Freeform Dynamics in association with **lineview**

Your production lines are trying to tell you something

Modern technology helps you listen and find that extra capacity you always sensed was there

Time to tune in

If your manufacturing operation is like many others, you know your production lines inside out. You understand their quirks and characteristics, their strong points and their challenges. You've invested significantly in modernisation and automation, and have teams of skilled people analysing data to manage operations and drive improvement.

Yet there's still that nagging feeling that your lines have something else to tell - if only you could listen more effectively. You sense there's additional capacity hiding in there somewhere, but finding it to drive your business objectives, e.g. cost reduction, sustainability and overall operational consistency, is frustratingly elusive.

Something fundamental has changed though. Modern technology has evolved to a point where you can now tune into your production lines at the next level - not just through periodic analysis and reporting, but through continuous, real-time insights into the performance metrics that matter to your business. This isn't just about collecting more data - it's about surfacing immediate and actionable opportunities for improvement that have always been there, just waiting to be discovered.

Who is this paper for?

This paper has been written for manufacturing professionals looking to drive performance through better production line visibility and intelligence. Whether you're a regional operations director seeking consistent performance across sites, a plant manager focused on real-time operational insights, or a manufacturing engineer working to optimise line efficiency, we'll explore practical approaches that don't require massive investment or add unnecessary complexity.

Why this discussion, and why now?

At the risk of stating the obvious, the pressure on manufacturers is arguably higher today than it's been in recent history. Rising material and energy costs, competition for skilled workers, sustainability commitments and supply chain volatility are all squeezing margins and demanding more from production facilities. Against this background, extracting maximum output from existing lines while keeping ever rising people costs under control has moved from an operational nicety to a business imperative.

At first glance, manufacturing professionals don't appear to be short of data to help in this area. Most plants generate huge volumes of data from equipment sensors, quality checks and production records.

But despite significant investments in analytical tools, skills and processes, the return on effort has often been less than ideal. Those elaborate reports and dashboards might look impressive, but are often outdated before they've even been reviewed, let alone before anyone has had a chance to act on them. It too often feels like teams are playing a constant game of catch-up, with the occasional fire-fights thrown in when unwelcome surprises appear.

The answer to such frustrations is not in collecting more data, but rethinking how that data is exploited to deliver actionable intelligence in real-time. Fundamentally a simple concept, but one with profound consequences.

You ideally want to know right away when a minor tweak could prevent 30 minutes of downtime, or a pattern of micro-stops is signalling an impending major failure.

Introducing real-time production intelligence

In the remainder of this paper, we'll review the way in which most manufacturers use operational data today to manage and optimise production flow. As part of this, we will highlight some of the shortcomings of traditional approaches, then look at how a modern real-time production intelligence platform can take manufacturing performance management to the next level.

From here we will look at a real world solution example from Lineview, an established player in this space. Our aim with this is not to endorse any particular vendor or offering, but to illustrate how some of the ideas and principles we will be covering translate to practical reality. Finally, we will zoom out to look at how real-time production intelligence platforms complement existing technology investments, while at the same time allowing teams to be refocused on higher value and more satisfying activities.

But first let's review some of the important fundamentals that allow us to make such lofty claims.

A level-set on some key fundamentals

Focus on production flow

Before we get into the meat of our discussion, let's be clear which part of the production process we are concerned with in this paper. Our focus is squarely on the continuous, high-volume production line part of the equation that generally starts with the ingestion of pre-prepared batches of raw product (e.g. drinks or other liquids), and the containers in which they are ultimately sent to market (e.g. bottles or cans). The output is a fully packaged and palletised product ready for shipment as shown in the bottling line example below.

Stylised bottling line example

B = Buffer (conveyor based)

Focus of production flow monitoring and optimisation
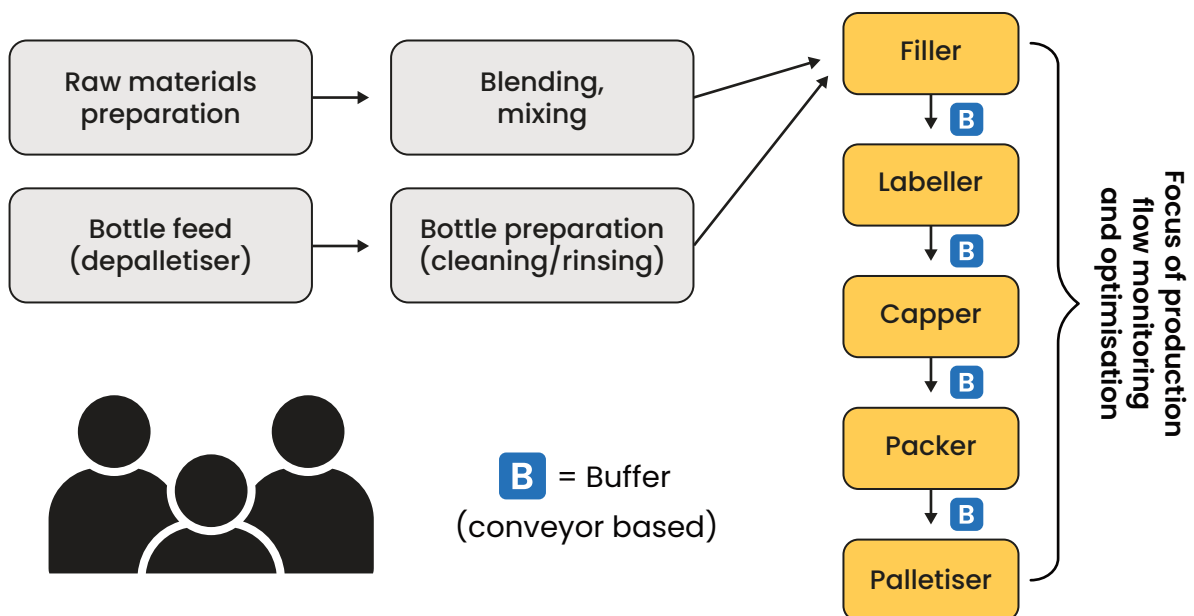
We'll be using bottling lines as our reference point in the remainder of this document, but most of the principles and practices we'll be covering apply to other manufacturing scenarios, such as food packaging, pharmaceutical production, cosmetics filling, and other continuous-flow manufacturing operations, i.e. any environment with a dependency on tightly integrated lines with sequential, interdependent processes.

Full optimisation requires a holistic view of flow

Effective production flow management requires more than simply monitoring and optimising the operation of individual items of equipment. Lines perform at their best when each component operates in harmony with the others – not too fast, not too slow, and with appropriate buffer management. The real requirement is therefore to coordinate and balance optimally across the entire system, and it's this systemic perspective that distinguishes what we might call 'production intelligence' from basic component-level monitoring and tuning. To get results, however, you first need to be clear on your specific objectives and the metrics and KPIs that you are looking to drive.

The importance of a metrics-driven approach

Effective production line optimisation begins with identifying the right things to measure, by which we mean the KPIs that map onto your business objectives and/or help you to understand your environment.

One of the first KPIs that's likely to spring to mind is Overall Equipment Effectiveness (OEE), a measure that's now widely used in the manufacturing industry. The degree to which operations specialists drill down into lower-level metrics varies quite widely, however. You may even see differences in the type of data captured and the analysis carried out between different lines and facilities within your own organisation.

As we consider a full production intelligence approach, which is based on the principle of real-time flow optimisation (more on that later), it's necessary to monitor and tune continuously at a more granular level.

The table below is not exhaustive, but it provides a feel for the kind of metrics we would ideally include as part of this.

Table 1 - Metrics that underpin production intelligence

Category	Key Metrics	What They Tell You
Overall Line Performance	• OEE (Overall Equipment Effectiveness) • Production Attainment	The big picture measures that reflect overall line health and performance.
Flow Efficiency	• Line Balance Ratio • Buffer Efficiency • Run Speed Ratio	How well product flows through the line without interruption.
Equipment Reliability	• MTBF (Mean Time Between Failures) • MTTR (Mean Time To Repair) • First-Fault Causal Loss	The stability and reliability of line components.
Process Consistency	• Minor Stops Frequency • Changeover Time	Effectiveness and efficiency of routine operations.
Quality & Resource Optimisation	• Quality Pass Rate • Resource Utilisation • Waste Percentage	Product quality, resource efficiency (people, energy, materials, etc).

Real world considerations and constraints

Looking at this list of metrics, you might be thinking: "Great theory, but we're not geared up for this level of monitoring." This would be perfectly understandable.

While you might appreciate the rationale for continuous monitoring of detailed metrics, in reality you probably don't have either the time or the resources to do this. More likely is that you work on a mix of daily, weekly, monthly or even longer cycles, with a lot of manual data processing along the way.

Even then, it's not uncommon for monitoring and tuning to rely on what's in the heads of experienced people. Impressive though it is to see old hands making decisions intuitively based on subjective observations and limited hard data, inconsistencies are inevitable, plus there's an obvious risk of critical insights disappearing when key people move on.

And if you stand back and consider the overall process, the chances are that many other weaknesses also become apparent.
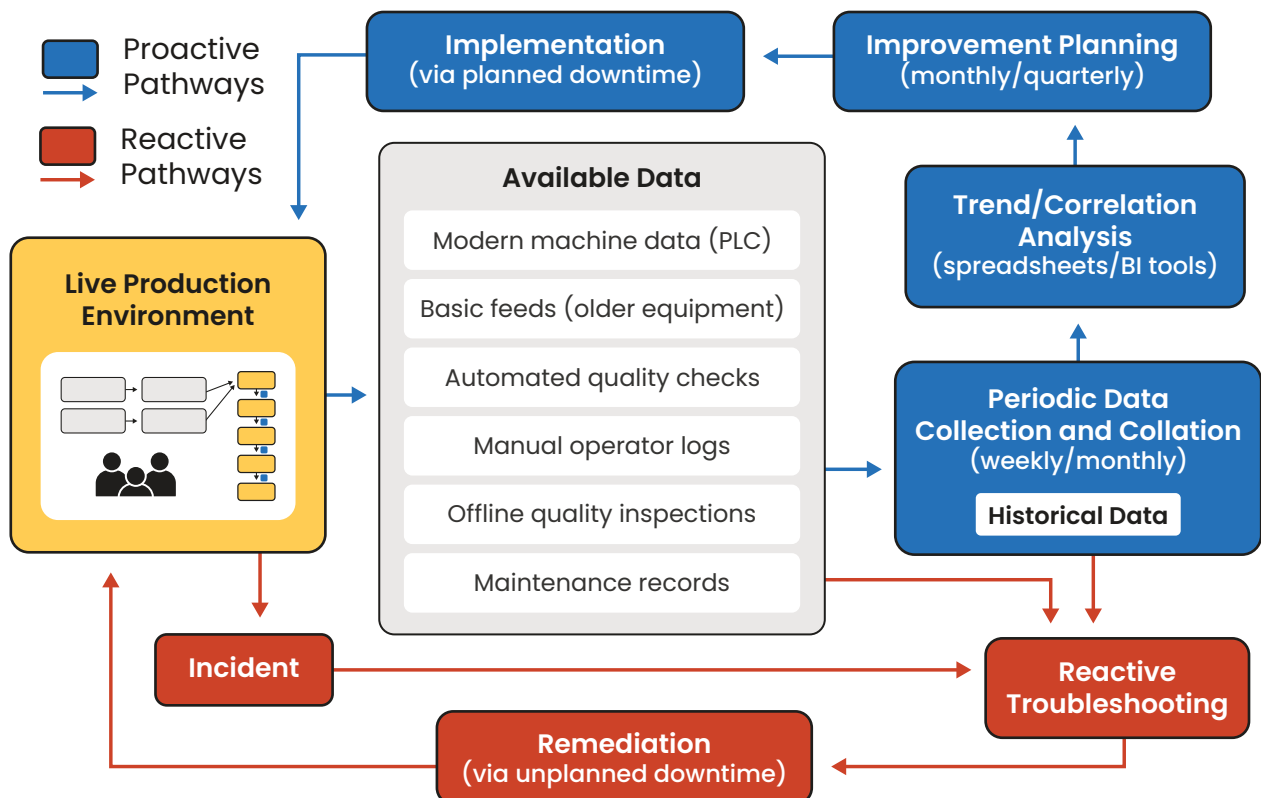
A critical look at current processes

Use of manual processing and ad hoc automations

While the details of processes vary between (and even within) organisations, we see some common workflows and patterns coming up repeatedly. For example, it's not unusual for data to be gathered from the production environment via various mechanisms, then collated manually or through home-grown scripts to pull all of the numbers together. This is then the starting point for a series of subsequent steps, frequently involving staff with data analysis expertise producing reports for use by operations specialists to optimise lines, plan improvement initiatives, and provide a foundation of knowledge that can help with troubleshooting and remediation.

Typical monitoring and management process

- Proactive Pathways
- Reactive Pathways

Implementation (via planned downtime)

Improvement Planning (monthly/quarterly)

Live Production Environment

Available Data
- Modern machine data (PLC)
- Basic feeds (older equipment)
- Automated quality checks
- Manual operator logs
- Offline quality inspections
- Maintenance records

Trend/Correlation Analysis (spreadsheets/BI tools)

Periodic Data Collection and Collation (weekly/monthly)
Historical Data

Incident

Remediation (via unplanned downtime)

Reactive Troubleshooting

Inefficiency, latency and reactivity

While you can speed things up and reduce the effort involved, e.g. through scripts, templates and pre-built models, there's only so much you can do to automate and streamline when using generic office and BI tools. This makes continuous visibility hard or impossible to achieve, as most processing takes place on a periodic batch-basis.

The result is high latency, and decisions being made on data that's a day, a week, a month or more out of date. Continuous improvement then relies on estimates, value judgements and/or extrapolation from history rather than solid up-to-date insights. The emphasis is then typically on handling incidents rather than preventing them.

The platform advantage

Model-driven, real-time and automated

We've mentioned the concept of a real-time production intelligence platform a number of times, but what does such a solution look like in practice. Well, at the centre is an intelligence model that not only 'understands' the generic principles of production flow, but also allows you to configure the system to reflect your particular environment - components, dependencies, tolerances, performance parameters, etc, along with the rules for line monitoring and balancing.

Once the platform is in place, data is captured continuously through live feeds and connectors, augmented by batch ingestion and operator logs where necessary. But the real power stems from the platform's continuous real-time data processing capabilities. As new data comes in, trends are updated, emerging patterns are recognised, and anomalies are detected, with causal analysis done on the fly.

The upshot is that at any moment in time, you can tap into a live view of your production environment, overlaid with a rich set of insights. This can be accessed via real-time interactive dashboards as well as detailed reports, and as you would expect, alerts and recommendations keep the whole monitoring and management process on a proactive footing.

Anatomy of a modern production intelligence platform
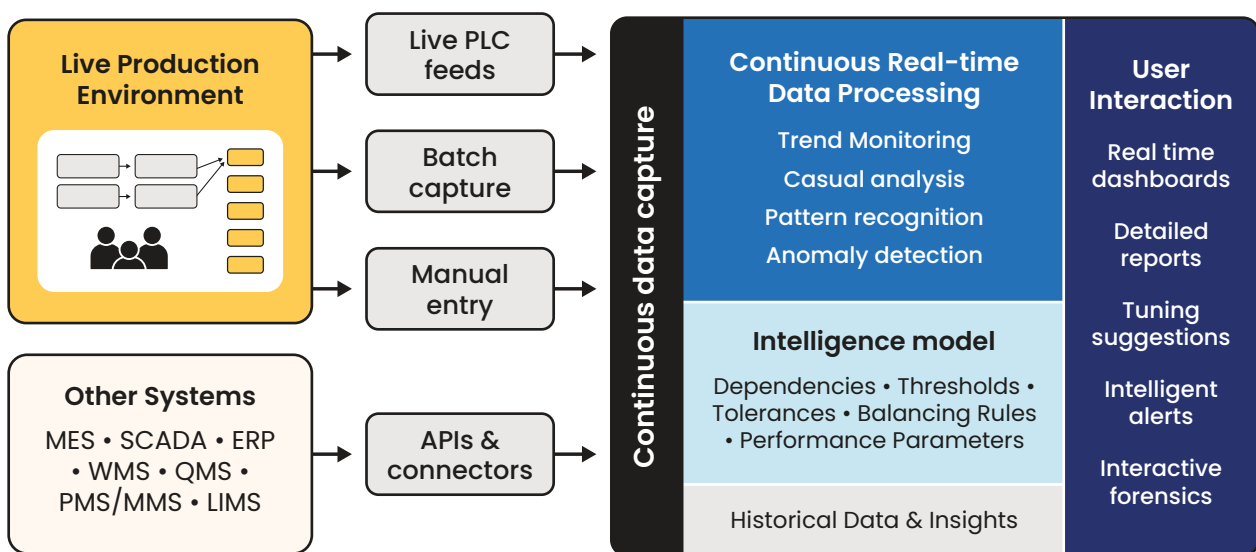
Real-time • Continuous • Integrated • Intelligent • Actionable

Just like your production line is talking to you

The real-time, automated approach clearly has direct advantages in terms of effort reduction - a lot less manual work is required to collate, analyse and interpret data. Analysts and others involved in the traditional monitoring and analysis process are freed up from routine tasks to focus on higher value work, e.g. strategic improvement activity.

But the real business impact comes from much deeper insights into line performance, and the ability to tune continuously. It's almost as if your line is telling you immediately when it feels stressed or unbalanced, or when something is starting to drift in the wrong direction and/or is headed for failure. This translates to a whole set of business benefits.
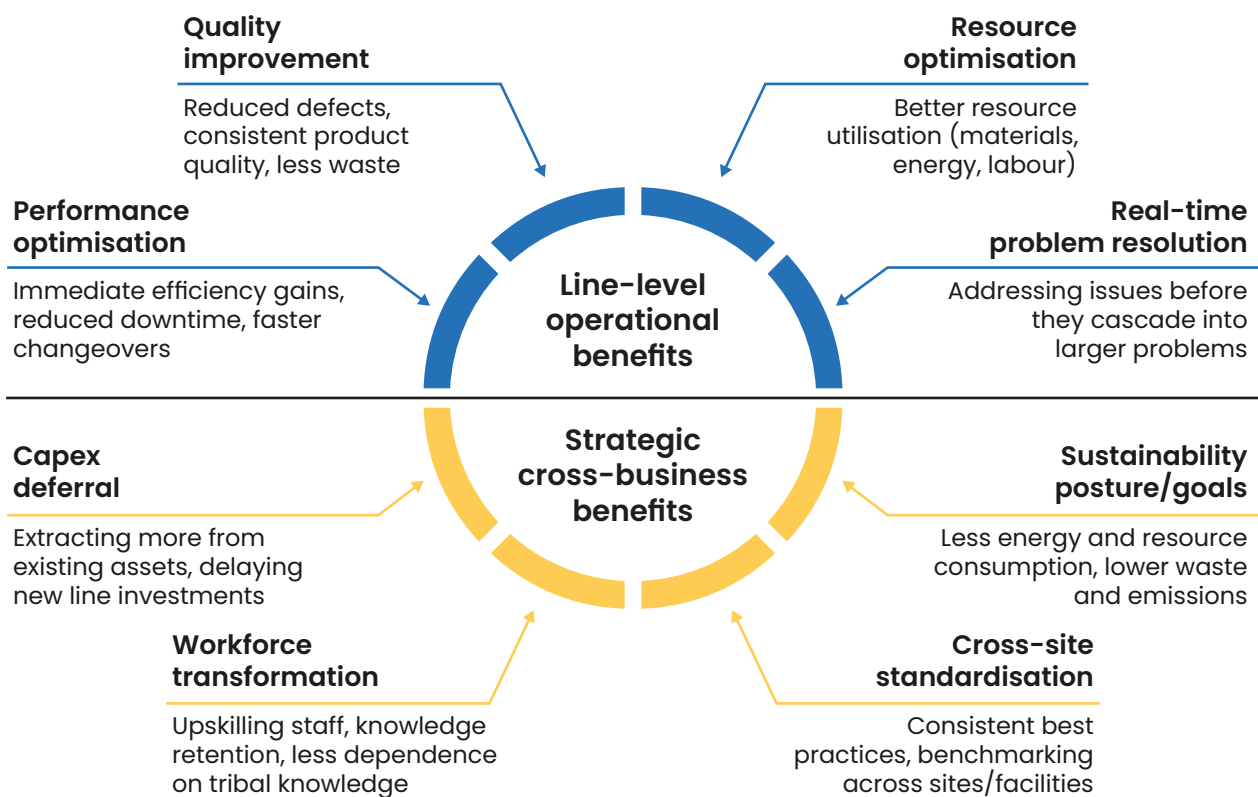
Benefits in more detail

Strategic as well as operational impact

Production intelligence delivers benefits across multiple levels of the organisation. While the immediate operational gains are often what triggers initial interest, the strategic advantages can ultimately deliver even greater medium and long-term value. The diagram below is not exhaustive, but it provides a feel for how the main benefits manifest at both the individual line level and across the wider business.

Broad and deep business impact

Quality improvement
Reduced defects, consistent product quality, less waste

Resource optimisation
Better resource utilisation (materials, energy, labour)

Performance optimisation
Immediate efficiency gains, reduced downtime, faster changeovers

Real-time problem resolution
Addressing issues before they cascade into larger problems

Line-level operational benefits

Strategic cross-business benefits

Capex deferral
Extracting more from existing assets, delaying new line investments

Sustainability posture/goals
Less energy and resource consumption, lower waste and emissions

Workforce transformation
Upskilling staff, knowledge retention, less dependence on tribal knowledge

Cross-site standardisation
Consistent best practices, benchmarking across sites/facilities

Building a business case

When making the case for production intelligence, it's important to consider both the immediate operational pain points and the broader strategic benefits. The interests of operations directors and plant managers can be addressed with reference to efficiency, quality and production flow gains that can be directly translated to financial returns.

Meanwhile, C-suite and other executive stakeholders may be more interested in the kind of strategic outcomes aligned with board-level priorities.

With this in mind, the best business cases typically combine quantifiable short-term improvements in OEE and resource utilisation with longer-term strategic benefits like Capex deferral, workforce development and sustainability metrics.

That said, your particular business case will reflect your own priorities, so it is likely to be based on a subset of the above benefits. But it's always good to have a broad set of impacts to consider, especially as priorities often change over time.

From concept to practical reality

Lineview as an example of a modern solution

Having explored the principles and potential benefits of real-time production intelligence, let's examine how these concepts translate into practical reality by looking at Lineview, an established provider in this space. Founded in 2001 and drawing on over two decades of experience in manufacturing environments, Lineview has evolved alongside the industry's changing needs and technological capabilities.

What began as a focused solution for bottling lines has expanded to address the broader production intelligence requirements we've been discussing, with implementations across food and beverage, pharmaceutical and cosmetics manufacturing sectors. Lineview's journey mirrors the evolution we've described in this paper from basic monitoring to comprehensive production intelligence.

It's worth noting that the solution details presented here are based on information provided by Lineview and conversations with its team. While we've made every effort to ensure accuracy, this section is intended to be illustrative rather than evaluative. Our aim is to help you understand how production intelligence principles can be implemented in practice, not to provide a formal assessment of any specific vendors or offerings.

What's particularly interesting about Lineview's approach is how it has been shaped by direct experience on the factory floor. With that context established, let's explore how the company's solution architecture, engagement model, and implementation approach address the challenges and opportunities we've discussed throughout this paper.

Core Lineview capabilities

Lineview's flagship solution is a real-time production intelligence platform that puts the concepts of continuous line monitoring and optimisation into practice. At its core is an intelligence model that understands the fundamentals of production flow, while allowing for detailed configuration to reflect the specifics of your environment.

The platform collects data directly from machine PLCs (Programmable Logic Controllers) on the production line, removing the need for additional sensors that might be expensive to install or could get knocked out of alignment. This direct connection enables the system to gather granular data about equipment performance and operations without manual intervention.

What transforms this data collection into genuine production intelligence is the platform's real-time processing capability. The system doesn't just passively monitor

performance metrics, it actively identifies patterns and emerging issues. For example, if a labelling machine is experiencing small but increasing periods of micro-stops over several days, the platform can identify this trend before it develops into a major failure causing significant downtime. Rather than waiting for the machine to fail completely, maintenance teams can address the issue during planned downtime, significantly reducing the impact on production.

The platform maintains a continuous understanding of line performance, automatically identifying causal relationships when issues occur. Rather than simply reporting that a line has stopped, it identifies which specific machine initiated the stoppage and its impact on upstream and downstream equipment. This "first-fault causal loss" analysis prevents teams from focusing on symptoms rather than root causes.

> "The big difference is that we're now processing data continuously to provide real-time insights. Once the penny drops, you can immediately see a change in mindset"
>
> *- Lineview Senior Engineer*

An interface that speaks your language

As you'd expect from any well-designed production monitoring system, Lineview's dashboards provide intuitive visibility of line status with colour-coding and historical reporting capabilities. In addition, however, Lineview's approach to making complex data truly accessible to all users is worth noting.

The platform's AI-assisted interaction allows team members to ask questions about their production data in natural language. With a library of pre-formulated queries covering

the most valuable insights, users can quickly extract actionable information in context without specialised analytical skills, whether it's an operator asking about current downtime causes or a manager reviewing last week's changeover performance.

This approach to simplifying complexity ensures actionable insights are immediately available to anyone who needs them, keeping the focus on improvement rather than interpretation.

From pilot to production: the Lineview journey

Lineview's approach to implementation recognises that every manufacturing operation has unique priorities, challenges and goals, so a one-size-fits-all solution is almost never going to work.

The company's client engagement process is designed with this in mind, with an aim to deliver quick wins around your immediate needs and pain points, while building toward long-term strategic benefits.

Lineview client adoption journey

1 Assessment & Discovery	2 Smart Start Pilot	3 Configuration & Training	4 Full Deployment	5 Continuous Improvement

The journey begins with an initial assessment to understand your environment, operational challenges and business objectives. This establishes clear expectations and helps tailor the engagement to address the most pressing needs first, whether that's improving OEE, meeting sustainability targets, or something very specific such as extending the life of an older line to avoid an expensive and disruptive replacement exercise.

From here the focus shifts to how best to act, acknowledging that the underlying causes of problems, limitations and inefficiencies are not always well understood initially, and may even have been misdiagnosed. A pilot project through Lineview's Smart Start program will quickly reveal what's really going on, as well as allowing operations teams to assess the value of production intelligence without an extensive commitment.

> **"New clients come to us with thoughts on what needs immediate attention, but so often a pilot rapidly reveals that the real problem lies elsewhere."**
>
> *- Lineview Senior Engineer*

Partnering for leadership and operational excellence

Lineview stresses that it doesn't just provide technology and integration expertise. It also aims to empower customer teams through a collaborative framework within which skills-transfer takes place throughout the implementation process. Beyond operational level support and assistance, this framework covers key aspects of leadership development, e.g. from coaching plant managers on how to standardise best practices across multiple lines, to advising regional directors on how to benchmark performance as a foundation for driving company-wide operational excellence.

A number of case studies illustrating this collaborative approach are available on the company's website.

Final thoughts

Real-time production intelligence in context

As we've explored throughout this paper, real-time production intelligence represents a significant opportunity to enhance manufacturing performance. But it's important to understand how such solutions fit into the broader landscape of manufacturing technology.

Most production environments already have several systems in place, from Manufacturing Execution Systems (MES) that coordinate production activities, to SCADA systems monitoring critical equipment, to ERP platforms managing business processes. Production intelligence platforms like Lineview's are designed to complement rather than replace these investments. They fill critical gaps by providing the real-time, flow-oriented visibility these broader systems often lack, while integrating with existing infrastructure through standard APIs and connectors.

Where functional overlap does exist – for example, with OEE calculation features in an MES, or basic analytics within your SCADA system – production intelligence typically represents a significant upgrade in capability. There's a world of difference between basic metrics monitoring and the continuous, causal analysis that production intelligence delivers. Just because an existing system can theoretically fulfil certain monitoring needs doesn't mean it's optimised to do so. If production visibility sits at the periphery of a system's core purpose, you're likely accepting unnecessary compromises in capability, usability and insight depth.

The idea is to fill critical gaps by providing real-time, flow-oriented visibility that broader systems typically lack.

Freeing your team for higher value work

Production intelligence solutions will likely replace homegrown analytics systems - those spreadsheets, scripts, and manual processes many organisations have developed over time. While this shift might raise concerns about changing analysts' roles, the reality is that manufacturing teams rarely lack things to do.

By automating routine work, you can redirect your people toward higher-impact activities - designing targeted improvement programs, developing cross-site best practices, or finally tackling those strategic initiatives that have remained perpetually deferred. This represents an opportunity to up-skill team members and enhance both their contribution and personal satisfaction.

Finally, as pressures on manufacturing continue to intensify, organisations that adopt this approach will be better positioned to maximise capacity, reduce costs, and drive sustainable growth - turning the whispers from their production lines into a clear roadmap for continued success.

About

About Freeform Dynamics

Freeform Dynamics is an IT industry analyst firm. Through our research and insights, we help busy IT and business professionals get up to speed on the latest technology developments and make better-informed investment decisions.

For more information and access to our library of free research, please visit www.freeformdynamics.com.

About Lineview

Founded in 2001, Lineview was inspired by co-founder Ian Rowledge's experience as a production manager at Coca-Cola Enterprises. Frustrated by the lack of actionable data to identify key issues and improve processes, Ian envisioned a solution to transform manufacturing operations.

To find out more about our business, our history, our philosophy and the countries we operate in, please visit www.lineview.com.

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