system status and pass/fail results.

Industrial Build Quality

The project emphasised industrial-grade construction, utilising components from trusted manufacturers such as Festo, Schneider, Siemens, and Omron. The hardware exhibited durability, while the software was built using National Instruments LabView.

Robust Pneumatic Guard

The team designed a custom guard to enhance station durability and ensure safety during testing.

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Safety Measures

Safety was a primary focus, incorporating two-handed control, a monitored emergency stop circuit, non-contact safety switches for the interlocked cover, and an ANDON tower for status indication. In addition, the team ensured the incorporation of the following considerations:

Adaptable Design

The test station was designed to accommodate future product and process changes. It utilised modular aluminium extrusion and the control system employed a programmable logic controller (PLC) for potential product portfolio expansions.

Maintenance

Hardware choices were made to minimise component failure, with on-site replacements available. The control cabinet utilised standard wiring techniques for easy troubleshooting, and the electrical system was fully documented.

Operator Interface

The interface was designed to be intuitive, featuring two-handed control, continuous safety monitoring with an Omron Safety Relay, and a PC monitor for status/results.

Modular Assembly

Construction employed modular aluminium extrusion, simplifying modification without custom brackets. The guard consisted of a steel square section with polycarbonate guarding, offering rigidity and impact resistance.

Hardware Expansion

The hardware facilitated future test capability expansion, featuring spare inputs/outputs in the PLC for control upgrades.

Data Analytics

Test data is automatically exported as CSV files for each test cycle and processed in PowerBi for analysis.

NEXT STEPS

- » Develop the ability to view First Pass Yield (FPY) & overall Yield data in real-time and display them visually on the factory floor.
- » Investigate the use of technology to identify which assembly line the product was manufactured on.
- » Transition results to a SQL database to support larger data volumes and improve analysis query load times.

KEY BENEFITS

- » Analysing defect data has led to an increased understanding of upstream manufacturing processes as targeted root cause investigation work could be performed.
- » This approach led to foil heater defect PPM & CoPQ reducing by 47% and First Pass Yield increasing from 94% to 97% since November 2022.
- » Successfully implementing this test system has increased our team members' knowledge, skills, confidence, collaboration, and pride in their work.
- » Additional improvement opportunities have been identified that would not have been considered previously due to being deemed cost-prohibitive if performed by an external company.

KEY TAKEAWAYS

- » Being involved with an in-house design/build project is incredibly rewarding for team members' skills development and implementing a positive culture.
- » Approaching the project with a strategic consideration of the test systems life-cycle is important as long-term implications including scalability and adaptability can help ensure lasting success and keep development costs to a minimum.

To find out more, head to www.industry4.govt.nz

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Ballance

Network Site Visit

BACKGROUND

Ballance is a farmer-owned co-operative based in New Zealand, deeply committed to fostering sustainable and profitable farming.

Founded as a fertiliser-manufacturing enterprise, the organisation has evolved to incorporate advances in agri-science and technology. Besides a broad range of science-based nutrient products, Ballance also offers award-winning farm systems software, providing a 360-degree solution for farming productivity while minimising environmental impact.

Within its Awarua fertiliser manufacturing facility, Ballance experienced a challenge: limited visibility into its production operations. Despite having a supervisory control and data acquisition (SCADA) system, the organisation found it difficult to access relevant information quickly and remotely, leading to delays in decision-making.

INITIAL RESPONSE

Ballance had been using a manual report, which operators would fill out on paper, based on the readings they were seeing on the control room screens.

This helped to highlight when trigger or alarm points were being approached, supporting quick response by the team, as well as giving a rough-and-ready paper trend.

THE SOLUTION

Ballance implemented a PI Historian system, which was connected to its existing SCADA setup. This was gradually rolled out across the production facility, department by department, by a cross-functional team. Initially constrained by data tag limitations, the team worked within these confines but quickly moving to tag all SCADA data points. This allowed the PI Historian to be comprehensively linked to the SCADA system.

IMPLEMENTATION PROCESS

The roll out was strategic, conducted department by department to ensure minimal time commitment from the implementation team and to test the system's efficacy in smaller environments before a full-scale implementation.

THE RESULTS

The PI system produced significant improvements:

- » Clear and easily accessible information
- » Data-sharing capabilities across various teams
- » Potential for automated daily production reports
- » Quick response to production challenges
- » Enhanced team agility
- » Data-driven decision-making
- » Enhanced problem-solving
- » The fine-tuning of existing systems and automation
- » Remote access and visibility to site operational data

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NEXT STEPS

Ballance plans to further expand the system's capabilities by:

- » Implementing automated production reporting
- » Adding control points and alerts
- » Increasing sampling, testing and tracking capabilities for quality assurance
- » Wider systems integration into lab systems and its enterprise resource planning

KEY BENEFITS

The PI system enhanced operational visibility and provided the team with the tools to make rapid, data-driven decisions. This enabled not just a more agile response to problems but also an overall streamlining of the manufacturing process.

Measurable improvements have been as follows:

- » Enables installation of automated pH control using existing SCADA system, resulting in increased Resource Consent compliance. Since system has been in place, there have been zero Resource Consent breaches.
- » Fine-tuning of existing wastewater system with targeted improvements.
- » Significantly reducing the time requirement from operators when running problem-solving activities.
- » Increased agility to proactively respond to potential production issues and keeping control parameters within agreed specifications analysing defect data has led to an increased understanding of upstream manufacturing processes as targeted root cause investigation work could be performed.

KEY TAKEAWAYS

- » **Tag Everything:** Comprehensive data capture is crucial for wider analytics and operational oversight. This can lead to improvements in traceability and quality control.
- » **Speed is Essential:** Leveraging system capabilities for rapid decision-making is key. In fast-paced industries, access to real-time data can be the difference between staying ahead of the competition and falling behind.
- » **Data-Driven Culture:** Cultivating a data driven culture is essential and can significantly benefit from making decisions rooted in solid data analytics. You can do this by taking the front-line teams through the "why" and highlighting the benefits to them.

To find out more, head to www.industry4.govt.nz

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BA Pumps & Sprayers

Network Site Visit

BACKGROUND

We are a family-owned business, founded in 1989 by siblings Mark, Penny and Guy Rendle. Like so many Kiwi businesses, we started BA Pumps & Sprayers, formerly known as Bertolini Australasia, out of the belief that we could design and build a better product.

Our approach to business is built around the simple premise that combining good old fashioned Kiwi ingenuity with the world's best components and technology, backed by nationwide support and service, will always be a winning formula.

With a combined experience in the agricultural sector in excess of 125 years, our sales and service team prides itself on delivering the best advice, solutions, and product support nationwide.

THE OPPORTUNITY

BA Pumps and Sprayers has an enterprise resource planning (ERP) system that is reaching the end of its product life, requiring it to look at new opportunities in the market.

An ERP is a solution that integrates and manages core business processes and data across various departments and functions within an organisation. This includes functions such as finance, human resources, inventory management, procurement, manufacturing and, in some cases, customer relationship management. BA Pumps and Sprayers currently has a tier 2 ERP system, a mid-level solution that offers a balance between affordability and functionality, catering to the needs of medium-sized businesses. Tier 1 systems are commonly found in large multinational corporations

THE SOLUTION

1-Need for new system

Understood the need for a new system, driven by the sunset of the current ERP, and a desire to improve our supply chain performance, real-time stock position and transparency of information across the business.

2-Cross-functional team

Gather a team of cross-functional users, including an external consultant, to capture the requirements for the business.

3 - Target systems/vendors

Using help from the consultant, drafted a list of target ERPs available in the NZ ecosystem.

4 - Develop a list of requirements and features

By refining the needs, not wants, of the business, understanding the strengths and weaknesses of the current ERP and the business model, the team were able to develop a list of requirements.

5 - Sought proposals from vendors

Sent a request for proposal to selected vendors.

6 – Preliminary review against criteria by consultant to create a shortlist

7 - Narrowing the shortlist

Comparing the features of the systems on the shortlist against the required features, the team were able to reduce the short list to three options for deeper investigation.

8 - Live demonstrations and real-world users

Went to companies using candidate solutions, viewed product demonstrations, and spoke to users of the software who were able to demonstrate the capabilities of the packages and understand the real-world implications of how they operate.

9 - Features matrix and independent rating by team

The team members then individually ranked the software packages against the predetermined criteria based on their impressions of the software in use.

These scores were then reviewed and presented to the board for consideration, along with cost and other factors.

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KEY TAKEAWAYS

- » By taking a collaborative approach to the decision, the entire team were engaged in the selection process, and have great levels of ownership about the recommendation presented to the board.
- The team understand there is significant preparation work around mapping business processes, and selecting what products and services carry through to the new ERP system. The team also understand what else is in the market, and a broader understanding of features and what is possible. Furthermore, they understand the way the system is designed to work and its philosophy.
- » Vertical integration is a key Smart Industry Readiness Index dimension and the team have elected to include a manufacturing execution system and customer portal, which will improve the flow of information through the business, tackling current challenges around information flow, process visibility and real-time data for decisionmaking.



To find out more, head to www.industry4.govt.nz

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Bonson

A vision for a quality future

BACKGROUND

Bonson Industrial co. produce and source plastic, recyclable and fibre-based packaging for some of the most widely recognised Kiwi brands. From their modern facilities in New Lynn, Auckland, they manufacture injection moulded products predominantly used in the food industry. With a highly automated process they produce millions of units annually, all of which must achieve the high quality standards expected by their wide customer base and final consumers.

THE CHALLENGE

Bonson have a wide range of in-mould labelled (IML) products where the label and plastic mould are combined at the same time to produce a high-quality finish with an embedded label made of the same material as the container, ensuring full recyclability. This technique automates the labelling process, but also means that every unit must be inspected for quality, especially when the differences between labels can be miniscule but ultimately determine whether the end product is packaged correctly.

Historically where machines had a low number of cavities or longer cycle times and produced only one or two units per injection cycle, the manual process of inspecting and packing the products could be managed by one person across multiple machines. To increase capacity, higher cavity number machines have been introduced, making it more challenging for packing teams to keep up with the logistical elements of the role. Part of the packing team's job is to inspect the products for critical features visually as they pack. A new contract led to the introduction of their fastest ever machine, capable of 1 unit per second, which would have required 3 packers full time to quality inspect and pack the product.

In addition to the visual checks, dimensional and specification checks around weight, lid fit and crushing performance are also carried out periodically and the data captured in the Manufacturing Execution system. The additional volume increased pressure and targets around productivity, which forced the Bonson team to look outside the box to improve their processes.

THE SOLUTION

The team realised the benefits of capturing empirical data about machine performance, but understood it was unrealistic and expensive to carry this out more frequently using the packaging team due to capacity. They used the introduction of a new machine (trialling a new product alongside MG and Cryovac) to introduce new vision technologies to control labour costs. It was estimated based on throughput that the new machine would require 3 personnel full time to pack the product, an additional labour cost that would have significantly impacted margins on the new product line.

The team began an investigation into vision quality systems, settling after much enquiry on Omron, due to the fact that the support and spare parts were readily available from a New Zealand based supplier. The multi camera based system is able to be 'trained' by an operator to look for critical characteristics, which can then be saved as a programme to run for that product at any point in the future. The vision based system worked as part of the integrated solution to remove, transfer and stack the product and was able to inspect the product from any angle to ensure compliance to specification. The Bonson team sought the external support of ACSE as a provider of technical support to integrate the system with their machinery.

THE RESULTS

The result was that 100% of products could be inspected for all critical features, or a critical 'master feature' that determines whether the rest of the labelling was correct. The system also allowed them to start capturing validated reject data, whereas the manual system previously resulted in rejects with no known reason codes for the rejection. Additional features were also in scope to be validated by the camera system such as dimensions.



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This quantitative, validated and reliable data is going to provide a vital foundation on which Bonson can build their future Industry 4 journey by gathering real time insights on quality and detailed diagnostics on possible root causes for any failures. This reduces the reaction time and the potential scrap produced as well as education and understanding for the production teams.

NEXT STEPS

The next step is to expand its use across clear plastic products through some adaptations based on learnings from their interaction with Omron, a brilliant example of where building a relationship with a solution provider could really add value to the business.

The database of information that will be at Bonson's disposal will allow them to overlay analytics on the data to gain insights on the quality performance of individual aspects of a machine and insights that can feed into their production scheduling process. Knowing which machines, machine setters and machine parameters provide the best empirical outcome for each product has huge potential to improve OEE.

KEY TAKEAWAYS

- » Vision systems are becoming more viable in terms of return on investment for ever increasing complexity of products.
- » Turning tacit knowledge into empirical data can have potentially far-reaching impacts on other business processes. Here quality data might have a huge impact on product scheduling optimisation in the future.
- » Vision systems offer the dramatic increase in data collection and digitisation; essential as a foundation for Industry 4 progression.

To find out more, head to www.industry4.govt.nz

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PROGRAMME PARTNERS



BOSTOCK New Zealand

Bostock

Digitising the Continuous Improvement Cycle

BACKGROUND

Bostock New Zealand is a family owned vertically integrated horticultural company specialising in producing and marketing premium produce to high paying customers around the world. Bostock grow and market high-quality organic apples and export conventional apples on behalf of independent orchardists.

The company also grows organic and conventional squash, onions and maize as well as producing organic wine and organic apple cider vinegar.

They aim to be a truly sustainable company - environmentally, socially and financially - with the commitment of growing healthy, premium produce in partnership with nature, preserving and enhancing the environment for future generations.

THE CHALLENGE

With a growing squash operation, expanding its exports into additional markets, Bostock increasingly had stricter regulations to comply with in terms of the size / weight grading of squash. If incorrect, Bostock was either losing value from pricing differences per size grade; or in reverse customers would claim against the grower for not meeting specifications. All this was exacerbated by challenges in getting team members to operate the process, especially through the pandemic. The traditional method for 'sizing' squash was a fully manual process, with product on conveyor belts and graders on either side making thousands of snap decisions daily to determine the size grade of a squash, typically Small, Medium or Large. This combined with manual handling of every squash to then ensure it went to the correct part of the process. Unsurprisingly, this job was an intensive task, which could wear out team members. Furthermore, depending on experience and skill the manual process could be as low as 30 per cent accurate to specification, resulting in significant customer claims.

With the ever-increasing volume through the packhouse, labour shortages and the increasing challenge of tighter customer specifications from emerging markets it was imperative that Bostock looked to alternative solutions to managing their size grading.

THE OBJECTIVES

- » Increase accuracy of size grading to consistently > 85 per cent (compared to between 30 and 70 per cent)
- » Remove the requirement for 2 (of 4) people to operate in the Small/Medium Size grading area
- » Fit the solution within the existing footprint of the sizing area

THE SOLUTION

Using an agile methodology to quickly prototype and iterate, the IT team at Bostock developed an in-line sizing tool, able to accurately determine weights and mechanically separate them accordingly.

Firstly, as is good practice, the team conducted extensive research through internet searches, liaising with suppliers of similar equipment and with their existing network to understand any existing 'off the shelf' or customisable solutions. It became apparent that nothing was readily available in the market, and they would have to develop the solution in house. Matt Stafford, Bostock's Innovation and Sustainability Manager then applied for a project grant from Callaghan Innovation using the research as part of this application.

Once approved, the project grant allowed the Bostock team time to dedicate specific resource into building a prototype without distracting from existing business operations.



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The prototype was retrofitted around the existing process to prove the concept they were looking to implement. Rigging the prototype to the solution, whilst still allowing for 'traditional' operation meant that testing could be done any time, and if unsuccessful, there would be limited impact to the product and customers.

The solution used readily available industrial components to determine an average size of the fruit, travelling at a known speed down a belt, based on known densities of the fruit and typical shape profiles. An algorithm then converts this into a known weight, liaising via a PLC with hydraulic rams, to separate fruit out as they pass down the belt. Originally incorporating a height measure for extra accuracy, it was later removed as the additional complexity did not sufficiently increase accuracy.



It is impressive and worth noting that Bostock extensively utilised internal resource such as interns from the local Eastern Institute of Technology to develop the solution. The advantages of this according to the project IT manager was to ensure that the functionality, ability to tweak and adapt the solution and repair or upgrade in the future remains in the business. Being a great innovative project to engage the team this also acted as a retention tool, exciting the teams that there would be interesting and challenging projects to work on in the future, where they could see the end result form from their own work. It is exciting to think that this innovative solution was put together using 'off the shelf' components showing the accessibility of technology integration. The collaboration across the workforce was also great to see. Inhouse engineers and graders all involved in providing ideas as to how to improve performance. For example, a challenge with an earlier version was that the fruit were 'moving around' too much to get an accurate reading on size. Through multiple discussions, a solution was found to reduce this movement through some simple mechanical retrofits.

In the year prior to its installation, the business had experienced a few claims from the people-driven sizing process not being accurate enough, in the season just finished, with two fewer operators in this area, no claims were logged regarding sizing. A great example of where technology solutions aimed at achieving certain objectives can often have positive impacts unwittingly elsewhere. In addition, this project added sufficient weight to another process change elsewhere.

Although the main objectives focused on operational improvements, additional health and safety benefits have also been significant. Also of benefit is the ability to collect real-time data using the PLC that drives the process. The data generated helps provide improved business performance intelligence and improves growing and grading processes.

KEY TAKEAWAYS

- » There are various funding opportunities available to companies looking to develop innovative in-house solutions, these grants allow teams to focus their attention on completing the solution and delivering results rather than 'fitting it around the day job'.
- » Identifying already in-market solutions, that are comparable but not the same can be a great advantage when developing a solution, but also when applying for grants.
- » Having a small, agile team with less 'red tape' allows projects to quickly adapt and deliver results.

To find out more, head to www.industry4.govt.nz

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Breadcraft

Network Site Visit

BACKGROUND

Breadcraft is an 80-year-old family-owned company in its third generation. With around 160 staff onsite, it is the third-biggest employer in the Wairarapa region. Breadcraft specialises in all things bread with a large portfolio containing artisanal breads, bagels, burger buns, flatbreads, paninis, tortillas, gluten-free products and more.

One of Breadcraft's house brands is Rebel Bakehouse, with a range of bagels and tortillas that can be found in all retailers. The tortilla manufacturing plant at Breadcraft is state-of-the-art with capability to run over 20,000 tortillas per hour. This plant operates by hot pressing dough pieces into the required size before baking, cooling, and packing the product for purchase and consumption.

This plant uses Industry 4.0 technology to capture tortilla sizes and send that real-time data to a system that can make size adjustments on the go to ensure all product stays within specification and of the highest quality.

THE CHALLENGE

When things go wrong on a high-speed manufacturing line, they go wrong quickly and the magnitude of an issue compounds quickly too. The cost of quality is significant, with a constant flow of valuable raw materials consumed and wasted and the scrap pile getting bigger by the second.

Processes are usually quite stable when running. However, batch to batch variation between raw materials, and even in batch variability,

can trigger a process to suddenly spiral out of control. This is especially common in processes relying on natural ingredients.

Breadcraft produces up to 20,000 tortillas per hour through their wheat-based tortilla manufacturing plant. There are many variables throughout the production process, from the composition and quality of the flour and other raw materials, dough temperatures and even the ambient air temperature and humidity, these all play a large roll towards processing and achieving product quality.

THE SOLUTION

Tortillas are made by pressing balls of dough into the characteristic flat round shape before they are baked in an oven and packaged, ready to eat. To compensate for the infinitely variable natural products, the tortilla press is equipped with two vision systems, one on the infeed and one after the baking process.

The first camera sits just after the press operation, scanning and monitoring the size and shape of each tortilla that has been pressed. Due to the variable elasticity of the dough the tortillas can shrink, or simply not be pressed enough to create the right sized product. The smaller tortillas will be thicker and may not bake properly, which has a significant impact on quality.

The camera measures each tortilla. If there are three Out of Tolerance readings, the camera calculates the required adjustment to the press and adjusts accordingly while continually monitoring the critical quality parameters. If it over-adjusts within another three cycles it can recalculate the fine-tuning required. 3 cycles on the press takes about 9 seconds, so this is more accurate, faster and less wasteful than relying on operators to make the adjustments.

KEY TAKEAWAYS

The first camera is a great example of Industry 4.0 technology, as the images captured are not only inspected, but the result of the inspection is used to adjust the process to mitigate future errors. The camera covers three of the SIRI assessment dimensions:

- Shopfloor automation making the adjustment for the operator
- Shopfloor connectivity by having the camera system able to communicate with the press
- Shopfloor intelligence where the camera system can make a decision automatically without human input

The impact this has had on Breadcraft's process is:

- Reducing waste from ~3% down to less than 1%
- Reduced the need for specialist press operators
- Empowered the team to challenge the way things have always been done with the power of data and analysis

To find out more, head to www.industry4.govt.nz



PROGRAMME PARTNERS



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WOOLCARPETS+RUGS

Bremworth Network Site Visit

BACKGROUND

Bremworth is an iconic New Zealand brand offering premium wool carpets and rugs uniquely designed and made in New Zealand.

With over 60 years in the flooring business, Bremworth's ingenuity to innovate with natural materials aims to make homes more sustainable, safer and desirable places to live.

Through operations in Auckland, Napier and Whanganui, Bremworth sources the best quality New Zealand wool for crafting woollen yarn into premium carpets and rugs that quietly work away to enhance your home and health.

THE OPPORTUNITY

Bremworth's spinning plants located in Napier and Whanganui have being producing yarn from 100% New Zealand wool for decades using largely unaltered manufacturing techniques. Over 40 legacy machines and assets are used to complete the manufacturing process. With the transformation to 100% wool carpets (removal of synthetic carpets from Bremworth's product range) there has been a lift in demand for wool yarn.

A key step in the production of carpet yarn is the dyeing process. Historically dye vats were run partially filled to order which results in some loss of manufacturing capacity, a change was made to increase vat utilisation and lift overall capacity. This change in business process required better ways of monitoring the process and increasing visibility of shop floor status. There were several gaps in the flow of information to and from the factory floor. Although some sensors were already in place on the vats, these were not connected to deliver an overall view of production. Process and formula control was also very manual, and paper based.

THE OBJECTIVES

- » Integrating existing systems for collecting and processing data from the shop floor.
- » Automating process and formula control to the shop floor and integrating with enterprise-level systems.
- » Ensuring the resultant system maintains machine efficiency, production throughput, and data integrity.

THE SOLUTION

Bremworth was simultaneously replacing and consolidating legacy financial, inventory control and other systems with Dynamics365 (D365). D365 integrates data throughout the organisation and makes a seamless connection between all available information systems. Despite its capabilities to manage enterprise-level information, D365 does not provide enough granularity for shopfloor data management and lacks efficient communication with sensors, PLCs, and production systems in general.

A manufacturing execution system (MES) for scheduling production processes and controlling shop floor machines and equipment in real-time was needed that integrates with D365. The Ignition platform by Inductive Automation was selected as the preferred MES. If fully utilised and integrated with other production systems, the Ignition platform can:

- » Provide better visibility of the production process with shopfloor-wide traceability.
- » Enhance equipment effectiveness and reduce downtime.
- » Assist with making better decisions using real-time data

A new cloud ERP (Dynamics365) was implemented at yarn manufacturing plants in Napier and Whanganui. The D365 cloud-based ERP system would be used for finance, inventory, procurement, sales and MRP, which would then pass on the production requirements to the MES (Ignition).



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PROGRAMME PARTNERS



An interface was developed between ERP (D365) and MES (Ignition). The ERP generated dyed fibre production orders to the MES where they could then be scheduled to run on specific dye vats. This brought together the product order details with the actual production data – start stop times, temperatures, pressures, cycles, chemicals, dyes used etc. Orders are displayed on a Gantt chart showing specific dye vat loading by date and sequenced by colour.



THE RESULTS

» The MES system provides data/visibility into the specific production details so a clearer understanding of plant, equipment and product performance could be achieved.

- » Visibility was improved throughout the process, allowing visualisation of OEE, production schedule, actual versus targeted production, machine status, delayed production, and more in real-time.
- » Schedule entries were automatically adjusted to accommodate production progress, breaks, and other factors that affect production in real-time.
- » Each dye vat was connected to the MES to show current machine status, pressure, temperature and setting. Operators also could see what the dye vat was currently dyeing and what was next.
- » All machine/vat data relating to the dye/shade order are saved to providing 'big data' for future analysis.
- » Start and end of each dye order was identified by using the sensor data from the machines, which allowed autoscheduling of 80-85% of the dye orders by applying the same scheduling criteria programmatically as the human planners were doing manually.

NEXT STEPS

- » Rolling out the project throughout the whole production line and connecting all the machines on the shop floor to MES (Ignition).
- » Employing Machine Learning and advanced data analytics on the collected data to optimize dye cycle times and chemical usage.
- » Root cause analysis by using quality inspection results and production data collected from MES, ERP, and other production systems.

To find out more, head to www.industry4.govt.nz

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PROGRAMME PARTNERS





Comvita

Beginning the paperless journey towards a smart supply chain.

BACKGROUND

Comvita was founded in 1975 by two New Zealanders, Claude Stratford and Alan Bougen, who are widely regarded as pioneers in Manuka honey. Their partnership was based on an enduring belief in the power of nature and as beekeepers, an understanding of the special properties of the hive to protect and heal. Through research and scientific rigour, the Comvita product range brings the power of the hive to the consumer through the core ingredients of Manuka honey and Propolis. With this potent combination of nature and science Comvita products offer consumers health solutions that support digestive health, immunity, everyday wellness and the skin.

THE OPPORTUNITY

In 2021, Comvita officially opened its state-of-the-art Wellness Lab experience space in the Viaduct, Auckland. A seamless integration of nature and science to take guests on a rich and unique multi-sensory journey that will bring an unparalleled depth to their perceptions of honey, Manuka and bees.

The iconic manuka tree grows deep in New Zealand's remote hill country and coastal lands. Flowering only once a year for 2-6 weeks, the nectar of the manuka flower is rich in a unique variety of phenolic compounds. Given its short flowering season, it takes immense skill, planning, and resources to harvest Manuka Honey, which is why we can never take a single drop for granted.

Natural ingredients contain many attributes, all of which vary in a way that inherently means that no two batches will be the same. As this is

our day-to-day reality at Comvita, we require successful processes that are designed to embrace this variation and are fully backed up by rigorous quality standards.

We use a combination of IT systems and paper-based batch information to support our daily quality processes and these systems help us to manage this variation in the natural ingredients. The mix of IT and paper-based systems we use provide our teams with clear guidance on how to care for our products and it also creates a good record of what has been done for future reference and traceability purposes.

We know that the information being captured manually through our quality systems is very valuable to us but when we asked "what does this information tell us", we were often met with an incomplete or inaccurate answer. Due to the manual handling of the paper-based information and the long timeframes between an event happening and this information being reviewed, we were faced with a slow rate of improvement and problem solving.

One example of a process like this is in our decant area, where we remove honey from the drums it arrives in. The paper-based systems we use to record and validate incoming weights had real limitations, with the information being captured by hand

THE SOLUTION

We decided to use our decant process as a best practice area and designed a flexible and modular digital framework to capture and integrate operational data into our reporting systems. We would use this to prove the concept of an agile developmental approach and the benefits of digitalising our shopfloor data.

We followed the "Think Big – Start Small – Scale Fast" approach as follows:

1-Establish the business need

We identified a specific implementation point (our decant process) to trial the concept but also considered the whole supply chain and the future state.

2 – Design and create the IT architectural foundations for a single secure and flexible database

We specifically scoped this to ensure high levels of compatibility with data capture hardware, initially for the decant weight information but incorporating the ability to be easily and quickly scaled.

3 - Define an adaptable development scope

PROGRAMME PARTNERS

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Aiming for as close to "agile plug and play" concept as possible with core functionality established and modular components built fit for a specific need allowing for easy expansion throughout the business.



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4 – Create a clear roadmap to change with a defined scope to start

A point within the supply chain with a specific data need was selected to develop the baseline model – this was the decant area.

- » The baseline model was limited in scope to a specific task and a small number of inputs/outputs (In decant we use a barcode scanner to wirelessly capture from a loadcell and collate into a database along with meta-data from a handheld mobile device and minimal integrations).
- » Trial and prove reliability and fine tune the all important usability of the system, along with the horizontal integrations as information flows through the system.
- » Build-out basic reporting and analytics along with exceptions notifications.

5 – Once the baseline model is proven in the decant area we will expand the scope

To include additional inputs and outputs, integrations, analytics, and exceptions from the selected point within the supply chain.

6 - Follow the roadmap

Use an "agile plug and play approach" to grow the horizontal and vertical integrations throughout the supply chain, to move forward on the paperless journey, and ultimately Big Data/Industry 4.0 journey.

KEY BENEFITS

The benefits we are seeing so far from this solution are:

» Saving production operator time, meaning they can focus on value adding tasks.

- » Removing paper, and utilising both horizontal and vertical integration to provide easy to access to data that was previously limited.
- » Achieving a significant improvement in accuracy and reliability of data collected.
- » Able to access up to date insights and reporting, allowing for improved transparency of information across the business, reducing the latency of solving problems.
- » Getting the team excited about a paperless system demonstrated the usefulness and value of the transition to the team members with an easier, faster, and more meaningful solution

KEY TAKEAWAYS

- » Information currently captured on paper can provide a wealth of useable insights if collected in a more accurate and reliable way.
- » Clear business needs, an understanding of the future state and a well-considered IT Architecture are essential o build the roadmap to change.
- » A core design built on the approach of agile plug and play means modular flexibility to suit the needs of the business.
- » Start small, at one point with a simple purpose, and grow from there when ready.
- » Building a solution with the team using the tools helps drive the desire to change, supports ongoing engagement and keeps the passion high.

To find out more, head to www.industry4.govt.nz







Convex

Supplier technology and focusing on your value add.

BACKGROUND

As a rapidly growing manufacturer Convex Plastics regularly pushes the boundaries of what is possible in terms of sustainability and performance for the packaging of hundreds of brands that Kiwis' know and love. Convex Plastics' culture is dedicated to ensuring customers get exactly what they need from their packaging, and Industry 4.0 offers a range of opportunities for the company to enhance this offering while maintaining their focus on core business.

THE CHALLENGE

The 'Pre-press' part of Convex's printing process is essential in delivering perfect packaging. It involves taking a designer's artwork and converting it into a format that will print and fold exactly as required to optimally display their clients' products. Historically this was achieved through experienced staff on site meticulously ensuring that the dimensions, colour saturations and a myriad of other factors were adjusted to suit the inks and films being used in printing.

However, following the departure of a key member of the team there was some trepidation around how the department would retain the skills and capacity. The critical role of the department rested with a skill set that was both difficult to train and find in the labour market. Replicating the previous workflow would maintain a single point of failure for the business, while limiting their capacity to grow with customer demand.

THE SOLUTION

A strong supplier relationship with Kirks, who supply the final 'plate' required for printing, opened the door for an opportunity to dramatically improve Convex Plastics' process efficiency. Kirks had recently introduced a more serviced-based approach, facilitated by cloud-based portals, which meant Convex could now manage their workflows and subcontract the time-consuming elements of file preparation to experts. Where historically the team were engaged in file preparation, they could now focus on account management, ensuring customers were happy with the end results and samples.

The new workflow process involves remote access to their suppliers' portal, uploading necessary documents and specifications, after which it is processed under a service level agreement and returned for approval. The approval process can also be set up to notify and require sign-off from a set group of individuals, all remotely. This removed consistent roadblocks from delayed email forwarding and responses.

The new workflow delivered multiple positive outcomes for Convex. They no longer have a single point of failure in the business around the critical skill set in file preparation, and their ability to flexibly manage workload is providing the business with the time critical equipment required to deliver products to customers despite increased demand. If they had not pursued this workflow change, they would have been forced to hire additional staff and complete lengthy training processes to achieve their previous capacity, without being able to easily expand.

THE RESULTS

This collaboration with Convex's supplier is a great example of how inter and intra company collaboration is an essential dimension to extract maximum value from Industry 4.0 technologies. The cloud-based web portal and seamless collaboration technologies are examples of Industry 4.0 in action and exemplify the simplicity with which the Industry 4.0 journey can be started. The introduction of these technologies has also opened new revenue sources for Convex's strategic supplier, ensuring their on-going success giving greater supply chain confidence.

KEY TAKEAWAYS

- » New technologies are changing the way companies can work with their suppliers
- » Service level agreements with industry specialists can maximise the efficiency and accuracy of non-core elements of your business while removing risk and providing flexibility.
- » It is important to challenge traditional work flows and ask whether new technologies can open doors to work best suppliers.
- » Using new technologies to deliver better outcomes from suppliers is a great way to introduce Industry 4.0 into a business.

To find out more, head to www.industry4.govt.nz



PROGRAMME PARTNERS





Custom-Pak

Custom-Pak's improved job costing process.

BACKGROUND

It took a pioneering spirit for founder Brian Wilson to make the move from farming to the totally different world of manufacturing plastic packaging in 1989. He purchased what was then Sullivan Plastics in Christchurch and expanded into Auckland in 1997. This move, having manufacturing facilities on both the North and South Islands, allows Custom-Pak to provide exceptional service, flexibility and short leadtimes to customers.

Custom-Pak specialise in clear, thermo-formed, ridged and semiridged PET packs for fresh produce, meals, salads, baked goods and fresh meat and fish. Whether you're opening a cream cake in Cape Reinga or a punnet of blueberries in Bluff, it's probably in a Kiwi-made container from this Kiwi-owned company. Custom-Pak brings fresh food to hungry mouths all over the country, in tip-top condition and bursting with goodness.

THE CHALLENGE

To enable Custom-Pak to accurately cost and price their jobs, an Excel tool had been developed. This would take into account the material, labour and machine costs, and allow the sales team to then set a price. It also set the standard for the production teams to measure their performance.

Using the job costing tool was difficult and often inaccurate, requiring several tweaks and adjustments to get it right. It also took a significant amount of time and input from the production manager for each job. Because this tool was standalone, it led to additional administra-

tion work. There were also challenges with keeping accurate levels of raw material stored in their system. The tool was limited in terms of flexibility and didn't allow changes to the speeds and feeds of various machines, and the type of raw material used in the job, so the pricing was being based on static data.

Another challenge for the team at Custom-Pak was that all the rules for how to use the Excel tool were held in people's heads. This made it difficult to respond quickly to pricing requests when people were unavailable.

Once the jobs were priced and released, there was a requirement for verbal communication to teams and between shifts on the target times for each job, which would sometimes make it difficult to keep track of job progress and performance.

THE SOLUTION

Custom-Pak decided to build a module within their business system to support their job costing. The main aim of this tool was to improve accuracy, give them some flexibility and save time.

The team reviewed the calculations that had been built into the Excel document that they had been using and adapted them to account for additional variables, including the ability to allocate a particular machine to the job. This was important as the various machines could run with different cycle times. These additional variables were needed to support more accurate estimates.

The team then worked with their systems provider to update and create the required additional fields within their database. The agreed algorithms were then built into the system. Finally, the frontend user interface was designed with input from the key management personnel who would be using the system.

An additional opportunity identified by the team as part of this activity was to enhance the way they communicated the agreed job specification to the production team, and how they would use the plan vs actual data to support their problem-solving activities.

This was managed by creating two reports. The first helped to communicate the key requirements of the job to the production team and the second allowed the lead production team to compare actual performance vs plan, to support more proactive and timely problem-solving.



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PROGRAMME PARTNERS



As quality is a key focus for the team at Custom-Pak, they also decided to use this as an opportunity to incorporate key "quality watchouts" into the report, for the various products and jobs. These were historically based and captured information from within the business system from previous runs. This included operator sign-off aligned with the quality checks that they had built into the process.

One of the unexpected benefits of building this information into the system was that they could now integrate their system for past pricing vs actual performance and begin reviewing and analysing the trends for common themes and improvement opportunities. The next steps the Custom-Pak team are planning to take is to incorporate the new systems and reporting into their production area for data capture using tablets.

KEY BENEFITS

- » Saving over 4.5 hours of management time each week on job costing
- » Reduced quality issues, through improved quality focus and clear "quality watch-outs"
- » Ability to identify key issues and trends with actual performance to support problem solving

- Visibility of key data to support senior level decision making around profitability
- » Increased accuracy of job costing leading to improved profitability

KEY TAKEAWAYS

- » Taking institutional knowledge and methods and building them into systems, and reduced risk of losing that information.
- » Using and adjusting existing systems to complete core business tasks can save significant time.
- » Being clear on what variables will have an impact on core business performance is important, and having a place to store these.
- » Having historic information allows the opportunity to analyse and break down trends which can often enable a real and significant performance improvement.

To find out more, head to www.industry4.govt.nz







Danone

Network Site Visit

BACKGROUND

The Danone Aintree site manufactures a wide range of infant formula products, including those for high-care and high-needs clients.

Employing 300 people, this facility is a cornerstone of Danone's commitment to quality and environmental responsibility.

Specialising in the production of globally exported baby formula, the Aintree site contributes significantly to Danone's international standing. As part of a global group employing 96,000 people, this case study explores how the Aintree site has tackled engagement with multiple digital tools through the adoption of facial recognition.

THE CHALLENGE

The Aintree site has dozens of digital applications designed to manage different tasks, from HR to production data capture.

Operators may interact with some of these multiple times a day, and others monthly or less. As is common across many organisations, remembering and managing passwords for cyber security was often a barrier to effective use of these tools.

This has cascaded to inconsistent use of the different applications, as people couldn't access systems in a timely manner. Frustration was borne by operators and support functions as tasks couldn't be completed in a timely and accurate fashion.

To tackle this, a Plant Management System (PMS) had been developed in-house to act as a consistent front-end experience for operators regarding shop-floor-specific activities.

This PMS has become a central tool for digitising processes that were historically paper or Excel based, resolving audit findings and reducing manual input.

Specifically, waste reporting and raw material quality checks were two important activities that the PMS was able to adopt. In addition, this system incorporated warning and alarm functions to warn operators when specific tasks were due or overdue with a built-in escalation hierarchy to prevent reaching out-of-spec conditions in production.

The importance of this system, alongside the many others that the Danone team are required to engage with still had the weak link of passwords being forgotten or entered incorrectly. Whilst resets via support staff were available, the delay in resets could still impact production.

THE SOLUTION

The Danone team decided to trial a facial recognition method of signing on to the PMS. To do this they first obtained some legal guidance to ensure that all employees were aware that this is an opt-in service for their benefit, with images being used for this purpose and nothing else.

When opening the PMS solution, a facial recognition option is presented to the user, at which point they can simply look at the device camera (standard on all Danone devices) and be automatically logged in.

The system works by establishing a matrix of the user's face and comparing it against a standard already captured in the database from when the solution was set up.



Testing to refine accuracy of the model resulted in a robust solution that could still work with slight changes for users, such as wearing masks or glasses. With any significant changes, such as tattoos, a new reference image can be supplied to ensure the solution keeps working seamlessly.

The solution combined best practice digital security with very simple useability, the perfect combination to ensure compliance and audit requirements are met, whilst reducing frustration and admin for operators.

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PROGRAMME PARTNERS

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KEY BENEFITS

The central benefit of facial recognition has been as an enabler for deploying digital tools in the business. Removing a key frustration for many users has improved engagement in these technologies dramatically.

This engagement then compounds to mean that systems are more frequently utilised and therefore compliance data is captured more routinely, leading to better audit scores and therefore more reliable access to lucrative markets overseas. Greater confidence and access to digital formats of data have also resulted in confidence in data collection and therefore the viability of data analytics on performance.

Importantly, workarounds or shortcuts are now no longer possible, but with the added reassurance that users are very unlikely to need them with the robust and simple nature of the system.



Ultimately, a single front-end for all applications accessed via facial recognition could be a really powerful solution on which Danone can build its employees' digital literacy and engagement - Incorporating clocking in and out, access management and other functions would simplify the employee experience across the site. Going forward, the solution can be expanded to become a single sign-in for all systems required to be accessed, with the PMS acting as a front-end of every application required by Danone employees, subscribing and publishing information from a standardised front-end that users are familiar with.

In terms of useability, the team have discussed combining this with site access management, training records, automated data capture on operator inputs and others. All these are to be explored and discussed with teams to understand the possible return on investment.

Furthermore, a new reference image of a user's face could be populated every time they use the system, keeping it consistently accurate.

KEY TAKEAWAYS

- » Streamlining Operations through Facial Recognition: Danone Aintree's adoption of facial recognition technology addresses the common challenge of password management across multiple digital applications. By implementing this solution, the PMS serves as a consistent front end for operators, reducing frustration, enhancing efficiency, and ensuring timely and accurate completion of tasks.
- Enhancing Engagement and Compliance: The facial recognition system not only improves user engagement with digital tools but also significantly contributes to compliance and audit requirements. This increased engagement results in routine data capture, leading to better audit scores and greater confidence in data analytics. The technology eliminates workarounds, ensuring reliable data and streamlined access to international markets.
- Future Potential and Integration: Looking ahead, the facial recognition system has the potential to evolve into a comprehensive solution for Danone, serving as a single sign-in for all systems and applications. The envisioned expansion includes incorporating clocking in/out, access management, and other functionalities, ultimately simplifying employees' digital experiences across the entire site. This forward-looking approach aims to enhance digital literacy, engagement, and overall operational efficiency for the benefit of the entire organisation.

To find out more, head to www.industry4.govt.nz







D&H Steel Construction

Network Site Visit

BACKGROUND

With 50 years of experience in the Structural Steel industry in New Zealand, D&H have built a reputation as a preferred supplier to some of the countries most iconic building projects. From airports to universities their expertise covers estimation, detailing, project management, manufacture, procurement and site erection. With a culture of innovation which led them to be the first accredited SFC company in New Zealand, D&H have started their Industry 4.0 journey looking for opportunities to improve the value their teams can add to the New Zealand Construction Industry.

Projects can stretch to multi-year engagements with clients, contractors and architects, with every project being unique in its physical structure. This engineer to order requirement for design and fabrication exposes the business to some unique challenges that have been difficult to overcome with off the shelf solutions.

THE CHALLENGE

Structural Steel has specific certification requirements to meet industry standards. Many of these standards originate with the manufacture of the raw material itself, which must be traceable all the way through it's lifecycle into a structure.

In order to manage this traceability requirement D&H has established a robust quality management system to collate all documentation and parameters which increase in number through the supply chain as more parties interact with the material. Until recently the collation of this documentation was manually controlled by Quality Assurance Engineers working across Goods-in, Manufacture and Site processes. The objective here being to deliver to the end client a package of information and data related to the structure. It was recognised that the current format, that was email based and ad-hoc, was time consuming and was restricting the ability of the Quality Engineer to add real value by being on the shopfloor working with the teams to improve product and process quality. It is thought that over 3 days a week are spent on this compliance procedure.

In addition to this, the timely availability of quality data was limited to a paper based system with traditional data entry and analytics restrictions and labour requirements. This was leaving the team with limited insights that allowed effective problem solving / root cause analysis following a non-conformance. Ultimately this restricted their ability to put preventative actions in place to reduce non-conformance.

THE SOLUTION

D&H had previously used full stack developers to generate app solutions of workflows for specific problems, however these were siloed, time-consuming and often expensive solutions which limited the breadth of their use. More recently, with the introduction of low and no code solutions that allow users to generate their own applications with no formal training or experience, D&H have broadened their approach with the overall aims of; reducing enterprise administration; improve data accuracy and timeliness and deliver useful insights to the relevant people.

Using Sharepoint, PowerApps and PowerBI – all Microsoft applications, the on-site team at D&H have developed into an agile solution delivery team whereby they can work through the developing business needs and adapt to changing requirements to deliver application solutions that allows the business to collect and collate data into a format that can be interrogated to generate business insights.

Although these solutions could be applicable to any area of the business (Shopfloor, Enterprise, Facility), this case study focuses on the opportunities at the enterprise level. See our Case Study from Longveld Ltd to understand a typical shopfloor example.

To begin the journey around improving the time-consuming nature of collating the vast quantities of quality assurance data surrounding each project, the internal IT team (2 people) at D&H began by investing in a SQL database to form a foundation of data management and control. Following this, they used the Microsoft tool suite of low code application builders (Sharepoint, Powerapps, PowerBI) to start addressing some of the most labour intensive elements of the process.



One example is that all Material certifications for every delivery to D&H were emailed as attachments, making them difficult to quickly





locate and interrogate as required. D&H approached their supplier, Steel and Tube and proposed a collaborative approach by which they could reduce workload for both parties whilst increasing accuracy and maintaining compliance. The internal team developed an easy to use front-end on Sharepoint with unique access for external parties that allowed them to upload the relevant material documents and allocate them to the required projects.

One of the key attributes of this programme is that the team have adopted the Think Big, Start Small, Scale Fast methodology. They have a long term vision of the entire project QA documentation collation process being automated but have started with smaller elements that will engage the team by removing a frustrating aspect of the process.

"We aim to build user-owned products, if the user is part of the development, we can be sure they will use it effectively in reality because it delivers value to them and the business".

KEY TAKEAWAYS

- » Low and no-code solutions available on commonly used platforms are becoming ever more accessible to SMEs looking to leverage the power of enterprise automation.
- » It can allow your team to become agile solution providers internally. These solutions can be shopfloor or enterprise focused.
- » The integration of these solutions with 'back-end' software such as PowerBI means real time insights can be given to the right people at the right time.

To find out more, head to www.industry4.govt.nz

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Douglas Pharmaceuticals

Network Site Visit

BACKGROUND

Douglas Pharmaceuticals are a family-owned, award-winning company with a reputation for high manufacturing standards, quality products, and outstanding client service. They work with innovative partners from around the world to research and develop, manufacture, market, and distribute prescription and over-the-counter pharmaceutical, nutraceutical, and consumer healthcare products.

THE OPPORTUNITY

Being a pharmaceutical company, the need to comply with ever-tightening regulations is an ongoing challenge. Douglas has a wide range of products requiring specialised, complex testing and analysis to exacting standards and regulations before the product can be released to consumers. As the business has grown and developed, the complexity within the testing labs has increased exponentially and the paper-based systems of the past were struggling to support the lab team's needs.

Compounding these issues is the complex systems putting pressure on the capacity of the team, with more people needed to administer the systems and record the data. Another key issue with paper-based systems is the possibility of transcription errors where the number recorded isn't always the number passed on, either through poor handwriting or "fat fingers" when entering data. This requires additional resource to verify every step.

THE SOLUTION

The team at Douglas saw the opportunity to bring the management of the lab, testing workflows, and approvals into a centralised software system. This system, in a scientific context, is called LIMS – Laboratory Information Management System.

LIMS directly interfaces with the lab equipment, reducing the risk of transcription errors, and allows the interoperability of the key systems, eliminating the need for people to enter data from the analysis equipment. This allows the operator to interpret the values rather than just mechanically typing the numbers from the machine. The LIMS software allows Douglas to create structured workflows for product testing protocols. It provides controlled Standard Operating Procedures for conducting tests while giving immediate feedback to the technicians on whether the results are erroneous and require further investigation.

LIMS also interfaces with the Enterprise Resource Planning system, allowing the seamless release of conforming product without the need for additional processes. This speeds up the response time and means goods ship more quickly, spending less time in the warehouse.

Deploying a solution which touches so many aspects of a complex business was no easy feat, however the team saw the benefits of the new technology and were willing to change the way they work to embrace the potential of Industry 4.0. This has been the key to Douglas's success with the implementation of the system.



KEY BENEFITS

The benefits of implementing the LIMS software cannot be overstated. The team are now able to process more assays with the same amount of resource, and to higher levels of regulatory complexity.

It automated the link between performing the Quality Control testing protocols and communicating that the product is ready for release, eliminating tedious and repetitive processes. The highly skilled lab teams could apply their skills to more value-adding activities,

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PROGRAMME PARTNERS

while delivering a more robust process. This integration of process through the business is called vertical integration.

By going through the implementation in a structured way, examining process first then automating, gains were made immediately. This underscores how Industry 4.0 is not all about shiny new machines and software, but also about good efficient business processes.



KEY TAKEAWAYS

- » Review processes before implementation
- » Don't bring waste into the new system
- » Reduce complexity and take the time to maximise the benefits
- » Targeting paper-based systems to onboard

Good project management and resources, and a clear vision with drive from senior managers were crucial to keeping on track even when the going gets rough. Despite the challenge of changing four project managers, Douglas built a strong team capable of tackling such challenges head-on.

To find out more, head to www.industry4.govt.nz





enatel

nue report that could be accessed by the Sales, Finance and Senior Leadership teams.

THE SOLUTION

During 2023, Enatel's parent company in the US, having recognised the importance of data and analytics within its businesses, gathered the business units together to roll out a plan to move everyone to the same architecture and reporting platforms. This meant pivoting from the Power BI solution to Tableau.

Having been made aware that this was the direction the group was heading, the Finance team was split into two functions – the Accounting & Control team and a new Performance & Analysis team (aka FP&A). This allowed a dedicated team to focus on the deployment of the Data & Analytics initiative for Enatel.

The first phase of this deployment at Enatel was considering the data governance and then mapping out the data flow. Having already worked through this data flow with the original proof of concept, this step was easy to achieve.



The second phase was to implement the chosen tools for the data flow and processing. The Data Ingestion/ETL (Extract, Transfer, Load) tool sits between our ERP and the Data Lake, transferring the required raw data at set intervals automatically.



BACKGROUND

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Network Site Visit

Enatel is a world-leading designer and manufacturer of power management, power conversion and energy storage technology. Its goal is to enable customers to make the most effective use of their energy through smart, innovative and reliable power solutions.

Enatel is based in Christchurch and has more than 30 years' experience as an electronics manufacturer. More than 95% of everything it designs and manufactures onsite is exported to over 75 countries.

Intelligent software combined with efficient hardware and decades of power electronics design experience has resulted in solutions that address industry needs.

THE OPPORTUNITY

Enatel is a company renowned for its diverse technology and manufacturing portfolio. It spans customised integrated power solutions to highefficiency modular battery chargers. Within this extensive array of operations lies a wealth of data held within many disparate systems, and the current reporting approach (mainly Excel-based) was struggling to keep pace with demand.

Identifying that there was significant opportunity for improvement, Enatel engaged the services of Parallel42 to advise and assist with the establishment of an integrated data platform and to develop a proof of concept report in Power Bl. The vision was to connect its ERP system to a Data Lake, and to create the proof-of-concept reve-



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Tableau then accesses the Data Lake, in this case Snowflake, and the team have designed a dashboard that presents the same information from our original Excel report with easy-to-use filters and toggles that were previously set as individual pivot tables.



Once satisfied that the correct data was flowing, phase three was to test, parallel run and verify the data. The team then got feedback from key users on their experience of using the Tableau dashboard.

Phase four was to go live with the Sales and Finance dashboard and increase the daily load frequency to 8 times in all the environments (Fivetran and Snowflake) to enable Tableau to update every 3 hours.

This is an example of a dashboard created by the team in Tableau:



KEY BENEFITS

- » Generating dashboards from the Data Lake ensures "one source of truth" across reports.
- » Access to regularly updated data at the press of the "refresh" button.
- » Significant time savings in generating reports.
- » Elimination of errors in the reports due to less manual manipulation.

NEXT STEPS

- » Expanding Data Sources and Integration: Enatel aims to expand the range of data sources. This expansion will enable them to offer comprehensive insights, from departmental to Enterprise BI.
- » Leveraging AI Capabilities: The team are exploring the generative AI capabilities to enhance Tableau functionality.
- » Predictive Metrics: They are also exploring the potential of Einstein Discovery to provide predictive metrics. This feature will allow users to gain insights into possible future trends.

To find out more, head to www.industry4.govt.nz

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ENI Manufacturing

Connecting up enterprise and shopfloor systems.

BACKGROUND

ENI are a leading provider of metalwork services in New Zealand. Their broad range of capabilities enable them to deliver a large variety of products and solutions. They support their customers from the initial design concept right through to logistics. ENI stands for excellence and innovation in the field of metal fabrication and is built on many years of industry experience.

Operating since 1993, ENI are a contract manufacturer with a strong reputation in New Zealand and Australia. The business prides itself on the high level of service, flexibility and quality that helps their customers to achieve their goals. ENI's capabilities are very broad and range from Design, CNC laser cutting, punching and folding, fabrication, powder coating and assembly.

THE OPPORTUNITY

At the core of the operation is CNC profiling which is utilising advanced CNC laser and punch machines which cut shapes from steel sheets of various thicknesses. Smart and optimal usage of this machinery is one of the key drivers of success for the business which manifest in the following advantages:

1– Optimising the use of the raw material (steel sheets) therefore minimising wastage and the need to carry offcuts.

2 – Reducing the time required to feed the machines with cutting programmes.

3 – Optimising job sequencing to meet schedule and minimise setup times for the machines thus improving throughput and machine capacity and optimising flow through the factory.

4 – Enhancing the accuracy of both labour and materials costing calculations for jobs.

For a number of years, the business had been using dedicated programming software for the machines and the engineering team had achieved good results in the four dimensions mentioned above. With the implementation of a new ERP system in 2020, the team at ENI was keen to leverage the increased wealth of data to make a significant leap in optimising efficiency in CNC profiling.

THE SOLUTION

As part of the ERP implementation process, ENI developed an integration with the programming software. Work Orders and part information is sent from the ERP system to the programming software. In the past, the process of part creation in the programming software was manual and time consuming and led to having two independent and inconsistent data sets, which often led to confusion and reliance on the part knowledge of the machine operators.

The programming software tells the machines on the shopfloor what settings to use when cutting the profiles from the steel sheets. The other inherent feature of the software is called nesting: all kinds of parts from different customer jobs - as long as they are to be made from the same material – can be selected to be cut from the same sheet of material. Upon selection of the parts, the software optimises the layout of the parts on the sheets to minimise waste. At this point the programmers have the option to remove or add more parts to make full use of the materials. This happens in conjunction with a clear view of the ERP system's schedule to ensure good flow is achieved and customer orders are delivered on time.

Once the machine programming is complete, the information of the "nest" of jobs that were bundled together gets sent back to the ERP system specifying the exact quantity of materials to use and purchase, splitting the cost of the materials and machine cutting accurately across the jobs in the nest. In the old disintegrated system environment, operators had to record their time against each job individually with little accuracy, materials could not be split accurately across jobs and admin staff needed to manually split the machine times across jobs – all of which is now at a very high level of automation.



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KEY BENEFITS

- » Reducing the amount of offcuts and waste created from the cutting process
- » Reducing the amount of time that the engineering team need to spend on setting up new parts in the programming software for the laser cutter
- » Enabling products to be produced in sync with the ERP schedule, leading to increased efficiency, improved flow through the factory and reduced WIP
- » Improved accuracy of labour and material costings and better quote accuracy
- » Reduction in the amount of time and manual interventions required to move information between the ERP and programming systems.
- » Increasing overall yield and material utilisation

KEY TAKEAWAYS

- » Connecting up digitalised systems to enable transfer of information between them can lead to multiple benefits across different KPI categories.
- » Keep an eye on what information is contained in different systems. Combining what you have can lead to unexpected opportunities and benefits, providing insights into your processes that you didn't expect.
- » Always think about where information and data generated by the planning process is to be stored and how easy it is to access via other systems.
- When deploying technology to the shop floor, always think about how Industry 4.0 can simplify the process. This can lead to opportunities to improve training outcomes and increase workforce flexibility
- » Don't forget to provide digital training to your teams on the shop floor as you embark on your Industry 4.0 journey.

To find out more, head to www.industry4.govt.nz

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PROGRAMME PARTNERS





Plastics Network Site Visit

BACKGROUND

ES Plastics is an independent family-owned New Zealand plastics company located in Hamilton.

Known for the development of products across a broad range that require strong design, ingenuity and manufacturing ability, ES Plastics has developed a significant customer base, many of whom have been associated with it since its original setup.

THE OPPORTUNITY

Plastic injection moulding and blow moulding operations are typically medium to fast-paced manufacturing environments with multiple machines, which require specific tooling to make each individual product. The tool changes can take days and require skilled resources to fit and maintain them correctly. Planning the runs and raw materials required while keeping track of the tools and the engineering needed to keep them going is a complex task, generating huge amounts of important data in a short time. Twenty years ago the Managing Director Jeff Sharp identified the utilisation of this data was key to his organisation's success.

THE OBJECTIVE

The key objective of the software was to develop a centralised source of all the information within the business. This would allow the

team to make faster data-driven decisions to successfully manage the dynamic business.

THE SOLUTION

The solution was to create an in-house data collection system and database with interfaces for operational tasks. This system is called a MES.

A MES (Manufacturing Execution System) is a computerised system that tracks and gathers real-time data about the production process on the factory floor. It monitors the machines and data flows involved in transforming raw materials to finished goods. The main goal of a MES system is to optimise and improve production output and efficiency.

Step 1: Data collection

The first hurdle was data capture. This important data was being generated across multiple machines on the production floor for every cycle lasting roughly between five seconds and five minutes.

Using in-house capability, the team and their business partners were able to develop a solution to connect their machines to a centralised server, allowing the real time machine data to be captured and stored for analysis.



Step 2: Data analysis

While captured data is useful, the real benefit of the investment is unleashing the power of these numbers into a format that allows easy interpretation of the data when it had deviated from defined parameters. Within the SIRI framework this is represented by the shopfloor intelligence dimension.

The team at ES Plastics have developed a dashboard showing the performance of the job on each machine using a traffic light system illustrating performance by time. The system also looks at the standard times for tool changes and highlights deviations.

One of the more advanced features is the labour planning aspect where the attributed labour per job is used to calculate the number of machine operators required for each shift, enabling the operations team a dynamic staffing model which can allow them to optimise their labour efficiency shift by shift.

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PROGRAMME PARTNERS

Step 3: Integration

One of the key benefits of the MES is that all the data from a run is available to the whole business in one place. This is a principle known as vertical integration.

Operator clock in and out is integrated with a third party software and allows the team leaders to see who is on site, who is on overtime and who hasn't clocked in for a shift. With the data visible the team leaders can act quickly to identify and correct problems or bring in extra staff to cover shortages.

Quality notes and continuous improvement ideas are also captured and logged onto the job. Whenever a new order for the product is raised the notes are flagged, giving the engineering team time to resolve issues, maintain tooling or support the start up of the job in the case of quality or re-work errors.



KEY BENEFITS

The key benefits of the system are:

- » Improved efficiencies the business can pivot more quickly to resolve issues.
- » Reduced complaints by logging issues, revisions can be made between runs minimising the risk of repeat errors.
- » Improved profitability by reacting quickly to performance or quality issues the team can easily minimise their impact.
- » Big data capture even if they don't use all the data on the day it's generated, it allows them to analyse trends in historic performance and implement improvement projects.
- » A better place to work by having data available to the whole team it reduces frustrations in accessing information and dependencies on team members.

While it is hard to quantify the benefits of the system due to it having grown and evolved with the business over the last 20 years, it is clear that the seamless transfer of data between planning and operations through to the operators and dispatch team would not occur without their MES system Project Manager.

Looking to the future, Project Manager is being developed to improve its integration with wider ERP systems and to improve its ability to help the team access and analyse data more quickly. Other opportunities could be the integration with a SCADA system and the development of a customer order portal.

To find out more, head to www.industry4.govt.nz

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PROGRAMME PARTNERS



FABRUM.

Fabrum

Integration of cryocoolers to the cloud using Ignition SCADA

developed a plan to support the implementation of this. The project will be divided into three phases. The first phase is a pilot test phase. This will be aimed at evaluating the feasibility of Ignition software by testing automated data transfer, automated alarming, and client views on a containerised liquid nitrogen plant located at Fabrum. The second phase will be to implement an Ignition home server to enable automated data transfer and alarming from remote plants. The third phase will be to roll out Ignition into Fabrum's other plants, new and existing, connecting to the home server as remote data feeds.

KEY BENEFITS

By integrating their standalone cryocoolers to the cloud using Ignition SCADA, Fabrum are planning to achieve several key benefits. These include:

1-Automation

The automation of datalogging and alarming will eliminate the need for manual processes, increasing efficiency, and streamlining operations.

2 - Scalability

Fabrum's standalone cryocoolers could be more easily connected to the cloud, making it easier to manage and monitor their operations, leading to better scalability.

BACKGROUND

Fabrum is a New Zealand-based company that designs and manufactures containerised cryogenic liquid production plants for nitrogen, oxygen, and hydrogen. Fabrum's containerised plants are sold internationally and can be found all over the world.

THE OPPORTUNITY

Fabrum's systems are installed with a suite of sensors to enable remote datalogging and alarming. These can be used to monitor pressure, temperature and flow, however, these systems currently need to be queried manually to gather the required data.

Fabrum decided to investigate solutions that would allow the automation of datalogging and alarming of its remote plants back to a home server using supervisory control and data acquisition (SCA-DA) as the core technology. They also wanted to keep the remote-in functionality where required. Their current manual system of datalogging and alarming was limiting their growth. They felt there was huge potential if they could connect their standalone cryocoolers up to the cloud and enable real time data to flow back to them.

THE SOLUTION

Fabrum has identified Ignition SCADA as a potential platform that could manage their machine data pipeline (MDP) and they have







3 - Real-time monitoring

By integrating their standalone cryocoolers to the cloud, Fabrum gained the ability to implement real-time monitoring capabilities, enabling quick response times to faults, reducing downtime, and increasing productivity.

4 – Flexibility

Ignition's flexible architecture will allow Fabrum to customize the platform to fit their specific needs, enabling easy integration with their existing systems.

Once the system is up and running, Fabrum will begin applying predictive analytics to help them to optimise their products and designs for efficiency, reliability and functionality, keeping them at the forefront of their industry.



KEY TAKEAWAYS

Consider connecting your products to the cloud. It can open up alternative business models and enable real opportunities to optimise your products based on real customer use. There are a few things you need to consider, though:

- » **Security:** Ensure that the connection between your products and the cloud is secure, with robust encryption protocols and protection against cyber-attacks.
- » Scalability: Consider the scalability of the cloud infrastructure to accommodate an increasing number of connected products and users.
- Interoperability: The cloud platform you use for connecting products should be compatible with various devices and platforms to allow for seamless integration.
- » Data analytics: The cloud platform should provide data analytics tools that enable manufacturers to extract insights from the data collected from connected products.
- » **Customer support:** Connected products require ongoing customer support, and it is important to ensure that the necessary resources are available to provide timely support and maintenance.

To find out more, head to www.industry4.govt.nz

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PROGRAMME PARTNERS





Innovations

Automating the supply chain with digital inventory

BACKGROUND

Fi Innovations is an award-winning hub of creativity, with a long history of challenging convention, trialling new materials and methods. Fi continue to be early adopters through use of some of the latest additive manufacturing capabilities as they serve clients across highly regulated and specialist industries. Additive manufacturing sits alongside two other major divisions in the business - Fibreglass manufacture, with a focus in the marine industry and Resin flooring.

Fi Innovations is a company built on a thirst for invention and ideas that allows it to stay ahead of the market and remain future-focused through inventing, adapting and educating. This case study focusses on the technology and innovative approaches to interacting with customers to automate supply chains rather than the technology of 3D printing itself.

THE OPPORTUNITY

Fi Innovations, with the support of the provincial growth fund, invested in a 3D systems SLS additive manufacturing machine, being the first to market with their capability to manufacture a vast array of polymers and resins on a scale that is well beyond purely prototypes. Initial success led them to further investment, and they now have three cutting edge machines and a state-of-the-art design room plus a renovation of their premises to allow for this growth.

The nature of the 3D printing set up was designed to give customers very quick turnaround times on their products. The necessary inter-

actions with customers such as quoting and receiving and verifying the 3D CAD files soon became a bottleneck to Fi Innovation's ability to deliver at pace. These customer interactions were being handled through traditional e-mail communications and a range of file sharing platforms requiring the team to 'stay on top' of the work in progress manually. This meant they did not have optimum visibility over priorities and were spending time on non-value add tasks.

The 3D side of the business was operating like a start-up, so it was natural to need further defining and improvement around some internal processes. In 2020, Fi Innovations partnered with Complete 3D who supplied the machines, allowing them access to a software solution that would vastly improve the workflow interaction with clients.

'Digifabster' allowed for automated quoting based on certain parameters (volume, surface area etc.), and for the upload of 3D files direct to Fi Innovations and tracking work in progress. Digifabster was a cost-effective solution as the software company themselves were at an early stage and still developing their solutions. Critically, this software acted as a real eye opener for the team who now appreciated the value that software could bring to their supply chain (without expensive investment in developing their own in-house solution).

Following use of the software for 6 months, they learnt more about customer demands and the shortcomings in functionality and flexibility of the software. For example, the automated quoting was restricted to certain parameters and the software wasn't able to provide digitised key performance indicators of Quality, Productivity and Yield – meaning the team were still spending time manually collecting information on machine performance.

THE SOLUTION

Digifabster acted as a springboard for the team to go on and investigate further options that would increase the functionality and capture even more value in their client interactions. The agility with which they were able to transition to new software is testament to their innovative approach and the cost-effective nature of subscription software solutions allowed them to test and verify guickly.

Through extensive online research and remote meetings, the team settled on a new software AMFG. From their prior experience they were able to build an accurate 'requirements' list for this new software, making the selection process quicker and more aligned to their needs. For example, there was a need to integrate this new solution with their ERP system in order to manage the invoicing process without laborious double handling.



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The new AMFG software moved Fi Innovations to the next level in terms of integrating their supply chain. Some of the optimised features of their AMFG solution included:

- » Instant automated quoting was now possible with much greater flexibility around the technology, material, leadtime and postprocessing options.
- » Introduction of an Ecatlogue solution where clients are able to store 'digital inventory' ordering what they need when they need it and optimising their physical inventory efficiency. This also provides options around automating customers supply chains on intricate and expensive parts. Whereas previously suppliers would manage cheaper consumables through Kan-Ban methodologies, they now have the ability to manage this for more intricate engineered parts. At the most mature level, it would be feasible for clients to fully automate the reordering of components through the Fi Innovation portal using RPA or similar technology.
- » Design freedom allows effective version control by the client as they have full capacity to manage the CAD files that are stored and produced, preventing 'old' drawings or files being selected for manufacture by accident. In addition, this design freedom stretches to infinite design changes, whereas traditional manufacture methods may require expensive moulds being made, the 3D printing allows for continuous improvements in designs to occur iteratively whilst being inexpensive.
- » The system provides the highest levels of security encryption, which is essential for many of Fi Innovation's clients where products are highly regulated and sensitive.
- » The software has also increased the vertical integration of the business by interacting directly with the machines to provide an accurate view of load vs capacity and acting as a decision support system around the most efficient production schedule. With the ability to 'nest' multiple client's parts in one production run, it increased capacity without investment in more machinery.
- » The direct integration between the machines and the software also permits automated printing direct from the software, reducing further inefficiencies but more importantly it allows the team digital visibility of performance through automated report-

ing of quality, yield and productivity KPIs. All this acts to elevate the role of the team, moving from collecting that data to freeing their time to look at the insights and make decision around improving their process or product quality. Ultimately this drives the team to become a group of skilled problem solvers as well as experts on the technical side of operating the machines.

- » The software permits workflows to be generated and customised, meaning in the near future the system will be able to provide automated updates internally and externally on the status of jobs and the performance of machines.
- » Traceability the 'metadata' around the production of a product is readily available for analysis. For example all parameters important in 3D printing such as temperatures and flow rates can be captured as a product is manufactured allowing both Fi Innovation and the customer to complete detailed analysis on the performance of the resulting component against these, providing further avenues for intelligent optimisation of product quality. This next level of traceability would normally require extra levels of destructive testing or similar in highly regulated industries.
- » Scalability is a key design principle in industry 4. The ability to introduce a new machine into the process seamlessly will become more important as the business grows to prevent disruption in production. The benefit of off the shelf software solutions being that they are driven to keep pace with the market and provide the functionality to allow machines to integrate quickly with operations.

KEY TAKEAWAYS

- » Taking the stepping stone approach is possible with subscription software, trialling cheaper solutions can act as an eye opener and allows effective 'requirements' lists to be built accurately.
- » Improvement in throughput / capacity doesn't have to come from extensive capital investment in machines by looking outside the immediate production process efficiencies can be identified which are often cheaper to resolve.
- » Elevating the role of team members away from tasks that can be automated to the value add problem solving is essential for the business and to create an engaged workforce.
- » Software such as those mentioned here can allow manufacturers to become far more in tune with their machines and what's happening. Acting to inform you around future capital decisions.

To find out more, head to www.industry4.govt.nz







Gallagher

Unpicking warehouse simplicity and efficiency

BACKGROUND

As a company steeped in 85 years of history and innovation, Gallagher's business units focus on protecting what matters most for its customers across the Animal Management and Security industries, with a strong focus on using technology to solve real problems.

With headquarters in Hamilton and a global footprint across ten key markets, Gallagher is one of New Zealand's most successful private companies, employing over 1300 people worldwide and building lasting relationships in over 160 countries. Its annual revenue is over \$350m.

The company is led by CEO and Executive Director Kahl Betham. Sir William Gallagher and Dr John Gallagher remain involved in the business at a governance level.

THE OPPORTUNITY

Picking product from multiple warehouses across site is an essential function in the Gallagher operation. This includes picking spares and finished goods to dispatch to customers and dealers worldwide, as well as picking parts to match the fast-paced assembly environment internally. Those familiar with these environments will know the challenges it can pose. Firstly, to keep pace with the required orders to satisfy internal and external customers, the efficiency of a picking team collecting and packing items from across the warehouse is imperative; and secondly, the accuracy of picking and putting away inbound goods ensures that the business ERP system and planning team can deliver achievable and accurate plans to meet customer

demand. In short, if done poorly it can 'unpick' your operation and customer satisfaction very quickly! Gallagher has a strong track record of continuous improvement. Always seeking a better way, they had consistently changed their picking processes to make them more efficient and accurate year on year. These improvements were cumulative, but as growth has accelerated in recent years, compounded by space constraints, the team were finding it harder to get return on investment for their warehouse projects. Although errors are infrequent, with huge growth in recent years, any errors cause a significant knock-on effect for customers or production. Movement between locations, confirmations of picking and other transactions essential for data accuracy still had a significant manual element that needed to be removed.

To match the projected growth and the ever-increasing functionality of products (which increase picking volume and time) and to ensure they were consistently meeting customer demand, the team knew they had to look beyond iterative gains to a brand-new solution. In particular, employing more people in the picking team was unsustainable with space restrictions in the warehouses possibly leading to safety concerns down the road.

THE OBJECTIVES

- » To keep up with projected growth without continually adding labour.
- » To improve pick and pack accuracy.
- » To reduce production delays due to accurate and timely tracking of stock movements.
- » Simplification of processes allows greater versatility and flexibility in the work force, reducing training time and skill levels required.



THE SOLUTION

Looking for an intuitive, easy to use, accurate system began with a detailed tender and evaluation process. This was importantly underpinned by a clear vision of what the employee experience and process outcome should be. This meant very early stakeholder engagement, bringing in change management skills from the people and brand team to understand key concerns and gather ideas from those who know the job best. As part of their improved maturity





around Information Systems best practice, Gallagher focused on bringing together a team of very specific skills, both internal and external. The tender process relied heavily on successfully deployed case studies in similar sized / structured organisations, bringing the right hardware and software to the table. The selected solution (a Voice Deployed Software and Hardware solution fully integrated into SAP), facilitated by external support from consultants with experience in similar projects. Although KPIs were established early in the programme to monitor return on investment, the fit and likely success of the solution were considered in more detail than the investment cost, knowing that the right solution would provide payback over many years of predicted growth.

The physical solution is a voice controlled and activated system that fully integrates with their ERP to communicate live via audio to the picking team which parts and locations require attention. The flexible system allows the operator to be efficiently directed to locations, informed of pick, or put away quantities and confirm transactions are completed. The data latency of stock accuracy is reduced dramatically with stock movements occurring live. In addition, issues that occasionally arise whilst picking, such as a stock shortage at a location, are flagged for immediate investigation by team leaders or supervisors, which allows the operator to continue unhindered with the next steps. This real-time flagging of issues allows for a more rapid response time, with operator interactions fresh in people's minds. When combined with the fact that the system provides traceability of operator interactions with bins automatically, it is possible to resolve inaccuracies much quicker than previously.

Although the hardware and software to deliver this solution have been around for many years, if now somewhat more refined and fit for purpose, the key Industry 4.0 aspect to this project has been the backend integration with SAP. Ensuring a seamless experience pulling requirements through to the operators is essential for project longevity and return on investment. Historically, interim steps using spreadsheets and downloads may have been required creating other process steps, opportunities for inaccuracies, and often single-person dependencies for critical processes.

Not all picking and warehouse movements are small components, so the team have ensured that they have included vehicle mounted units with keypads to allow pallet movements and bulky items to be tracked in the same way.

In line with the project objectives, ensuring that the system sped up training times and removed the need for specialist knowledge and skills may create opportunities for a more diverse range of people in warehousing roles. Whilst also providing exposure and development of existing staff to new ways of working and skills. For example, accompanying the solution is a live dashboard of the team and functions, alongside insights around shift workloads and requirements. This central console will change frontline leader's roles towards solving problems before they occur, delivering more value to the supply chain. An example of this is the required labour requirement for a shift can be quickly calculated and visualised, allowing team leaders to rapidly allocate daily responsibilities. This removal of manual calculations allows leaders more time to consider training requirements and process improvements each day.

Gallagher is a global business with operations in all major markets. The detail and focus on the successful implementation of this project has upskilled the internal delivery team to be able to leverage the solution elsewhere in their future operations, with shorter development cycles and reduced implementation costs.

With a phased roll out, Gallagher have allocated the necessary internal and external resources to ensure any bugs identified through deployment can be rapidly resolved. Ensuring first impression from employees is positive, and operations aren't disrupted. Combining this with a phased roll out, starting small and scaling fast has helped the team manage the extra workload and complexities that the pandemic introduced to the project. All this is exemplified by the positive project feedback that employees are providing.

KEY TAKEAWAYS

- Get the right team on the job and don't underestimate the value of real experience in delivery of similar projects. External support was invaluable to delivering this project smoothly.
- » Early engagement, feedback and change management activities were essential to bring users on the journey, starting early (pre-tender) with communicating the vision is essential.
- » Blueprinting and scoping the solution was a thorough process drawing on the whole team's experience and operator feedback.
- What would they have done differently? Expand the team – with COVID-19 increasing workload, having a wider team to share the responsibility may have helped during peak periods.
- » Never underestimate the importance of being flexible in your approach to delivering a project of this magnitude – flexibility offers a greater chance of user adoption, as well as project success.

To find out more, head to www.industry4.govt.nz

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Griffin's Food Company

Network Site Visit

BACKGROUND

Griffin's Food Company is a food manufacturer that produces many of the brands of biscuits, crackers and chips that people will recognise from their weekly shop.

The company, which was started by John Griffin in the 1890s, now has more than 500 staff working in a fast-paced environment with highly automated production lines. Griffin's, who is passionate about crafting New Zealand's favourite snacks, operate from two sites, in Papakura and Manukau.

THE CHALLENGE

Griffin's have long appreciated the need for data collection as part of their processes. Knowing the daily performance through collecting paper-based, manually entered figures has been a staple of their reporting for a number of years. However, their continuous improvement philosophy identified that although this data collection was valuable to the management teams, very little was able to be communicated to the shop floor team to boost engagement in identifying and quickly resolving production issues.

Data on key quality parameters was monitored throughout production, but this data would then be collected and manually entered into databases at the end of a shift. Being retrospective there was little use for the data by then and it only added more administrative tasks to the supervisory staff. It was difficult for the shop floor team to interpret performance over a day consistently, leaving them not knowing whether they had a good, productive day or not.

THE SOLUTION

The team at Griffin's had heard of Industry 4.0 and sought to identify what value it could add for them at their Papakura site. They quickly adopted a useful philosophy that Industry 4.0 offered opportunities through technology to resolve issues that were previously too costly or difficult to tackle. The senior management team in the business were passionate about implementing some initiatives, so pulled a very small, agile team together.

This small team submitted a high-level business case for funding and were given a high degree of autonomy with freedom to decide where to focus. This resulted in a team that was rapidly able to make decisions and iterate, delivering some immediate initial solutions. This progressive view of a delivery team worked well and has enabled them to demonstrate the value as of the project early on in the project cycle, enabling quick expansion.

One of the solutions, aimed at increasing their shop floor intelligence and vertical integration maturity, was to access previously challenging data sources within machine PLCs and visualise these in an intuitive way to the shop floor teams. This also provided a one-stop shop for managers and supervisors to easily interpret live performance across the lines.

From a technical perspective, the team used a platform to tap into the PLCs of critical performance data points on the line, such as carton weights and number of products shipped, transferring this into a database which was then used to drive large TV screen dashboards of live performance data. More of these links have been put in place for managers to access a detailed analytics dashboard through their tablet or laptop.



KEY RESULTS

Thinking big, the team have a paperless vision that they are working towards, however to start small the team first identified the critical data required to engage the shop floor team and give insights to





supervisory staff. They boiled this down from tens of lines of possible data to four or five lines. By getting teams to a place where 'they can't live without it' ensured that further investment and expansion was much easier to achieve.

Across four out of six production lines they now have access to critical data sources visualised in an easily understandable (not language dependent) format. This has enabled the shop floor teams to begin the problem-solving journey, identifying issues daily and aiming to put preventative fixes in place where possible to avoid repeat issues.

Ultimately it is now plausible that all operational staff on site know how well their team has performed that day, as well as being able to engage in discussion about how they can improve.

The next steps are to introduce more intelligent parameters. With the plethora of accurate data now in a useable format and accessible it is possible to overlay analytics tools for optimised parameter settings that will help to lift the performance of the line. For example, on a hot or humid day historically a certain dough mixture may have performed better in terms of quality parameters, providing data supervisors on a day with similar conditions the ability to influence the performance of their product. This also removes a level of dependence on experienced individuals who may be leaving the business in the coming years.

KEY TAKEAWAYS

- » A small very agile trusted team to cut through the red tape and deliver value quickly, proving the concept.
- » Identify basic structural elements necessary for delivery earlier, for example WiFi and data storage.
- » Keep it simple and don't let perfection get in the way of quick progress to show the benefits.
- » An iterative mindset happy to make adjustments now the framework is established to optimise engagement.

To find out more, head to www.industry4.govt.nz

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Gyro

Live chat and automated lead qualification

BACKGROUND

Gyro Plastics is one of the leading plastics engineering companies in NZ. The company made its first plastic moulded product way back in 1968 and since then have become known as expert plastic manufacturers. They provide products to the infrastructure sector in New Zealand with a broad range of distribution pillars and cabinets as well as taking on custom design and manufacturing projects. Gyro pride themselves on applying the same dedication and commitment to achieving the best result possible for custom products as they do with their own proprietary product.

Since July 2016, Gyro have been operating out of their new premises in friendly Feilding, after moving from Wellington where they were based since the company's inception. Their services and products are available nationwide and they have become one of the key plastic manufacturers in New Zealand.

THE CHALLENGE

Gyro are committed to providing their customers with a seamless and engaging end to end experience. One area that they identified as an opportunity for development was around the way they interact with customers at the beginning of their engagement.

Gyro have a number of different ways for potential customers to initiate contact and these were predominantly via direct phone calls, emails and web forms. As it was usually a small, busy team who were fielding these initial contacts, they felt that they didn't always do justice to the initial conversations, having to provide information on the fly.

The team were also mindful that quickly assessing the needs of the customer and streaming them to the most appropriate place was incredibly important for both that customer and the business, but this was often difficult to do.

There were also challenges with mobile reception when remote working that led to difficulty taking and progressing calls.

The team felt that an additional mode of communication would be beneficial, but that it would need to allow for immediate and dynamic conversations to happen.

THE SOLUTION

After reviewing the available options, a solution was identified to enable a live chat function on the Gyro website. It was decided that this chat application needed to have simple plug and play integration as well as functionality that supported mobile use and the ability to connect a chat request with the most relevant person at Gyro.

To ensure that customer queries weren't lost or delayed, they also wanted the ability for all team members to be able to respond if required. The team also decided to take a "Minimum Viable Product" approach to quickly test the concept.

Drift was identified as the product that provided the required functionality, and they began building this into their website.

As the new functionality was being implemented, the team also worked on the internal processes they felt were needed to support this new method of communication, which included:

- » Agreement on who would have access to utilise the application to respond to initial customer queries
- » Confirmation of the rules of engagement what level of detail to go to regarding pricing and quotes etc before referring through more formal channels
- » Development of an informal set of questions that could be used at the start of the conversation to help gather the relevant information
- » Mapping the website pages to the people at Gyro who were most relevant to respond to live chat requests.

From identifying the need for an additional mode of communication through to having the identified solution live and available took less than a week and once implemented, the system proved to be a significant success with the majority of all initial contacts coming in via the live chat function on the Gyro website.

An unintended consequence of the success of the implementation was the large volume of information arriving through the app. This was leading to a significant amount of work for the team to provide direct support to potential customers that didn't progress through to a full customer relationship.

The team recognised that it was really important for them to qualify the leads that were being generated and to highlight the most rele-

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vant queries coming in. This was done by first developing a profile for their ideal customer and then mapping the characteristics of both target and off-target clients – this mapping included specifying flags to help categorise the queries and creating a set of questions to help guide this categorisation.

Embracing a culture of continuous improvement, the team have identified many further opportunities through leveraging this new "live chat" functionality. One key enhancement identified is to implement an automated lead qualification process.

This process will be developed utilising the rules and process flow created to help categorise their target and off-target customers and then automatically divert them to the most appropriate value-added channel. The team is also looking at creating more formal integration into their CRM (Customer Relationship Management) system.



KEY BENEFITS

Improved accuracy of information being provided to potential customers around the Gyro offering

- » Having a documented record of the conversations between Gyro and potential customers
- » No longer needing to write customer conversations into emails following a call saving time
- » Achieving a significant improvement in accuracy and reliability of data collected re. customer requirements
- » Having a clear structure to support the dynamic qualification of customer leads
- » More time spent working with strategically selected target customers and sectors.

KEY TAKEAWAYS

- » Technology can be leveraged quickly to release opportunities identified by the team.
- » When implementing a new technology don't forget to organise your internal processes to support its successful adoption.
- » Remember to consider how the functionality of your current systems can be enhanced through easily accessible and available add-ons.
- » Always think about where the generated data and information created by the new technology should be stored to allow maximum benefit (e.g. customer conversations recorded in CRM).
- » Look for further opportunities for improvement when reviewing any unintended consequences and unexpected results – embrace a culture of continuous improvement and innovation around new technology.

To find out more, head to www.industry4.govt.nz

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Hansa Products

Network Site Visit

BACKGROUND

Hansa Products manufactures wood-chippers for the consumer and commercial market globally and has grown from seven people to 40 in the last 10 years.

From their base in Hamilton, Hansa Products design, manufacture and service wood-chippers that are gaining a reputation for quality and performance around the world. Having grown rapidly over the past 10 years and moved to multiple new premises in the process, they have actively employed technology to cut down on administration time and costs and boost the value added by their team.

THE CHALLENGE

As a rapidly growing manufacturer with a complex supply chain and large and geographically widespread customer base, the Hansa team were at risk of incurring large administrative overheads as they grew. Managing suppliers, customers and engineering changes alone could have introduced multiple roles to manage data entry and paperwork, as well as introducing opportunities for errors in data.

A traditional quoting process would involve capturing all the requirements of a customer on an email or phone call, transferring this data manually into a computer system, generating a PDF, saving it, locating it, and attaching it to a reply email to the customer. This was followed by entering the contact details into a CRM and manually scheduling a follow up call in a week's time. This process could easily take a team member 20 minutes by the time they collated all the relevant information, typed up an email and sent it back to the customer. Multiplied across all the enquiries in a day this seemingly small task clocks up significant non-productive time. Minor inaccuracies could also be introduced when manually entering information, for example with purchase orders, where getting a single digit wrong could cause significant waste downstream in production.

THE SOLUTION

Early on in their growth, the management team identified the need to quickly and accurately manage data to operate efficiently and deliver the right service and experience to customers. They started small and engaged an independent company to build a data management portal for customers - tracking distributors, dealers and end users and their order history.

When enterprise automation is introduced, the information from the phone call or email is entered through data validated fields (drop-downs etc.) and the click of a button completes all the above steps instantaneously with very few opportunities for error.

This quickly progressed into the ability to automate call scheduling and follow up (similar to many CRM systems today). This ability to automate previously administrative and time-consuming tasks opened the management teams' eyes to the possibilities of automating numerous other processes.

After starting small, the team then scaled fast, rolling out solutions in quoting, purchasing, and managing engineering changes. The agile approach allowed them to deploy solutions rapidly and identify and fix issues rapidly which promoted a culture of continuous improvement around the ideal of 'zero admin.'



THE RESULTS

Anytime enterprise information needed to be collated and reported, or sent to suppliers or customers, it represented a potential waste and opportunity for inaccuracy, which in turn formed an opportunity

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to improve. Through these constant iterations, despite growing rapidly, the company has never needed to employ any admin staff. Any minor admin required is managed easily by existing areas in engineering, marketing, and sales.

This could equally apply to other businesses, for example those where engineering drawing updates are needed. An error-strewn and laborious process is converted into a one button click, which would also archive all old drawings of that part number, generate the new drawing, send the new drawing to the supplier and update revisions on paperwork.

When these results are mirrored across all enterprise functions the result is 'zero admin' with all tasks completed 'at source' meaning there is little to no delay in processing, and data is always up to date and accurate. This is essential with multiple points of contact servicing customers around the world.

Ultimately this has resulted in the Hansa 'office' team, despite having no administration staff, categorising themselves as having an hour or less of admin each week.

KEY TAKEAWAYS

In going through the Network Site Visit, there were several key learnings:

- » Very few, if any, clerical or data errors due to automated data transfer between processes.
- » Significantly lower overheads as a result of less admin and production efficiency.
- » Elevation of team members to add more value for customers and take on more interesting roles.
- » Empowered change culture to constantly challenge the way systems operate and make them more efficient for the benefit of all.







Howard Wright

Network Site Visit

BACKGROUND

Howard Wright manufacture and export high quality hospital beds and stretchers worldwide.

Starting in the 1950s, the organisation has won multiple design awards for their Simple, Smart & Human designs. Engineering, Manufacturing and Assembly are based in their New Plymouth headquarters with distributors and subsidiaries worldwide. Known for high quality and functionality at a competitive price point, Howard Wright pride themselves on value for money and impeccable customer service.

THE CHALLENGE

The bottleneck process for Howard Wright historically has been welding. Being relatively early adopters of robotic welding, the throughput wasn't able to meet the time required for effective single piece flow through the operation. With a need to grow capacity to keep lead times in customer expectations, its efficiency at the robotic welding was a logical starting point.

The main contributor to downtime was change overs, with individually cut and orientated steel tubes originally requiring fixing to a jig, before being thoroughly visually inspected prior to commencing the welding programme. The vast majority of the changeover time is made up of fixing the new fabrication to the jig and inspecting the finished unit afterwards.

The original jig designs followed common practice using manual clamps pushed down in specific locations around the fabrication to ensure welds were correctly positioned and the resultant heat distortion is controlled.

The manual clamp handles sit proud of the fabrication and take up significant areas of the fixture. This can result in:

- » Poor access for the welding torch at the preferred angle to increase likelihood of a successful weld
- » Crashing of the robot on clamps that hadn't been fully depressed, or clamps that had been worn out through use
- » Damage to the torch from rubbing against clamp positions

These issues meant that the manufacturing process still required a portion of manual welding to both check and touch up defects and finish off welds that could not be achieved through the robot welder at all, due to lack of access.

To improve changeover time and reduce defects requiring rework (which absorbed further capacity at the bottleneck) new jig designs were proposed.

THE SOLUTION

To reduce downtime and rework impacting capacity, the team needed a better way to changeover, eliminate crashes of the robot against clamps, ensure greater consistency in successful welds and move to as much robotic weld as possible.

The tool-making team started experimenting. Firstly, with pneumatic clamps that could sit flush to the jig and be centrally controlled by a small control unit. SolidWorks was used to create the jig designs, with Phase 2 introducing the idea of using electromagnets to hold the fabrication in place where full access was required.

When a cost benefit was completed on the new jig proposal, each new jig was comparable in price to the traditional manual clamp equivalent – around \$15,000 in this case.

Using an agile approach, nylon tube was tested and compared with copper tubing between the pneumatic cylinders, pulling on the extensive knowledge of the welding team to identify where weld splatter and heat would damage the tubing.

The next steps for this project are to introduce 'Smart clamping' where proximity switches or cylinder travel on the pneumatics will feed back automatically to the control system on the jig to verify that all positions are adequately clamped. This will remove the need for lengthy visual inspection and increase getting it right first time. Experiments with this are underway.



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KEY BENEFITS

The project, through a number of iterations, was extremely successful, allowing on the M9 product introduction for 100% robot weld and removing the manual welding bottleneck.

Crashes were eliminated, and greater consistency was achieved in weld pass rate.

Ultimately, the project aim was to increase capacity. With the new jigs, even with a more complicated design than previous models, the team were able to achieve 12 units a day with no overtime versus the maximum 11 that had been achieved previously. With the choice to focus on the bottleneck, this throughput was realised through the whole operation resulting in a 9% productivity gain with no introduction of labour.

KEY TAKEAWAYS

- » Where robotic welding forms or could form part of your process, review the suitability of jigs could smarter jig design reduce errors, change overtime and machine crashes?
- » Pull on skills of experienced welders to achieve the best possible jig design
- » Can clamping verification feedback be automated to reduce errors and changeover time in your operation?







Independent Doors

Unlocking the door to efficiency

BACKGROUND

Since 1994, Independent Doors has been a leading provider of high-quality doors and sliders for residential and commercial construction markets in the Christchurch and greater Canterbury region.

With branches in Christchurch, Timaru and Cromwell, the company offers a wide range of customised doors, including internal and external doors, bi-fold doors, cavity sliders and hardware.

Independent Doors is widely recognised for delivering superior products at a fair price, catering to customer of all sizes, from commercial developers and builders to DIY renovators.

The company takes pride in delivering quality, flexibility, and dependability to its customers and has completed projects for some of the South Island's premier properties.

THE CHALLENGE

Despite Independent Doors success, the company has faced several challenges in its manufacturing process. It found it difficult to gain visibility across the manufacturing process from the start of the job through to dispatch.

This made it challenging to identify areas where improvements could be made, to gather information on how effectively people were operating and how productive they were and identify training needs.

They also struggled to capture the labour component of each job and understand their margin across the different product range. These areas of concern impeded the company's ability to optimise their manufacturing process and improve efficiency.

THE SOLUTION

To address these challenges, Independent Doors implemented a manufacturing execution system called Empower. This system allowed them to achieve the following:

- » Understand the efficiency and output of each work centre and link it to the output of each person, enabling them to learn from the team members who were performing well.
- » Schedule, track, manage, and drive productivity more effectively.
- » Provide real-time updates to customers on the progress of their orders.
- » Capture real-time data for the time spent on each job, allowing them team to track this against the budget and adjust bill of materials (BOM) times based on actual times.
- » Use reporting to identify problems based on actual vs. budgeted times, leading to problem-solving activities.
- » Improved planning and scheduling by gathering and analysing actual averaged times.

The next step is to focus on the integration of their finance system with Empower enabling direct up-loads of data while reducing current data entry requirements. They will also focus on best practice day-to-day use of the system as they transition to a paperless environment. The team will also push the planning and scheduling elements of the software and begin to create enhanced real-time and daily reporting for their teams.

The implementation of Empower has allowed Independent Doors to gain greater visibility over its manufacturing process, identify areas of improvement, and optimise their operations to improve efficiency. Their first customer is already using Empower to track their order's progress. Independent Doors plans to continue integrating the system with their operations to drive further gains in productivity.



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KEY BENEFITS

- » Accurate job scheduling based on true capacity and historic records of actual times.
- » Intelligent pricing systems now based on more accurate production data.
- » Prompt and real time feedback to team members on how they are performing.
- » End-to-end management and visibility of the manufacturing process with real time data.

KEY TAKEAWAYS

- » Good information is essential to set up the system effectively. This includes having a clear understanding of the problems the system is intended to solve and the goals you want to achieve.
- A structured roadmap is critical for implementing the functionality needed in an organised and efficient manner.
 Following the Plan-Do-Check-Act (PDCA) cycle can assist in this process.
- » Change management is key to the success of any system implementation. It is essential to involve the team in the process and provide them with the relevant training to support effective utilisation of the system.
- » To ensure adoption by the team on the shop floor, it is important to make the system is as user-friendly as possible. This can include things like providing tablets right on the line, making it easy for employees to access and use the system in real-time and anything else that takes away the barriers to adoption.

To find out more, head to www.industry4.govt.nz

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Longveld

Network Site Visit

BACKGROUND

Longveld is a world-class manufacturer of primary food processing machinery, systems and equipment and an expert in custom metal fabrication, specialising in foodgrade stainless steel. Key market sectors include dairy, food and water and Longveld exports to Australasia. Longveld continuously strives to expand and refine its capability, particularly in engineering and design, technology and systems. Longveld's goal is to enhance global food safety with quality fabrication.

THE CHALLENGE

Three years ago Longveld began a process of modernising its quality management system which up to this point had been largely paper-based. Longveld stands by the quality of its work so this was a project of great importance.

The old quality system came with a raft of issues. Paper documents in a manufacturing environment did not last long; in some cases becoming illegible and requiring re-writing. The system was prone to the effects of human error such as lost documents, incorrectly filled out forms and stages or steps in the process being skipped or forgotten.

With the paper-based system the team lacked visibility into how systems and processes were performing and there would often be delays in understanding the current situation due to the time taken for documents to be gathered and collated. If an issue was found, it was difficult to search for the related document and although they were scanned to PDF and placed in a specific job folder, the line that pertained to the issue could not be searched for. Additionally, pages were collated in the wrong order, often illegible or missing all together.

It was also at a time where the company was making a shift towards a more standardised and systematic approach to information management, rather than relying on the knowledge of individual subject matter experts.

Over time the investment required to develop custom software was gradually lowering. Less training was required and companies like Microsoft were incorporating low-code or no-code software development platforms into their existing suites, so Longveld began developing its own automated quality management systems.

THE SOLUTION

Longveld decided to utilise Microsoft Power Apps as the main tool for developing its shop floor applications. The MS Power Apps suite is a low/no code development platform that allows users to quickly create simple apps in-house, using pre-set templates. This set-up makes rapid app development possible without the need for specific software training. Longveld developed three main apps to use in its QA system - Non Conformance Reporting (NCR), Welding Aid, and Quality Inspection apps.



The NCR app allows the user to log information on any faults identified quickly, add photos and capture costs and learnings. The Welding Aid app helps Longveld staff on the shop floor quickly check welding procedures and individuals' qualifications. It provides a simple way to quickly view weld procedures on the spot.

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Quality Inspection is an app which enables all workshop staff to have the correct QA forms easily accessible on their mobile device. This means that the correct form can be filled out when required and after completion stored on the cloud in the correct location, all without needing to print out a physical copy. It eliminates many of the data entry errors caused by having to manually write or input job numbers and other descriptors.

There have been a number of significant benefits provided by deploying these apps to the shop floor, including a reduction in time lost filling out paperwork, clear and live visibility of where Work in Progress is sitting and a clear understanding of what issues and problems are occurring to allow rapid and effective problem solving to take place.

Having the data and information available has also allowed Longveld to review the information that is being captured at an aggregated level, and gain insights into longer term trends, e.g. the direct link between overtime worked and NCR occurrence that could then be clearly discussed with the team and managed as both a safety issue and a quality issue.



KEY TAKEAWAYS

- » The Microsoft platform, linking Sharepoint with MS Power Apps, is a simple and accessible way to begin digitalising information capture on the shop floor.
- » Once digital, the information can be handled in a well organised way, eliminating the need for printing and scanning, automatically saving data against the correct project.
- » It is important to keep up to speed with new technologies as well as the lowering barriers to utilising it (e.g. reduced entry cost / lower training requirements / improved modularity of systems etc).
- » Change management can be challenging when introducing new technologies. Clearly define what will deliver tangible benefits compared to sticking with the status quo and start there - allow the team space to let go of the old and embrace the new.
- » Leverage the technology that is built into our devices, for example utilising cameras to take photos of quality issues, QR code scanning, GPS location data etc.
- » As more information is captured, looking at trends and the associated impacts can reveal some surprising insights into improvements that are available in other areas of the business.

To find out more, head to www.industry4.govt.nz



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Metco Engineering

Network Site Visit

BACKGROUND

Metco Engineering offer full turnkey engineering and manufacturing capabilities from their operations in Wellington and Auckland. Always aiming to exceed customer expectations by investing in the best people and equipment; they forge strategic partnerships to bring mutual competitive edge by securing supply lines, new products, and future investment. With engineering services from industrial design for one-off commissions through to runs of tens of thousands of units destined for use in New Zealand and abroad.

THE OPPORTUNITY

Metco Engineering have a vast array of product types, capabilities, and materials, with every day completely different in terms of the production. With product complexity ranging from laser cut profiles through to fully assembled and welded finished product packaged for retail, it is critical that the information provided to the operations team is clear and effective to allow the manufacturing process to proceed without error or delay.

This variability does have an underlying series of recurring products, but the timelines between production runs could be months or even years. Metco was losing the tacit knowledge from achieving a positive outcome in previous production runs, as there were no formal records tracking the product through its lifecycle.

For example, a complex part with a combination of specifications detailed by the customer might involve an exact grain direction in the material, multiple different surface finishes, and exact packaging requirements to meet export demands. Often these requirements were not clearly articulated in customer enquiries, so must be identified through continued collaboration during the project. Once successfully completed, all the appropriate information related to the project was lost on paperwork filed away and difficult to retrieve or interpret.

This could include details for jigs and tools used; set up instructions; or how long each step took in order to accurately re-price the job – all useful information when repeating projects in future. Compounding this issue was the lack of functionality in the shopfloor manager of Metco's Enterprise Resource Planning (ERP) solution – which only allowed for some basic timing information to be captured. Where other manufacturers can refine processes over time and establish clear work instructions to train teams with, the variability and volume of products made this approach untenable. Though the team's collective memory occasionally prevented errors, the level of rework was too high with engineers and programmers frequently distracted from estimation and design activities to review ongoing projects.

THE SOLUTION

A solution was proposed whereby a digital footprint of every job would be captured as it progressed through manufacturing. This included key time-saving and quality-maintaining specifications such as tools and setups; and empowering the manufacturing team to review and rapidly find relevant information about their specific task without disrupting other function.

The solution developed was PowerApps-based with the ERP database queried regularly to keep information such as part numbers, machines, and router steps up to date. Running on a tablet, the solution allows anyone to scan the barcode that follows each job to capture relevant information for next time. For example, they may wish to photograph the setup method used that achieved a positive outcome for part quality.

In a year's time, when this operation is carried out again, a different operator can scan the barcode and view the associated photographs or notes and instantly get accurate information about setups and tools. The information against each party is separated by 'labour step' so the relevant information (like folding or welding) can be located quickly, rather than needing to look at all notes associated with the job – saving significant time.



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KEY BENEFITS

Metco trialled this solution in the CNC machine shop part of the business initially, but now plan to roll it out across all operations. This approach was beneficial as many iterations were made rapidly to ensure the solution was user-friendly and working effectively before exposure to the wider business. Historically Metco stored 'samples' of each completed job as a reference guide which took up huge volumes of space, were difficult to locate efficiently, and version control was hard to achieve. This solution is viewed as an efficient way of developing 'virtual samples' that are easy to locate and interpret. Ultimately, the solution acts as a tool for democratising data and empowering the workforce with information at their fingertips to achieve the right result for clients.

A training programme to deploy the solution in new departments is planned, with communication supporting the change management process found to be valuable.

KEY TAKEAWAYS

- » Democratising data and empowering shopfloor teams to find the information they need rapidly is a win-win.
- » Operators have less frustration, and design and engineering teams become more efficient.
- » The pressure on individuals to remember specific details is reduced – so stress levels improve.
- The solution is scalable and built on a common platform

 if issues occur the skills required to repair or update the solution are readily available.

To find out more, head to www.industry4.govt.nz



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MJH Engineering

Leadership Competency – Solving problems with new thinking and technology

BACKGROUND

MJH Engineering Ltd are one of New Zealand's leading structural steel fabricators. Established in 1982, they have become industry leaders in the fabrication and installation of large-scale structural steel projects including industrial warehouses, commercial buildings, multi-storey towerblocks, and seismic strengthening projects.

They are Steel Fabrication Certificated (SFC) and hold AS/NZS ISO 3834 quality assurance accreditation. MJH manage multiple large scale projects safely, smoothly, and on time and their focus on quality provides confidence and peace of mind to clients. They also have a pedigree in innovation, using technology to improve their capability and efficiency to deliver projects effectively and successfully.

THE OPPORTUNITY

MJH Engineering were experiencing a significant growth in building strengthening and post-earthquake retrofitting projects. These projects required a significant amount of surveying to assess the current state of the building structure and highlighting services like water and gas to determine where strengthening steel structures could be incorporated.

Traditionally, surveying was undertaken through manual measurement techniques by experienced surveyors. This survey information was captured and transferred, usually through manual methods, to a detailing team who would then design the necessary solution. The manual aspects of this process introduced the potential for errors in interpretation, as well as double handling of data and the large manual task of 'reconstructing' the building in the CAD software to then design the retrofitted steel.

With increasing demand for these jobs, and increasingly complex buildings, the capacity for surveying and designing was being stretched and the potential for an error increased at the same time. MJH needed to identify a quicker and more accurate method of surveying and 'reconstructing' the existing building to fulfil this demand so they could make the most of the market opportunity in front of them.

Notably it was not possible to use designs from when the buildings were originally constructed, either because designs didn't exist, were altered during construction or the building had since been damaged or upgraded which made these designs outdated.

THE SOLUTION

One of the senior team at MJH had observed 3D scanning technology being used in Australia to survey similar buildings. They contracted a company from Australia to bring their equipment to New Zealand and survey several structures to save time and increase accuracy on a number of jobs.

MJH have always been on the lookout for new and different technologies that would allow them to innovate. By adopting this approach senior managers at MJH could think more laterally around how technology can be part of the solution when new challenges arose.

MJH were offered a project where the complexity and time needed to survey would have made the lead time and cost unviable. This was a trigger point for the company and justified the investment in the 3D scanner technology. The decision was made easier because they had experienced the technology first-hand and could 'try before they buy'.

They were also aware of the necessary integrations into their existing systems. They had also done preliminary research in-house as to the specific equipment that would suit their purposes so when the time came they were able to react quickly to purchase and implement the 3D scanning technology.

To conduct the preliminary research, the company used their contacts in Australia as well as their relationships with the contractor to ensure they made the right purchasing decision. Even though they were ahead of their time, their previous exposure to the technology provided enough training and insight to make the system almost 'plug & play' and the equipment was used on site the same day it arrived. Now they had made the decision and could support and train locally, MJH took advantage of their position as leaders in this space.



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KEY BENEFITS

- » Automation of the surveying processing 5x faster.
- » Removed any manual error no interpretation. After integration and alignment on a 'coordinate' structure has been completed.
- » Skills/capability to bid for more complex jobs and ability to compete on those jobs price wise.
- » Could test out solutions virtually, before arriving onsite with the steel to ensure it was going to work.

This technology is applicable outside of structural steel in other construction environments and development of prototypes or bespoke projects to ensure that key linkages marry up and there are no clashes with the existing facilities in place at an installation site. Once the technology was available in the business, multiple other uses were identified and help expand the team's horizons in terms of what else they can automate and what projects that can manage successfully and profitably.

KEY TAKEAWAYS

- » Try before you buy allows you to learn without the investment cost, benefit from the knowledge of an experienced contractor and test the integration with you other systems.
- » The advantages of 'leadership competency' in the digital age. Being aware of what is possible by looking outside your immediate network to keep up to date. Allowing more lateral thinking to solve problems.
- » Technology allowing an evolution in capability / competitiveness with regards to projects. The technology acts as a differentiator whether directly in capability or indirectly by creating a cost advantage.
- » Once the technology is in your business its uses develop.







Myriad Engineering

Network Site Visit

BACKGROUND

Myriad Engineering is a precision engineering organisation based in Petone, Lower Hutt, New Zealand. The company has been in operation for over 50 years, offering a full solution engineering capability, including CNC machining, welding, fabrication, pressing, drilling, tapping, and more.

Despite their established presence in the market, Myriad Engineering was facing challenges with their scheduling process.

THE OPPORTUNITY

In a fast paced, short lead-time environment, schedules require updating constantly. At Myriad Engineering, the existing scheduling process involved printing job cards on paper; cutting off a small slip containing key information; transferring these to a magnetic strip and placing them on a whiteboard aligned to each machine after the material was cut. The actual schedule was short term focused, looking at daily capacities, not taking the bigger picture view to combine orders for shipment.

With the extensive manual intervention required, the whiteboard did not match the schedule in the ERP system, causing confusion and inefficient communication for purchasing running the MRP process, as well as hindering clarity around exact delivery dates. The latter causing phone call and email clarifications and updates to be provided regularly to customers.

THE SOLUTION

By listening to feedback from the team and monitoring KPIs related to delivery, it was apparent improvement was needed. After Mark, the managing director of Myriad Engineering, got some first-hand experience of the process, he quickly drove the team to make a step change and encouraged the use of technology as the enabler to facilitate this.

Building on the use of their existing system, they moved to one source of the truth by scheduling only in the ERP system (Abel). The key challenge was then how to clearly communicate this realtime information to the team. They elected to connect the ERP software's database to PowerBI and generate a summary view of the schedule for each work centre.

Installing a large screen and attaching a small computer allowed this Dashboard to be viewed in the factory any time. Training the team was identified as a critical risk to the success of the trial. Starting with a couple of full team sessions, followed up by 1:1's where needed, the initial teething problems around adhering to schedule were addressed.

To successfully transition to scheduling solely on the system, some process changes needed to occur, for example, visibility of the initial cutting operation which makes material available for machining and fabrication needed to be improved. Providing training for the material handling team to update job routings after completion of tasks created this visibility.

It's estimated that the change in processes reduced at least one hour of admin time a day for the production leadership team, and scheduler with reduced phone calls as delivery in full on time (DIFOT) increased and accurate dates could be provided to customers. With this reduction in admin and double handling, combined with fewer phone calls, the virtuous circle of continuous improvement has started. High value tasks aligned to annual strategic goals and quarterly plans are now realistic aspects of roles that previously struggled with business as usual demands.

The cash investment required to achieve the above solution was minimal compared to the time saved by the team in asking questions and/or working on the wrong job.

KEY TAKEAWAYS

- » A process that 'provided substantial frustration' is now part of BAU. The next step change is coming into view following a SIRI assessment completed on site.
- » The open communication and feedback with the team about 'what's in it for them' helped people 'stick' with the change and work through any initial challenges.
- » Communicating the 'why' can be significant. Working with the team to link the impact between adhering to the schedule and the KPIs and associated discussions had a positive impact.

To find out more, head to www.industry4.govt.nz



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Northpine

Felling the old ways of timber tracking

BACKGROUND

Northpine Ltd is a multi-award-winning, privately owned timber manufacturer based in Waipu with a distribution centre in Silverdale, Auckland.

Northpine was established in 1999 by Keith Reay, Richard Wilson, and Bruce Larsen from the rundown assets of the defunct Waipu Timber Company.

Northpine timber products come only from sustainably managed, high-density Northern pine forests because reliable academic research shows that pine grown in the North is stronger and firmer than anywhere else in New Zealand. Northpine is a relatively small sawmill in terms of production, but with over 60 people on the payroll it is a significant employer in a tight knit community. Northpine invests heavily in staff training and development.

Northpine trains and retains the best people, encouraging individuals to achieve their full potential, and takes pride in recognising outstanding individual and company achievements. Senior management are degree qualified, and employees hold a wide variety of technical qualifications specific to the industry.

THE CHALLENGE

Work in progress (WIP) Timber from the sawmill at Northpine is stacked in 'packets' of similar profiles for transport between process steps including shaving wood to dimension and treatment. These packets had traditionally been identified by tag numbers stapled to the side of the packet. Being a natural product and construction being the final customer, there are clear industry regulations around traceability and conformance of products. The ability to be able to identify packets and their locations is therefore essential to meeting these requirements.

Historically, the tracking of packets and WIP have been done through individuals, however, it has always posed a challenge for various reasons: the workflow for packets is not always first-in-first-out; the process is not linear with different process streams for different products, and combinations of products being put through treatment at the same time. Further, the natural raw material does not always lend itself to being broken down perfectly into the required WIP, and recent improvements through their 'faster, flex and flow' programme had increased workforce flexibility meaning operators were interacting with material throughout the process. In summary, a significant amount of time therefore was spent by the workforce searching for and identifying packets required by the planning team for the next process.

Overall, the time spent identifying packets and the industry compliance regulation for product traceability, meant Northpine had to think outside the box for how to track their packets.

THE SOLUTION

Although multiple off the shelf solutions exist for tracking and tracing WIP with barcodes and scanners, Northpine has recently brought in new capability to the business in the IT space which afforded them a more cost-effective approach.

They initially engaged with their existing software provider to understand what had been done elsewhere and if they were able to develop the solution alongside their requirements to avoid new integrations. These conversations were not initially successful and Northpine developed their own mobile app through freelance developers to trial the concept and prove how it would work, however, they encountered challenges with hosting the app and its capability to operate effectively across the whole site.

Ultimately, the team learnt a significant amount about how the system needed to operate to give optimum functionality to operators. This additional insight allowed them to have more effective conversations with their existing software provider and establish a project plan that met the needs of both parties. The clever aspect of how Northpine have developed their system is their cost-effective use of hardware.



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PROGRAMME PARTNERS





With the requirements for several tablets, phones, and scanners around site, the hardware capital could have escalated quickly. To avoid this, Northpine made use of their recently installed on-site server. By emulating a desktop on each tablet driven from their onsite server, the team were able to avoid needing to run multiple apps and a full operating suite on the tablets, which meant the specification for the tablets could be dramatically reduced. Using \$100 tablets and phones that perform the required tasks perfectly means that hardware capital was significantly reduced as well as future maintenance and upgrades. A spend of \$20,000 on hardware was significantly less than originally anticipated in the project plan. The approach of not being tied to specific software and hardware meant they were free to identify more cost-effective scanning hardware on the market as well. The implementation of long-range 20' scanners costing around \$80 improved system efficiency, as fork-lift drivers no longer have to get on and off a fork-lift multiple times.

Having developed their own system, they have avoided subscription fees, meaning their return on investment was improved.

KEY TAKEAWAYS

- » Mobile app development served a purpose in terms of understanding the problem and possible solutions, but they believe could have 'failed faster' here and avoided some sunk cost.
- » Knowing their audience and truly understanding the problem they needed to solve would have avoided lost time in discussion with their existing software supplier. Once they truly understood the simplicity of what needed to be achieved, they were able to ask the right questions.
- » Not all manufacturing software providers are set up to develop bespoke solutions, so have not necessarily got the skills to distil exactly what customer requirements are in unique situations.
- » This project acted as a catalyst for other opportunities around the business using software in different ways. Sometimes it can be one success that acts as the eye opener for what is possible, unlocking the potential in our teams to identify new and smarter ways of using technology.





Oasis

Oasis Engineering

Network Site Visit

BACKGROUND

Oasis Engineering and its staff of 26 manufacture precision stainless steel machined and assembled components, primarily for the natural gas industry.

The company began as the maintenance division of the Gisborne Oasis soft drink brand, before moving to Tauranga and becoming known for its close-tolerance machined parts in difficult to work materials including stainless steel and titanium. It now makes parts for every major compressed natural gas (CNG) company in more than 40 countries.

THE CHALLENGE

Around 2010 Oasis Engineering's level of internal quality issues and customer complaints was too high. As part of their continuous improvement journey they decided to focus their offering by putting product development on hold for a year. This freed up capacity for the product and process development teams to build and standardise robust standard operating procedures (SOPs) for all processes, while at the same time introducing a robust feedback loop to resolve issues quickly and effectively.

The SOPs started to provide the consistency in quality, however time was being lost by operators locating the laminated, A4 SOPs filed close to the point of use. Having the SOPs in this format also meant loss of agility for regular rapid changeovers between products and operators using their memory instead, sometimes exacerbating customer service and product quality issues.

The other problem was that revision of these SOPs had become a mammoth task so a project had been created where all SOP updates would be completed every Christmas. This resulted in a significant delay in the feedback loop between identifying an issue and a reliable fix being in place.

Following some research and having seen a number of organisations start putting their SOPs on to electronic devices, the Senior Leadership Team also realised there was value in also transferring other information to tablets, and embarked on a larger 'paperless factory journey' project to pilot to gain maximum return.

The in-house team started experimenting, in their pilot zone, using their normal server folders as the source of SOPs. The initial trials encountered issues around accessibility across networks and potential security weaknesses, so they moved to a cloud-based solution.

However, this introduced duplicate copies of each SOP being generated, doubling the revision workload overnight. At this point feedback was sought from the assembly team, who noted that they were still having to locate the correct SOP by searching for different terms as they were not standardised, limiting the uptake and not achieving the overall goal of accessible and up-to-date standards directly to the fingertips of the shop floor team.

THE SOLUTION

Oasis Engineering consequently changed its production system to Ostendo in 2017 and the in-house Process Development Team identified how they could associate different components with the necessary SOPs in the system. This combined with applications downloadable straight to the tablet allowing it to interface with the production system, provided the desired result. In addition, an upgrade to their WiFi infrastructure in 2017 enabled the speed and security for success.

After an audit against ISO9001:2015 and with a sustainability-conscious workforce the impetus was there to scale the new system across all document types. This has resulted in close to real time data capture on the shop floor of test results, with other data streams becoming available in the near future, providing visibility of the shop floor performance live. Finally, the engagement of the shopfloor team has led to suggestions for further waste reduction. A key example is the coming transition to QR codes for product specification and servicing manuals, instead of using printed copies.

THE RESULTS

Bringing task instructions, SOPs, tests, certificates, and any other production documents effectively to the shopfloor is an example of dramatically increasing Oasis Engineering's Industry 4.0 Vertical Integration. The flow of data and updates between the shop floor and enterprise levels has improved productivity, sustainability and engagement from a workforce in need of better systems to adapt to more dynamic ways of working.

The journey followed by Oasis Engineering exemplifies the 'think big, start small and scale fast' philosophy. They identified a significant benefit and a level of flexibility for the future, proved the concept and

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recognised their knowledge and infrastructure gaps early, which prevented potential sunken costs.

KEY BENEFITS

- » This agile approach to run with newly developed systems that can be tuned to optimum rapidly allows quicker implementation and a faster journey to ROI.
- » Weekly Kaizen meetings worked to share progress and gather feedback in order to refine the approach.
- » A cross functional team was essential to avoid a siloed approach to the project workload.
- » There was a 95 per cent reduction in time saved on searching for SOPs.
- » There is scope for future improvements such as transitioning to video formatted SOPs and real time data capture now the infrastructure is in place.

KEY TAKEAWAYS

- » Look beyond the small change to the bigger picture of what it could do long term. This may support your business case for investment, where the initially smaller investment may not.
- » Identify the enablers such as WiFi infrastructure capability and security, standardisation of SOP format and locations.
- » Test quick and fail fast by starting small with a pilot to avoid excessive development costs.
- » Have a robust process to identify and rectify issues with the system and allocate resource to complete these improvements.
- » New staff can be trained and productive much more quickly with good quality SOPs at their fingertips.

To find out more, head to www.industry4.govt.nz

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Pan Pac Network Site Visit

BACKGROUND

Pan Pac Forest Products was established in 1971 at Whirinaki, 16km north of Napier.

Part of Oji Group, Pan Pac Whirinaki processes locally grown Hawke's Bay radiata logs into appearance grade timber for export around the world, as does its site in Milburn, Otago. This case study focuses on the sawmill operations at the Whirinaki site.

THE OPPORTUNITY

Pan Pac Forest Products strives for exceptional safety performance across its business. As an industry, it has a wide range of high-risk activities occurring throughout its operations. Alongside continuously improving their safety culture and reporting using common best practice methods, the engineering team has spent time looking at how they can adopt Industry 4.0 technologies in their day-to-day operations to keep the team safe.

The site has a high degree of automation that allows operators to largely remain in lower risk areas. However, this situation reverses when a breakdown occurs. The engineering team now must interact directly in areas with high energy equipment. With such a high complexity of equipment, numerous contractors, new staff and a constantly changing environment, the team needed effective methods to communicate the correct isolation procedures.

THE OBJECTIVE

Develop a solution in which any operator, maintainer or contractor, even with limited experience, can identify and correctly isolate all energy sources associated with any asset, and surrounding assets when necessary to carry out safe repairs or upgrades.



THE SOLUTION

Hosted on Microsoft 365 SharePoint, the Pan Pac engineering team developed a simple block representation of the entire sawmill facility, colour coding and applying hover over labels to show the major parts of the facility. This representation links directly to documents associated with each area, including Isolation Master Lists incorporating CAD images of the area and electrical drive numbers.

Hosted on the company's SharePoint, the tool is accessible remotely throughout the network so teams can access the required information without leaving the work area, delivering a solid time saving. In addition, the revision level of the digital material can be accurately controlled to ensure that engineers are always looking at the latest information.

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Once the relevant equipment has been rapidly identified and located, there are clear instructions identifying the isolation method and how to lock it out to ensure the safety of personnel. This includes directions as to what other surrounding equipment is recommended to be at 'zero energy'. This is being supplemented by a library of video tutorials supporting specialist or common tasks.

Traditionally, with libraries of information like this, it is challenging to store and locate the relevant files rapidly when needed, as to do so could require significant and expensive administration time. Using smart functionalities that come as standard through the Microsoft Stream service, the audio on every video is automatically transcribed, meaning detailed searches of metadata can quickly deliver the correct content. Creating this internal library has involved a necessary shift in operation from the team. With a number of highly experienced team members retiring from the business soon, this repository will be invaluable to ensure information is quickly and effectively transferred. This is being added to by capturing video information when contractors or subject matter experts are on site, potentially reducing the need for costly call outs and travel expenses.



MANAGING FIRE HAZARDS

At particular locations in the automated sawmills cutting processes, it is possible for significant heat build up to greatly increase the risk of fire. While processes are highly automated, monitored and optimised by operators, it is virtually impossible for operators to identify these risks escalating due to the location of their control room. The Pan Pac team is using a thermal imaging setup and is in the process of developing solutions that will allow the process to automatically identify when fire risk arises and alert this to operators.

This process is a good example of an iterative deployment of technology. Rather than build and deploy the solution all in one, the team has first installed the thermal imaging system, and connected this to live view for the operators.

This is followed by applying a machine vision algorithm to identify when temperatures exceed a threshold and creating a visible flag to the team. Theoretically, it would be possible to close this safety loop by controlling machine behaviour following this event, although this is not yet being explored. This iterative approach has meant step change improvement in the identification of an event, with minimal 'project management delay'.



KEY TAKEAWAYS

- » Existing subscriptions to services such as Microsoft 365 offer a range of functionalities, such as automation, low code app development and metadata tagged library building that many manufacturers could benefit from. Online tutorials often make the required skill acquisition cheap and manageable inhouse.
- The required culture shift for transferring knowledge from experienced operators and engineers will be fundamental to many manufacturers and primary processors.
 Technology can assist with this capture and transfer of knowledge.
- » Technologies that would have previously required bespoke development, are now able to be managed through existing platforms, limited minimal training required, great value can be leveraged from them.







Plazmax Technologies

Network Site Visit

BACKGROUND

Plazmax Technologies is a cutting and profiling machine building company with 10 staff that operates from Rotorua.

Using a combination of their own proprietary engineering and partnerships with world leading suppliers, Plazmax manufactures some of the most advanced machines in the world. They export from their site in Rotorua to manufacturing businesses that require precise, efficient and reliable equipment to cut metal profiles. They are constantly looking to advance their product and business offering to compete on a global scale with some of the largest machine builders in the market, by leveraging technology to differentiate themselves.

THE OPPORTUNITY

When Plazmax first started to build Plasma cutting machines almost a decade ago they quickly understood the possible advantages of leveraging technology to improve their offering and reduce costs.

Back then clients were repeatedly highlighting errors with the machines, which Plazmax found was mostly the result of incorrect processes and inexperienced operators, with the machine consistently running correctly. Providing this level of support to clients was becoming a costly way to help them troubleshoot and resolve issues. Plazmax identified that the training, education and often process improvement services could all be done if they were able to troubleshoot the machine parameters remotely. This situation was often exacerbated by the fact that operators would occasionally not disclose the history leading up to a potential problem, which was

often human error. This made it a real challenge to devise the best course of action to get the client back up and running.

These issues were compounded by the fact that most clients only had one Plazmax machine as part of their manufacturing process, and without it their processes stop completely. For example, a recently installed machine may require slight recalibration to optimise its efficiency after a period of bedding in. Where previously this required Plazmax to travel to site to do the recalibration, this can now be done in matter of minutes remotely. Plazmax expanded this offering to commissioning, with detailed and visual instructions allowing client engineers to physically set up the machine, which freed up Plazmax to focus on the software set up.

THE SOLUTION

Using a windows-based digital controller integrated into the machines meant Plazmax could quickly connect to their clients' networks and get basic visibility of the machine, seeing exactly what the operator sees. They trialled readily available off-the-shelf software, settling on a corporate Teamviewer as the solution. It satisfied all the security requirements that inevitably must be overcome when connecting to a client's network, and the ease with which this solution could be integrated with their windows-based system meant they could be up a running very quickly.

This saw a change in philosophy from the team at Plazmax, with any electronic component in their machines requiring to be connected to the controller and therefore providing maximum visibility of the history and performance of a machine. It allowed them to see more about the machines than the operator standing next to it. This protects the scripts and software that optimises the machines performance from being altered by operators, while providing a wealth of data to Plazmax to enable it to best service the clients.

THE RESULTS

The above represents part of the transition that is becoming more and more common with the introduction of Industry 4 technologies - moving from offering a product to a service. This transition forms some of the key next steps that Plazmax are looking to implement. Plasma cutters require a regular input of consumables to work effectively, these consumables represent a cost to clients and an inventory cost to Plazmax themselves.



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Optimising the supply chain in this area therefore has benefits to both parties. As such Plazmax are introducing capability into their machines to monitor and optimise consumable usage, which in turn pushes data back to them allowing them to set more efficient supply chains in the future. This capability has seen them expand their internal skill set developing their own controller system, which opens up options for sensor and software connections in the future.

Moving towards more remote access and service opportunities through technology, such as the above consumable examples, simplifies clients operations while adding value to both parties. Innovation such as these can act as significant differentiators, allowing New Zealand based manufacturers to compete globally by providing a higher value product without the hinderance of expensive travel costs from our remote location.

Further to this it is slowly becoming an expectation from clients that machine and equipment suppliers take more initiative in delivering value to them. With technology and off the shelf solutions becoming cheaper all the time it allows SMEs to target markets they would have previously not considered viable.

KEY TAKEAWAYS

- » New technologies are changing the way companies can work with their suppliers.
- » Service level agreements with industry specialists can maximise the efficiency and accuracy of non-core elements of your business while removing risk and providing flexibility.
- » It is important to challenge traditional work flows and ask whether new technologies can open doors to work best with suppliers.
- » Using new technologies to deliver better outcomes from suppliers is a great way to introduce Industry 4.0 into a business.





A PYRAMID ENGINEERING Engineering Excellence

Pyramid Engineering

A Learner's Guide to Lights Out Machining

BACKGROUND

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.

THE OPPORTUNITY

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 RESULTS

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



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.

To find out more, head to www.industry4.govt.nz

Lmac EMA

PROGRAMME PARTNERS



Red Steel

Shopfloor Intelligence – Measuring more than productivity

BACKGROUND

Red Steel's foundations were laid in the 1960s as a building company specialising in steel construction and Red Steel was officially formed in November 2002, before purchasing Woolaway Steel Structures in January 2003.

They specialise in structural steelwork and undertake contracts predominantly in the lower North Island of New Zealand from their purpose built facility in Pandora, Napier constructed in 2015. Red Steel is an active member of Steel Construction New Zealand (SCNZ) and in 2014 became the second fabricator to be certified under the Certified Fabricator Scheme.

THE OPPORTUNITY

In the steel construction industry, the scheduling of work is essential in order to deliver the correct components to site in the correct sequence to allow the erection process to progress in the right order. This flows up the value stream to prioritise the workflow in the fabrication shop. It is important to know what components have had the precursor process completed (mainly cutting and drilling).

To help manage these processes, Red Steel planned to move towards an in-house, cloud based solution called Contracka, that allowed bespoke customisation and avoided the escalating costs of extra licenses on externally governed products. This transition had the potential to leave them with reduced visibility of what components had been cut and drilled prior to manufacture though, and could have greatly damaged their ability to accurately schedule work in the fabrication shop. The robust Steel Fabrication Certification (SFC) that structural steel fabricators in New Zealand comply with requires detailed traceability of manufactured components (similar to ISO 9001). To deliver against these traceability outcomes could potentially require labour intensive processes that are prone to inaccuracies from human errors.

Red Steel needed a solution that could help ensure visibility and traceability was maintained while not introducing labour intensive administrative processes.

THE SOLUTION

In order to close these gaps and deliver the right information about production and traceability to the workshop manager and client respectively, Red Steel tapped into new Internet of the Things (IOT) capabilities from their equipment provider (Peddinghaus).

The tracking system, rather than simply monitoring uptime/productivity - which is becoming more common across industry - was able to identify which part had been manufactured, as well as details around what machine it was manufactured on, when, and potentially combine this information with machine parameter meta data as well.

This process works by using the programme file that instructs the machine how to process the part, which includes the part number from the original model produced by their in-house detailing team. It then captures the associated data when running each part of the programme to show when each component was manufactured and the associated data. Originally this data was automatically exported into an .XML (excel) format that constantly updates when new components are added. As a basic report this could be filtered and analysed manually if required.

The main success was to automate this process further to automatically update the 'part status' in Red Steel's system, and therefore identify which components in each project were complete through which process. These tracking systems historically have relied on manual intervention (often using bar code scanners) to capture this data. Although this data is useful, it is a waste of time from a value add perspective and therefore results in less shopfloor efficiency.



PROGRAMME PARTNERS



IBBECA LMAC EMA

NEXT STEPS

The next step with the project was to replicate a similar outcome on the 'plate line' to determine which plates have been manufactured for each assembly within each project.

At this point, all the required information on raw materials for assembly will be available and therefore permit effective scheduling so fabricators will only be provided with the information for the jobs where 100% of the components are available – this helps avoid any rework and reduces work in progress.

In addition, starting to introduce other essential meta data to further automate the traceability elements such as heat number and operator added extra value. For example if a component was cut out of specification, they could associate all the relevant factors such as machine parameters (vibration, temperature), operator, raw material heat number, what programme it was running etc., to truly understand where a fault has arisen quickly and put corrective actions in place.

KEY TAKEAWAYS

- » Look to trial new processes in low/no code customisable solutions online prior to developing in-house to 'fail fast' and avoid costs.
- » With IOT solutions look beyond pure uptime and productivity measures to understand if there is meta data that can add extra value to processes.
- » Understand the value that a 'track & trace' system could have for your components when it comes to scheduling and root cause analysis of non-conformances.

To find out more, head to www.industry4.govt.nz

Lmac EMA

PROGRAMME PARTNERS





RML

Precision - Performance

BACKGROUND

RML has been providing high-performance innovative robotic and automation solutions to their customers for the past 40 years. From robotic automation systems, cartoning, case packing, conveyor solutions, custom assembly, palletising, lidders, closers and components. RML has worked with large and small production lines throughout New Zealand and Australia.

THE CHALLENGE

As a machine builder, RML have identified key issues which were stopping their customers from maximising the value of their investments. Primarily, it was difficult to be connected to machines from outside of the customers' plant. This led to site visits being required to provide customer support and delivering upgrades that increased customers productivity. The lack of network connectivity also meant that machines were generally standalone, with limited integration with the customers business systems, thus not delivering the performance data to the teams that are.

THE SOLUTION

RML identified that the current PLC technology is great for controlling plant, but is lacking in their ability to fully control machines and harness the full potential of Industry 4.0. To make their products Industry 4.0 ready, RML moved to using Industrial Controllers (IC's) about six years ago. IC's are similar to a Windows computer. They have the ability to run real-time control and allow a suite of additional programs to be installed, beyond simple machine controls. This has also helped them bridge the common access or security issues which machine builders face with PLCs. Using IC's, it is now easier to support customers in real-time while ensuring security needs are met.

The IC's allow for the remote adjustment of settings to help when troubleshooting, allowing remote support and troubleshooting, and allowing RML to train new operators online. This ensures machines are back up and running quickly, effectively maximising production. Also of benefit is the ability to collect real-time data using the PLC that drives the process. The data generated helps provide improved business performance intelligence and improves growing and grading processes.

They also allow for the storage of information at the point of use, like SOP's or training videos. These help machine owners to bring their staff up to speed on the machines' function through an accurate instruction from the OEM. Historically, it was common to have manual and electrical drawings stored in locations where supervisors and operators did not have immediate access, now the team have access to the latest documents at their fingertips

PLC	IC
Specialist software required	Standard programming language
Easy to program	Unrestricted programming capability
Traditionally most robust	Typically, less well shielded from process environments, but not now
Can only run machine instructions	Can process and report data (graphs, dashboard, Power Bl etc)
Can output data	Can process and report data (graphs, dashboard, Power Bl etc)
Most secure	More easily integrated into business security frame- work (allowing external ac- cess to machines securely)
Hard to upgrade (generally requires code transfer)	Easy to update (common programme language)



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PROGRAMME PARTNERS



While the machines are running, they are generating both products for the machine owner, but also a large volume of data. RML can, with customers authority, review this data and understand the performance of their products in the field. This information, when integrated into their design process allows them to create more suitable machines in the future by having a clear understanding of how their machines work in the real world.

The benefits of enabling their machines with this additional functionality speaks to interoperability and real-time capabilities, which are core principles of Industry 4.0. The feedback generated from the product in-use is part of the concept: "Integrated product life cycle".

- » Interoperability represents the ability for manufacturing systems to exchange information between them for example the MES system being able to communicate how many of each item the machine needs to process and the SKU and even machine parameters for the next product to be made.
- » Real-time capabilities as the name suggests, is focused on reducing the lag time between the generation of data and it being available for communication to either people, or software or other manufacturing assets. Reducing this time allows for faster detection of issues and seamless transitions.
- » Integrated product lifecycle covers the design, manufacture and ongoing service and support of a product. Data generated by a product in-use can be fed back to the design team to allow for improved design, or to the support team to help service the product before it fails.

KEY TAKEAWAYS

- Interoperability of machines is critical to maximising their potential, this reduces the tasks for operators and makes for a more responsive operation.
- » Remote troubleshooting
- » Universal programme language for IC's, specialist software is not required.
- » Real-time visibility of processes allows for faster identification of problems, more robust decisionmaking, and most importantly, faster deployment of countermeasures.
- » By monitoring a process, we can often identify when it is trending away from normal and can identify and execute solutions before it fails.
- » Real world data can help in designing products to ensure they meet the actual needs of the customers and their processes.
- » IC's allow for greater interoperability and functionality than PLC's.

To find out more, head to www.industry4.govt.nz

Imac EMA

PROGRAMME PARTNERS



ROCKLABS

Rocklabs

Digitising the continuous improvement cycle

BACKGROUND

Since 1975, Rocklabs has been a global innovator in the sample preparation equipment field, supplying a wide variety of equipment for the mining of gold, silver, platinum, iron and palladium. Early achievements in the mining and exploration industries created a platform for the development of equipment designed specifically for commercial and mine site laboratory environments. Whilst still being world leaders in these sectors, Rocklabs have continued to enhance our core products and adapt them for virtually any endeavour requiring world-leading sample preparation equipment.

Rocklabs are based in Mangere, Auckland where they form the Scott Automation Centre of Excellence for Mining, including the design, engineering and manufacture of cutting-edge sample preparation machinery.

THE CHALLENGE

Rocklabs had been operating its Engineering Change Requests and Health and Safety Reporting through manual paper-based process. Both processes are central to the continuous improvement culture that Rocklabs has been fostering over the past few years. The existing mechanisms weren't providing quick enough feedback and improvement loops for the shopfloor team in particular. To maintain engagement, it was necessary to decrease the administration associated with reporting.

Engineering change requests are predominantly focussed on product and manufacturing process improvement, identifying parts and sub-assemblies that can be modified to increase the quality and efficiency of the process. For example, notifying engineering of obsolete components being kitted to jobs from stock that may require updated drawings to be supplied to suppliers. Historically, these had been carried out through an extensive paper process requiring the physical movement of paper forms at least six times, as well as regular filing, printing and scanning making the overall process inefficient.

Health and Safety reporting, both hazard identification and incident reporting, forms the backbone of the iterative continuous improvement approach that Rocklabs takes to looking after it's teams. Previously, paper-based forms were required to be printed off, after identifying the correct form from a list of almost forty and then completed manually. The time taken for the form to be read and acted on by the necessary leaders was inefficient, and in some cases, it could take days for a report to be read and an investigation to begin. This lag reduced the efficacy of the process and the engagement of team members to report hazards and incidents in the first place.

THE SOLUTION

In terms of Health and Safety, the operations manager at Rocklabs and Scott Automation Group Health and Safety Manager reviewed several digital solutions to reduce the lag in reporting and make reporting easier and faster for employees. After considering multiple options they engaged Evotix to deploy their web-based app solution. To support the uptake of the new system training was put in place for all employees to physically trial the software and interact with it before providing feedback for adjustments to be made to optimise it for Rocklabs purposes.

In addition, QR codes were placed at handy location making it very quick and easy for employees to access the web app as required. The app has supported much greater hazard reporting and as a knock-on effect, a reduction in incidents. Historical issues about how to conduct monthly safety audits and walks and report them appropriately disappeared as Rocklabs were able to separate out hazard reporting from safety audits making their data analytics and trend analysis more important.

Further to the efficiency improvement the roll out has allowed the disparate sites that form the Scott Automation group to report consistently giving better insights to performance and opportunities. Beyond efficiency, the robust nature of the app, providing reminders for actions to be closed and audits to be carried out, helps the leadership team stay on top of their requirements providing a better experience to the team that submit results. Overall, this has generated an organic benefit to the business with a big uptake in collaboration and implementing solutions globally, not just locally.



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PROGRAMME PARTNERS



For engineering change requests, the process has improved dramatically by introducing electronic forms accessible on the shopfloor, which are automatically collated into a database for resource allocation to completing requests and reporting on progress, will full traceability and a closed loop feedback system to ensure that the originator of a request hears first-hand about the change that has been made. The key to the success of this system was to trial basic versions initially with one or two people before iterating to more complete solutions over time. Framing the development in the trial format gave people the confidence to give it a go and be open with feedback, rather than feeling like a change had been imposed on them.

Ultimately changes to both these processes are just two small examples of how Rocklabs have taken the initiative internally to improve processes and adopt technology solutions to improve efficiency and communication, all whilst providing good quality data to provide insights on progress over time.

KEY TAKEAWAYS

- Having a small number of people with lower digital literacy in the business is not a good reason to stop the business moving forward with adopting digital solutions. We should look for ways to improve the digital literacy where needed or provide alternative options for this minority. If we stop moving forward and adopting solutions, we inadvertently frustrate the wider workforce who are keen to adopt new solutions.
- » Framing changes in a trial format initially helps to smooth the transition and reduce opposition.
- » Moving to digital formats for processes doesn't just increase efficiency and reduce paper, it also increases the ability to report and identify trends and opportunities.







Southern Spars

Network Site Visit

BACKGROUND

Southern Spars is a world leader in the manufacture of composite masts, booms and spreaders - used on everything from super yachts to America's Cup racers. The company has been in businesses for 29 years and employs more than 500 staff worldwide. Its operation, headquartered in Auckland, has centres in the USA, Denmark, Spain and Sri Lanka.

THE OPPORTUNITY

This case study looks at how an organisation, such as Southern Spars, can progress their journey to Industry 4.0 by reviewing the technology and processes already implemented as part of Industry 3.0.

The implementation of new technology into a manufacturing process can be critical for maintaining or extending an advantage. Investing and deploying technology involves constant decision making based on specific knowledge of the technology and the problem being solved. To remain cost competitive, when positioned on the other side of the world from their customer base, it was clear that Southern Spars needed to improve their workforce efficiency. With a traditional assembly process reliant on very experienced and skilled staff, the senior team decided to look at opportunities to automate parts of the process.

In 2010, a robotic arm was selected as the technology to be deployed to realise the above opportunity. When issues arose shortly after commissioning, the solution provider was willing to engage and provide resources and knowledge to the project to optimise the technology, which was very helpful. In a "learning first" approach, however, a cross functional team, including the prospective solution provider, could have developed a series of activities to prove or disprove this capability prior to investment and derive alternative set ups.

The "learning first" approach reduces expensive and timely 'loopbacks' (i.e. returning to a previous stage later in the project, such as designing after implementation) which are a common feature of traditional "staged gate" approaches. The "learning first" approach would have provided a much better outcome for the organisation.

Solution providers are often used as a resource to assist in closing knowledge gaps, however where the providers themselves are unsure they must be willing to engage collaboratively with the client to develop the right offering. This shift to a 'partner' approach will be key to the success of solution providers in the future as more clients move to a "learning first" method for implementing technology.

Another knowledge gap that the Southern Spars team recognised in hindsight was in the technical set up of the equipment. An internal team tasked with optimising and broadening the capabilities of the technology were originally unfamiliar with all the technical requirements needed for the robot to be precise and machine effectively. Following commissioning, the team uncovered multiple limiting factors that they overcame through creative problem solving.

THE SOLUTION

A "learning first" approach aimed at reducing costly and time consuming 'loopbacks' delivers value in new product development. The principles can be effectively translated to technology deployment where a test first and fail fast philosophy contradict traditional "staged gate" methods, ultimately delivering a better likelihood of successful implementations hitting objectives first time.

KEY TAKEAWAYS

- » Industry 4.0 is not just about robotics and AI. Nor is it about implementing technology solutions that cost a lot of money, or having to find staff with specific skills. It is about challenging the status quo and improving things like planning, processes, product design and strategy.
- » As an example, one of the key findings was that Southern Spars' planning processes were not as good as what the team had thought. This was ultimately holding them back in some areas – specifically around efficiencies.
- » One of the outcomes was to pull together a roadmap to start a more tangible digital strategy. As part of this, LMAC provided Southern Spars with examples of best practice from similar organisations and industries overseas as examples of what could be achieved.
- » Jim McColl, the General Manager NZ of Southern Spars, gave this advice to those attending a webinar about their site visit - "Be open minded about Industry 4.0 and have the courage just to get started so that you make sure that you don't get left behind". You can view a recording of this webinar on the EMA website.

Lmac EMA

PROGRAMME PARTNERS





Stake Glass

Enhancing manufacturing quality and productivity with a 'foil' proof solution!

BACKGROUND

Stake Glass is an independent, locally owned and operated glass supplier in Christchurch. They provide clients with the highest quality, innovative glass solutions for commercial and residential applications. Having grown rapidly over the 7 years since its inception Stake Glass has brought in cutting-edge processes to maintain its competitive advantage.

THE CHALLENGE

The business of supplying glass in NZ revolves around the efficient purchasing of glass from overseas sources, and the safe, efficient, and expedient turn around of orders. Almost every window is a different size and can be specified from a different combination of materials in different configurations leading to a staggering number of potential products. The market is tough, with cost and lead time being critical factors for the success of the business. The impact of getting an order incorrect on such tight turn around times is the difference between success and failure.

THE SOLUTION

In order to accurately communicate the requirements of the business to meet the tight timelines of delivery, Stake have invested in the integration of their production software. This allows fast accurate information flow through the business minimising the need for human input. One example of this is the integration of the auto loader. The auto loader is a robot which stores and retrieves sheets of glass from their store and loads them onto the cutting tables, based on the production plan submitted by the planner. This ensures that the right material is selected for the job and that traceability is maintained throughout the production cycle, eliminating human error in the selection of the right material.



As each pane is labelled, its location in the factory can be traced at any time and the team can see how far through processing it has progressed. This gives the team a dynamic real time view of the products in their plant allowing for faster, more accurate data-driven decisions.

The barcoding allows for the products to be routed through different production processes as required, to be brought together for the completed order at the same time, ensuring the delivery is completed on time and in full. This means the glass is processed through the right production steps in the right order reducing the amount of rework required, and the amount of paperwork generated in the plant.

As we all know, glass breaks easily, and this does occur from time to time in the plant. With the individual barcoding the team can quickly and easily identify the broken pane and reschedule its manufacture to ensure it meets the rest of the assembly for delivery on their tight timelines.

NEXT STEPS

The next integration steps for Stake will be the connection and integration of their manufacturing assets into the software which will allow the scanning in and out of the process to be automated, further reducing the lag between processing and visibility in the MES software.

The team are also looking to harness the power of IIOT, or the Industrial Internet of Things, which is one of the core Industry 4.0 technologies.

The IIOT devices will add "smarts" to older legacy equipment with limited communication capabilities, allowing them to capture data and report it into the cloud where it can be used to dashboard equipment performance and empower the management team to optimise their processes with real time data. Previously this was impossible with operator dependent processes, however with IIOT devices this data can now be generated from any manual corded tool.



In Beca lmac EMA

SWITCH Lighting

Switch Lighting

Making lighting smarter

BACKGROUND

Switch Lighting is a Nelson-based manufacturer of LED lighting. With close to 14 years' experience since their establishment in 2009, they have been dedicated to creating high-quality LED lighting solutions for their customers. Their lights are designed and crafted to suit the New Zealand environment, whether that be on the coast or atop a mountain in a national park. Their mission is to enhance the environments we work, live and play in.

Never tell them that an LED is just an LED! They are committed to investing in the future and are always on the lookout for the latest advancements in their sector. As pioneers in their field, they were the first lighting company to introduce colour tuning LED lighting to New Zealand. Switch Lighting firmly believe that LED lighting is the way of the future. As a clean, green, energy efficient light source, it is environmentally friendly, and they take great pride in being one of the few LED light manufacturers based in New Zealand.

THE OPPORTUNITY

The team at Switch Lighting regularly attend trade shows to stay up to date with the latest industry technology. During a recent trade show visit, they identified a gap in the market for a product that would simplify the process of creating different lighting environments in the home. While other solutions were available, they were often difficult to learn, train, and use, and required additional cables and a high level of expertise to install, commission and be used by the customer.

Recognising the opportunity, rather than adopting a platform that was locked to a particular hardware supplier, the team decided to

adopt the available "open source ecosystem" technology, which allows manufacturers to create hardware products that use the ecosystem to communicate with each other. This approach has allowed them to develop products that are highly flexible, easy to use and provides a simple way for end-users to create uniquely lit environments.

To simplify installation, the team leveraged Bluetooth connectivity, which eliminates the need for additional wiring and reduces the level of expertise, time and cost required for installation and commissioning. Additionally, they have incorporated colour tuning technology, which allows for the creation of personalised lighting environments with simple wireless controls.

Overall, they believe their product represents a significant opportunity to meet the needs of customers who want to create personalised lighting environments in their homes without the hassle and complexity of traditional solutions using the latest technology available.

THE SOLUTION

Upon discovering the Casambi solution, our team of R&D Engineers investigated other Bluetooth chip manufacturers, including Qualcom IC from the USA. While this IC was excellent, it would require Switch Lighting to develop its own App or user interface.

The advantage of Casambi was that they had already developed a comprehensive App, allowing Switch Lighting to avoid investing heavily in software and staff. Therefore, the Casambi solution was chosen as the best way forward. Switch Lighting required a method of controlling their colour tuning, and customer feedback indicated that a physical light switch was still essential rather than just using an App to control the lighting. Other solutions that used a fixed wall switch turned off the Wi-Fi/Bluetooth, thus making the smart functionality unavailable. Switch Lighting recognised this gap and developed a Bluetooth interface between the standard switch and the Casambi system. Their next step is to add a rotary dimming control, as requested by their customers. Switch Lighting is currently the only company in Australasia designing and manufacturing Casambi-enabled products.



Lmac EMA

PROGRAMME PARTNERS





KEY BENEFITS

- » Cemented Switch as the Industry Leader
- » Allows Switch to use colour tuning in their products
- » First New Zealand company to introduce colour tuning lighting (and still the only one)
- » Providing affordable, simple, smart lighting to the end user

KEY TAKEAWAYS

- » Importance of visiting trade shows to keep up to date with latest trends and technology was hugely beneficial.
- » Open-source platforms that enable products to talk to each other are good (not locked to a particular hardware provider).
- » Sometimes, taking a calculated risk on emerging technology early can put you at the forefront of the market.
- » Don't be tempted to shortcut and skip ahead when you are developing a new and groundbreaking product, if you have an agreed NPD process, stick to it.







Tait Communications

Machine learning and vision systems - Building collaborative intelligence into the assembly process

BACKGROUND

Tait Communications is a global leader in designing and delivering critical communications solutions which are the right fit for a variety of industries including public safety agencies, government services, utilities, extractive industries and urban transport providers. Tait was founded in 1969 by Sir Angus Tait, who built an organisation focused on innovation and technical excellence. His catch cry 'the best is yet to come', continues to inspire a new generation of innovators at Tait.

THE CHALLENGE

Tait develops, designs and manufactures a broad range of communication devices at its site in the garden city of Christchurch, New Zealand. These devices include handheld radios, many of which are purchased by organisations that operate in extreme and even potentially explosive environments, so quality is very important to Tait.

A key element of the handheld radios is the battery, and a number of these models are manufactured to be intrinsically safe, IP67 rated. The battery assembly process consists of placing the battery core into the cover, positioning the base over the cover and then ultrasonically welding the cover and base together to form the finished battery.

The design of the battery base is subtly asymmetrical which could lead to fitting and welding the base with the wrong orientation. Although downstream processes would detect the issue on the rare occasions that it occurred, once the welding was completed the battery could not be reworked and the defect resulted in scrap.

As a quick response to this issue, the production support teams implemented a number of physical changes to the process that included updating their visual SOPs, providing additional training for the assembly team, and making a change to the way the battery bases were presented to the team member who was working on that assembly station, in order to support correct assembly practices.

A request was also logged with the mechanical engineering team to design this potential assembly error out of the next iteration of the product. As well as the above improvements, there was a desire to implement a more robust solution that would help to eliminate the chance of this issue occurring in the future.

THE SOLUTION

A cross-functional team was set-up to implement a vision system at the battery weld station that could detect and check the correct orientation of the base before the ultrasonic welding happened.

A key requirement of the system was for it to be highly flexible and able to work with different battery configurations. To achieve this, Machine Learning was incorporated into the system to allow it to be trained to detect errors across different battery variants.

Taking a 'think big, start small, scale fast' approach, the team decided to begin by developing the system in-house and to use off the shelf items to get it up and running.

The system was set up as shown below and retrofitted to their current welder.



A key part of the vision system involved training it on the range of battery variants, with good and no-good parts. A comprehensive set of images were used, covering 'good' and 'bad' examples of each battery type as well as images from when the welder was empty.

These images were augmented during its training with random variations, helping the system to be resilient to slight movement and changes in lighting. If a battery is ever mistakenly classified, the system is retrained using the problematic image, so that it improves and learns over time.

In practice, the vision system follows this process:

- Capture image from webcam. 1.
- Process image to enhance sharpness and contrast. 2.
- 3 Compare image to trained database of good and no-good assemblies.



PROGRAMME PARTNERS



- 4. Provide a visual indication showing good or no-good parts.
- 5. If a no-good part is detected, lock out the welding machine until error is corrected.
- 6. Capture image of no-good part and store in database for review.

Step 5 was not implemented until after a short trial period to confirm that the system was working and to limit disruption to the assembly line while any teething issues were resolved. The system has been warmly received by the team working in the assembly area and defects in that area have fallen dramatically.

The next activity identified by the team is to scale the system up and into other areas, one of which could be to complement and then replace the visual checks that are conducted in their Surface Mount department.



KEY BENEFITS

- » Removed the possibility for the battery case to be assembled in the wrong way, materially reducing the instances of this error without requiring a redesign of the case.
- » Simplified the battery assembly process step. This now requires less training which makes it much easier to flex new team members into the position.
- » Allowed an initial trial of the machine learning solution to provide proof of concept and help to gain buy-in from key stakeholders.

KEY TAKEAWAYS

- » Leveraging easily available, off the shelf hardware / equipment can help to get solutions up and running quickly.
- » Building machine learning code into systems can ensure high flexibility and adaptability as products and requirements change.
- » Implementing a trial in a clearly defined and scoped area can pave the way to bigger and more complex implementations of new technology.
- » New tech systems such as this can easily be retrofitted to work with existing equipment and machinery.







Tasman Bay

Revolutionising Juicies: Automated packing for increased efficiency and profitability

BACKGROUND

Over 30 years ago founder Brian Hirst had a vision to create an innovative food production business using healthy and delicious produce from the Nelson region. One of the first products developed was Juicies - freshly pressed Nelson apple juice blended with other fruit juices into sachets. Juicies were originally designed as a lunchbox drink, but school children had other ideas and started the trend of eating them frozen. Over the past 30 years they have been increasing in popularity and sales.

Tasman Bay Food Co. is still a family-owned business and are still in the business of making Juicies as well as other Juicies products, Moosies and a large selection of baked and unbaked products. Juicies are sold in three formats original ambient Juicies, frozen Juices (sold as a bulk or retail products) and Juicies in a tube. Frozen Juicies are sold in New Zealand and Australia. Juicies Tubes are sold into nine export markets. Tasman Bay Food Co. employ around 40 staff and is based in Brightwater Tasman.

THE CHALLENGE

Tasman Bay Food Co., the company behind the Juicies and Moosies brands, are experiencing ongoing, growing sales and needs to maintain competitiveness in the market while ensuring profitability. They are facing challenges such as potential price competition, increasing material and labour costs, and the need for continuous process improvement. Historically, Juicies were packed by hand into retail boxes, requiring six people to handle the process. This manual process was labour intensive and the pre-formed retail boxes were expensive. The boxes were also susceptible to damage in the retail stores. This posed a risk to potential loss of competitiveness and profitability.

THE SOLUTION

To address these challenges, Tasman Bay Food Co. implemented a staged process to improve efficiencies and packaging quality on the frozen Juicie line. They worked closely with RML throughout this process and had an "end goal" vision.

Initially the change for the retail products was from a crashlock box that was filled by hand - crashlock boxes are the most expensive style of box. This box had a hand closed top with a locking tab on it. The product could be tampered with through the sides, and they were easily ripped when removing from the shippers.

The first change was to use a skillet system box that was glued on site as part of the process. One side of the skillet box is glued by the supplier, with the other side glued by Tasman once the product is packed. There was no staffing reduction as part of this change.

The second stage was to move from the skillet and poor ergonomic packing set up to use a self-erect box for the retail product. The self-erect box is the cheapest form of box as it arrives flat from the printer, and it is formed and sealed all on site. An erector and closer as well as an ergonomically designed hand packing station was installed. The redesign included placing of the erector, conveyoring systems for the partmade box, juicies being moved from fillers to the packing area and taking packed boxes to the closer. This system reduced staffing by two. Savings were made on packaging; a third filler could also be added into the feed but three staff were still required to hand pack the juicies after the box had been formed by the erector. Then after packing it was fully sealed in the closer.

Through the first and second stage the bulk boxes (40 juicies per box) were hand packed. This final stage was an automated robot system for packing Juicies into retail boxes. The system consists of a three-robot cell that picks individual Juicies and places 10 in a retail box.



The Juicies are fed into the robot cell passing under a camera, the robots using a vacuum pick head pick up product that is the right shape and place them in the retail boxes. The robots use vacuum pick heads and vision technology to identify the products and determine their location and colour.





Implementing the system also required reconfiguring the line to eliminate the need for lining up the products, leading to significant improvement in the efficiency and consistency of the packing process. One filler was moved to fit the robot cell into the area. It was repositioned and became part of the line. They were then able to align the three fillers to feed into the robot packing cell for maximum production. The erector was turned 180 degrees, conveyors were modified, as were guards to suit the automation system.

The automation system eliminated the need for lining up as the products fall directly onto conveyors. The camera sends signals to the robots – robots will not pick up Juicies that are the incorrect shape or in the wrong position. All three robots can pick up Juicies and pack into retail boxes allowing up to 1,000 retail boxes of Juicies to be packed per hour. Installing the robot system has increased productivity and efficiency.

The robot system can also pack the 40 Juicies per box that are sold into schools. Two of the robots are dedicated to picking Juicies and packing them into the shipper. The third robot has a "head change" which allows it to remove the flat blanks from a gravity magazine, ploughs to assist the robot in folding the bottom flaps, a glue gun to apply glue to the base of the RSC and a compression punch to press down on the flaps to set the glue. The box is put on the conveyor to allow the other two robots to count 40 into the shipper.

Once filled, the cartons are pushed on the carton conveyor onto a conveyor that takes them to an operator for manual closing of the top and taping.

The robots and associated conveyor are enclosed within an interlocked safety cell to ensure operator safety. There are alarms and a light stack to indicate issues and when magazines of packaging are running low. There are two computer screens for trouble shooting and more in-depth info.

The system can also be used to pack Moosies where the camera picks up the colour of the Moosie it is programmed to pack four chocolate and four strawberry into a retail box.



KEY BENEFITS

The implementation of the proposed automation system for packing Juicies has brought several benefits to Tasman Bay Food Co.

» Mitigating threats of uncompetitive pricing and increasing labour costs: The automation system has improved manufacturing operations and reduced reliance on human resources, allowing the company to run the production line with less people, thereby reducing labour costs. The increased efficiency and accuracy of the automated system has also helped to maintain competitive pricing of the products in the market, protecting the company's profit margins.

- » Improved process efficiency and product quality: The automation system has eliminated the need for lining up the products, reducing the chances of products getting out of shape and improving the overall process efficiency. The use of vision technology for product identification and colour determination has ensured accurate and consistent packing, resulting in improved product quality.
- » **Enhanced safety:** The interlocked safety cell enclosing the automation system has ensured operator safety, reducing the risk of accidents and injuries during the packing process.

KEY TAKEAWAYS

- » **Cost and ROI:** Evaluate the upfront cost of the automation system and compare it to the expected return on investment (ROI) in terms of labour savings, increased production capacity, and improved product quality.
- » **System integration:** Plan and coordinate the integration of the automation system into existing production processes, equipment, and systems to ensure seamless operation and avoid disruptions. Work closely with equipment suppliers from the start and stage the process where possible and if time allows.
- » **Training and workforce implications:** Plan for training programs and workforce development to ensure employees are skilled in operating and maintaining the automation system and consider potential workforce implications of automation.
- » System flexibility and scalability: Design the automation system with modularity and flexibility in mind to accommodate future changes in production requirements, product variants, and market demands.
- » **Safety and compliance:** Thoroughly assess and address safety considerations, including machine guarding, lockout/tagout procedures, and compliance with industry standards and regulations.
- » Supplier selection and support: Choose a reliable automation equipment supplier based on expertise, track record, customer support, and establish clear communication channels and support agreements.
- » Change management: Have a well-planned change management strategy in place to address potential resistance to change, communicate the benefits of automation to employees, and facilitate a smooth transition to the new automated system.

To find out more, head to www.industry4.govt.nz

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Tumblar

Mining for Data

BACKGROUND

Tumblar Products are a leading chemical contract and private label manufacturing company specialising in the household, pesticide, and agricultural industries. The products manufactured by Tumblar range from FMCG products for large corporate organisations to small volume orders for local or start-up businesses.

Tumblar was founded in 1981 by John Smith who started the business to manufacture antistatic fabric softeners for Fisher & Paykel tumble dryers. They have developed a strong reputation by modernising their manufacturing facility, diversifying their product range, and have expanded their customer base globally.

THE CHALLENGE

Tumblar began contract manufacturing for a well-known household multinational in 1985.

Since then, they have continued to welcome other large FMCG corporations and have accumulated a variety of products over the years due to their reputation for quality.

The rise of overseas contract manufacturers has driven Tumblar to become more and more competitive on pricing but without readily available and detailed information on the cost to manufacture their various products.

The Earthquake in 2011 pushed Tumblar to be even more competitive and it was acknowledged that often the manufacturing information they would use to set pricing was inaccurate or incomplete. Collecting the information and data manually was time consuming, often included inaccuracies due to human error, and was hard to compile from paper.

The opportunity that emerged was around the implementation of a system to help Tumblar understand their manufacturing performance at a granular level, and to use this to increase their competitiveness in the market. Their idea was to centralise the data collected and allow more rapid movement of information within the business as well as increasing visibility of their production progress through the availability of real time data.

This was an important opportunity, as it would support the team's decision-making by providing the necessary information to make a case for renegotiating pricing with customers where required, as well as identifying opportunities for them to increase their capacity.

THE SOLUTION

The option of installing a manufacturing execution system (MES) was identified by the management team, and a business case was developed for this. A MES is a system that manages, monitors and synchronizes the execution of real-time, physical processes involved in transforming raw materials into finished goods.

A project team was formed, and the following were identified as key requirements for the system:

- » The ability to integrate with their current ERP system
- » Need for visibility of real-time data on the shop floor
- » Digitalisation of the production schedule
- » Digitalisation of quality assurance processes
- $\, \text{ > } \,$ A proven system with tried and tested external SME support in NZ

Once a system was selected according to the above criteria, the implementation began. This initially included a site visit from the selected MES provider. They reviewed the existing processes and conducted an initial engagement activity with key stakeholders including the production teams, ERP vendor representative, IT rep, and electrician. Some minor tweaks to the current ERP system were also required, such as separating out work centres that include multiple machines.



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The next steps taken to establish the system included:

- » Finalising integration between the ERP and MES systems
- » Determining site-specific parameters such as common downtime reasons, reject reasons, quality check tasks, and user codes
- » The purchase and install of hardware such as PLC, server, cabling, tablets, TVs etc.

To accomplish the change and make it more manageable for the teams who would be using the systems, Tumblar broke the implementation process into 3 stages:

Stage 1:

Introduce how to start / stop production, begin recording yield and downtimes, and start reporting on associated losses

Stage 2:

Introduce QA Tests, material batches, Job Comments

Stage 3:

Integrate rejects into the information capture and reporting processes

Stage 1 was completed in three months with Stage 2 and 3 both taking six months to implement.

NEXT STEPS

Several challenges were encountered and lessons learned through the implementation process. ROI calculations were based on assumptions of potential process efficiencies as well as some intangible benefits. We assessed these on a worst, average, and best-case basis to ensure the right decisions were being made.

The introduction of the technology to sometimes untechnical staff was an important consideration for us, and we would recommend using a 'dummy tablet' for training before the integration as well as allowing enough time to do this effectively.

Engaging training experts to support this is also something we would recommend.

The key next step for Tumblar is to carry out a more detailed analysis of the insights being provided by the system. This will be used to support decision making on the shop floor and enable further improvements to be realised.

KEY BENEFITS

Intangibles

- » Improved employee engagement production leaders can now display production performance easily as there is a centralised system for analysis.
- » Improvement in employee morale most production staff perceived the change as a result of company success.

Tangible Benefits

- » Improved product costing accuracy this allowed us to renegotiate prices, use more accurate information for tendering, and identify low 'hanging fruits' for targeted efficiencies improvement.
- » Accurate reporting for justification of production projects as well as quantification of results.
- » Time saved as a result of having a fully integrated system, reducing burden to capture information manually and allowing streamlined planning and scheduling processes.
- » Improved product traceability time saved finding information on released products as the information is centralised on the one system benefiting both Tumblar and our customers.
- » Reduction in paperwork Less information is collected on paper improving accuracy and reducing the risk of it being lost.

KEY TAKEAWAYS

- » Remember to get 'buy-in' early involve the key stakeholders in the system selection process
- » Use a change management framework to support the implementation the whole team needs to get on board and consider what quick wins are available and can be widely celebrated
- » Don't rush implementation, take time to plan, and consider a staged approach – don't try to cover off too much all at once
- » Resource the programme effectively. Consider dedicating a part or full resource to co-ordinate the activity internally
- » Time to train staff is important particularly at the implementation stage, but it is also important to maintain with regular training sessions moving forward and to include in the onboarding of new staff.

To find out more, head to www.industry4.govt.nz

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United Machinists

Flipping cobots at it again!

BACKGROUND

United Machinists precision engineer critical components for hightech manufacturers across the aerospace, medical, mining, and marine industries – we like to say we "machine possibilities".

Founded in 1977 by Doug Ramsay, we have a long history servicing leading New Zealand manufacturers. Today, owned by the next generation Alex & Sarah Ramsay, our vision is to be the machine shop of the future, working in partnership with New Zealand's leading product innovators.

To achieve this, we have invested heavily in new capabilities, plant, and machinery:

- » 12 mills and lathes up to 5 axis
- » 'Lights out' 24/7 production capability, with custom process automation for production clients
- » Dedicated research and development team, focused on process automation and consulting on design for manufacturing
- » Real-time live customer production links showing all work on order, stages of production and scheduled delivery.
- » Vision CMM (Coordinate Measuring Machine), capable of measuring up to .002mm tolerances.
- » Assembly and sub-assembly in-house assembly of mechanical products. Subcontracting and project management of electronic assemblies.

THE CHALLENGE

In order to secure several purchase orders for some extremely high tolerance, small aluminium components used in high end prosthetics, United Machinists has upgraded their CMM capability. These machined components, being less than 20mm (H) and 10mm (W), often ordered in quantities of several hundred with a requirement for 100% inspection, created a significant capacity bottleneck. Each individual component would need to be placed in the jig on the CMM, the measurements programme completed, the component flipped, and the process repeated. The order quantities being sporadic meant this task was often attended to by flexible part-time labour, at additional cost. United's continuous improvement mentality meant they transitioned rapidly to multi-part fixtures and expanded programmes so batches of up to 50 could be processed (on one side) at a time. This gave increased flexibility of up to one hour of unsupervised work by the machine, however this was still not utilising the fully automated capability of the CMM. The task remained to extract all 50 and 'flip them' - disrupting operators from other tasks and extending lead-times.

It was likely from their strong relationship and ability to deliver on time, that United Machinists would secure more orders for similar components in the future. This helped create a flexible method of automatically measuring the components which was essential to efficiently be able to deliver on their work.

THE SOLUTION

United's Chief Technical Officer, Alex – after attending a Callaghan organised trip to visit manufacturers in Singapore (pre-COVID) saw the capability of cobots (collaborative robots) to work alongside people and other machines to optimise efficiency. Upon his return, he explored options for bringing this methodology into the business.

After exploring different cobot options, the team settled on a 5kg universal robot, as it had the required physical capability, but also a good user interface. The weight rating was a key consideration, knowing that attachments would be required to manipulate the components, taking up a portion of this working weight, they were keen to leave capacity in the weight for utilising the same philosophy on larger, heavier components in the future. This was the beginning of a journey. Keen to establish a sustainable benefit, and upskill internally, United employed Rovin, a recent mechatronics graduate to deliver the project. Internalising the skillset was a key decision. Not wanting to rely on external resource has given them greater flexibility, but also training Rovin in other areas of the business to ensure he could add value and understand the value chain was essential, whilst still working on this project.

Integrating the cobot and the CMM machine had multiple barriers. These included, not having the full range of motion to complete a sufficiently accurate 'flip' of the product to inspect both sides, interoperability between the CMM controller and the robot PLC, alongside different voltage requirements. By following an iterative approach to prototype and solve individual issues, the team made quick, relatively cheap progress.

Rovin programmed the cobot to remove components from a much larger (400) seat fixture and place them in the correct location on the CMM fixture. This fixture itself was designed to be smart, by fitting





servos and motors alongside an Arduino PLC it was possible to do the fine manipulation to provide the rigidity to the component for measuring. It also functions to complete the required 180-degree flip between measurement which acted as the barrier to maximising efficiency previously. The fixture, servos and motors were prototyped several times before they could operate effectively.

When the signal for the completion of the programme is recognised by the fixture PLC, it clamps the part in place allowing for measurement, where the data is captured directly into an excel folder for each order, acting as a detailed inspection report. When the first programme completes the fixture motors and servos flip the part to allow the second programme to complete the measurement.

Upon which the cobot removes this part and replacements sit with the next. Although the individual cycle time of each component remains similar, this permits almost 24/7 operation, assuming the large pallets of parts are filled prior to commencing the operation.

The next steps are to finalise the last production version of the hardware and validate it for full production use. Following this, the same design principles can be applied to the next part types, ultimately turning the CMM operation for production parts into a fully automated process.

KEY TAKEAWAYS

- » The skills required for programming and integration of cobots are available from New Zealand universities.
- The retrofitting of cobots to automated machinery can enable 'lights out' operation of large production runs of components, reducing the investment required (in brand new machine tools or measuring equipment) to enable this capability.
- » The interoperable requirements between machine tools / measuring equipment are the largest single risk in enabling this retrofitting activity.
- » Research trips to other sites provide opportunities for using technology in ways we hadn't previously considered.

To find out more, head to www.industry4.govt.nz











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