SAP Manufacturing Execution for the High-tech Industry

2nd Manufacturing Excellence Day
Dresden – January 26, 2012
SAP Manufacturing Execution

SAP Manufacturing

- SAP's Manufacturing Suite
- SAP Manufacturing Execution for discrete Manufacturing Industries
  - Short overview
  - Industry alignment and customers

SAP Manufacturing Execution 6.0

- New functionality - focusing on …
  - Visual Test & Repair
  - MES data exploration via mobile devices
The Perfect Plant
Harmonizes Complex Manufacturing Network Interdependencies

The Perfect Plant reliably produces to targets and delivers continuous improvements in cost, quality, and responsiveness.
SAP Solutions for Manufacturing
The most comprehensive suite of manufacturing solutions available today

1. Global Coordination
   - Manufacturing planning and control across the entire supply chain
   - Supporting lean manufacturing principles and practices

2. Plant-to-Enterprise Visibility
   - Manufacturing Integration and Intelligence

3. Local Execution
   - Manufacturing Execution
   - Asset Management
   - Quality Management
   - Plant Maintenance
   - Environment, Health & Safety

BENEFITS
- Reduced Network Inventory
- Profitable response to volatility
- Decreased production cost
- Increased visibility
- Increased OEE and RoA
- Compliant, high quality products
SAP Manufacturing Execution for Discrete Manufacturing Industries

low volume/high mix – build to order : high-volume/low mix – repetitive manfuacturing

High Tech
Medical Devices
Automotive & Auto Electronics
Industrial Machinery & Components
Aerospace & Defense

SAP Manufacturing Execution

Data & Processes
Visibility
Individualization
Vertical Integration
SAP Manufacturing Execution
Leveraging visibility, integration and enforcement

- Enables detailed modelling of the manufacturing process and allows to dynamically control and monitor the execution process on WIP level

- Collects and communicates production data in real-time – continuously and across the entire product lifecycle

- Improves product and process quality by
  - Enforcing zero-defect production
  - Complying with legal and industry regulations
  - Providing detailed order-to-shipment traceability
  - Providing role-specific production and process data visibility

- While ensuring standalone (offline) shop floor operations, SAP ME fully integrates shop floor with enterprise operations

- Manufacturing Execution System (MES) for cross-plant deployment
  - Cross-plant master and process data management
  - Based on open technologies
  - Scalable production data and system management

Production & Process Management
- Process modelling and specifications
- Tool management
- Floor stock management
- Return and repair management
- Paperless production support

Machine and Production Data Collection
- Labor tracking
- Equipment & automation integration
- Production monitoring (WIP, OEE, Yield, etc.)

Quality Enforcement & Traceability
- Tests & SPC
- Sampling & non-comformance management
- Visual Test & Repair
- Traceability (serials, batches, time stamps, time sensitivity)
- Genealogy and process traceability

Production Reporting & Dashboards
- Improves product and process quality by
  - Enforcing zero-defect production
  - Complying with legal and industry regulations
  - Providing detailed order-to-shipment traceability
  - Providing role-specific production and process data visibility

Enterprise Integration
- Pre-defined integration with SAP ERP
- 3rd-party / legacy systems via web services
SAP Manufacturing Execution . . . Remember!

- **SAP ME is an application, not toolkit**
  - Built-in business rules and logic
  - Configurable system rules
  - Ease of use/usability with configurable GUI

- **SDK (software development kit) for extendibility**
  - Extend product capabilities
  - Upgradeable product extensions
  - Support partners and customers

- **SAP compliant product**
  - Solution validation
  - Product standards
  - Ramp-up process
  - Built on J2EE Architecture

- **Product configuration**
  - SAP Technology Stack (NetWeaver)
  - Integrated or standalone
  - **Core solution components**: SAP NetWeaver, SAP ME, SAP PCo, SAP MEINT (MII-based ERP integration content), BO reporting content package
  - **Additionally**: BusinessObjects for reporting, SAP MII for dashboarding

Enterprise grade software – Will scale as business grows.
## SAP Industry Alignment

<table>
<thead>
<tr>
<th>Medical Device</th>
<th>Automotive</th>
<th>IM&amp;C</th>
<th>Aerospace &amp; Defense</th>
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<td><img src="image" alt="Caterpillar" /></td>
<td><img src="image" alt="Kongsberg" /></td>
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</table>
SAP Industry Alignment

High Tech

ITT

Nokia Siemens Networks

ABB

oce

ELCOTEQ

JABIL

Endicott Interconnect Technologies, Inc.

FLEXium Interconnect, Inc.

austriamicrosystems
NSN is a leading producer of mobile phones (wireless voice and data devices), multimedia (home satellite systems, mobile gaming devices), networks (wireless switching and transmission equipment) used in carrier networks, and enterprise solutions (wireless systems for businesses).

Achieve fully automated production control. Based on the conditions of static capital cost and variable labor cost, if production is automated, it would be possible to produce in more economical geographies.

Produce ANY product at ANY factory (standardize factory capabilities)

Achieve same production quality throughout all factories

Monitor and control production remotely from any factory

SAP Manufacturing Execution (incl. traceability, non-conformance management, WIP tracking, real-time SPC, CAPA)

All four business objectives have been achieved – ROI within six months

- Implemented proactive materials management
- Reduced work in process (WIP) inventory and cycle times
- Reduce lot sizes and scrap waste
- Improved yields and quality
- Easy access and visibility of real-time data
- Real-time response to shop floor problems
- Reduced rework & higher yields
- Improved equipment utilization
- Improved traceability and quality at a lower cost
SAP Manufacturing Executive

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SAP Manufacturing Execution 6.0

- New functionality - focusing on …
  - Visual Test & Repair
  - MES data exploration via mobile devices
SAP ME 6.0 New Functionality

✓ Enhanced Security – UME
✓ NetWeaver ADS Integration
✓ Configuration Data Transfer Tool
✓ New Production Operator Dashboard
✓ Shop Work Bench
✓ Visual Test & Repair
✓ Floor Stock Management
✓ Sampling
✓ Message Board
✓ Earned Standards
✓ Electronic Time Sheet
✓ Operation Standard Labor Time Recording
✓ Phantom BOM Support
✓ DHR Improvements
✓ Technical Enhancements
✓ 2D Barcode
✓ Data Field List
✓ SAPMEINT Interfaces

USER EXPERIENCE, TCO, EXTENSIBILITY, NW ADOPTION, MULTI-INDUSTRY
Extensibility
- The ME domain object model for persistence will be available for reuse to better support custom data objects and services
- New UI framework based on LSF (WPMF) for extensibility
  - The plug-in/layout architecture enables small but non-disruptive changes
- PODs converted to WPMF (rest of app on older UI framework)
- New tool to generate web services from API PLUS documentation and samples
  - All new API’s will be available as web services
  - Legacy web services hand coded and based on legacy code
  - Backwards compatibility with legacy web services maintained
- Additional APIs (and web services) published (approximately 500 in total)
- Documentation for WPMF plug-in writing and API to be included in SDK version 2.x
- Extending EXISTING POD UIs can be done through creation of plug-ins
  - Existing core plug-ins cannot be extended

Security
- NetWeaver UME integration (single sign-on)

Auditing
- NetWeaver Administration Measurement Framework integration
- Import the measurements into the License Administration Workbench (LAW) for consolidation

Solution Manager
- New Solution Manager content added to cover 6.0 scope

TCO
- Diagnostics
  - New activities to be used by SAP Services and Support to diagnose issues, particularly around transaction mgmt and DB settings
- Installation
  - NetWeaver CTC integration to improve SAPMEINT installation and configuration process
- Database
  - Consolidated ME DB scripts to reduce number of manual steps to decrease potential errors
SAP ME 6.0
Enhanced Security – User Management Engine (UME)

**Key Features**

- User Management using SAP UME for NetWeaver
- Login using standard SAP NetWeaver login.
- User authorization and authentication into SAP ME through standard login.
- Site switch capability once logged into SAP ME to allow users to identify which site they want to work on.
- Custom UME field to identify SAP ME users as “read-only” users in support of ITSAM requirements.

**Key Benefits**

- **Single source for user management and configuration**.
- Login through standard NetWeaver protocol.
- **Centralized authentication and authorization** through NetWeaver.
- LDAP support through UME.
- Restricts users to a “read-only” mode with no edit capabilities, **ensures secure access to distributed applications**.
**SAP ME 6.0**

**Data Field List**

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**Key Features**

- Creates a master data field to be defined and shared across data type categories
- Offers a restricted list of values option for each data field
- Provides a pre-save validation for each data field and data type
- A redesigned SFC Data POD plug-in

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**Key Benefits**

- Enables tighter data integrity through additional validations
- Increases data field data accuracy through a restricted list
- Enhances the data collection experience during manufacturing
SAP ME 6.0
Configuration Data Transfer Tool

Key Features

- Ability to configure master configuration data along with the dependent objects can be exported and import
- Ability to configure the destination site
- Ability to create a file of the exported data to be directly loaded into the destination site

Key Benefits

- Fast setup of a new site with assurance that master configuration data is configured properly
- Cost-saving on implementation setup and time
SAP ME 6.0
Adobe Document Services (ADS) Integration

Key Features

- Print Adobe forms from SAP ME using the ADS component in SAP NetWeaver
- Templates can be created in Adobe Live Cycle Designer w/in SAP NetWeaver Development Studio
- Print forms (e.g. labels, travelers, operating procedures,…etc. ) that contain data extracted from SAP ME during the manufacturing process

Key Benefits

- A low cost printing solution for the shop floor (no additional license costs for static/classic forms …. additional license cost for interactive forms)
- Entire solution can be procured directly from SAP (no need for third party vendors)
- Quick and easy implementation w/minimal consulting required
SAP ME 6.0
UI Harmonization: New Production Operator Dashboard

**Key Features**

- Modular plug-in and layout configuration
- Highly configurable to meet the disparate needs of the shop floor w/out custom coding
- Transact at both the production unit and operation levels
- Filter work by production unit, operation/resource, or work center/end item number
- Updated design to reflect modern “look and feel”

**Key Benefits**

- Modular configuration supports customer process/workflow requirements
- Support for multi-mode manufacturing in both high volume and complex assembly environments
- Ease of setup and configuration allow a build
SAP ME 6.0
Phantom BOM, Co-product, and By-product Support

Key Features

- Phantom BOM is supported as a BOM Component in the SAP ME BOM
- Phantom BOM members are associated to the Phantom via the Phantom Component Assembly Sequence
- Phantom Components can have assembly data type assigned
- Phantom Components and its members appear in the Component List
- All web services have been enhanced to support the import of this information

Key Benefits

- Core SAP ME BOM Maintenance will support the import of these components from SAP ERP via an integration extension
- Allows for a one-to-one mapping between ERP and SAP ME for these type of components
SAP ME 6.0
Floor Stock Management

Key Features
- Ability to define storage locations
- Enhanced ability to track and view location of floor stock
- Split an inventory ID
- Enhanced Floor Stock Report

Key Benefits
- Faster replenishment of components/floor stock avoids manufacturing delays
- Ability to track small quantities of floor stock from one storage location to another
- Flexibility to split existing floor stock across storage locations
- Better visibility to the amount of floor stock residing on the shop floor
SAP ME 6.0
Sampling

**Key Features**

- Support two types of sample plans (ANSI and Custom)
- Provides the ability to attach a sample plan to objects representing when sampling is required
- Provides the ability to collect multiple types of data during the sample-based inspection and can send messages (Message Board)

**Key Benefits**

- In-process sampling detects possible process problems and identifies non-conforming product as early as possible to prevent excess rework or scrap cost
- A sample-based approach balances the risk to quality against the costs of performing sampling
- Sampling is often conducted at the following process points to detect and eliminate problems at a minimum cost
SAP ME 6.0
New Device History Report — Unit-Specific, As-Built Data

Key Features

- Added a direct link to As Built Summary Report
- Enhanced support to view archived product genealogy
- Added the Tool and Work Instruction View logs for greater visibility
- Enhanced Data Collection and Custom Data presentation

Key Benefits

- Provides a more complete and in depth view of product genealogy
- Strengthens support for industries mandated by heavy regulatory compliance
SAP ME 6.0
Electronic Time Sheet

Key Features

- Creates user verification of work time events logged through the system
- Allows the user to review, edit and add (indirect) labor time roll up records recorded by the system prior to supervisor approval
- Provides the required labor tracking records including work time and person time events of indirect labor to be sent to SAP ERP for payroll processing

Key Benefits

- Empowers a shop floor operator to review and make edits to their labor time prior to supervisor approval
- Increases the response time for updating payroll with shop floor labor records
SAP ME 6.0
Operation Standard Labor Time Recording

Key Features

- The ability to define standard labor values in SAP ERP.
- The Standard Labor values are created in SAP ME.
- The User is able to see the Standard Labor values that were assigned to the Operation.
- Through the Collect Work Time activity the user is able to enter the actual time in SAP ME for the labor duration.

Key Benefits

- Collect actual distributed labor for a production unit and at the operation level.
SAP ME 6.0
Earned Standards

Key Features

- Claiming of standards by operators
- Controlled automatic awarding of standards
- Unclaiming of standards to correct errors
- All actions recorded in Activity Log and Earned Standards Log
- Earned Standards Log Report
- Earned Standards Log Details Report

Key Benefits

- Tracks earned value for a production unit and at the operation level
- Provides backup documentation for progress payment requests
- Ability for multiple operators to receive partial credit for a job
- Provides visibility into progress on operations with a long cycle time
SAP ME 6.0
Message Board

Key Features

- Create and send messages to either system users or external recipients (Standalone or POD)
- Messages can either be pre-defined such as events/alarms or free form
- Messages can be automatically sent based upon events that occur in the system
- Define workflow to determine how a message can be processed

Key Benefits

- Provides a single location for viewing and transacting on messages between manufacturing personnel as they perform their work
- Enables faster communication and response times in a shop floor environment
- Could be used as a vehicle to provide real time updates to partners and customers
SAP ME 6.0
Visual Test and Repair POD – Powered by Right Hemisphere

Key Features

- Viewing of ECAD layouts & schematics
- Supports standard ECAD formats, including A3P, GenCAD, IPC-2511 (GenCam), IPC-2581 (Offspring) and ODB++*
- Viewing of 2D & 3D geometry models
- Interaction with model to log a NC
- Marking of defect location in ECAD layout
- New viewer technology from Right Hemisphere (acquired by SAP in 2011) adds significantly more features

Key Benefits

- Utilizes graphics to better identify and communicate location of defects through visualization
- Supports multiple users simultaneously viewing models and creating NCs
- Enhances the repair process of defective product through visual identification
SAP ME Visual Model Viewer ECAD

Production Operator Dashboard: Site - 3000, User - DEMO_CM

POD Selection

* Operation: REPAIR
SFC: BC_20111113-170648

* Resource: DEFAULT

Completed: 0
Nonconformed: 0

Visual Test and Repair

POD Work List

<table>
<thead>
<tr>
<th>SFC</th>
<th>Material</th>
<th>Qty</th>
<th>Prio...</th>
<th>Operation Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC_20111110-153453</td>
<td>S100-1</td>
<td>1</td>
<td>500</td>
<td>11/15/2011 11:12</td>
</tr>
<tr>
<td>BC_20111113-170622</td>
<td>S100-1</td>
<td>1</td>
<td>500</td>
<td>11/15/2011 9:45</td>
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<td>BC_20111113-170648</td>
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<td>1</td>
<td>500</td>
<td>11/14/2011 3:30</td>
</tr>
<tr>
<td>S100-1-MECH-45</td>
<td>S100-1-MECH</td>
<td>1</td>
<td>500</td>
<td>11/15/2011 8:30</td>
</tr>
<tr>
<td>S100-1-MECH-ENGINE-55</td>
<td>S100-1-MECH-ENGINE</td>
<td>1</td>
<td>500</td>
<td>11/15/2011 8:30</td>
</tr>
</tbody>
</table>

Type: Component
Reference designator: U7
Device reference: 5462-0347-00
SAP ME Visual Model Viewer ECAD

Production Operator Dashboard: Site - 3000, User - DEMO_CM

POD Selection

* Operation: REPAIR
  SFC: BC_20111113-170622

* Resource: DEFAULT

Completed: 0
Nonconformed: 0

Start  Log NC  Complete  Sign Off

Visual Test and Repair

NC Data Tree

<table>
<thead>
<tr>
<th>NC Code</th>
<th>NC State</th>
<th>Failure ID</th>
<th>Ref Des</th>
<th>Component</th>
<th>Action Detail</th>
<th>Edit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAD_COMPON...</td>
<td>Open</td>
<td>U4</td>
<td>U4</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAIL</td>
<td>Open</td>
<td>R1</td>
<td>R1</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Close All Open NCs  Close

NC Selection

Available NC Codes
- BROKEN_PIN
- SCRATCH

NC Data Entry

NC Client: Log
NC with Secondary Client
1 SFC Selected
SFC: BC_20111113-170622

As-Built
* NC Code:
SAP MES Integrated Model Viewer ECAD
Philips Lighting Electronics

Enterprise
- Leading manufacturer of electronic components used in approx. 35% of all cars in the world

Business Challenges & Requirements
- Meet customer requirements to provide detailed genealogy reports for QS9000
- Integrated with SAP ERP and Metaphase PDM

Solution
- SAP Manufacturing Execution (incl. traceability, non-conformance management, test and repair, real-time SPC)

Results
- Achieved ROI for implementation in only 9 months
- Implemented across various production lines
- Traces serial numbers for modules, units and individual components throughout the manufacturing process
- Increased test yield by 5%
- Reduced repair time by 25%
- Reduced scrap by 50%
- Reduced lead time to introduce new products by 50%
- Reduced customer response time by 50%

Software Demo
Business Objects Explorer
BO content (universes, WebI reports) for SAP ME ODS
Business Objects Explorer
BO content (universes, Web-I reports) for SAP ME ODS
Exploring the SAP ME database via iPhone or iPad …
Leveraging Business Objects Explorer
### Production Detail

#### Resource (39)
- STAHL FTE: 170,153,769,324
- FTE_KLEIN: 113,260,135
- RES-2: 44,827,126,160
- R_REPAIR: 36,060,830,861
- DEFAULT: 19,880,402,305
- R_CUTTING_1: 17,622,913,193

#### Description (40)
- Descriptions:
  - epS Endmontage 2 FTE: 170,153,769,324
  - epS ANALYSE FTE: 89,543,863
  - ESC-100 PCA Board: 42,202,273,567
  - Rungs 300mm long: 20,606,426,179
  - Luefter: 15,330,451,029
  - P300: 13,487,611,707

#### Operation (55)
- Operations:
  - ANALYSE_FTE: 89,543,863
  - ENDMONTAGE2_FTE: 170,153,769,324
  - OP-2: 45,326,791,331
  - P100: 37,248,454,704
  - REPAIR: 36,060,830,861
  - CUT: 17,823,404,399

#### CNC Machine (3)
- res1: 17,622,913,193
- res2: 200,500,933

### Bar Chart
- Work Time vs. Cycle Time
- Resources:
  - R_REPAIR: 36,060,830,861 Work Time: 36,070,313,861 Cycle Time: 36,070,313,861
  - DEFAULT: 19,880,402,305 Work Time: 45,200,072,305 Cycle Time: 45,200,072,305
  - WELDRIG1: 9,598,736,073 Work Time: 22,923,447,073 Cycle Time: 22,923,447,073
  - RES-1: 5,908,918,363 Work Time: 24,122,466,363 Cycle Time: 24,122,466,363
  - R_GALVANIZE: 266,779,533 Work Time: 2,925,739,533 Cycle Time: 2,925,739,533

#### Total (15/39)
- Total Work Time: 313,181,030,294 Cycle Time: 558,689,337,414
Thank You!

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