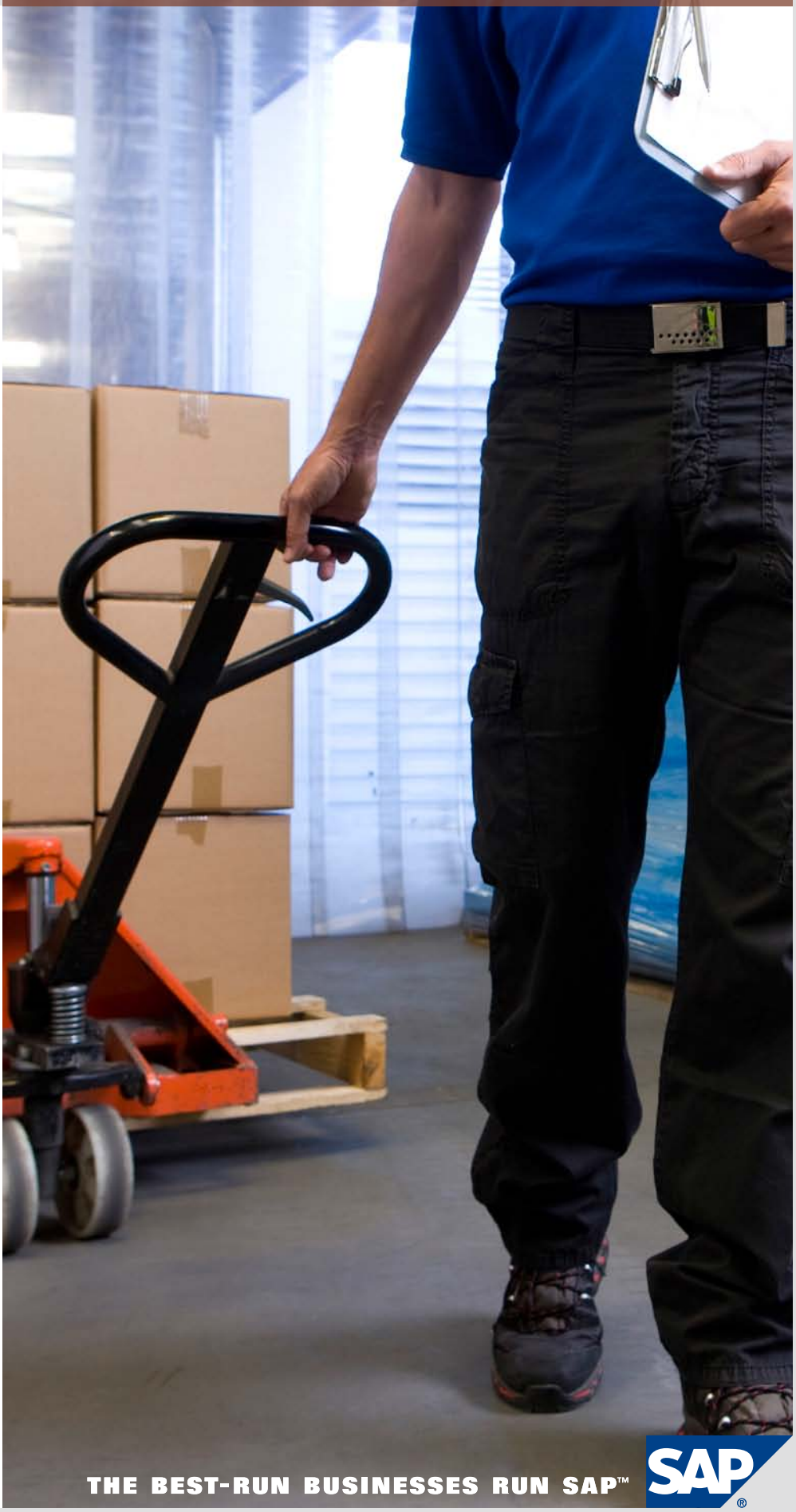
SAP Solution in Detail
SAP Manufacturing

SAP Manufacturing Execution

SAP® MANUFACTURING EXECUTION

MANAGE, CONTROL, AND INTEGRATE PRODUCTION WITH THE ENTERPRISE

With the SAP® Manufacturing Execution application, you can manage, control, and execute shop-floor production and connect manufacturing operations with the rest of your enterprise. The application facilitates the closed-loop flow of information between the production floor and your global enterprise and supply chain. You can achieve more accurate, detail-oriented control over the shop floor, across your entire fleet of plants, and around the world. And by leveraging real-time data, you can improve product quality, satisfy customer expectations, and impact the bottom line.



THE BEST-RUN BUSINESSES RUN SAP™

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ACHIEVE SHOP-FLOOR TO TOP-FLOOR INTEGRATION

MAXIMIZE CONTROL OF PRODUCTION OPERATIONS

Leading manufacturers realize they must optimize control over shop-floor operations to succeed in a global economy characterized by intense competition, compliance requirements, ever-changing customer demands, and relentless pressure to reduce costs. To achieve this goal, manufacturers must integrate the shop floor to the enterprise, enabling closed-loop business processes.

Companies frequently implement a manufacturing execution system (MES) to monitor, record, and guide production activities. The use of MESs gives rise to another complex issue: the need to integrate them with enterprise resource planning (ERP) solutions that guide top-floor decision making. It's also important to provide visibility across the value chain for better strategic business decisions and responsiveness.

The SAP® Manufacturing Execution application provides a powerful means for managing and controlling shop-floor operations. Because it enables enterprise-wide integration, the application facilitates processes critical to shop-floor execution, including process control, production quality, traceability, labor management, production transfer, engineering change management, and return and repair management. It captures, shares, stores, and reports data that determines how a product is manufactured, enabling you to recognize and respond rapidly to configuration or quality changes. The result is improved product quality and delivery performance, yielding reduced production costs. In short, SAP Manufacturing Execution helps manufacturers accomplish the following:

- Meet regulatory compliance through powerful product traceability and reporting
- Improve production quality with better control and communication of manufacturing processes
- Address requirements for serial-number generation and serialized traceability
- Implement and enforce standards across global operations
- Efficiently manage extensive work-in-process (WIP) rework and frequent or complex engineering change orders
- Streamline the new-product introduction (NPI) process to realize ramp-to-volume manufacturing

SAP Manufacturing Execution provides a means for managing and controlling shop-floor and manufacturing operations. The application facilitates processes, including shop-floor execution and reporting, traceability, labor management, production transfer, return and complaint management, and test and repair. The result is improved quality and delivery performance, yielding reduced costs.

IMPROVE PRODUCTION PROCESS VISIBILITY

CAPTURE AND REPORT MANUFACTURING OPERATION DETAILS

Our customers – spanning discrete industries such as high tech, aerospace and defense, automotive, industrial machinery and components, and medical devices – tell us that they need to capture and report on critical details to better control production processes. The reasons vary from regulatory and customer compliance to the drive to reduce costs, meet production goals, improve product quality, and achieve other business-critical objectives. However, many organizations are saddled with legacy and point solutions, leaving crucial production process and product data details isolated in separate silos. In these cases, management must function without sufficient visibility into manufacturing operations, with manual inefficiencies and disparate data sources blocking the ability to make informed and timely business decisions.

To enable a more adaptive enterprise, organizations need transparency in all aspects of manufacturing operations. They need improved execution efficiency through real-time process monitoring and control; enhanced communications between management and production personnel; and fast access to accurate, relevant, and timely data. SAP Manufacturing Execution joins the shop floor with the rest of the enterprise, providing managers with rapid access to critical data, enhanced intra-business communication, and real-time process monitoring and reporting. Managers and executives can tap the pulse of the organization without slowing down the production process or adding to lead time. Shop-floor workers can perform more efficiently and effectively. And you can make engineering changes to products currently in production with greater speed, accuracy, and flexibility (see Figure 1).

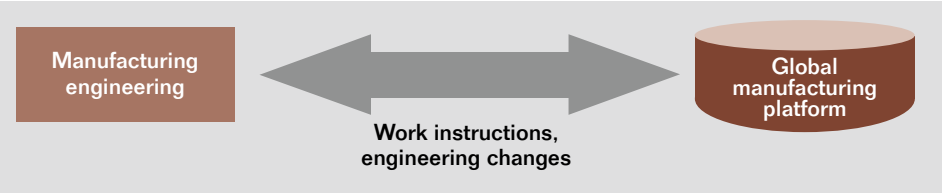


Figure 1: On-the-Fly Engineering Changes

ELEVATE MANUFACTURING QUALITY, SPEED, AND FLEXIBILITY

INTEGRATE PRODUCTION ACTIVITIES INTO THE ENTERPRISE

SAP Manufacturing Execution integrates production operations at key points throughout the enterprise, enabling you to monitor, record, and guide manufacturing activities, so your organization can realize the following business benefits.

Higher Product and Process Quality

With SAP Manufacturing Execution, you can boost productivity and product quality by improving your ability to measure, record, and evaluate processes and facilitate the adoption of best practices by employees. Real-time visibility into manufacturing operations helps you pinpoint and manage quality issues quickly, and traceability functionality reduces warranty and liability risks and costs.

Better Throughput

With improved work status visibility and analytics, you can increase throughput by spotlighting problem areas – where processes slow down, for example, due to nonconforming processes, logistical issues, or a shortage of production materials. The application enables best-practice adoption with up-to-date information on process plans and work instructions.

Streamlined Compliance Processes

The application helps streamline compliance activities and reduce associated costs with genealogy management, performance management, and automated data collection functionality. For example, it captures and references a complete and permanent genealogy record of the product being built. This enables you to establish a set of repeatable processes and access an audit trail of all processes, resources, components, and materials used during the manufacturing process. In addition, with tracking functionality that links completed products and components, you can identify the products most likely to be affected by or involved with a problem. As a result, you can limit exposure to warranties and mitigate risks while controlling recall cost.

Greater Flexibility

SAP Manufacturing Execution gives you the flexibility to provide custom orders and make products to meet market demand. You can better conform to specific customer requirements, simultaneously improving customer service and efficiency. The application facilitates shifting production from one product to another or from one plant to another while supporting plants with a large number of product offerings.

Optimal Asset Utilization

You can increase your return on assets and lower costs by maximizing asset use, performing work in the right location for the job, and reducing application and software downtime during changeovers. SAP Manufacturing Execution facilitates preventative maintenance by putting production and process data at employees' fingertips, minimizing downtime, and keeping daily operations running smoothly.

With SAP Manufacturing Execution, you can boost productivity and product quality by improving your ability to measure, record, and evaluate processes and facilitate employee best-practice adoption. Real-time visibility into manufacturing operations helps you pinpoint and manage quality issues quickly, and traceability functionality reduces warranty and liability risks and costs.

OPTIMIZE SHOP-FLOOR EXECUTION

ENABLE BETTER DECISIONS WITH COMPLETE, FLEXIBLE TOOLS

SAP Manufacturing Execution is an enterprise-level, scalable, J2EE manufacturing application that enables global manufacturers to manage and control shop-floor operations. This powerful application provides a multifaceted set of features that integrates business systems with the shop floor, allowing complete component- and item-level traceability for single and global installations. SAP Manufacturing Execution helps ensure that products are built as designed and built right the first time. It collects data from multiple sources, integrating data systems with shop-floor activities to create one comprehensive "as-built" production record. The result is an aggregate record of the entire product history, stored and available to drive effective decision making and regulatory compliance. SAP Manufacturing Execution includes specific functionality that supports the following manufacturing requirements.

Figure 2: Executive Dashboard

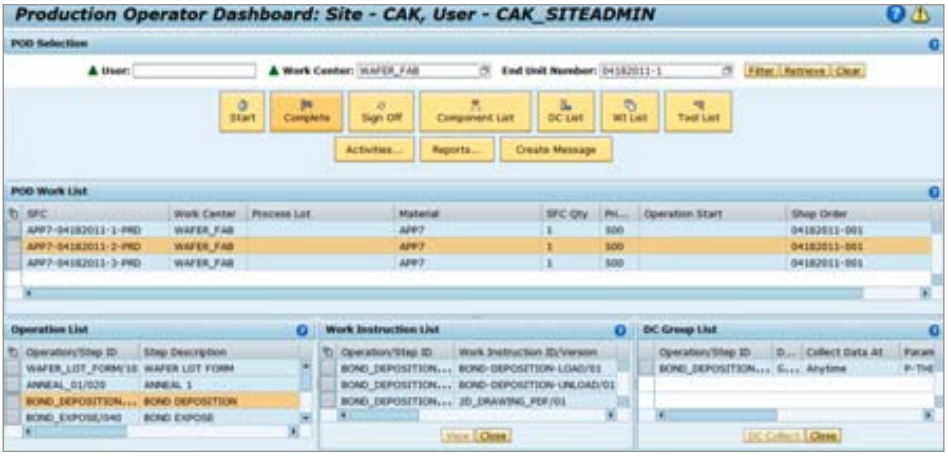


Figure 3: Production Operator Dashboard

Coordinated Manufacturing Operations

The ability to collect information from multiple sources enables the coordination of manufacturing functions with data systems to create a single comprehensive production record. With role-based interfaces, users from the shop floor to the boardroom can access real-time information to perform more efficiently. Taking advantage of up-to-the-minute data on all operations, you can greatly streamline and empower decision-making processes while eliminating time-consuming production meetings that often work off outdated information and assumptions. You can manage plant activities with the executive dashboard viewer (see Figure 2) and get an up-close view of manufacturing activities with the production operator dashboard (see Figure 3). You can even drill down into dashboard views to access additional detail.

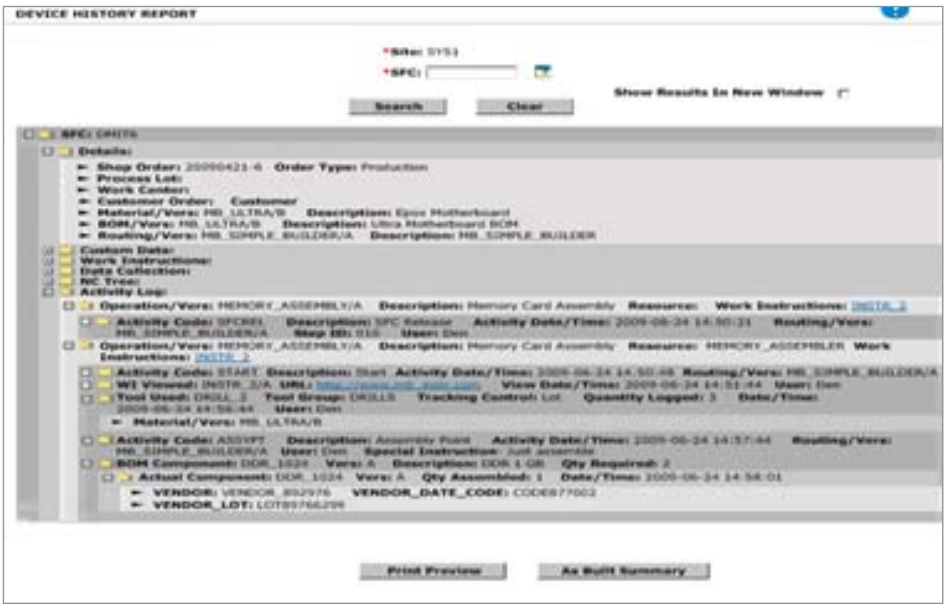
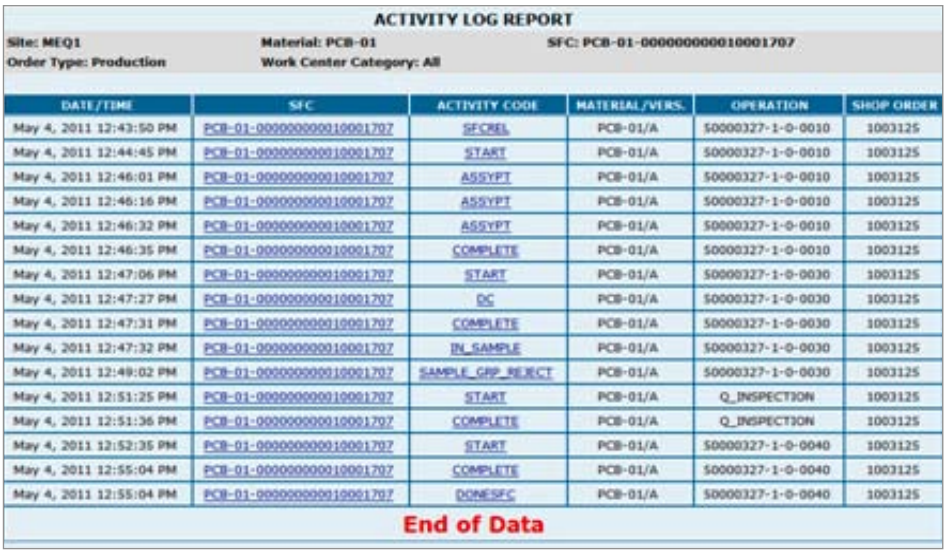


Figure 4: Device History Report



ACTIVITY LOG REPORT

Site: MEQ1 Material: PCB-01 SFC: PCB-01-0000000000010001707

Order Type: Production Work Center Category: All

DATE/TIME	SFC	ACTIVITY CODE	MATERIAL/VERS.	OPERATION	SHOP ORDER
May 4, 2011 12:43:50 PM	PCB-01-0000000000010001707	SFCREL	PCB-01/A	50000327-1-0-0010	100312S
May 4, 2011 12:44:45 PM	PCB-01-0000000000010001707	START	PCB-01/A	50000327-1-0-0010	100312S
May 4, 2011 12:46:01 PM	PCB-01-0000000000010001707	ASSYPT	PCB-01/A	50000327-1-0-0010	100312S
May 4, 2011 12:46:16 PM	PCB-01-0000000000010001707	ASSYPT	PCB-01/A	50000327-1-0-0010	100312S
May 4, 2011 12:46:32 PM	PCB-01-0000000000010001707	ASSYPT	PCB-01/A	50000327-1-0-0010	100312S
May 4, 2011 12:46:35 PM	PCB-01-0000000000010001707	COMPLETE	PCB-01/A	50000327-1-0-0010	100312S
May 4, 2011 12:47:06 PM	PCB-01-0000000000010001707	START	PCB-01/A	50000327-1-0-0030	100312S
May 4, 2011 12:47:27 PM	PCB-01-0000000000010001707	DC	PCB-01/A	50000327-1-0-0030	100312S
May 4, 2011 12:47:31 PM	PCB-01-0000000000010001707	COMPLETE	PCB-01/A	50000327-1-0-0030	100312S
May 4, 2011 12:47:32 PM	PCB-01-0000000000010001707	IN_SAMPLE	PCB-01/A	50000327-1-0-0030	100312S
May 4, 2011 12:49:02 PM	PCB-01-0000000000010001707	SAMPLE_GRP_REJECT	PCB-01/A	50000327-1-0-0030	100312S
May 4, 2011 12:51:25 PM	PCB-01-0000000000010001707	START	PCB-01/A	Q_INSPECTION	100312S
May 4, 2011 12:51:36 PM	PCB-01-0000000000010001707	COMPLETE	PCB-01/A	Q_INSPECTION	100312S
May 4, 2011 12:52:35 PM	PCB-01-0000000000010001707	START	PCB-01/A	50000327-1-0-0040	100312S
May 4, 2011 12:55:04 PM	PCB-01-0000000000010001707	COMPLETE	PCB-01/A	50000327-1-0-0040	100312S
May 4, 2011 12:55:04 PM	PCB-01-0000000000010001707	DONESFC	PCB-01/A	50000327-1-0-0040	100312S

End of Data

Figure 5: Activity Log Report

Product Lifecycle Traceability

The ability to trace the entire history of a product – through design, planning, manufacturing, shipping, and maintenance – is particularly important for regulatory compliance. With SAP Manufacturing Execution, you can capture a complete and permanent genealogy record of your products, including multilevel detail. This enables quick electronic recall of product, process, resource, and material information. The application tracks, collects, and verifies information on all product components, creating an audit trail of all processes, resources, components, and materials involved in manufacturing the product. For example, the solution enables you to trace device history (see Figure 4) and view activity log reports (see Figure 5). If a defect is detected, you can immediately trace back to the source of the problem (for example, the item, process, or supplier at fault) and take action to provide corrective and preventive steps while mitigating risks.

Support Continuous Improvement Initiatives

SAP Manufacturing Execution is a vital tool for continuous improvement initiatives. By capturing the complete, accurate product genealogy, from initial order to final shipment, the application enables you to respond in a timely manner to product concerns, customer questions, or regulatory inquiries. By providing greater insight into product movement, it helps management identify problem suppliers or weak elements in your production system, resolve bottlenecks, and meet future labor and scheduling needs while

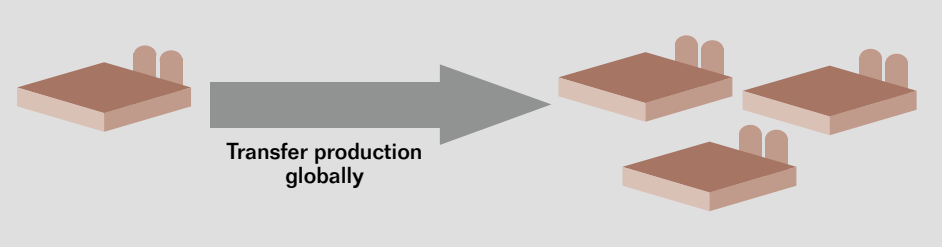


Figure 6: Global Production Transfer

incorporating improvements into the production process. This quick access to information also helps decision makers observe trends, taking the steps necessary to reduce the risk of defects escaping from the shop floor.

Labor Tracking

SAP Manufacturing Execution provides tools to document and track employee time and attendance accurately, helping to satisfy payroll and contract billing requirements. The application also facilitates the assignment of labor costs to specific projects or shop orders, enabling the accurate allocation of these costs across the manufacturing process. You can track time spent working on particular components and units for greater visibility into project- and task-specific costs. For example, aerospace and defense companies working on government contracts can improve required time-tracking and employee data accrual processes, reducing costs and increasing efficiency. For longer manufacturing times, collection of earned standards will enable production personnel to take credit for partial work completed.

Identify Inefficiencies

Using the data captured by SAP Manufacturing Execution, you can detect bottlenecks in the workforce, trace labor charge codes back to the appropriate contract, and rapidly identify labor shortages on the production line. As a result, you can improve procedural or process inefficiencies, reduce turnaround time for incoming orders, and meet customer delivery demands.

Production Transfer

Beyond connecting the wider enterprise to the production organization, SAP Manufacturing Execution helps you integrate your enterprise with numerous production facilities, greatly enhancing visibility and flexibility across global locations. The application enables you to configure and automatically transfer product configuration and production information – including related activity records, component traceability records, and nonconformance data – to single or multiple sites (see Figure 6). This lets you preserve a complete, as-built history of the product for future reference. By electronically sending the complete product history from the NPI site to the recipient production site or sites, the application helps eliminate delays associated with the manual transfer of records and setup of a production line. This information can be received automatically or, at your shop-floor manager's discretion, manually and then inserted into the production process.

Match Production to Available Resources

SAP Manufacturing Execution enables you to transfer current WIP to other sites, including all the traceability information, activity logs, and nonconformance data associated with the product configuration. This allows your planners to distribute production properly across available sites and labor resources. It also enables shop-floor managers to see all the information associated with the product. The application preserves a complete manufacturing history of the product at one site even if the product is produced at different sites, letting you work more efficiently, reduce product cycle times, and increase customer satisfaction.

Engineering Change Management

Traditionally, manufacturers have reacted to a change request by making the necessary adjustments to an order released into production. However, the change details often never make it back to engineering, leading to confusion when the job returns to the shop floor. To avoid confusion and keep production plans on schedule, you need to manage feedback from numerous parties. The SAP Manufacturing Execution application helps ensure an effective, closed-loop feedback process for changes driven by design integrity, cost control, inventory, and other issues –

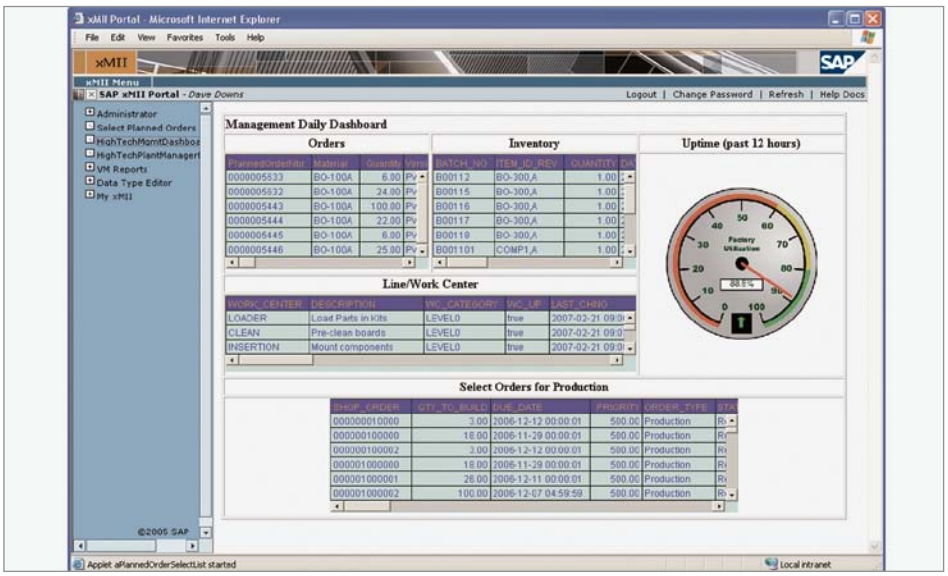


Figure 7: Code Report Summaries

for example, a part requirement change in the bill of materials. Product and process engineering changes can be readily communicated to the shop floor. You can initiate change requests in real time, not after the fact, maintaining order integrity while controlling costs and keeping a complete historical reference. Further, you can process engineering change orders for products currently in production for great flexibility and speed.

Keep Your Production Plans on Schedule

By capturing revision history, SAP Manufacturing Execution helps ensure that your organization follows proper product builds and process flows – without needing to establish new bills of materials or routings or get input from the engineers. Efficient, closed-loop feedback helps keep production plans on schedule. The application initiates real-time change requests to your released and pending orders to maintain order integrity and complete historical reference. You can also generate an engineering change order for multiple planned changes across one or more released orders. In addition, SAP Manufacturing Execution provides your decision makers with the visibility to implement change orders into production process in real time.

Nonconformance Management

Delivering quality products on time is essential for any manufacturing organization. Now you can test, track, identify, and repair defects quickly with a comprehensive repair-loop management environment and create a database that supports essential continuous improvement initiatives. As a result, you can view complex design data, monitor critical components using time-based component traceability, and gauge the effectiveness of manual assembly processes.

An integrated environment for optimizing all facets of test and repair – from equipment control to repair loop management – provides critical functionality that helps improve your operational efficiency and that of your service providers. Test results are compared and stored with existing database data to track repairs continuously and enable a fact-based diagnosis of issues. SAP Manufacturing Execution creates a dynamic knowledge base of verified repair actions that supports continuous improvement initiatives, minimizes defects, reduces scrap, and improves throughput and yields. You can even view summaries sorted by code reports and use sophisticated diagnostic functionality for product and process analysis.

Return and Repair Management

Best-in-class customer service includes timely processing of returned products. SAP Manufacturing Execution effectively executes service orders and facilitates the management of returns throughout both the production environment and the enterprise as a whole. Feedback on the reasons for returns and repair provides valuable information useful in improving product quality. SAP Manufacturing Execution enables you to track returned products or components through their lifecycle – right down to return delivery to customers. This provides companies with valuable information for product development, launch, design, and production.

STRIVE FOR THE PERFECT PLANT

IMPROVE PERFORMANCE WITH ENHANCED VISIBILITY

To achieve the ultimate goal of running the "perfect plant," you need 360-degree visibility into all aspects of your manufacturing operations. With SAP software, you gain the visibility to optimize manufacturing asset utilization and increase production performance. Distributed enterprises face disconnects between crucial manufacturing processes and data that slow production, decrease quality, and reduce profits. For instance, a typical manufacturing plant may run between 10 and 50 shop-floor automation (SFA) systems, while a multi-site manufacturer may have between 40 and 700 SFA systems across the enterprise. With SAP Manufacturing Execution, you can better address the challenges caused by disparities of solutions and data, align and improve key performance indicators, and drive real value in the following ways:

- Reduce manufacturing costs through process monitoring and increased visibility
- Increase plant efficiencies with process optimization and enterprise-wide integration
- Raise production yields through proactive event monitoring and timely corrective actions
- Lower maintenance costs with streamlined maintenance processes and alignment with manufacturing metrics
- Reduce capital investments with improved asset performance and reliability
- Decrease inventory by enforcing lean processes to streamline and reduce execution variability

With improved work status visibility, you can increase throughput by spotlighting problem areas – where processes slow down, for example, due to logistical issues or a shortage of production materials. The application enables best-practice adoption with up-to-date information on process plans and work instructions. It helps you optimize plant production with advanced scheduling and automatic work-dispatching functionality.

- Reduce premium freight costs with integration of manufacturing events with the enterprise and supply chain
- Improve value-chain agility and customer responsiveness through complete value-chain integration and visibility

In short, SAP Manufacturing Execution helps you leverage your existing data, infrastructure, and investments in enterprise applications and optimize front-line business processes and operations. Your company can strive toward the goal of the perfect plant by improving delivery times, increasing yields, and optimizing asset utilization and fulfillment processes, yielding lowering costs. SAP Manufacturing Execution facilitates control across the organization with improved visibility at many levels – into individual plants, the extended supply chain, and enterprise-wide engineering and manufacturing operations.

BENEFIT FROM GREATER CONTROL AND VISIBILITY

MANAGE AND COORDINATE PRODUCTION OPERATIONS

Powered by the SAP NetWeaver® technology platform, SAP Manufacturing Execution integrates smoothly with your SAP ERP application and can be deployed quickly. As a result, your company can realize the following business benefits:

- Better visibility into production operations to identify problem areas and increase throughput
- Greater control over shop-floor production in all plants to optimize quality and reduce costs
- Higher product quality, customer satisfaction, and bottom-line results

To learn more about how SAP Manufacturing Execution can help you optimize your manufacturing operations, contact your SAP representative today or visit www.sap.com/solutions/manufacturing/manufacturing-execution.

QUICK FACTS

www.sap.com/contactsap

Summary

Integrate shop-floor production operations with the rest of your enterprise with the SAP® Manufacturing Execution application. The application facilitates real-time visibility and reporting into plant-floor activities to enable accurate, precise manufacturing execution across your global fleet of plants.

Business Challenges

- Enable full visibility into production operations to achieve fact-based decision making
- Eliminate information lag to and from the manufacturing department and other areas of the enterprise
- Connect manufacturing execution systems with the enterprise for integrated shop-floor control, delivering timely and accurate information exchanges
- Satisfy requirements associated with complex compliance mandates and fluid customer demand

Key Features

- **Product quality and production** – Improve ability to monitor, record, and control manufacturing activities
- **Throughput** – Speed up operations with improved visibility and best-practice adoption
- **Preventative maintenance** – Optimize asset utilization
- **Compliance** – Meet complex regulations more easily
- **Production** – Increase flexibility and ability to meet varied and changeable customer demand
- **Work-in-process engineering** – Execute changes smoothly

Business Benefits

- **Improve control over manufacturing operations** with an integrated application connected with enterprise software solutions
- **Decrease costs and time to market** with lower manufacturing process downtime
- **Meet highly specific and time-sensitive customer demands** through more agile, flexible production operations
- **Reduce compliance costs and risks** with powerful product traceability

For More Information

Call your SAP representative, or visit us at www.sap.com/solutions/manufacturing/manufacturing-execution.

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