Critical manufacturing

# Industrial Operations Platform for Electronics Manufacturing

MES-powered execution, connectivity, analytics, and trusted AI.



# Closing the loop between execution and decisions

Manufacturers need to know **what is happening, why it is happening, what is affected, and what action to take**, from the individual component and machine to the line, plant, and enterprise.

Critical Manufacturing closes this loop with an MES-powered Industrial Operations Platform, **unifying execution, equipment connectivity, and operational intelligence**, on a Canonical Data Model that creates a common manufacturing context for actionable data.

By connecting intelligence back to execution, manufacturers can act faster on the shop floor, prevent and contain quality issues, accelerate new product ramp-up, standardize operations across sites, and create a trusted foundation for analytics and AI.

**1.**

## Model Operations

Structure the factory into one common data model.

**2.**

## Connect Everything

Equipment, IoT, ERP, PLM, and enterprise systems share a unified data layer.

**3.**

## Generate Intelligence

Gen AI turns structured context into real-time decisions.

**4.**

## Act and Improve

Continuous improvement built into daily work.



# The pressures electronics manufacturers face every day

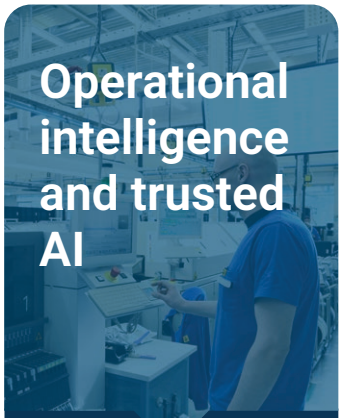
**More variants. Less room for error.**
High-mix production increases the risk of incorrect materials, component combinations, recipes, and process conditions.

**Faster NPI. Faster time to stable production.**
New products and frequent design changes need to reach the shop floor quickly without sacrificing control or quality.

**Global operations. Consistent execution.**
Products and processes need to be standardized across plants while accommodating deliberate site differences and ensuring changes are executed correctly on the shop floor.

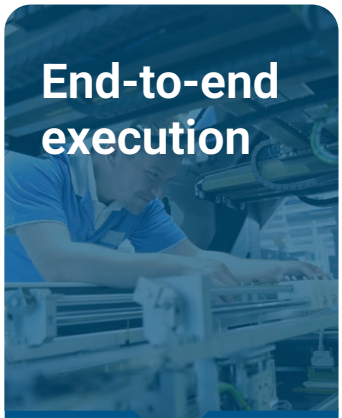
**More data. Not always more insight.**
Machines and systems generate enormous amounts of information, but without manufacturing context it is difficult to understand what matters, what is affected, and what action to take.

# Meeting complexity with control and intelligence



## Operational intelligence and trusted AI

Turn contextualized manufacturing data into insights that support faster decisions and action.



## End-to-end execution

Control production from incoming components through SMT, assembly, test, repair, and packaging in one connected operational environment.



## Full traceability

Maintain complete material and process genealogy across the production lifecycle.



## Governed flexibility for high-mix

Adapt products and processes to high-mix manufacturing while keeping configurations controlled, versioned, and upgrade-safe.

# Make Every Decision Count.
# From first build to every plant.

## Accelerate new product ramp-up and control complexity.

THE CHALLENGE

**New designs need to reach stable production, even as variants of the same base product continue to change.**

HOW IT WORKS

Critical Manufacturing manages **product definitions, routings, recipes, and work instructions** as governed configuration rather than code, so bringing a new design up is a configuration exercise, not a development project.

Variation is defined at the bill-of-materials level: what is valid for a given product is declared once, and at the moment of build the system checks that what is being consumed matches what was declared.

ON THE SHOP FLOOR

So when a preferred component goes on allocation and an approved alternate is used in its place, the **substitution happens inside the rules rather than around them**, and the genealogy records which alternate went into which unit. Checking that while the board is being built, rather than at the end of the line, is what keeps a substitution from becoming a recall.

## Prevent defects. Trace and contain precisely.

THE CHALLENGE

**The goal is to prevent defects where possible, and when one occurs, know exactly what is affected.**

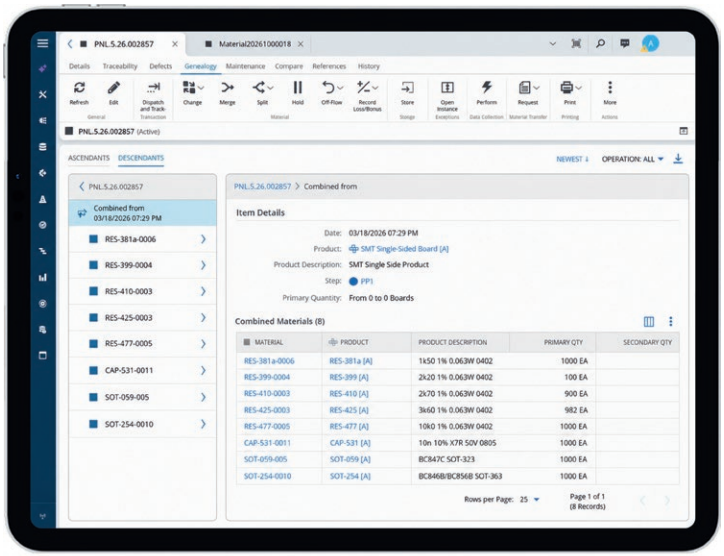
HOW IT WORKS

Critical Manufacturing controls materials throughout production, **from incoming material through assembly, inspection, test, and repair**. Material that is out of condition, outside its moisture sensitive device floor life, or not approved for a specific position can be stopped before reaching the line, while a unit that fails a check can be automatically routed to rework rather than moving forward.

**Genealogy connects the batch, lot, serialized unit, individual component and reel** down to the reference designator and design revision.

ON THE SHOP FLOOR

This level of traceability means that when a problem occurs, manufacturers can **identify which units and materials are actually affected**, enabling faster investigation and more precise containment rather than treating a broader production population as suspect. The same record answers the traceability requirements customers and regulators write into a programme, and at current board values the difference between a narrow containment and a broad one is a write-off rather than an administrative exercise.



## Turn manufacturing data into operational context.

THE CHALLENGE

**Machines, lines, and surrounding systems already generate enormous amounts of data. The challenge is turning that data into manufacturing context that execution, analytics, and AI can understand and use.**

HOW IT WORKS

At the core of the platform, the **Canonical Data Model** connects equipment and system data to the product, serialized unit, design revision, equipment, and process step that gives it meaning.

With manufacturing data structured in context, **purpose-built agents and GenAI capabilities** can turn natural-language requests into dashboards, shift summaries, and relevant shop-floor information, grounded in the operational data behind execution.

Extended across sites through the **Enterprise Data Platform**, this common model makes manufacturing context searchable and usable across the operation, providing a trusted data foundation for operational analytics and AI.

ON THE SHOP FLOOR

The effect on the shop floor is that engineers spend their time deciding what to do rather than reconstructing what happened.

## Govern change globally. Execute correctly locally.

THE CHALLENGE

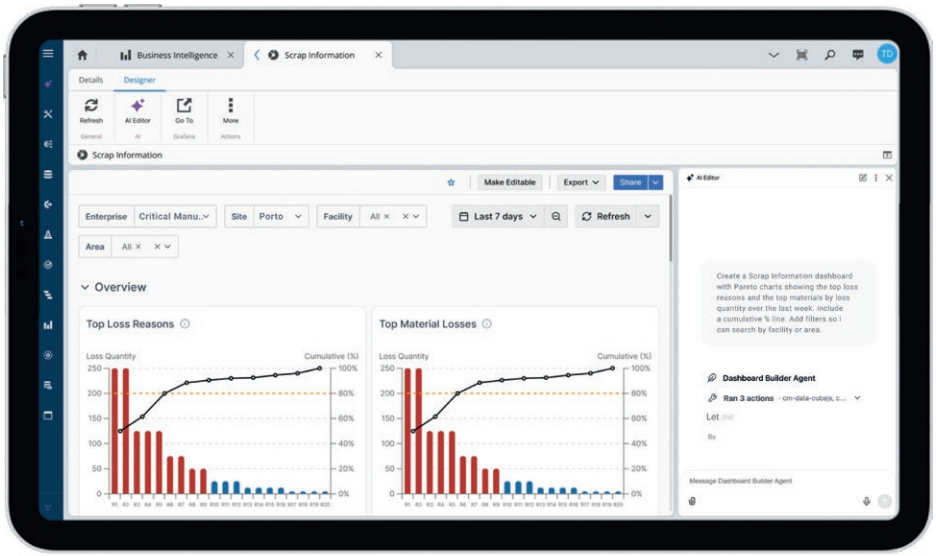
**A product or process change needs to reach every plant that requires it consistently, with governance and a way back, while ultimately reaching the operator as the instruction and validation required to execute it correctly.**

HOW IT WORKS

Critical Manufacturing distributes centrally defined master data through **governed change packages** with approvals, and dry runs before deployment. Sites are not forced to be identical. Where a plant genuinely differs, the difference is declared and approved rather than left as a local workaround.

ON THE SHOP FLOOR

On the shop floor, changes become relevant instructions and validations at each step, while personalized workspaces give operators the information they need for their specific responsibilities.



# Why Critical Manufacturing

Built on manufacturing. Designed to evolve.

**Deep manufacturing foundation**
Execution isn't one capability among many. It is the operational foundation that connects products, materials, processes, equipment, quality and people.

**One Canonical Data Model (CDM)**
A common manufacturing context connects execution, equipment data, analytics and AI, so intelligence is grounded in how production operates.

**Native evolution, not technology silos**
Connectivity, data, analytics and AI extend the platform while remaining connected to execution, allowing manufacturers to adopt new technologies without creating another fragmented technology landscape.




**Recognized in the market**

Gartner FROST & SULLIVAN IDC verdantix ABIresearch

# Manage high-mix complexity with Critical Manufacturing

**Industrial Operations Platform for Electronics Manufacturing**

| | | | | | | |
|---|---|---|---|---|---|---|
| **AI Agents** | | | | | | |
| **Advanced Planning and Scheduling** | | | **Global Data Orchestrator** | | | |
| **Manufacturing Operations** | Materials & Containers | Resource Tracking & Tools | Routing & Dispatching | Data Collection | Master Data Management & Change Control | Tasks, Checklists & Work instructions |
| **Visibility & Intelligence** | Dashboards | BI Cards | Data Warehouse | fabLIVE: Factory Digital Twin | Alarm Management | Augmented Reality |
| **Quality Management** | Sampling Based Inspection/AQL | Statistical Process Control (SPC) | Non-Conformance Management | Document Management | New Product Introduction (NPI) | Material Defects |
| **Operational Efficiency** | Maintenance Management | Order Management | Labor Management | Costing | Advanced Layout & Printing | Material Logistics / MSD & Floor Life Control |
| **Integration & Automation** | Enterprise Integration | Equipment Integration: Connect IoT | Recipe Management | Factory Automation | Mapping | |
| **Data Layer / CDM** | **Enterprise Data Platform** | | | **Data Platform** | | |

## Built on a strong MES foundation. Ready for what comes next.

Critical Manufacturing has evolved from MES into an Industrial Operations Platform by building new capabilities on the same manufacturing foundation, not by surrounding execution with disconnected technologies.

Connectivity, data, analytics, and AI become part of a common operational environment, grounded in the Canonical Data Model and connected back to execution.

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