



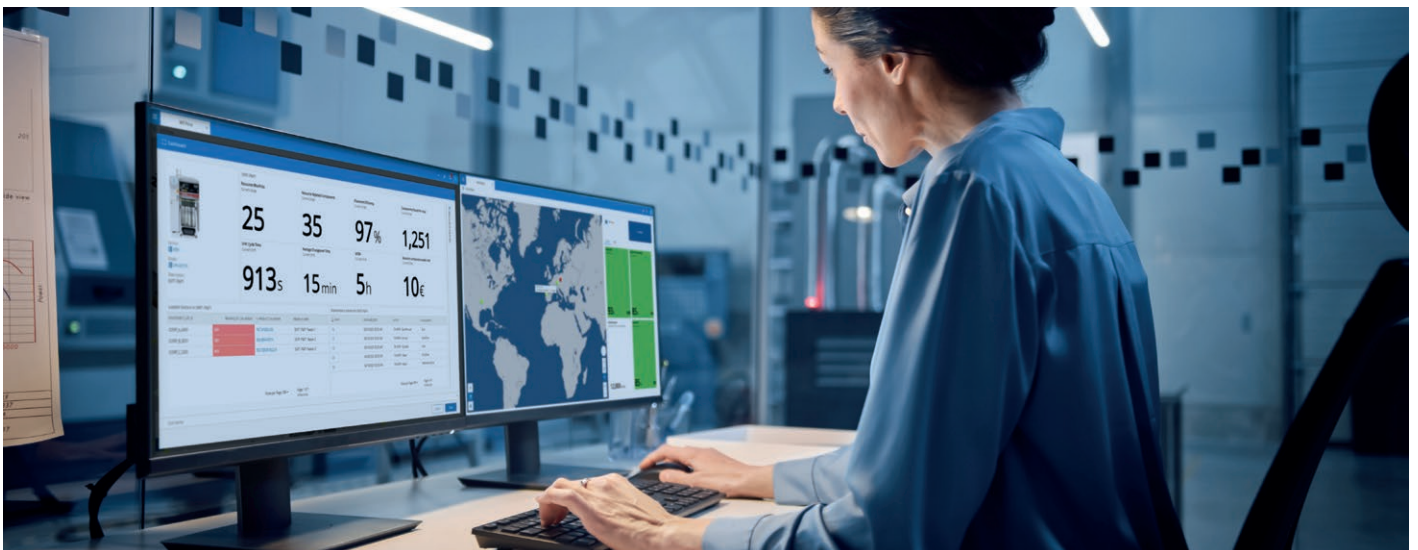
Critical Manufacturing MES for Electronics

Expect more
from your MES



A Future-Ready MES Runs a Smart Factory: Expect More

Electronics are an integral part of almost every product, and the demand for electronic components, SMT processing, and PCBs has become a core global industry. This forces manufacturers to manage complex supply chains, variable demand, shrinking margins, and shortened product life cycles. Your MES must provide complete command and control to drive factory floor production in real-time to meet every possible condition. The key to an MES for electronics manufacturing is flexibility with end-to-end traceability, connectivity for machinery and multiple data systems, and real-time shop floor visibility—at the machine, line, factory, and enterprise levels.



Innovation from an Industry Leader

Critical Manufacturing MES is a best-in-class, comprehensive, top-tier Manufacturing Execution System (MES) for electronics manufacturing. It is now easier to use than ever, offering greater configurability, industry-specific features, full value chain visibility, and an innovative architecture that utilizes containers for secure deployment. Additionally, its low-code capabilities empower users to easily adapt workflows and interfaces to their unique needs, making implementation and maintenance simpler and faster.

Advance your digital transformation to the next level with Industry 4.0-ready, out-of-the-box modules to drive quality control, traceability, and superior material management. From material incoming through SMT, assembly, and finished goods, get real-time visibility across manufacturing operations with an advanced IoT data platform and connectivity.

Meeting your Needs at Every Phase

Electronics manufacturing is a complicated operation integrating people, materials, machines, and enterprise-level infrastructure. Manufacturers must now deal with product designs that feature reduced SMD size and higher PCB component density, rapidly changing customer requirements and demand, and component shortages—all while pushing to increase quality, within more complex processes, and reduce production costs.

Critical Manufacturing MES integrates shop floor information and functionalities into a single source of truth for contextualized manufacturing data to make informed strategic business decisions. Expect more from your MES—that it will support your entire operation with real-time performance data and help identify and prevent issues, solving problems before they impact production.

Why Critical Manufacturing MES

Critical Manufacturing MES is recognized as a top-tier manufacturing solution in both the Gartner Magic Quadrant and the Critical Capabilities Report.

Complete End-to-End Traceability

Traceability becomes essential for customer satisfaction and regulatory compliance, warranty claims, recalls, and other customer-oriented activities. Critical Manufacturing MES guides each production step, offering complete end-to-end traceability and genealogy by the individual batch, lot, serialized unit, and reference designator—and now offering a new, Full Flow Configuration (Master Record) Report that includes the complete product manufacturing specification.

Manage Product Variation with Quality Control

Critical Manufacturing MES enables users to define sampling plans by product or batch, how many materials to test/inspect, and how often by defining time- and counter-based, dynamic, and static sampling plans. The system also allows to combine steps within a single flow for more flexibility in handling the production process. For example, if a component passes a quality check, it moves forward to the next assembly stage. If it fails, the system can automatically trigger an alternate flow, such as rerouting the material to a rework path or additional testing.

Shop Floor Integration and Connectivity

The Critical Manufacturing MES offers a unique Data Platform and Connect IoT module. It provides connectivity with enterprise systems and SMT lines or other equipment to make manufacturing varied data available and in context, for predictive and reactive analysis, developing insights that drive performance improvement.

Real-Time Shop Floor Visibility

Shopfloor visibility speeds up the troubleshooting process by providing teams with the necessary information. Critical Manufacturing MES enables real-time enterprise-wide visualization and monitoring with a digital twin, a real-time virtual window into the shop floor with interactive performance monitoring. Real-time notifications can also be triggered using low code business workflows, enabling quick action to solve the issue. For example, a notification to the maintenance technician when an equipment changes from productive to unscheduled down.



Improve product quality and efficiency



Reduce or eliminate excessive safety stocks



Reduce time-to-market



Get full material and process traceability



Reduce machine downtime



Standardize and optimize operations



Optimize material flows





Advanced Electronics/SMT Use Cases

SMT and electronics manufacturers face significant challenges related to the need to properly optimize and manage inventory and supply chain variability, high-mix production, and drive down costs to mitigate shrinking margins. All while not losing focus on delivering products on time and with quality, which cannot be done without an integrated MES.

1. Complex BOM Structures

In electronics manufacturing, there are several cases where the base product is the same, but the BOM can vary according to special configurations. For example, PCBs with LEDs. The potential for defects is introduced when the same product can be manufactured using different combinations of LEDs - Bin Code and Resistors, but in the end, the same desired brightness and color need to be ensured. BOM variation allows users to specify a certain BOM item that would only apply to a certain characteristic, such as brightness. This allows the users to define all the valid LED/Resistor combinations (LED Pairing) for a given product at the BOM level. At runtime, the system can validate that the combination LED/Resistor used in production matches a valid combination defined at the BOM for that product.

2. Defects and Repair Handling in MCAD and ECAD

To prevent defects from shipping, manufacturers often rework products while still in production. However, the number of components on PCBs and PCBs per panel challenges the operators at the repair station to identify the component and the PCB that requires a repair activity. When repairing a defect on a multi-panel PCB, the MES delivers the defect code, the board ID, the board side (top/bottom), the part number, and the reference designator. The system can also highlight these visually in a PCB MCAD or ECAD file, essential for creating detailed work instructions, guiding operators during test or assembly operations, and capturing defects. By integrating MCAD and ECAD files, Critical Manufacturing MES ensures operators are well-informed and defects are effectively documented and managed.

3. Material Management

A centralized material management system has all the relevant information around a single component, such as supplier part number, internal part number (e.g., reel ID), and detailed logic about the parts and materials and their environmental and handling requirements. Being missing, mishandled, or damaged material one of the primary causes of SMT line stoppages, Critical Manufacturing MES ensures MSD handling. It also provides the ability to define minimum component inventory at a given piece of equipment, manage and request materials, fulfill requests, and move material between locations ensuring material replenishment takes place on time.

4. Equipment and Software Integration

In an SMT production line, machines and systems often generate data in various formats. Without an MES, integrating these disparate data formats can be challenging, leading to inconsistencies, data loss, or errors. Through advanced connectivity, real-time data acquisition, and using standardized communication protocols, Critical Manufacturing MES enables equipment integration seamlessly, ensuring that data from various sources—such as equipment, sensors, and software systems—are unified into a consistent format. The system addresses efficiently a diversity of SMT use cases, such as kitting, material serialization, gatekeeping, recipe check, ink spot handling, traceability, maintenance and raw materials, genealogy, material defects and repair and analytics. Critical Manufacturing MES supports multiple communication protocols and APIs, ensuring consistent data formats across different systems and simplifying integration. With a flexible architecture, it can scale with the growth of manufacturing operations, accommodating increased data volumes and new equipment and system integrations.

Critical Manufacturing MES V11

The core of your Industry 4.0 digital transformation journey: connect, execute and analyze

Critical Manufacturing MES should be an essential part of your Manufacturing Operations Management (MOM) system. Increase efficiency with complete connectivity and total visibility of your shop floor enabling better, faster, data-driven production decisions.







Cover the SMT lines and manage the entire factory. Operate Incoming, Assembly, Testing, Inspection, Packing, and Shipping as a synchronized production process. Define quality monitoring protocols for each product, reduce costs, and increase quality levels. Increase quality and OEE through advanced analytics that reduce unplanned downtime and cycle time.

Apply the integrated Data Platform to collect data from both machines and the full array of data systems, put it in context, and use sophisticated analysis tools to deliver insights for high-value process improvements. And all of this is delivered on on-prem, cloud, or hybrid architectures that use container-based deployment protocols for secure coverage of multiple sites.

Expect more from your MES. Make digital transformation and Industry 4.0 a reality with advanced capabilities from Critical Manufacturing.

Solution map

Critical Manufacturing MES V11 for Electronics Manufacturing

Advanced Planning and Scheduling							
	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	
	IoT Data Platform						

Low Code Platform



Critical
manufacturing
an ASMPT company

Critical Manufacturing provides the most modern, flexible and configurable Manufacturing Execution System (MES) available. Critical Manufacturing MES helps manufacturers stay ahead of stringent product traceability and compliance requirements; reduce risk with inherent closed-loop quality; integrate seamlessly with enterprise systems and factory automation and provide the right insights based on visibility and fast analysis of global production operations.

Be Industry 4.0-ready. Compete effectively and profitably by easily adapting operations to handle any changes in demand, opportunity or requirements, anywhere, at any time.

To learn more about the Company, review our products, or see industry analysts' evaluations, visit:

www.criticalmanufacturing.com

Headquarters - Porto, Portugal

Critical Manufacturing, S.A.

t: +351 229 446 927

contact@criticalmanufacturing.com

Subsidiaries:

Suzhou, Jiangsu - **China**

Shenzhen, Guangdong - **China**

Dresden - **Germany**

Penang - **Malaysia**

Tijuana - **Mexico**

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