Callaghan Innovation Te Pokapū Auaha

Manufacturing Execution Systems in New Zealand

A Buyer's Guide

Contents

Foreword

Over the past five years at Callaghan Innovation, I've had the privilege of engaging with hundreds of manufacturers across New Zealand, all seeking ways to become more profitable and productive.

The objective for me has been clear: Empower manufacturers to work smarter - not simply longer or harder.

It's encouraging to see many manufacturers recognise the competitive edge that software in manufacturing can provide, whether through greater efficiency, improved quality or reduced costs. Yet, despite this awareness, there is often uncertainty when it comes to selecting the right solution.

Version 1.0 of this MES Guide has been developed to cut through this confusion. Drawing on valuable input from solution providers, industry experts and manufacturers themselves, our aim is to provide an independent and practical introduction to Manufacturing Execution Systems (MES). We explore what MES are, and why they could be a crucial step towards smarter, more productive manufacturing in your business.

I would like to acknowledge the hard work from Frank Phillips at Fulcrum, pulling all the data and insights together in a short timeframe. Without his help this guide would never have been published. I would also like to thank everyone who has generously shared their insights to support others starting on this journey.

We hope this guide helps you understand how MES can fit into your operations and support your ongoing drive for continuous improvement and increased productivity.

Sean Doherty
Product Manager
Callaghan Innovation

At Fulcrum, we jumped at the opportunity to be involved in an MES guide for New Zealand. As an organisation built on connecting manufacturers to the right technology partners, the alignment was clear.

Fulcrum started from the perspective that finding the right technology in manufacturing was difficult, and because of this progress for manufacturers has suffered.

Working continuously to make these investments easier, and through developing this guide we've had the privilege of getting under the hoods of dozens of businesses and individuals. All of whom have matched Fulcrum's optimism and enthusiasm for New Zealand's manufacturing sector.

We have worked hard to challenge traditional thinking and to be as open to why a manufacturer WOULDN'T adopt this as to why they would. Distilling hours' worth of conversations and wisdom to bite-sized insights was never going to be simple, but the clarity of thought of the experts and manufacturers involved has made it a lot easier.

I'll conclude by paraphrasing the standout piece of advice that was universally echoed in our research.

'The sooner we acknowledge that adopting an MES is a journey and not a single transaction, the quicker manufacturers will progress and get value from these systems'

Thanks and acknowledgements go to the many contributors who have freely given their time and experience. We hope you find this guide useful, whatever stage you are and decisions you make.

Frank Phillips
Director
Fulcrum New Zealand Ltd.

Executive Summary

As New Zealand manufacturers scale operations, managing supplier coordination, production scheduling and data collection requirements become increasingly complex and time-consuming.

Manufacturing Execution Systems (MES) offer a solution by streamlining these processes, delivering real-time performance insights, and supporting data driven continuous improvement initiatives.

However, choosing the right MES can be challenging due to the variety of available solutions and providers. This guide is designed to simplify your decision-making. It explains MES core functions, integration benefits, key success factors and is supported by expert insights and local case studies.

The guide also profiles several leading MES providers in New Zealand and includes practical tools such as a requirements checklist and a light business case template to assist your evaluation process.

Successful MES adoption typically delivers 10% to 30% higher throughput, 15% to 30% greater labour productivity, and significant reductions in manufacturing costs. Manufacturers who align their digital investments with business strategy typically save an additional 10% on project costs and achieve faster returns by ensuring clear strategic direction.

We encourage you to use this guide to develop your own business case, clarify your requirements, and identify a shortlist of vendors. Then engage with providers who will help you understand how their solutions can save you time and money and give you valuable insights into overcoming your unique operational challenges.

Rukuhia te wāhi ngaro, hei maunga tātai whetū.

Explore the unknown, pursue excellence.

01 Why do manufacturers invest in MES?

Manufacturers invest in MES systems for reasons as wide-ranging as their processes.

Some of the most common reasons centre on the following:

Compliance and regulatory requirements, where the current burden is too high or unachievable without a system to support.

Visibility and performance monitoring to support continuous improvement.

Scheduling through coordinating and optimising factory throughput.

While it's possible to address individual challenges by introducing a specific tool or system that targets one pain point, it can be a smarter long-term investment to adopt a Manufacturing Execution System (MES) that streamlines broader factory operations. See our discussion on the MES journey (page 14) for advice on phasing the introduction of MES – focussing on the most pressing and highest-return areas first.

An MES also delivers sustained benefits, with most systems being effective for 10 years or more. This broader approach helps manufacturers maximise efficiency, adaptability, and return on investment well into the future as opposed to solving an immediate pain point but with little room for scalable growth.

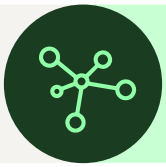
Overall, MES help manufacturers gain control, improve quality, and stay competitive by enabling operations to be more efficient and flexible.

On the following page we have summarised some of the common pain points experienced by manufacturers and how MES can support in improving these, adding value to the organisation.

Don't just take our word for it – see our manufacturer case studies for some real-world customer feedback.

Pain Points vs. Value Added

Below is a summary of the pain points identified by manufacturers, and the value that a well-adopted MES solution can add.

Lack of Real-Time Visibility and Control Manual data collection is slow, error-prone, and often outdated, leading to poor decision-making and inefficiencies.		Real-time monitoring and analytics, giving operators and managers immediate insights into production status, bottlenecks, and inventory levels.
Production Bottlenecks and Inefficiency Without accurate, up-to-date information, it is difficult to identify and resolve production delays or resource allocation issues.		Optimised scheduling, resource allocation, and workflow, enabling faster response to issues and improved throughout.
Quality Control Issues Paper-based or manual systems make it hard to enforce quality standards and quickly detect defects or process deviations.		MES automates quality checks, flags discrepancies in real time, and can halt production to prevent defective batches, Corrective actions can be taken in real time reducing waste and rework.
Compliance & Traceability Challenges Regulatory requirements in industries like food and pharmaceuticals demand detailed product tracking and documentation, which is difficult to manage manually.		MES ensures full traceability of materials and processes, automates compliance documentation, and simplifies audits. Reducing administrative effort at audit time, and stress with annal audits or mock recalls.
Inventory Management Problems Overstocking or stockouts occur due to inaccurate or delayed inventory data, leading to increased costs or production stoppages.		MES updates inventory in real time with ERP, supporting just-in-time manufacturing and reducing unnecessary inventory costs.
High Administrative Overhead Manual data entry, reporting, and workflow management consume significant time and are prone to errors.		MES automates these processes, reducing administrative burden and improving data accuracy.
Scalability & Growth As companies grow, manual or siloed systems struggle to keep up with increased production complexity and workforce size.		MES provides scalable solutions with real-time insights and standardised workflows, supporting efficient expansion across the organization.
Lack of Integration with Other Systems Disconnected systems (ERP, MRP, etc.) lead to duplicated work and inconsistent data. Legacy Systems represent a significant business risk, updating these maybe essential for continuity and security.		MES integrates seamlessly with ERP and other business systems, ensuring data consistency and streamlined operations.
Talent Retention & Acquisition Changing expectations from teams about the systems and tools that enable them to be successful can be a reason for staff to move roles.		MES helps manufacturers to present themselves as a cutting-edge operation for attracting talent, whilst helping existing teams to remain engaged in operational improvement. They also remove the dull and repetitive data handling tasks humans don't want to do.

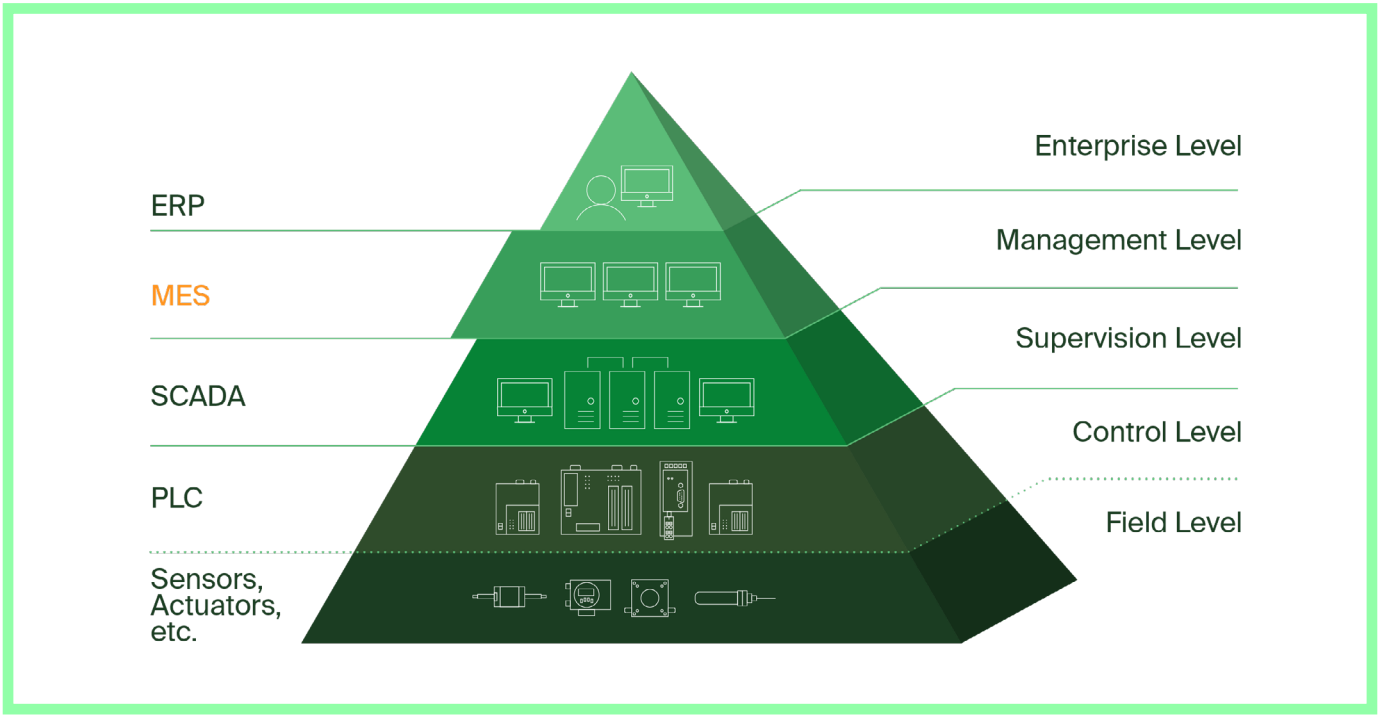
02 What is an MES?

An MES is a software solution designed to monitor and highlight how to optimise manufacturing processes on the shop floor in real time.

Its services act as a bridge between administration systems like ERP (enterprise resource planning), and the equipment and operations on the factory floor. An MES is a key enabler of Industry 4.0, promoting seamless data flow and process automation surfacing the right information to the right people at the right time.

In simple terms, an MES helps connect business systems with manufacturing systems to ensure everything runs smoothly.

While formal definitions of MES vary, it is often most productive to look at their features to help define it in your own context. Not all features are relevant in all industries and some features can overlap with other systems often found in manufacturing such as ERP and computerised maintenance management systems (CMMS).



Automation Pyramid ISA-95 - IEC 62264

Key Functions of an MES

Below is a summary of the key functions of an MES. These functions are critical for a number of reasons, including:

- **Efficiency:** Real-time monitoring and scheduling reduce downtime and keep production running smoothly.
- **Quality:** Immediate detection of issues and robust traceability minimise defects and ensure compliance.
- **Agility:** MES enables quick responses to changes in demand, equipment status, or material availability.
- **Transparency:** End-to-end visibility supports better decision-making and continuous improvement.

Visibility into real-time data

MES gathers data from machines, sensors, and operators in real time, tracking production rates, equipment status, inventory levels, and quality metrics. This data is continuously updated, providing a live view of what's happening on the factory floor.

Detailed production scheduling & work-order management

MES receives production orders from higher-level planning systems (like ERP) and creates detailed schedules. It assigns work orders to specific machines or operators, provides instructions, and tracks the progress of each order as it moves through the production process.

Process control and synchronisation

The system ensures that all necessary conditions for each order – such as material availability and machine readiness – are met before production starts. If a machine stops or an issue arises, MES can trigger maintenance requests and automatically adjust schedules.

Integration with business systems

MES bridges the gap between business management (ERP) and shop-floor operations, ensuring smooth information flow and keeping production aligned with business goals.

Traceability and compliance

MES records the entire history of each product, including what materials have been used, what processes have been applied, and what quality checks have been performed. This is essential for industries with strict regulatory requirements.

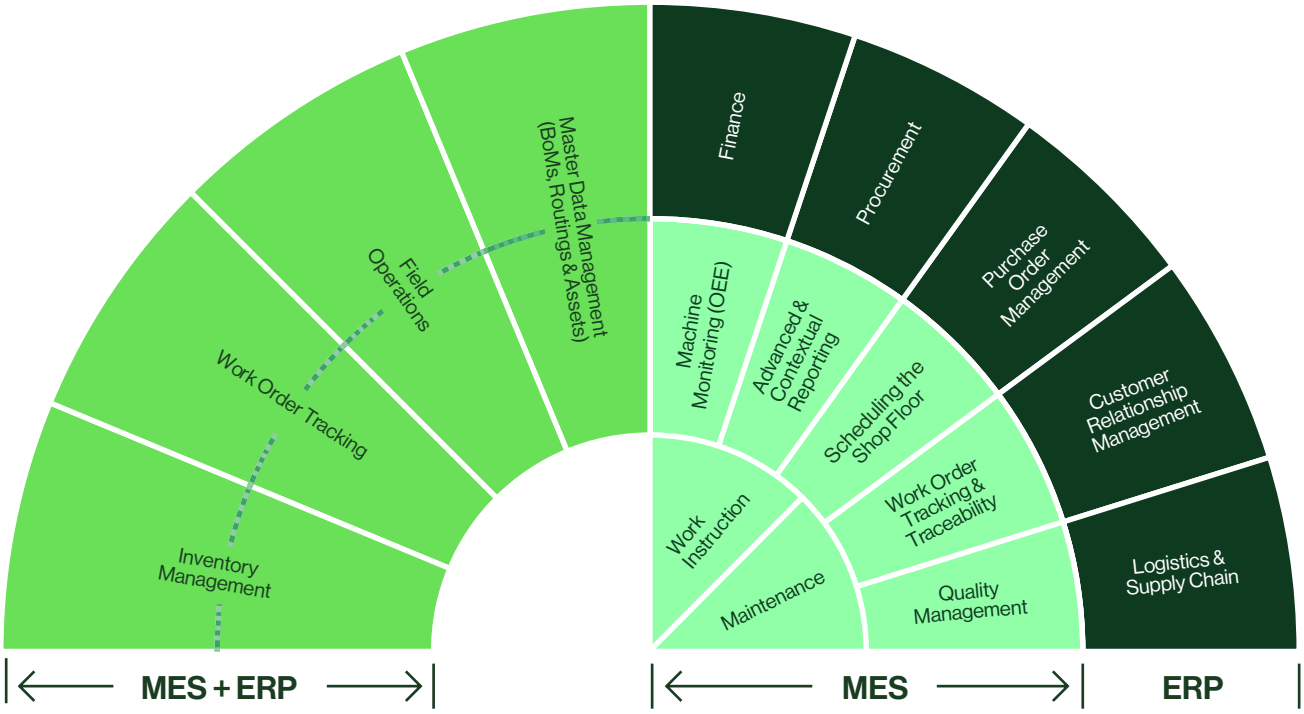
Quality management

MES help management the collection of quality critical data, managing sample plans and inspections. Allowing non-conformance activity to be commenced, tracked and closed out.

Right Tool for the Right Job

While ERP systems handle broader business functions such as finance and inventory management, an MES is a specialized tool for the detailed, real-time execution of manufacturing processes. This makes it the best choice for direct production control and operational efficiency on the factory floor.

However, digital transformation is increasingly blurring the lines between these tools, as integration and enhanced capabilities lead to more unified operations. Nonetheless, it remains important to understand and select the right tool for each specific job.



03 How does an MES work?

An MES is the Swiss Army knife of operations, a versatile tool that transforms high-level business functions into actionable plant floor activities.

While an MES is fundamentally a software solution, its real value lies in how it acts as the central nervous system of a factory, seamlessly connecting machines, operators, and business systems to orchestrate efficient, high-quality production from raw materials to finished goods.

How MES turns business objectives into plant floor operations:

1. **Order Transformation:** MES bridges the gap between business-level orders (such as sales or production orders managed by ERP systems) and the practical realities of the plant floor. It takes these orders and translates them into detailed work orders, dispatching them to the right machines and operators, complete with priorities, instructions, and required materials.
2. **Real-Time Execution:** By capturing and contextualizing data from machines, sensors, and operators, MES provides structured ways for teams to log critical information directly tied to specific orders.
3. **Workflow Guidance:** Operators receive clear, step-by-step instructions for each task, reducing errors and ensuring compliance with quality standards. MES also tracks the movement of materials and the status of each order in real time, enabling traceability and rapid response to issues.
4. **Feedback and Insights:** Leadership and administrative teams benefit from comprehensive reporting tools, real-time dashboards, and analytics that provide visibility into plant performance, resource utilization, and order progress. This data-driven approach supports continuous improvement and strategic decision-making.

Unlike simple integration tools, MES actively manages and enhances every stage of manufacturing operations. It not only connects systems but also:

- Standardizes and enforces process steps to ensure consistency and quality.
- Integrates with IoT devices and advanced analytics for predictive maintenance and process optimization.
- Adapts to different manufacturing contexts, whether continuous or discrete production, and addresses industry-specific requirements like traceability or regulatory compliance.

MES takes broad business objectives and turns them into precise, actionable tasks on the factory floor, coordinating people, machines, and materials with real-time intelligence and control. This is what enables manufacturers to deliver on orders efficiently, maintain high quality, and continuously improve their operation.

A Day in the Life of MES

Whilst manufacturing will always have challenges and opportunities to improve, we've summarised an aspirational day at a factory that has a mature MES. This should provide an idea of the different points in the production workflow that these solutions support and provide insights on:

→ 06:00
Order creation

MES auto-generates works order from ERP input based on due date.

→ 06:45
Material receipt

MES verifies delivery, flags inspection batches, assigns urgent use, and updates inventory locations.

→ 07:30
Smart scheduling

MES dynamically sequences jobs using material status, machine load, and due dates. Flags downstream impacts.

→ 08:30
Job release

MES sends digital work instructions to the shop floor. Operator logs in and confirms setup.

→ 10:15
Real-time monitoring

MES collects machine data: part counts, cycle times, tool wear. Triggers alerts and reschedules maintenance.

→ 11:00
Capacity insights

MES analytics support leadership planning with live throughput, bottleneck, and utilisation data.

→ 13:00
Quality tracking

MES logs operator, machine, batch, and timestamp. Non-conformances auto-generate corrective workflows.

→ 16:00
Order completion

MES confirms production, updates stock, and triggers dispatch.
Order loop closed.

→ ALL DAY
Live visibility

MES dashboards monitor OEE, WIP, quality, and delivery — enabling real-time control and response.

04
Your Journey as an MES Customer

We've broken down the MES customer journey into stages, distilling down the key considerations at each stage using insights from our expert contributors.

We explore why each stage is important and what it involves, and we provide bite-size insights from the contributors.

We round off each section with our 'Top 3 questions' that act as a simple checklist to ensure you have the right pieces in place to successfully move forward.

Please note: We've included more specific questions in the 'Requirements' tool at the end of the document.

THE CUSTOMER JOURNEY STAGE BREAKDOWN

WHAT'S INVOLVED?

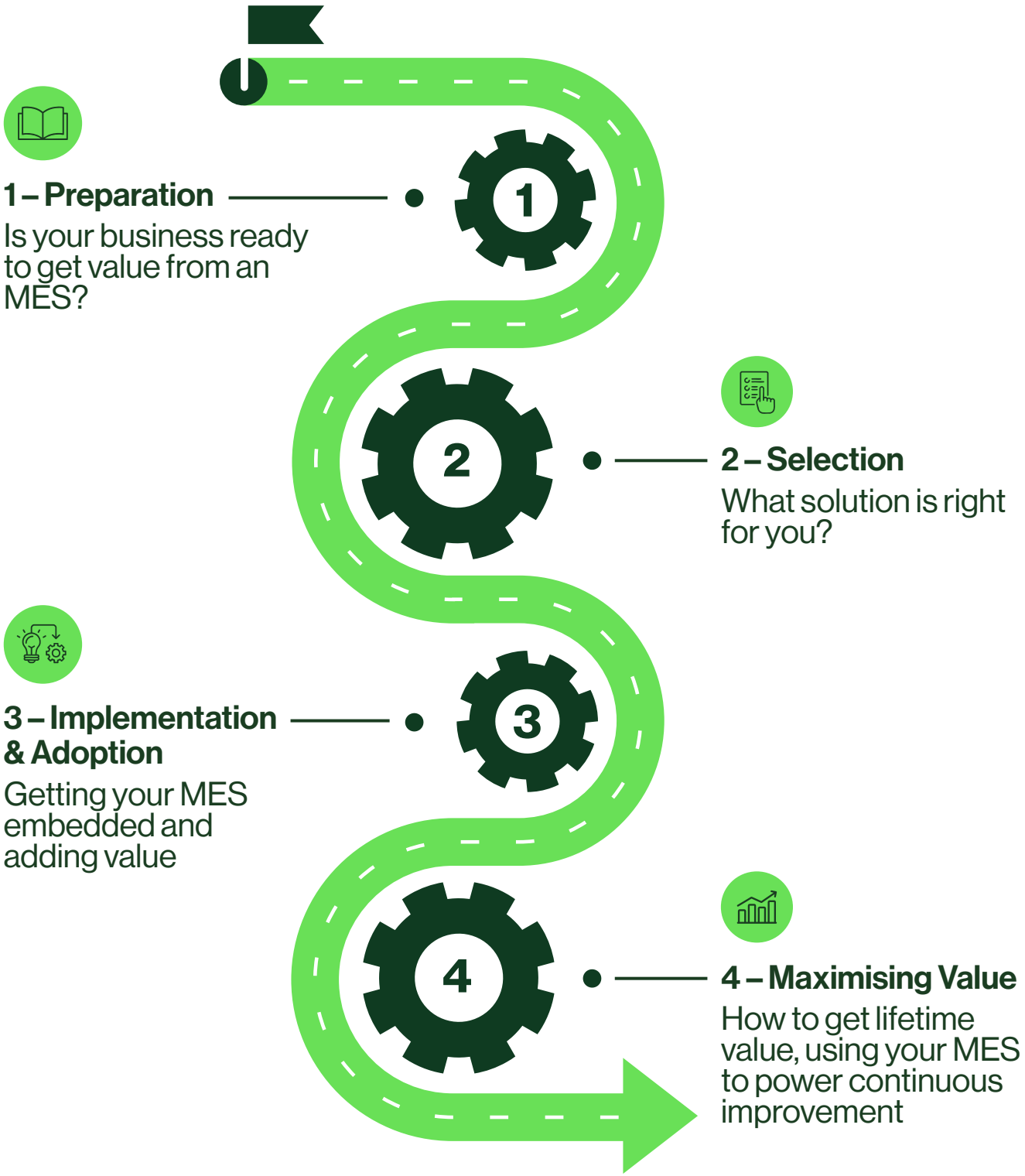
DOS AND DON'TS

EXPERT CONSIDERATIONS

TOP 3 QUESTIONS TO CONSIDER

The Customer Journey Stages

There are four stages in the MES customer journey:



STAGE 1 – PREPARATION

Is your business ready to get value from an MES?

WHY IS IT IMPORTANT?

While MES can be a powerful software tool, it is unlikely to be a 'silver bullet' to resolve all the challenges we can face in manufacturing. This is where preparation and understanding if your business is ready to get return on investment from an MES is essential.

Digital Strategy vs. Business Strategy

"Manufacturers should step back and look at their overall strategy, and how technologies align to help execute and deliver on this, having a separate technology strategy can create confusion and silos of work. At this stage in the journey manufacturers should ensure that the value from an MES would help deliver on at least some elements of the strategy"

– Frank Phillips, Fulcrum

"Are my people, processes and equipment mature enough to maximise the value from an MES system?"

– Craig Vincent, Nemesys

WHAT DOES THIS STAGE ENTAIL?

This is the start of your MES journey. It involves asking some honest questions of your business, processes and team to understand if you need an MES and then if you're ready before taking steps to close any gaps you find.

"Is my business complicated enough for an MES?"

– James Balzary, Tillit

STAGE 1 – PREPARATION

Dos & Don'ts

DO talk to the whole team wherever possible. Educate them on MES where required and hear their thoughts and opinions.

DON'T ignore experience – speak to others who have gone through the process before in other businesses.

DO challenge your team on how well our process is documented, standardised and repeatable.

DON'T assume MES will be a silver bullet to solve key business challenges.

DO consider the intangible elements such as team engagement or talent acquisition.

DON'T think an MES will always flex to match your process, understand there might be times where your process should change.

Expert Considerations

STRATEGY & DIRECTION

Being able to clearly articulate which elements of the company strategy an MES will support in delivery of can be helpful to avoid scope creep.

Similarly, this will help gaining relevant engagement from senior leadership teams and therefore the budgeting and resourcing of the following stages.

> *"Do I have a champion in the business to lead the vision? Is this champion connected across the business functions and especially to the shop floor?"*
>
> **– Tim Brown, Motion Design**

DATA & PROCESS MATURITY

Many manufacturing systems are dependent on the quality of data they use to deliver value, the preparation stage is great time to assess the quality and availability of existing data such as Bills of Materials (BoMs), Methods of Manufacture (Routings); Work Instructions; Assets and team capabilities.

> *"Are there core aspects of our strategy that an MES will support the delivery of?"*
>
> **– Craig Vincent, Nemesys**

RESOURCING & OWNERSHIP

Having an individual or team able to create alignment, listen to concerns and keep the scope in check is a defining feature of successful MES implementations according to our contributors.

> *"Has the manufacturer got reliable data, such as bills of materials, to set up their MES with? Even if it's just documented in a spreadsheet"*
>
> **– Frank Phillips, Fulcrum**

STAGE 1 – PREPARATION

Top 3 Questions to Consider

1. **Who is / are my champion(s) for this project, do they have the right process knowledge and cross functional connections?**

2. **Do I have the core data accessible to set up an MES such as Bills of Materials and Methods of Manufacture / Routings?**

3. **Does the adoption of an MES support our broader business strategy?**

STAGE 2 – SELECTION

What solution is right for you?

WHY IS IT IMPORTANT?

Our research identified almost **170** solution providers globally for MES. Combined with variations in industry focus, features, hosting structures and deployment partners, it can understandably seem like a challenge to find the right solution.

> *"Be conscious that it's impossible to know everything up front."*
>
> **– Bob van de Kuilen, Thred**

WHAT DOES THIS STAGE ENTAIL?

Overall, the selection process should be one that results in a clear vision of the solution operating in your context, but with an appreciation that exactly how the solution will deliver this vision may develop over time.

It should also be the start of a collaboration to build a business case, engage stakeholders across the business and understand the resourcing you will require to make your deployment successful.

With that in mind, an example of a selection process could be:

1. Understand your business processes.
2. Summarise your requirements and build a business case *(See our MES tools for support on page 58)*.
3. Research solution providers *(See solution provider profiles on page 39)*.
4. Get demos (with your data!) and visit reference sites.
5. Get a quote that states clear outcomes and deliverables from solution providers with an agreed timeframe.

System architects and/or business analysts with manufacturing experience can be engaged to support this process if additional skills, experience and capacity are required.

STAGE 2 – SELECTION

Dos & Don'ts

DO share key information with vendors such as business goals, current pain points, your vision and requirements.

DO get customised demos with examples of your data / product included to bring it to life.

DO shortlist your solution providers through research – *see our provider list on page 38.*

DON'T rely too heavily on Google – a lot of solution providers displayed may be 'Sponsored content'.

DON'T avoid involving other teams – operators, quality teams, finance, and health and safety will all have valuable contributions.

DON'T assume the features listed on a website mean exactly what you want them to – e.g. 'Planning and scheduling' can range from simplistic ordering of jobs, to full finite optimisers.

STAGE 2 – SELECTION

Expert Considerations

SEE THE SOLUTION IN YOUR CONTEXT

Nothing substitutes for seeing a potential solution in action, whether that's demos using your own data / products or getting on site to another manufacturing business using the potential solution you're interested in.

"Consider the support structure that's available, will it allow your team to be as independent as possible, safe in knowledge you can pick up the phone and get expert advice when needed."

– Bruce Pollock, Aspect PT

THE JOURNEY

Examples of where a specific function in a business have led the selection process of an MES inevitably leaves key requirements in other areas further down the priority list. This hampers engagement at the adoption stage and ultimately can result in a poor fit for the solution to the manufacturer.

"Go. Look. See. Work with the solution provider to find a site that will let you go and see it in action."

– Michael Nesbitt, Wayahead Systems

SUPPORT STRUCTURE

This points to the long-term relationship that an MES solution should be built on. Having reliable support options to ensure you maximise value and can expand the solution when needed will be valuable, particularly when considering the investment from a lifetime value perspective.

"A siloed approach to solution provider selection will lead to siloed approach to adoption, start as you mean to go on."

– Mick Bucknell, Rhize

STAGE 2 – SELECTION

Top 3 Questions to Consider

1. **Do we have our core requirements clearly defined?**

2. **Has a broad team from across the business been involved in our requirements?**

3. **Can we see ourselves partnering with this solution provider long term as we evolve?**

STAGE 3 – IMPLEMENTATION & ADOPTION

Getting your MES embedded and adding value

WHY IS IT IMPORTANT?

Where implementation refers to the 'technical' aspects of bringing an MES into the business, adoption refers to the change management and engagement from teams who will be using the solution. It's essential to consider these two areas to plot a trajectory towards the return on investment planned for in your business case.

A significant takeaway from our research has been the consistency with which our expert contributors have signalled the importance of change management.

Regarding technical implementation, scope creep and not focussing on the quickest time to value, or solving a specific pain point were highlighted as common pitfalls our experts had seen in real projects.

> *"Having your end users (operators) engaged is just as critical to success as selecting the right system."*
>
> **– Mick Bucknell, Rhize**

> *"Taking a big bang approach to implementation is too much, focus on the must-haves and build an effective feedback process to improve."*
>
> **– Tim Brown, Motion Design**

WHAT DOES THIS STAGE ENTAIL?

This stage starts well before technical implementation with change management and communication. Making the teams aware of the need for change, the value the tool will bring and completing any preparatory training such as digital skills or system thinking.

> *"Budgeting resource and time for change management is essential."*
>
> **– James Balzary, Tillit**

Dos & Don'ts

DO appreciate the value of agility – think about how phasing your approach can benefit your business and your team.

DON'T ignore how much time your 'super-users' might end up dedicating to supporting users in the early stages.

DO establish a robust feedback loop between users and solution providers to fix problems quickly.

DON'T rely on classroom training alone – often teams will want follow-up sessions at their workstations to embed the learning.

DO setup regular standups to check in with project management teams to quickly identify where implementation isn't on track and put action in place to resolve.

DON'T ignore concerns from users, be willing to deep dive where needed to understand exceptions and agree how to manage them.

Expert Considerations

TRAINING

Being aware that teams that are most significantly impacted by the adoption of an MES are often those who have the least exposure to new systems and software. Specific consideration of how to get teams hands on early with solutions, in the selection phase specifically.

"An MES is not just the system of record for the shop floor. It's the glue that digitally binds the business data to your manufacturing processes. Undertaking an MES implementation reaches back into all of your business processes and will impact them at some level. Good process management, good training and good support are the keys to success"

– Stephen Prendergast, SPS

KNOWLEDGE SHARING

The specific product and process knowledge held by experienced team members can often be captured in MES solutions to support the wider team. For example, images and videos of how to set up a specific machine or tool can be captured and displayed back to operators to help get tasks done, right first time.

"Explicitly target quick wins in the adoption process to get momentum for change."

– Bob van de Kuilen, Thred

QUICK WINS

MES has a wide range of possible positive impacts, spreading the focus and resource too thinly can mean missing key Business Case deliverables. It can also reduce momentum required to positive adoption. Picking a focus area and communicating clearly the phased approach can help with this when considering the investment from a lifetime value perspective.

"Working with teams to impart their 'tribal knowledge' and embed this knowledge into the solution benefits the whole team."

– Phil Jobbins, DMO Solutions (DELMIAWorks)

STAGE 3 – IMPLEMENTATION & ADOPTION

Top 3 Questions to Consider

1. **What type of training might be needed to help our teams adopt this solution?**

2. **Is everyone clear on the initial focus areas and outcomes?**

3. **Can we free up the right resources, such as subject matter experts from our process, to help configure the solution correctly?**

STAGE 4 – MAXIMISING VALUE

How to get lifetime value, using your MES to power continuous improvement

WHY IS IT IMPORTANT?

Maximising value from your MES is the fundamental purpose for its initial implementation. Looking back to our 'Why adopt an MES' section, the ability to extract and extend value from your solution will be essential in delivering the outcomes that have been identified in any business case, supporting the delivery of strategic goals and ultimately maintaining a competitive edge.

Beyond the go-live phase, the real return on investment comes from how consistently and effectively your MES is used over time. Establishing and embedding valuable routines and processes for assessing insights and improving performance is critical. This includes regular review of dashboards, KPIs, and production data to uncover bottlenecks, waste, or areas of underperformance, then taking data-driven action to address them.

WHAT DOES THIS STAGE ENTAIL?

To do this effectively, many manufacturers form cross-functional teams that meet on a regular cadence to review MES-generated insights. These teams should be empowered to make decisions and drive small, incremental improvements that accumulate into significant performance gains over time.

Similarly, ensuring robust processes are in place to consistently add and update data, such as bills of materials, process steps, quality parameters, and production standards, for both new and existing products ensures that your MES remains current and relevant. This guarantees that frontline teams are provided with the latest best practices for operations, enabling a more agile response to customer requirements, compliance needs, and innovation opportunities.

It's also worth investing in regular MES training and capability development. Staff turnover, new feature releases, or expanded use cases can all lead to drift from best practice. Periodic re-training, new-user onboarding, and internal champions can help maintain high engagement and proficiency.

Finally, as your business evolves, revisit your original MES objectives. Are they still relevant? Are there new capabilities, such as integration with advanced analytics, AI tools, or machine learning that could unlock further value? Treat your MES not as a static system but as a platform for continuous improvement, capable of scaling with your business ambitions.

STAGE 4 – MAXIMISING VALUE

Dos & Don'ts

DO continue to train users and expand their knowledge and features they use.

DON'T treat the implementation as a one-off. Look for where the extra value might come.

DO bring insights / reporting from the MES into decision making forums.

DON'T leave system ownership undefined, have clear accountability for the data and workflows.

DO update key data regularly through standard processes.

DON'T ignore updates or the solution providers road map of improvements and features.

STAGE 4 – MAXIMISING VALUE

Expert Considerations

ROUTINES & RITUALS

Having accurate data powering regular discussions saves time and improves decision making. The transparency that often comes with successful MES implementation can help teams align behind challenges and move away from blaming cultures.

"Owning and evolving your MES continually is essential – adapting to new markets, customer requirements or processes keeps it relevant, a single source of truth and continually valuable."

– James Balzary, Tillit

WAYS OF WORKING

Another theme we heard from our contributors was that in many of the deployments they have been involved with, there was significant value from the MES that wasn't initially considered or included in the business case. Where these opportunities are identified by teams, consider how they can own these to deliver extra value. An example of this is one manufacturer who adopted MES to give them greater visibility of real time performance, but ended up leveraging the in-process QA workflows heavily to increase right first-time quality.

"Continuing or establishing in shift, daily, weekly and monthly cadence for reviewing performance and insights is essential to build a culture of continuous improvement."

– Thomas Nolan, OFS Systems

FOCUS AREAS

With the agile approach to adoption that is widely promoted by our experts, maximising value can occur through widening the feature use and teams involved in an MES. Whilst at the initial adoption stage it's beneficial to focus on clear pain points, over time as the solution is embedded new challenges can be brought into focus and new features leveraged to solve them.

"Be open to the fact that MES systems might present you with new ways of solving old problems."

– Heiko Wolf, PSI

STAGE 4 – MAXIMISING VALUE

Top 3 Questions to Consider

1

Do we have good routines where we evaluate performance and make decisions? *e.g. daily, weekly, and monthly*

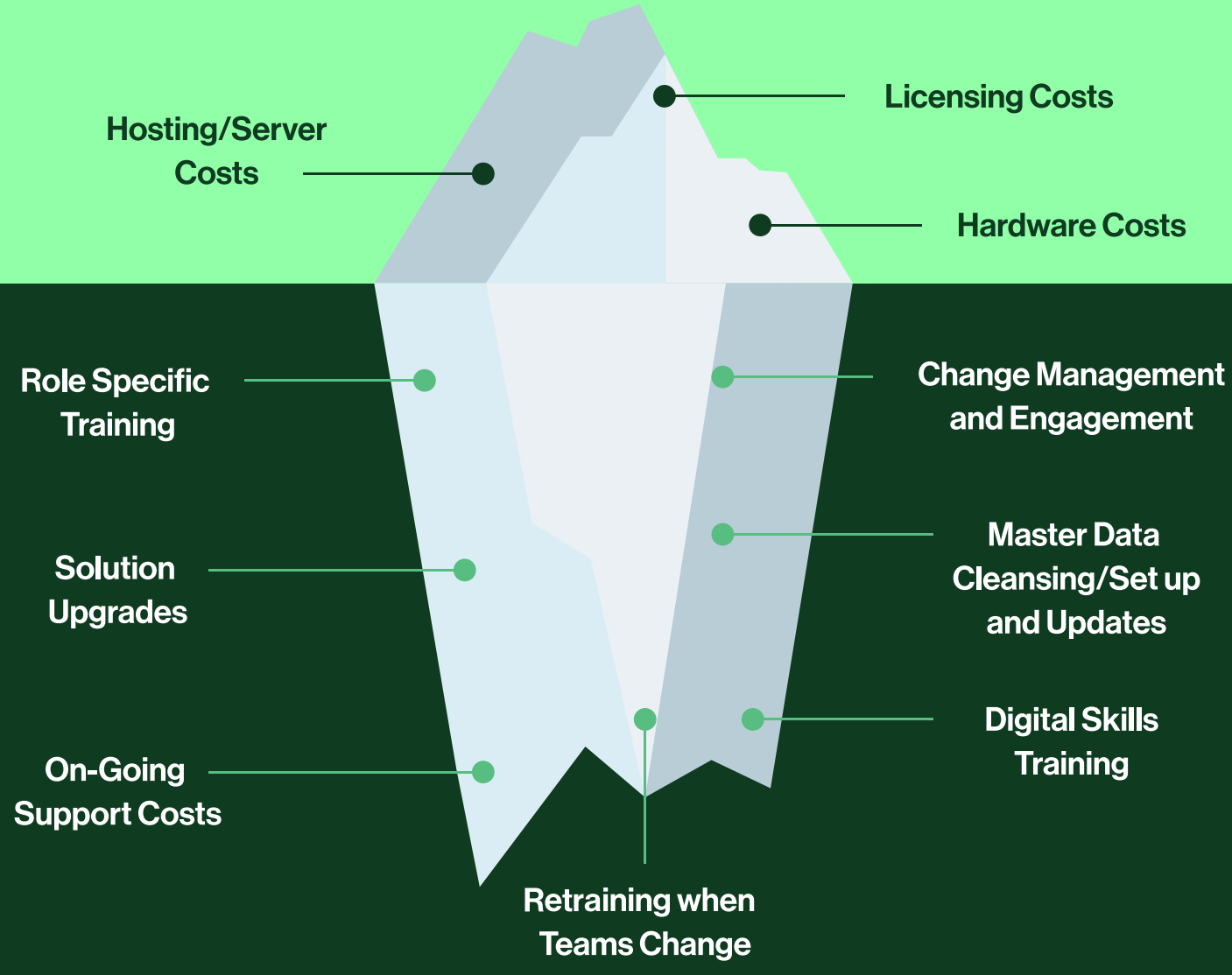
2

Are we clear on the steps we need to take to achieve the goals we set when adopting an MES?

3

What features are we already paying for and how do they align to our current challenges, what updates have occurred and are we trained in how to use them?

The Hidden Costs of MES



05
The Manufacturer's Perspective

Hear from the following manufacturers who have shared their experience of implementing MES, including the selection process, how they prepared a business case, and the value added post-implementation.

MANUFACTURER	INDUSTRY
NEW ZEALAND APPLE PRODUCTS	Food & Beverage
SOUTHSTAR	Chemicals
DEC NEW ZEALAND	Pharmaceuticals
APL WINDOW SOLUTIONS	Metallic Components, Fabrication & Assembly

NEW ZEALAND
APPLE PRODUCTS LTD

Food & Beverage

New Zealand Apple Products

A conversation with Pamela Rodríguez, Compliance Manager at NZ Apple Products.

MES Solution Provider – iMonitor

What made you start looking for an MES? What was the tipping point?

"Being a food and beverage business consolidating a paper-based compliance process was the main trigger."

How did you go about the selection process?

"Online research led us to a SaaS product that fulfilled some of our needs but was missing a couple of key requirements. We learned rapidly from this what we needed and then found iMonitor."

How did you build a business case for the investment?

"It was very difficult! Seeing demos of different products and listening to the solution providers gave us good ideas of where our improvements would come from. The main opportunities for us initially were around automating the alerts for key compliance activities, guiding the team with mandatory fields that reduced the compliance errors."

What value has MES adoption added to your business?

"Firstly it's delivered on the initial requirements for improving compliance. Further to this it has increased how adaptable we are, if we introduce new products, processes or compliance checks it is easier to make, communicate and train people on the change – rather than designing another form. The other key value area has been on reporting, understanding any issues with a batch very quickly and therefore being able to resolve it a lot quicker than before. The next step in the journey is to put more focus on production, using the tool to help us understand opportunities for reducing waste and increasing efficiency."

How did the business manage change when adopting the new system?

"It went smoother than expected! We started small on one line, then have expanded in stages to new lines and products. We are now at 90% of our production covered by iMonitor. Some people were nervous when we talked about digital transformation, but it actually ended up improving the team culture with individuals helping each other to learn the tools. It also provided a sense of achievement for those who were unsure to begin with to now feel comfortable with digital tools day to day."

PAMELA'S ADVICE:

- Make sure you understand the internal cost of implementation, setting up forms and data in the system does take time up front. This might not be in the price from a solution provider.
- Just get started! Especially if you can find a SaaS product that delivers some value, it will help you identify what's important to you.

Chemicals

Southstar

A conversation with Matt Lehmann, Operations Manager at Southstar.

MES Solution Provider – Smartworks Software

What made you start looking for an MES? What was the tipping point?

"Our pain point was scheduling – plain and simple. To figure out what we needed to produce next week, we had to manually loop through three siloed systems and spreadsheets. That process was time-consuming and error-prone. By adopting MES modules, we solved that straight away – and the benefits kept coming. Our export market is growing fast, and our European team needed to quickly see when we could deliver – especially with 12 weeks of shipping involved. With a live MES scheduling tool, they can check production availability in real time and commit to customers on the spot."

How did you go about the selection process?

"We started by digging into our existing MRP system to make sure we weren't just missing something. It turned out we'd hit its limits. Because our manufacturing process is a competitive strength, we didn't want a rigid system that would force us to change how we operate. Instead, we partnered with Smartworks Software – a team I'd worked with before who understood our space and could build something flexible around us."

How did you build a business case for the investment?

"Our business is seasonal, so we kicked this off during a quieter period. That gave the team time to be hands-on in development. We built the case by showing a clear before-and-after: the time our office team spent wrangling schedules, versus a streamlined, automated future. The ROI was obvious once we mapped it out."

What value has MES adoption added to your business?

"As well as solving the scheduling issue, it gave us unexpected wins. The visibility across orders has made invoicing smoother and faster – which we didn't even plan for. And the time savings each week? Significant. It's reduced admin noise and helped us work smarter."

How did the business manage change when adopting the new system?

"We brought everyone in early, that was key. Being in a quieter season helped us include different roles and perspectives during development. We started with one clear challenge, so the training was light touch and adoption was easy. No doubt we'll keep expanding the system, the team can already see how it's improving life on the floor and in the office."

Pharmaceuticals

DEC New Zealand

A conversation with Natasha Harvey, Chief Financial Officer at DEC New Zealand.

MES Solution Provider – DELMIAWorks, through DMO Solutions

What made you start looking for an MES? What was the tipping point?

"Our customers have very specific requirements for our pharmaceutical products and services and therefore compliance frameworks that we must adhere to. This combined with a movement towards Industry 4.0 naturally lead us to considering MES."

How did you go about the selection process?

"We worked with a business analyst to document our requirements, which we then circulated to solutions we had identified as possible candidates and invited to respond. Some of our key functions were production scheduling, production monitoring, and quality process and procedure management."

How did you build a business case for the investment?

"We included comparisons across the various systems being considered, with pricing and the modules available within each. From a return on investment perspective our benefits were built on efficiency improvements we estimated through improved visibility of production processes. Combining this with a potential reduced compliance burden from audit preparation made it a compelling case."

What value has MES adoption added to your business?

"Having a single source of the truth across real time performance and reporting functions has focussed our conversations on continuous improvement, not discussing data inaccuracies. With this foundation it has also promoted better data management, with teams being aware of the impact their data has and more automated workflows for updating key fields. Ultimately at the business level the clarity on workflows has enabled stronger financial understanding and control."

How did the business manage change when adopting the new system?

"We brought in specialist resource to help implement the solutions, alongside the product and process subject matter experts in house. This collaboration and resource ensured clarity, often most importantly what was 'out of scope'. Finally the continual improvement in practices across the features of the solutions and skills of our team in using the tools has itself contributed to change management. The team get more engaged as they successfully learn new skills."

APL WINDOW SOLUTIONS

Metallic Components

Fabrication & Assembly

APL Window Solutions

A conversation with Anthony Grace, Projects and Process Manager at APL Window Solutions.

MES Solution Provider – Aspect

What made you start looking for an MES? What was the tipping point?

"A legislative change affecting the products we produce was coming into force. The outcome of the change was that we were going to need to process significantly more of a product that had historically been in very low demand. We wanted to explore whether we could achieve this with existing assets and operators, to do that we needed reliable insights on production volumes, capacity and downtime."

How did you go about the selection process?

"We developed our requirements through cross functional discussions with the impacted teams, we collated these into a request for proposal (RFP) which we sent out to solution providers we had identified through online research and attending industry events."

How did you build a business case for the investment?

"Our business case centred on our ability to accurately understand our capacity and how this related to likely forward demand, coupled with the ability to truly understand our constraints. Previously evidence for bottlenecks and production issues were anecdotal, getting real time reasons for downtime and non-conformances would be a game changer."

What value has MES adoption added to your business?

"Working with the team and using the insights, we have seen a greater than 40% increase in productivity in the specific processes where our MES is implemented. Alongside the tangible benefits we've seen teams valuing the real time performance metrics, working together to continuously improve and leading to some healthy 'cooperation'."

How did the business manage change when adopting the new system?

"Leadership buy in was essential, which we gained by being clear on the outcomes we wanted to achieve. Simultaneously we conducted change management with stakeholders by communicating at all levels in the business, focussing on how the MES would benefit their role and the changes that would result."

06
Solution Providers in the New Zealand Market

This section highlights some of New Zealand's leading MES solutions that met our criteria.

To give an idea of market scale, during our research we identified over 170 MES solutions globally. We reached out to 98 of these to understand if they met our eligibility criteria.

These criteria were:

- Having at least one site actively using their solution in New Zealand.
- Their solution having four basic functionalities consistent with MES:

1. **Work order tracking**
2. **Planning and scheduling**
3. **Contextual analytics**
4. **Shopfloor equipment connectivity and reporting**

Even with the extent of the research and outreach we cannot guarantee this list is exhaustive.

When reviewing this list, it is beneficial to keep in mind that there are two broad categories that MES can fall into:

A '**configurable product**' which is a single version of a solution that can be configured with specific workflows, materials, and equipment based on the needs of each manufacturer.

Bespoke solutions built by a manufacturer, often using an expert partner to deliver highly tailored functionality and integration.

The solution providers profiled here are a combination of these two categories. Regardless of the category, our research shows that most solution providers in New Zealand deploy their own MES, as opposed to using partners in deployment.

MES Solution Providers by Industry

Note – Information here was gathered by asking solution providers to identify the 'Top 5 Industries' they operate in. Many solution providers have successful deployments in industries outside the top 5 they selected here.

	ASPECT	DELMIAWORKS	iMONITOR	MOTION DESIGN	ROCKWELL AUTOMATION	SMARTWORKS SOFTWARE	THRED	TILLIT	WAYAHEAD SYSTEMS
Aerospace / Defence	✗	✗	✗	✗	✗	✓	✗	✗	✗
Chemicals / Petrochemicals	✗	✗	✗	✗	✗	✓	✗	✗	✗
Construction Materials Manufacturing	✗	✗	✗	✓	✓	✗	✓	✗	✗
Electronics	✓	✓	✗	✗	✗	✗	✗	✗	✗
Dairy	✗	✗	✓	✗	✓	✗	✓	✓	✓
Fabrication & Assembly	✗	✓	✗	✓	✗	✓	✗	✗	✗
FMCG	✓	✗	✓	✗	✓	✗	✓	✓	✓
Food & Beverage	✓	✗	✓	✗	✓	✗	✓	✓	✓
Laboratories	✗	✗	✗	✓	✗	✗	✗	✗	✗
Meat & Primary Processing	✗	✗	✗	✓	✗	✗	✗	✗	✗
Metallic Components (Machining)	✓	✗	✗	✓	✗	✓	✗	✗	✗
Packaging	✗	✓	✗	✗	✗	✗	✗	✓	✓
Pharmaceuticals	✓	✓	✓	✗	✗	✗	✗	✗	✓
Plastics	✗	✓	✓	✗	✗	✗	✓	✓	✗
Timber, Paper & Pulp	✗	✗	✗	✗	✓	✗	✗	✗	✗
Transport, Machinery & Equipment	✗	✗	✗	✗	✗	✓	✗	✗	✗

Please note: The following industry sectors were also included in this research question, but were not selected by any vendors; **Footwear & Textiles, Furniture, Glass & Ceramics, Logistics/Warehousing & Distribution, and Mining, Aggregates & Cement**

MES Solution Providers by ERP System

Note – Manufacturers should be aware that all the MES solution providers emphasised their ability to integrate with any ERP system as part of new engagements. This table simply shows which system solution providers have integrated with to date.

	ASPECT	DELMIAWORKS (Combined MES and ERP)	iMONITOR	MOTION DESIGN	ROCKWELL AUTOMATION	SMARTWORKS SOFTWARE	THRED	TILLIT	WAYAHEAD SYSTEMS
Abel	✓								
Cin7	✓		✓			✓		✓	
Epicor	✓								
Global Shop				✓			✓		
Infor CloudSuite (Syteline)	✓								✓
JD Edwards EnterpriseOne	✓				✓			✓	✓
Microsoft Dynamics	✓			✓	✓		✓	✓	✓
MYOB Advanced	✓							✓	
Oracle Netsuite	✓				✓			✓	✓
Ostendo									✓
Pronto Xi								✓	✓
QAD Adaptive			✓						✓
Sage (Various)						✓		✓	
SAP Business ByDesign		✓	✓		✓			✓	✓
SAP Business One	✓	✓	✓		✓				✓
SAP ECC								✓	
SAP S4/Hana	✓	✓	✓		✓	✓		✓	✓
Syspro	✓								
Unleashed	✓		✓						
Wiise	✓							✓	

Please note: We also asked Solution providers about the following ERP systems but they were not identified as 'Integrated with' by any solution provider so have been removed from the table; **IFS Application, N2, Priority, AP+, Mietrak, Logiq, Apetean, Deacom, MRP Easy, Odoo & WinMagi**

aspect PRODUCTIVITY TECHNOLOGY

CONFIGURABLE PRODUCT

COMPANY HEADQUARTERS
New Zealand

COMPANY SIZE
15 FTEs

NO. OF NZ SITES INSTALLED
34

NO. OF GLOBAL SITES INSTALLED
68

TYPICAL CLIENT SIZE
30-250 FTEs

HOW IT IS DELIVERED
Directly in NZ

TYPICAL COST MODEL
One-off fixed fee
$30,000

Monthly unlimited subscription
$2,000 per month

TOP 5 INDUSTRIES DEPLOYED IN:

- FMCG
- Metallic Components
- Food & Beverage
- Electronics
- Pharmaceuticals

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E sales@aspectpt.com
P +64 9 930 6642

MOST SUITED TO MANUFACTURERS

- ✗ Continuous — *E.g. Petrochemical*
- ✓ Batch Continuous — *E.g. Food & Beverage*
- ✓ Discrete Machine Based — *E.g. CNC Machine Shop*
- ✗ Discrete Bespoke — *E.g. Fabrication Job Shop*
- ✗ Discrete Operator Based — *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NZ

- PACT Group
- Pharmac
- 30 Seconds
- Pasta Vera
- Gallagher

MOST COMMON HOSTING TYPE

On Premises – *Self-hosted*

Virtualised Deployment – *Hosted on virtual machines in client's environment*

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

aspect PRODUCTIVITY TECHNOLOGY

CONFIGURABLE PRODUCT

DELMIA WORKS

CONFIGURABLE PRODUCT

COMPANY HEADQUARTERS
USA

COMPANY SIZE
120,000 FTEs
8 in NZ as partners

NO. OF NZ SITES INSTALLED
2

NO. OF GLOBAL SITES INSTALLED
1500+

TYPICAL CLIENT SIZE
100-250 FTEs

HOW IT IS DELIVERED
Through partners
DMO Solutions are the exclusive NZ partner

TYPICAL COST MODEL
One-off set up fee & Annual License

TOP 5 INDUSTRIES DEPLOYED IN:

- Fabrication & Assembly
- Electronics
- Packaging
- Pharmaceuticals
- Plastics

W *www.3ds.com/how-to-buy/contact-sales*

MOST SUITED TO MANUFACTURERS

- ✗ Continuous — *E.g. Petrochemical*
- ✓ **Batch Continuous** — *E.g. Food & Beverage*
- ✗ Discrete Machine Based — *E.g. CNC Machine Shop*
- ✗ Discrete Bespoke — *E.g. Fabrication Job Shop*
- ✓ **Discrete Operator Based** — *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NZ

- » **DEC Pharmaceuticals**
- » **IP Plastics**
- » **Elite Polymers**

MOST COMMON HOSTING TYPE

- **On Premises** – *Self-hosted*
- **Single Tenant Cloud** – *Client managed*
- **Virtualised Deployment** – *Hosted on virtual machines in client's environment*

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✓ **Field Operations** *(Operatives working remotely on sites or servicing equipment)*

Other Notable Features:

- » DELMIAWorks can be deployed as an MES, ERP or both.
- » Knowledge management & maintenance work orders/inspections

iMonitor

CONFIGURABLE PRODUCT

COMPANY HEADQUARTERS
New Zealand

COMPANY SIZE
13 FTEs

NO. OF NZ SITES INSTALLED
8

NO. OF GLOBAL SITES INSTALLED
20

TYPICAL CLIENT SIZE
100-250 FTEs

HOW IT IS DELIVERED
Directly in NZ

TYPICAL COST MODEL
Standard monthly subscription – not linked to users.

Starting at $1495 USD / Month + Additional costs for machine integration and advanced reporting. *when set up using internal resource*

TOP 5 INDUSTRIES DEPLOYED IN:

- Dairy
- FMCG
- Food & Beverage
- Pharmaceuticals
- Plastics

W www.imonitor.co.nz
E sales@imonitor.co.nz
P 0800 274 7014

MOST SUITED TO MANUFACTURERS

- ✓ **Continuous** *e.g. Petrochemical*
- ✓ **Batch Continuous** *e.g. Food & Beverage*
- ✗ Discrete Machine Based *e.g. CNC Machine Shop*
- ✗ Discrete Bespoke *e.g. Fabrication Job Shop*
- ✗ Discrete Operator Based *e.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NZ

- » Griffin's
- » Compound Labs
- » Skellerup
- » NZ Apple Products
- » Rutherford & Meyer

MOST COMMON HOSTING TYPE

Shared Tenant Cloud – *Software as a Service* *(Others available)*

HIGH-LEVEL FEATURES

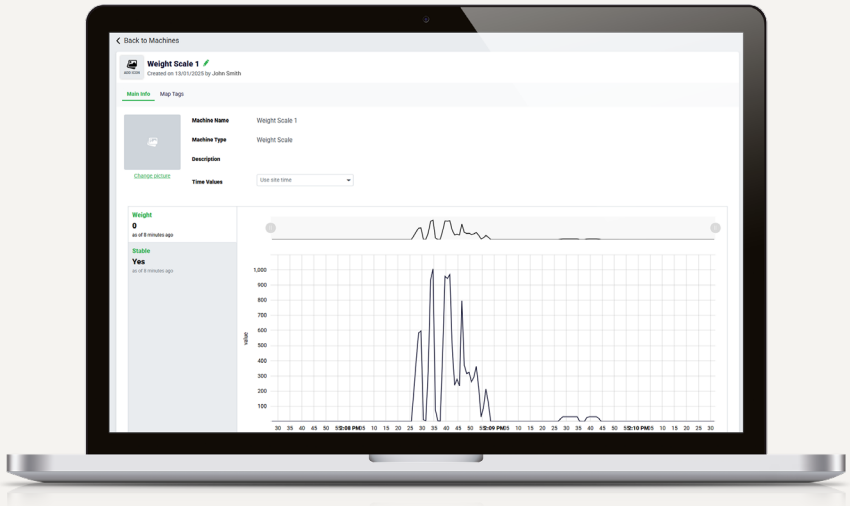
- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

Other Notable Features:

» No-code workflow builder with notifications and automation

iMonitor

CONFIGURABLE PRODUCT



MOTION DESIGN

BESPOKE SOLUTION

COMPANY HEADQUARTERS
New Zealand

COMPANY SIZE
38 FTEs

NO. OF NZ SITES INSTALLED
6

NO. OF GLOBAL SITES INSTALLED
36

TYPICAL CLIENT SIZE
250+ FTEs

HOW IT IS DELIVERED
Directly in NZ

TYPICAL COST MODEL
Milestone-based project fee for initial development
Annual service and support agreements on-going.

TOP 5 INDUSTRIES DEPLOYED IN:

- Fabrication & Assembly
- Metallic Components
- Meat & Primary Processing
- Laboratories
- Construction Materials Manufacturing

MOST SUITED TO MANUFACTURERS

- ✗ Continuous — *E.g. Petrochemical*
- ✗ Batch Continuous — *E.g. Food & Beverage*
- ✓ **Discrete Machine Based** — *E.g. CNC Machine Shop*
- ✓ **Discrete Bespoke** — *E.g. Fabrication Job Shop*
- ✗ Discrete Operator Based — *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NZ

- » AsureQuality
- » LIC
- » Greenmount Interiors

MOST COMMON HOSTING TYPE

Shared tenant cloud – *Software-as-a-service* *(Others available)*

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of Material & Routings / Methods of Manufacture)*
- ✓ **Production Planning & Scheduling*** **Not a finite scheduling capability*
- ✓ **Resource & Labour Management** *(Machine & People Availability, Task Assignments, Tool management)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✓ **Field Operations** *(Operatives working remotely on sites or servicing equipment)*

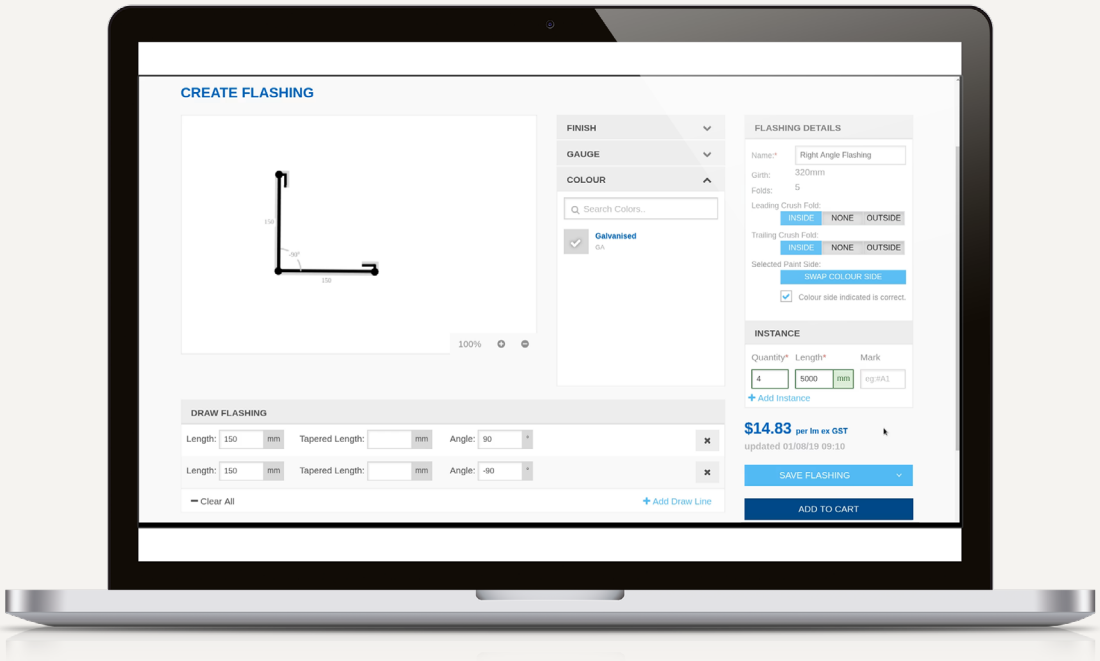
Other Notable Features:

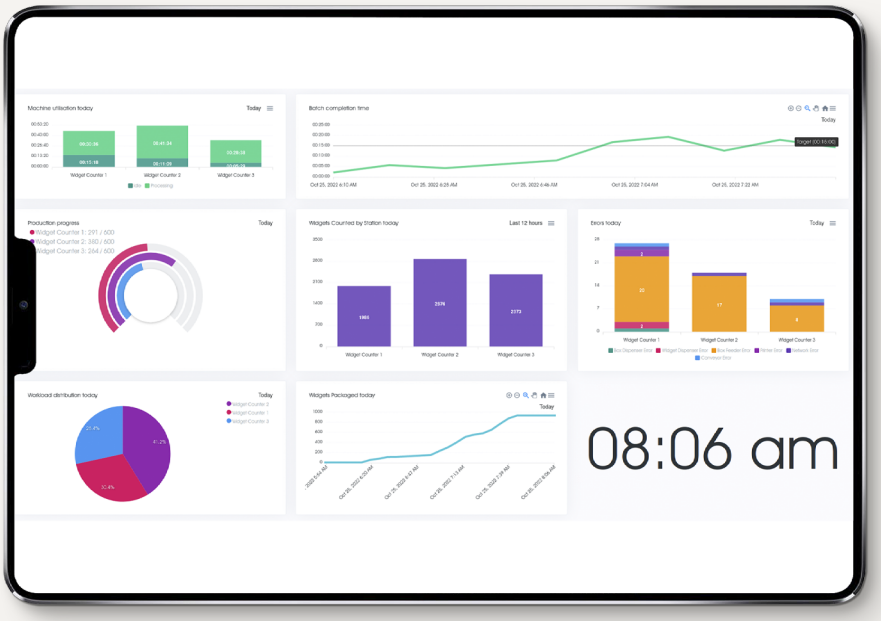
- » DELMIAWorks can be deployed as an MES, ERP or both.
- » Knowledge management & maintenance work orders/inspections

W *www.motiondesign.nz*
E *sales@motiondesign.nz*
P *+64 9 411 8230*

MOTION DESIGN

BESPOKE SOLUTION





Rockwell Automation | PLEX

CONFIGURABLE PRODUCT

COMPANY HEADQUARTERS
USA
with office & staff in NZ

COMPANY SIZE
27,000 FTEs

NO. OF NZ SITES INSTALLED
3

NO. OF GLOBAL SITES INSTALLED
700+

TYPICAL CLIENT SIZE
100+ FTEs

HOW IT IS DELIVERED
Directly in NZ & through partners

TYPICAL COST MODEL
Annual subscription
including support

TOP 5 INDUSTRIES DEPLOYED IN:

- Dairy
- Metallic Components
- Food & Beverage
- Plastics
- Construction Materials Manufacturing

MOST SUITED TO MANUFACTURERS

- ✗ Continuous — *E.g. Petrochemical*
- ✓ Batch Continuous — *E.g. Food & Beverage*
- ✗ Discrete Machine Based — *E.g. CNC Machine Shop*
- ✗ Discrete Bespoke — *E.g. Fabrication Job Shop*
- ✓ Discrete Operator Based — *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NZ

» Tasti
» Miraka

MOST COMMON HOSTING TYPE

- Cloud-based (SaaS)
- Multi-tenant cloud
- Hybrid cloud

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

W www.plex.com
E maheenm@rockwellautomation.com

SmartWorks software

BESPOKE SOLUTION

COMPANY HEADQUARTERS
United Kingdom

COMPANY SIZE
2 FTEs

NO. OF NZ SITES INSTALLED
2

NO. OF GLOBAL SITES INSTALLED
4

TYPICAL CLIENT SIZE
1-100 FTEs

HOW IT IS DELIVERED
Directly in NZ

TYPICAL COST MODEL
One-off costs
Split into milestones

TOP 5 INDUSTRIES DEPLOYED IN:

- Aerospace/Defence
- Metallic Components
- Fabrication & Assembly
- Chemicals
- Transport, Machinery & Equipment

MOST SUITED TO MANUFACTURERS

- ✓ **Continuous** *E.g. Petrochemical*
- ✗ Batch Continuous *E.g. Food & Beverage*
- ✓ **Discrete Machine Based** *E.g. CNC Machine Shop*
- ✗ Discrete Bespoke *E.g. Fabrication Job Shop*
- ✗ Discrete Operator Based *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NZ

» **GA Harris**
» **Southstar**

MOST COMMON HOSTING TYPE

On Premises – *Self-hosted*

Private cloud

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

W www.smartworkssoftware.com
E jake@smartworkssoftware.com

thred

BESPOKE SOLUTION

COMPANY HEADQUARTERS
New Zealand

COMPANY SIZE
10 FTEs

NO. OF NZ SITES INSTALLED
10

NO. OF GLOBAL SITES INSTALLED
10+

TYPICAL CLIENT SIZE
100-250 FTEs

HOW IT IS DELIVERED
Directly in NZ

TYPICAL COST MODEL
Milestone-based project fee for initial development
Annual service and support agreements on-going.

TOP 5 INDUSTRIES DEPLOYED IN:

- Dairy
- FMCG
- Food & Beverage
- Construction Materials Manufacturing
- Plastics

MOST SUITED TO MANUFACTURERS

- ✗ Continuous — *E.g. Petrochemical*
- ✓ Batch Continuous — *E.g. Food & Beverage*
- ✗ Discrete Machine Based — *E.g. CNC Machine Shop*
- ✓ Discrete Bespoke — *E.g. Fabrication Job Shop*
- ✗ Discrete Operator Based — *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NEW ZEALAND

- Fletcher Building
- Champion Flour
- Ballance
- Contact Energy
- Ixom

MOST COMMON HOSTING TYPE

Shared tenant cloud – *Software as a Service* *(Others available)*

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

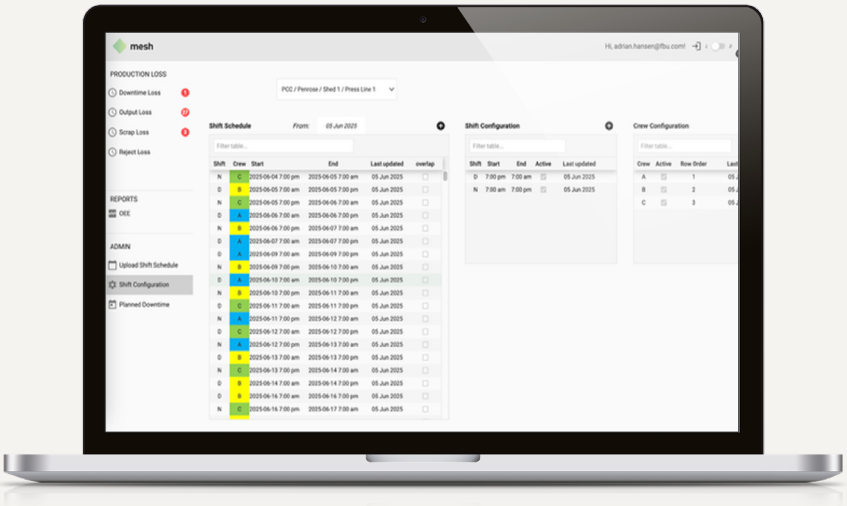
Other Notable Features:

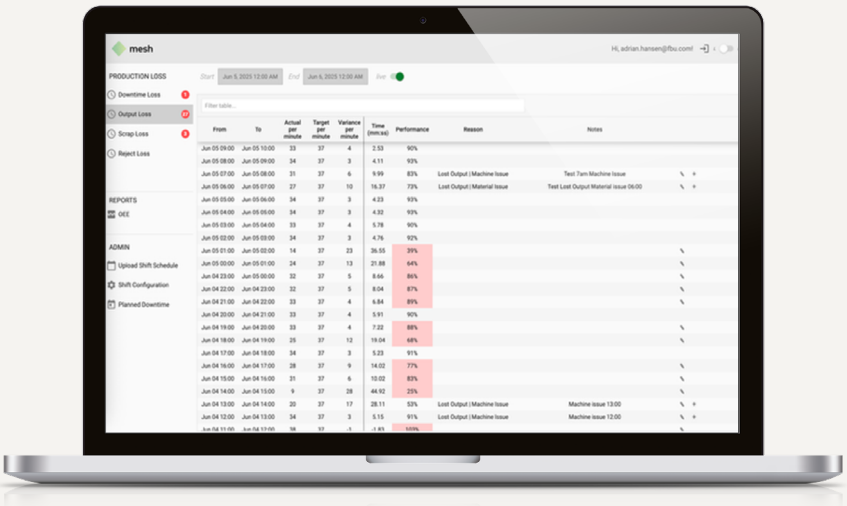
- Maintenance management & Distribution and logistics (pick, pack load and manifest reconciliation)

W *www.thred.cloud*
E *bob@thred.co.nz*

thred

BESPOKE SOLUTION





CONFIGURABLE PRODUCT

COMPANY HEADQUARTERS
Australia

COMPANY SIZE
15 FTEs

NO. OF NZ SITES INSTALLED
7

NO. OF GLOBAL SITES INSTALLED
50+

TYPICAL CLIENT SIZE
50-150 FTEs

HOW IT IS DELIVERED
Directly in NZ & through partners

TYPICAL COST MODEL
Annual subscription

Monthly subscription
Starting from AUD$595 per month

TOP 5 INDUSTRIES DEPLOYED IN:

- Dairy
- FMCG
- Food & Beverage
- Packaging
- Plastics

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MOST SUITED TO MANUFACTURERS

- ✗ Continuous — *E.g. Petrochemical*
- ✓ Batch Continuous — *E.g. Food & Beverage*
- ✓ Discrete Machine Based — *E.g. CNC Machine Shop*
- ✗ Discrete Bespoke — *E.g. Fabrication Job Shop*
- ✗ Discrete Operator Based — *E.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NEW ZEALAND

- Fletcher Building
- Nature's Flame
- Talleys

MOST COMMON HOSTING TYPE

Private cloud – *Hosted a dedicated cloud environment for each customer*

Multi-tenant cloud – *Multiple customers using the same shared cloud environment*

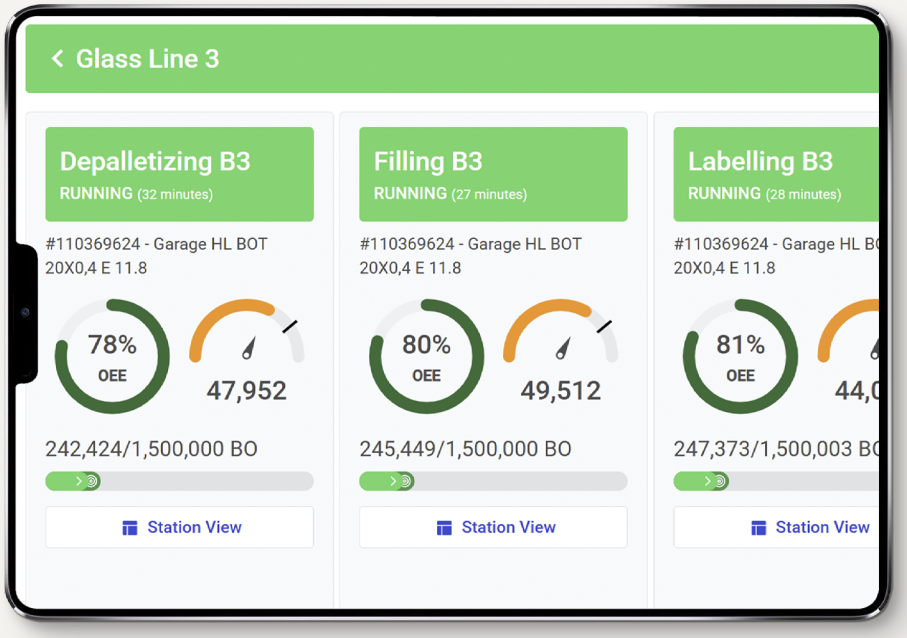
HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✓ **Connected Worker: Information Collection & Automated Workflows** *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

Other Notable Features:

- Knowledge management & maintenance work orders/inspections

CONFIGURABLE PRODUCT



WAYAHEAD SYSTEMS

CONFIGURABLE PRODUCT

COMPANY HEADQUARTERS
Australia

COMPANY SIZE
10 FTEs

NO. OF NZ SITES INSTALLED
4

NO. OF GLOBAL SITES INSTALLED
40+

TYPICAL CLIENT SIZE
250+ FTEs

HOW IT IS DELIVERED
Directly in NZ

TYPICAL COST MODEL
One-off set up fee & annual subscription

TOP 5 INDUSTRIES DEPLOYED IN:

- FMCG
- Dairy
- Food & Beverage
- Packaging
- Pharmaceuticals

MOST SUITED TO MANUFACTURERS

- ✓ **Continuous** *e.g. Petrochemical*
- ✓ **Batch Continuous** *e.g. Food & Beverage*
- ✗ Discrete Machine Based *e.g. CNC Machine Shop*
- ✗ Discrete Bespoke *e.g. Fabrication Job Shop*
- ✗ Discrete Operator Based *e.g. Equipment Assembly Line*

EXAMPLE CLIENTS FROM NEW ZEALAND

- » Vitaco
- » Bodco
- » Alaron
- » Fonterra

MOST COMMON HOSTING TYPE

On Premises – *Self-hosted*

Hybrid cloud

HIGH-LEVEL FEATURES

- ✓ **Work Order Management & Traceability** *(Bills of material & routings / methods of manufacture)*
- ✓ **Production Planning & Scheduling**
- ✓ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ✗ Connected Worker: Information Collection & Automated Workflows *(E.g Raising an engineering change request or improvement idea)*
- ✓ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ✓ **Real-time Machine Monitoring**
- ✓ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ✗ Field Operations *(Operatives working remotely on sites or servicing equipment)*

Other Notable Features:

- » Electronic batch records

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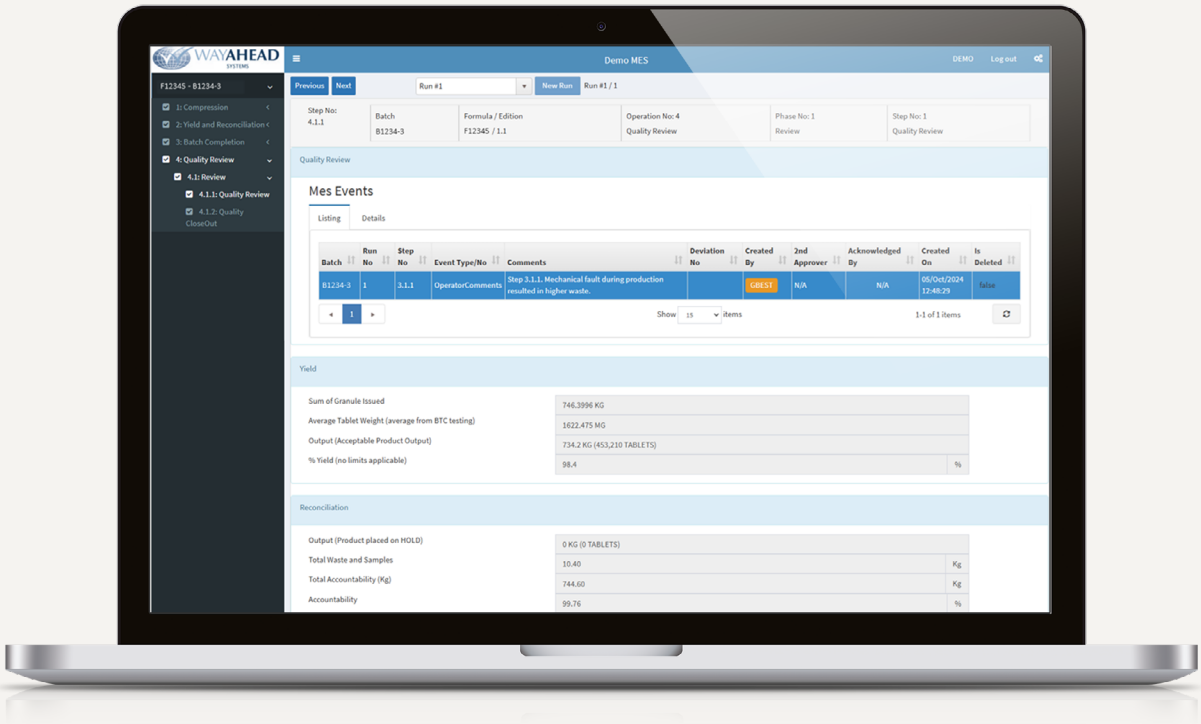
WAYAHEAD SYSTEMS

CONFIGURABLE PRODUCT



07 Trends in the World of MES

From our research and multitude of conversations with experts in the field we have identified three major trends likely to impact the industry and customer journey:

1 – A focus on user experience / user interfaces

Evolving demographics of people in the workforce and their familiarity with technology has seen a surge in focus on intuitive and seamless user experience as a key tool in promoting adoption. Consider getting some perspectives on potential solutions 'user experience' from across your team to gauge this.

2 – An increase in low code / no code workflow tools

Whilst MES is often built around 'event' data – things like downtime incidents or inventory use. There has been a growth in the use of 'workflow building tools' within the MES functionality. Where historically you may have seen 'static workflows' for inputting an Engineering Change, or incoming parts inspection. Having fully adaptable workflows andforms gives businesses the ability to rapidly build and deploy new ways to capture and report on key information digitally.

3 – The role of Artificial Intelligence (AI)

AI requires data sets to operate from. MES can provide a solid foundation of data on performance of operations, including contextual elements like what shift was working or what product was running when an event occurred. We are starting to see solution providers integrate chatbot features that interpret your data and provide insights and opportunities rapidly.

08
Next Steps – Where to from here?

We have discussed the typical customer journey; the dos and don'ts and explored the solution providers active in New Zealand. Where should you go from here?

If this document has piqued interested in MES for your business we suggest the following next steps:

1. Look at the tools below related to building your business case and establishing a Request for Information (RFI) template.
2. Use these as a starting point to get buy-in internally. They are not able to replace detailed support from experts, but are aimed at getting engagement and sign off to allocate resource or budget to dive deeper.

If you need more support, consider reaching out to the experts who contributed and created this resource. We hope the content and solution provider profiles provide a valuable starting point for your business's digital transformation journey through MES.

STARTING YOUR MES JOURNEY

BUILD A BUSINESS CASE

ESTABLISH A REQUEST FOR INFORMATION (RFI)

GET INTERNAL BUY-IN

ENLIST EXPERTS FOR SUPPORT

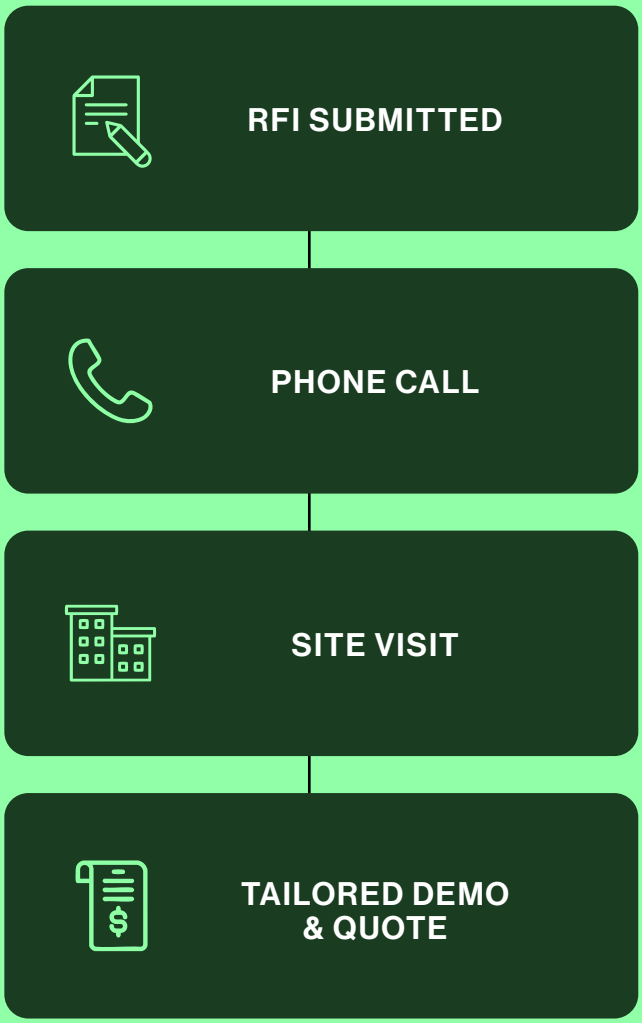
Appendix A – MES Request for Information (RFI) Template & Requirements Checklist

One of the best ways to engage with a short list of MES solution providers is through a 'Request for Information' or RFI.

It's a document that summarises critical information about your manufacturing business that can be reviewed by short listed solution providers to understand how their solution might fit your business.

This RFI process is often followed by a call or site visit to answer any questions and educate the solution provider on your process. Finally the solution provider can use the gathered information to deliver a tailored demo of how their solution meets your requirements and a quote (if their pricing varies by project).

We have provided a basic RFI template here for manufacturers to use to scope their own requirements and send on to MES providers. The template structures information on Business goals and vision, current process and pain points, current systems and requirements of their MES.



MES Request for Information (RFI)

COMPANY NAME

01
BUSINESS OVERVIEW
Give a summary of your business, products, processes and locations.

02
KEY BUSINESS GOALS
Outline one or two key things your business needs to achieve that you believe an MES will support the delivery of. Alternatively, include any specific pain points that you are trying to eliminate.

03
BASIC DETAILS
Include things like the likely number of users, the environment they operate in, and the types of equipment they use. Furthermore, do you have specific delivery dates in mind, or specific data collection and integration points to highlight

04
CURRENT SYSTEMS
Outline the other business systems that will be replaced or will work alongside a new MES

05
REQUIREMENTS

Set some key requirements ahead of selecting an MES solution provider to help narrow down the options and provide a solid base for measuring the success of implementation.

We've produced a checklist that can act as a starting point for your team to identify what features and capabilities must a solution have to deliver results.

ADVICE FOR USING THIS TOOL:

1. **Keep it inclusive**. Can you get input from as many areas of the business as possible? Different people will naturally focus on various timescales and functions covering a good base of potential opportunities.
2. **Be brutal but phased.** Be clear on the non-negotiables and you will find a solution that gets you to value the quickest. By getting into the 'phased' mentality it is easier to highlight what needs to be deployed first, and in the future.
3. **Think scenarios or events not requirements.** Events are a more natural way of thinking for many of us. Build up your requirements by running through potential scenarios that you and your team encounter daily and weekly. To help with this consider an 'event storm', similar to a brainstorm, but focussed on the events that occur at different frequencies across the 'quote to cash' process.
4. **Manage exceptions.** If an event occurs very infrequently, can you manage the exception instead of including it as a 'requirement'.
5. **Determine your 'master' system.** Where potential overlaps in functionality could occur between the MES and other systems, try and articulate which system will be the 'master' and control this data and process. E.g. inventory management

> *"When you're thinking about processes, start with outcomes - the process is just the route. The outcome is the destination. A common trap I've seen is businesses mapping out their current processes in great detail, then building requirements around those. The risk? You end up buying a system that's tailored to the old way of doing things – and miss the opportunity to improve. Instead, focus on the outcomes you want to achieve. Let the system help defi ne the best way to get there."* **– Bruce Pollock, Aspect**

HIGH-LEVEL FEATURE REQUIREMENTS:

- ☐ **Work Order Management & Traceability** *(Bills of materials & routings / methods of manufacture)*
- ☐ **Production Planning & Scheduling**
- ☐ **Resource & Labour Management** *(Machine & people availability, task assignments, tool management)*
- ☐ **Connected Worker: Information Collection & Automated Workflows** *(E.g. Raising an engineering change request or improvement idea)*
- ☐ **Quality Management** *(E.g Managing inspections, raising NCRs & corrective actions)*
- ☐ **Real-time Machine Monitoring**
- ☐ **Analytics & Reporting** *(OEE, throughput, downtime)*
- ☐ **Field Operations** *(Operatives working remotely on sites or servicing equipment)*

Other requirements (if any):

WORK ORDER MANAGEMENT & TRACEABILITY

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Work order generation (direct or through ERP integration)	☐	☐	☐	☐
Unique order ID. batch & serial number management	☐	☐	☐	☐
Work order prioritization (based on due date, customer, production constraint)	☐	☐	☐	☐
Real-time order status	☐	☐	☐	☐
Digital work instructions	☐	☐	☐	☐
Bill of materials (BoMs)	☐	☐	☐	☐
Multi-level BoMs	☐	☐	☐	☐
Routing and process flow management	☐	☐	☐	☐
Work order review & approval	☐	☐	☐	☐
Work order attachments (drawings etc.)	☐	☐	☐	☐
Electronic batch record (electronic signature & time stamps)	☐	☐	☐	☐
Learning management system integration - skills verification for operation sign off	☐	☐	☐	☐
Barcode code / QR code / RFID operation scanning	☐	☐	☐	☐
Actual material & consumable usage allocation to work order	☐	☐	☐	☐
Material (BoM) backflushing option (at order release, or completion)	☐	☐	☐	☐
Rework work order (with traceability to original)	☐	☐	☐	☐
Mixing of batches	☐	☐	☐	☐

PRODUCTION PLANNING & SCHEDULING

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Demand forecasting	☐	☐	☐	☐
Capacity planning	☐	☐	☐	☐
Long term (rough cut) planning	☐	☐	☐	☐
Material requirements planning (MRP)	☐	☐	☐	☐
Finite scheduling	☐	☐	☐	☐
Infinite scheduling	☐	☐	☐	☐
Scheduling by workcentre	☐	☐	☐	☐
Automatic sequence optimisation (e.g. reducing changeovers)	☐	☐	☐	☐
Work order release in alignment with scheduling	☐	☐	☐	☐
Equipment availability management (factors in machine maintenance etc.)	☐	☐	☐	☐
Labour scheduling & skills matching (aligns people with the with skills to required tasks)	☐	☐	☐	☐
Tool & fixture management & allocation	☐	☐	☐	☐
Drag & drop manual rescheduling	☐	☐	☐	☐
Dynamic rescheduling from equipment feedback (e.g. downtime)	☐	☐	☐	☐
What-if scenario planning	☐	☐	☐	☐
Production order dependency management	☐	☐	☐	☐
Gantt charts / interactive scheduling boards	☐	☐	☐	☐
Work order status tracking	☐	☐	☐	☐
Real time alerts of scheduling changes	☐	☐	☐	☐

RESOURCE & LABOUR MANAGEMENT

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Role based access control / hierarchy	☐	☐	☐	☐
Time & attendance tracking	☐	☐	☐	☐
Operator certification / skills tracking	☐	☐	☐	☐
Operator identification & authentication	☐	☐	☐	☐
Machine utilisation tracking	☐	☐	☐	☐

CONNECTED WORKER: INFORMATION COLLECTION AND AUTOMATED WORKFLOWS

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Safety - incident / near miss workflow	☐	☐	☐	☐
Engineering change request workflow	☐	☐	☐	☐
Continuous improvement / idea management workflow	☐	☐	☐	☐
Supplier non conformance reporting	☐	☐	☐	☐
Machine maintenance request	☐	☐	☐	☐
Tool callibration workflow	☐	☐	☐	☐
Integrated form builder (configurable by the client)	☐	☐	☐	☐
Automated workflow builder (configurable by the client)	☐	☐	☐	☐
Task assignment to specific users	☐	☐	☐	☐
Approval / escalation functionality	☐	☐	☐	☐
CMMS (work order management scheduling & workflows)	☐	☐	☐	☐

REAL-TIME MACHINE & PRODUCTION MONITORING

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Partial overall equipment effectiveness (speed & uptime only)	☐	☐	☐	☐
Overall equipment effectiveness (speed, uptime & quality)	☐	☐	☐	☐
Downtime - automated detection & reason allocation from machine fault	☐	☐	☐	☐
Downtime - automated detection & manual reason allocation	☐	☐	☐	☐
Downtime - manual detection & reason allocation	☐	☐	☐	☐
Operator allocation to assets	☐	☐	☐	☐
Native data contextualization (work order, machine performance, operator & meta data - date, time)	☐	☐	☐	☐

QUALITY MANAGEMENT

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Non-conformance reporting (NCR)	☐	☐	☐	☐
Rework work orders (with cost allocation of time & materials)	☐	☐	☐	☐
Inwards goods QA workflow (& rejection)	☐	☐	☐	☐
Material quarantine & approval workflow	☐	☐	☐	☐
First article inspection (FAI)	☐	☐	☐	☐
Sampling & statistical process control	☐	☐	☐	☐
In-process QA with tolerance requirements	☐	☐	☐	☐
Deviation request & approval workflow	☐	☐	☐	☐
Customer complaint / rejection workflow	☐	☐	☐	☐
Root cause analysis (RCA) / corrective / preventative action (CAPA)	☐	☐	☐	☐

ANALYTICS & REPORTING

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Real time data visualisations	☐	☐	☐	☐
Drill-down capability	☐	☐	☐	☐
Integrated dashboard builder (customizable dashboards)	☐	☐	☐	☐
Automated report scheduling (send specific reports at certain times)	☐	☐	☐	☐
Artificial intelligence integration	☐	☐	☐	☐
Suggested improvement areas	☐	☐	☐	☐
API to external reporting tools (e.g. Tableau, PowerBI)	☐	☐	☐	☐
Multi-format export	☐	☐	☐	☐
Mobile & web access for reports	☐	☐	☐	☐
Overall equipment effectiveness	☐	☐	☐	☐

ANALYTICS & REPORTING CONT.

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Production throughput	☐	☐	☐	☐
Shift / end of day report	☐	☐	☐	☐
Bottleneck identification	☐	☐	☐	☐
Delivery in full on time	☐	☐	☐	☐
Defect tracking & pareto analysis	☐	☐	☐	☐
Downtime tracking & pareto	☐	☐	☐	☐
Machine utilisation report	☐	☐	☐	☐
Skills utilisation report	☐	☐	☐	☐
Shift performance comparison	☐	☐	☐	☐
Material consumption & waste report (yield)	☐	☐	☐	☐
Work-in-progress report	☐	☐	☐	☐
Supplier performance report	☐	☐	☐	☐
Energy consumption report	☐	☐	☐	☐
Preventative maintenance report	☐	☐	☐	☐
Predictive maintenance report	☐	☐	☐	☐

FIELD OPERATIONS

	MUST HAVE	SHOULD HAVE	COULD HAVE	WON'T HAVE
Work order assignment & scheduling	☐	☐	☐	☐
Job prioritisation	☐	☐	☐	☐
Real time job status	☐	☐	☐	☐
Geo-location based work allocation	☐	☐	☐	☐
Material / inventory requests (spare parts management)	☐	☐	☐	☐
Asset useage logs (capturing informationon equipment in service)	☐	☐	☐	☐
Operator notes (against jobs & assets)	☐	☐	☐	☐
Asset identification and recall (barcode / QR code) management	☐	☐	☐	☐
Photo and video attachments	☐	☐	☐	☐
Safety checks & audits	☐	☐	☐	☐
E-signatures & approvals	☐	☐	☐	☐
Work instructions, forms & checklists	☐	☐	☐	☐

OTHER EVALUATION QUESTIONS

1. Can you link to documents (SOPs, Videos, Images etc.) that are currently stored locally to prevent having create new work instructions / SOPs?

   ☐ Yes ☐ No

2. How does the solution provider propose managing the integration to our specific ERP? Is there a native API, or would there be additional cost for this?

3 How does the solution provider propose hosting the solution? Does this align with our needs? *See Appendix 1 for details on hosting options*

4 How would the implementation process be supported and how long would it take?

5 How does on-going support work for our business after the system has become 'business as usual'?

6 What features are on the roadmap in the near future?

Appendix B – MES Business Case Template

This section has been developed to work alongside the New Zealand Treasury's Detailed Business Case template, which can be found here.

It is designed to help manufacturers understand the case for adopting an MES and present this case to the relevant stakeholders in their business. We expect more detailed analysis would be required beyond these tools before a business case could be signed off, to account for the variety of industries and contexts that must be considered.

Our business case solution covers a wide range of areas where potential savings can be found, the applicability of these will be dependent on the type of manufacturing business and current performance levels.

General advice on how to build the business case:

1. Collaborate with potential MES partners on the development of the case. They will have reference examples for various RoI improvements and knowledge of what works well in business cases.

2. Business cases may evolve over the course of your preparation and selection of an MES solution provider, consider updating where necessary to reflect this.

3. Use a cross functional team to help get key figures on current performance if they aren't currently measured, for critical figures consider setting up some short-term measurement activity to give reliable figures to use in the business case. E.g. Machine downtime recorded manually for 2 weeks.

Advice from the Experts

"If we can't put an approximate dollar figure in the business case, it's highly likely we don't understand the problem well enough."

– Jake Saunders, Smartworks Software

"Itemise your areas of improvement, do some simple analysis so you have a current performance, then target these after implementation."

– Bob van den Kuilen, Thred

"Adopting MES will deliver savings in areas you didn't expect and account for in your Business Case, these only act to improve the RoI."

– Tim Brown, Motion Design

"The analytics from MES – such as highly accurate Cost of Goods Sold (COGS) allows much better analysis of which products are profitable, decisions using this data can increase profitability significantly, without changing a single manufacturing process."

– Maheen Mudannayake, Rockwell

"Consider the potential upsides of new markets and new customers that your improved compliance and quality could open up."

– Heiko Wolf, PSI

MES Business Case

COMPANY NAME

01
EXECUTIVE SUMMARY
Give a brief overview of the business case, including any key figures, resources and unknowns at this stage.

02
THE CASE FOR CHANGE
Describe the key pain points or compliance areas the business is currently facing that adopting an MES would improve. Include 'intangible' improvements as well. Rank these according to their priority, for example:

1. Overall equipment effectiveness
2. Talent acquisition
3. Time to schedule operations

03
THE STRATEGIC CASE
How does implementation of an MES fit into a wider business strategy? Are their compliance considerations for new or existing customers or markets?

03
THE ECONOMIC CASE

In the economic case tool we've made some assumptions:

1. That the companies bottleneck is operational (not sales / demand).
2. That the production processes are influenced by both machines and people.
3. Only upfront costs and the first year of licensing is included in the costs.
4. The typical % improvements included in the document have come from vendor discussions, online research and the contributors experience.

This tool should be used a preliminary guide with basic figures that should be readily available in most businesses through the accounting or ERP software. The intent of the document is to give an indication of return on investment timescales. If these look attractive to the business it would be expected that more thorough economic analysis be completed.

REFERENCE FIGURES

FINANCE	
Average hourly rate of shopfloor team ($)	
Average material cost per unit ($)	
Target or average profit margin per unit produced (%)	
Average unit value (per kg/metre/each)	

Average hourly rate for non-production operations staff ($) *e.g schedulers, production managers etc.*	

OPERATIONS	
Number of shopfloor staff (FTEs)	
Average units produced per hour	

SAVINGS

Productivity

Area of Opportunity	Current performance (Actual or estimate)	Percentage improvement (Post-implementation)	Financial opportunity
Unplanned downtime *Reduced unproductive time assets, and labour*	Unplanned downtime hours (annualised)	Suggested improvement = 10-20%	**$ 0.00**
Speed *Reduced overtime from consistent line speeds*	Total overtime labour hours for shopfloor staff (annualised)	Suggested improvement = 10-20%	**$ 0.00**
Quality *Reduced rework hours, labour, and material*	Total rework hours (annualised)	Suggested improvement = 10-20%	**$ 0.00**
Yield / Waste / Scrap *Reduced material costs*	Average scrap rate from production (%)	Suggested improvement = 10-20%	**$ 0.00**
Planned downtime *Better scheduling reduces setups, cleans & changeovers*	(Annualised)	Suggested improvement = 15%	**$ 0.00**
Energy efficiency *Reduced power useage from visibility*	Annual energy costs ($)	Suggested improvement = 5%	**$ 0.00**
Process compliance *Reduced paperwork*	Total labour hours spent completing shopfloor paperwork (annualised)	Suggested improvement = 20-75%	**$ 0.00**

Administration

Area of Opportunity	Current performance (Actual or estimate)	Percentage improvement (Post-implementation)	Financial opportunity
Scheduling time *Reduced labour hours manually scheduling*	Total labour hours spent planning & scheduling operations (annualised)	Suggested improvement = 30-70%	**$ 0.00**
Inventory accuracy (stock & WIP) *Better scheduling = reduced stock & WIP*	Average value of stock & WIP	Suggested improvement = 5-10%	**$ 0.00**
Audit preparation *Reduced hours as data readily available*	Total labour hours spent preparing for audits (annualised)	Suggested improvement = 30%	**$ 0.00**
Audit performance *Reduced findings with improved process control*	Total labour hours spent rectifying audit findings (annualised)	Suggested improvement = 15%	**$ 0.00**
Improved customer communication *Data readily available on order status*	Total hours spent finding/communicating customer order information (annualised)	Suggested improvement = 15%	**$ 0.00**
Other savings *Other savings you may wish to include can be added here. Calculate these using a method that works for you.*			
		TOTAL OPPORTUNITY	**$ 0.00**

COSTS

Capital Costs

Cost	Total
Up front implementation costs	
Annual or monthly license fees (annualised)	

Operational Expenditure

Area of Opportunity	Hourly rate ($)	Total labour hours required	Financial opportunity
Discovery and scoping			**$ 0.00**
Project management			**$ 0.00**
Change management, engagement & training			**$ 0.00**
		TOTAL COSTS	**$ 0.00**
		TOTAL RETURN ON INVESTMENT *(CAPEX & FIRST YEAR LICENSE)*	**0.00%**

04

THE COMMERCIAL CASE

The intended procurement / contract structure. How will the costs be structured? Annual or monthly license, any upfront costs?

05

THE FINANCIAL CASE

Affordability – where's the cash coming from? What is the breakdown of capital vs operational expenditure? How does the budget for the current and next financial year allow for this investment?

06

THE MANAGEMENT CASE

Delivery – Resourcing and project management How will the scoping, project management and change management be resourced?

07

RECOMMENDATIONS / NEXT STEPS

Include here what you propose to do now to move the business case forward. Collect some data on current downtime? Or get demos from three solution providers.

Appendix C – Technical Considerations

1 – What hosting infrastructure should I use?

There are three hosting approaches and choosing between them can be confusing, especially with all the jargon and technical terms involved.

The three approaches are:

On-premise application hosting

Cloud-based (SaaS) application hosting

Fog computing / hybrid infrastructure hosting

On the following pages is a breakdown of the main advantages and disadvantages of each approach, with a special note for industries like defence, pharmaceutical or where strict rules may apply so that on-premise might be the only suitable option.

ON-PREMISE APPLICATION HOSTING

Advantages & Disadvantages

ADVANTAGES

» **FULL CONTROL**
The company owns and manages the MES software and hardware on-site. This means they decide how it works, when it's updated, and how data is handled.

» **STRONG SECURITY**
The company owns and manages the MES software and hardware on-site. This means they decide how it works, when it's updated, and how data is handled.

» **HIGHLY CUSTOMISABLE**
The system can be tailored to fit the unique needs of the business, supporting specific processes or requirements.

DISADVANTAGES

» **HIGH UPFRONT COSTS**
Most SaaS MES vendors include the hosting costs within the subscription.

» **HARDER TO SCALE**
Requirements change over time so will the need to keep upgrading as required.

BEST SUITED TO...

Companies in industries like defence, pharmaceuticals, or electronics, where there are strict regulations or special requirements for data and processes.

CLOUD-BASED (SaaS) APPLICATION HOSTING

Advantages & Disadvantages

ADVANTAGES

- **LOW COST**
  There's no need to buy expensive hardware or set up complex IT systems. Instead, companies pay a regular subscription or usage fee.
- **ACCESS FROM ANYWHERE**
  Managers and staff can check the system and make decisions from any location with internet access, which is great for companies with multiple sites or remote teams.
- **EASY TO SCALE**
  The system can quickly grow or shrink to match production needs, making it ideal for businesses that are expanding.
- **AUTOMATIC UPDATES**
  The software provider handles updates, backups, and security, so the company always has the latest features and protections.
- **LESS I.T. OVERHEADS**
  Internal IT teams have less to manage, freeing them up for other tasks.
- **QUICK TO SET UP**
  Cloud MES can be deployed faster and often connects more easily with other business systems.

DISADVANTAGES

- **RELIANT ON INTERNET CONNECTION**
  Production and compliance activities may potentially be affected if connection to the cloud is lost. It's important to check with the vendor about how likely this is to be a problem.

BEST SUITED TO...

Fast-growing companies, those with several locations, or businesses wanting flexibility and lower upfront costs.

FOG COMPUTING/HYBRID INFRASTRUCTURE HOSTING

Advantages & Disadvantages

ADVANTAGES

» **A MIDDLE GROUND**
Fog computing processes data close to where it's created (on the factory floor) but can also send information to the cloud. It combines the benefits of both local and cloud systems.

» **FAST RESPONSE**
Because data is handled locally, the system can react instantly to changes or problems on the production line-crucial for time-sensitive operations.

» **SAVES BANDWIDTH**
Only relevant, not all data is sent to the cloud, which reduces internet traffic and costs.

» **KEEPS DATA SAFE**
Sensitive information can be kept on-site, while less critical data is shared with the cloud, balancing security and convenience. (be careful limiting data could limit some reporting functionality).

» **KEEPS RUNNING IF INTERNET DROPS**
If the connection to the cloud is lost, the local system can still operate, preventing downtime. It will also store and forward data when the connection returns.

» **SUPPORTS MODERN MANUFACTURING**
Fog or hybrid infrastructure is useful for companies adopting new technologies and moving towards more automated, "smart" factories.

DISADVANTAGES

» **REQUIRES SET MANAGEMENT**
Requires a clear delineation of who manages what part of the onsite infrastructure in regard to updates, security and compliance. If data privacy is a concern we suggest the IT team should own and manage any onsite assets.

BEST SUITED TO...

Manufacturers wanting the reliability and security of on-premise systems as well as the flexibility of the cloud.

Which hosting infrastructure is right for you?

Choosing the right MES deployment depends on a manufacturer's specific operational, regulatory, and strategic needs.

Feature / Benefit	On-premise MES	Cloud-based MES	Fog / Hybrid Infrastructure MES
Upfront cost	High	Low	Moderate
Managed by	Customer	Provider	Mix but often given to the provider to manage
IT resource demand	High	Low	Low to moderate
Control	Maximum	Moderate	High (local nodes)
Security	Customisable, local IT maintained (normally driven by regulation requirements)	Provider-managed, strong	Local + cloud enhanced
Physical server location	Onsite	Offsite	Both – generally a data server onsite with application in the cloud
Accessibility	Dependant on IT permissions	Secure access from anywhere	Secure access from everywhere
Scalability	Limited	High	High (modular)
Latency	Low	Higher (network-dependent)	Low (local processing)
Ease to update application	Hard without IT permissions	Easy	Moderate
Data sovereignty	Full control	Depends on contract to where and how data is hosted	Depends on contract to where and how data is hosted

2 – What data standard should I use?

While most MES solutions will not care which standard you use, it is important to structure and label your data to a standard.

However, your approach here could be critical and taken into consideration especially if you plan to share data with customers or moving towards a wider connected supply chain.

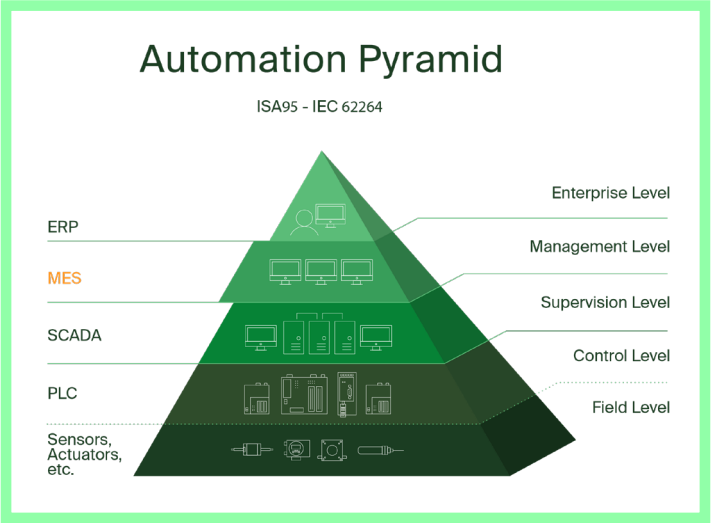
ISA-95 – THE CURRENT MAIN PLAYER

The most common standard globally is the traditional ISA-95. It's like a map showing how information and activities flow in a manufacturing company, from the machines on the factory floor up to the business planning done in the office.

HOW ISA-95 WORKS:

ISA-95 segments the company's systems into five levels:

- **4 - Enterprise Level:**
  Business planning and logistics systems, such as Enterprise Resource Planning (ERP) software.
- **3 - Management Level:**
  Systems that manage and optimize manufacturing operations – this is where MES sits.
- **2 - Supervision Level:**
  Systems that monitor and control the production process (like control panels and automated controllers).
- **1 - Control Level**
  Sensors and devices that gather data from the production process.
- **0 - Field Level:**
  The actual physical production processes (machines, materials).



MES operates at Level 3, acting as the bridge between the business planning systems (Level 4) and the shop- floor control systems (Level 2). It also acts as the translator and coordinator: It takes business goals and production plans from the office (Level 4) and turns them into instructions for the factory floor. At the same time, it collects real-time data from the shop floor and reports back to business systems, helping managers make informed decisions.

MES error proofs to make sure that what's happening in production matches the company's goals, schedules, and quality standards.

EMERGING TRENDS IN DATA STANDARDS

There is now some disruption to the traditional ISA-95 standard with emerging new trends and standards.

These include:

- **UNIFIED NAMESPACE ARCHITECTURE**

  The Unified Namespace (UNS) concept is gaining traction as an alternative to ISA-95's strict layer-based model. Instead of organising systems and data into discrete levels, UNS creates a single, interconnected data framework where all information is accessible through a unified naming structure.

- **INDUSTRY 4.0 REFERENCE MODELS**

  International frameworks such as Germany's RAMI 4.0 (Reference Architectural Model for Industry 4.0), the Scandinavian Smart Industry Model, Japan and China's Smart Value Chain Initiative, and the NIST model in the US, all incorporate and extend aspects of ISA-95 but also introduce new dimensions.

- **MODULAR AND DATA-CENTRIC ARCHITECTURES**

  Trends in digital transformation are driving the adoption of modular, containerised, and data-centric architectures. These allow workloads to scale dynamically and operate across on-premise, cloud, or hybrid environments, challenging the static boundaries of ISA-95's traditional layers.

In summary, while ISA-95 continues to serve as a backbone for manufacturing integration, its traditional layered approach is being disrupted by unified, data-centric, and modular architectures, as well as by new international reference models redesigned as Industry 4.0 matures.

Acknowledgements to contributors

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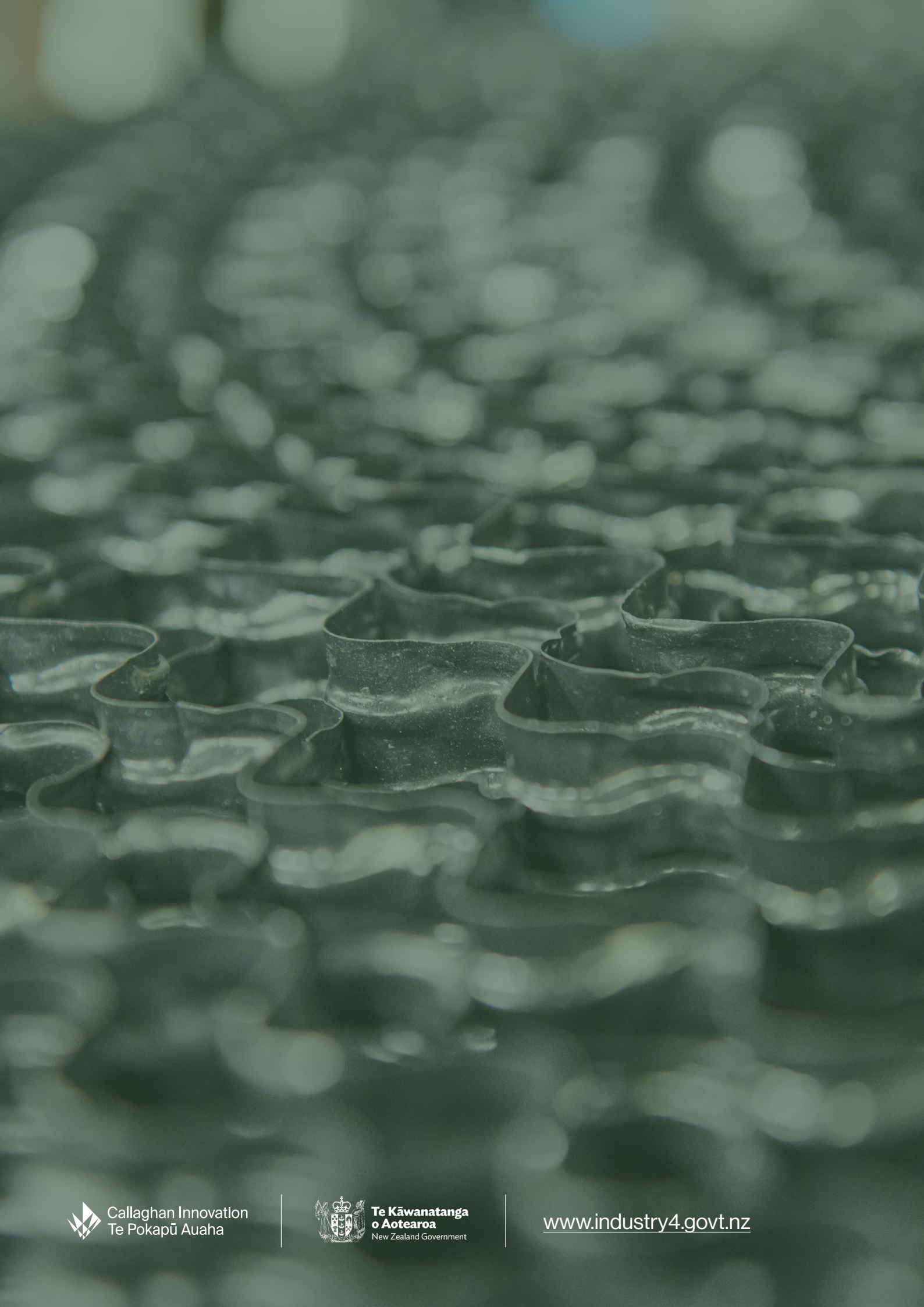

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