



Improvement of Production Execution and SAP Process Management (PP-PI-PMA) by SAP Notes

Increase Performance, Improve Usability and Total Cost of Ownership (TCO) of SAP Business Suite and S/4HANA

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IMPROVEMENT OF PRODUCTION EXECUTION AND SAP PROCESS MANAGEMENT (PP-PI-PMA) BY SAP NOTES

Version History

Current Version: Version 1.1 (2017-03-01) Minor improvements (removed typos etc.)
 Previous Version: Version 1.0 (2016-12-29) Initial version

Introduction

SAP provides several *Business Suite* applications to support production execution in batch-oriented production and discrete production:

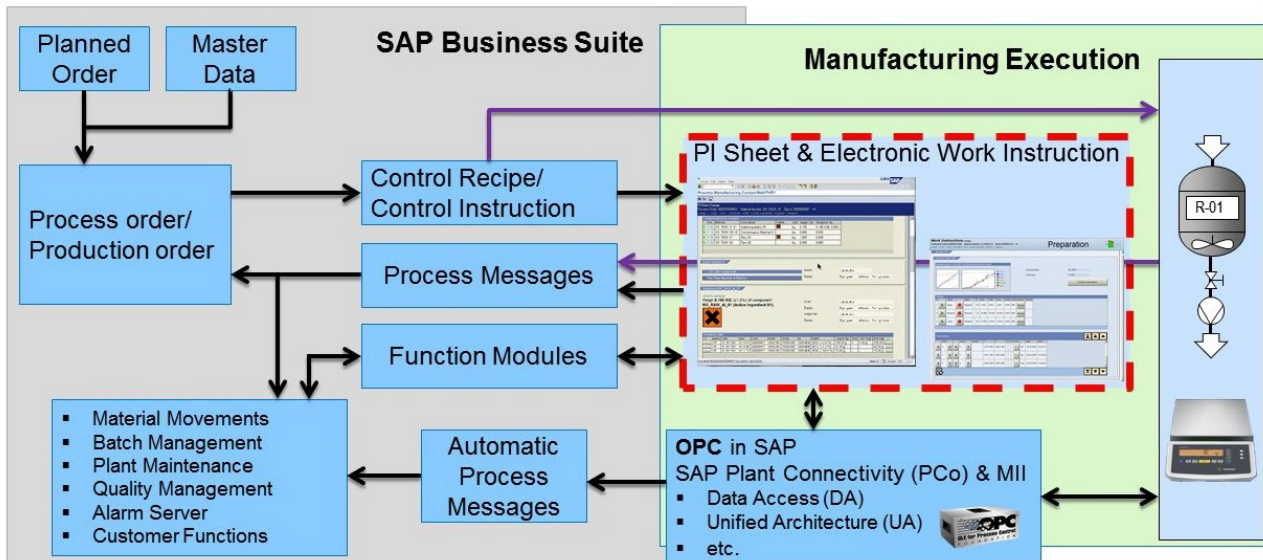


Figure 1: Main Functional Blocks of Production Execution and SAP Process Management (PP-PI-PMA)

Most of these applications were developed before SAP introduced the *Enhancement Package* concept. Since its introduction for *SAP Business Suite*, SAP has delivered several *Business Functions* that contain functional enhancements of the applications:

Business Function	Description	First Shipment
LOG_PP_PI_EHM	PP-PI, Process Industry Enhancements: XSteps / Campaign Weighing and Dispensing	EHP 2
LOG_PP_PI_PMA_01	Archiving of PI Sheets and Work Instructions	EHP 5
LOG_PP_PMA_PMC	PI Sheet	EHP 3
LOG_PP_XS_01	Cross-Plant and Multi-Language XStep Repository	EHP 5
LOG_PP_XS_RTG_PO	XSteps for Routing and PO	EHP 3

Since then the mentioned applications have shown to be a robust and reliable support of manufacturing execution processes.

These applications are still included in the actual *Enhancement Packages* of the *SAP Business Suite*. They can also be used in *SAP S/4HANA On-Premise* editions.

This document describes improvements of these applications that prevent errors, improve performance, and lower the total cost of ownership. These improvements were realized and shipped as parts of SAP notes.

Improvements of Application Components

The following application components received significant improvements by SAP notes:

Application	Application Component
NetWeaver-Based Audit Trail	BC-SRV-ASF-AT
ABAP interface for SAP Plant Connectivity	BC-SRV-PCO
Digital Signature	CA-DSG
Electronic Batch Record	PP-PI-PDO
Process Management	PP-PI-PMA
Manufacturing Data Access and Intersession Events	PP-PI-PMA
Process Messages	PP-PI-PMA-MSG
SAP OPC Data Access	PP-PI-PMA-OPC
Browser-based PI Sheets and Work Instructions	PP-PI-PMA-PMC
Execution Steps (XSteps)	PP-PI-PMA-XS

Details about the improvements are explained in the following chapters.

NETWEAVER-BASED AUDIT TRAIL (BC-SRV-ASF-AT)

The *Audit Trail* (Logging) component enables you to log and evaluate changed data in the system. *Audit Trail* facilitates a detailed, consistent and traceable description of your production processes.

You can change logging settings simply and without technical modification and carry out an evaluation of the changed data that conforms to the requirements like those of the *Federal Drug Administration (FDA)*.

Documentation of Features and Functions (SAP NetWeaver Library)

SAP NetWeaver Library: Technology Platform -> SAP NetWeaver 7.5 -> Function-Oriented View

- [Link](#)
- Menu Path: *Application Server -> Application Server ABAP -> Other Services -> Services for Administrators -> Audit Trail (BC-SRV-ASF-AT)*

Improve Usability

Recommended Prerequisite Support Packages

The *NetWeaver-based Audit Trail* is available since *SAP_BASIS 7.01, Support Package 6 (SAPKB70106)* and the corresponding support packages of higher *SAP_BASIS* releases. After the initial shipment there were additional improvements regarding performance and stability. SAP note [1834718](#) contains information about the recommended support packages that should be applied to be able to consume these improvements.

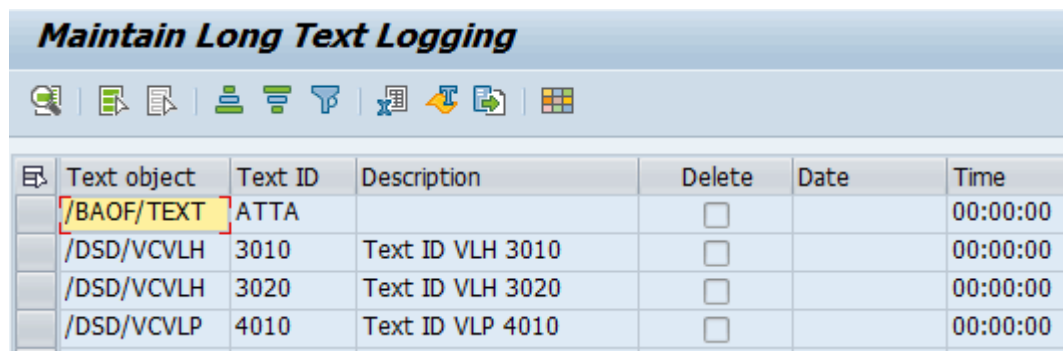
SAP Note	Description
1834718	NetWeaver audit trail: Required Support Packages

Use and Archive of Long Text Logs: Improve Performance

Delete Obsolete Long Text Logs

To trace changes on *SAPscript* long texts it is necessary to activate table logging for the tables *STXH* and *STXL*. But this activation will lead to a large increase of the *DBTABLOG* data sets: *SAPscript* texts are used in lots of business processes. And not all of these business processes are relevant for logging the changes of the corresponding long text log changes. The corrections of SAP note [2236509](#) introduce additional functions to reduce the number of recorded long text log files to the required logs. Identification of those long text changes that must be logged are described in the *SAP NetWeaver Library* of the *Audit Trail* (chapter [Configure Deletion of Long Text Logs](#)). Using this information, it is possible to define a positive list of the relevant long text objects that are logged. All other long text log objects do not need to be logged. To suppress them from

being logged, the system allows to maintain the filter table for long text log change recording (transaction *S_AUT04*):



Text object	Text ID	Description	Delete	Date	Time
/BAOF/TEXT	ATTA		<input type="checkbox"/>		00:00:00
/DSD/VCVLH	3010	Text ID VLH 3010	<input type="checkbox"/>		00:00:00
/DSD/VCVLH	3020	Text ID VLH 3020	<input type="checkbox"/>		00:00:00
/DSD/VCVLP	4010	Text ID VLP 4010	<input type="checkbox"/>		00:00:00

Figure 2: Define Filter Values for Long Text Log Creation (TA *S_AUT04*)

More details how to maintain the filter are described in the chapter [Filter for Long Text Logging](#) of the *SAP NetWeaver Library of the Audit Trail*. Please note that after synchronizing the filter tables and saving the data it is necessary to restart the system and all of its application servers.

It is possible to delete the obsolete long text logs from table *DBTABLOG* using the above defined filter table (see chapter [Delete Long Text Logs](#)). The above mentioned SAP note [2236509](#) introduced the new transaction *S_AUT05* and the new report *S_AUT_DEL* for deleting these obsolete long text logs.

SAP Note	Description
2236509	Recommendations for the use and archiving of long text logs

Archive Long Text Logs

Further improvements to increase the performance can be archived by archiving long text log files. SAP note [2236509](#) provides best practices to prepare and execute archiving. This includes the activation of archive information structures, the structure of the archive, and the activation of an additional database index. Carefully read and implement the SAP notes [2286231](#) and [2362854](#). At best do this before starting to archive your long text logs.

SAP Note	Description
2286231	Incomplete archiving of long text logs
2362854	Incomplete cleanup of archived long text logs

ABAP-INTERFACE FOR SAP PLANT CONNECTIVITY (BC-SRV-PCO)

SAP Plant Connectivity (PCo) is the favorite application to connect external data sources with *SAP Business Suite* applications. In the meantime, the usage of *SAP PCo* is **free of charge** for customers that own a valid *Business Suite* license.

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> Manufacturing -> SAP Plant Connectivity -> SAP Plant Connectivity 15.1

- [Link](#)
- Menu Path: *Processes and Integration Scenarios with SAP PCo -> Connection to External Data Sources to Bus. Suite Applications*

Improve Usability

Handle Connectivity Problems with SAP Gateway

Connecting *SAP Business Suite* applications with *PCo* agents require that suited entries are made for the corresponding RFC destination (transaction *SM59*). If the SAP application cannot connect to *SAP PCo*, this might be related to missing entries in *reginfo*- and *secinfo* files of the SAP gateway (transaction *SMGW*). SAP note [1789575](#) describes the required activities to establish the connection.

SAP Note	Description
1789575	Plant Connectivity (PCo): No registration with SAP Gateway

Processing of PCo Notifications: Improve Performance

SAP PCo introduced the possibility to bundle notification messages. This feature allows to improve the performance of sending and receiving notifications. SAP note [1901723](#) provided the required corrections to be able to handle bundled notification messages by *SAP Business Suite* applications. To ensure that all XML attributes of a PCo notification message can be accessed and evaluated it is necessary to implement the corrections of SAP note [2079530](#).

SAP Note	Description
1901723	Business suite integration with PCo: Message bundling
2079530	S_PCO: Processing of notifications and attributes

DIGITAL SIGNATURE (CA-DSG)

After SAP introduced the class-based signature tool it has been quite easy to implement digital signatures for ABAP-based applications of the *SAP Business Suite*: Just follow the instructions of the implementation guide that is attached to SAP note [700495](#).

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Cross Application Functions -> Cross Services -> Scenarios in Applications -> Data Archiving (CA-ARC) -> ArchiveLink Scenarios -> SAP ArchiveLink – Application Scenarios (PP) -> Optical Archiving of Batch Records (PP-PI)*

Digital Signature Log: Improve Usability**Display Application Logs of Signature Processes**

During execution of signature processes the system creates application log entries. SAP provided the transaction *DSAL* to access and evaluate these application logs. This transaction is only available in SAP systems with an *ERP SAP_APPL* software layer. But as the digital signature functionality is located in the *SAP_ABA* basis layer, it is also used in systems without the *SAP_APPL* software layer. After implementing SAP note [1139038](#) the new transaction *DSLOG* is available in your system. It now allows the access and the evaluation of application logs in all systems that can use the digital signature tool functionality. In addition to the functionality of transaction *DSAL* it allows to access and display archived application log data:

Figure 3: Selection Screen of Transaction DSLOG

SAP Note	Description
1139038	Signature tool: Missing log display in SAP_ABA

Access Signed Documents and Display Signature Comments from the Digital Signature Log

During evaluation of the signature logs it might be necessary to display the signed document or check the comments that the signer entered during signing. To archive this SAP provided suited Business Add-ins (BAdI) for the transactions *DSAL* and *DSLOG*:

- The classical BAdI *CJ_DSAL_FUNC* has to be implemented to enhance transaction *DSAL*. The SAP notes [594010](#), [827417](#), and [1027446](#) provide the required information for creating the suited custom implementation of the BAdI.
- The kernel-based BAdI *BADI_DS_DSAL_FUNC* allows the same enhancement for transaction *DSLOG*. Please check that the corrections of SAP note [1742572](#) are existing in your system. The function to display the comments of individual signatures is part of the core functionality of transaction *DSLOG* and does not require implementing the BAdI:

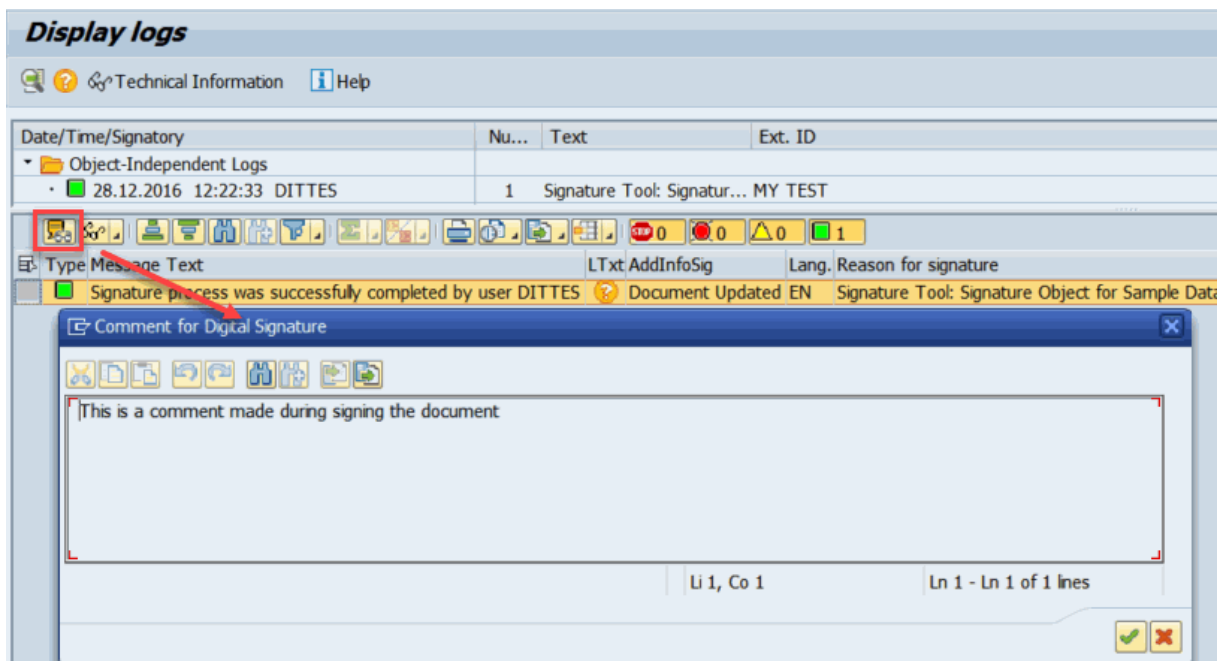


Figure 4: Display the Comment of an Individual Signature (Transaction DSLOG)

SAP Note	Description
593041	DSAL: Digital Signature Logs - BAdI
594010	DSAL: Example implementations for BADI CJ_DSAL_FUNC
827417	Signature tool: Output of signed documents using DSAL
1027446	DSAL: Activating the comment display for indiv signatures
1742572	BADI_DS_DSAL_FUNC: Implementation does not run

Digital Signature Framework: Improve Usability

Define Signature Strategies with more than Eight Individual Signatures

SAP provides the possibility to set up multi-step signature processes like four eyes cross-checks by defining signature strategies (transactions *ELSIG00*, *ELSIG01*, *ELSIG02*, and *ELSIG03/ELSIG03N*). This includes also the definition about the sequence in which the individual signatures have to be executed. Initially the number of individual signatures of a signature strategy was limited to eight individual signatures. But some business processes like the long-term approval of documents requires more than eight individual signatures per signature strategy. If your business process has similar requirements, then check the SAP notes [861377](#) and [1481933](#).

SAP Note	Description
861377	Using more than eight individual signatures per strategy
1481933	Dump GETWA NOT ASSIGNED when defining more than 8 signatures

Digital Signature Framework: Improve Performance

Archive Data of Digital Signatures

If data of the application is going to be archived the corresponding digital signature data should also be archived. Archived digital signature data remains accessible in the archive after deleting the corresponding datasets from the database.

Archiving of the digital signature data is available as of support package 4 of software component *SAP_ABA 7.02*: SAP introduced the new archiving object *DS_ARCH* of the archiving transaction *SARA*:

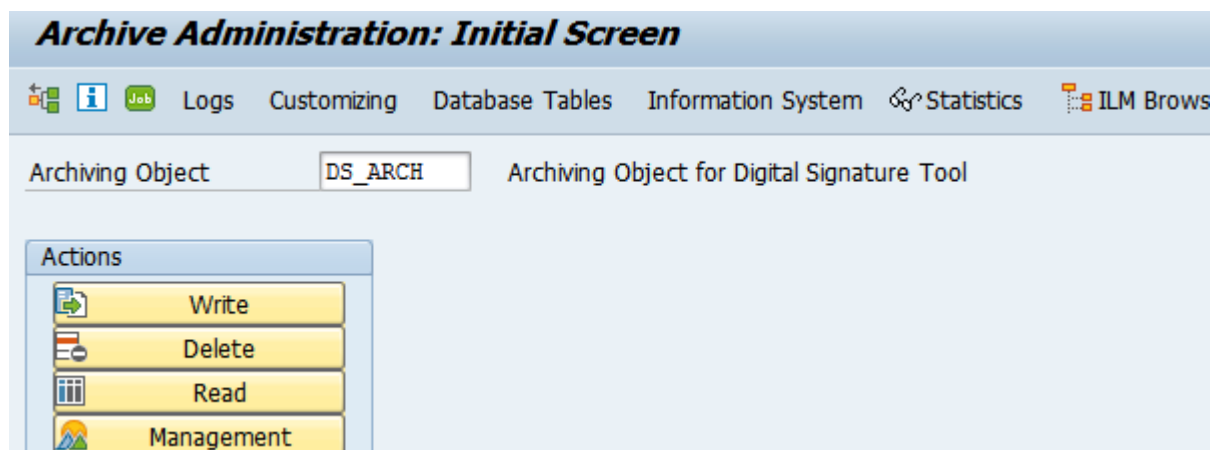


Figure 5: Archiving Signature Data using Transaction SARA

As a prerequisite to archive the signature data it is necessary to flag their signature header data for archiving. Setting this flag has to be triggered when the application data is archived. Please note that **setting the archive flag is currently not implemented** for the applications that use the digital signature framework. Efforts to implement setting the archive flag are quite low. The required activities are described in the chapter *Archiving Guide Digital Signature Tool* of the implementation guide (attachment of SAP note [700495](#)).

SAP Note	Description
700495	Digital Signature implementation by using signature tool

Delete Data of Digital Signatures

If documents that had digital signature processes were deleted in applications that use the digital signature tool, the dependent entries (the data from the signature processes) was not deleted from the database tables of the digital signature framework. These entries are orphaned to an extent, because the business data they refer to no longer exist in the system or because the connection with this data can no longer be restored. Follow the instructions of SAP note [2085590](#) to detect and remove orphaned database table entries.

The incomplete deletion of signature data of browser-based PI Sheets and work instructions was fixed with SAP note [2270500](#).

SAP Note	Description
2085590	Signature tool: Deletion of digital signatures
2270500	PI sheet/work instruction: Incomplete deletion of signature data

ELECTRONIC BATCH RECORD (PP-PI-PDO)

Batch records allow the documentation of the production and the processing of your batches. Initially the batch records have been mostly used during batch-oriented production of pharmaceuticals and active ingredients. In the meantime, batch records are also required for production of food and beverages. Also the discrete production of medical devices requires batch record functionality. The following chapters briefly describe the available enhancements that are part of SAP notes.

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> Process Data Documentation and Evaluation (PP-PI-PDO) -> Process Data Documentation*

Improve Usability

Use the Batch Record for Production Orders

The creation of batch records for batches of production orders is now possible by creating an implementation of the new BAdI *BADI_VBP_ORD_EXT*. The BAdI is shipped as content of SAP note [1993446](#). Implementation efforts are reduced when the provided sample class *CL_EI_VBP_ORD_EXT* is inherited. Similar to the application data of the PP-PI batch records the work instructions, the process messages, and other application data of the batch are also part of the batch record. This includes archiving the batch record data on optical archives using *SAP ArchiveLink* technology.

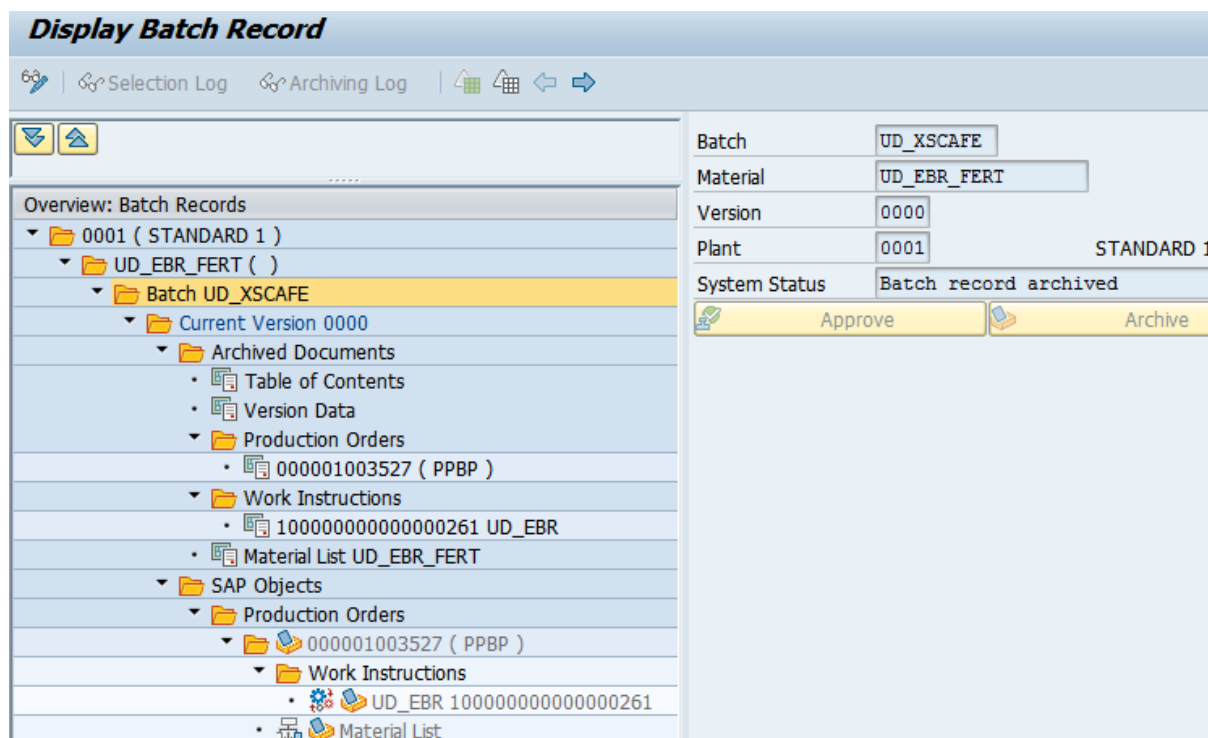


Figure 6: Batch Record for Batch of the Production Order (Transaction COEBR)

SAP Note	Description
1993446	Batch record: Preparation for integration of external inspection lots

Assign Additional Content to the Batch Record

Until now there were only very limited possibilities to add additional custom information of batches to the batch record. If the batches are used in other applications like quality messages or outbound deliveries, it would require quite complex custom development to add the application context to the batch record.

The assignment of additional content is now easily possible by creating an implementation of the new BAdI *BADI_VBP_CUST_EXT*. The BAdI is shipped as content of SAP note [1993446](#). Implementation efforts are reduced when the provided sample class *CL_EI_VBP_CUST_EXT* is inherited. The additional content is collected in a new folder (Customer Objects) of the navigation tree of the batch record. The new BAdI provides additional methods to navigate to the application or archive the application data:

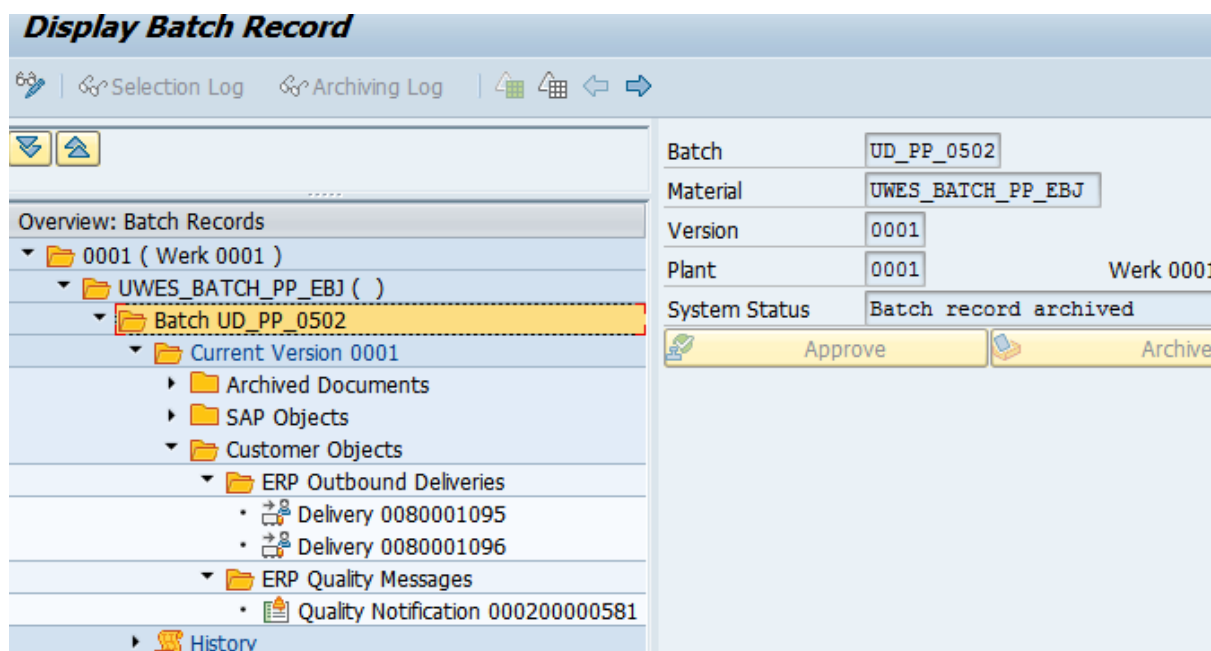


Figure 7: Display Data of Additional Applications in the Batch Record (Transaction COEBR)

Assign Data of External Inspection Lots

Batches of the batch record are assigned to external inspection lots that, for example, were created during the confirmation of the goods receipt in *SAP Extended Warehouse Management (EWM)*. The handling of the external inspection lots in the batch records is less user-friendly.

To improve the usability of external inspection lots the new BAdI *BADI_VBP_LOT_EXT* is provided. The BAdI and its sample class *CL_EI_VBP_LOT_EXT* are shipped as content of SAP note [1993446](#).

SAP Note	Description
1993446	Batch record: Preparation for integration of external inspection lots

Improve Deviation Analysis for Batch Records

SAP offers the possibility to execute deviation analysis for batch records. Under certain circumstances more deviation documents are created for a batch record version than needed. This may lead to confusion during audits. The SAP notes [2268946](#), [2305649](#), and [2375232](#) contain improvements that allow streamlining the creation of deviation documents.

SAP Note	Description
2268946	Batch record: Unnecessary variance analysis during approval of the EBR version
2305649	Follow-on note for SAP Note 2268946: Hiding radio buttons for saving and discarding variance analyses
2375232	Side effect of SAP Note 2268946: No automatic archiving of variance analyses in dialog mode

Improve Performance

Creation of Batch Record Versions via Background Jobs

The automatic creation of new batch record versions via background jobs is currently not supported in SAP standard. But it is possible to create a custom report instead. Unfortunately, the required function module *VB_CP_NEW_VERSION_CREATE* is not suited for execution in background jobs. Implement SAP note [2233620](#) to add the required coding changes that allow background job usage.

SAP Note	Description
2233620	VB_CP_NEW_VERSION_CREATE by background job

PROCESS MANAGEMENT (PP-PI-PMA)

You can use the applications of the process management component to coordinate the exchange of production-relevant data between the *SAP Business Suite* system and the independent production level (of an external system). The following chapters contain information about improvements of specific applications like *Intersession Events (ISE)*, process messages, Browser-based PI Sheets, work instructions, and XSteps.

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> Process Management (PP-PI-PMA)*

MANUFACTURING DATA ACCESS (MDA) AND INTERSESSION EVENTS (ISE) (PP-PI-PMA)

Manufacturing Data Access (MDA) is an internal interface that enables data exchange between different applications of the SAP system. Applications that have registered as services at this interface can read and write values of data points from other applications. You can subscribe to events that have occurred in other applications. The exchange of these events is based on the *Intersession Event (ISE)* framework. The *ISE* framework uses the shared buffer of the ABAP application servers to distribute the *ISE* events. In the beginning *MDA* and *ISE* functionality has been used by applications of the process management component.

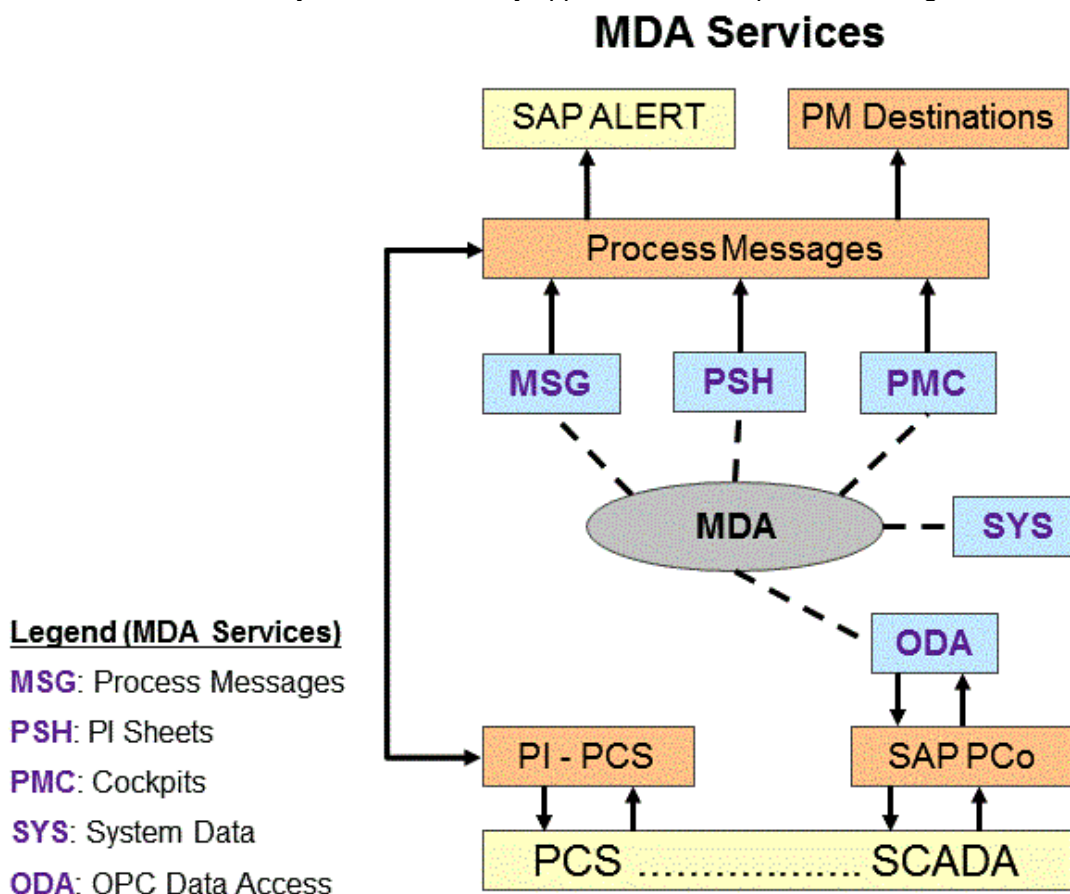


Figure 8: Process Management Applications Using Manufacturing Data Access (MDA) Services

In the meantime, other applications like the status board of SAP's Aerospace and Defense solution (IS-DFS-LM-STs) use *Intersession Events (ISE)*. Based on customer feedback the performance of the *ISE* framework was significantly improved.

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> Process Management (PP-PI-PMA) -> Events in PI Sheets and Cockpits -> Manufacturing Data Access*

Improve Performance

Major Redesign of Intersession Events (ISE)

The ISE framework was redesigned to reduce the system load and improve the performance. Additional tools and reports are provided to clean-up orphaned entries in shared buffer and in the event registration database. After implementing the corrections of the SAP notes listed below you will benefit from the increase in ISE performance.

SAP Note	Description
2131657	Performance problems with regard to intersession events (ISE)
2133793	Intersession eventing: Performance improvement (subsequent note)
2136067	Intersession eventing: No manual read of ISE event queue
2136069	Intersession events (ISE): Information about performance optimization
2137408	Intersession events (ISE): Cleanup of shared buffer
2156497	Intersession Events: Collective SAP Note for Improve Performance
2199381	Error in the report RCMX_ISE_CLEANUP_SHBUF
2213045	Report RCMX_ISE_CLEANUP_SHBUF: Incomplete deletion of obsolete ISE registrations when the report is executed as a background job
2399522	Intersession Events (ISE): Zu frühes Setzen der DB-Sperre für CMX_ISE_REG

PROCESS MESSAGES (PP-PI-PMA-MSG)

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> -> Process Management (PP-PI-PMA) -> Process Messages*

Improve Usability

Prevent Overriding the Creator of Process Messages by Batch User

If process messages are sent automatically by background jobs the person who created the background job appears as creator of the process message. This correct system behavior may not be the wanted behavior. SAP note [1454671](#) introduced the new BAdI `BADI_COCB_MSD_PROC`. It contains methods to set the creator of the process message from the information of the field `SOURCE`. To activate this BAdI it is necessary to create and activate a custom implementation. The example implementation class `CL_IM_BADI_COCB_MSD_EXAMPLE` is also part of the corrections and can be used as template for the custom implementation.

SAP Note	Description
1456450	Optimizing method calls for BAdI <code>BADI_COCB_MSD_PROC</code>
1454671	Batch user overrides creator of process message

Improve Performance

Reduce Time for Sending of Process Messages

In most cases process messages are sent using the SAP standard reports `RCOCB002`, `RCOCB003`, or `RCOCB004`. Implementing the corrections of SAP note [2146873](#) can speed up sending the process messages significantly.

SAP Note	Description
2146873	Performance problem during process message sending

SAP OPC DATA ACCESS (PP-PI-PMA-OPC)

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> SAP OPC Data Access*

Improve Total Cost of Ownership (TCO)

Use SAP Plant Connectivity (PCo) for Accessing OPC Data

SAP PCo is the favorite choice to connect external data sources like weighing systems, process logic controllers with SAP process management components like browser-based PI Sheets, Process Operator Cockpits, or Electronic Work Instructions. You can reuse the configuration in your SAP system that you set up for using the predecessor functionality *SAP ODA Connector*. Check the linked SAP library chapter for further information.

SAP Note	Description
1993447	Replacement of SAP OPC Data Access (SAP ODA) against SAP Plant Connectivity (PCo)

BROWSER-BASED PI SHEETS AND WORK INSTRUCTIONS (PP-PI-PMA-PMC)

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- Links: [Browser-Based PI Sheet](#), [Work Instructions](#)
- Menu Paths:
 - *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> -> Process Management (PP-PI-PMA) -> Process Instruction Sheet -> Browser-Based PI Sheet*
 - *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Orders (PP-SFC) -> Process Integration -> Work Instructions*

Improve Usability and Security

Access New Context Menu

Most of the functionality to process browser-based PI Sheets and work instructions are accessible by the context menu. Prerequisite for using the context menu was the implementation of an *ActiveX* component (*iemenu.ocx*) of *Microsoft*. To improve usability and security the context menu does not need the *ActiveX* component after implementing the corrections of SAP note [2343187](#). Based on this solution it is now possible to restrict the access of the context menu for selected users (SAP note [2383597](#)).

SAP Note	Description
2343187	New Context Menu solution to replace the obsolete ActiveX control - iemenu.ocx.
2383597	CO60: User specific access to new context menu on PI Sheets.

Support Processing of PI Sheets and Work Instructions using Internet Explorer 11

If you use *Internet Explorer 11* you will observe difficulties during processing of browser-based PI Sheets and work instructions. The root cause of these difficulties are related to incompatible changes in the functionality of the Internet Explorer. Implement the corrections of SAP note [2224356](#) to get rid of these blockers.

SAP Note	Description
2224356	Internet Explorer 11: No maintenance of browser-based PI Sheets and Electronic Work Instructions

Improve Performance

Use Destination Sequences

The processing of large browser-based PI Sheets and work instructions leads to long loading times. It is not easy to identify the place to continue processing in the content of such objects. Ideally such large objects should be split into smaller objects that can be processed in a defined order.

To archive this, the sequenced processing of browser-based PI Sheets and work instructions was shipped with SAP note [2286550](#). This SAP note contains a detailed implementation guide covering all necessary aspects. Activation of the functionality is controlled by the new BAdI *BADI_CMX_XS_DST_SEQ*. The sample implementation class *CL_EI_CMX_XS_DST_SEQ* contains all required elements and can easily be inherited in your custom implementation of the BAdI.

The destinations of the corresponding control recipes or control instructions can be chained to custom defined destination sequences. The destination sequence is assigned to the XStep tree that acts as the design time element for the resulting browser-based PI Sheets and work instructions.

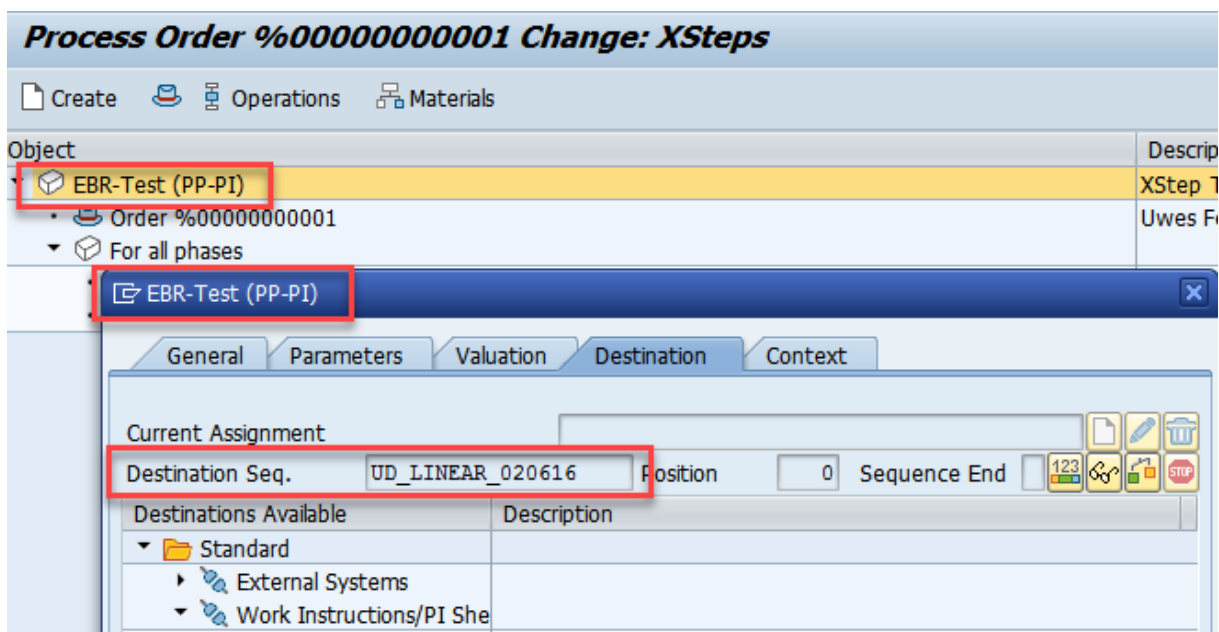


Figure 9: Assignment of Destination Sequence to the XStep Root Node

If destination sequences are used the system behavior will change as follows:

During generation of control recipes/instructions for an XStep tree the system checks if destination sequences are linked to the corresponding XStep tree root node:

- If a destination sequence is assigned the system determines the destinations that belong to the current position of the destination sequence.
- The system generates the control recipes/instructions for the determined destinations. The system does not generate control recipes/instructions for the destinations that are maintained for other positions of the destination sequence.
- After processing all control recipes/destinations of the current position the generation of control recipes/instructions can be executed again: The system determines the destinations that belong to the next position of the destination sequence. The system generates the control recipes/instructions for the determined destinations. The system does not generate control recipes/instructions for the destinations that are maintained for other positions of the destination sequence.
- After processing of all control recipes/instructions that belong to the last position of the destination sequence the execution of the destination sequence is finished.

The new report *RCMX_XS_MAINT_DST_SEQ* provides an easy and comfortable way to maintain destination sequences:

XSteps: Maintenance of Destination Sequences

General Selection Criteria

Plant	0001
Maintenance Action	Create Destination Sequence
Destination Sequence	SAMPLE_SEQ
Description Destination Seq.	Sample Destination Sequence

Figure 10: Selection-Screen of Maintenance Report

The available destinations can be assigned to positions of the destination sequences. Definition of destination sequences that contain endless loops or other inconsistencies is prevented by automatic consistency checks.

Destination Sequence SAMPLE_SEQ: Positions

Consistency Check Reset to DB Status Append Position Insert Position Delete Position Save Changes

Destination Sequence	Position	Name	Description	Location	Namespace	Type	Predecess.
SAMPLE_SEQ	1	04	Proc. Control Sys. 2	0001	SAP	PCS	
SAMPLE_SEQ	2	05	HTML-PI sheet grp 2	0001	SAP	PMC	04
SAMPLE_SEQ	3	UD	UD EBR: PI Sheet/EWI	0001	SAP	PMC	05

Figure 11: Maintenance of Positions for a given Destination Sequence

Destination sequences can contain the following structures:

- Linear order of destinations
- Forks
- Parallel branches

Linear Destination Sequences

This destination sequence consists of a linear sequence of destinations:

- At first the control recipe/instruction of destination S1 is generated (position 0001)
- After processing control recipe/instruction of destination S1 the next control recipe/instruction of destination S2 is generated (position 0002)
- Then control recipe/instruction of destination S3 is generated (position 0003)
- Finally control recipe/instruction of destination S4 is generated (position 0004)

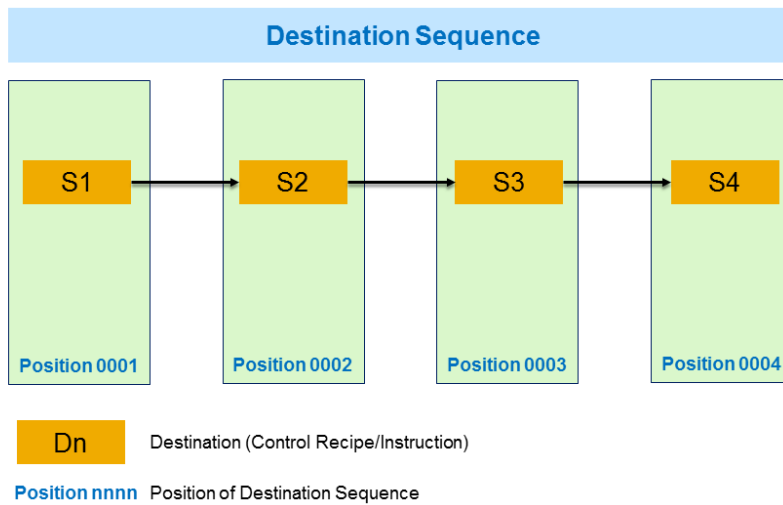


Figure 12: Example of a Linear Destination Sequence

Forked Destination Sequence

This destination sequence contains a fork:

- At first the control recipe/instruction of destination S1 is generated (position 0001)
- After processing control recipe/instruction of destination S1 the next control recipe/instruction of destination S2 is generated (position 0002)
- Then control recipe/instruction of destination S3 is generated (position 0003)
- Finally the control recipes/instructions of destinations S4 and T4 are generated (position 0004)

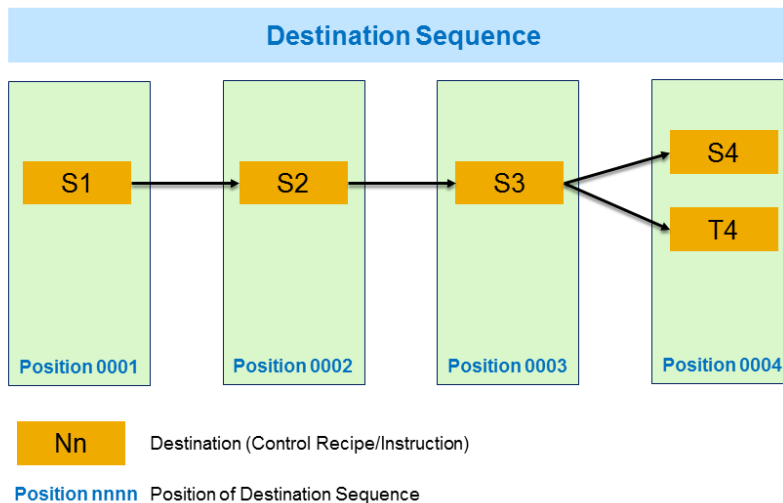


Figure 13: Example of a Forked Destination Sequence

Destination Sequence with Parallel Branches

This destination sequence contains two parallel branches:

- At first the control recipe/instruction of destination S1 is generated (position 0001)
- After processing control recipe/instruction of destination S1 the next control recipes/instructions of destination S2 and T2 are generated (position 0002)
- Then control recipes/instructions of destination S3 and T3 are generated (position 0003)
- Finally, the control recipe/instruction of destination S4 is generated (position 0004)

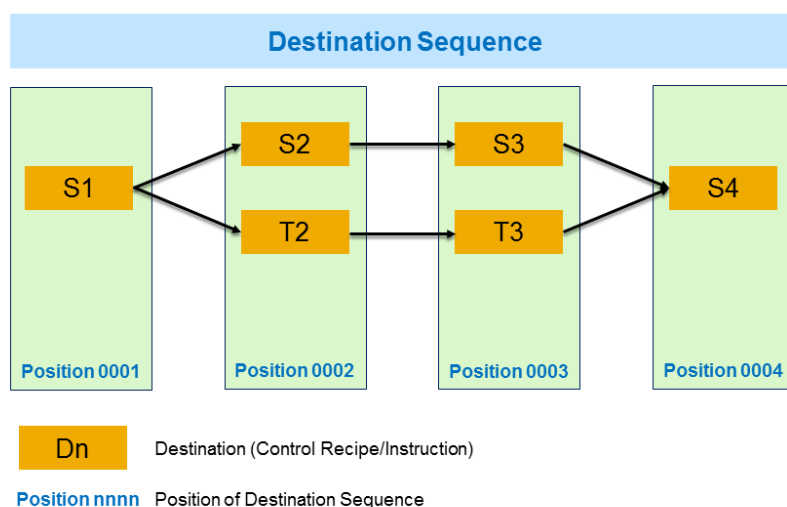


Figure 14: Example of a Destination Sequence that Contains Parallel Branches

SAP Note	Description
2286550	No processing of PI sheets/EWIs in accordance with destination sequence

Archive Browser-Based PI Sheets and Work Instructions

If you work with browser-based PI Sheets and work instructions for a longer period of time you might recognize a decrease in performance during loading and processing. In most cases this is related to the high number of datasets in the corresponding database tables. If the PI Sheets and work instructions should be accessible also in future (during audits) the archiving of these objects should be the favorite choice. Until this time only those PI Sheets and work instructions could be archived that are part of a batch record. Since *Enhancement Package 5 (ECC 6.05)* SAP provides the possibility to archive PI Sheets and work instructions that are not part of batch records in the standard (transaction `CO_ARCH_PISHEET`).

Similar to the archiving of batch record content the *SAP ArchiveLink* functionality is used. This allows you to display the content of the PI Sheet and work instruction in the usual way. After archiving the corresponding database entries can be deleted to free disk space and increase performance.

For lower *SAP Business Suite* releases (including *SAP R/3 4.70* and *4.6C*) this functionality is also available: SAP note [1317521](#) contains detailed information which SAP note is applicable for your release.

SAP Note	Description
1317521	Archiving PI sheets and work instructions
1417286	Browser-based PI sheet: Missing archiving
1417893	Browser-based PI sheets: Archiving (R/3 4.6C)

Completely Delete Obsolete Signature Data from the Database

If you delete browser-based PI Sheets and work instructions from the database, the data of the corresponding digital signatures will not be deleted from the database. This results in orphaned data sets. After implementation of SAP note [2270500](#) the system will properly delete the signature data when browser-based PI Sheets and work instructions are deleted. The prerequisite SAP note [2085590](#) provides you with a report that can detect and remove the remaining orphaned signature data sets.

SAP Note	Description
2085590	Signature tool: Deletion of digital signatures
2270500	PI sheet/work instruction: Incomplete deletion of signature data

Select Signature Strategies Dynamically

You use browser-based process instruction sheets or electronic work instructions. They contain input fields for digital signatures. The signatures should use signature strategies. These signature strategies had to be

assigned during the design time (maintenance of XSteps). The assigned signature strategy cannot be replaced after the process instruction sheet or the work instruction was created.

To map scenarios that require the use of different signature strategies depending on the process flow of production, you must define the relevant input fields of the signatures several times. This increases the data volume of the process instruction sheet or the work instruction, which leads to problems with runtime and long load times. In addition, the process instruction sheet or the work instruction contains sections that are not processed. This impairs clarity and usability. These issues are solved after implementing the corrections of SAP note [2302865](#): Now a dynamic selection of signature strategies is possible during the maintenance of PI Sheets and work instructions.

SAP Note	Description
2302865	Performance improvement with dynamic selection of signature strategies

EXECUTION STEPS (XSTEPS) (PP-PI-PMA-XS)

Documentation of Features and Functions (SAP Library)

SAP Library: Enterprise Management -> SAP ERP -> SAP ERP 6.0 EHP8

- [Link](#)
- Menu Path: *SAP ERP -> SAP ERP Central Components -> Logistics -> Production Planning and Control (PP) -> Production Planning for Process Industries (PP-PI) -> Process Management (PP-PI-PMA) -> Execution Steps*

XStep Repository: Reduce Total Cost of Ownership (TCO)

Improve Content of the XStep Repository - Add New Features to the SXS Library

You can speed up the creation of custom Standard Steps (SXS) by copying and adjusting SXS templates of the Standard XStep Library. These templates are available as attachments of SAP note [2409582](#).

Some of the SXS templates required the creation of custom function modules. In the meantime, most of them are replaced by similar function modules of the function group `CMX_TOOLS_FM`. Depending on the release and support package level of your system it might be necessary to implement the SAP notes [1453716](#) and [1990497](#).

SAP Note	Description
1453716	SXS library: Missing function modules
1990497	Function group <code>CMX_TOOLS_FM</code> : Improved functionality
2409582	Standard XStep Library – Reusable Standard XStep Templates

XStep Repository: Improve Usability

Better XML Import and Drag & Drop Behavior of the XStep Repository

The XStep repository showed strange behavior when you tried to import the XML content of a folder as child node of the repository top node. This includes wrong drag and drop behavior while moving folder nodes in the XStep repository. These issues are fixed after you implemented SAP note [2155559](#).

SAP Note	Description
2155559	XStep repository: XML import for repository node, drag and drop behavior

XStep Repository: Improve Performance

Faster Where-Used Search for SXS Reference Nodes

The where-used search for SXS reference nodes should allow a quick overview about the usage of the SXS building blocks in manufacturing orders, routings, master recipes, and SXS. The speed of the where-used search can significantly be improved by implementing the corrections of the SAP notes listed below.

SAP Note	Description
1486939	SXS where-used list: Additional Improve Performance
1510533	SXS where-used list: Orphaned SXS references
2375051	SXS where-used list: Missing recipes
2396186	Where use List in XStep repository: issue for search in SXS references

XStep Integration in Applications: Improve Usability***Defrost Frozen XStep Editor***

A side-effect of SAP note 2148349 caused the freezing of the XStep editor during maintenance of XStep data. At that point in time it is not possible to save the changes or leave the XStep editor. To remove this blocker please implement the SAP note [2253390](#).

SAP Note	Description
2253390	XSteps: Editor does not react on user input

Prevent Using Content of Invalid SXS Versions in Applications

In very exceptional and rare cases the system assigned wrong SXS versions during the creation of manufacturing orders. This error was fixed with SAP note [2296659](#). Please consider the recommendations that are listed in this SAP note. The SAP note [2369245](#) offers the possibility to implement additional checks that prevent using invalid or outdated SXS versions in process in browser-based PI Sheets and work instructions.

SAP Note	Description
2296659	Wrong SXS Version Assigned during Manufacturing Order Creation
2369245	Avoiding the use of contents of invalid SXS versions in process instruction sheets and work instructions

Use Context of Reference Operation Sets for XSteps of Routings and Production Orders

Since *Enhancement Package 3 (ECC 6.03)* it is possible to use XSteps in standard routings and production orders. It is quite common to reference operations of reference operation sets to standard routings. These operations could be assigned as operation context to XStep nodes of the standard routing. But these XStep nodes are not properly transferred to the production orders during order creation: They disappear. This issue does not appear after the SAP notes [2402215](#) and [2402216](#) are implemented in your system. If your system is based on *Enhancement Package 8 (ECC 6.08)* you only need to implement SAP note [2383905](#).

SAP Note	Description
2383905	Error During Transfer of XSteps with Operation Context of Reference Operation Sets
2402215	Error During Transfer of XSteps with Operation Context of Reference Operation Sets (I)
2402216	Error During Transfer of XSteps with Operation Context of Reference Operation Sets (II)

Remove XSteps with Invalid Context Automatically (XSteps and Variant Configuration)

You are using configurable production or process orders and you maintain object dependencies in the corresponding planned data or master recipe data. When creating the orders, the system copies the XStep trees of the respective routing to the order. Due to the configuration of the order, XStep nodes for which the operation or phase context is now missing are marked as invalid. However, these superfluous nodes are retained in the XStep tree and this can cause problems.

The same is true for production orders for which a sequence exchange of alternative sequences leads to invalid XStep contexts. After implementation of SAP note [1450677](#) the XSteps that carry invalid context are automatically deleted during order creation.

SAP Note	Description
1450677	No automatic deletion of XSteps with invalid context

Access XML-based Change Logs of XStep Data

If you change XSteps of master recipes and routings the system generates change logs (XML) and stores them in binary form on the database. To display and evaluate these XML-based change logs it is necessary to implement the SAP note [1474343](#).

Display Change Logs of XStep Trees for Task Lists

Selection Data for Task Lists

Task List Type: 2

Group: UD_EBR

Selection Data for Change Documents

Selection Mode: Entry of Date/Time

Date: From - To: 01.01.1900 to 29.12.2016

Time: From - To: 00:00:00 to 23:59:59

Documents Older Than (Days): 0

Figure 15: Extract of Select-Options for Choosing XML-based Change Logs of XSteps

The new report *RCPC_CMX_DISPLAY_XS_CLOG* offers features like comparing two XML change logs or downloading the XML change logs as XML files:

Overview XML Change Logs

Compare Changes | Changes in XML File | Changes as List | Change Documents Task List

Type	Group	GrC	XStep	Object	Short text	GUID of Node	Description	Current Date	Time	User
2	UD_EBR	1			Root Node	{XO{HvZB7kIWzHMcx{M90	EBR-Test (PP-PI)	24.02.2015	13:17:24	
2	UD_EBR	1			Root Node	{XO{HvZB7kIWzHMcx{M90	EBR-Test (PP-PI)	10.04.2015	17:00:56	
2	UD_EBR	1			Step	{XO{HvZB7kIWzOTWosM9G	Für alle Phasen	24.02.2015	13:17:24	
2	UD_EBR	1			Process Instruction	{XO{HvZB7kIWzUJ}LshM9G	Phasentext & Unterschrift	24.02.2015	13:17:24	

Figure 16: Result List containing the Selected XML Change Logs

Implement the SAP notes [1979219](#) and [1980656](#) to improve performance and eliminate errors with activation of change log creation in new master recipes and routings.

SAP Note	Description
1474343	XSteps: Missing change document display
1979219	Logging not activated for new recipes with XSteps
1980656	Performance improvement for report RCPC_CMX_DISPLAY_XS_CLOG

Activate XStep Functionality for Master Recipes and Routings

SAP Business Suite systems that are based on *Enhancement Package 8* or *SAP S/4HANA* systems do not contain the *EA-APPL* software layer. Its content was merged with the *SAP_APPL* software layer. Hence, the activation of the enterprise extension *EA-SCM* became obsolete. In rare cases the XStep maintenance of master recipes and routings is not possible (XStep icon is greyed out). To reactivate the maintenance of XSteps please follow the few steps that are described in SAP note [2211508](#).

SAP Note	Description
2211508	Missing activation of XSteps function for master recipes and routings

Better Handling of XSteps for External Destinations if Control Recipes and Control Instructions

Compared with the offered functionality to maintain XStep data for destinations of type 4 (browser-based PI Sheets/work instructions) the maintenance of XSteps for external control recipe destinations remained rudimentary. SAP note [2237177](#) allows you to improve the maintenance of XStep data: The functional enhancements are activated by creating a custom implementation for the new BAdI

BADI_CMV_XS_INSTR_MAINT. The correction includes a fallback class *CL_EI_CMV_XS_INSTR_MAINT* that contains examples for the BAdI method implementations.

After you implement the correction instructions, you have the following enhancement options for the process instruction maintenance in XSteps:

The F4 input help for selecting the process instruction type on the detail screen of the process instruction node is now active:

Process Instruction - Sample 1

General Characteristics

Properties

Description	Process Instruction - Sample 1
Process Instruction Type	Process parameter
Instruction Category	AORD_1

Figure 17: Select Process Instruction Type and Instruction Category

Once an instruction category is chosen the system transfer of the process instruction characteristics that belong to the selected process instruction category:

Process Instruction - Sample 1

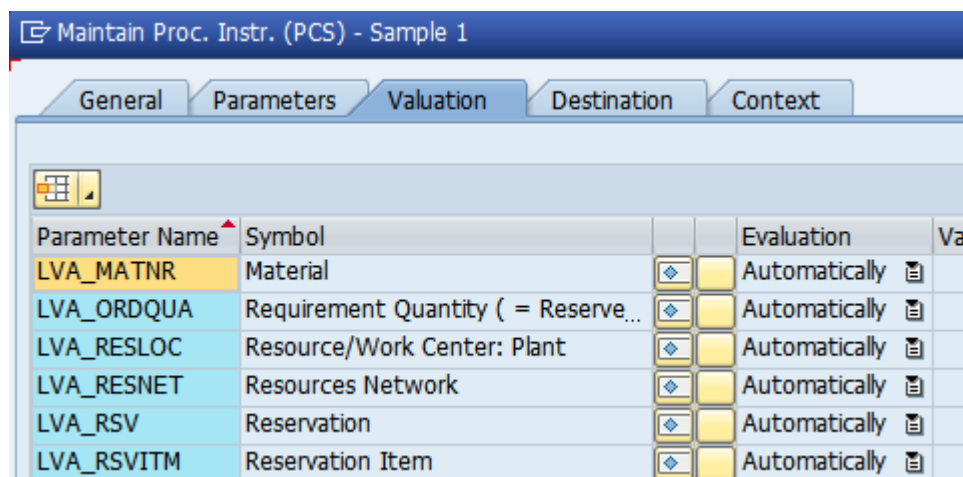
General Characteristics

Char.	V...	Value
PPPI_MATERIAL	<input checked="" type="checkbox"/>	&LVA_MATNR&
PPPI_ORDER_QUANTITY	<input checked="" type="checkbox"/>	&LVA_ORDQUA&
PPPI_UNIT_OF_MEASURE	<input type="checkbox"/>	
PPPI_RESOURCE_NETWORK	<input checked="" type="checkbox"/>	&LVA_RESNET&
PPPI_PLANT_OF_RESOURCE	<input checked="" type="checkbox"/>	&LVA_RESLOC&

Figure 18: List of Characteristics that are Automatically Created

For process instruction characteristics that have to be assigned a value automatically, suitable XStep parameters are automatically created:

- If there are value assignment symbols that are used for the automatic value assignment of the characteristic in the standard SAP system, the system makes an assignment to the XStep parameter.
- If no suitable value assignment symbols are available in the standard SAP system, the system only generates a suitable XStep parameter without a value assignment



Parameter Name	Symbol			Evaluation	Val
LVA_MATNR	Material			Automatically	
LVA_ORDQUA	Requirement Quantity (= Reserve...			Automatically	
LVA_RESLOC	Resource/Work Center: Plant			Automatically	
LVA_RESNET	Resources Network			Automatically	
LVA_RSV	Reservation			Automatically	
LVA_RSVM	Reservation Item			Automatically	

Figure 19: XStep Parameters that are Automatically Created

Please also implement SAP note [2237177](#) that prevents errors that can occur when external control recipes are created for XSteps.

SAP Note	Description
2237177	Control recipe cannot be generated for external destinations with XSteps
2246256	XSteps: Error during maintenance of external control recipes

XStep Integration in Applications: Improve Performance

Archive XStep Data

You use XStep data in your applications such as process orders and production orders, master recipes, and routings. To improve the performance of your system, you archive your orders and routings. When you do this, the XStep trees belonging to the orders and routings are flagged for archiving. You want to archive XSteps but face the following challenges:

- The archiving object of the XStep data (*CMX_XSTEPS*) that is currently available in the SAP standard system uses the XML data archiving service (*XML DAS*). However, data of plans and orders is archived using the *Archive Development Kit (ADK)* via transaction *SARA*.
- The XML-DAS-based solution provides only little support for the *SAP Information Lifecycle Management (ILM)*.
- The archived XStep data from the archive can be displayed only in the XStep repository of archived XStep trees for SXS versions.

SAP note [2062761](#) introduces the possibility to archive XStep data using the new archiving object *CMX_XS* of the *ADK*. Compared with *XML-DAS* based archiving the archiving of XStep data now becomes much easier and comfortable:

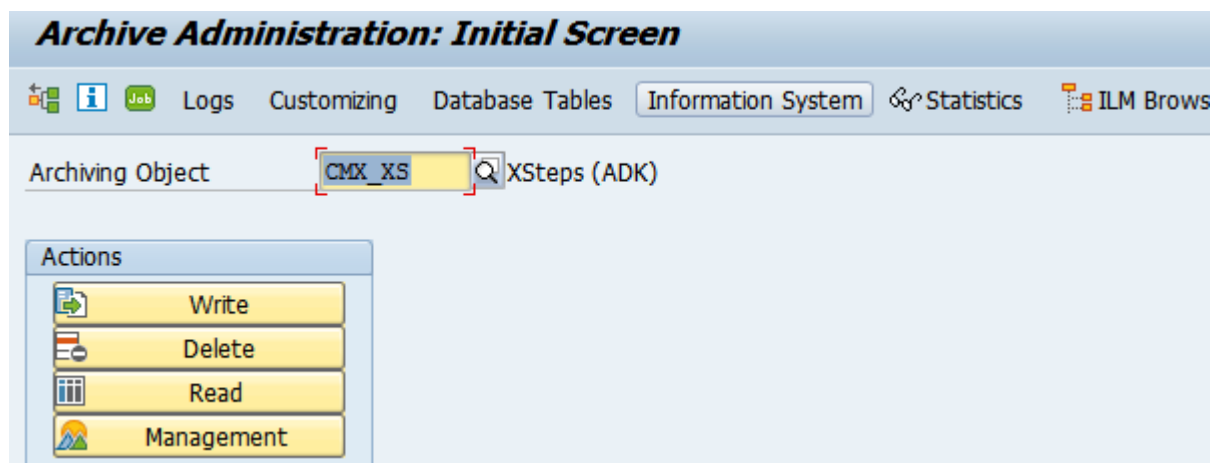


Figure 20: Entry Screen of Transaction SARA for Archiving Object CMX_XS

SAP Note	Description
2062761	Archiving of XSteps

Reorganize XStep Data of Manufacturing Orders

You use XStep data in production orders or process orders. You have completed the orders but are unable to delete them from the database for operational reasons. As a result, the related XStep data cannot be deleted from the database either. This increases the system utilization and negatively affects the system performance. The XStep data cannot be archived: The archiving flag for the XStep trees is set only when the archived orders are deleted.

If you do not need the XStep data you can delete the XStep data prematurely: To archive this you create a custom implementation for the new BAdI *BADI_COCR_CMX_XS_DEL*. This BAdI and its sample/fallback class *CL_EI_BADI_COCR_CMX_XS_DEL* will be available if the corrections of SAP note [2069357](#) are applied to your system. Implementing this BAdI is fairly easy when you inherit the methods from the sample class.

SAP Note	Description
2069357	Reorganization of XStep data of orders

XStep Integration in Applications: Improve Total Cost of Ownership

Use XSteps in Reference Operation Sets

To reduce maintenance efforts it is now possible to assign XSteps to reference operation sets: If you want to use this functionality it is necessary to implement the SAP notes [2402215](#) and [2402216](#) in your system. If your system is based on *Enhancement Package 8* you only need to implement SAP note [2383905](#). Then you need to create a custom implementation for the new BAdI *BADI_CPC_XSTEP*. At best inherit the content of the sample class *CL_EI_BADI_CPC_XS* and adjust your implementation as described in the SAP note. Then you can create XStep data for reference operation sets. If the operations of reference operation sets are referenced in routings the corresponding XStep data is also referenced.

Operation Overv.								
Op...	SOp	Work c...	Plnt	Co...	Standar...	Description	L...	P...
0010		UWE_REW1	0001	PP01		Start Rework - Identify Amount of Rework	<input type="checkbox"/>	<input type="checkbox"/>
0020		UWE_REW1	0001	PP01		Execute Rework	<input type="checkbox"/>	<input type="checkbox"/>
0030		UWE_REW1	0001	PP01		Stop Rework	<input type="checkbox"/>	<input type="checkbox"/>

Figure 21: Operation Overview of the Reference Operation Set

Object	Description
▼ Rework	XStep Tree
• UWES_REW 01	Uwe's Rework
• Rework	Plant 0001, control recipe destination RW, a
▼ General Rework Instructions	
• SXS Rework - Enter Comments	SXS Rework - Enter Comments
▼ Individual Worksteps	
▼ SXS Rework - Enter Signature	SXS Rework - Enter Signature
• Plan Reference UWES_REW Operation 0030	Stop Rework

Figure 22: XStep Data of the Reference Operation Set

Production orders that are created from such routings also get a copy of the XStep data that belongs to the reference operation sets. Operations of the reference operation sets that are copied to the production order are unlocked and get new operation numbers.

Operation Overv.										
Op.	SOp	Start	Start	Work C...	Plant	Co...	StdText	Operation short text	T...	Syst
0010		30.12.2016	06:00:00	UD_MACH1	0001	PP01		Cut Holes in Main Section	<input type="checkbox"/>	CRTI
0020		03.01.2017	15:50:00	UD_MACH2	0001	PP01		Assemble Engines and Cl...	<input type="checkbox"/>	CRTI
0030		10.01.2017	14:35:00	UD_MACH3	0001	PP01		Mount Engines and Cloak...	<input type="checkbox"/>	CRTI
0031		20.01.2017	11:10:00	UWE_REW1	0001	PP01		Start Rework - Identify A...	<input type="checkbox"/>	CRTI
0032		20.01.2017	14:00:00	UWE_REW1	0001	PP01		Execute Rework	<input type="checkbox"/>	CRTI
0033		20.01.2017	19:10:00	UWE_REW1	0001	PP01		Stop Rework	<input type="checkbox"/>	CRTI
0040		20.01.2017	20:45:00	UD_SUPER	0001	PP01		Mount Saucer Section to...	<input type="checkbox"/>	CRTI

Figure 23: Operation Overview of the Production Order Containing an Inserted Reference Operation Set

If these operations are used as XStep context, they are automatically exchanged against the copied operation.

Production Order 1000300 Change: XSteps	
Object	Description
▼ Rework	XStep Tree
• Order 1000300	
• Rework	Plant 0001, control recipe destination RW, address REWORK_1
▼ General Rework Instructions	
• SXS Rework - Enter Comments	SXS Rework - Enter Comments
▼ Individual Worksteps	
▼ SXS Rework - Enter Signature	SXS Rework - Enter Signature
• Operation 0033 Sequence 0	Stop Rework
▼ XStep Tree of the Production Order	XStep Tree
• Order 1000300	
• HTML-PI sheet grp 2	Plant 0001, control recipe destination 05, address GROUP 2
▶ Main Branch	

Figure 24: XStep Data of the Production Order after Context Exchange of the Operations

Unlocking operations of reference operation sets in routings automatically triggers the context exchange of the corresponding XStep data.

SAP Note	Description
2383905	Error During Transfer of XSteps with Operation Context of Reference Operation Sets
2402215	Error During Transfer of XSteps with Operation Context of Reference Operation Sets (I)
2402216	Error During Transfer of XSteps with Operation Context of Reference Operation Sets (II)



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