NUCLEUS RESEARCH

Manufacturing Execution System Technology Value Matrix 2025

ANALYST

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The Bottom Line

The inaugural Manufacturing Execution System (MES) Technology Value Matrix examines how MES has shifted from a niche, compliance-driven tool to a core operational priority across manufacturing sectors. Rising cost pressures, supply chain volatility, and regulatory demands are driving broader adoption as manufacturers seek real-time visibility to reduce downtime, improve quality, and optimize throughput. The market is rapidly evolving with cloud-native and hybrid deployment options, deeper interoperability through partnerships with infrastructure and data platforms, and embedded AI that augments operator efficiency through documentation retrieval, scheduling assistance, and guided issue resolution. Advancements in proactive quality data management, predictive and prescriptive analytics, and the ability to process multimodal data are expanding MES use cases, positioning the technology as a central enabler of operational agility in an increasingly complex manufacturing landscape.

Market Overview

The 2025 MES Technology Value Matrix marks Nucleus Research's inaugural analysis of the manufacturing execution system market. MES platforms act as the operational bridge between enterprise-level planning systems and shop floor execution, coordinating people, machines, materials, and processes to ensure production goals are met with consistency and quality. These systems collect and contextualize data from machines, sensors, and connected systems across the plant, providing a live picture of production status, asset availability, and quality conditions. This data supports immediate operational decision-making and enables performance benchmarking, predictive maintenance, and continuous improvement initiatives. In a manufacturing environment where disruptions can cascade quickly across supply chains, detecting and responding to issues in real-time has shifted from a desirable capability to a core operational requirement.

MES platforms serve as the operational bridge between enterprise planning systems and shop floor execution, ensuring production goals are met with consistency and quality.

Manufacturers today are navigating a complex mix of cost pressures, operational risks, and regulatory demands. Logistics, warehouse labor, and energy costs remain among the heaviest financial burdens, leading organizations to hold more buffer inventory, renegotiate carrier agreements, and optimize transportation routes. Geopolitical instability has disrupted established trade flows, forcing companies to reconfigure sourcing strategies and extend lead times. Currency volatility has introduced additional complexity in managing margins for imported components, prompting more frequent pricing adjustments and the use of inventory hedging. Supplier reliability issues, from late deliveries to quality deviations, have reinforced the need for tighter performance tracking and multi-supplier sourcing strategies. At the same time, operational data is often fragmented across ERP, TMS, and WMS systems, making it challenging to maintain a single, accurate view of production and supply chain conditions. The shortage of skilled digital and automation talent further slows the adoption of advanced analytics and AI. At the same time, new sustainability and compliance requirements demand greater visibility into multi-tier supplier networks and the provenance of materials.

Real-time detection and response to production issues has shifted from a desirable capability to a core operational requirement for manufacturers.

Against this backdrop, MES has emerged from being a secondary consideration to becoming a strategic investment priority. Historically, MES adoption was concentrated in industries where product complexity, regulatory oversight, or traceability requirements, such as semiconductors, pharmaceuticals, and food and beverage, made real-time production control essential. These sectors relied on MES for

functions like product genealogy tracking, in-process quality checks, and asset monitoring to maintain compliance and product integrity. In recent years, adoption has broadened into automotive, medical device, and other discrete manufacturing sectors as the value of real-time shop floor visibility and control has become clear. Manufacturers recognize that preventing unplanned downtime, reducing scrap, and improving throughput requires continuous monitoring and rapid response capabilities only MES can provide at scale.

The MES market is entering a phase of rapid evolution, driven by shifts in deployment models, data integration capabilities, and the growing influence of artificial intelligence. While traditional MES deployments were almost exclusively on-premises, vendors now offer cloud-native and hybrid options that improve scalability, reduce infrastructure costs, and enable access to production data across geographically distributed plants. Partnerships with major infrastructure and data platform providers are central to this shift, with integrations into ecosystems such

Rising logistics, labor, and energy costs, along with geopolitical instability and currency volatility, are forcing manufacturers to optimize operations and strengthen supplier performance tracking.

Manufacturers are increasingly recognizing MES as a strategic investment for reducing unplanned downtime, improving throughput, and enhancing quality at scale.

Fragmented data across ERP, TMS, and WMS systems makes it difficult for manufacturers to maintain a single, accurate view of operations.

as Snowflake and Databricks enabling more advanced analytics and cross-functional data sharing. Collaborations with middleware providers like Red Hat have improved interoperability, making embedding MES into complex enterprise technology stacks and connecting with adjacent systems easier.

MES adoption is expanding beyond regulated and high-complexity industries like semiconductors and pharmaceuticals into automotive, medical devices, and other discrete manufacturing sectors.

Quality data management is also advancing, becoming more proactive, granular, and tightly integrated with other operational systems. This allows manufacturers to detect potential quality issues earlier, respond with targeted corrective actions, and strengthen continuous improvement efforts. Usability and role-based UI/UX improvements have become competitive priorities, ensuring MES can be adopted more easily by diverse user groups, from operators to plant managers. Deployment flexibility and security compliance are now core selling points, with platforms designed to meet regional data residency rules and industry-specific regulatory requirements. Predictive and prescriptive analytics are increasingly built into MES as native capabilities, allowing manufacturers to anticipate equipment failures, optimize production runs, and simulate process changes before implementation. The ability to handle multimodal and unstructured data, such as images, video, and sensor fusion, also expands MES use cases into visual quality inspection support and enhanced production context.

AI in MES today primarily augments operator efficiency, helping retrieve work instructions, surface KPIs, and recommend next steps based on historical data.

As these advancements converge, MES is evolving into a highly integrated decision-support environment that enables faster, more informed, and more coordinated action across the manufacturing enterprise. The combination of cloud-enabled scalability, enterprise-wide interoperability, AI-assisted workflows, and deeper quality and analytics capabilities positions MES as a central enabler of operational agility in a manufacturing landscape where speed, quality, and adaptability are critical to success.

The Nucleus Research Manufacturing Execution System Technology Value Matrix provides an assessment of the market based on how vendors deliver value to customers through the usability and functionality of their solutions (Nucleus Research x222 – Understanding the Value Matrix – August 2025). The research is intended to deliver a relevant snapshot of the MES technology market, rather than serve as an empirical ranking of the vendors. The arrows indicate each vendor's perceived momentum, which is informed through conversations with end users, recently released capabilities, features, and other areas of investment.

Leaders

Leaders in the MES Technology Value Matrix include Critical Manufacturing, Eyelit Technologies, Infor, iTAC, Parsec Automation, and Siemens.

Critical Manufacturing

Critical Manufacturing is positioned as a Leader in the 2025 MES Technology Value Matrix, based on the depth of its MES for Industry 4.0 platform and its native Smart Factory IoT Data Platform. Unlike many MES vendors that rely on third-party integrations for industrial data collection, Critical Manufacturing's platform includes built-in IoT capabilities. This allows for direct connectivity to machines and sensors across the shop floor, enabling more consistent data collection and contextualization, which improves traceability, automation, and real-time decision support. The MES platform, designed as part of a broader Manufacturing Operations Management (MOM) framework, includes capabilities for resource tracking, routing and dispatching, master data management, maintenance management, exception handling, experiment management, advanced layout and printing, material logistics, and factory automation.

Critical Manufacturing's MES for Industry 4.0 includes a built-in Smart Factory IoT Data Platform, removing the need for third-party IIoT integrations and enabling direct machine and sensor connectivity.

Additional capabilities available through the Smart Factory platform include a fabLIVE digital twin environment, advanced planning and scheduling (APS), augmented reality support, and integrated material handling and automation features. Critical Manufacturing supports organizations in the semiconductor, electronics, medical device, and industrial equipment sectors across North America, Asia/Pacific, and EMEA.

The platform extends beyond core MES to offer digital twin, advanced planning and scheduling, and augmented reality capabilities, supporting high-precision industries such as semiconductors, electronics, and medical devices.

Recent updates and announcements include:

- **Critical Manufacturing acquires Convanit.** Critical Manufacturing acquired Convanit, an AI company specializing in image-based analytics, to enhance its MES platform with visual inspection and anomaly detection capabilities. The integration of Convanit's flagship solution, c-Alice, enables customers to ingest, classify, and analyze image data alongside real-time production data. Manufacturers can automate defect detection, trigger real-time alerts, and connect image-based insights directly to MES workflows and quality records. The solution is designed for ease of use, allowing non-technical users like quality engineers to develop and deploy custom AI models without programming expertise. This acquisition supports high-precision

industries like semiconductors and medical devices, where visual inspection and traceability are mission-critical.

- **Critical Manufacturing MES available on AWS.**

  Critical Manufacturing announced that its MES platform can now be deployed on Amazon Web Services (AWS), offering customers increased flexibility and scalability through cloud-based infrastructure. Running the MES on AWS enables broader integration with other AWS services, aligning manufacturing operations with enterprise cloud strategies. Customers benefit from improved responsiveness, faster deployment cycles, and easier access to advanced capabilities like AI/ML-powered optimization. This move supports manufacturers looking to reduce on-premises infrastructure while maintaining the traceability and control required in regulated environments.

- **Critical Manufacturing and Twinzo partner on digital twins.**

  Critical Manufacturing partnered with Twinzo to integrate real-time 3D digital twin visualization into its MES platform, giving users a live, immersive view of factory operations. The integration enables plant personnel to virtually navigate their facilities, track KPIs like OEE, and access tailored insights from the shop floor to management. Twinzo's mobile-friendly platform allows configurable data streaming, providing only the most relevant metrics to support faster, more informed decisions.

- **Critical Manufacturing and Red Hat expand collaboration.**

  Critical Manufacturing expanded its partnership with Red Hat to embed Red Hat Device Edge and Apache Kafka streaming into its MES infrastructure. This unified platform bridges IT and OT environments, enabling greater automation, faster software updates, and real-time data streaming across factory operations. The collaboration supports low-latency decision-making and efficient containerized workloads, even in resource-constrained environments. By combining edge infrastructure and open-source tooling, the solution helps manufacturers reduce downtime, optimize resource usage, and increase system agility. This joint effort is especially valuable for high-precision industries such as automotive and pharmaceuticals, where performance, traceability, and scalability are essential.

- **Critical Manufacturing and Loftware form a strategic partnership**

  Critical Manufacturing formed a strategic alliance with Loftware to integrate enterprise labeling directly into the MES environment.

Critical Manufacturing acquired Convanit to integrate AI-powered visual inspection and anomaly detection into its MES, enabling manufacturers to automate defect detection and link image-based insights directly to quality records.

The partnership allows manufacturers to unify labeling and production data, improving traceability, compliance, and labeling accuracy across regulated industries. Using APIs and low-code tools, the two companies are developing a connector that simplifies deployment and enhances operational efficiency. This integration helps reduce labeling errors, accelerate implementation, and improve coordination between MES workflows and labeling systems. The partnership supports customers in sectors like medical devices and automotive that rely heavily on accurate labeling for quality and compliance.

Critical's MES platform is now available for deployment on Amazon Web Services (AWS), giving customers cloud scalability, and access to AI/ML tools.

Eyelit Technologies

Eyelit Technologies (Eyelit) is recognized as a Leader in the 2025 MES Technology Value Matrix for its unified platform that combines MES, Advanced Planning and Scheduling (APS), and Sales, Inventory, and Operations Planning (SIOP) capabilities. Eyelit's MES functionality includes order management, bill of materials management, work-in-process (WIP) allocation, asset management, KPI reporting, quality control, connected worker tools, and predictive maintenance. Eyelit also offers a revenue generation management tool designed to improve coordination between planning and execution layers, leveraging low-code/no-code configuration coupled with best practice process design. Industries served include semiconductor, automotive, aerospace and defense, food and beverage, medical device, battery, and solar. Eyelit's FactoryConnect platform integrates signals from IoT devices, ERP, PLM, SCM, and scheduling systems. This data combines demand, supply, quality, and equipment inputs to support decision-making and visibility across production environments. Eyelit's EquipmentConnect enables IoT at the machine and is configured as part of FactoryConnect.

Recent updates and announcements include:

- **Eyelit MES Release Updates.**
  New AI/ML-based root cause and anomaly detection helps manufacturers quickly identify the source of production issues and detect abnormal behavior, reducing downtime and improving product quality. New experiment and exception management allow users to efficiently manage test processes and out-of-spec conditions, supporting faster innovation cycles and better compliance tracking. Eyelit showcased its blockchain-based eDHR (Electronic Device History Record), which introduces a tamper-proof system for recording production data, enhancing traceability, and meeting stringent regulatory or audit requirements with greater confidence.

Eyelit Technologies offers a unified platform that combines MES, Advanced Planning and Scheduling, and Sales, Inventory, and Operations Planning capabilities in a single solution.

- **Eyelit acquires SCP vendor Adexa.**

  On January 14th, 2025, manufacturing execution software (MES) and advanced planning and scheduling (APS) solution vendor Eyelit Technologies (Eyelit) acquired supply chain planning (SCP) software provider Adexa. This move will improve Eyelit's ability to provide customers with a single solution for planning, production, and execution workflows. Eyelit will add planning functionality, including sales and operations planning (S&OP), demand planning, multi-echelon inventory optimization (MEIO), and factory planning from the acquisition while enhancing current capabilities in S&OE, factory scheduling, and supply planning. Eyelit customers will also benefit from Adexa's AI platform, Genie, which uses intelligent agents to perform specific supply chain functions autonomously, such as inventory monitoring and supplier management.

Eyelit's latest MES release introduces AI/ML-based root cause and anomaly detection, helping manufacturers quickly identify production issues, reduce downtime, and improve product quality.

Infor

Infor is recognized as a Leader in the 2025 MES Technology Value Matrix for its comprehensive Manufacturing Operations Management (MOM) solution. The MES platform includes functionality for production management, quality control, inventory, logistics, maintenance, tooling, energy usage, and workflow execution, including electronic batch records (EBR). These capabilities can be integrated with Infor's CloudSuite ERPs, 3rd party applications, or standalone. Infor supports manufacturing operations in food and beverage, automotive, paper and packaging, and metal and plastic fabrication industries. Customers can deploy Infor MES using an enterprise or distributed enterprise model. This allows organizations to operate with a single MES instance across all plants and warehouses or use multiple coordinated instances for decentralized control and visibility.

Infor's Manufacturing Operations Management solution delivers MES capabilities for production management, quality control, inventory, logistics, maintenance, tooling, energy monitoring, and workflow execution.

Recent updates and announcements include:

- **UI/UX Redesign.**
  It improves ease of use and navigation with tabs and introduces a completely new experience for dashboards. It helps users complete tasks faster and with fewer errors, bringing their attention to the relevant information at the right moment.

- **Integration with Infor OS for GenAI-Powered Features.**
  Enables automatic report and email summaries, saving time and improving decision-making with AI-generated insights.

- **Drag-and-Drop Dashboard Builder.**

Allows users to create custom dashboards and widgets without coding, tailoring views to their role and priorities.

- **Skills Matrix Functionality.**
  Ensures only certified workers are assigned to specific tasks, supporting safety, compliance, and workforce planning.

- **Progressive Web App (PWA) for Mobile Devices.**
  Enhances performance and usability across smartphones, tablets, and handheld scanners, improving support for frontline workers.

- **Expanded Integration with Infor CloudSuites and Third-Party Apps.**
  Strengthens system connectivity, making syncing data across ERP, MES, and other business systems easier.

Integration with Infor OS enables GenAI-powered features such as automatic report and email summaries to save time and support faster decision-making.

iTAC

iTAC Software AG is recognized as a Leader in the 2025 MES Technology Value Matrix for its iTAC.MOM.Suite is a Manufacturing Operations Management platform that includes integrated MES functionality. The solution supports core MES workflows such as work order execution, scheduling, and traceability. It extends into advanced planning, material logistics, production management, equipment maintenance, quality control, business intelligence, and plant simulation. The platform is available for on-premises or cloud-based deployment. The suite integrates with external enterprise systems, including ERP and PLM platforms, supporting broader digital continuity across the manufacturing IT landscape. iTAC also offers a complementary analytics and edge computing suite, the iTAC.MA.Suite, which includes the iTAC.IIoT.Edge platform for industrial data processing is the iTAC.SMT.Edge platform for machine connectivity and surface-mount technology (SMT) environments, and the iTAC.Asset.Analyzer for asset-level diagnostics and monitoring. In addition, iTAC provides the basics.MESDevice, a micro PC with a pre-installed operating system, is designed as a plug-and-play component to enable direct machine-level connectivity and control (using SHEMA) in production environments. iTAC primarily supports discrete manufacturing organizations across the automotive, wire processing, electronics and telecommunications, injection molding, medical device, and metal casting industries, with a strong presence across EMEA.

iTAC Software AG's iTAC.MOM.Suite integrates MES, APS, material logistics, quality control, and plant simulation, with deployment options on-premises or in the cloud.

Recent updates and announcements include:

- **iTAC.Asset.Analyzer release.**

iTAC launched Asset.Analyzer to help manufacturers monitor and evaluate equipment performance across the shop floor. The solution provides real-time insights into machine utilization, availability, and efficiency, enabling proactive maintenance and better resource allocation. By identifying underperforming assets, users can take corrective action faster and improve overall equipment effectiveness (OEE).

iTAC launched Asset.Analyzer to provide real-time insights into equipment performance, utilization, and efficiency, enabling proactive maintenance and improved OEE.

- **iTAC.AOD (Ask Our Doc) release.**
  Ask Our Doc is an AI-powered assistant that allows operators and plant personnel to retrieve manufacturing documentation through natural language queries. This tool simplifies access to technical manuals, process guidelines, and SOPs, reducing downtime and improving operational efficiency. By lowering the barrier to information, iTAC.AOD helps ensure production teams access the correct information and procedures with minimal delay.

- **iTAC.MaintenanceManager.**
  iTAC introduced MaintenanceManager to schedule, track, and manage maintenance tasks across manufacturing operations. The system supports preventive and reactive maintenance workflows, helping organizations reduce unplanned downtime and extend equipment life. It also improves traceability and compliance by centralizing all maintenance records and schedules in a single platform.

- **iTAC.MOM.Suite.**
  The latest release of iTAC.MOM.Suite 11 shifts the entire MES suite to a Kubernetes-based architecture, enabling greater scalability, flexibility, and easier deployment. This containerized approach allows manufacturers to deploy updates more quickly, run microservices in parallel, and manage multi-site environments more efficiently. The move supports modern IT/OT convergence strategies and positions iTAC for more agile, cloud-native operations.

The company released Ask Our Doc, an AI-powered assistant that retrieves manufacturing documentation via natural language queries to reduce downtime and improve accuracy.

- **iTAC and Red Hat Partnership.**
  iTAC Software AG entered a strategic partnership with Red Hat to deliver a modular, future-ready manufacturing operations management (MOM) platform based on iTAC.MOM.Suite and Red Hat's OpenShift-based Advanced Compute Platform. The joint solution allows manufacturers to operate across edge, on-premises, hybrid, and cloud environments, providing the flexibility to meet varying regulatory and infrastructure demands. Built on open-

source technologies like Helm, Apache Kafka, and PostgreSQL, the platform offers a microservices-based architecture that simplifies system updates, scaling, and integration with existing IT stacks. Manufacturers benefit from automated operations and maintenance via OpenShift Operators and DevSecOps methods, which reduce complexity across the software lifecycle.

The acquisition of Accevo Systems expands iTAC's capabilities into process manufacturing, adding MES, CMMS, and BPM tools designed for highly regulated industries.

- **iTAC acquires Accevo.**
  iTAC Software AG expanded its MES/MOM portfolio by integrating Accevo Systems (formerly ANT Solutions), a software provider focused on the process manufacturing industry. This acquisition strengthens iTAC's presence in sectors like pharmaceuticals, food, and fast-moving consumer goods, where compliance, traceability, and operational complexity are key challenges. Accevo brings specialized solutions, including MES, computerized maintenance management (CMMS), and paperless manufacturing tools with business process management (BPM) functionality.

  The combined offering supports flexible deployment options, on-premises, hybrid, or cloud, and leverages modern microservices and low-code technology for greater agility and ease of implementation. Customers benefit from expanded automation capabilities, improved predictive analytics, and data-driven decision-making tailored to process industry requirements. As part of the broader Dürr Group ecosystem, iTAC and Accevo plan to accelerate feature development and deliver a more comprehensive set of solutions to meet the evolving needs of global manufacturers.

  In addition to Accevo, iTAC has strong partnerships with the subsidiaries DUALIS and Cogiscan, which have expertise in Advanced Planning and Scheduling and machine connectivity.

Parsec Automation

Parsec Automation's TrakSYS platform delivers MES functionality for resource planning, scheduling, dispatching, execution, and production tracking.

Parsec Automation is positioned as a Leader in the 2025 MES Technology Value Matrix for its TrakSYS platform, which delivers broad MES functionality in cloud and on-premises deployments. TrakSYS supports core MES functions including resource planning, scheduling, dispatching, execution, and production tracking. Additional capabilities include compliance, inventory and operations management, lean manufacturing tools, asset maintenance, quality management, traceability, and performance monitoring. The platform is used across several industries, including automotive, chemical, food and beverage, life sciences, and consumer packaged goods. Parsec also offers a Smart Data Collection System that connects to third-party IIoT sensors. Data

is aggregated through a coordination device and integrated into the TrakSYS platform, allowing real-time monitoring and process visibility.

In April 2025, Parsec added real-time data integration via MQTT for UNS, enabling seamless communication between IIoT devices and enterprise systems to improve data availability and synchronization.

Vendor updates and announcements over the last year:

- **April 2025 TrackSYS updates.**
  The software vendor released a real-time data integration via MQTT for UNS. This enables seamless communication between IIoT devices and enterprise systems, improving data availability and process synchronization across the factory floor. The vendor improved containerized deployment with MQTT/OPC support to simplify system setup and integration with automation systems, reducing IT overhead and accelerating time to value for MES deployments. Lastly, the vendor released drag-and-drop editing tools to give users more control to customize dashboards and interfaces without developer support, speeding up configuration changes to match operational needs.

- **Expected updates in Q4 2025:**
  Parsec Automation will release a conversational AI tool for data access. This tool will allow frontline workers to retrieve and analyze plant data using natural language, reducing reliance on technical staff and increasing data accessibility. The vendor will deploy AI-driven operational insights, showcasing real-time recommendations to improve efficiency and reduce unplanned downtime, helping teams make faster, more informed decisions. Parsec also plans to roll out reporting and visualization features that allow users to generate visualizations automatically via natural language processing.

Siemens

Siemens Digital Industries Software is recognized as a Leader in the 2025 MES Technology Value Matrix for its Opcenter Execution MES, part of the broader Opcenter Manufacturing Operations Management (MOM) portfolio. Opcenter Execution provides discrete and process manufacturers with core MES functionality, including order dispatching, production tracking, material genealogy and traceability, equipment and asset monitoring, resource management, and quality execution. The platform also enables coordination between production lines and enterprise systems, helping align floor-level operations with broader business plans. Siemens offers industry-specific digital manufacturing solutions built on the MES platform, tailored for electronics, semiconductors, pharmaceuticals, medical devices, and discrete manufacturing.

Siemens Digital Industries Software's Opcenter Execution MES delivers core MES capabilities such as order dispatching, production tracking, material genealogy, and quality execution.

The broader Opcenter portfolio includes additional MOM components such as Opcenter Quality (QMS), Opcenter Advanced Planning and Scheduling (APS), Opcenter RD&L for formulation and product development, Opcenter Intra Plant Logistics for material movement, and Opcenter Intelligence for production analytics. Siemens also offers Opcenter X, a cloud-native MES targeted at small and mid-sized discrete manufacturers.

The platform supports both discrete and process manufacturers and offers industry-specific solutions for electronics, semiconductors, pharmaceuticals, medical devices, and discrete manufacturing.

Beyond the Opcenter suite, Siemens provides technologies that complement MES deployment, including the Insights Hub industrial IoT data platform, the Mendix low-code development environment, the Solid Edge CAD tool, and Simcenter for simulation and performance testing. All Opcenter solutions are part of Siemens Xcelerator. This modular digital business platform connects MES with PLM, simulation, IoT, and low-code tools to enable integrated digital manufacturing across industries.

Siemens supports global manufacturers across electronics and semiconductors, life sciences, food and beverage, aerospace and defense, pharmaceuticals and medical devices, and energy and utilities.

Updates over the last 12 months:

- **Various Siemens Opcenter Semiconductor Updates.** Siemens released the general availability of its Semiconductor–Electronics synergy functionality, allowing both process types to be executed in a single MES environment. This update supports vertically integrated manufacturers by enabling hybrid workflows across backend assembly, SMT, and inspection processes. A new Remaining Process Time (RPT) calculation engine was introduced to support dispatch and scheduling decisions. This capability allows the system to calculate and track how much processing time remains for a lot at each step, improving production prioritization.

  The product now supports containerized deployment on Azure with an Oracle backend, reflecting Siemens's move toward cloud-native architecture. This enables more flexible, scalable deployments aligned with IT modernization efforts.

  Siemens introduced role-based, process-centric user interfaces for core functions using the Mendix low-code platform. These new UIs improve usability for operators and engineering staff by guiding them through standard workflows with more visual feedback and contextual actions. Twelve new capabilities were added to the WIP Main Simple interface, including support for wafer sampling, inline

Siemens also offers Opcenter X, a cloud-native MES for small and mid-sized discrete manufacturers.

SPC charting, slot mapping, and future lot holds. These enhancements improve execution efficiency on the shop floor.

The Future Hold Matrix user interface was redesigned for better alignment with Mendix UI standards, offering easier filtering, a more intuitive layout, and additional configuration options. A technical preview of the Semiconductor–Electronics synergy functionality was made available, signaling Siemens' direction toward unified MES support for vertically integrated operations. Phase one of the Teamcenter Quality integration introduced bidirectional connectivity. This allows inspection plans to be downloaded to MES and nonconformance data to be escalated back to Teamcenter, strengthening closed-loop quality control. Single sign-on was extended to support embedding the portal in third-party applications and deep-linking to specific pages, making incorporating MES into broader IT environments easier.

Containerized deployment options expanded to Azure, AWS, and Oracle environments, improving flexibility and scalability for cloud and hybrid deployments.

- **Siemens Opcenter Electronics Updates.**
  Opcenter Execution Electronics introduced an updated material setup interface that allows users to view, assign, and load materials against feeder plans and BOM requirements in real time. This improvement helps reduce setup errors and supports faster production readiness. A new configurable depaneling feature allowed manufacturers to determine when child containers are disassociated from their parent. This enhances routing flexibility and supports automatic rework for failed units.

  The system now supports assigning an active manufacturing order to a resource, which blocks containers from proceeding with unrelated orders. This reduces the risk of order mix-ups on shared lines. A BOM import wizard was introduced to streamline the creation of manufacturing orders and products from hierarchical BOMs, helping reduce manual data entry during NPI processes. The production client received numerous updates, including support for substitute materials, enhanced defect handling, and document viewing capabilities. These improvements enable operators to work more efficiently with fewer system interruptions.

  Containerized deployment support was expanded to include images available for AWS and Oracle environments and JSON-based and Ansible installation options. This modernizes infrastructure deployment and simplifies system provisioning.

Role-based, Mendix-built UIs were introduced to improve usability for operators, engineers, and coordinators, consolidating production, quality, and work instruction execution into a streamlined interface.

Siemens released a new real-time manufacturing operations page using the Mendix platform, with enhanced KPI visualization and tool setup management. This enables better monitoring and faster response to production issues. A new lean assembly client was introduced to support barcode-driven PCB and box-build assembly. The interface supports sequenced guidance, automatic material recognition, and real-time feedback, streamlining operator workflows.

Opcenter Electronics added real-time material setup views, configurable depaneling, BOM import wizards, and substitute material support to reduce setup errors and improve NPI speed.

Fast assembly and auto-fill options were added, allowing the system to reuse previously entered data and scanned materials. These updates reduce repetitive manual input and increase production throughput. Tool traceability was improved by allowing users to collect and validate tool information during component issues. This ensures proper tool usage and enhances traceability for regulated industries.

The Valor Process Preparation 3D Viewer was made available in technical preview, providing better visualization and support for new product introductions. Connectivity was simplified by removing the requirement for the MOM license and improving SDK access to OOTB drivers. This reduces system complexity and total cost of ownership for machine integration. Teamcenter Quality integration and semiconductor-electronics synergy features were introduced in preview. These updates position Siemens to support unified MES environments across diverse electronics and semiconductor workflows.

Opcenter Pharma expanded Operator Cockpit functionality with integrated alerts, real-time task updates, and packaged business capabilities for cyclic operations and at-line testing.

- **Siemens Opcenter Execution Pharma Updates.**
  Siemens expanded Operator Cockpit functionality to support integrated alerts, real-time task updates, and cyclic operation management. These updates improve operator responsiveness and reduce task-switching between applications. A new API enables annex uploads to work orders, which supports richer documentation and streamlined batch record management. The Equipment Logbook now includes export to PDF/A and performance optimizations to support high user concurrency, enhancing regulatory compliance and system scalability. Enhancements to shop floor integration allow automatic population of batch context parameters without custom scripting, reducing configuration complexity and improving MES-automation interoperability.

  Process execution improvements include electronic signature extensions, audit trail linking, and optimizations to weighing and

dispensing workflows, supporting stricter control and traceability across manual and automated operations. Deployment has been simplified through expanded automation support, including Ansible playbooks for PostgreSQL and Oracle. Documentation and installation tooling were updated to reduce implementation time and configuration errors.

Siemens released Semiconductor–Electronics synergy functionality, enabling hybrid workflows across both process types in a single MES environment.

Siemens introduced new packaged business capabilities (PBCs) for cyclic operations and at-line testing, enabling integrated process control and quality testing directly from the Operator Cockpit. This helps streamline common batch tasks and improves real-time decision-making on the shop floor. The Operator Cockpit now includes adaptive features such as locale settings, embedded Mendix integration, and modular access rights. These updates support tailored user experiences based on operator location or role. Equipment Logbook enhancements include support for custom attributes, API-based configuration, and improved performance in large-scale deployments. These changes extend logbook use cases and improve system usability.

- **Opcenter Execution Medical Device and Diagnostics Updates.** Opcenter MDD now supports containerized deployments on AWS with Oracle, offering more flexibility in deployment strategies for regulated manufacturers. The Mendix-based Operational View was enhanced with drill-down capabilities and real-time resource status updates, improving visibility into manufacturing operations. A new dynamic purge tool was introduced in evaluation form, allowing customers to archive and restore transaction data. This supports data management in high-throughput, regulated environments.

Opcenter Discrete introduced SPC directly into execution workflows, a new Work Order Network visualization, and improved coordination for complex assemblies.

BOM import capabilities were added via a CSV wizard, streamlining product setup for complex assemblies and enabling faster onboarding of new parts. REST API enhancements improved data discoverability, upload performance, and error handling, reducing integration effort with external systems. Power BI reporting was expanded with new dashboards focused on training records and material management, supporting compliance and workforce tracking. Additional UI enhancements and Mendix runtime updates were introduced to improve accessibility, maintainability, and application performance.

- **Opcenter Execution Discrete Updates.** Siemens introduced Mendix-based user interfaces tailored for production coordinators and operators in discrete industries. These

UIs consolidate production, quality inspection, and work instruction execution into a single experience, improving usability and reducing navigation time. SPC functionality was introduced directly into the execution workflow, allowing operators to view real-time control charts and define sampling sizes. This enables in-process quality control for serialized and batch production environments. A new Work Order Network UI was added to visualize work order relationships and dependencies across units and parent batches. This supports better planning and coordination in complex assembly and job shop scenarios. These updates reflect Siemens's ongoing investment in out-of-the-box functionality that supports discrete manufacturers operating in highly regulated or dynamic production environments.

Opcenter X added expanded shop floor usability features, enhanced non-conformance management, new scheduling tools, and improved interoperability for faster integration with control devices.

- **Opcenter X Updates.**
  Siemens introduced new MES functionality in Opcenter X, expanding the Operator Terminal with a full-screen material picking view and real-time production task updates. These enhancements support improved shop floor usability and faster execution of material handling activities. Electronic signature tracking was extended to the shop floor, and audit trail records were modeled, improving compliance visibility across operations and design environments. Work orders can now be created without requiring a collect task, and new container validation checks ensure better data integrity by verifying quantities and final material status during runtime.

In Non-Conformance Management, Siemens added a new failure processing view that allows quick access to affected units, enhanced editing of failure data, and improved workflows for submitting and managing defect records. Inspection Planning capabilities were enhanced with smarter failure pattern recognition, importable inspection steps, and expanded statistical process control evaluation. Gage equipment is now formally managed as a system resource. Scheduling was improved through a new utilization chart for better visibility into resource usage and the introduction of secondary calendars and constraint import functionality, allowing for more flexible capacity modeling.

Opcenter MDD added AWS containerized deployment support, enhanced Operational Views, new data purge tools, and Power BI dashboards for compliance and workforce tracking.

The GI milestone visualization enhanced the usability of the Gantt chart and improved tooltip information to help planners make more informed scheduling decisions. Interoperability improvements include centralized management of Remote Interop Connectors

(RICs) and co-located Kafka RIC deployment within Kubernetes environments, streamlining infrastructure control and deployment.

Opcenter X added comment tracking and acknowledgment features within order management, enabling more transparent and auditable collaboration across operations. Comments now display visual indicators and acknowledgment history. Audit Trail functionality was improved with configurable default views, allowing users to set personalized layouts for navigating historical data across the shop floor and modeling environments. Genealogy capabilities now support enhanced MTU search with quick search and scan fields, improving traceability and investigation speed.

Electronic Signature was introduced with configurable scenarios tied to CRUD operations. This allows manufacturers to enforce credentialed actions based on object status changes and defined policies. Resource management now supports subclassing of resource classes and electronic signature enforcement when changing resource statuses, offering more control over resource governance.

Quality management enhancements included visual inspection improvements, expanded inspection plan imports, and better non-conformance traceability with Teamcenter IDs. Defects can now include visual documentation with location grids, and non-conformances can be created in bulk with links to related issues. Siemens introduced early support for Measurement System Analysis (MSA) through API functions and calculation methods, laying a foundation for future measurement capability evaluation.

Scheduling functionality was updated with support for resource capacity modes, execution group modeling, and custom calendar states, which provide greater flexibility in how schedules reflect real-world conditions. Interoperability improvements automated topic creation in RIC, introduced alarm support via OPC UA, and added REST API access for easier testing of RIC integrations. These updates simplify system configuration and speed up integration with external systems and control devices.

- **Partnership with NVIDIA.**
  Over the past year, Siemens has deepened its partnership with NVIDIA to bring accelerated computing and AI infrastructure into the Siemens Xcelerator platform. This collaboration enables manufacturers to directly deploy real-time simulations, predictive

Siemens partnered with NVIDIA to integrate GPU-powered real-time simulations, predictive maintenance, and AI quality inspection into Siemens Xcelerator for faster, more intelligent production.

maintenance models, and AI-powered quality inspections on the factory floor. By integrating NVIDIA Omniverse and GPU-based processing with Siemens' industrial software, customers gain faster, more intelligent production environments with reduced latency and improved data responsiveness.

Siemens released Industrial Copilots, generative AI assistants for design, planning, operations, and maintenance, as well as Industrial AI Agents that autonomously execute multi-step workflows, available via a new AI agent marketplace.

- **Industrial Copilots Releases.**
  Siemens introduced a new portfolio of generative AI-powered copilots across key manufacturing roles, including design, planning, engineering, operations, and maintenance. Each copilot is embedded within the Siemens Xcelerator ecosystem and delivers task-specific assistance using natural language interfaces. For example, the Engineering Copilot helps users generate automation logic through conversational prompts, while the Design Copilot enhances CAD workflows by accelerating navigation and content creation. These tools reduce manual effort and provide immediate value for front-line and engineering users.

  Siemens introduced the Operations Copilot, a generative AI assistant tailored for factory-floor use. The copilot enables operators to interact with machine data, resolve alerts, and optimize production tasks using conversational queries. It helps reduce error resolution time, improves process compliance, and ensures consistent knowledge across shifts. The tool is designed for day-to-day operational roles, extending AI's value beyond planning into real-time execution.

- **AI Agents.**
  Beyond copilots, Siemens unveiled Industrial AI Agents, autonomous digital assistants designed to execute complex tasks across operational systems. These agents operate using shared data context and a common architecture, enabling seamless handoffs and coordination between processes like production scheduling, equipment setup, and issue resolution. This shift allows manufacturers to automate entire workflows rather than augmenting them, resulting in faster decisions, fewer errors, and reduced dependence on manual interventions.

  As part of its broader composability strategy, Siemens launched an AI agent marketplace within Siemens Xcelerator. This marketplace allows manufacturers to browse, deploy, and manage prebuilt agents from Siemens and third-party partners. It supports modular growth of AI capabilities without requiring deep internal development resources.

Experts

Experts in the MES Technology Value Matrix are Applied Materials, AVEVA, Honeywell, Körber, and Rockwell Automation.

Applied Materials

Applied Materials is recognized as an Expert in the 2025 MES Technology Value Matrix for its SmartFactory suite. It delivers MES capabilities tailored to semiconductor manufacturers engaged in assembly, testing, and packaging operations. The MES solution includes functionality for production execution, traceability, and process coordination, with additional modules such as Asset Trace, Alarm Management, Material Control, and Available-to-Promise (ATP) that address the complexity and precision required in semiconductor manufacturing environments.

Applied Materials' SmartFactory suite delivers MES capabilities purpose-built for semiconductor assembly, testing, and packaging operations, including production execution, traceability, and process coordination.

In addition to MES, the SmartFactory suite includes a broader set of solutions supporting semiconductor-specific operations. SmartFactory Supply Chain provides enterprise-level planning and production control, while SmartFactory Process Quality supports run-to-run process control, fault detection, equipment automation, and recipe management. SmartFactory Productivity delivers advanced scheduling and reporting functionality to help manufacturers monitor performance and improve operational efficiency.

Applied Materials primarily supports semiconductor organizations across the Asia-Pacific and North American regions. It focuses on high-volume, highly automated facilities that require close integration between MES, quality control, and supply chain systems.

Applied Materials primarily supports high-volume, highly automated semiconductor facilities in the Asia-Pacific and North American regions, with strong integration between MES, quality, and supply chain systems.

SmartFactory Genie enhances the suite with an LLM-powered assistant based on large language model technology. It interfaces with SmartFactory data to support smart scheduling, predictive maintenance, process development, and inspection workflows. Genie can provide context-aware recommendations, alert users to potential anomalies or equipment failures, and streamline decision-making by analyzing machine, sensor, and operational datasets.

AVEVA

AVEVA is recognized as an Expert in the 2025 MES Technology Value Matrix for its AVEVA MES solution, a core component of the company's Production Optimization suite. AVEVA MES supports production execution, batch and recipe management, material tracking, supply

chain coordination, and production accounting, providing manufacturers visibility and control over their production processes. The MES solution is integrated within AVEVA's broader operations portfolio, including additional capabilities for production planning and scheduling, optimization, and asset performance management.

AVEVA MES is a core component of the company's Production Optimization suite, supporting production execution, batch and recipe management, material tracking, supply chain coordination, and production accounting.

AVEVA CONNECT, the company's industrial cloud-based data platform, further extends these capabilities by connecting data from AVEVA applications, partner systems, assets, and third-party data-sharing platforms. CONNECT provides services for data visualization, advanced analytics, modeling, app development, and service management, enabling organizations to develop a unified operational view and leverage AI-driven insights for continuous improvement.

AVEVA supports global manufacturers across the food and beverage, consumer packaged goods (CPG), and chemicals industries.

Recent updates and announcements include:

- **ServiceNow Partnership.**

  AVEVA has announced a strategic partnership with ServiceNow to accelerate industrial transformation by uniting AVEVA's CONNECT industrial intelligence platform with ServiceNow's AI-driven Operational Technology (OT) Management workflows. The collaboration aims to break down silos between teams, locations, and digital assets, fostering seamless collaboration and enhanced productivity across industrial enterprises. This joint offering allows customers to unify process data, leverage AI and automation for streamlined workflows, and apply integrated analytics to improve asset reliability, reduce unplanned downtime, and optimize operational performance.

  AVEVA partnered with ServiceNow to combine the CONNECT platform with AI-driven Operational Technology (OT) management workflows, improving collaboration, asset reliability, and real-time anomaly detection across industrial operations.

  Both companies emphasize the need for manufacturers to modernize outdated processes, automate operations, and equip the next generation of industrial workers while meeting sustainability goals. By integrating ServiceNow's secure OT management workflows with AVEVA's industrial data platform, the partnership provides end-to-end visibility across assets and processes, enabling real-time anomaly detection and proactive operations. This collaboration represents a significant step in advancing industrial cybersecurity, aligning with the growing demands of AI-driven automation and data-driven decision-making in industrial environments.

- **AVEVA World 2025 Updates.**

At its flagship AVEVA World 2025 event, AVEVA announced new strategic partnerships with Databricks and Track'em to enhance its industrial software ecosystem further. The partnership with Databricks bridges IT and OT data through AI and data intelligence, integrating AVEVA's CONNECT platform with Databricks' Data Intelligence Platform. This integration enables industrial companies to unify operational and enterprise data, accelerate insights, enhance forecasting, and deploy generative AI applications for advanced decision-making. By ensuring secure and scalable data governance across cloud environments, the partnership aims to drive data-driven innovation and sustainable growth.

At AVEVA World 2025, the company announced partnerships with Databricks and Track'em to enhance data integration, AI-driven forecasting, material tracking, warehouse management, and project execution capabilities.

Simultaneously, AVEVA partnered with Track'em to enhance its Enterprise Resource Management (ERM) capabilities with real-time material tracking, traceability, and mobility. The collaboration will bring expanded warehouse management features and cloud-native solutions to AVEVA ERM, improving supply chain visibility and enabling more efficient project execution. By combining digital project execution with real-time tracking, AVEVA and Track'em address key challenges in capital projects, such as cost overruns and schedule delays, providing customers greater control and transparency across complex operations. Risk management with "Process on Risk," visibility into component delays with "Push Alert Cumulated Delays," Phantom Part logic for discrete planning, and proposal-level approval control to ensure precise, efficient planning.

Also, during AVEVA World 2025, AVEVA unveiled significant enhancements to its software portfolio, focusing on artificial intelligence, energy transition, and digital transformation. Among the showcased innovations is the application of generative AI for piping design. AVEVA is also introducing AI-powered summarization and processing tools within its CONNECT platform to manage large datasets more efficiently, enabling smarter multi-site operations and improved visibility across hybrid environments.

Honeywell

Honeywell is recognized as an Expert in the 2025 MES Technology Value Matrix for its modular MES solutions tailored to industry-specific requirements. Within life sciences, Honeywell offers the TrackWise Manufacturing Excellence Solution, a TrackWise Manufacturing Suite component designed for pharmaceutical manufacturing operations. The solution provides core MES functionality, including batch production execution, data management, and electronic batch records

Honeywell delivers modular MES solutions tailored to industry-specific requirements.

(MBR). The broader TrackWise Digital Platform includes a Quality Suite that supports quality management systems (QMS), product quality reviews, and quality management reviews. Honeywell also leverages AI-driven analytics within this suite to assist in automating quality decision-making processes.

In life sciences, Honeywell offers the TrackWise Manufacturing Excellence Solution, providing batch production execution, data management, and electronic batch records within the broader TrackWise Digital Platform.

Honeywell offers a specialized Manufacturing Operations Management (MOM) platform called Battery MXP for the lithium battery manufacturing sector. This solution integrates manufacturing excellence modules such as QMS, SCADA visualization and orchestration, traceability and genealogy tracking, and real-time KPI dashboards. Digital Production Management capabilities are complemented by asset management, order management and scheduling, and production tracking with AI/ML-driven production insights. The Battery MXP platform provides seamless data connectivity, enabling operators to synchronize shop floor activities with enterprise objectives through a unified digital environment.

In addition to life sciences and battery manufacturing, Honeywell supports global manufacturers in the oil and gas, chemicals, mining, and metals industries. The company's MES and MOM solutions are deployed across North America, EMEA, APAC, and Latin America.

Körber

Körber delivers the PAS-X MES Suite under its Körber Pharma business unit, designed specifically for pharmaceutical and biotech manufacturing in highly regulated environments.

Körber is recognized as an Expert in the 2025 MES Technology Value Matrix for its PAS-X MES Suite, offered under the Körber Pharma business unit. PAS-X is designed specifically for the life sciences sector, supporting pharmaceutical and biotech manufacturing operations globally with functionality tailored to highly regulated environments.

The suite includes core modules such as PAS-X MBR Design & Execution, which supports the creation, approval, and execution of electronic batch records; PAS-X Weighing & Dispensing, which ensures accurate material handling and compliance; and PAS-X Equipment Management, which monitors and maintains the state and readiness of manufacturing equipment.

Additional optional modules extend PAS-X functionality into line management, smart packaging, regulatory information management, and PAS-X Track & Trace for serialized product tracking. These modules help pharmaceutical manufacturers meet compliance requirements while improving operational efficiency.

Updates over the last 12 months:

- **PAS-X MES Updates.**
  Körber's PAS-X MES 3.4 represents a major advancement in cloud-ready, AI-supported pharmaceutical manufacturing execution. The release addresses industry challenges around efficiency, compliance, and innovation by delivering a web-based, scalable MES platform with built-in lifecycle management, AI-driven support, and continuous delivery capabilities. The solution offers pharma and biotech manufacturers improved operational flexibility, intuitive user interfaces, and smart deployment tools, all while reducing infrastructure and integration burdens.

  The PAS-X MES 3.4 release introduces a cloud-ready, AI-supported platform with web-based deployment, built-in lifecycle management, and continuous delivery to improve efficiency, compliance, and scalability.

  The NextGen Shopfloor (NGS) execution module within PAS-X MES 3.4 introduces equipment-specific master batch records (MBRs), enabling more granular control over order execution and batch record review processes. Operators benefit from a fully web-based, responsive UI that works seamlessly across devices—from tablets and handheld scanners to full-size desktops. This enables true mobility for production personnel and significantly improves usability. Notably, access to exception data is five times faster, and order activity recording is three times quicker, helping accelerate decision-making on the shop floor.

  PAS-X MES 3.4 includes a fully integrated interface with SAP EWM, streamlining inventory reconciliation and reducing ERP integration efforts by 15 percent. The platform supports both on-premises and SaaS deployments, allowing manufacturers to tailor the system based on their IT capabilities. Because the client is web-based, no local installations are required, reducing the cost and complexity of IT setup.

  NextGen Shopfloor (NGS) execution enables equipment-specific MBRs, faster exception data access (5x), and quicker order activity recording (3x), improving shop floor decision-making.

  To help customers transition smoothly to PAS-X MES 3.4, Körber offers a structured migration path with tools like DAPI, which automates 95 percent of master data migration, and MBRIO, which can reduce manual MBR rework by up to 75 percent. The lifecycle support model spans up to seven years, with three distinct support tiers. Standard support (years 1–3) delivers quarterly updates; extended support (years 4–5) shifts to biannual service packs; and optional long-term support (years 6–7) ensures flexibility for organizations requiring extended maintenance windows. This structure provides greater planning certainty and reduces upgrade risks.

- **AI Chatbot.**

The PAS-X K.AI chatbot introduces intelligent support within the MES environment. As a web-based assistant, users can retrieve contextual documentation, ask system-related questions, and receive immediate guidance—all within the PAS-X interface. This reduces time spent searching for information and supports faster, AI-enabled decision-making. By integrating K.AI, Körber enhances user empowerment while simplifying the complexity of MES operations.

The PAS-X K.AI chatbot provides contextual guidance within the MES interface, enabling users to retrieve documentation, ask system questions, and receive support.

Rockwell Automation

Rockwell Automation is recognized as an Expert in the 2025 MES Technology Value Matrix for its cloud-based Plex MES platform and FactoryTalk ProductionCentre. It delivers core functionality across production tracking, quality management, traceability, connected worker support, and asset performance. Plex MES supports discrete and process manufacturing and is a cloud-native solution. FactoryTalk ProductionCentre is designed for high-volume manufacturers in highly regulated industries. The MES portfolio also includes industry-specific solutions tailored for the pharmaceutical, food and beverage, consumer packaged goods, automotive, and metals industries. Additional capabilities across the suite extend into enterprise resource planning (ERP), quality management systems (QMS), production monitoring, and asset management.

These MES solutions are part of Rockwell Automation's broader software ecosystem, which includes Emulate3D for digital twin modeling, FactoryTalk Analytics and DataMosaix for real-time operational intelligence, and the ThingWorx industrial IoT platform developed in partnership with PTC. Beyond software, Rockwell Automation provides industrial hardware for factory automation and control, including sensors, distributed control systems, motion and motor control, network infrastructure, power supplies, and condition monitoring tools, supporting integration between physical assets and digital systems.

Rockwell Automation delivers the Plex MES platform and FactoryTalk ProductionCentre, providing core MES functionality for production tracking, quality management, traceability, connected worker support, and asset performance.

Rockwell serves manufacturers in the aerospace, automotive, chemical, food and beverage, metals, life sciences, oil and gas, and semiconductor industries. These organizations are typically located in North America, APAC, and EMEA.

Updates over the last 12 months:

- **AWS Collaboration.**

Rockwell Automation and Amazon Web Services (AWS) have partnered to accelerate digital transformation in manufacturing by combining Rockwell's operational technology with AWS's advanced cloud infrastructure. This collaboration allows manufacturers to adopt scalable, flexible, and secure cloud-enabled solutions that improve asset performance, increase operational visibility, and transform raw data into actionable insights. As part of the partnership, Rockwell is expanding its FactoryTalk Hub software offerings—including DataMosaix and Fiix CMMS into AWS Marketplace. These SaaS solutions provide customers with greater access to cloud-native tools for industrial data management and asset maintenance. Additionally, Rockwell and AWS are enabling edge-to-cloud connectivity for AI applications and advanced analytics, helping customers make faster, more informed decisions. The partnership also marks AWS's official entry into the Rockwell Automation PartnerNetwork as a Technology Partner, strengthening the joint go-to-market strategy across core industries like automotive, life sciences, and consumer packaged goods.

Rockwell Automation partnered with AWS to combine operational technology with advanced cloud infrastructure, enabling scalable, secure, and flexible cloud-enabled manufacturing

- **Expansion of Cloud and AI capabilities.**
  Rockwell Automation is extending its cloud-native capabilities by expanding FactoryTalk Hub solutions on AWS and continuing investment in AI-powered offerings. FactoryTalk DataMosaix, developed in partnership with Cognite, enables industrial data contextualization for better decision-making, while Fiix CMMS leverages AWS's infrastructure for scalable asset performance management. Rockwell also showcased its Production Logistics solution, which offers AI-driven production scheduling and management of autonomous mobile robot (AMR) fleets through a unified interface. These cloud-based tools help manufacturers shift toward predictive, autonomous operations, offering benefits such as reduced downtime, faster insights, and increased process agility. By integrating these innovations into cloud ecosystems like AWS, Rockwell is making it easier for manufacturers to deploy and scale smart manufacturing strategies across diverse environments.

Rockwell Automation expanded its cloud and AI capabilities by enhancing FactoryTalk DataMosaix for industrial data contextualization and leveraging Fiix CMMS for scalable asset performance management.

Accelerators

Accelerators in the MES Technology Value Matrix are 42Q, Aegis Software, Apprentice.io, MASS Group, and Tulip.

42Q

42Q is recognized as an Accelerator in the 2025 MES Technology Value Matrix for its MES product portfolio. The vendor's MES solutions include

Connected Manufacturing, which offers end-to-end visibility and coordination across global suppliers' operations, and Smart Manufacturing, which provides a fully-featured foundation for digital factory transformation across multiple plants. Leverage advanced functionalities and flexible configurations to meet complex and diverse manufacturing requirements. At the core of the 42Q MES solution is MES 101, which provides the fundamental building blocks for shop order management and route control. Additional Smart Manufacturing modules include: CMMS, OEE, IIoT, Business Intelligence, Business Connectivity, and additional features in MES+.

42Q offers a modular MES portfolio including Connected Manufacturing and Smart Manufacturing, designed to provide end-to-end visibility, process control, and operational coordination across global manufacturing environments.

42Q supports manufacturers in the medical systems, automotive, industrial manufacturing, defense and aerospace, and electronics sectors, offering solutions designed to enhance traceability, process control, and operational visibility across complex production environments.

Recent updates and announcements include:

- **AI Chatbot Launch.**
  42Q announced the release of its advanced AI-powered chatbot, developed in collaboration with Amazon Bedrock. This new solution aims to transform customer interaction and streamline MES operations by leveraging generative AI capabilities. Unlike traditional chatbots, the 42Q Arthur chatbot is designed to interact seamlessly with MES environments, providing real-time insights, guiding users through complex MES functions, and automating customer support tasks. Key capabilities of the chatbot include automated handling of high-volume customer inquiries, multi-language support with the ability to search various documentation sources, and seamless integration with existing MES systems. Additionally, the chatbot assists developers by generating code examples in multiple programming languages. The solution is fully customizable and scalable, enabling manufacturers to configure the chatbot's knowledge base for specific workflows or documents. This launch marks a significant step in 42Q's commitment to AI-driven automation, enhancing operational efficiency and the overall user experience.

42Q launched the Arthur AI-powered chatbot, built with Amazon Bedrock, to provide real-time MES insights, automate support tasks, and guide users through complex MES functions.

- **Connected Manufacturing Release.**
  42Q unveiled Connected Manufacturing, an innovative platform that gives manufacturers real-time visibility across their global suppliers' operations. Addressing long-standing challenges related to data fragmentation, the solution consolidates supply and operational data

into a "single pane of glass", enabling faster and more informed decision-making. Connected Manufacturing empowers OEMs and manufacturers to anticipate supply disruptions and respond proactively to quality and production issues.

Key features of Connected Manufacturing include real-time analytics that deliver immediate operational metrics, enhanced shop floor inventory visibility, and faster response times to quality deviations. Integrating seamlessly with existing systems or operating as a stand-alone solution, Connected Manufacturing can be deployed within 4 to 12 weeks, dramatically improving agility and operational efficiency. The platform's unified data ecosystem ensures manufacturers no longer rely on outdated or incomplete datasets when making critical supply chain decisions.

42Q released Connected Manufacturing, a platform that unifies supply and operational data into a single view, enabling manufacturers to monitor global supplier performance in real time.

Aegis Software

Aegis Software is recognized as an Accelerator in the 2025 MES Technology Value Matrix for its FactoryLogix platform. It delivers core MES functionality including production tracking, process control, traceability, and real-time operational visibility. FactoryLogix is designed as a modular platform, allowing manufacturers to extend MES capabilities with additional modules for digital manufacturing engineering, quality management (QMS), lean materials management, adaptive planning, return material authorization (RMA), and maintenance, repair, and overhaul (MRO) operations, IIoT connectivity, augmented reality guidance, and device integrations. The platform is available as an on-premises deployment or as FactoryLogix Online, a cloud-based SaaS MES solution hosted on Microsoft Azure, providing flexibility for manufacturers seeking scalable, subscription-based models.

Aegis supports manufacturers across aerospace and defense, automotive, consumer goods, electronics, industrial manufacturing, and medical device industries, with a primary customer base in North America and Europe.

Aegis Software's FactoryLogix platform delivers production tracking, process control, traceability, and real-time operational visibility within a modular MES framework.

Apprentice.io

Apprentice.io is recognized as an Accelerator in the 2025 MES Technology Value Matrix for its MES solution tailored to life sciences and batch manufacturing environments. The platform supports production execution in highly regulated industries, providing functionality for batch records, process guidance, materials management, equipment tracking, and real-time production visibility.

In addition to MES, Apprentice.io offers a laboratory execution system that digitizes test methods, enhances sample and instrument management, and supports quality control processes. The platform also includes digital work instruction capabilities, enabling users to author and execute guided workflows embedded with subject matter expertise. The vendor provides web, mobile, and augmented reality-based collaboration tools for remote operations that deliver visibility across production floors, facilitating virtual support and issue resolution. A key component of Apprentice.io's offering is its Connected Manufacturing Network, which allows organizations to link manufacturing sites and partners globally. This enables global recipe management, real-time technology transfers, and collaborative multi-organization production processes. The vendor has also invested significantly in AI-driven automation, introducing a suite of AI Manufacturing Agents, including an AI Authoring Agent, AI Process Agent, AI Quality Agent, AI Continuous Improvement Agent, AI Scheduling Agent, and Ask Apprentice AI.

Apprentice.io's MES platform is purpose-built for life sciences and batch manufacturing environments, supporting batch records, process guidance, materials management, equipment tracking, and real-time production visibility.

Apprentice.io primarily serves manufacturers in North America, addressing complex operational and compliance needs in pharmaceuticals, biotech, and related sectors.

Updates over the last 12 months:

- **Tempo Manufacturing Cloud Release.**
  In April 2025, Apprentice.io released Tempo Manufacturing Cloud 7.5, introducing a range of upgrades aimed at accelerating procedure authoring, simplifying execution workflows, and enhancing real-time visibility into quality data. The update includes new capabilities that improve both usability and integration across the platform.

  Within recipe building, users can now import steps from existing templates across procedures, which supports the reuse of validated content. This significantly reduces authoring time and enhances collaboration across teams. Additionally, dynamic text support enables references to BOM (Bill of Materials) and BOE (Bill of Equipment) data in real time, ensuring that instructions remain clear and up-to-date.

  The operator execution experience has also improved, particularly through an upgraded web-based weighing and dispensing user interface. Apprentice.io introduced no-code integrations with systems like Veeva SOPs and Blue Mountain, enabling seamless

In April 2025, Apprentice.io released Tempo Manufacturing Cloud 7.5, adding features to speed procedure authoring, streamline execution workflows, and improve quality data visibility.

calibration tracking and compliance support directly within the workflow.

In terms of quality data management, the release includes more granular controls for distinguishing between exceptions and reviewable data. Dashboards have been enhanced to provide better visibility into critical process parameters, while user activity tracking features offer improved audit capabilities.

A new operations dashboard provides a real-time interface to track production status. This allows users to quickly identify and address exceptions, delays, and review metrics that impact batch progression. Optimization features now include batch parameter group integrations that tie into ERP-connected workflows, along with TIR/TOR (Time in Refrigeration / Time Out of Refrigeration) tracking to ensure that refrigeration times are accurately recorded and data is automatically transferred across systems.

Operators benefit from an upgraded web-based weighing and dispensing interface, along with no-code integrations to Veeva SOPs and Blue Mountain for compliance and calibration tracking.

- **Agentic AI Capabilities.**
  In 2025, Apprentice.io formally launched its Agentic AI capabilities, introducing a suite of autonomous "digital co-workers" that operate within predefined rules to assist throughout the manufacturing lifecycle. These AI agents are designed to increase efficiency across authoring, execution, quality assurance, and post-batch analysis.

  One key capability is AI-assisted authoring, which allows users to prompt the system to automatically generate procedures or convert PDF documents into editable digital workflows. The system also supports XML uploads, streamlining the conversion of legacy documentation into digital formats. This functionality can reduce initial configuration and authoring time by up to 90%.

  AI-driven simulation features enable teams to preview runs before execution, forecast estimated durations, and identify likely bottlenecks. These insights help process engineers make proactive adjustments, improving throughput and reducing errors.

  During execution, embedded AI chat functionality provides real-time support to operators, offering contextual guidance and troubleshooting assistance directly within the workflow. After batch completion, the AI generates concise run summaries for supervisors and delivers actionable recommendations for optimization to authors and process engineers, helping to accelerate batch review and release.

The Quality Agent offers agentic exception review by analyzing process deviations, offering remediation suggestions, and integrating seamlessly with existing QMS (Quality Management Systems). This allows for faster and more consistent exception handling, improving compliance and continuous improvement efforts.

Apprentice.io launched a suite of autonomous digital co-workers that assist with authoring, execution, quality review, and post-batch optimization.

MASS Group

MASS Group is recognized as an Accelerator in the 2025 MES Technology Value Matrix for its Traceability Made Easy (TME) platform. TME provides core MES capabilities including production tracking, material traceability, work-in-process (WIP) management, and real-time visibility into manufacturing operations. Beyond MES, the TME platform extends into adjacent areas such as enterprise asset management (EAM), computerized maintenance management systems (CMMS), and inventory and warehouse management.

MASS Group primarily supports organizations in the semiconductor, aerospace and defense, discrete manufacturing, industrial machinery, medical device industries, and federal, state, and local government agencies. The vendor's solutions are designed to address environments where high levels of traceability, compliance, and asset oversight are operational priorities.

MASS Group's Traceability Made Easy (TME) platform delivers MES capabilities for production tracking, material traceability, WIP management, and real-time manufacturing visibility.

Updates over the last 12 months:

- **Analytics and Data Collection Updates.**
  MASS Group significantly expanded its analytics capabilities by deepening integration with Microsoft Power BI. This enhancement allows manufacturers to interact with live shop floor data through customizable dashboards, providing AI-driven insights for faster, more informed decision-making. By transitioning from reactive reporting to proactive monitoring, teams can accelerate issue resolution, improve operational agility, and reduce downtime across manufacturing environments.

  MASS Group introduced wafer defect mapping and delta charting features to enhance data collection and anomaly detection precision. These tools allow manufacturers to identify micro-level deviations earlier in production, enabling faster corrective actions. These capabilities have been instrumental in reducing scrap, preventing quality escapes, and improving overall yield and profitability for customers in high-precision industries.

- **Traceability and Logic Enhancements.**
  New functionality was introduced to enable more granular traceability and configurable conditional workflows. These capabilities are particularly critical for customers in regulated industries such as aerospace, defense, and semiconductors, where process compliance is non-negotiable. The advanced traceability features have streamlined audit preparation, reduced instances of non-conformance, and provided greater assurance during customer and regulatory reviews.

- **Cloud Deployment and Enhanced Security.**
  MASS Group expanded its cloud and hybrid deployment models, offering customers more flexibility to modernize their infrastructure while maintaining strict compliance requirements. Security enhancements included alignment with CMMC 2.0 standards and support for top-secret environments, ensuring sensitive operations, especially within defense contracting and semiconductor manufacturing, could scale securely and efficiently.

- **UX/UI Update.**
  The release of TME 8.0 delivered a major user experience upgrade, featuring a modernized interface designed for ease of use and faster onboarding. The refreshed UI has significantly reduced training time for new users and increased adoption rates across departments. This usability improvement has directly translated into faster system deployments, broader cross-functional engagement, and more consistent use of TME's capabilities in daily operations.

MASS Group deepened integration with Microsoft Power BI, enabling live data dashboards that deliver AI-driven insights for faster decision-making and improved operational agility.

Tulip

Tulip is recognized as an Accelerator in the 2025 MES Technology Value Matrix for its MES capabilities delivered through the Tulip Frontline Operations Platform. The platform provides a modular approach to manufacturing execution, integrating MES with solutions for production management, quality management, digital work instructions, traceability, and compliance. Tulip supports a range of frontline operational use cases, including kitting, production tracking, non-conformance management, electronic batch records, equipment logbooks, operator training and guidance, manufacturing dashboards, and virtual and inline quality inspection.

Tulip primarily serves organizations in discrete manufacturing sectors, including industrial products, aerospace and defense, automotive, consumer products, luxury goods, and electronics. It supports life sciences manufacturers in pharmaceuticals, biotech, medical devices,

Tulip delivers MES functionality through its Frontline Operations Platform, offering modular solutions for production management, quality management, digital work instructions, traceability, and compliance.

cell and gene therapy, and laboratory operations. The platform is designed for seamless connectivity with existing enterprise systems and includes a library of pre-built connectors to vendors such as SAP, Oracle, Microsoft, PTC, Snowflake, Litmus, Hexagon, and Katana.

Tulip launched its Composable MES for Aerospace and Defense, delivering AI-powered, human-centric solutions for highly regulated manufacturing, with built-in compliance for ISO 9001, AS 9100, and EN 9100 standards.

- **Composable MES for A&D Industry.**
  In April 2025, Tulip introduced its Composable MES, a flexible, AI-powered manufacturing execution system tailored for the aerospace and defense (A&D) sector. Designed to address the complexity and regulatory rigor of A&D manufacturing, the Composable MES enables manufacturers to deploy connected, human-centric solutions rapidly. Key features include apps for end-to-end traceability, quality management, calibration, defect tracking, and CAPA management, all with built-in electronic signatures and automated audit trails for ISO 9001, AS 9100, and EN 9100 compliance. Tulip is also pursuing FedRAMP Moderate Equivalency (expected to be listed on the FedRAMP marketplace by 2026), reinforcing its commitment to secure, compliant manufacturing environments.

The vendor announced a strategic AWS partnership, integrating AWS IoT SiteWise for machine data connectivity, enabling closed-loop feedback systems, predictive maintenance, and AI-assisted workflows via Tulip Frontline Copilot.

- **AWS Partnership.**
  Tulip announced a strategic collaboration with Amazon Web Services (AWS) in April 2025, integrating AWS IoT SiteWise with Tulip's Frontline Operations Platform. This partnership bridges the gap between machine data and human-centric workflows, delivering real-time insights that drive continuous improvement. Manufacturers can contextualize machine metrics like spindle speeds or temperatures with operator inputs and work orders, enabling faster root cause analysis and corrective actions. The integration establishes closed-loop feedback systems, accelerates predictive maintenance, and provides scalable deployment across global manufacturing sites. Tulip's no-code app builder further empowers manufacturers to unify machine data with operator-driven insights for enhanced productivity and agility.

  Tulip announced an expanded Strategic Collaboration Agreement (SCA) with AWS in April 2024 to deliver Tulip Frontline Copilot, built using Amazon Bedrock's generative AI services. This initiative will embed generative AI across Tulip's platform, enabling real-time insights, no-code app development, and AI-assisted troubleshooting directly on the factory floor. By combining Tulip's composable no-code platform with AWS's AI infrastructure, the partnership empowers manufacturers to digitize frontline operations, preserve institutional knowledge, and create adaptive,

human-centric workflows. Tulip's solutions, including Computer Vision for Quality Insights and Cloud MES, are available via AWS Marketplace.

Tulip introduced AI Composer, which converts SOPs and documentation into interactive no-code apps.

- **AI Composer.**
  At Hannover Messe 2025, Tulip launched AI Composer, a generative AI-driven tool that automates the transformation of SOPs, work instructions, and documentation into interactive, no-code apps. By extracting steps, inputs, and logic from PDF documents, AI Composer generates pre-configured Tulip apps that are ready for deployment. This capability significantly reduces app development time, enabling process experts to digitize workflows without IT support. AI Composer complements Tulip's broader AI suite, which includes Frontline Copilot, AI Insights, multilingual translation, AI-triggered actions, and computer vision-powered apps. These capabilities enhance digital transformation speed, operational efficiency, and workforce empowerment.

Tulip partnered with Snowflake to create a cloud-native data historian solution, integrating production data from machines, sensors, and human workflows into the Snowflake AI Data Cloud for real-time visibility and advanced analytics.

- **Composable MES for Pharmaceutical Industry.**
  In October 2024, Tulip unveiled its Composable MES App Suite for Pharmaceuticals, offering a comprehensive set of pre-built apps and a common data model tailored for the pharmaceutical industry. Designed to simplify electronic batch records (eBR), logbooks, and batch production management, the suite empowers manufacturers to digitize operations rapidly while ensuring compliance with ISO 9001, AS 9100, EN 9100, and GxP requirements. Tulip's latest release, LTS 13, also introduced enhanced governance features, including gated app releases, automated documentation versioning, and Frontline Copilot™ AI capabilities for troubleshooting and insights. These innovations reduce the validation burden, accelerate batch release processes, and enable more agile, compliant manufacturing.

- **Snowflake Partnership.**
  Tulip announced a strategic collaboration with Snowflake in October 2024, introducing a cloud-native data historian solution that allows manufacturers to unify and analyze production data from machines, sensors, and human-centric workflows within the Snowflake AI Data Cloud. This solution enables real-time visibility, advanced analytics, and scalable data governance across complex manufacturing environments. Manufacturers can drive smarter, data-driven decision-making and streamline operational efficiency by integrating Tulip's frontline operations platform with Snowflake's secure data infrastructure.

- **Composable MES for Discrete Manufacturing.** In April 2024, Tulip introduced a Composable MES App Suite for Discrete Manufacturing, a pre-built, configurable suite of applications designed to accelerate shop floor digitization across traceability, production, inventory, and quality management. Built on Tulip's Common Data Model, the suite allows manufacturers to rapidly customize and scale their digital production management systems. The solution integrates with IoT devices, enables real-time data capture, and supports no-code extensibility, making it easier for frontline engineers to adapt systems to their unique operational needs without relying on legacy monolithic MES platforms.

The vendor introduced a Composable MES App Suite for Discrete Manufacturing and Pharmaceuticals.

Core Providers

Core Providers in the MES Technology Value Matrix are Aptean, GE Vernova, SAP, and Sepasoft.

Aptean

Aptean is recognized as a Core Provider in the 2025 MES Technology Value Matrix for its industry-specific MES offerings, Activplant for automotive and discrete manufacturers, and Apparel Shop Floor Control (SFC) for apparel production environments.

Aptean delivers industry-specific MES solutions, including Activplant for automotive and discrete manufacturing and Apparel Shop Floor Control (SFC) for apparel production environments.

Aptean Activplant provides MES capabilities focused on plant floor data collection, visualization, and performance analysis. The solution's core component, ActivEssentials, is a data collection and modeling platform that standardizes plant floor data and captures interactions between machines and processes. ActivEssentials is built on a Universal Factory Data Model (UFDM), which measures asset states, incidents, accumulators, and events to centralize operational visibility. Visualization tools like VPFlex and VPWeb allow users to interact with real-time production data, offering layout, production, detailed, and trend views. ActivViewer extends this visibility with dashboard and report slideshow functionalities across multiple monitors and remote sessions. The platform also includes ActivEssentials Reporting for generating dynamic, hyperlinked reports and ActivEssentials Administration for controlling data collection processes. The Integration Toolkit (ITK) allows seamless data exchange with third-party ERP, SCM, and BI applications. Additional modules like Throughput Analyzer help identify production bottlenecks by analyzing historical equipment performance. At the same time, Reason Code Assignment (RCA) enables operators to log incident root causes directly from the shop floor.

For the apparel industry, Aptean Apparel Shop Floor Control (SFC) delivers real-time production tracking, incentive pay management (both individual and team-based), and RFID/QR code scanning. The solution supports multi-site operations and includes configurable dashboards, reports, and embedded quality control features. Other functionalities include mobile device management, cross-site visibility, multi-shift scheduling, and flexible report scheduling, providing manufacturers with granular control over workforce management and production metrics.

Aptean's MES offerings are complemented by a broader enterprise application suite, including ERP, transportation management, PLM, WMS, retail planning, and EAM, creating an integrated operational platform for manufacturers.

Aptean complements its MES offerings with a broader enterprise application suite, including ERP, transportation management, product lifecycle management (PLM), warehouse management, retail planning, and asset management solutions, providing an integrated platform for manufacturing operations.

Recent updates and announcements include:

- **App Central Launch.**

  Aptean launched AppCentral, an AI-powered, cloud-based platform that unifies all Aptean applications into a single workspace, delivering embedded intelligence, integrated workflows, and self-service tools to streamline user operations. The Made2Manage ERP solution for discrete manufacturing is now fully available within AppCentral. It provides users with pre-connected modules such as CRM, Shipping, and Asset Management, a unified login experience, and integrated analytics for a seamless experience across the Aptean ecosystem.

  Aptean launched AppCentral, a cloud-based platform that unifies all Aptean applications into one workspace with embedded AI, integrated workflows, and self-service tools.

  New AI-enabled enhancements introduced through AppCentral include embedded dashboards, context-aware guidance, and AI-powered automation features like AP Invoice Automation, all designed to reduce manual effort and increase productivity. AppCentral also includes expanded self-service and integration tools, such as the Apps workspace, Connect workspace, and Subscription Center, which allow users to manage applications, monitor integrations, and configure environments without IT support.

- **Recent Acquisitions.**

  In January 2025, Aptean announced its acquisition of Germany-based TRASER Software, a provider of dealer management system solutions for industries including heavy equipment, agriculture, and construction machinery in the DACH market.

Additionally, in Q1 of 2025, Aptean announced its acquisition of US-based SCP software provider Logility to expand its SCM coverage.

In November 2024, Aptean announced its acquisition of Indigo Software, a warehouse management (WMS) and logistics software solutions provider, to add new capabilities to its existing WMS and supply chain management (SCM) offerings.

In August 2024, the vendor announced its acquisition of SSG Insight, an Enterprise Asset Management (EAM) solution provider. The move expands Aptean's global footprint within the EAM space.

Over the past 12 months, Aptean acquired TRASER Software, Logility, Indigo Software, and SSG Insight.

GE Vernova

GE Vernova is recognized as a Core Provider in the 2025 MES Technology Value Matrix for its Proficy Smart Factory MES, part of the GE Vernova Electrification Software portfolio. Proficy Smart Factory is designed to monitor, manage, and synchronize production activities across machines, systems, and personnel involved in manufacturing operations. The solution supports on-premises, cloud, and hybrid deployments.

GE Vernova's Proficy Smart Factory MES is part of its Electrification Software portfolio, delivering production execution, work order management, real-time visibility, traceability, and downtime tracking capabilities.

Proficy Smart Factory provides core MES capabilities including production execution, work order management, real-time process visibility, traceability, and downtime tracking. It helps manufacturers coordinate physical operations and ensure consistency across production lines and facilities. GE Vernova has established platform interoperability through Proficy Operations Hub, which allows clients to interact with many data sources.

GE Vernova serves a wide range of industries, with a strong presence in consumer packaged goods (CPG), food and beverage, automotive, and chemical sectors. It also supports complex manufacturing environments in aerospace and defense, oil and gas, and mining and metals industries.

Recent updates and announcements include:

- **Production Manager Updates.**

  GE Vernova's update to Production Manager (v8.1 SP1) introduces usability and performance improvements for MES and operator-facing components. In the Route Management module, users can now directly edit route details upon creation, update, or duplication, eliminating the need for an extra click and streamlining workflow efficiency. The operator web client also gained added flexibility by

allowing users with proper permissions to adjust quality threshold parameters in real time. In addition to new functionality, several user-reported issues have been resolved. These include improved performance during route revisions and shop order processing, enhanced support for simultaneous client sessions, and the ability to upload PowerPoint documents as templates within MES. These changes collectively improve user experience, data management flexibility, and system performance during complex operations.

The Production Manager v8.1 SP1 update improves MES usability and performance with streamlined route editing, real-time quality threshold adjustments, and enhanced support for simultaneous client sessions.

- **AWS Partnership.**
  GE Vernova and Amazon Web Services (AWS) expanded their strategic partnership to address growing energy demand, grid resilience, and decarbonization goals. As part of the agreement, GE Vernova will provide AWS with turnkey electrification solutions—including substation infrastructure, project execution, and power generation equipment—across global data center sites. In parallel, GE Vernova will adopt AWS cloud services, including generative AI, high-performance computing, and data analytics, to accelerate its digital transformation and operational modernization. This partnership supports the energy needs of AWS's growing infrastructure and enhances GE Vernova's ability to develop and deliver digital solutions across its GridOS, APM, and manufacturing software portfolios. The collaboration reflects companies' commitment to scalable, secure, and sustainable energy systems.

  As a result, GE Vernova transitioned its Proficy MDC platform from High Volume Replication (HVR) to AWS Database Migration Service (DMS), significantly enhancing the performance, scalability, and reliability of data replication from SQL Server databases. This update simplifies the overall deployment process by removing the need for sysadmin-level permissions and reducing dependency on legacy HVR components. By leveraging AWS DMS, manufacturers gain more resilient and future-ready data integration capabilities that support real-time analytics and cross-facility insights, laying the foundation for expanded cloud-based data strategies in production environments.

GE Vernova expanded its AWS partnership to deliver electrification solutions for AWS data centers while adopting AWS cloud, generative AI, and data analytics to modernize its own digital operations.

- **Alteia Acquistion.**
  GE Vernova's acquisition of Alteia SAS, a French provider of AI-powered visual intelligence software, strengthens the company's strategy to integrate computer vision and visual data into utility operations. Alteia's technology has already been embedded within GE Vernova's GridOS Visual Intelligence platform, enabling electric utilities to assess damage, inspect infrastructure, and manage

vegetation encroachment using aerial and ground-based imagery. Through this acquisition, GE Vernova will further integrate visual intelligence with core grid management systems such as Advanced Distribution Management Software (ADMS), enhancing situational awareness and enabling faster, more informed responses to disruption events like wildfires and storms. This move positions GE Vernova as a leader in visual AI for grid operations, with the potential to expand into broader asset inspection and risk mitigation use cases across infrastructure-intensive sectors.

The acquisition of Alteia SAS strengthens GE Vernova's AI-powered visual intelligence capabilities.

SAP

SAP is recognized as a Core Provider in the 2025 MES Technology Value Matrix for its Digital Manufacturing solution, part of its broader supply chain management (SCM) portfolio. SAP's MES functionality focuses on live production monitoring, operational analytics, dispatch and work order tracking, labor management, hybrid manufacturing coordination, and production operator dashboards. Additional MES features include issue resolution workflows and automation capabilities to streamline shop floor operations.

Beyond MES, SAP's SCM portfolio encompasses supply chain planning, procurement management, product lifecycle management (PLM), logistics, asset management, AI-driven analytics, and the SAP Business Technology Platform (BTP), which provides the foundational infrastructure for data integration and application development. The company has also recently invested in AI with the introduction of Joule Agents, which aim to enhance decision automation across manufacturing and supply chain processes.

SAP Digital Manufacturing delivers live production monitoring, operational analytics, dispatch and work order tracking, labor management, and production operator dashboards as part of its broader supply chain management portfolio.

SAP's MES solutions are primarily adopted by organizations that are already SAP ERP users. Their customer base is concentrated in discrete and process manufacturing industries across Europe and North America. While SAP's MES footprint has traditionally focused on core manufacturing sectors, it plans to expand its capabilities to better support life sciences and other regulated industries in the future.

Recent updates and announcements include:

- **August 2025 Digital Manufacturing Updates.**

  SAP introduced a wide range of updates in the 25.08 release of Digital Manufacturing, focusing on enhanced flexibility, integration, and automation across manufacturing processes. One of the key enhancements is the ability to define dynamic MQTT topics in both Subscriptions and the Publish MQTT Message service. This allows

users to configure topic strings using parameters, variables, and free text, enabling more flexible messaging structures across production environments. This update requires Production Connector version 2.6.0 or higher.

In the Manage Data Collection app, SAP added a new 'List' option to the parameter Type field, allowing users to select data fields from a predefined list. Additionally, Boolean parameters now support default True/False values, simplifying configuration for operators. SAP has also expanded support for special characters in Data Collection Group Names, Versions, and Parameter Names, enhancing usability and compliance.

Further enhancements include configuring production processes triggered during packing actions in the POD, custom field visibility in the Operation Activity List plugin, and enabling SFC-based scheduling in the Dispatching and Monitoring app for more granular production control.

SAP has also introduced filtering of operation activities by resource in the Operation Activity List, improved the user interface of the Manage Orders app, and launched new apps for managing visual inspection results and datasets. Users can now collect visual inspection data, create datasets, and train machine learning models directly within the platform.

The update introduced SFC Set Quantity as a new cloud event in the Manage Automatic Triggers app, allowing business rules to respond to quantity adjustments dynamically. Additionally, the Configure Production Connectivity app added a Certificate Validity column to streamline certificate management and validation processes.

A key update includes enabling Production Connectors to function as RESTful web servers, simplifying integration through RESTful services managed directly from the Design Production Processes app. Enhanced functionality for Change Production scenarios ensures that activity confirmation data is preserved during routing changes, with a new flag introduced to control this behavior.

Several usability enhancements were rolled out, including visual improvements to the Order and SFC Reports, expanded Manufacturing Data Object (MDO) event tracking for SFC hold and release events, and additional business rule triggers for failed integration messages.

The August 2025 release introduced dynamic MQTT topic configuration, expanded parameter options in the Manage Data Collection app, SFC-based scheduling in Dispatching and Monitoring, new visual inspection apps, and the ability for Production Connectors to act as RESTful web servers.

As part of ongoing platform modernization, SAP announced the deprecation of legacy cloud events, business services, and badge access features. Replacement events and services were introduced to ensure a smooth transition. The Overlay Authoring Tool and associated plugins were also deprecated. These changes reflect SAP's commitment to streamlining operations while improving security and compliance.

For API users, SAP introduced new endpoints for creating Electronic Batch Records (EBR) and enhanced Print API functionality by allowing users to set print resolutions for Adobe Forms. These updates provide manufacturers with more control over documentation and batch records.

- **Digital Manufacturing May 2025 Updates.**

  In the 25.05 release, SAP introduced foundational concepts like 'Panel' and 'Location' in the Manage Materials app, marking the first phase of a broader strategy to support multi-level material management. A new Manage Time Records app was launched, replacing the deprecated Manage Time Tracking app and offering expanded labor and resource tracking capabilities.

  Custom POD plugins deployed through the POD Designer can now be accessed directly in the Design Production Processes app, reducing deployment friction. Access management also saw significant improvements, with enhanced role templates and changes to Identity and Access Management (IAM) for greater flexibility and security.

  SAP also expanded support for Collaboration Directives, enabling better integration of workflow mappings. New functionality allows DMir issues to be created directly from PODs using custom plugins. At the same time, the Order POD now supports Review by Exception, enabling faster identification and resolution of production variances.

  Routing and BOM upversioning features were enhanced, triggering upversions based on specific changes from SAP ERP, including BOM component batch numbers and standard value key parameter values. Schedulers can now prioritize resources using new settings in the Manage Scheduling Profile app, further improving resource orchestration.

The May 2025 release added multi-level material management concepts, a new Manage Time Records app, improved routing and BOM upversioning, expanded collaboration directives, and enhanced scheduling and labor planning capabilities.

Additional updates include time zone support for timers in the Manage Automatic Triggers app, improvements to the Shift and Labor Planning module, and enhancements to the Production Process export/import functionality. SAP also introduced new public APIs, special character support in design processes, and zero-downtime deployment for Production Process Design during Quick Deploy.

The release brought Buyoff process improvements, including automatic status resets for rejected quantities, enhanced reporting in SFC Reports, and integration into MDOs. Other operational enhancements included prioritizing SFCs in work lists, support for parallel units of measure, improvements to print templates, and expanded automation for handling integration message failures.

Further advancements were made to continuous scheduling and labor planning processes. SAP introduced enhanced REO Scheduling for Process Orders, reorganized REO tiles for better navigation, and added smart numbering patterns to support new prefix/suffix parameters. SAP Digital Manufacturing's documentation and help resources were expanded to support 39 additional languages, reflecting a broader push for global accessibility.

SAP expanded its AI capabilities with over 40 Joule Agents, broader integration with Microsoft 365 Copilot, predictive maintenance scheduling, AI-assisted manufacturing error analysis, and embedded AI in over 400 planned scenarios by the end of 2025.

- **AI Updates.**
  In Q2 2025, SAP reinforced its AI-first strategy with innovations and partnerships, placing customers at the center of its Business AI developments. Key highlights include the general availability of over 40 Joule Agents introduced at SAP Sapphire, which assist users across business functions like dispute resolution, customer relationship management, and task completion. SAP's AI Foundation continues to simplify AI solution development by centralizing tools for building, extending, and scaling custom AI agents.

  Significant advancements were also made in Joule's capabilities. SAP Joule for Consultants became generally available, helping consultants accelerate project execution by rapidly understanding ABAP code and SAP best practices. SAP also announced phased integrations between Joule and Microsoft 365 Copilot for a unified user experience across SAP and Microsoft environments. By the end of 2025, SAP aims to have over 400 AI scenarios embedded across its solutions, all powered by AI Foundation on SAP Business Technology Platform.

AI enhancements span SAP's entire portfolio, including supply chain, finance, procurement, HR, and IT. For instance, Joule assists in supply chain planning, SAP Digital Manufacturing error analysis, and predictive maintenance scheduling. In finance and spend management, Joule enhances error resolution for e-invoicing and automates expense report validation. In procurement, AI features within SAP Fieldglass streamline contingent workforce management, while AI summarizers in SAP Ariba halve document review times. SAP's AI for IT empowers developers with advanced AI models and prompt optimization tools within the AI Foundation.

Partnerships with Microsoft, Cohere, Google Cloud, and Databricks strengthen SAP's AI and data capabilities, enabling secure AI agent orchestration, unified data access, advanced analytics, and industry-specific AI workflows.

At SAP Sapphire, SAP unveiled comprehensive AI-driven updates to its Supply Chain Management (SCM) and SAP Cloud ERP offerings to create a unified, intelligent supply chain ecosystem. Key innovations included enhanced product data handover for production, integrated service orders in SAP Digital Manufacturing, and smart guided execution for compliant manufacturing in regulated industries.

SAP introduced several Joule-powered AI agents, including a Maintenance Planner Agent, Shopfloor Supervisor Agent, and Field Service Dispatcher Agent, all scheduled for general availability in Q4 2025. SAP's enhancements to SAP Business Network streamline compliance, document management, and logistics collaboration, supporting sustainability efforts through emissions tracking and advanced freight capabilities.

These enhancements reflect SAP's commitment to transforming supply chains from reactive to proactive, intelligent networks that optimize operations and improve resilience. SAP also emphasized its AI-driven orchestration of supply chain processes, offering improved data flow, real-time decision-making, and integrated process execution across its business suite.

- **Microsoft Partnership.**
  SAP and Microsoft announced the SAP Business Suite Acceleration Program with Microsoft Cloud to simplify cloud ERP adoption and drive faster time-to-value for customers. The program merges SAP and Microsoft's partner ecosystems to provide connected processes, integrated AI innovations, and collaborative frameworks.

  Key benefits include faster deployments through joint AI solutions like Joule Copilot and Microsoft 365 Copilot and Azure AI integrations. RISE with SAP customers can now benefit from a

99.95% SLA when leveraging SAP Cloud ERP Private Edition on Microsoft Azure. The partnership focuses on unlocking business insights with AI, improving productivity, and accelerating digital transformations across industries. The program is currently available in the U.S., with EU and APAC expansions planned later in the year.

SAP's MES offering supports hybrid manufacturing coordination, issue resolution workflows, and automation to improve efficiency and consistency across shop floor operations.

- **Cohere Partnership.**
  SAP announced an expanded partnership with Cohere to integrate its advanced retrieval and reasoning models into the SAP ecosystem. These models, including Cohere's Rerank, Command, and Embed, will be available in SAP's AI Core generative AI hub, enhancing enterprise search, agentic workflows, and data retrieval capabilities.

  SAP will also be a launch partner for Cohere's upcoming reasoning model, designed to power agentic AI experiences across SAP Business Suite. The collaboration will enable SAP customers to build AI agents to automate complex, multi-step business tasks while maintaining data privacy and regulatory compliance.

  Together, SAP and Cohere aim to empower businesses with context-aware, secure AI applications for tasks like intelligent document analysis, multilingual search, and enterprise-wide task automation. This partnership reflects SAP's strategy of expanding its trusted AI model portfolio while ensuring enterprise-grade scalability and compliance.

- **Google Partnership.**
  SAP has deepened its partnership with Google Cloud to advance enterprise AI by contributing to the Agent2Agent (A2A) interoperability protocol. This open standard allows AI agents from different vendors to interact and collaborate across platforms securely. SAP uses this protocol to enable Joule, its AI copilot, to orchestrate complex workflows. For instance, in customer dispute resolution, Joule can initiate processes in SAP and coordinate with Google agents accessing Google BigQuery to resolve issues without users switching tools or losing context.

  SAP has expanded access to Google's Gemini models within its generative AI hub on SAP Business Technology Platform (SAP BTP). Newly added models include Gemini 2.0 Flash and Flash-lite, offering customers enterprise-grade, low-latency AI capabilities. Additionally, SAP leverages Google's Video Intelligence and Speech-to-Text APIs to enable multimodal retrieval-augmented

generation (RAG), allowing users to search and retrieve specific video moments for more effective training and support. These efforts reflect SAP and Google's shared vision of open, composable, and business-context-driven AI.

- **Databricks Partnership.**
  SAP has launched SAP Business Data Cloud, a fully managed SaaS solution that unifies SAP data and integrates third-party data for enhanced analytics and AI use. SAP Business Data Cloud combines SAP Datasphere, SAP Analytics Cloud, and SAP Business Warehouse under one platform. It enables organizations to access fully governed data products aligned with SAP's unified domain model, simplifying lifecycle management and enabling zero-copy data sharing.

  A partnership with Databricks allows SAP customers to integrate Databricks' data engineering and machine learning capabilities directly within SAP Business Data Cloud. This enables advanced AI applications, including predictive finance use cases and ERP modernization. SAP Business Data Cloud also introduces pre-built analytical applications, called "insight apps," to accelerate decision-making in key business areas such as cash flow, HR, supply chain, and spend management. Joule, SAP's AI copilot, is embedded to enhance decision support with grounded, real-time data insights.

The new SAP Business Data Cloud, powered by Databricks integration, unifies SAP and third-party data for analytics, predictive finance, ERP modernization, and AI-driven decision-making.

Sepasoft

Sepasoft is placed as a Core Provider in the 2025 MES Technology Value Matrix for its MES Platform 3.0, developed as a premier technology partner within the Inductive Automation Ignition software ecosystem. By leveraging Ignition's modular, scalable architecture, Sepasoft delivers MES functionality that can be deployed flexibly across on-premises, edge, or cloud environments. Core MES capabilities within the platform include OEE and downtime monitoring, track and trace, statistical process control (SPC), batch procedure management, document management, and SepaIQ, incorporating advanced analytics and AI-driven insights for process optimization.

Through the Ignition Gateway Network, Sepasoft enables organizations to configure and manage MES servers at any global site, whether deployed on Ignition Edge servers or cloud-hosted instances. The platform also provides a pre-configured interface for SAP ERP integration, facilitating seamless data exchange between shop floor operations and enterprise business systems.

Sepasoft MES Platform 3.0 is built as a premier technology partner within the Inductive Automation Ignition ecosystem, offering modular, scalable MES capabilities deployable on-premises, at the edge, or in the cloud.

Sepasoft primarily supports discrete and batch manufacturers across North America, EMEA, and APAC, serving industries where flexible deployment, real-time visibility, and integration with existing control systems are critical to operational success.

Updates over the last 12 months:

- **Product Updates.**
  Sepasoft has continued advancing its MES platform with the release of version 8.1, introducing enhanced module compatibility, expanded Perspective Module support, and a streamlined versioning system for seamless integration with Inductive Automation's Ignition platform. The modules now follow a structured versioning scheme based on the MES platform, Ignition version, and minor revision, ensuring consistency across installations. With this release, Sepasoft's core MES modules—including Production, Batch Procedure, Document Management, OEE Downtime, Track & Trace, and Statistical Process Control (SPC)—are now compatible with the Inductive Automation Perspective Module, enabling fully responsive designs accessible across devices and screen sizes.

  New functionalities introduced in versions 3.81.8 SP1 and beyond include enhanced SPC visualization tools like Box and Whisker Charts, Histograms, C-Charts, and Process Capability Analysis. Modules like the MES e-Signature Template Manager, Electronic Batch Record (EBR) Viewer, and expanded Batch Management tools now provide greater control over quality compliance and production workflows. Version 3.81.10 RC3 introduced the Settings Editor Table and Selector Components, further enhancing user configurability for operations teams.

  Sepasoft continues its agile development cadence with Release Candidate (RC) versions that undergo rigorous QA testing before advancing to Stable Releases with monthly Service Packs (SP). Planned future updates will extend advanced Perspective Module capabilities to SPC, Settings & Changeover, and Utility Modules, ensuring a cohesive, cloud-ready MES ecosystem. The company emphasizes best practices for upgrades, recommending that all MES modules match in versioning and align with the highest-tested Ignition version to ensure stability.

The 8.1 release enhanced module compatibility, added full support for the Inductive Automation Perspective Module, and introduced a standardized versioning system to improve integration stability across installations.

Quality and compliance management was strengthened with updates to the MES e-Signature Template Manager, Electronic Batch Record (EBR) Viewer, and expanded Batch Management features.