



Siemens PLM Software

Camstar Semiconductor Suite

Global MES to keep pace with demanding change in frontend and backend operations

Benefits

- Rapidly implement a manufacturing execution system platform for maximum ROI
- Increase process yields by building quality into processes
- Quickly adapt to changing processes and product designs

Summary

Camstar™ Semiconductor Suite effectively replaces legacy and siloed manufacturing systems that haven't kept pace with the demanding and ever-changing requirements of semiconductor manufacturing. With Camstar Semiconductor Suite, manufacturers are no longer hindered by islands of automation and disjointed systems: now they can innovate, adapt and succeed. Manufacturers that choose Camstar Semiconductor Suite are up and running quickly, and are assured that the

application can grow with and conform to their business needs.

Camstar Semiconductor Suite is designed for frontend and backend manufacturing operations, offering a high level of out-of-the-box industry functionality, the highest level of configurability and complete interoperability with other business systems. It provides instant intelligence; from test results and yields to statistical quality control that enable you to improve quality and productivity.

Camstar Semiconductor Suite

Benefits *continued*

- Quickly and accurately deploy manufacturing process changes
- Easily integrate with business systems and shop floor equipment
- Standardize on a single solution for frontend and backend plants
- Eliminate the cost and risk of aging systems

Getting more

Replace the basic work-in-progress (WIP) tracking of your legacy manufacturing execution system (MES) with Camstar Semiconductor Suite and also get dispatching, statistical process control (SPC), nonconformance management, dashboards, maintenance management, paperless manufacturing and much more.

Standardizing on a single system

Deploy one configurable enterprise MES across your global frontend and backend operations, including Fab, Probe, Assembly Test and Subcontractors. Standardization enables consistency in global reporting and simplification of application support.

Enhance efficiency

Replace your cumbersome systems with a modern and robust MES that is powerful enough to handle high transaction volumes, and is flexible enough to meet each site's specific needs. Camstar MES platform enables you to efficiently innovate, adapt and change.

The screenshot displays the Camstar Semiconductor Suite software interface. The top navigation bar includes options like Inventory, WIP Tracking, WIP Adhoc Txn, Equipment, Job, Part, Adhoc, and Inquiry. The main content area is divided into several sections:

- Left Panel:** Contains fields for Selection Id, Employee, Process Type (set to NORMAL), and Equipment (set to HT_WireBond01). Below these are icons for various actions like WIP, WIP Msg, Online Traveler, Documents, Failures, Lot Info, Resource Details, and SPC Chart.
- Table:** A table titled "Lot" with columns: Container, Qty, Qty2, and Spec. The first row shows Container: HT0227, Qty: 1000, Qty2: 0, and Spec: HT_Wire Bond:1.
- Right Panel:** Contains a "Service Name" dropdown (TrackOutLot), a checkbox for "Skip SPC Failure Email", a "Display Filter" dropdown, and a "Lot/Wafer Grid Display" dropdown (set to Lot Only). Below this is a table titled "By Lot" with columns "WIP Data Name" and "WIP Data Value". The table lists five rows: Pull Test 01, Pull Test 02, Pull Test 03, Pull Test 04, and Pull Test 05. Each row has a small icon to its right.

At the bottom of the right panel, there is a pagination control showing "Page 1 of 1" and "Displaying 1 to 5 of 5 items". Below the table are "Reset" and "Submit" buttons.

Features

- Visibility and control of work-in-progress
- Automatically enforced dispatching
- Integrated equipment maintenance management
- Statistical process control and nonconformance management
- Manufacturing process change management and quality enforcement
- Comprehensive workflow management
- Operator certification and training

One platform for semiconductor manufacturing

Complete traceability

Camstar Semiconductor Suite provides the complete history of all manufactured lots, wafers and serialized units, spanning production in multiple plants. Some of the information captured as part of the searchable, electronic audit trail includes materials consumed, processes utilized, parametric data collected, splits and combines, bins, shipments and receipts as well as dates and times.

Visibility and control of WIP

Multilevel work-in-process tracking provides unprecedented visibility and control over production processes. Data can be collected by lot, wafer, serial number, etc., as well as in combinations of these categories.

Operators are presented with instructions for each product and process. Movement and processing can be controlled by myriad business logic functions, such as time limits, future holds and test results.

Maintenance management

Integrated equipment maintenance management supports proactive problem resolution and optimal equipment scheduling for both primary and sub tools. It automatically tracks and schedules maintenance based on time or usage, which can include enforcement of predefined job process flows. It also tracks equipment, tool and carrier states, and ensures that only qualified and calibrated resources are used for processing. Downtime registration provides grouped reason codes and operator logging functionality.

Statistical process control

Camstar Statistical Process Control (SPC) applies statistical process control to quality and defect data that is collected during the manufacturing process, allowing manufacturers to identify, analyze and solve potential problems while production continues before equipment is shut down, material is scrapped and production time is lost. Engineers select the statistical rules that the SPC engine will apply to the chart. Violation of a rule causes an alarm, and can also trigger actions such as generating an alert or email notification, changing the status of a machine, or placing material on hold. With ad hoc access to control charts, engineers can use Camstar SPC to monitor current conditions and to perform historical analysis.

Graphical resource layout

Drawing on real-time data from Camstar MES, resource layout graphically displays the status of all your manufacturing resources so you can maximize throughput, pinpoint potential capacity issues and prioritize maintenance.

Manufacturing process change management

Superior manufacturing process change management capabilities enable the swift deployment of new or updated products and processes across your global manufacturing operations. It is a game changer for manufacturers of complex products who must quickly accommodate high volumes of manufacturing changes.

Achievements

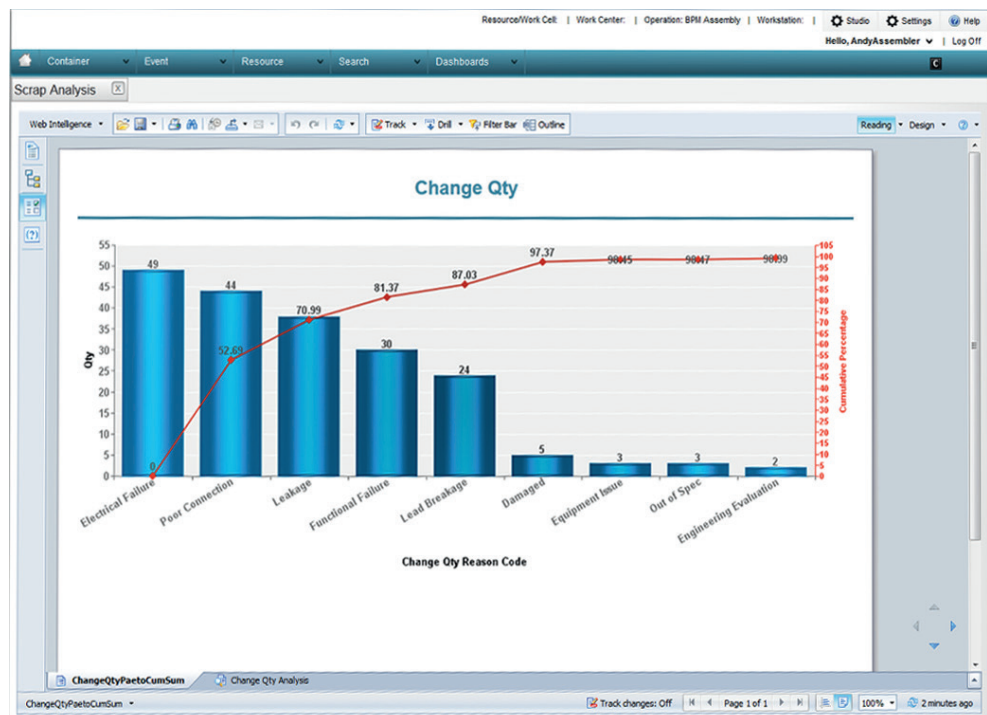
- Reduced costs while increasing throughput and quality
- Reduced operating costs from between \$2.6 and \$3.3 million over three years
- Lowered rollout costs for new sites by 75 percent
- Met 90 percent of business requirements with an out-of-the-box solution
- Implemented MES in new plant environment in 60 days
- Implemented MES in three operating plants in 11 months

Manufacturing quality enforcement

Camstar Semiconductor Suite facilitates a self-auditing manufacturing process to control production and collect detailed manufacturing quality data in real time. Electronically managed specifications and procedures significantly reduce the possibility of human error, and direct integration with equipment and tools allows for maximum data acquisition. Automatic detection and control of parametric data results combined with structured data and reporting and analysis tools make it possible to solve problems quickly, easily preventing recurrences. Visualization of key manufacturing and quality performance indicators, root cause analysis of issues and controlled execution of changes all facilitate continuous product and process improvement.

Comprehensive workflow management

Intuitive workflow modeling employs drag-and-drop tools, making it easy to set up dynamic routings, add new steps, vary production requirements and make customer order changes, all with revision control and an audit trail. Camstar Semiconductor Suite enables you to manage complex workflows with hundreds of Fab operations, frequent rework paths and parametric data collection. Multiple products on a wafer, multi-die parts, stacked die assembly, wafer sort, bumping, back grind, assembly, test and binning are all part of the application, eliminating the need to modify the system.



Manufacturing business intelligence

A wide range of monitoring, reporting, analytical and notification capabilities enable better and faster business decisions based on real-time, relevant manufacturing and quality data across multiple manufacturing sites. Camstar Intelligence software provides state-of-the-art dashboard visualization of key manufacturing performance indicators with drill-down analysis, as well as the ability to close the loop on identified problems by managing root cause analysis and enforcing changes that prevent issue recurrence.

Enterprise business process interoperability

Camstar Semiconductor Suite creates an enterprise manufacturing and quality hub that aggregates real-time production and

quality data for collaboration within the business and with suppliers and customers. It interacts easily with enterprise resource planning (ERP), applied power systems (APS), quality management system (QMS), data warehouse (DWH) and product lifecycle management (PLM) applications for synchronizing products and bills of material (BOM); downloading orders and providing timely and accurate work-in-process information for improving designs, quality, inventory, processes, planning and financial analysis. Camstar Semiconductor Suite delivers best practices interoperability with leading ERP systems such as SAP® software, Oracle® software and Microsoft Dynamics® software.



Equipment tool tracking

Detailed resource tracking supports the Semiconductor Equipment Materials Initiative (SEMI E10) and other state models and allows overall equipment effectiveness (OEE) key performance indicator (KPI) calculations to determine bottlenecks and inefficiencies on the shop floor. It also supports tracking tools, tool life, tool usage and job models such as cleaning and refurbishment. The flexibility of Camstar Semiconductor Suite supports processing multiple lots within different chambers of equipment and auto lines consisting of connected equipment.

Nonconformance management

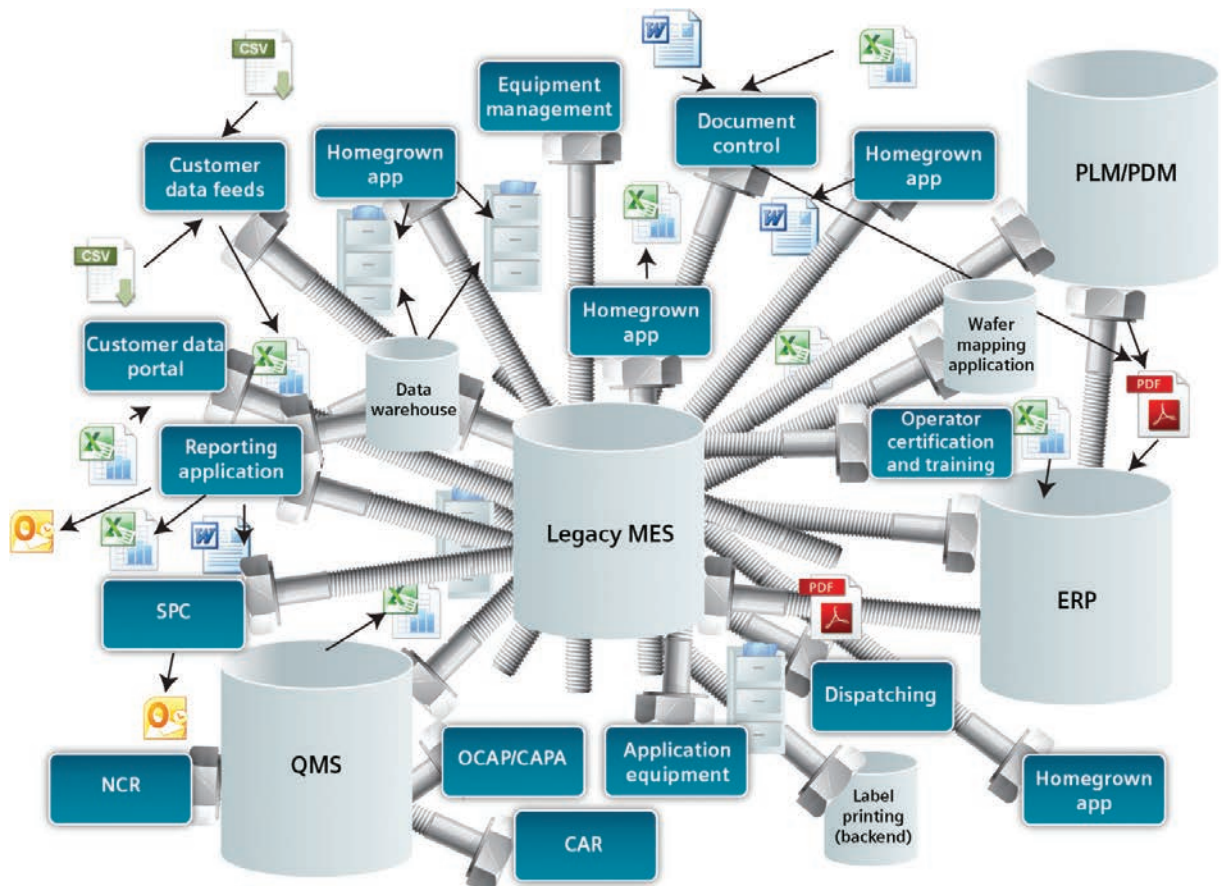
Nonconformance management is used to automatically recognize and react to exceptions or failures with parametric data

specification limits, percent defect allowances and yield limits, material issues, binning and retest requirements. It enforces structured failure analysis, root cause identification, quarantine and final disposition (release, rework, scrap, etc.), and prevents product shipment or processing beyond a prescribed step until all issues are resolved.

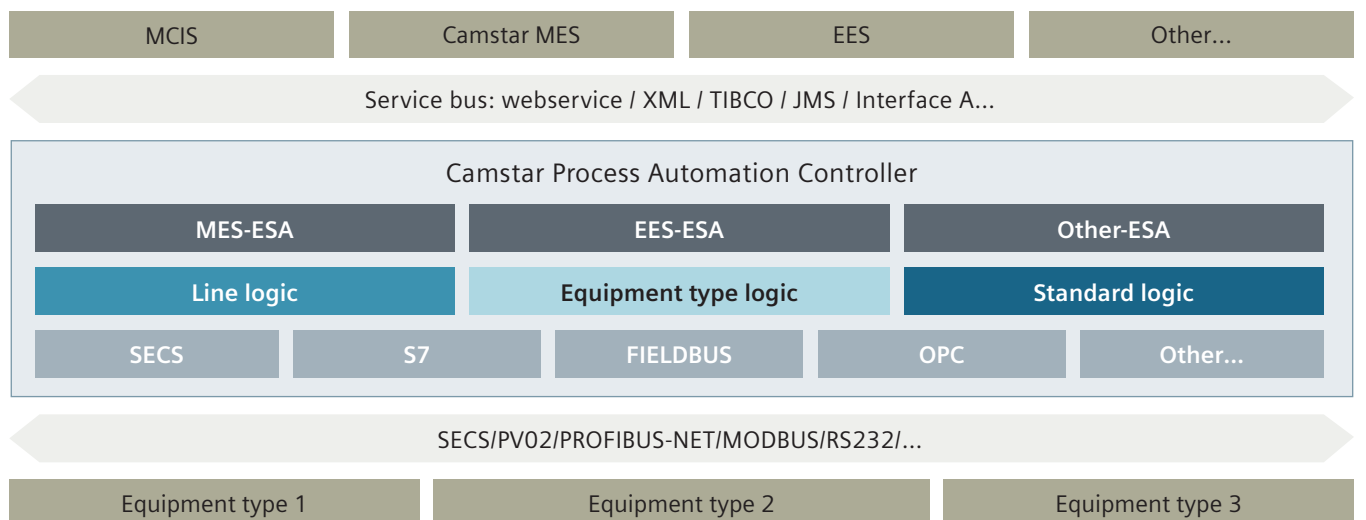
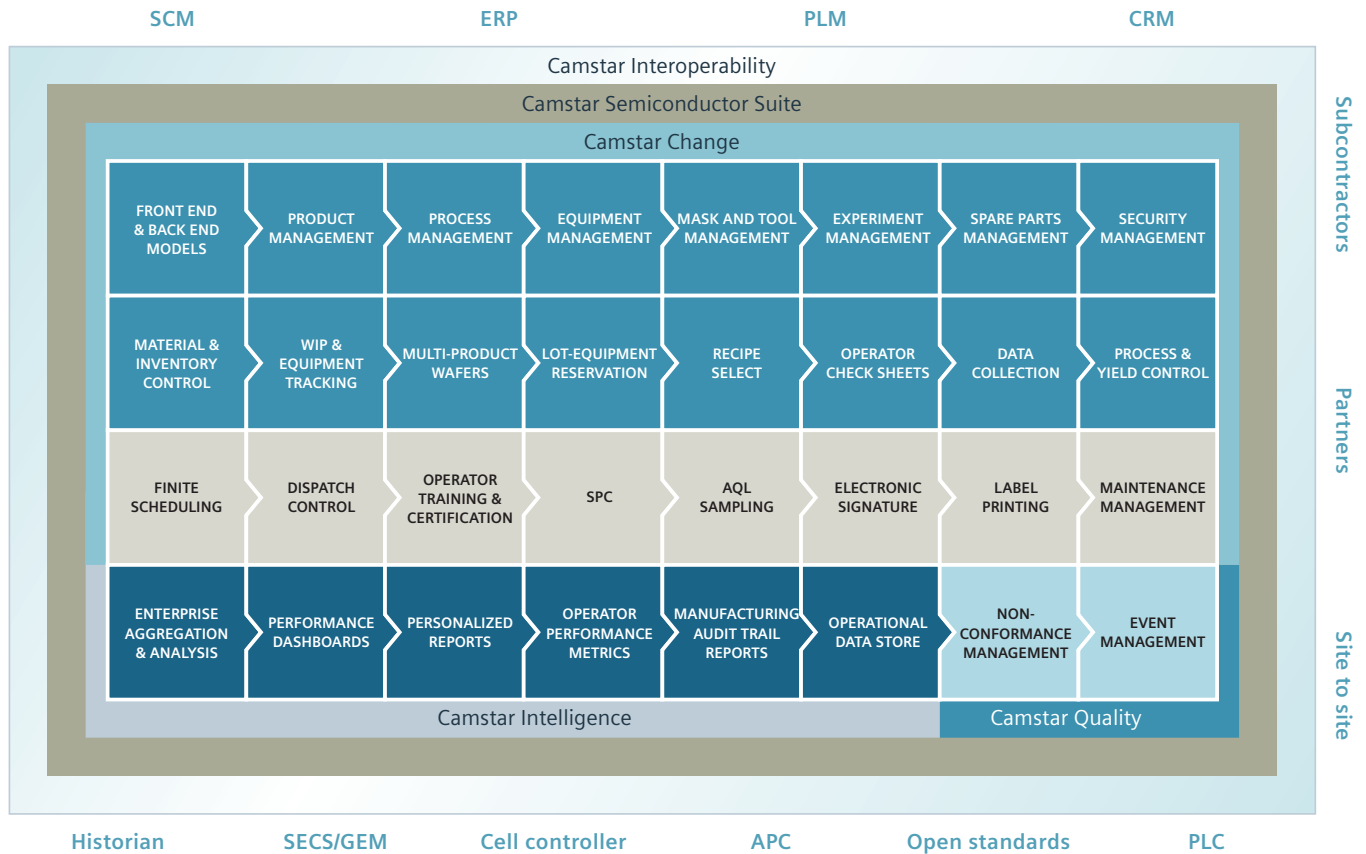
Event management

Event management enables the identification and documentation of quality events from any production or nonproduction source across the enterprise, and applies standard risk criteria to triage and route events appropriately. It monitors the enterprise and identifies quality incidents, enables the necessary investigation and enforces quality processes.

BEFORE... replace obsolete and cumbersome islands of automation and disjointed systems.



AFTER... with Camstar Semiconductor Suite.



Label printing

Label printing automatically prints product labels from actual specification and manufacturing data, ensuring that labels are accurate, produced in a timely manner and are attached to the proper lot, wafer or unit.

Operator certification and training

Operator certification and training enables you to establish manufacturing roles, define training for the various roles, define process certification requirements, maintain training records and establish certification expiration. Automatic certification verification ensures that only qualified employees perform prescribed shop floor functions.

Fast, easy operator interaction

Operators use simple forms to view instructions and record data and events. Browser-based user interfaces can be configured to effectively guide and respond to the way people work. In addition, any data can be collected directly from production systems and equipment, ensuring maximum speed.

Customization without programming

Configurable business logic, rather than hard-coded logic, allows Camstar Semiconductor Suite to be tailored to meet unique factory requirements without changing program code. Server-side logic makes it easy to integrate the application with existing systems, make new functionality available without disrupting operations and completely support thin-client workstations.

Process automation control

Camstar for Process Automation Control software integrates multiple pieces of equipment within the factory infrastructure into the MES, providing fully automated control, status monitoring, material tracking and data collection. The bi-directional communication allows the MES to verify that correct lots, products, tools, recipes and parameters are being used. Camstar for Process Automation Control supports multiple protocols, including Semiconductor Equipment Communication Standard/SEMI connectivity standard E30 (SECS/GEM), Extensible Markup Language (XML), SEMI PV2, OLE for process control (OPC), Structured Query Language (SQL) and several others, enabling rapid, reliable and cost effective integration.

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