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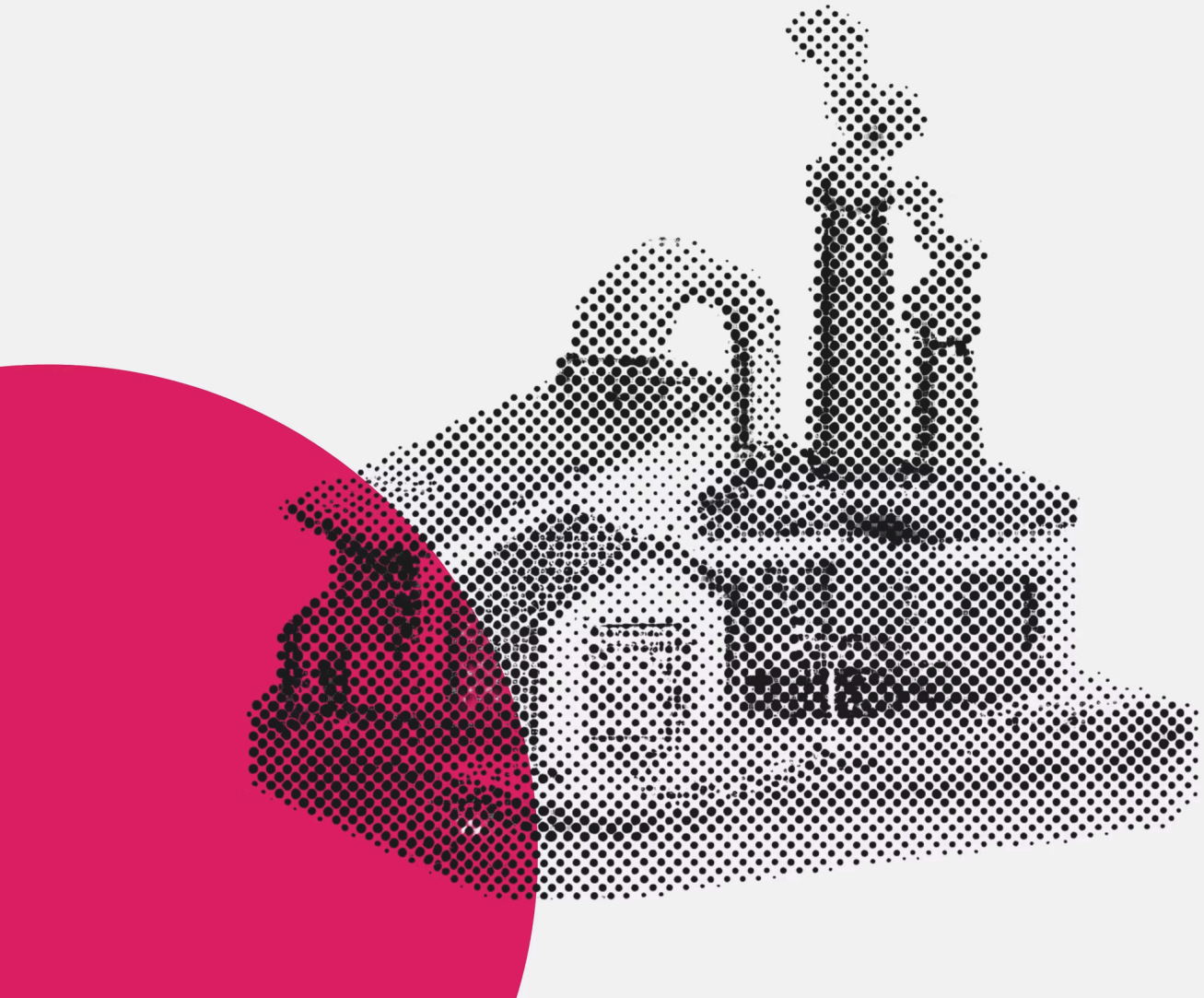
Predictive Analytics in Manufacturing

6 Practical Use Cases and Impacts



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Foreword

> **Manufacturing organisations are not short of data. In many organisations, more data has not accelerated decisions. It has slowed them down.**

Charlotte Bailey

CEO, Panintelligence

Across production lines, supply chains, quality systems, maintenance operations, and enterprise planning, vast volumes of data are generated every second. Over the past decade, the sector has invested heavily in ERP systems, MES platforms, IoT infrastructure, and increasingly artificial intelligence, all with the expectation that this would lead to faster, more efficient, and more predictable operations.

It hasn't.

The Investment Has Not Delivered

What Was Expected

Faster, more efficient, and more predictable operations through ERP, MES, IoT, and AI investment.

What Actually Happened

Investment has not consistently translated into better decisions on the factory floor or across the supply chain. In many cases, it has simply made the gap more visible.

What is consistently visible is not a lack of capability, but a **failure to translate that capability into action**. Data exists. Insight exists. But the ability to use that insight at the moment decisions need to be made is still lagging behind.

⚠ This is the difference between having data **available** and having **clarity at the point of action**.

The Gap Is Structural, Not a Tooling Issue

The Decision Gap

The space between insight existing and action being taken.

How It Is Measured

In manufacturing, that gap is measured in **time**, and time is measured in cost, efficiency, and output.

Who Feels It

Both manufacturing organisations and the industrial SaaS platforms that support them. Where it is not closed, the decision gap becomes a **product gap**.

This is not theoretical. At **Denmaur Independent Papers Ltd**, reporting processes relied heavily on static PDFs and spreadsheets that were already out of date by the time they were reviewed.

> **Decision making was delayed not by lack of data, but by how that data was delivered and used.**

The New Reality of Manufacturing

Manufacturing remains one of the largest contributors to global economic output and it is becoming more complex by the day.

16%

Global GDP Share

Manufacturing's contribution to global GDP, according to the World Bank.

£200bn

UK Annual Contribution

Manufacturing's annual contribution to the UK economy, according to Make UK.

2.6M

UK Jobs

People employed in UK manufacturing, underscoring the sector's social and economic importance.

Data Volumes Are Exploding, But Clarity Is Not

The Data Reality

Modern manufacturing environments generate vast volumes of data from connected machines, sensors, and systems. According to **McKinsey & Company**, industrial IoT deployments can generate **terabytes of data per day** in large-scale operations.

Yet despite this, operational clarity remains limited.

The Systems Problem

Data is distributed across ERP, MES, SCADA, and supply chain systems that were **not designed to operate as a unified decision-making environment**.

For operational teams, this often means working across multiple systems to understand what should already be clear with time spent navigating data rather than acting on it.

ⓘ The constraint is no longer access to information. It is the ability to act on it.

Why This Matters Now

> **This is not a future challenge.**
> **It is already constraining manufacturing performance today.**

Manufacturers are operating in an environment defined by volatility and disruption. Global supply chains continue to face instability. According to the **OECD**, supply chain disruptions during recent years significantly impacted production output across multiple sectors.

Compounding Pressures on Manufacturers

At the same time, cost pressures are increasing.

Energy Costs

Sustained energy price volatility is placing direct pressure on operational margins across all manufacturing sub-sectors.

Labour Shortages

Skills gaps and workforce availability continue to constrain capacity, forcing manufacturers to do more with fewer people.

Material Price Volatility

Unpredictable input costs make planning and margin management increasingly difficult without real-time visibility.

Fragmented Data

Research from **Deloitte** indicates manufacturers struggle to achieve consistent efficiency gains due to fragmented data and systems, despite identifying operational efficiency as a top priority.

A Coordination Problem, Not a Capacity Problem

This is often framed as a cost or capacity problem. In reality, it is a **coordination problem**.

The system is not short of data. It is constrained by how effectively that data is connected and acted upon.

When decisions are delayed:

- Production inefficiencies increase
- Downtime extends
- Output is lost

The Cost of Delay

According to **Siemens**, unplanned downtime costs U.S. manufacturers an estimated **$50 billion annually**.

That is not a system inefficiency.

It is a decision failure.

⊗ Decisions delayed by minutes can become production losses measured in hours or days. The cost of the decision gap is already being paid.

The Structural Problem: Data Exists, Decisions Lag

Manufacturing has not failed to invest in data. Production environments are instrumented. Machines are connected. Supply chains are tracked. Enterprise systems are in place.

And yet, when decisions need to be made, the system still slows down.

Three Roles. Three Delays. One Root Cause.

The Line Supervisor

Responding to a drop in output, they rarely see a single, clear view of performance. In many environments, this means switching between MES dashboards, ERP schedules, machine data, quality reports, and manual logs **before a decision can be made**.

The Planner

Managing order fulfilment often means reconciling ERP demand forecasts, warehouse inventory, and supplier updates **manually** before committing to delivery dates.

The Maintenance Engineer

Reviews historical data, alerts, and manual logs before deciding whether to intervene or allow a machine to continue running — often with **incomplete information**.

> **In each case, the decision is not delayed because it is complex.**
>
> **It is delayed because the information required to make it is not available in a form that supports action.**

Why Manufacturing Systems Were Not Built for Decisions

Manufacturing systems have been designed to **capture and report on activity**, not to support decisions in the moment that activity occurs.

Fragmented

Data is spread across operational and enterprise systems that were never designed to work together.

Inconsistent

Data is structured differently across functions, making cross-system interpretation time-consuming and error-prone.

Ungoverned

Data is governed inconsistently across teams, leading to conflicting interpretations and reduced trust.

In practice, this often results in manual reporting workflows. At **Denmaur Independent Papers Ltd**, teams were spending significant time manually producing reports across disconnected systems, with no single, trusted view of performance.

Even Routine Decisions Become Effortful

Stop or continue a production run?

Without a unified view, this requires cross-referencing multiple systems before a call can be made.

Is an order at risk of delay?

Demand forecasts, inventory levels, and supplier commitments must be manually reconciled before anyone can answer with confidence.

Does a machine require immediate intervention?

Engineers must piece together alerts, historical data, and manual logs, often without full context before deciding.

> **Manufacturers are not struggling to generate insight. They are struggling to use it at the moment it matters.**

The Cost of Inaction

When decisions slow down in manufacturing, the impact is immediate and measurable.

$50B

Annual Downtime Cost

Unplanned downtime costs U.S. manufacturers, according to Siemens.

£10K

Per Minute

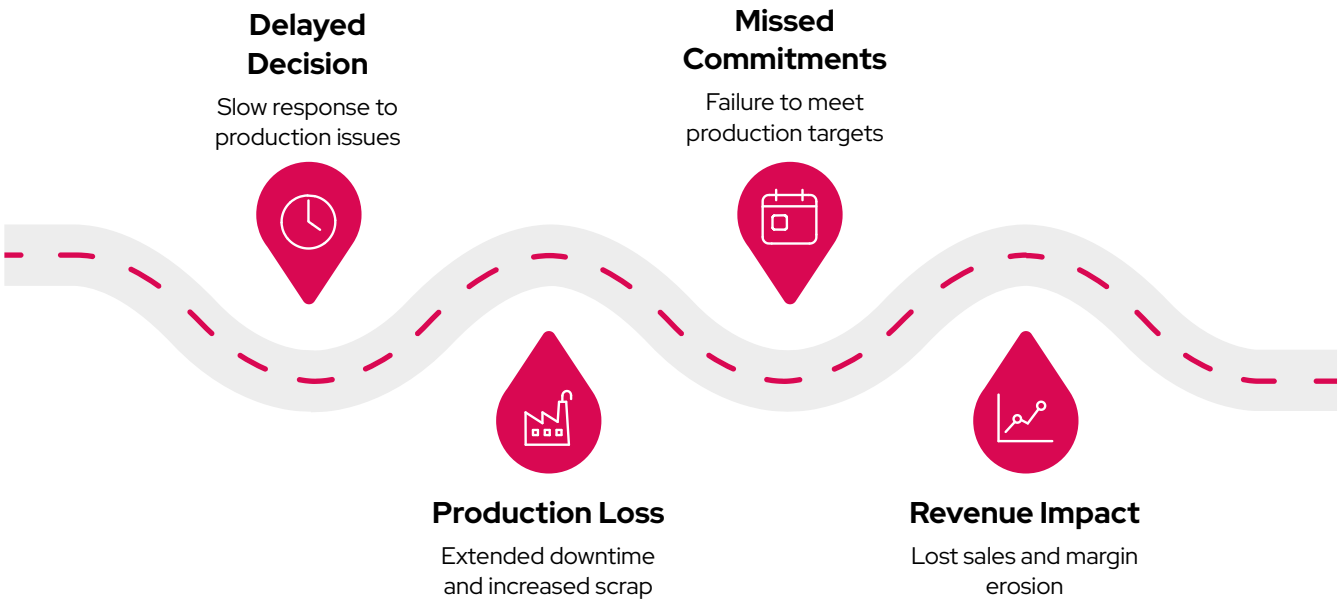
Unplanned downtime in automotive manufacturing can exceed £10,000 per minute in high-throughput environments.

1%

OEE Drop Impact

A 1% drop in OEE can translate into significant lost output across high-volume operations.

How Delays Cascade Across the Business



The system is tightly interconnected, and small delays propagate quickly across it.

A delayed response to a production issue results in:

- Extended downtime,
- Increased scrap and rework
- Missed production targets

A delayed planning decision leads to:

- Late deliveries
- Expedited shipping costs
- Strained customer relationships

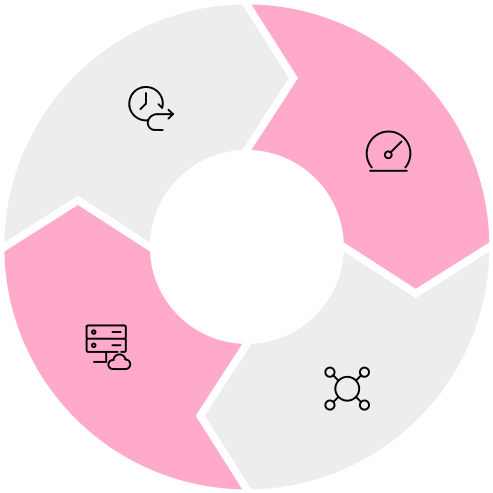
The Reinforcing Cycle of Delay

Delays Reduce Output

Slow decisions mean production issues go unresolved longer than necessary.

Complexity Increases Fragmentation

Teams rely more heavily on disconnected data sources to manage the chaos.



Reduced Output Increases Pressure

Teams are pushed harder to recover lost throughput, increasing stress and error rates.

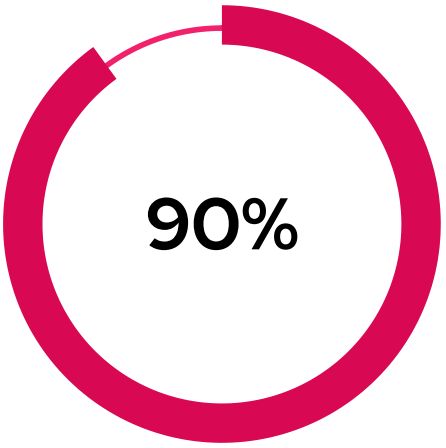
Pressure Increases Complexity

Reactive management creates more exceptions, more manual interventions, more noise.

Breaking this cycle requires more than better reporting. It requires **removing the delay between insight and action**.

Case Study: Denmaur Independent Papers Ltd

denmaur
A CARBON BALANCED COMPANY



At Denmaur Independent Papers Ltd, finance teams reduced report preparation time by approximately 90%.

They shifted from hours of manual effort to near real-time access to data.

Before

Static PDFs and spreadsheets already out of date by the time they were reviewed. Hours of manual effort per report cycle.

After

Access to key data moved from **days to seconds**, fundamentally changing how decisions were made across the business.

Commercial Impact

Improved data access supported over **£500,000 in pipeline eligibility** by enabling compliance and ESG reporting capabilities expected by customers.

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The Shift Required: From Data Access to Decision Capability

To move forward, manufacturing must shift fundamentally, not incrementally.

1	2
Data Access	**Decision Capability**
Information exists somewhere in the system	Insight is available at the exact moment action is required

Three Fundamental Shifts

From Reporting Outputs → To Operational Inputs

Stop producing reports that describe what happened. Start delivering insight that informs what to do next.

From Dashboards → To Embedded Intelligence

Move beyond visualisation tools that require interpretation. Embed decision-ready insight directly into operational workflows.

From Days to Seconds

At Denmaur Independent Papers Ltd, access to key data moved from days to seconds, **fundamentally changing how decisions were made** across the business.

What Is Operational Intelligence?

Operational Intelligence is not about seeing more data. It is about removing the delay between knowing and acting, by placing governed, decision-ready insight directly inside operational workflows.

What It Is Not

- More dashboards to interpret
- More data to reconcile
- More reports to produce
- AI layered on top of fragmentation

What It Is

- Governed, consistent insight
- Embedded in operational workflows
- Available at the point of decision
- Replacing interpretation with action

The Manufacturing Data Maturity Curve

Most manufacturers believe they are progressing in their use of data. In reality, many are stalled between stages. Capability has been layered in over time, but without coherence.

The challenge is not progression. It is **progression without coordination**. Each stage adds capability without resolving the underlying structural problem of fragmented, ungoverned data.

Stage 1: Data Consolidation

What It Looks Like

Data is centralised, but access is slow and dependent on specialists. Teams must request reports or wait for data teams to extract and prepare information before any decision can be made.

The Risk

Insight is not available when decisions are made. By the time data reaches the people who need it, the operational moment has already passed.

Common Signs

- Data warehouse exists but few can access it
- IT team produces most reports
- Decisions made on gut feel or experience
- Long lead times for new reports

Stage 2: Standardised Reporting

What It Looks Like

Reports provide consistency across the organisation. Teams receive regular updates on performance, and there is a shared language around key metrics.

The Risk

Insight is retrospective. Decisions are based on **lagging indicators**. What happened last week, last shift, or last month. By the time the report is reviewed, the opportunity to act has often passed.

Common Signs

- Weekly or daily report packs
- Static PDFs or spreadsheet exports
- Decisions made after the fact
- Reports already outdated on arrival

Stage 3: Self-Service Analytics

What It Looks Like

Access to data increases. Teams can build their own reports and explore data without relying on IT. Speed of insight improves significantly.

The Risk

Consistency declines. Without governance, different teams produce different numbers from the same data. **Conflicting interpretations reduce trust** — and without trust, decisions slow down again.

Common Signs

- Multiple versions of the same metric
- "Which number is right?" conversations
- High tool adoption, low decision confidence
- Governance gaps across teams

Stage 4: Predictive Capability

What It Looks Like

AI and machine learning are introduced to forecast demand, predict failures, and identify patterns. The ambition is to get ahead of problems before they occur.

The Risk

AI is introduced without integration. When the underlying data environment is fragmented and ungoverned, **AI amplifies inconsistency rather than improving decisions**. Predictions are only as reliable as the data they are built on.

Common Signs

- AI pilots that don't scale
- Predictions that conflict with operational reality
- Low adoption of AI recommendations
- Fragmentation unresolved beneath the AI layer

Stage 5: Operational Intelligence

Embedded

Insight is delivered directly within operational workflows. No switching, no exporting, no interpreting.

Governed

A consistent semantic layer ensures every team works from the same definitions, metrics, and logic.

Real-Time

Decisions are supported at the moment they need to be made, not hours or days after the fact.

Outcome: Decisions are **faster, more consistent, and more scalable** across the entire organisation.

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Why Traditional Approaches Continue to Fail

> **Adding more tools does not solve the problem. The issue is not capability. It is alignment.**

Digital transformation programmes have focused on connecting systems and collecting data. Less attention has been given to how decisions are actually made within those systems.

Three Tools That Don't Solve the Problem

1

Dashboards

Dashboards were designed to explain what has **already happened**. They were never designed to support decisions in real time. They describe the past, but not enable the future.

2

Self-Service Analytics

Self-service increases access to data, but not alignment on what that data means. Without governance, more access creates more confusion, not more clarity.

3

AI Without Integration

AI does not solve fragmentation. **It amplifies it.** Predictive models built on inconsistent, ungoverned data produce outputs that cannot be trusted and therefore cannot be acted upon.

The Decision Gap for Manufacturing SaaS Providers

For industrial SaaS providers, the decision gap sits **within the product**. If users must extract, reconcile, or interpret data outside the system before acting, the platform is not enabling decisions.

> **Analytics that sit outside the workflow do not create value. They create dependency.**

Three Challenges Created by the Product Gap

Product Value Gap

Insight exists within the platform but is not delivered in workflow.

Users export data, build their own reports, and make decisions **outside the system**, undermining the platform's core value proposition.

Adoption Risk

Users disengage when systems do not support action.

If the platform requires effort to extract value, users find workarounds, reducing engagement and increasing churn risk.

Commercial Impact

Without measurable operational impact, differentiation is limited.

Manufacturing organisations expect their systems to **enable decisions**, not just store data. Platforms that cannot demonstrate this lose competitive ground.

When Analytics Become Part of the Product

CASE STUDY: DENMAUR INDEPENDENT PAPERS LTD

The Transformation

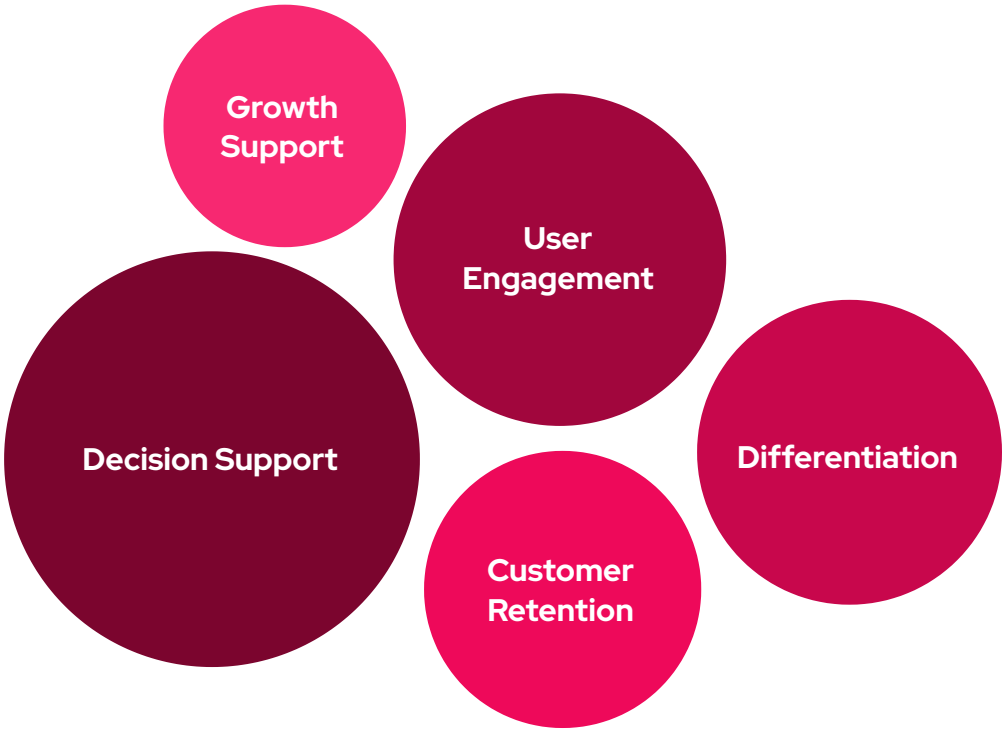
Analytics evolved from an internal reporting tool into a **customer-facing capability**, enabling clients to access live dashboards, compliance data, and performance metrics on demand.

Insight became part of the product experience, not something delivered separately.

The Commercial Result

This shift is not only operational. It is commercial. Improved access to data supported over **£500,000 in pipeline eligibility** by enabling compliance and ESG reporting capabilities expected by customers.

The platform became a decision support system, increasing user engagement, strengthening differentiation, and supporting customer retention and growth.



The Panintelligence Approach

Panintelligence is designed to close the decision gap by changing how insight is delivered and used, not by adding another layer of complexity on top of existing systems.

01

Operates Against Existing Data

Works directly against existing data environments, without requiring data to be moved or duplicated. Manufacturers retain full control of their data, definitions, and logic.

02

Governed Semantic Layer

A governed semantic layer ensures consistency across operations. Every team works from the same definitions, the same metrics, and the same logic.

03

Embedded in Operational Systems

Insight is embedded directly into operational systems, supporting decisions at the point of action, not after the fact.

04

AI Within a Governed Framework

AI operates within this governed framework, ensuring outputs are explainable and aligned with operational reality.

What Panintelligence Changes

1	2
Where Data Lives	**How It Is Used**
Unchanged. Data stays in existing systems, under existing governance	Transformed. Insight is embedded, governed, and available at the point of decision

For manufacturing SaaS providers, this enables analytics to be embedded into their platforms, delivering decision-ready insight without building the capability internally.

The result is not more data. It is **faster, more consistent, and more reliable decisions**.

Use Cases in Practice: Operational Intelligence in Action

The following six use cases demonstrate how Operational Intelligence removes the delay between insight and action across the most critical areas of manufacturing operations.

1. **Production Performance**
2. **Supply Chain Planning**
3. **Maintenance & Assets**
4. **Quality & Yield**
5. **Workforce Coordination**
6. **Embedded Analytics**

Use Case 1: Production Performance

Without Operational Intelligence

- Performance drops identified after the fact
- Root cause analysis requires cross-referencing multiple systems
- Intervention decisions made retrospectively
- Recovery is reactive and costly

With Embedded, Real-Time Insight

- Performance deviations identified **as they emerge**
- Root causes visible in context across machine, process, and quality data
- Decisions on intervention made **immediately**
- Production losses reduced before issues escalate

The result: Production losses are reduced, downtime is shortened, and throughput is stabilised **before issues escalate**.

Use Case 2: Supply Chain and Demand Planning

Planning decisions are often made using data that is **already out of date**. Demand forecasts, inventory levels, supplier commitments, and production constraints are reconciled across multiple systems. By the time a plan is agreed, conditions have already shifted.

1 Late identification of supply shortages

Shortages are discovered when they are already impacting production, not before.

2 Overproduction or underproduction

Without real-time demand visibility, production plans are based on assumptions that quickly become outdated.

3 Reactive rescheduling and expedited logistics

Last-minute changes are expensive, disruptive, and damage customer relationships.

With real-time, integrated insight: Demand, inventory, and supply risks are visible in a single, consistent view. Orders at risk of delay are identified earlier. Planning decisions are adjusted dynamically as conditions change.

Use Case 3: Maintenance and Asset Performance

Maintenance decisions are often based on a combination of alerts, historical data, and experience. Engineers must determine whether a machine requires intervention or can continue running, often **without full context**.

The Dilemma

Acting too early reduces utilisation. Acting too late results in unplanned downtime. In fragmented environments, this decision is made with incomplete information, and the consequences of getting it wrong are significant.

With Embedded, Governed Insight

- Early indicators of performance degradation surfaced in real time
- Machine behaviour understood in context of production and load
- Maintenance decisions made with **full visibility of operational impact**

The result: Unplanned downtime is reduced, maintenance is prioritised effectively, and asset utilisation is optimised without increasing risk.

Use Case 4: Quality and Yield Management

Quality issues are often identified **after production has already been affected**. Defects may only become visible during inspection or downstream processes — by which point rework, scrap, and delays have already been introduced.

The Challenge

Quality teams must trace issues back across production runs, machine settings, and material inputs to identify root causes. It is a time-consuming process that delays corrective action.

With Real-Time, Contextual Insight

Variations in quality are detected **during production**, not after completion.

Root causes are visible across process, machine, and material data. Corrective actions are taken before defects propagate.

The Result

Scrap and rework are reduced, yield is improved, and production stability increases, delivering measurable impact on cost and output quality.

Use Case 5: Workforce and Operational Coordination

Operational decisions are often made with **limited visibility of workforce availability and workload**. Supervisors manage staffing, production targets, and operational issues separately, relying on experience and manual coordination to balance demand and capacity.

Without Aligned Insight

- Underutilised resources in some areas
- Bottlenecks in others
- Reactive adjustments during shifts
- Decisions based on experience, not data

With Real-Time Workforce Insight

- Workforce availability viewed alongside production demand
- Pressure points identified as they emerge
- Staffing decisions adjusted **dynamically** to match operational need
- Resources deployed more effectively

The result: Bottlenecks are reduced and operational flow becomes more consistent across shifts.

Use Case 6: Embedded Analytics for Industrial Platforms

Industrial SaaS platforms often capture critical operational data but deliver insight separately, through reports or external tools. Users must leave the application, interpret data, and return to act. This creates a **disconnect between workflow and decision making**.

Insight in Workflow

Delivered directly within the application interface. Users can act on data without switching context.

Consistent Metrics

Definitions and metrics remain consistent across all customers, eliminating conflicting interpretations.

Decision Support System

The platform becomes a decision support system, increasing user engagement, strengthening differentiation, and supporting customer retention and growth.

Conclusion: The Decision Gap Is Already Costing You

> Manufacturers are not short of data. What has become clearer is that the challenge is not how much data exists, but whether it can be used at the moment it matters.

Across the organisations Panintelligence engages with, the pattern is consistent:

- Investment has been made
- Systems are in place
- Capability exists

And yet, when pressure is applied, teams still pause. They reconcile. They validate. They interpret. And only then do they act.

That pause is the decision gap.

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The Gap Is Not Abstract

$50B

Annual Downtime Cost

The measurable cost of delayed decisions in manufacturing.

90%

Reporting Time Saved

Reduction in report preparation time achieved at Denmaur Independent Papers Ltd.

£500K+

Pipeline Unlocked

Pipeline eligibility supported at Denmaur through compliance and ESG reporting capabilities.

In a manufacturing environment, the decision gap is measured in **lost output, extended downtime, missed commitments, and reduced margin**. It is not about reporting. It is not about dashboards. It is about whether your organisation can act.

Three Moments That Define the Gap

At the Point a Line Slows

Can your team identify the cause and act before throughput is materially affected? Or does the investigation begin after the damage is done?

At the Moment a Supplier Fails

Can your planners see the impact immediately and adjust? Or do they discover the problem when a customer calls about a late delivery?

At the Time a Decision Must Be Made

Is the insight your team needs available, trusted, and actionable? Or does it require effort to find, reconcile, and interpret before anyone can act?

Denmaur Is Not an Exception

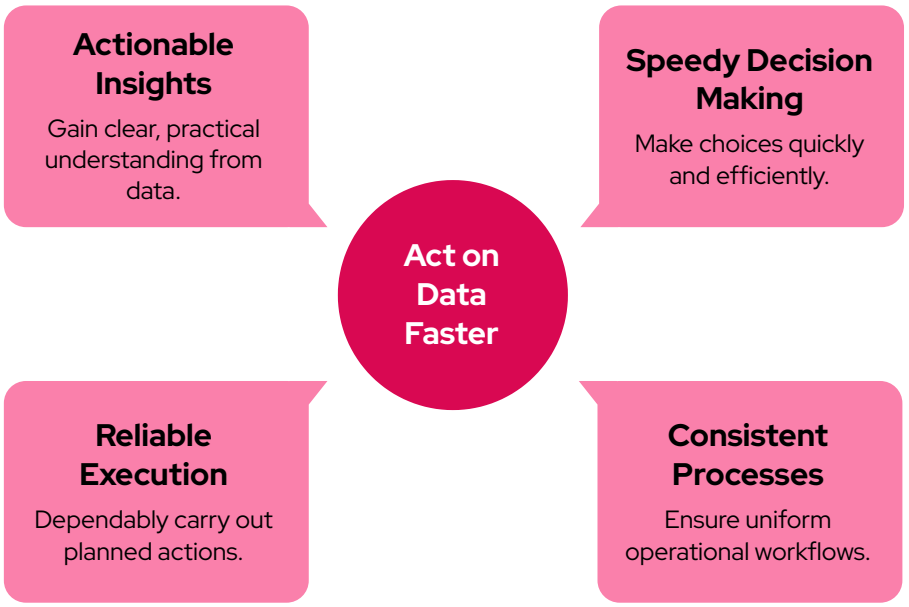
> **Denmaur is not an exception. It is an example of a wider pattern: manufacturers do not need more disconnected reporting. They need decision-ready insight in the flow of work.**

The organisations that close this gap will not be those that invest more in data. They will be those that **remove the delay between knowing and acting**.

ⓘ Because in manufacturing, delay is not neutral. **It is cost.**

The Organisations That Will Win

The competitive advantage in manufacturing will not come from having the most data. It will come from being able to act on it faster, more consistently, and more reliably than competitors.



Ready To Close the Decision Gap?

Panintelligence is designed to close the decision gap, by changing how insight is delivered and used across manufacturing operations and industrial SaaS platforms.

It does not change where data lives. It changes how it is used.

For Manufacturers

Embed governed, real-time insight into your operational workflows. Remove the delay between knowing and acting. Reduce downtime, improve yield, and protect margin.

For Industrial SaaS Providers

Embed decision-ready analytics into your platform without building the capability internally. Increase user engagement, strengthen differentiation, and support customer retention and growth.

Book a free strategy call