Batch Manufacturing with SAP MII

Application Guide

Version 1.0

February 2010
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1 Batch Manufacturing with SAP MII

1.1 Solution Overview

Batch manufacturing with SAP MII delivers a set of preconfigured, best practice templates for the solution SAP Manufacturing Integration and Intelligence (SAP MII). The batch manufacturing with SAP MII templates provide an integrated, plant-specific solution for manufacturing operations. They provide prebuilt applications with simplified user interfaces, preconfigured business processes and content to support manufacturing operations and performance reporting in batch manufacturing industries.

Batch manufacturing with SAP MII has been designed to provide plants with a lean, “smart” approach to support core manufacturing processes. The prebuilt, preconfigured templates and supporting documentation help customers and partners accelerate implementation and reduce project costs and effort. Furthermore, the “smart approach” of batch manufacturing with SAP MII delivers customers a lean solution for core manufacturing execution processes – with central, single data maintenance and seamless integration with ERP and shop floor systems. Companies can thus leverage existing investments, avoid data duplication and profit from lower total cost of ownership and time-to-value.

Batch Manufacturing with SAP MII coverage

The preconfigured templates delivered with batch manufacturing with SAP MII provide straightforward, role-specific applications to support efficient manufacturing preparation, execution, documentation and reporting. They cover 9 application areas:

- Manufacturing operations cockpits
- Manufacturing order list
- Material identification
Leveraging the SAP MII development infrastructure and pre-built, standards-compliant integration to SAP ERP and shop floor systems, the batch manufacturing with SAP MII templates integrate and synchronize manufacturing enterprise, operations and device data. In this way, plants and the enterprise benefit from accurate, real-time visibility into manufacturing activities and performance to increase plant operational efficiency and reduce costs.

### 1.2 Documentation Overview

To support SAP customers and partners leverage and implement the batch manufacturing with SAP MII templates, two documents are provided:

1. The “Technical Guide” to support implementation. This document describes the technical prerequisites and steps required to set-up a server for SAP MII and implement the batch manufacturing with SAP MII templates.

2. The “Application Guide” to support user knowledge transfer/training. This document describes the functions and features of each application template and includes a user guide. The user guide section describes a business scenario and takes the respective user role step-by-step through the applications.

To support easy demo, test and training purposes, the batch manufacturing with SAP MII templates have been set up to run with a preconfigured SAP ERP system using the SAP Best Practices for Chemicals package. In this way, integrated business scenarios are covered, running between SAP ERP for enterprise manufacturing processes and SAP MII for manufacturing operations. For documentation of SAP ERP, please see the SAP Best Practices for Chemicals package documentation.
2 Application Documentation

2.1 Icons and Context Menu in SAP MII

2.1.1 Icons used in SAP MII

The following icons are used in the SAP MII applications described herewith:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Hide Navigation Tree</td>
</tr>
<tr>
<td></td>
<td>Show Navigation Tree</td>
</tr>
<tr>
<td></td>
<td>Expand Selection Options or Table</td>
</tr>
<tr>
<td></td>
<td>Collapse Selection Options or Table</td>
</tr>
<tr>
<td></td>
<td>Input Help</td>
</tr>
<tr>
<td></td>
<td>Display Application Log</td>
</tr>
<tr>
<td></td>
<td>Refresh</td>
</tr>
<tr>
<td></td>
<td>Automatic Refresh</td>
</tr>
<tr>
<td></td>
<td>Date &amp; Time Selection</td>
</tr>
<tr>
<td></td>
<td>Material Identification in Process (Material Identification Template)</td>
</tr>
<tr>
<td></td>
<td>Material Identification successfully completed (Material Identification Template)</td>
</tr>
<tr>
<td></td>
<td>Material Identification failed (Material Identification Template)</td>
</tr>
<tr>
<td></td>
<td>Insert Table Row in a Work Instruction</td>
</tr>
</tbody>
</table>

2.1.2 Context Menu

The context menu for tables provide the following options:

- Sorting: The displayed list of orders can be sorted by column (i.e. Order or Material). The user needs to press “CTRL” and click on the column header.
- Settings
  - Refresh Rate
  - Refresh Automatically (Select/Deselect)
  - Enable Logging
• Data:
  o Export Raw Data as HTML
  o Export Raw Data as CSV
  o Export Raw Data as XML
• Preview: shows the table as HTML
• Print: Prints screen area, i.e. the table
• Help: Points to the general SAP MII documentation
• Refresh
2.2 Manufacturing Operations Cockpit

2.2.1 Description

The preconfigured, role-specific cockpits provide real-time insight into activities and important key performance indicators (KPIs), as well as quick access to relevant applications and information. Manufacturing operations cockpits are delivered for the production supervisor, shift supervisor and shop floor operator and serve as the entry and overview application for the user. They bring together the central applications the user works with (i.e. manufacturing order list, shift book messages and instructions), role-specific KPIs with drill-down capabilities, as well as URL links to additional solutions and websites.

2.2.2 Main Functions

The following manufacturing operations cockpits are provided:

a) Production Supervisor Cockpit
   - Central application: Manufacturing order list (described in Chapter 2.3)
   - Graphical display of manufacturing performance KPIs
     - Plant on-time delivery (Gauge)
     - Production Plan Adherence (Gauge)
     - Capacity Utilization (Bar chart)
   - KPI drill-down (accessed via double click on the KPI visual display)
     - KPI graphical display, KPI description, KPI calculation formula, and detailed base value data
   - Navigation tree
     - Links to further Batch Manufacturing with SAP MII applications relevant for the production supervisor
       - Usage decision (for quality control)
       - Shift book
       - Manufacturing performance (individual KPIs and production report)
     - Log Monitor (see chapter 2.9)
     - Internal links (for example purposes, a link to the SAP corporate portal is provided)
     - External links (for example purposes, selected external website links are included, like Chemical and Other Safety Information (http://msds.chem.ox.ac.uk/) and the Emergency Response Safety and Health Database (http://www.cdc.gov/niosh/ershdb/)).
b) **Shift Supervisor Cockpit**
- Central application: Shift book (described in Chapter 2.8)
- Graphical display of manufacturing performance KPIs
  - Performance (Gauge)
  - Production Plan Adherence (Gauge)
  - Capacity Utilization (Bar chart)
- KPI drill-down (accessed via double click on the KPI visual display)
  - KPI graphical display, KPI description, KPI calculation formula, detailed data for base values
- Navigation tree
  - Links to further Batch Manufacturing with SAP MII applications relevant for the shift supervisor
    - Work Instructions
    - Production Confirmation
    - Shift book
    - Shift Handover
    - Shift Administration
    - Usage Decision (for quality control)
    - Initiate Material Identification
    - Manufacturing Performance (individual KPIs and production report)
  - Log Monitor (see chapter 2.9)
  - Internal links (for example purposes, a link to the SAP corporate portal is provided)
  - External links (for example purposes, selected external website links are included, like Chemical and Other Safety Information (http://msds.chem.ox.ac.uk/) and the Emergency Response Safety and Health Database (http://www.cdc.gov/niosh/ershdb/)).

c) **Operator Cockpit**
- Central applications:
  - Shift book (described in Chapter 2.8)
  - Manufacturing order list (described in Chapter 2.3)
- Navigation tree
  - Links to further Batch Manufacturing with SAP MII applications relevant for the shop floor operator
    - Shift book
    - Work Instructions
    - Quality Control for Results Recording and Usage Decisions
    - Production Confirmation
    - Material Identification
  - Internal links (for example purposes, a link to the SAP corporate portal is provided)
  - External links (for example purposes, selected external website links are included, like Chemical and Other Safety Information (http://msds.chem.ox.ac.uk/) and the Emergency Response Safety and Health Database (http://www.cdc.gov/niosh/ershdb/)).
2.3 Manufacturing Order List

The manufacturing order list provides a convenient overview of scheduled process orders and important order details (process order number, order short description, status, scheduled start date and time, material number, short text, etc.). Users have the complete overview on one screen and can select an order from the list to mark orders for material identification or start the work instructions for order execution.

The manufacturing order list displays all scheduled, released orders for which a control recipe has been sent from SAP ERP to SAP MII.

2.3.1 Main Functions

The manufacturing order list covers the following main functions:

- Create a work overview by displaying all downloaded process orders. Using certain selection criteria the orders are grouped. To open the selection area click on the icon in the upper right corner. The following selection parameters can be used alone or in combination:
  - Plant
  - Header material number
  - Batch number (if a planned batch for the header material is already assigned)
  - Order number
  - Control recipe number and control recipe destination
  - Scheduled start and scheduled end dates for production
  - Order status ((from the SAP MII database) to include or exclude orders with the status “New”, “In process”, “Closed”)
  - Maximum number of work instructions (to restrict the number of orders shown to a maximum)

- Order Selection (for subsequent order processing)

- Order Processing
  - With “Show”, the work instructions for a selected order are displayed for further processing (see Chapter 2.5)
  - With “Discard”, the work instructions for an order can be discarded and the order line item deleted from the manufacturing order list. For this functionality, an additional authorization is needed (See Technical Guide).
  - With “Unlock” work instructions can be unlocked, for example, in case they are inadvertently locked by a user (e.g. in case of system failure). To perform “Unlock”, an additional authorization is needed (see the Technical Guide).
  - With “Mark Order for Material Identification”, a selected order is added to the material identification work list. Here orders which require identification/checking of input materials prior to further processing are sent to the Material Identification application. (See Chapter 2.4 for further details).
The following order status are used in SAP MII:

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>The control recipe has been received by SAP MII, the work instruction has been parsed and created, but it has not been switched to edit mode yet.</td>
</tr>
<tr>
<td>In process</td>
<td>A user has already changed the work instruction mode to &quot;edit&quot; and presumably made some entries. When the user leaves the work instructions, or goes to view mode again, the status is set to &quot;in process&quot;.</td>
</tr>
<tr>
<td>Locked</td>
<td>When a user is working on a work instruction (edit mode), the work instruction is locked for other users.</td>
</tr>
<tr>
<td>Closed</td>
<td>Work instructions that have been “finalized” are set to “closed” and cannot be edited anymore. The actual process and quality data entered in this work instruction have already been sent back to SAP ERP or are prepared to be sent.</td>
</tr>
<tr>
<td>Discarded</td>
<td>The work instruction has been discarded by a user with the appropriate authorization, e.g. due to errors in the order or unexpected events. Discard is only possible for an order with the status “new”. The “discard” status is sent to SAP ERP. The order status is set to “discarded” in the local SAP MII database and the work instruction no longer appears in the work order list.</td>
</tr>
</tbody>
</table>
2.4 Material Identification

2.4.1 Description

Material identification is a mobile solution to support shop floor operators controlling the correctness and completeness of staged materials for a specific process order. Operators simply select a process order, (to display the corresponding material list), and scan the material barcodes with their handheld. The pre-built interfaces for communication between handheld devices, SAP MII and SAP ERP, enable seamless integration and further processing of the barcode information. The material and batch number are automatically checked by the system for correctness. After completing material identification, the process order can be executed with for example, the work instructions application.

2.4.2 Main Functions

The material identification is carried out in two steps. In the first step, orders that require identification need to be marked. In the second step, material identification is performed for the selected order. The initiation of material identification should be done by a production or shift supervisor for orders that are due for execution. The identification data is kept in an order-specific record in the database for later review.

The following functions are available.

2.4.2.1 Initiate Material Identification

- Available Order list: On entering the transaction, a list of all available process orders is shown. The list contains only process orders that have not previously been marked/selected for the material identification process. To restrict the number of orders shown, selection parameters, like order, material, material short text, batch number and start date can be used. Once selection parameters have been entered, use “Execute” to start the selection. “Clear” resets the selection criteria.

- Order Selection: Select the orders that require a material identification from the list of available orders and press “Initiate Identification”. The selected order(s) disappear from the list and are added instead to the list of available identifications. From now on, the order is blocked for further processing until the material identification is performed.

- The order selection for material identification can also be done from the manufacturing order list. (see Chapter 2.3)

2.4.2.2 Material Identification

- Available Identifications: This transaction would usually be run on a handheld device. On entering the transaction, a list of all orders that have been marked/selected for identification is shown. To restrict the number of orders shown, selection parameters, like order, material number, status and start date can be used. Use “Execute” to start the selection; with “Clear” the selection criteria are reset.

- “Start Identification” starts the identification for a selected order. The “Identify Material” screen is then shown.

- Scan barcodes allows data entry via a pre-built interface to a barcode device. The barcode device reads i.e. the material number, barcode numbers. However, the correct quantity needs to be checked by the operator (e.g. if the amount is split across different cases). The number of scans is displayed in the column “#”.

- Automatic check for correctness and completeness of each scan.

- Pause identification allows a user to pause the identification process and complete it at a later time. The order is then marked with the symbol in the selection list. Material identification however, must be completed a max. of 30 minutes later, otherwise the
material identification for this order is discarded. A new material identification can be started.

- Complete identification after all components have been successfully identified. The order will be marked with a ☑ symbol in the order list.
- Invalidate incomplete identification after the set time interval. The default is set to 30 minutes, after which the identification has to be restarted.
- A failed identification record will be generated when the user tries to finish an incomplete material identification. This is documented with a ☒ symbol in the order list (Filter set to “All” or “Failed”). The user can pause or resume the material identification.

After successful identification, the order is again available for further processing.
2.5 Work Instructions

2.5.1 Description
The work instructions template integrates manufacturing enterprise, operations and shop floor data to support comprehensive task and process control, as well as process documentation. It provides an intuitive, easy-to-use application to take operators step-by-step through production execution for the selected process order. Work instructions provide operators all the necessary information, instructions, as well as comment and data entry fields (with automatic data validation) they need to support efficient process order execution - from safety instruction review, phase execution instructions, material consumption, in-process quality control and process order confirmation – all with digital signature support.

The content of such work instructions is defined in the overarching SAP ERP system in the master recipe and the process order. The work instruction data is sent to SAP MII via the control recipe from the SAP ERP application Production Planning for Process Industries (PP-PI). Control recipes usually transfer the following data:

- Process and control parameters
- List of materials
- Texts with instructions
- Information on process messages

Control recipe content is defined in the S88 compliant operations and phases of the master recipes, and in the SAP ERP PP-PI configuration. (See SAP Online Documentation http://help.sap.com/)

The work instructions are not only used to communicate production-relevant information and control data to operators, they are also used to provide input fields to operators to enter actual process and quality values. Actual process values that are entered in the SAP MII work instructions are stored in process messages and then sent to SAP ERP to ensure accurate update of process orders, batch records, as well as goods issue/receipt, and order settlement. Likewise, SAP ERP quality management inspection lots are updated with the confirmed inspection data. Process messages supply information on:

- Process order status
- Consumption and production of materials
- Results of in-process controls (to update the corresponding inspection lots in SAP ERP)
- Time ticket confirmations
- Material Confirmations

The operator enters the work instructions application by selecting a process order and clicking on “Show” in the Manufacturing Order List application.

2.5.2 Main Functions
The work instructions application offers the following main functions:

- Display Work Instructions: Selecting a process order in the manufacturing order list and pressing “Show” work instructions, displays the work instruction for the selected order in view mode.
- Edit Work Instructions: By selecting “View -> Edit”, work instructions are displayed and fields are activated for actual process data entry.
- Create Comment: Allows the operator to enter a comment for a work instruction.
• View Comments: Allows the operator to view all existing comments that have been entered for a work instruction.
• Display work instruction header data.

With the pre-defined process instructions and process messages, the following instruction types can be realised:

• Written instructions for the process operator describing how to carry out the production step.
• Instructions with process order-related information, like scheduled dates, times, material and component information, i.e:
  o Material consumption posting
  o Product quantities posting
  o Inspection results recording for in-process control
  o Time ticket recording (w/o yield)
  o Phase and order confirmation

• Written safety instructions and hazard, safety symbols.
• Work instructions with input fields, push buttons, drop down data selection.
  o With automatic data input validation for formulas or limits
  o With electronic signature: for user authentication via system user name and password
• Work instruction check of signature completion before finalization.

The following pre-defined process instruction categories from SAP ERP are available. They can be parsed correctly from the Work Instructions application and have been tested (See Scenario 1, Chapter 3.4).

<table>
<thead>
<tr>
<th>Process-Instruction Category</th>
<th>Content</th>
<th>Requested Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>YQ_AIR</td>
<td>Air flow with validation formula</td>
<td>YQ_AIR</td>
</tr>
<tr>
<td>YQ_ENDPI</td>
<td>Signature at the end of PI sheet</td>
<td>SIGN</td>
</tr>
<tr>
<td>YQ_HEAD</td>
<td>PI Sheet header for control recipe destination Y1</td>
<td></td>
</tr>
<tr>
<td>YQ_INSTR</td>
<td>Instruction</td>
<td></td>
</tr>
<tr>
<td>YQ_LAY</td>
<td>Layout definition of PI sheet for Chemicals</td>
<td></td>
</tr>
<tr>
<td>YQ_MATLI</td>
<td>Dispensing material list</td>
<td>YQ_CONS</td>
</tr>
<tr>
<td>YQ_PROD</td>
<td>Goods receipt from production</td>
<td>PI_PROD</td>
</tr>
<tr>
<td>YQ_PTEXT</td>
<td>Description for phase in PI Sheet</td>
<td></td>
</tr>
<tr>
<td>YQ_RPM</td>
<td>RPM with validation formula</td>
<td>YQ_RPM</td>
</tr>
<tr>
<td>YQ_TEMP</td>
<td>Temperature with validation formula</td>
<td>YQ_TEMP</td>
</tr>
<tr>
<td>YQ_DOC_X</td>
<td>Display of documents in SAP MII. To be used only in conjunction with SAP MII.</td>
<td></td>
</tr>
<tr>
<td>QMJMP_PH</td>
<td>Jump to Quality Management results recording for a phase of an order</td>
<td></td>
</tr>
<tr>
<td>YQ_CON1</td>
<td>Time ticket confirmation in conjunction with YQ_PROD</td>
<td>YQ_PHCO1</td>
</tr>
<tr>
<td>YQ_CON2</td>
<td>Time ticket confirmation in conjunction with YQ_PROD</td>
<td>YQ_PHCO2</td>
</tr>
</tbody>
</table>
Changes to these process instructions will not necessarily be reflected in SAP MII. E.g. the instruction texts can obviously be changed to your needs, formulas can be adapted as well. The general structure however should not be changed.

**Remark:** For more details and additional process instruction categories see the Technical Guide.
2.6 Quality Control

2.6.1 Description

This application template provides quality control capabilities to the shop floor. It supports result recording for inspection lots, as well as usage decision processing. Leveraging the integration with SAP ERP Quality Management, all required inspection lot data (including inspection operations, characteristic tolerance limits, decision codes for qualitative characteristics, inspection result valuation and usage decision options), are made available to the SAP MII quality control application.

For results recording, the user simply selects the relevant operation in an inspection lot. All information to record inspection results for distinct samples (with automatic tolerance validation), add comments (i.e. for defect documentation) and perform evaluation is displayed on one screen.

A qualified person can then review the recorded inspection results and make an appropriate usage decision. The results, valuation and usage decision recorded in SAP MII are automatically sent to SAP ERP to update SAP Quality Management. In return, any error messages are sent back from SAP ERP to SAP MII and displayed there.

The quality control application can be used for production-related inspection results recording for both process orders without work instructions, as well as for those with work instructions, but for which in-process quality control is not set up.

2.6.2 Main Functions

The quality control application consists of two parts – results recording and usage decision. The main functions are:

2.6.2.1 Results Recording

The Results Recording application enables a shop floor operator or a quality technician to perform quality inspections. All inspection lots intended for SAP MII are shown and can be displayed based on specific selection criteria. The inspection lots are created on order release in SAP ERP.

- Selection of inspection lot work list: To restrict the number of lots shown, the selection parameters plant, material and scheduled start date can be used. The focus should be on inspection lots for goods receipt from production. However, in-process control lots can be selected as well.
- List of Inspection Lots: Shows all selected inspection lots. For each lot, key information like, lot number, creation date and batch number are shown.
- List of Operations: For a selected inspection lot, the list of operations is shown. On selecting an operation, all samples are displayed with the corresponding inspection characteristics.
- Results Recording for inspection characteristics per sample:
  - Qualitative valuation of results (Drop-down list with predefined decision codes)
  - Quantitative inspection result recording (with automatic validation with characteristic limits)
  - Remark entry (per inspection characteristic)
  - Visual status field (per inspection characteristic)
    - grey – not recorded
    - green – within specification tolerances
    - red – outside specification tolerances
2.6.2.2 Usage Decision

The Usage Decision application enables a qualified person to decide on the usage of an inspection lot. The predefined material movements are carried out after synchronisation with SAP ERP. The previously recorded results can be reviewed by selecting the corresponding inspection lot. This application can also be used for results recording i.e. to support exceptional cases in which the qualified person, for usage decision processing, carries out results recording as well.

- Selection of inspection lot work list: To restrict the number of lots shown, the selection parameters plant, material and scheduled start date can be used. The focus should be on inspection lots for goods receipt from production. However, in-process control lots can be selected as well.
- Show inspection results: The recorded inspection results for a selected inspection lot and the respective inspection lot operation are shown
- Record results: As described in the previous chapter. Results recording can be carried out for non-valuated inspection lots. Results for other lots cannot be done.
- Make usage decision: For the selected inspection lot, the usage decision can be made via:
  - A drop-down list with predefined decision codes (i.e. accept, other batch, other material, reject, rework). These codes are defined in SAP ERP.
  - Free text remark to give information about the usage decision
2.7 Production Confirmation

2.7.1 Description
Production confirmation provides operators with a lean, straight forward application to confirm process orders and post goods movements. It is designed for order header level confirmation of process orders that are not executed via the work instructions application. Operators simply choose a process order from the order list and select confirmations or goods movements to quickly record needed information i.e. actual quantities, batch number, date and time, etc. Confirmation data is checked automatically for plausibility and validity with regards to tolerance limits, and sent to SAP ERP to update the process order and goods issue/receipt. The Goods Movement part of the application can be used to post goods receipts for orders (movement type 101) in SAP ERP, as well as planned goods issues of order components (movement type 261).

2.7.2 Main Functions
On entering the application, the system builds an order list according to the default selection criteria settings. The system selects all orders from the SAP MII data base that match the selection criteria. Please refer to the Technical Guide for information on how these defaults can be set.

2.7.2.1 Order List
- Order selection: The icon opens the selection screen. The following selection criteria are available:
  - Plant, material, order, order type and production scheduler.
  - Start date, end date, and status (i.e. to exclude already confirmed orders (system status CONF)).
  - Pressing “Execute” starts the selection.
- Order list: For each selected order, the list contains one row with the key order header information, like product, dates and status. The number of orders in the list is automatically counted in the header row.
- Right scroll bar: Used to scroll through the order list.
- Column sorting: Using the control key and the mouse pointer allows an ascending or descending sort per column.
- Data export: A right mouse click on the order list enables a data export e.g. as csv-file.

2.7.2.2 Production Confirmation
To enter production confirmation, the user needs to mark an order in the order list and press “Confirmations”. The production confirmation window, for the selected order, consists of two main parts:
In the lower part of the screen, a list of already posted confirmations is shown by confirmation number. The list provides confirmation details (i.e. confirmed quantities, execution dates) for review.
Production confirmation data for the selected order is confirmed in the upper part of the screen.

You can confirm the following data for the order:
- Produced quantity with unit of measure
- Execution start and finish dates
- Confirmation status: Final confirmation or partial confirmation
• Indicator if open material reservations have to be cleared.
• Comment: A text comment can be entered.

With “Confirm Production”, the entered data are posted and sent to the SAP ERP system. A pop-up window indicates whether the posting was successful or not. The posted confirmation is then added to the list below.

With “Clear”, the selection fields are cleared. With “Close”, the production confirmation screen is closed, and the user returns to the order list.

2.7.2.3 Goods Movements

To enter the goods movement screen, the user has to mark an order in the list of available orders and press “Goods Movements”. The “Perform Goods Movements” window for the selected order opens. It consists of three main parts:

• In the lower part, all goods movements that have already been posted for the order are listed. Key information gives a quick overview of the order status.
• In the middle section, called Materials, each order item is listed and key information provided.

Remark: In the case that you work with components that are managed in batches, and you have already done a batch selection in SAP ERP, one additional row for the batch totals record (batch key 1) is shown.

• The upper part is used to enter the goods movement data that needs to be posted. By clicking on the rows with the different materials, the system automatically displays the corresponding data in the upper section.
• For each material, quantity, storage location, batch number and a posting date can be entered.
• To prevent wrong manual entries, the posting date is selected via a date picker window. If this field remains empty, the system defaults the current date.

With “Perform Goods Movement”, entered data are posted and sent to the SAP ERP system. A pop-up window indicates whether the posting was successful, and a material document has been created in SAP ERP. The posted material movement is then added to the Posted Goods Movements list below.
2.8 Shift Book

2.8.1 Description

The shift book application supports accurate shift set-up, as well as management and reporting of shift activities, information, events and messages. Shift master data maintenance provides the user, e.g. the shift supervisor, with comprehensive tools to set up the shift structure (according to the needs of the specific plant), as well as define shift plans. Shift instructions can be used to provide relevant information to shop floor operators (i.e. tasks, due dates and times, general information). Furthermore, the shift notes capability enables manual entry, classification and documentation of important production messages and events during a shift. Finally, the shift hand-over report provides a summary of the current production order and resource status, as well as relevant shift messages and instructions. It is generated in .pdf format for storing and printing.

2.8.2 Main Functions

The Shift book application consists of 3 applications - each with a separate entry in the navigation tree:

- Shift Administration
- Shift Book
- Shift Handover

2.8.2.1 Shift Administration

In the shift administration application, the shift master data settings are made. The screen consists of 2 parts. The upper part covers master data. Here, a tab exists for each master data object. In the lower area, more detailed information is shown for each master data object tab. The content varies depending on the different master data object (i.e. factory, shift). In addition, the lower part is used to enter data for master data creation or master data changes. Pressing “Add” or “Update” saves the master data on the MII data base. The newly created or changed object is then shown in the upper part of the screen.

- Maintenance of Factories:
  Factory name and factory details (i.e. description and address) can be maintained. In the field “Plant” a reference to the SAP ERP object “Plant” is made. A unique ID is set by the system.
  **Remark:** In the shift book application the plant defined in SAP ERP can be detailed further by defining factories (1:n relationship).
  Entering the plant ID, displays the hierarchy of functional locations for the plant (as downloaded from SAP ERP to the SAP MII database). In the topology area, the downloaded hierarchy can be assigned to the factory. The hierarchy is then available as a basis for the shift book.

- Maintenance of Users:
  Users need to be assigned to factories (known as factories in the shift book application). Therefore, the available factories are shown in the dropdown list. For each user, login data, as well as details, such as, name, and phone number can be maintained. Whether the user is a team leader and/or a shift login needs to be checked.

- Maintenance of Teams:
  For each factory, teams can be created with an own login and an assigned team lead. The team order defines the sequence in which the teams usually work.

- Maintenance of Shifts:
For each factory, different shifts can be created. A description, the starting time and the duration in minutes needs to be maintained.

- **Maintenance of the Shift Plan:**
  A shift plan is maintained for a factory. It describes the sequence of shifts for a certain time period in the future. It shows the start time, the duration, as well as, the assigned team. To generate a shift plan for a factory the first time, the factory has to be chosen from the dropdown list. The defined shift list, as well as the valid team list, are displayed. The timeframe covered by the shift plan needs to be entered (e.g. the next 60 days). To include the week-end as working time, use the “Weekend” indicator (Include WE).
  With “Execute Planning”, the system generates the shift plan and displays the result in the table.
  With “Remove Future Shift Planning”, a generated shift plan can be deleted and e.g. replanned.
  A valid shift plan is the prerequisite for later use of the shift book application.

- **Maintenance of Info Types:**
  For each factory, so-called info types can be maintained. These define the “Instruction” and “Message” categories that can be used in the shift book.
  The category “Instruction” can be used to enter an information or warning that is valid for a certain period of time and shown for certain shifts or equipment.
  The category “message” is designed to be used by shop floor operators to enter observations or events that occur during a shift.
  Colour coding can be used e.g. to visualize the importance or the urgency of the entered message or instruction.

- **Maintenance of Status**
  System, as well as user-defined status, can be used for status management of the entered info types. The field “Sequence” can be used to define the priority of the different status by entering a number.
  As system status “New”, “Read”, “Closed”, “Forwarded” and “Deleted” are defined. By entering a short and long description, user status can be defined.
  To use a status in a certain factory, and a specific info type (e.g. a warning message), the status has to be assigned to info type in this factory.
  Therefore, first the factory, and then the info type, need to be selected from the respective dropdown lists. The available, as well as the already assigned status, are listed below.
  To assign or reassign a status, the move right icon and the move left icon can be used.

Once the master data settings have been maintained, the shift book application can be used.

### 2.8.2.2 Shift Book

The second application, shift book, mainly deals with instructions and messages. Instructions are entered by authorized users and are given a certain validity period. They are to be read by the shift workers to get, for example, the latest information they need for the area they work in.
Messages are entered by shop floor workers to report events that occur during the shift. They are later read, by e.g. shift supervisors, to get the latest information on shift events.
When the shift book transaction is opened, the created messages and instructions are shown in the upper part of the screen.
They are grouped on four tab pages. In addition, the actual time, the current team, shifts, as well as the name of the team lead, are displayed. For instructions, “Current Instructions” and “Future Instructions” tab pages are shown. The “Current Instructions” tab lists all instructions that are valid for the current shift.

To create an instruction, you first need to select the validity criteria. The validity covers the timeframe (start and end dates), as well as the shifts involved. Then the functional location (or group of functional locations) that the instruction refers to, has to be defined.

The functional location can be entered manually or by clicking on the icon. In the select topology pop-up, the hierarchy of functional locations is displayed in a tree structure. The required single functional location (or group of functional locations) can be selected via double-click. Press “Apply” to transfer the functional location and to close the popup.

As a next step, the user selects the instruction type and status. Finally, the instruction title and instruction text can be entered.

Pressing “Add”, creates an entry for this instruction in the SAP MII data base. A unique ID is generated by the system. In addition, the newly created instruction is shown in the list of current or future instructions (depending on the validity period), in the upper part of the screen.

To change or update an instruction, the user needs to mark the relevant instruction. The instruction details are shown in the area below and changes can be made accordingly. Pressing “Update” saves the changes to the SAP MII database and creates a new version (indicated by the Version ID). The instruction list is updated automatically with the new version.

Messages are displayed in the “Current messages” and “Previous Messages” tab pages. Current means, that the message has been created during the actual, on-going shift. At the end of the shift, all messages for the shift are transferred to the previous messages tab.

The user keeps track of shift events and new messages for the shift in the “Current messages” tab. To enter a new message, or to update an existing one, the lower part of the screen is used.
To note an event, the user first needs to classify which functional location the message is applicable to. The functional location can be entered manually or by clicking on the icon. In the select topology pop-up, the hierarchy of functional locations is displayed in a tree structure. The required single functional location, (or group of functional locations), can be chosen via double-click.

Pressing “Apply” transfers the selected functional location and closes the popup.

As a next step, the user selects the message type and status. Finally, the message title and message text can be entered.

Pressing “Add”, creates an entry for this message in the SAP MII database. A unique ID is generated by the system. In addition, the newly created message is shown in the list of current messages in the upper part of the screen.

To change or update a message, the user has to mark the relevant message in the current messages list. The message details are then shown in the area below and changes can be
done. Pressing “Update” saves the changes to the SAP MII database and creates a new version (indicated by the Version ID). The list of current messages is updated automatically with the new version.

To copy a message, mark the message in the list. The details are shown below. Pressing “Add” creates a new message but keeps the content.

The “Previous Messages” tab page is used to display message history. With “<- Previous Shift” and “Next Shift ->” the user can flip the pages of the shift book and browse through past shifts. For the selected shift, the shift start time, as well as the name, and team are shown below the message list.

The shift book is available to operators, as well as shift supervisors. To create and update instructions, a special authorization is needed.

### 2.8.2.3 Shift Handover

The Shift Handover transaction consists of the two tab pages “Messages” and “Instructions”, as well as the button at the top to generate a shift report. It is used by shift supervisors to end a shift and prepare handover for the next shift. Before generation of a shift report, all open messages should be reviewed and closed, instructions can be confirmed and the document is ready for storage or print-out.

After starting the transaction, the user has to check the listed new messages and decide whether they can be closed or forwarded. The message status is then changed appropriately, and the message itself is deleted from the list.

Switching to the instructions tab page shows the list of non-confirmed instructions that have been valid for the current shift. The user can confirm a single instruction or the whole list by clicking on the respective button. The status is changed, and the entry or entries are deleted from the list.

Finally, the user can generate the shift report by pressing “Generate Shift Report”. A new popup is displayed showing the shift report in the standard format as a .pdf file. From here the report can be saved or printed.
2.9 Monitoring and Logging

2.9.1 Description

All relevant events that occur in the different batch manufacturing templates are automatically captured and stored as log messages in the SAP MII database. The most current logs can be directly displayed from each application by pressing the icon in the upper right corner.

Alternatively, the log monitor can be used as a central place for monitoring and log analyses across all applications. Usually, a technical or key user would use this tool to retrieve information from the log files in order to track and trace system and user actions.

Log entries are classified according to severity (information, warning, error or critical messages) and can be easily filtered to support quick message finding, or selection to support problem detection and root-cause analysis.

The different applications are responsible for the creation of the log entries, as well as the content that is contained in each log message. On creation, each log entry gets an ID, as well as a time and date stamp. In addition, the severity, the message title, and the message body text are filled. Depending on the application, and the type of message, additional information is provided.

2.9.2 Main Functions

The log monitor consists of two main parts: A selection screen in the upper area, and a list table of logs in the area below.

When the log monitor application is called, a list of log entries according to the default selection parameters is shown. The counter in the header displays the number of logs contained in the list.

For each entry, the following information is shown:

- Application (that created and sent the message)
- Category
- Severity
- Date & Time when the message was created
- Message Title and Message text
- User
- Object, Object Type and Sequence
- Transaction

Filters can be used for any of the fields in the list. In this way, the user can, for example, select all messages that have been sent from a certain application, in a certain time-frame. Drop-down lists are also provided to support selection and filtering of log entries. For the field “Application”, only the applications that have sent messages to the database are shown and offered as a filter parameter.

To start a selection, choose the filter criteria and press “Execute”. “Clear” can be used to clear the selection screen.

Clicking on the icon, opens up the advanced filtering section that provides additional fields to allow a more targeted analysis of log entries. Furthermore, the maximum number of returned records can be restricted here.
2.10 Manufacturing Performance

2.10.1 Description
Manufacturing performance delivers reporting and key performance indicator (KPI) tracking.

- Batch manufacturing with SAP MII provides example KPIs for plant on-time delivery, production plan adherence and capacity utilization.
- They support easy data selection (for example, via time-frame, resource, material or cost-centre), graphical KPI display (i.e. gauge, line and bar charts), and drill-down to base values for detailed analysis.
- A production report enables production supervisors to gain quick insight into recent manufacturing data for analysis and prioritization of the manufacturing execution schedule. The production supervisor will use this report to periodically assess manufacturing execution performance.

2.10.2 Plant On-Time Delivery

2.10.2.1 Definition
The KPI plant on-time delivery indicates how many orders have been completed/delivered on time with the required quantity and quality.

In a simplified approach, it is assumed that the product is ready for shipping on completion of a process order (on time delivery keeping the planned delivery times). The latest date of completion is calculated upfront with backward scheduling from the latest delivery date (taking delivery lead times into account). Only production orders of plant outbound products are considered.

Calculation
- Plant On-Time Delivery = Number of Production Orders Completed On Time / Total Number of Completed Production Orders
- Unit of Measure: %
- Evaluation: Min: 0%, Max: 100%. Increasing trend is positive.

2.10.2.2 Main Functions
- Selection by product and time period
- Description panel with a gauge, meaning, formula and interpretation. The gauge displays the trend for the current selection
- Detailed section displaying all process orders for the selection parameters. The following information is displayed:
  - On time delivery status (per order)
  - Process order number
  - Material and material description
  - Planned and confirmed quantity
  - Scrap quantity
  - Planned and actual start data
  - Planned and actual finish date
  - Batch number
  - Order Status
2.10.3 Production Plan Adherence

2.10.3.1 Definition

The production plan adherence KPI is an indicator of the reliability and robustness of the production plan. A complete adherence is achieved when the production plan has been exactly executed. Deviations are penalized, regardless of the lateness of orders.

Calculation

- Production Plan Adherence = Planned Produced Quantity – Σ Variances (ABS (Actual Produced Quantity - Planned Produced Quantity)) / Planned Produced Quantity
- Unit of Measure: %
- Evaluation: Min: 0%, Max: 100%; Increasing trend is positive.

2.10.3.1.1 Main Functions

- Description panel with meaning, formula and interpretation
- Selection by production unit, product and time period
- Description panel with a gauge, meaning, formula and interpretation. The gauge displays the trend for the current selection
- Detailed section displaying all process orders for the selection. The following information is displayed:
  - On-time delivery status (per order)
  - Process order number
  - Material and material description
  - Delivered quantity
  - Open quantity
  - Planned and confirmed quantity
  - Scrap quantity
  - Planned and actual start date
  - Planned and actual finish date
  - Batch number
  - Order Status

2.10.4 Capacity Utilization

2.10.4.1 Definition

The capacity utilization KPI provides the ratio between the time a production unit is in use (busy time) and the time it is generally available (excluding down times (e.g. emergency shut-down, maintenance periods)).

Calculation

- Capacity Utilization = Busy Time / Total Available Time
- Unit of Measure: %
- Evaluation: Min: 0%, Max: 100%; Trend: Increasing trend is positive.

2.10.4.2 Main Functions

- Selection by production unit, product, production order and time period
- Description panel with a gauge, meaning, formula and interpretation. The gauge displays the trend for the current selection.
2.10.5 Performance

2.10.5.1 Definition
The performance KPI is an example how machine data can be visualized in SAP MII. The value of a single tag is shown in context with a work center hierarchy (see Technical Guide). The performance calculation is already calculated on the tag, therefore only a summation of values is done. The unit of measure is percent.

2.10.5.2 Main Functions
- Selection: by hierarchy, work center and time period
- Description panel with a gauge, meaning, formula and interpretation. The gauge displays the trend for the current selection
- Detailed visualization of all tags
  - The selection can be further detailed by setting the start and end date, e.g. to one week.
  - The user can work through this weekly performance within the borders of the general selection.
  - He can navigate through the week using the arrow buttons.
  - The data can be refreshed manually with the refresh button or automatically pressing

2.10.6 Production Report

2.10.6.1 Main Functions
The production report offers the following functions:
- Generate production report based on selection data. The selection data is used to build the list of process orders and aggregated confirmations entered per material. To open the detailed selection screen, click on the icon in the upper right corner. The following selection parameters can be used alone or in combination:
  - Plant
  - Material number of the order header material
  - Order number
  - Order Type
  - Production scheduler
  - Planned start date
  - Date range – and / or
    - Click on the check box to select orders whose planned start and planned finish dates fall within the dates period defined through “Planned start” and “Finish dates” (as entered by the user).
    - Uncheck the check box to select orders whose planned start or planned finish dates fall within the dates period defined through “Planned start” and “Finish dates” (as entered by the user)
  - Planned finish date
  - The maximum records returned shown can be restricted

- The generated production report is presented in two sections:
- Confirmations by material: This lists aggregated confirmation quantity entered for different process orders per material
  - Order production status: This lists process orders by their status

- Confirmations by material: This section displays the aggregated confirmation quantity posted (according to the selection data) per material in the following columns:
  - Material number of the order header material
  - Material short text
  - Unit of measure
  - Confirmed yield quantity

- Order production status: This section displays a list of process orders (according to the selection data) with associated information, in the following columns:
  - Order number
  - Material number of the order header material
  - Material short text
  - Batch
  - Target quantity
  - Yield (to be confirmed)
  - Unit of measure
  - Planned start date and time
  - Planned finish date and time
  - Actual start date and time
  - Actual finish date and time
  - Planned duration (hours)
  - Actual duration (hours)
  - System status
  - Storage location
  - Plant

In the Order Production Status and Confirmations by Material sections the following additional functions are available using the context menu.

- Data export: Pointing with the mouse pointer on the respective section (like Order Production Status) and making a right mouse click opens a pop-up. Select “Data” and a raw data export option (HTML, CSV or XML).
- Print screen: Pointing with the mouse pointer on the respective section (like Order Production Status) and making a right mouse click opens a pop-up. Choose “Print”. 
3 User Guide

3.1 Purpose & Introduction

This section shows a sample business scenario of how the different applications fit together SAP ERP Best Practices package for Chemicals is used as the ERP backbone system for this description to leverage preconfigured master data. This data can be used as is for system demonstration and user training.

Customers who have already set up an SAP ERP system can use their own data as well but would have to adapt or create some data especially in the area of work instructions to run through this scenario.

3.2 Prerequisites

Essential master and organizational data should be set up according to SAP ERP Best Practices for Chemicals; for the documentation refer to http://help.sap.com/bp_chem603/Chem_DE/HTML/index.htm. The Best Practice set up was used as a baseline for interaction with MII.

Using a Best Practice system or a similar set up in your system ensures a smooth process flow after implementation of the templates. It comprises important information like the organizational structure of your company and master data that suits its operational focus, for example, master data for materials, recipes, and customers. Some additional settings have to be done in ERP (See Technical Guide).

The setup of the SAP MII templates has to be completed upfront and SAP MII has to be connected to the ERP backbone. Details on how to make these settings are described in the Technical Guide.

3.3 Scenario Flow

3.3.1 Scenario Overview

The first scenario is a complete production run from order creation in the ERP system via execution in the MII Work Instructions applications to the final closing on the ERP side. In the second scenario the confirmations are done via the Production Confirmation application in SAP MII assuming that for certain production areas electronic work instructions are not used. The third scenario describes the use of the shift book application that enables a complete information flow from entering a message about a shop floor event, managing instructions and the creation of shift report.

Scenario 1: Bulk manufacturing with Work Instructions

This scenario starts with the creation and the release of a process order. All prerequisites for production at a given date are checked such as material and resource availability. The release triggers the creation and later sending of a control recipe to SAP MII that contains the necessary information to execute this order. Also the quality inspection for in-process control and goods receipt inspection is initiated and necessary information is downloaded to SAP MII.

In SAP MII the operator checks the list of downloaded orders for a certain workstation and selects the one he wants to start working on. He starts the manufacturing process by verifying the available material components for correctness and completeness. After completion of this
step the operator opens the work instructions and performs all described operations including an in process control. The production is finished after the work instruction is set to complete. The material postings are done and the goods receipt from production inspection is performed. To decide on the usage of the produced batch a qualified person does a usage decision.

Since all recorded data are transferred to SAP ERP, the production supervisor can do a final check and close the order.

Scenario 2: Production Confirmation

The operator starts this process with the Production Confirmation application that shows all orders for his area of responsibility. The operator then selects an order and performs a confirmation of the produced quantity. This is done by directly confirming either the completion or a partial completion of the order on header level and the later posting of goods movements for components and the product. After posting of the confirmation and the material movements, the appropriate stocks are updated and the reservations are cleared.

Scenario 3: Shift Book

The operator observes a shop floor event at a machine that he has to document. Therefore he creates a message in the shift book that relates to the e.g. malfunctioned equipment. The shift supervisor reviews the message and creates an instruction with a distinct validity period. All operators can now read the new instruction and act accordingly. At the end of a shift the supervisor checks all messages for the current shift. He either forwards the messages to the next shift or confirms them. He also checks the instructions that are due for this shift. The shift supervisor creates a shift report in a PDF format and saves it. The shift report can be used for a shift handover.

User Roles

The batch manufacturing with SAP MII templates covers three different roles:

- Production Supervisor
- Shift Supervisor
- Operator

Users shall be provided with a focused menu for different shop floor employees and their respective tasks. A user can therefore be assigned to one of these roles to view the predefined, role-specific menu and access corresponding role-relevant applications.

Remark: The roles in a real company will most probably vary from those ones and may implemented differently even between plants. E.g. if the results recording is done by the shop floor operator or by a quality technician cannot be generalized. Thus the process flow described in detail below will be executed from different employees. To improve readability the changes between roles are not mentioned.
3.3.2 Used data and settings for the Demo Scenario

3.3.2.1 SAP ERP Best Practice for Chemicals

You can find the description of the preconfigured scenarios for bulk manufacturing in the Best Practice documentation (rf. to http://help.sap.com/bp_chem603/Chem_DE/HTML/index.htm).

### Production of GranSAP blue in Plant 1000 (München)

<table>
<thead>
<tr>
<th>Master data</th>
<th>ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>CH-3200 / CH-2200 / CH-1440</td>
<td>GranuSAP, blue / SAPulat / Pigment, blue</td>
</tr>
<tr>
<td>Resource</td>
<td>RES-3010 / RES-0310</td>
<td>Extruder / Production laboratory</td>
</tr>
<tr>
<td>Master recipe</td>
<td>MR-11001</td>
<td>GranuSAP, blue, bulk production</td>
</tr>
<tr>
<td>Inspection plan</td>
<td>IP-006 / IP-007</td>
<td>Inspection plan for SAPcolor / for SAPulat</td>
</tr>
</tbody>
</table>

### Master Recipe for the production of Material “GranuSAP, blue”

<table>
<thead>
<tr>
<th>Operation</th>
<th>Phase</th>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td></td>
<td>RES-3010</td>
<td>Extrusion</td>
</tr>
<tr>
<td>0110</td>
<td></td>
<td>RES-3010</td>
<td>Dispense materials</td>
</tr>
<tr>
<td>0120</td>
<td></td>
<td>RES-3010</td>
<td>Add materials</td>
</tr>
<tr>
<td>0130</td>
<td></td>
<td>RES-3010</td>
<td>Perform Extrusion</td>
</tr>
<tr>
<td>0200</td>
<td></td>
<td>RES-0310</td>
<td>Quality inspection</td>
</tr>
<tr>
<td>0210</td>
<td></td>
<td>RES-0310</td>
<td>Quality inspection</td>
</tr>
<tr>
<td>0300</td>
<td></td>
<td>RES-3010</td>
<td>Nozzling and chopping</td>
</tr>
<tr>
<td>0310</td>
<td></td>
<td>RES-3010</td>
<td>Nozzling and chopping</td>
</tr>
</tbody>
</table>

### Production of “Blue Paint” in Plant 1000 (München)

<table>
<thead>
<tr>
<th>Master data</th>
<th>ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>CH-3000 / CH-1010 / CH-1020 / CH-7100 / CH-1430 / CH-1440</td>
<td>Paint, blue / Acrylic resin / Additive BG99 / Solvent (Grade B) / Solvent (Grade A), alternative item / Pigment, blue</td>
</tr>
<tr>
<td>Resource</td>
<td>RES-4010 / RES-0310</td>
<td>Production resource / Production laboratory</td>
</tr>
<tr>
<td>Master recipe</td>
<td>MR-21001</td>
<td>Paint, blue, Grade A, bulk production</td>
</tr>
<tr>
<td>Inspection plan</td>
<td>IP-006 / IP-009</td>
<td>Inspection plan for SAPcolor / for SAPcolor – Recurring inspection</td>
</tr>
</tbody>
</table>
### Master Recipe for the production of “Blue Paint”

<table>
<thead>
<tr>
<th>Operation</th>
<th>Phase</th>
<th>Resource</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td></td>
<td>RES-4010</td>
<td>Manufacturing basic batch</td>
</tr>
<tr>
<td>0110</td>
<td></td>
<td>RES-4010</td>
<td>Filling</td>
</tr>
<tr>
<td>0120</td>
<td></td>
<td>RES-4010</td>
<td>Heating</td>
</tr>
<tr>
<td>0130</td>
<td></td>
<td>RES-4010</td>
<td>Dispersing</td>
</tr>
<tr>
<td>0200</td>
<td></td>
<td>RES-0310</td>
<td>Quality inspection</td>
</tr>
<tr>
<td>0210</td>
<td></td>
<td>RES-0310</td>
<td>Quality inspection</td>
</tr>
<tr>
<td>0300</td>
<td></td>
<td>RES-4010</td>
<td>Add pigment</td>
</tr>
<tr>
<td>0310</td>
<td></td>
<td>RES-4010</td>
<td>Add pigment</td>
</tr>
</tbody>
</table>

#### 3.3.2.2 Additional configuration of Best Practice for Chemicals data

In addition to the settings documented for Best Practice for Chemicals, the following settings have to be made to enable the communication between ERP and SAP MII.

- Copy the control recipe destination Y1 or create a new one (see Technical Guide)
- Assign the new control recipe destination (CRD) Z1 to all operations and phases in the master recipe MR-11001. Go to master recipe maintenance (transaction C202), select recipe group MR-11001, select version 1 if not automatically displayed and change the CRD in the tab operations accordingly.
- Delete phase 0115
- Change or copy the process instruction category YQ_MATLI (see Technical Guide). If you do a copy of it, you have exchange the process instruction category in the control recipe destination.
- Change the instruction text optionally:
  - **0210**, instruction 0010, characteristic PPPI_INSTRUCTION
    "After extrusion carry out the Results Recording. In the new window enter the measured values in the appropriate fields and sign your results before coming back to the PI sheet"
  - **0310**, instruction 0010, characteristic PPPI_INSTRUCTION
    "Finalize polymerization and confirm yield accordingly. Mark the resource as 'NOT CLEAN' afterwards."
- Alternatively you can copy the recipe and do all described changes in the copied recipe version.

#### 3.3.2.3 Creation of Users in Batch Manufacturing with SAP MII

The following users are delivered with the Batch Manufacturing for MII to control the system access. To check or modify log onto the MII portal and go to User Admin.

- **BM_Operator**
  - Name: Jim Operator
  - Assigned Roles: BM_Operator, SAP_XMII_USER
• **BM_ProductionSuper**  
  Name: Jack Production  
  Assigned Roles: BM_ProductionSupervisor, SAP_XMII_USER  

• **BM_ShiftSuper**  
  Name: Bill Shift  
  Assigned Roles: BM_Shiftsupervisor, SAP_XMII_USER  

The default password for all users is “abc123”.

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3.4 Scenario 1: Bulk Manufacturing with Work Instructions

3.4.1 Prerequisites to run the scenario


Therefore, you must have completed the following processes and fulfilled the following business conditions if you want to run the templates in a broader context.

- Carry out costing run
- Check and change MM period to current period
- Post initial stock levels

Create your SAP ERP user in SAP Best Practices for Chemicals by copying the demo user “DEMO” password “best123”.

3.4.2 Detailed Overview: Scenario 1

3.4.2.1 Create and Release Process Order

3.4.2.1.1 Use

In this step the process will be created and released in SAP ERP.
3.4.2.1.2 Procedure
1. Access the transaction COR1:

<table>
<thead>
<tr>
<th>SAP menu</th>
<th>Logistics → Production - Process → Process Order → Process Order → Create → With Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction code</td>
<td>COR1</td>
</tr>
</tbody>
</table>

2. On the Create Process Order: Initial screen, make the following entries:

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
<th>User action and values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material no.</td>
<td>CH-3200</td>
<td></td>
</tr>
<tr>
<td>Production plant</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Process order type</td>
<td>YQ11</td>
<td></td>
</tr>
</tbody>
</table>

3. Choose Enter.
4. On the Create Process Order: Header – General Data screen, make the following entries:

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
<th>User action and values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantities: Total qty</td>
<td>e.g. 100 KG</td>
<td></td>
</tr>
<tr>
<td>Scheduling: Type</td>
<td>Current date</td>
<td></td>
</tr>
</tbody>
</table>

5. Choose Enter.
8. Choose Save.

3.4.2.1.3 Result
The process order is released and saved, the availability check is carried out and the quality inspection is prepared. A control recipe is generated.

3.4.2.2 Send Control Recipe

3.4.2.2.1 Use
In this step the generated control recipe of the released order is sent from SAP ERP to SAP MII.

3.4.2.2.2 Procedure
1. Access the transaction CO53:

<table>
<thead>
<tr>
<th>SAP Menu</th>
<th>Logistics → Production–Process → Process Management -&gt; Control recipe -&gt; Control recipe monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction code</td>
<td>CO53</td>
</tr>
</tbody>
</table>

2. On the Control Recipe Monitor: Initial screen, enter the plant “1000” and your process order number. Choose Display.
3. On the Control Recipe Monitor: Overview screen select the corresponding control recipes for your process order and choose Send. After processing choose Refresh.

### 3.4.2.2.3 Result
The control recipe is sent to SAP MII.

### 3.4.2.3 Check Worklist (Operator Cockpit)

#### 3.4.2.3.1 Use
The order list shows all downloaded process orders with a control recipe for the selected plant/material combination and the selected timeframe. The selection criteria are set up with default values to select process orders for material CH-3200 with work instructions that are either new or in process. For certain orders, the supervisor decides to require a material identification before the work instructions are executed.

#### 3.4.2.3.2 Procedure
1. Access the order list via the navigation tree menu.
   a. Option 1: Access the manufacturing order list in the Operations Cockpit
   b. Option 2: Access the manufacturing order list via “Work Instructions” in the navigation tree: Operations / Shift supervision → Work instructions

   In the list of orders you can change the selection criteria e.g. to restrict the selection of orders by pressing the expand selection options icon.

2. Enter the plant (1000) and your process order number.
   There are additional selection options like batch or Start/End Date that can be entered if known.
3. Choose Execute.
4. Select an order.
5. Flag the selected order by pressing “Mark Order for Material Identification”.

#### 3.4.2.3.3 Result
The order is marked for material identification and this task has to be completed before you can show the related work instructions.

### 3.4.2.4 Perform Material Identification

#### 3.4.2.4.1 Use
The material identification is used to identify component materials at staging for production for completeness and correctness using a barcode scanner. The system checks the material and/or batch numbers and/or process order number against the material list for the process order. Completeness refers to having all items of the list correctly identified. The system checks whether or not the identified components belong to the process order, it does not automatically check for quantities. The quantity is displayed for the operator to cross-check manually if necessary.
### 3.4.2.4.2 Procedure

1. **Select process order.**
   
   Logon to SAP MII and go to Operation → Material Identification. The Material Identification screen displays all process orders for which a material identification has been triggered and is not yet completely performed.

   The selection can be narrowed down by entering any of the following criteria:
   - process order number
   - material number
   - material identification status (all, unstarted, running, finished, failed)
   - scheduled start date.

2. **Press “Execute” to run the selection**

3. **Select an order and press “Start identification” to start/resume the selected material identification.**
   
   - One or more process orders can be selected. After pressing “Start Identification” the process orders are removed from the list and are marked for material identification.

   Please note: If a material identification is paused and not resumed within 30 minutes, the material identification is marked as having failed. The material identification in process is marked with the symbol ![Material Identification in Process](image).

   When the user subsequently selects the process order and resumes the material identification, a new material identification record with the same parameters is generated and started.

4. **On the “Identify Material” screen all planned components for the process order are displayed, with material number, batch number (if applicable) and the planned material quantity. The column # indicates the number of scans per material position if e.g a material is staged in more than one container.**

5. **Read the barcode with a scanner.**

6. **If no barcode scanner is available, use the following workaround/emulation:**
   
   - Click on the “Identify material” header.
   - Above it a line to enter data is opened. The syntax for entering data is $M$ material $B$ batch $O$ order $$, where $M$, $B$, $O$ and $$ are controls for the emulation and material, batch and order are the strings for the emulated bar codes.
   - The following string shows the correct syntax for material CH-2200, Batch AM01 and order number 1000525: $M$CH-2200$B$AM01$O$1000525$

   ![Identify Material](image)

<table>
<thead>
<tr>
<th>Material</th>
<th>Batch</th>
<th>Quantity</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH-2200</td>
<td>AM01</td>
<td>9.500 KG</td>
<td>2</td>
</tr>
<tr>
<td>CH-1440</td>
<td>200300132</td>
<td>0.500 KG</td>
<td>0</td>
</tr>
</tbody>
</table>

   The system checks the scanned information and plays a sound indicating a match of the information. The counter is increased by one. If the material is divided across multiple containers the user scans each container which increases the counter.

   If the system detects a mismatch (e.g. wrong combination material/batch) a different sound is played to make the user aware of a read failure. A message is written to the application log.
7. After identifying all materials finish the material identification by pressing “Complete”. The application jumps back to the material identification list.
   
a. The user can interrupt the material identification at any time by pressing “Pause”. The process must be resumed within 30 minutes; otherwise the material identification is discarded and reset for new material identification.
   
b. If any of the materials on the material list are not identified when the user tries to complete the process, an error message is displayed with the options to resume the material identification or pause it.

3.4.2.4.3 Result
The components of a process order are identified and checked for completeness. A material identification record is written to the database and the manufacturing operator can start processing the work instructions.

3.4.2.5 Process Work Instruction

3.4.2.5.1 Use
In this step, a user interface is displayed to guide the shop floor operator step-by-step through the process order execution. Predefined instructions for the operator are displayed to read and sign-off safety information, perform actions and confirm actual process values, the consumption of components and the production yield. In addition, an in-process control is performed.

Remark: Inspection result recording
As an example for in-process control using work instructions for CH-3200 (GranuSAP blue,) one standard process instruction is included in the master recipe MR-11001/1 (Phase 210).
You can switch to the results recording for in-process control window by choosing this button. This way you can directly enter measured values for the characteristics.

3.4.2.5.2 Procedure
1. Access the application by logging onto the SAP MII menu choosing one of the following navigation options:
   
a. Option 1: Access the work instruction from the manufacturing work order list in the Manufacturing Cockpit
b. Option 2: Use the left hand menu: Operations ➔ Work instructions ➔ Manufacturing Order List

On the Manufacturing Order List, you can restrict the selection of orders by pressing the pull down symbol .

2. Enter the plant (1000) and your process order number.
   • There are additional selection options like Batch or Start/End Date that can be entered if known.

3. Choose Execute to start the selection.
4. In the Order List select the corresponding process order and then select “Show”.
5. Press “View ➔ Edit” to switch from display to edit mode.
7. Check the batch number and the material quantity to be consumed and correct the values if appropriate.
8. Do a partial consumption for material CH-2200 with a third of the reservation quantity.
   • You will be prompted to accept the value that is out of range. Accept the value.
   • Create a comment in the appropriate field (optional).
9. Sign the entry by pressing “Signature” at the end of the row and sign your entry as described above.

10. Add a new line by clicking on [+].

   **Remark:** Only one table row is editable. If you open two lines one will be set to display only with the consumed quantity 0.

11. Confirm the remaining quantity, press “Signature” at the end of the row and sign your entry as described above.

12. Confirm the quantity of material CH-1440.

13. Expand phase 120 “Add Materials” and read the instruction.

14. Expand phase 130 “Perform Extrusion”.

15. Read the instruction and enter the required values

   - Temperature: 85 Grad Celsius
   - Air Flow: 3 m3/s
   - Extruder RPM: 25 1/min

   **Remark:** Values out of range will prompt for an exception to be signed. If you failed to enter to enter a value the message will be created w/o a value and will fail to be sent.

16. Expand the phase 210 “Quality Inspection” and branch to the in-process control by pressing “Insp. Results Rec”.

17. On the screen “QM data acquisition for Order […]” enter the correct values as results for inspection. Choose Enter.

   - The valuation of the characteristics occurs automatically.
   - If the values are within the given range or the correct qualitative characteristics the user can proceed.
   - If the number format is not correct or the value is out of range for the quantitative characteristics the input field will be marked red and the user is prompted to enter the value in the correct format, e.g. 3.0 instead of 3.
   - If the qualitative characteristic chosen from the drop down menu is an out of spec result, the user is prompted to enter a comment on the exception.

18. The user has the possibility to document any other occurrence by clicking “Comment” and entering a short text.

19. The results recording can be finished by entering a digital signature. It can be accessed by pressing “Signature”. The user signs with the user identification and password.

20. Expand the phase 310 “Nozzling and Chopping” and read the instruction.

21. Enter the product quantity and sign your entry.

22. Confirm the completion of the work instruction by executing the digital signature at the end of phase 310

23. Choose Finalize after confirming the end of the Work Instruction and go back.

   You will only be able to finalize the work instruction if all phases are completed (with a digital signature).

24. Review the entered comments by pressing the appropriate button in the header.

25. Close the window.

3.4.2.5.3 Result

The work instruction has been processed and completed. Process messages are sent to SAP ERP.
### 3.4.2.6 Results Recording for Good Receipt Inspection

#### 3.4.2.6.1 Use

The user records the results for inspection lots when the goods are received from production and before they are posted to the warehouse stock (04).

#### 3.4.2.6.2 Procedure

1. Access the transaction following the navigation path Operation → Quality Control → Results Recording
2. On the Results Recording Worklist screen, first enter the material CH-3200
3. Enter the plant 1000.
4. Enter a date in the “Created From Date” field either manually or by clicking on the calendar icon.
5. Check “View Production Lots” for inspection lots from production.
6. Press “Execute”. A list of inspection lots is displayed.
7. Select an inspection lot.
8. The inspection operations are shown in the list below and can be executed separately. In this example, only one operation is configured. Select the operation 0010 Inspection Semi-finished products.
9. The inspection characteristics per physical sample are displayed. Enter some values that are in the range displayed for each characteristic.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>User action and values</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color comparison</td>
<td>Select from catalogue (drop down list)</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Surface</td>
<td>Select from catalogue (drop down list)</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Viscosity</td>
<td>18,0 - 20,0</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Solid state content</td>
<td>0 – 40,0</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Recess acc. to Erichsen</td>
<td>&gt; 1,8</td>
<td>Quantitative</td>
</tr>
</tbody>
</table>

10. Enter a comment optionally.
11. Choose “Record Results”. The records are set to non-editable. They are valuated, so that values are either marked green (within specifications) or red (out of specification).
12. Choose “Perform valuation”. You can accept the sample or discard it.
13. Execute Steps 8 to 11 for each sample.

#### 3.4.2.6.3 Result

The QM inspection results have been recorded in the appropriate inspection lot.

### 3.4.2.7 Record Usage Decision

#### 3.4.2.7.1 Use

In this process step, the appropriate batch will be evaluated concerning its usage.
3.4.2.7.2 Procedure
1. Access the transaction following the navigation path Operation \(\rightarrow\) Quality Control \(\rightarrow\) Usage Decision
2. On the Results Recording Worklist screen, first enter the material CH-3200 and the plant 1000.
3. Enter a date in the “Created From Date” field either by clicking on the calendar icon.
4. Check “View Production Lots” for inspection lots from production.
5. Choose “Execute”
   A list inspection lots is displayed.
6. Select the inspection lot from previous step.
7. If you want to review the results select an inspection lot operation and press “Show Results”
   The results are shown in display mode.
8. Select a valuation code, e.g. Accept or Reject from the drop down menu.
9. Enter a comment optionally.
10. Choose “Record Decision”
    A message will be displayed indicating the successful creation of a usage decision.

3.4.2.7.3 Result
The usage decision for inspection lot will be saved. As a result, the material will be posted into
the unrestricted or restricted use in SAP ERP according to the performed usage decision.

3.4.2.8 Check Order Record

3.4.2.8.1 Use
The production supervisor checks the process order status and closes it.

3.4.2.8.2 Procedure
2. Access the transaction COR2 to check a single order:

<table>
<thead>
<tr>
<th>SAP menu</th>
<th>Logistics (\rightarrow) Production - Process (\rightarrow) Process Order (\rightarrow) Process Order (\rightarrow) Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction code</td>
<td>COR2</td>
</tr>
</tbody>
</table>

3. On the Change Process Order: Initial screen, enter the process order number you want to check.
4. Choose Enter.
5. In the process order, header data you can look at each screen to check the order status,
delivered quantity, start & end time.
6. Click on Materials in the header area of the screen.
7. Check the material quantities withdrawn in detail.
5. Choose Back.
7. In the menu go to Process order \(\rightarrow\) Functions \(\rightarrow\)Restrict Processing \(\rightarrow\) Technical complete
9. Choose Save.
OR
10. Access the transaction COHVPI for mass processing of process orders

<table>
<thead>
<tr>
<th>SAP menu</th>
<th>Logistics  \rightarrow Production - Process  \rightarrow Process Order  \rightarrow Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction code</td>
<td>COHVPI</td>
</tr>
</tbody>
</table>

11. Enter your selection criteria, e.g. plant or material
12. Press execute (F8)
13. Mark one or more orders.
   - Please note: you can review single orders by double clicking on a specific line.
14. Select execute on the mass processing symbol or press F8.
15. Select the function “Technically Complete” from the drop down list.
16. Press execute or F8.

**3.4.2.8.3 Result**

The process order is completed and saved.
3.5 Scenario 2: Production Confirmation

3.5.1 Prerequisite to run the scenario

At least one process order for the material CH-3000 has been created and released in SAP ERP.
No control recipe has been created for this order. Manual confirmations on header level will be done using the Production Confirmation application only.

3.5.2 Detailed Overview: Scenario 2

3.5.2.1 Use

The transaction for production confirmation enables the user to confirm the quantity of the produced material and the consumption of the components.
This can be done either by confirming the material to be produced or by carrying out distinct goods movements.

3.5.2.2 Procedure

1. Access the application by logging onto the SAP MII menu choosing one of the following navigation options:
   a. Option 1: Go to Shift Supervision → Production Confirmation
   b. Option 2: Go to Operation → Production Confirmation

   The selection criteria can be changed by clicking on the expand symbol in the selection bar. With the default selection, already confirmed orders and orders for which a control recipe exists are not displayed.

2. Select a process order by clicking into the appropriate row.

3. Access the Confirmation area pressing “Confirmations”.

   A pop up window is displayed where a confirmation of the produced material on header level can be performed.
   a. Check the product quantity (yield); overwrite with the actual quantity if needed.
   b. Check the batch number

Remark: In this scenario the batch number of the product is already assigned to order release in SAP ERP.
c. Click the checkbox “Final” if no further confirmations are expected and the order is complete.

**Remark:** The indicator can be set regardless whether the target quantity is confirmed or a smaller amount. Checking the “Final” indicator will automatically check the box “Clear Matl Reservation” that removes all reservations for this order. This indicator can be unchecked and all reservations on material components will remain in SAP ERP and have to be removed later.

d. Enter an execution start and finish date by clicking on the calendar symbol, selecting the correct day. The time can be set as well.
e. Enter a comment (optional)
f. Press “Confirm Production”

The order confirmation is sent to ERP.

**Remark:** The behaviour of the confirmation strongly depends on the customizing settings in SAP ERP, like backflushing or automatic goods movement.

After posting, the confirmation is displayed in the lower part of the screen to give the user an overview of already confirmed quantities (e.g. partial confirmations).

4. Post goods movements for components and the produced material by pressing “Goods Movements”.
   a. Check the material reservations and the already performed material movements.
   b. To post new or additional goods movements select a row of the material list. The data for the goods movement is prefilled by the system in the upper part of the screen.

   See below a table with the entries for a process order with the target quantity of 1000 kg for material CH-3000.

<table>
<thead>
<tr>
<th>Material</th>
<th>Qty</th>
<th>UOM</th>
<th>Stor.Location</th>
<th>Batch</th>
<th>MoveType</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH-3000</td>
<td>1.000</td>
<td>KG</td>
<td>10Q4</td>
<td>2009510457</td>
<td>101</td>
</tr>
<tr>
<td>CH-1430</td>
<td></td>
<td>KG</td>
<td>10Q2</td>
<td></td>
<td>261</td>
</tr>
<tr>
<td>CH-1010</td>
<td>450</td>
<td>KG</td>
<td>10Q3</td>
<td>2008280029</td>
<td>261</td>
</tr>
<tr>
<td>CH-1020</td>
<td>150</td>
<td>KAI</td>
<td>10Q2</td>
<td>9000000000</td>
<td>261</td>
</tr>
<tr>
<td>CH-7100</td>
<td>350</td>
<td>KG</td>
<td>10Q2</td>
<td>2008280054</td>
<td>261</td>
</tr>
<tr>
<td>CH-1440</td>
<td>50</td>
<td>KG</td>
<td>1070</td>
<td>2009300132</td>
<td>261</td>
</tr>
</tbody>
</table>

c. Enter the current date or any day in the future as posting day.

d. Change the material quantity or the storage location if appropriate.
e. Change the batch number if the material is batch managed

5. Press “Perform goods movement”. The material document is posted and the material movement will appear in the table below.

6. Click on “Close” to return to the production confirmation entry screen.

### 3.5.3 Result

The product quantity is confirmed and put into the warehouse. The components are withdrawn from stock. Unless the final indicator is set, new postings can be performed until the production is finished.
3.6 Scenario 3: Shift Book

3.6.1 Prerequisites to run the scenario

To run the shift book application in SAP, the following master data to need to be set up (see also Chapter 2.8).

Log on to SAP MII and go to Shift Supervision ➔ Shift Administration ➔ Master data.
Click on the appropriate tab and add or modify the data in the detail section in the lower screen section.

- **Factory**
  Factory Name / Plant Number (Enter the plant number of SAP ERP)
  Description / Address / Phone
  Press „Add“ to save your entry.

*Remark*: in this section the plant defined in SAP ERP can be detailed further by defining factories. Within these factories users are combined to a team that can work in different shifts. The ERP plant(s) need to have functional location(s). The hierarchy is dynamically displayed and an assignment of the different data can be done accordingly.

- **User**
  Choose the factory name in the drop down box and specify
  Login ID / Last Name / First Name / Phone / e-Mail Address
  Team leader: check this box if the user is a team lead
  Shift login: check this box if the user should be able to login with a specific shift login for a group of people
  Press „Add“ to save your entry.

- **Team**
  Choose the factory name in the drop down box and specify a name for the team.
  Assign a shift lead with the drop down box and specify a team login
  Press „Add“ to save your entry.
  If you create several teams for one factory you should specify the sequence of the teams.
  Press save to save your entry.

- **Shift**
  Select the factory from the drop down list and specify a name, description, starting time and duration of a shift.
  Press „Add“ to save your settings.

- **Shift Plan**
  Create a shift plan by selecting the factory from the drop down box.
  Define the duration of the plan in days.
  Check the box if you want to include the weekend.
  Press “Execute Planning“ and the teams are distributed in the previously defined sequence to the number of shifts you already have defined.

- **Info Types**
  On this tab you define the message and instruction types for a factory.
  Choose the factory from the drop down list.
  Enter a text for type (e.g. Info, Warning,….) and description.
You may add a colour coding, e.g. for critical messages/instructions. Check the right category to define a “message” or “instruction”. Press „Add“ to save your entry.

- **Status**
  On this tab you can create a user status scheme for messages and instructions and/or assign the status schemes to the messages/instructions. To create a status scheme, specify a long and a short description as well as a sequence number. Press „Add“ to save your entry.

To assign a status scheme choose the factory and the info type from the appropriate drop down list and assign the available status by selecting it and clicking on the arrow. The order or the status is defined by the sequence number of the status.

The handling of the shift book is dependant on the role of the user. The users BM_Shiftsuper and BM_Operator are required.

### 3.6.2 Detailed Overview: Scenario 3

![Diagram of shift book process]

### 3.6.3 Shift Book for the Shop Floor Operator

#### 3.6.3.1 Use
The operator can create messages for unexpected events and read instructions from a shift supervisor.

#### 3.6.3.2 Procedure
Log onto SAP MII and go to Operation → Shift Book.
1. Go to Current Messages tab.
2. Create a new message.
   a. Input the values into prepared field for message title, message text.
   b. Select the type of message and set the status to new.
   c. Click “Add” to save the message.
3. Modify already created messages.
3.6.3.3 Result

A new message has been created and the current instructions have been read by the operator.

3.6.4 Shift Book for a Shift Supervisor

3.6.4.1 Use

The supervisor can review the messages from the shop floor operator and create instructions. The supervisor can perform a shift handover by creating a shift report.

3.6.4.2 Procedure

Log onto SAP MII and goto Shift Supervision → Shift Book.

3.6.4.2.1 Read and create messages.

1. Steps for using messages are identical to Shop floor Operator (see Chapter 3.6.3).

3.6.4.2.2 Create and modify instructions

1. To create a new instruction:
   a. **Prerequisite**: the validation period of instruction can be set in the future only!
   b. Go to Current Instruction tab. The instructions valid for the current shift are displayed.
   c. Select “Valid From” date by using the calendar button and choosing the shift from the drop down menu.
   d. Select “Valid To” date by using the calendar button and choosing the shift from drop down menu.
   e. Click the “Topology” button and select the element of plant topology structure. Click “Apply”.

   a. Select the message from message table.
   b. Change if necessary the input fields.
   c. Click “Update” to save the changes.

4. Go to Previous Messages tab to read messages from previous shifts.
   a. Click to the “Previous Shift” or “Next Shift” buttons to switch between shifts.

5. Copy expired message to current shift.
   a. Go to Previous Messages tab.
   b. Find the message to copy.
   c. Select the message from message table. All input fields are filled with data but in read-only mode.
   d. Click the “Copy To Current Shift” button. A copy of the message will be created with status new and it is available for modification in Current Messages tab.

6. Read current instructions.
   a. Go to Current Instruction tab. All instructions valid for the current shift will be displayed.
   b. Select an instruction from the instruction table to get the detailed data from it.

7. Read future instructions.
   a. Go to Future Instruction tab. All instructions valid for the future shifts will be displayed.
   b. Select an instruction from the instruction table to get the detailed data from it.
f. Select the instruction type and set the status to new.
g. Input the instruction title and long text in predefined fields.
h. Click “Add” to create a new instruction.

2. To modify an instruction:
   a. **Prerequisite**: the validation period of instruction can be set in the future only!
   b. Select the instruction from the instruction table. The detailed data is displayed.
   c. Modify the detailed information, change the status.
   d. Click “Update” to save the changes.

3.6.4.2.3 Prepare the Shift handover

1. Go to Message tab to close or forward the messages.
   a. Select one or more row in message table.
   b. Click “Close selected messages” for setting the status of selected messages to “closed”.
   c. Click “Forward selected messages” to forward the messages to the next shift. In this case, the messages get the status “closed” in the current shift. A copy will be created valid for the next shift with the status “forwarded”.
   d. Click “Close all messages” to close all opened messages for the current shift.

2. Confirm instructions
   a. Go to the Instruction tab.
   b. Select one or more instructions from the instruction table.
   c. Click “Confirm selected instruction” to set a confirmation flag in the shift book table for selected instruction in the current shift.

3. Create shift report
   a. Click “Generate Shift Report” to generate a pdf report. It contains information about the current shift, messages and instructions created or valid in the current shift.
   b. Save the shift report to an appropriate location for later review.

3.6.4.3 Result

The shift supervisor has reviewed the messages from the shop floor, created an instruction and performed a shift handover by creating a shift report.