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Agenda

- Automated Agile Manufacturing - Strategy
- PLM – Single Version of the Truth
- SAP Manufacturing Execution Overview
- SAP Manufacturing Execution Roadmap
- Wrap Up
Enable Production of One
Ensure seamless vertical and horizontal integration for individualized products

» Support **Variant Configuration** within the complete E2E process

» Up to real-time **lot-size one production** in high volume production scenarios for addressing individual customer requirements

» Integrate **Shop Floor to Top Floor** for minimizing disruption caused by any kinds of disconnect

» Integration of Quality Management with MES

Powered by **SAP HANA**

SAP PP, SAP Variant Configuration, SAP QM
SAP MII / SAP ME / SAP PCo
Handover Engineering to Manufacturing (H2M)
Ensure seamless end-to-end Engineering to Manufacturing Business process

» Support handover from **Engineering to Manufacturing** for rearranging Engineering BOM structures for Manufacturing needs

» Automate the transformation of engineering documents into production relevant BOMs and routings and increase transparency

[SAP Visual Enterprise]
[SAP Visual Manufacturing Planner]

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Provide Real Time Analytics
Predictive Analysis of Business and Sensor Information in HANA

» Deliver deep vertical integration to expose manufacturing Big Data
» Automate data aggregation to power analytics
» Develop applications that leverage the power of in-memory technology
» Innovate new business models with insights gained from analytics

Predictive Analytics
Transform
Connect
Reimagine

Powered by SAP HANA

SAP HANA, Lumira, InfiniteInsights, ESP, SQLA
SAP MII / SAP ME / SAP PCo
Production Planning & Execution
Simplify processes and deliver extraordinary user experience

» Provide real time supply chain information with solutions that solve critical planning situations -- Insight To Action – MRP Apps (MRP Cockpit)

» Combine Monitoring and Scheduling to monitor the production progress and to react in real-time to unforeseen events in the shop floor – Shop Floor Dispatcher

» Enable Complete Product and Process Genealogy throughout the entire product life cycle – from order to shipment

» Support Process Step Enforcement on serial number level to meet individual customer requirements

SAP PP & QM / MRP Live / MRP Apps / Shop Floor Dispatcher
SAP MII / SAP ME / SAP PCo / CAMS
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SAP PLM solutions for R&D and Engineering
Accelerate innovation, integrated product development, ensure compliance

SAP PLM

Product visualization, Visual Enterprise

Portfolio and project management
Embedded analytics and collaboration
Enterprise change management
Embedded quality and compliance management

Product data and structure management

Ideation  Portfolio  Concept  Design, Variants, Recipes  Simulation  Manufacturing  Maintenance  Service

Tool integration

CAD  Layout, schema, and code  Bill of results  Simulation data

CAD  ECAD, Software  CAE  Digital Manufacturing

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BOM Management
Complete historical view of all BOM types in the life cycle

- Manage BOMs from engineering across manufacturing, sales, and service
- Date and parameter effectivity driven by change management processes
- Existence of manufacturer parts visible on item level in BOM overview
- Manufacturer Parts tab summarizes in one customizable view all manufacturer parts information
- Ability to export MPN list to Excel
BOM Management
Product Structure and Variant Management

- Web UI for product structure management (high level product definition like concept BOM)
- Integrated variant configuration and simulation
  - Tabular maintenance of selection conditions
  - Automatic syntax generation
  - Visual overview about differences for variants
  - Colour coding for characteristic values
- Supporting change management both with date and parameter effectivity
- Web UI for variant assembly management
- CAx integration to variant assembly management
BOM Management
Engineering to Manufacturing Product Structure Synchronization

- Allow decoupled engineering BOM (eBOM) and manufacturing BOM (mBOM) management, to serve manufacturing and engineering requirements
- Guided process for semiautomatic reconciliation between eBOM and mBOM
- Memorize the restructuring operations between mBOM and eBOM
- Synchronize and compare structure and attributes of items
- Consider change state (smallest atom) during synchronization
Vertical Integration
Visual Manufacturing Planner for Handover Engineering to Production

- Create and maintain Material BOMs from Engineering BOM (Document Structure or iPPE)
- Enable easy rearranging of Engineering BOM structures for Manufacturing needs
- User 3D information for visualization
- Fast processing by visual supported drag & drop
- Support manufacturing planning via 3D visualization
- Fully integrated into SAP ERP
- No system border between Engineering and Manufacturing

Prerequisites:
- SAP PLM CAD integration to create the document structure
- Visual Enterprise Generator to create the RH viewing files
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Integrated Manufacturing Solution

PLM
MRP
ERP PP
APO PP/DS
Shop Floor Scheduler

Production Planning and Scheduling

Performance Visibility and Monitoring

Manufacturing Execution

Quality Planning and Control

MII
ME
ERP QM
QIM

BOBJ
Dashboards
SAP on the Shop Floor Today
MII has been positioned as the “Foundation”

### SAP MII only scenarios
- **SAP ERP**
- **SAP MII**

### SAP ME scenarios
- **SAP ERP**
- **SAP MII**
- **SAP ME**

### SAP CAMS scenarios
- **SAP ERP**
- **SAP MII**
- **SAP CAMS**

**Range of use**
- **Manufacturing Execution System**
  (in addition to SAP MII use cases)

**Target Industries**
- **Discrete Industries**

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**Target Industries**
- **A&D**
- **Complex Manufacturing**

---

**Range of use**
- Integration and Intelligence
- Reporting & Analytics
- Individual Scenarios and Use Cases

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**Target Industries**
- All Manufacturing Industries
- Utilities

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**Range of use**
- Manufacturing Execution System
- Process Planning / PLM

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**Target Industries**
- A&D
- Complex Manufacturing
## Manufacturing Suite Release Number Change

<table>
<thead>
<tr>
<th>ME</th>
<th>MII</th>
<th>PCo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original: 6.1 &gt;6.2</td>
<td>Original: 14&gt;15</td>
<td>Original: 2.3 &gt;2.4</td>
</tr>
</tbody>
</table>

**Manufacturing Suite 15.0**
SAP Manufacturing Execution (ME)
Solution Suite Overview

SAP Manufacturing Execution
» Manages and controls manufacturing and shop floor operations
» Integrates business systems to the shop floor
» Complete component and process traceability across global operations

Manufacturing Functionalities
- Traceability
- Non-conformance Management
- Labor Tracking
- Engineering Change Management
- Production Transfer
- Return and Repair
- Real-time SPC
- Production Metrics (BOBJ)
- Machine Integration Layer (PCo)
- ERP Shop Floor Integration
- Test and Repair
SAP Manufacturing Execution

Enterprise
- R&D
- Sales
- Supply Chain
- Manufacturing
- Aftermarket Service

Roles
- Planner
- Plant Mgr
- Quality Mgr
- Operator

Integration
- Bi-directional, buffered data transfer

Plant Connectivity

Processes
- Fine-granular, event-driven shop floor processes

Product and Process Data (WIP and archive)

User
- Real-time Dashboards
- Production Reporting
- 3D Visualization
- Operator-UIs

SAP Manufacturing Execution

Machines

Core components
- ME
- MEINT/MII
- PCo
SAPMEINT Pre-Built Integration

SAP Enterprise Resource Planning
- Production Order
- Planned Order
- Service Order
- Material/Classifications
- Serial Number (Material)
- BOM
- Routing
- Operation
- Work Center
- HR User w/Certification
- Inventory¹ Receipt w/ Batch
- Inventory¹ Reservation
- Inventory¹ Locations
- Equipment Scheduled Downtime
- Quality Inspection Lot
- Work Instructions
- Alternate Components
- Phantom BOM Component
- Co- and By-Products

SAP Manufacturing Execution
- WIP (Lot and Serial #) Tracking and Genealogy
- Manufacturing Process Control
- Defect Tracking and Resolution
- Data Collection
- Labor Tracking

¹ Inventory is referred to as Floor Stock in SAP ME.

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Master Data Transfer

Materials are defined at the Client Level in ERP. Therefore, MII will communicate to all ME Sites (i.e. Plants)

- Item Create or Update
  - Create new Current Revision if Necessary

- BOM Create or Update
  - Create new Current Revision if Necessary

- Router Create or Update as Current Revision
  - Create new Current Revision if Necessary

Typically the Routing from the ERP is a smaller cost routing containing only milestone operations. SAP ME users will enhance this to a very detailed production floor routing.

- Material Master Integration
  - Material Master Create or Update

- BOM Master Integration
  - Material Production BOM Becomes Effective
  - Material Production BOMs Created

- Routing Master Integration
  - Routing Task List Becomes Effective
  - Routing Task Lists Created

Materials are defined at the Client Level in ERP. Therefore, MII will communicate to all ME Sites (i.e. Plants)
SAP ME Touch Screen POD

Benefits

Touch Screen POD UI which incorporates the latest touch screen-friendly design concepts to make the shop floor operation’s navigation and use simple and easy on a touch device.

Touch-friendly designed user interfaces of the most widely used POD activities to complete the Touch Screen POD for use on the manufacturing floor.

Newly designed touch controls and features ensure an accurate and smooth experience on a touch monitor or large touch tablet:

- Graphical status indicators
- Sound alert upon error display
- Button change when process is complete
- Icon and text on the button
SAP ME Routing Enforcement and Process Assurance

Key Features and Benefits

» Ability to create, edit, and modify a manufacturing route
» Ability to support alternative and sequential operations, add conditions and logic, automate actions and nest multiple routes into a single operation
» Ability to display route in a graphical or tabular format
» Execute build plan and enforce route enabling process control
» Graphically model build plan to optimize user experience
» Automate actions for shop floor operators and conditions based on manufacturing events
» Reduce errors and improve quality
Device History Report — Unit-Specific, As-Built Data

Key Features and Benefits

» Complete “as built” record in a single report
» Electronic Device History Report
» Tree structure for drill down capabilities
» Ability to retrieve and display data as needed
» Direct link to As Built Summary Report
» Enhanced support to view archived product genealogy
» Complete process and component level traceability
» Complete genealogy in a single view
» Maintain customer and regulatory compliance
» Risk mitigation for recall exposure
» Strengthens support for industries mandated by heavy regulatory compliance
SAP ME Backward Traceability

There are times when you find a component is defective. This means that units that contain this component may potentially be defective. All you need it to quickly find all units that use the component with particular assembly data.

Just select what data you are looking for and task the system to find it for you...

SAP ME Component Usage Report gives you full components to material level visibility.
Visibility to Manufacturing Activities with SAP ME

There are so many things to ask about your production process!

- How much time it took to complete the work?
- Where the work was performed?
- When the work was performed?
- Who performed the work?

Full traceability of your production activities is available with **SAP ME Activity Log Report**
Nonconformance Management with SAP ME

When a production operator determines that a product being produced does not conform to the applicable manufacturing standards and requires special processing, the operator may assign one or more nonconformance (NC) codes to it.

With SAP ME failure tracking functionality, you can:

- Define a category of an NC code, such as Failure, Defect, Repair and allow operators to log NC codes based on the level of their expertise.
- Define unlimited number of NC codes specific to your company and define data to collect when a nonconformance code is logged.
- Determine the disposition options for the nonconforming part.
- View ECAD layouts including GenCam, Offspring and ODB++ & schematics formats.
- Viewing of 2D & 3D geometry models.
- Interact with model to log a nonconformance (NC).
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New Innovation
Order-Based Execution (SAP ME 15.0)

- Single, non-serialized unit quantities can be processed over many steps together or separately
- One-to-one relationship between the SFC and the order, helping SAP Manufacturing Execution support order-based processing for common shop floor actions
- Automatic split when partial quantity is non-conformed and dispositioned. Upon return to the production routing, the quantities are automatically merged back.
- Key data logging (i.e., components and non-conformances) against partial quantities within an non-serialized SFC
- Deliver an optimal, order-based touch UI for production operators
- Process order quantities through multiple routing steps
- Eliminate unnecessary traceability records that reduce database maintenance, helping to ensure optimal system performance
New Innovation
Mobility (SAP ME 15.0)

- Deliver browser-based mobile apps for wireless bar code scanners used on the shop floor for executing production activities
- Enable production activities in the application to be executed from mobile data terminals
- Deliver an exposed data layer, source code, and templates to support custom mobile app development

- Easier access to functionality in SAP Manufacturing Execution on the shop floor using mobile devices
- Add an enterprise mobility front end to SAP Manufacturing Execution through a newly created data layer
- Empower partners and customers to easily develop custom mobile apps
New Innovation
Enhanced Connectivity (SAP PCo 15.0)

- Near Real Time UI Support with PCo as WebSocket-Server
- HANA (ODBC)
- SAP ESP
- RESTful WS
- ODATA
- Performance Improvements
- Bundling of Data

- Support of Big Data Scenarios in the Shop Floor
- High Performance
New Innovation
Industry 4.0: Set Point Object

- A Set Point Parameter is an entity used in Manufacturing and Automation that identifies a value to which a control system will strive to achieve on a particular resource, for a particular material.

- A Set Point Group will contain one or more set point parameters, either numeric or string, that are delivered to the shop floor to a specific resource for specific products.

- The new functionality will provide PAPIs/Web Services for the master data and run time execution.

- Delivers a solution to define the set point parameters outside the controller and into the execution system for easier maintenance. Provides a concise definition, along with features, without the overhead of Data Collection within SAP ME.

- Provides a framework to support configurable products in the future.

New Innovations (ME 15.0.3)
New Innovation
POD Enhancements

- The Touch POD continues to be enhanced by the addition of two more activities available in a Touch UI
  - Standalone Data Collection
  - Time Sensitive Material
- A new messaging queue framework extended with the SDK that can be used to auto-refresh POD plug-ins by listening for notification updates
- The Operation List can be configured to automatically start the first open operation of a selected SFC for a Work Center POD

- This will reduce clicks and improve performance for customers that have many objects (i.e., work instructions) attached to an SFC
- New auto POD refresh capabilities enable SAP ME to better support automated production environments

New Innovations (ME 15.0.3)
Planned Innovation
Industry 4.0: Configurable Product

- Up to real-time lot-size one production in high volume production scenarios for addressing individual customer requirements
- Configurable product via Variant Configuration is supported today within the complete E2E process where the primary manufacturing planning is maintained within ERP
- New development will focus on supporting the same E2E process where the primary manufacturing planning is maintained within ME
- Following objects in ME will depend upon the configuration:
  - BOM (from ERP)
  - Production Steps
  - Sub-steps
  - Automation Parameters (Set Points)
- Reduces costs for manufacturing customized products by enabling product variations in any order and quantity - on the same production line
- Producing highly configurable product at costs comparable to those of mass production can provide a key competitive advantage
Sub-step is a new master data object that is defined under a routing step.

These sub-steps typically represent a list of tasks or activities that must be performed before a routing step is complete.

Sub-steps will allow parameter data collection, work instructions, components to be assembled, tools to be logged, and certifications to be enforced.

Allows the definition of sub-steps executed in manufacturing but does not require the shop floor to start and complete at every sub-step.

The goal is to minimize the amount of operator interaction with SAP ME in an operation, yet provide the associated sub-steps that must be acknowledged and tracked.
Planned Innovation
Multiple Browser Support

- In addition to Internet Explorer, SAP ME will run in a Safari, Chrome and Firefox browser*

- Offers customers the flexibility to select from multiple browsers that may better align with their internal IT standards

- This will allow for users to work on multiple browsers on a desktop computer as well as on different types of devices including an iPad

*Certified OS for each browser will be TBD
Planned Innovation
SAP ME on HANA

- Adding support for in memory technology powered by SAP HANA
- Eliminate the need for the ODS database by enabling HANA analytical capabilities on the WIP database
- Leveraging HANA compression for less frequent archiving allowing more data to be stored in WIP w/out impacting performance

- Real-time analytics and reporting
- Potential for increased transactional performance compared to relational database
- Lower TCO solution
SAP Connected Manufacturing Strategy
Cloud / On-Premise / Shop Floor

Public cloud

Private cloud

On-premise

SAP Manufacturing Execution Suite
(SAP ME, SAP MII, SAP PCo)

Manual Data Entry

Automatic Data Entry (Machine Connectivity)

SAP S/4HANA

Process & Production Planning

SAP MII

Predictive Maintenance
Logistics

Cloud fully integrated with on-premise investments

powered by SAP HANA

SAP Fiori

LIMS
MES
SCADA / HMI
Plant Data Collection
Plant Historian
Wireless Integration
LIMS / SCADA / HMI
Environmental Building Management
Sensors

DCS
PLC
MES

Shop Floor
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Where to find more information

Links

- SAP Manufacturing  http://www54.sap.com/lob/manufacturing.html
- SAP Manufacturing  http://www.youtube.com/sapvideomom
- YouTube http://scn.sap.com/community/manufacturing
- SAP Manufacturing  http://wiki.sdn.sap.com/wiki/display/ME/Home
- Community http://wiki.scn.sap.com/wiki/display/xMII/Manufacturing+Intelligence
- SAP ME WIKI on+and+Intelligence
- IOT and Industry 4.0 http://go.sap.com/assetdetail/2015/01/4c02dfc2-107c-0010-82c7-eda71af511fa.html
- Connected Manufacturing  eda71af511fa.html
Thank you

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