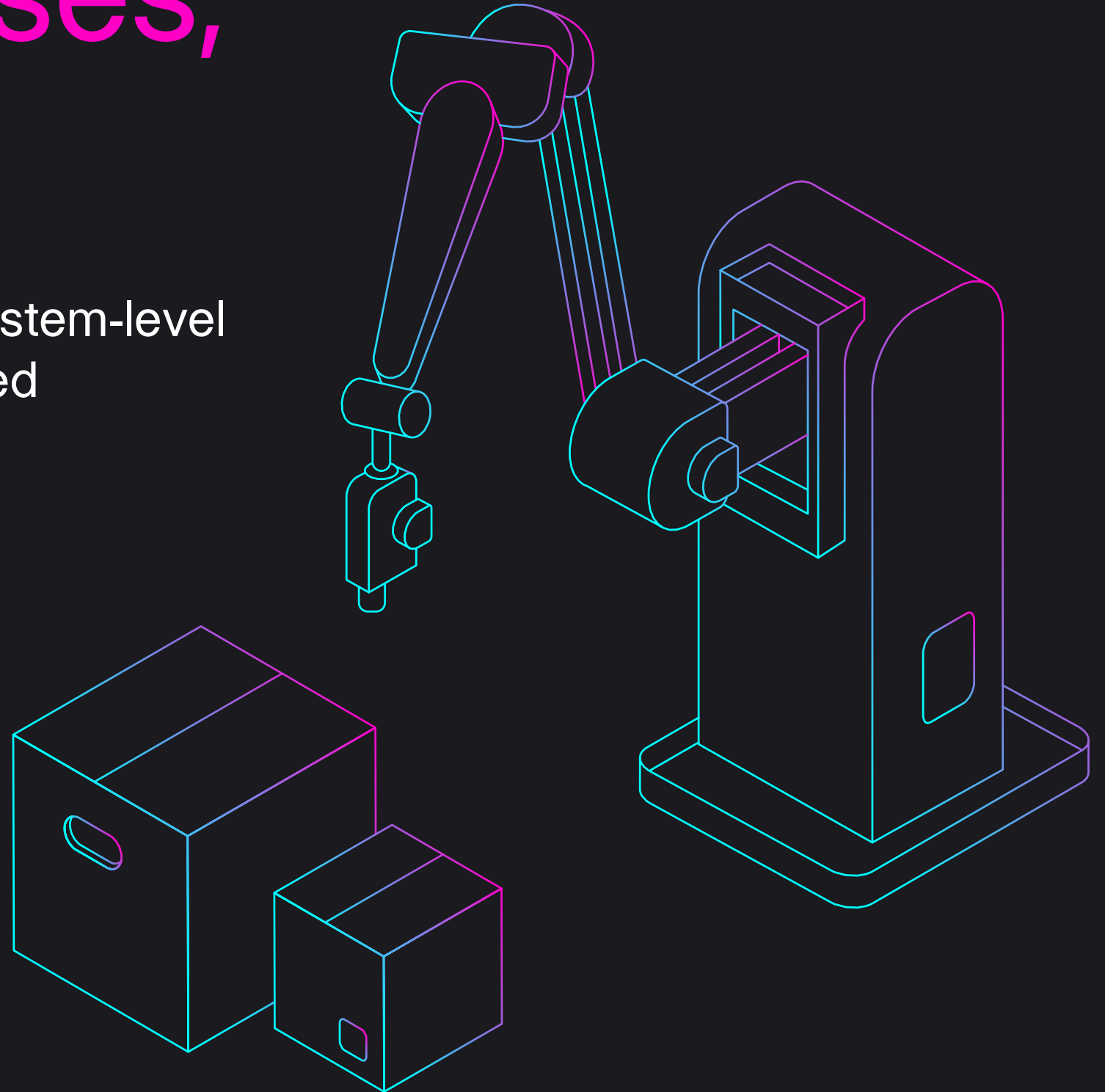




# Zero surprises, zero waste

Closed-loop manufacturing, system-level OEE and the case for integrated asset intelligence.

EBOOK



# Introduction

Unplanned downtime costs manufacturers approximately \$50 billion annually, a figure that has risen rapidly since 2019. This is driven largely by traditional practices: reactive maintenance, siloed data and disconnected systems.

At the core of these challenges is the fact that most manufacturers operate with more data than they can act on and more systems than they can connect. According to Octave research, 78% of manufacturing leaders cite incomplete or inaccurate information as a key contributor to operational challenges and 72% say poor data integration is having a strong or severe impact on their business. The visible result is operational latency: the gap between when something goes wrong and when the right person, in the right system, can act on it. Closing that gap does not require understanding a manufacturer's every process in detail. It requires connecting the systems they already run and surfacing the right information at the right moment.



# The downtime equation

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\$253M

Annual downtime cost per large plant

[Source](#)

Closed-Loop Manufacturing (CLM) addresses this problem by replacing slower, reactive practices with faster, coordinated control across operations.

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42%

of unplanned stoppages caused by equipment failure

[Source](#)

CLM forms a control architecture in which production variables are continuously measured, analyzed and automatically adjusted using real-time data. This creates a feedback loop that drives the system toward defined performance targets.

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55-65%  
vs 85%

Typical OEE ranges fall between 55–65% in discrete manufacturing sectors. 85% is commonly cited as a high-performance benchmark.

[Source](#)

Overall Equipment Effectiveness (OEE) is the primary system-level metric for CLM. OEE is commonly misread as a per-machine metric: in reality, a production system's effective OEE is governed by the weakest link in an interdependent asset chain.

# OEE as the language of operational loss

OEE is the ratio of fully productive time to planned production time. It decomposes into three multiplicative factors:

Factor	Definition	World-class target	Dominant loss driver
Availability	Actual run time as a percentage of scheduled time	90%+	Unplanned breakdowns, changeovers
Performance	Actual throughput vs. theoretical maximum speed	95%+	Micro-stoppages, speed degradation
Quality	Percentage of output meeting spec on first pass	99%+	Defects, rework, scrap
<b>Combined OEE</b>	<b>Availability × Performance × Quality</b>	<b>85%+</b>	<b>Systemic underperformance</b>

# Octave's solutions: the orchestration layer that makes your stack work as a system

Octave's role is not to replace the manufacturing stack: it is to make the existing stack work as a system. ERP remains the system of financial record, MES retains execution coordination, SCADA and PLC systems govern process control, and QMS owns compliance. What Octave adds is the operational intelligence and orchestration layer across these systems: Attune APM for condition monitoring and predictive insight, Attune EAM for asset lifecycle and work execution, ETQ Reliance for quality and compliance, and Databridge Pro as the digital spine that connects each pillar and routes events across systems in real time. This architecture maps directly onto the Sense, Reason, Decide Act, Verify feedback loop that defines closed-loop manufacturing.

## 01

### Octave Attune EAM

#### Act + Verify

Full asset lifecycle management, work orders, PM scheduling, compliance, spare parts, mobility

## 02

### Octave Attune APM

#### Sense + Reason + Decide

Real-time condition monitoring, AI/ML anomaly detection, RUL calculation, risk scoring

## 03

### Octave Databridge Pro

#### Sense + Decide

The digital spine of the Octave platform: connects EAM and APM, routes signals between systems, and auto-triggers work orders from APM anomalies in real time

## 04

### Octave InConcert

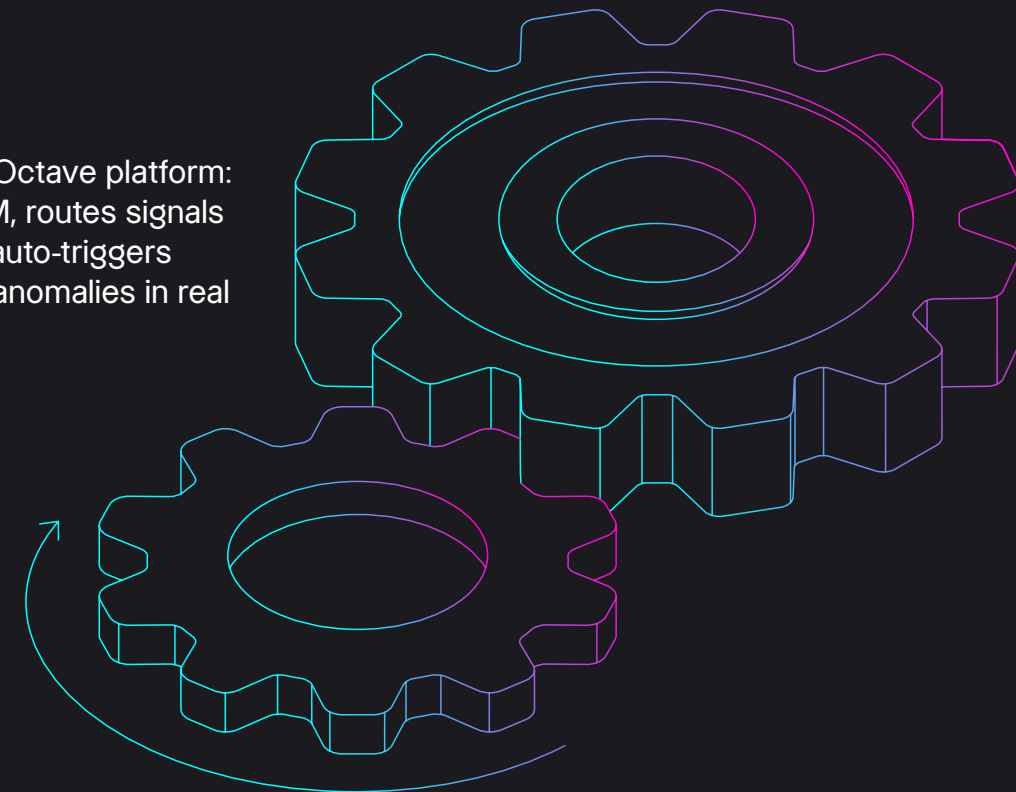
#### Reason + Verify

Unified data layer and OEE tracking

## 05

### Octave Reliance

CAPA management, deviation response, change control, audit readiness, validation lifecycle



# Progressing in five stages

The Closed-Loop Manufacturing operating model is a five-step framework that breaks down how a factory can move from passive monitoring to continuous optimization by linking data, analytics and execution into one cycle.

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## Building blocks

**Sense** - Continuously capture physical state of assets, processes and environment

**Reason** - Analyze data, detect anomalies, predict failures, diagnose root causes

**Decide** - Generate recommendations or trigger autonomous actions based on analysis

**Act** - Execute maintenance, process adjustments, quality interventions or procurement

**Verify** - Confirm resolution effectiveness; feed results back into models



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## Enabling technology

IIoT sensors, PLCs, SCADA, vision systems

AI/ML models, digital twins, APM analytics

Autonomous decisioning engines, work order automation

EAM work management, MES integration, QMS workflow

KPI dashboards, model retraining, performance loop closure

# Data silos and the cost of operational latency

Most manufacturing environments run ERP, MES, SCADA, QMS and maintenance platforms in parallel, with limited real-time connectivity between them. Research by Mulesoft indicated that 99% of manufacturing executives report data integration challenges, with only 30% of their key software applications being integrated.

When systems operate in isolation, the effects compound. OEE figures become unreliable because the data feeding them is incomplete or delayed. Predictive maintenance fails because asset health signals are never correlated with operational context. Compliance gaps persist because quality events in one system are invisible to the teams responsible for corrective action in another. These are not independent problems: they are all downstream consequences of the same root cause.

Closing this gap does not require replacing existing systems. It requires connecting them: establishing a common operational data layer that surfaces the right information, in the right context, at the point where action is still possible.

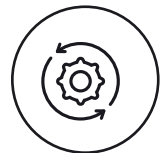


# What manufacturers stand to gain



## Downtime reduction

20–30% reduction, which can translate to hundreds of hours recovered every year



## Asset life extension

10–15% longer asset life



## Quality yield improvement

5–10% yield improvement, with non-conformity recurrence down by 25%



## Energy efficiency

10–12% reduction through embedded energy monitoring



## OEE improvement

+5 to +10 OEE points from Attune EAM alone



## Maintenance cost reduction

15–20% reduction in direct maintenance spend

## Contact us

Whether you're looking to reduce downtime, improve OEE or connect your existing systems into a single operational loop, we can help you get there faster.

With Octave, you can:

- Turn disconnected signals into coordinated action through a unified data layer
- Close the loop between quality events, asset performance and operational decisions
- Orchestrate ERP, MES, SCADA and QMS systems into a single, responsive control architecture

Start turning data into action and performance into predictable results.

[Learn more](#)

**About Octave**

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we’ve partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what’s possible from day one onward.

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