FORCAM™ FORCE

Version 5.9

Manual Operation Rescheduling

Manual

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1 Introduction

1.1 Use case

Production departments generally operate 24 hours around the clock. However, master production scheduling is often not immediately available in ERP. As a result, it is not always possible to respond to every contingency via master production scheduling in ERP and adjust accordingly. Moreover, rapid changes in ERP may be very complex in certain situations.
FORCAM FORCE™ provides a number of manual ad hoc functions to adapt production dynamically in situations where ERP is unavailable as a master system. One of these functions facilitates splitting operation quantities manually.

⚠ Such scenarios are inherently questionable as they may result in asynchronies between ERP and actual practice which may impact cost balancing. These ad hoc functions may therefore only be used with foresight and due care.

The scenario described below is a general use case for manually splitting operation quantities in a production order in FORCAM FORCE™:

- The production scenario is affected by sudden, dynamic change. Master production scheduling is not available and no dynamic scheduling system is being deployed in FORCAM FORCE™.
- The Foreman decides to manage part of the workflow at another workplace/machine during production. The machine operator has to be able to do this directly in the shop floor terminal (SFT), i.e. independently of ERP and at any time (day and night shift).

1.2 Operation rescheduling concept

In FORCAM FORCE™ it is possible to reschedule an operation which has been scheduled for a certain capacity group or workplace to a different workplace. The manual operation rescheduling function is provided at the SFT as an ad hoc process which can be initiated by the user.

On rescheduling an operation to a new workplace, the existing operation data set is simply mapped to a new target workplace. An operation can only be rescheduled during an inactive phase.

Rescheduling is only possible with reference to an explicit workplace:

- An operation is scheduled for a capacity group. Rescheduling the operation to a new target workplace
- An operation is scheduled for a workplace. Rescheduling the operation to a new target workplace

2 Manual operation rescheduling in the SFT

Every operation (including split operations) can be rescheduled via a button in the SFT and thus assigned to another workplace. A pop-up dialog displays a list of available workplaces from the hierarchy of the operation.

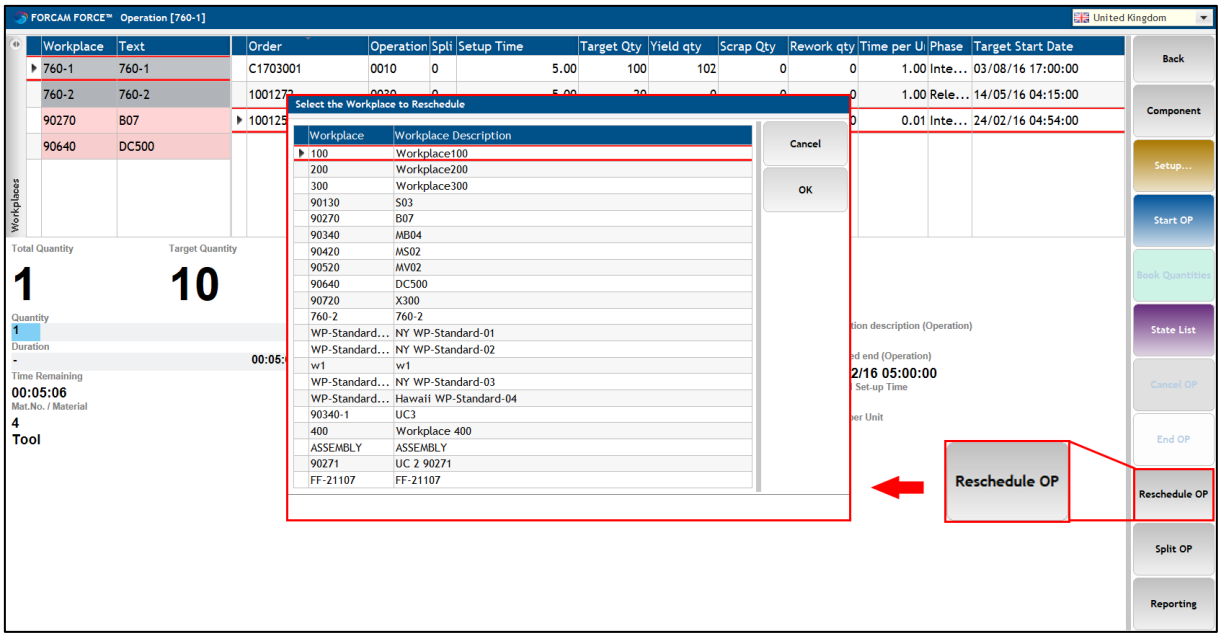

Fig. 1: Rescheduling an operation via a configured button

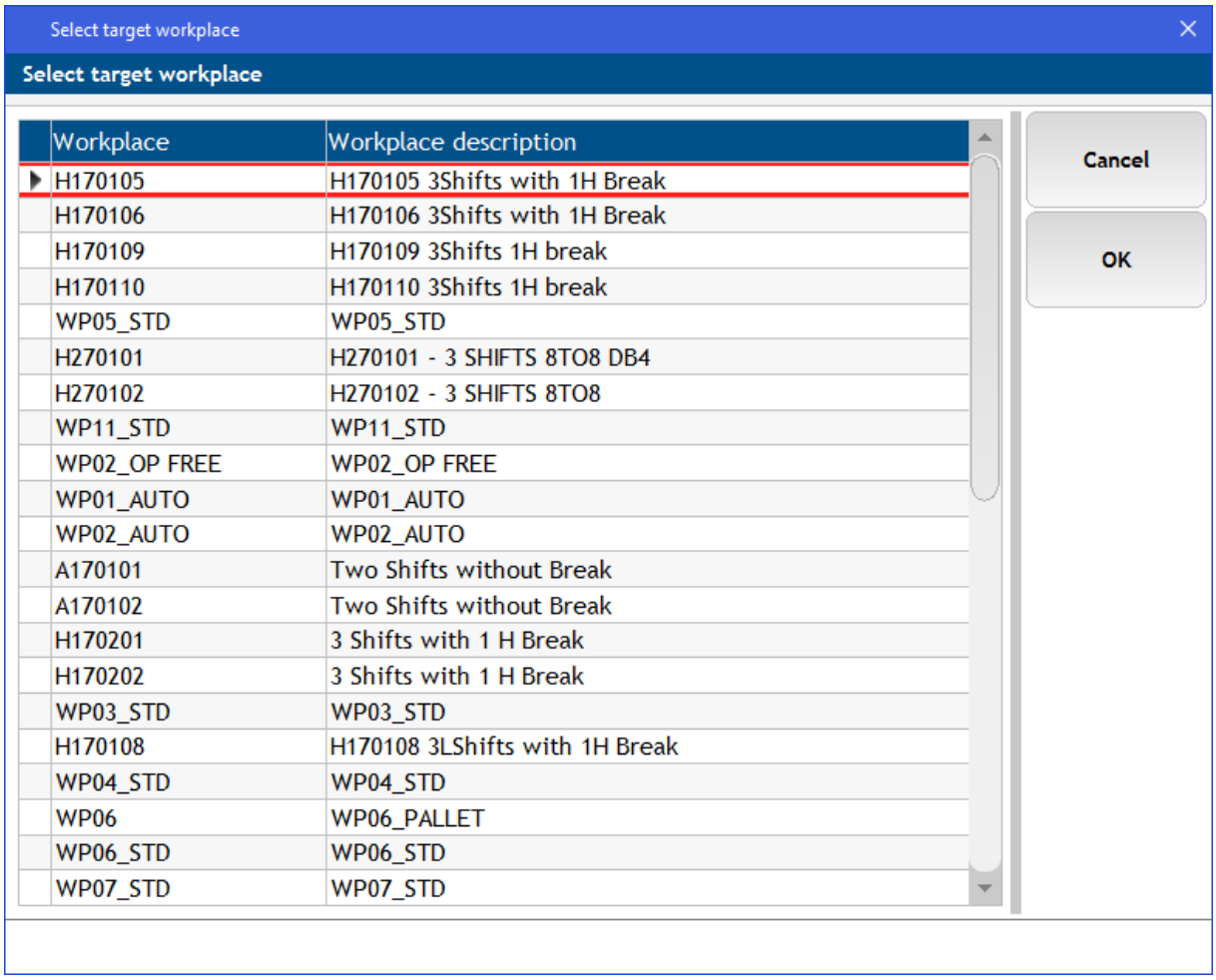

Fig. 2: Dialog for rescheduling an operation to another workplace

The user marks an operation in the operation list on the root base page. A dialog listing all available workplaces appears on actuating the button. The user selects the workplace to which the split operation is to be transferred.

After confirming the dialog (and SFT updating), the operation marked in the operation list is transferred to the workplace selected in the dialog.

Workplaces

Workplace	Text
760-1	SAP 760-1
760-2	SAP 760-2
90270	B07

Order	Operation	Spli	Setup Time	Target Qty
1001893	0010	0	5.00	200
1001892	0010	0	10.00	50
1001891	0010	0	10.00	200
1001889	0010	1	10.00	50
1001888	0010	1	10.00	50
1001883	0010	1	2.00	50
1001882	0010	1	2.00	50

Workplaces

Workplace	Text
760-1	SAP 760-1
760-2	SAP 760-2
90270	B07

Order	Operation	Spli	Setup Time	Target Qty
1001893	0010	0	5.00	200
1001890	0010	0	10.00	150
1001728	0010	0	2.00	100
1001727	0010	0	2.00	100
1001723	0010	0	2.00	100
1001722	0010	0	2.00	100
1001721	0010	0	2.00	100

Fig. 3: Transferring the operation from workplace 90270 to 760-1

3 Configuration

This section describes configuration of the activity steps to reschedule an operation to another workplace.
Access to the Workbench and familiarity with step configuration are prerequisites.
All designations used here (e.g. for buttons, steps etc.) are for purposes of illustration only and can all be freely defined in principle.
ⓘ Refer to the Shop Floor Terminal manual for details of configuring activity steps.

The SFT button for rescheduling the operation comprises three consecutive activity steps in total:

- Query of domain objects:
  Polls the data of all workplaces for transfer to the next step
- Display of workplaces:
  Receives the data of all workplaces and lists it in a dialog. Transfers the workplace selected in the dialog to the next step
- Change of domain attribute:
  Changes the previously selected workplace to the new (target) workplace of the operation

3.1 Query of domain objects

The **Query of domain objects** activity step is generally used to determine domain objects such as workplace, material, order etc. This activity step is always used in conjunction with other steps and the data are transferred to the next step.
In this case, the step determines all available workplaces from the hierarchy of the selected operation and transfers them by the output parameter.
The activity step requires the following configuration at least:

- Input parameter: **Workplace (WPL) → Exclude Domain Objects (EVERY)**
- Output parameter: **Workplace 2 (WPL) ← Found Domain Objects (EVERY)**
- Domain object type: **Workplace**

Identifier	Value
Query of domain objects	
Activity step name	Get all workplaces
Configuration of execution conditions	
When cancelling continue reporting procedure	☑
Input parameters	[] (1) List Elements
Parameter assignment	Workplace (WPL) — Exclude domain objects...
Output parameters	[] (1) List Elements
Parameter assignment	Workplace 2 (WPL) — Found domain objects (...
Domain object type	Workplace
Max. number of matches	-1
Return value OK	true
Return value NOK	false

Fig. 4: Configuring the "Query of domain objects" step

3.2 Display of workplaces

The **Display of workplaces** activity step receives a list of workplaces from the previous step and displays them in a dialog. The user selects a workplace from this list. This is then transferred to the next step as an output parameter. The selected workplace is the target workplace to which the (split) operation is to be transferred.

The name of the step assigned in the configuration appears in the dialog title. It is recommended to phrase the name as an instruction to guide the user (in this case: “Select the Workplace to Reschedule”).

The activity step requires the following configuration at least:

- Input parameter **Workplace 2 (WPL) → Workplaces**
- Output parameter: **Workplace 3 (WPL) ← Selected workplaces (WPL)**

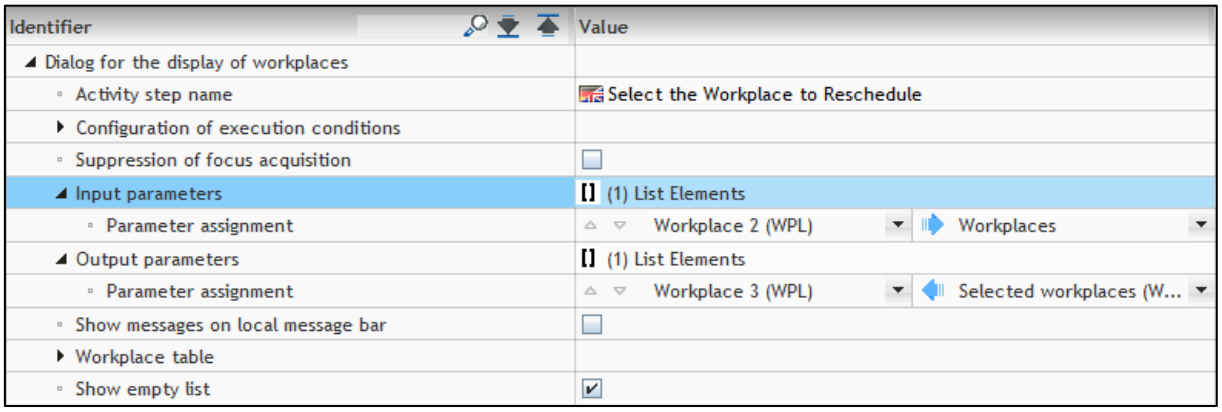

Fig. 5: Configuring the “Display of workplaces” step

The columns in the dialog are freely configurable. The dialog shown in Fig. 6 was configured to display the workplaces and the associated descriptions.

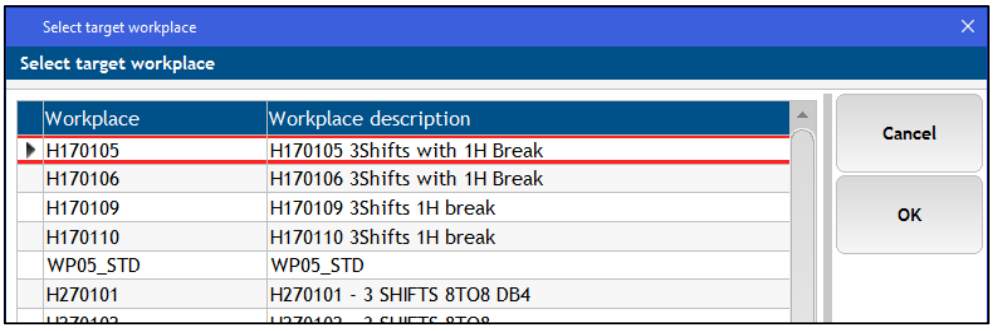

Fig. 6: Dialog displaying available workplaces

The following configuration was used for this dialog:

◢ Column configurations	[] (2) List Elements
◢ Grid column configuration	Workplace
Column name	Workplace
Column width	30%
Column visibility	☑
Column attribute	Workplace (Ext key)
Reference to color column	
◢ Grid column configuration	Description
Column name	Description
Column width	70%
Column visibility	☑
Column attribute	Text
Reference to color column	

Fig. 7: Configuring the dialog to display workplaces

3.3 Change of domain attribute

Domain objects such as workplace, material, order etc. bear attributes, for instance setup time or stroke factor. The **Change of a domain attribute** activity step is generally used to modify these attributes. To do this, the step obtains the domain object and its attribute from the previous step.
In this case, the domain object is the previously marked workplace whose attribute is changed to **Target workplace**. The previously marked workplace thus becomes the new workplace of the current operation.

The activity step requires the following configuration at least:

- Input parameter: **Parameter (EVERY) → Domain Object**
  Workplace 3 (WPL) → Attribute Value
- Attribute to change: **Target workplace id (Operation)**

Identifier	Value	
◢ Change of a domain attribute		
▫ Activity step name	Change target workplace ID	
▸ Configuration of execution conditions		
◢ Input parameters	[] (2) List Elements	
▫ Parameter assignment	Parameter (EVERY)	Domain Object
▫ Parameter assignment	Workplace 3 (WPL)	Attribute Value
▫ Output parameters	[] (0) List Elements	
▫ Attribute to change	Target workplace id (Operation)	

Fig. 8: Configuring the "Change of domain attribute" step

4 Restrictions

4.1 General restrictions

The following restrictions apply to the manual rescheduling function at the shop floor terminal:

- This is a purely internal FORCAM FORCE™ functionality (detached from ERP -> Asynchronism)
- The operation must be in an inactive phase to allow rescheduling
- Rescheduling applies to explicit workplaces only
- No rescheduling/support on capacity groups
- This information is lost on rescheduling from a capacity group (operation cannot return to a capacity group)
- Workplace selection dialog is currently a list with a level
  - No search function
  - No hierarchy mapping
  - For individual project implementations, a quantity of valid target workplaces can be modeled using Groovy scripting and effort per WPL and shared (as a resource) in order to limit and predefine the selection.
- Rescheduling is only possible at the SFT
- No correction function is provided in the Workbench

Restrictions on the ERP confirmation process

- Postings to a prior period are allocated to the original operation and confirmation numbers and the planned cost / work center in ERP
- Although the data of the workplace actually deployed in production is included in the confirmation, it is the operation itself and the original planning/cost which are confirmed (cf. SAP). Customers can implement their own logics for different ERPs based on the confirmation data (depending on the specifics of the ERP concerned).

4.2 Restrictions on ERP operation downloading

Initial production orders and their data (e.g. operations, production resources and tools etc.) can be stored in ERP at any time by various triggers.
Changes made to released and initially provisioned data in ERP result in change provisioning of the update data sets for the various data (orders, operations, production resources and tools etc.).

ERP is basically the master system and owns the data. However, the original ERP workplace is written once more on provisioning changes when an operation was consciously rescheduled in FORCAM FORCE™. Rescheduling is thus undone.

The response of the system is regulated to resolve this state despite ERP being the master system. The conscious decision and change made by the user in FORCAM FORCE™ must not be overwritten. The following information fields are provided for an operation:

Fig. 9: Information fields for an operation

Restrictions on ERP downloading:

- Operation has already had an active phase in FORCAM FORCE™:
  - FORCAM FORCE™ rejects rescheduling of the same operation to a new target workplace by ERP
  - Restrictions by ERP systems (e.g. SAP) and the cost perspective for an operation with postings to a prior period. A new part order for the new target workplace has to be created and provisioned anew in ERP
- Operation did not have an active phase in FORCAM FORCE™ yet:
  - As master system, FORCAM FORCE™ allows ERP to reschedule the same operation to a new target workplace as no postings have been made on the operation as yet.
- On manually rescheduling to a new target workplace (independently of ERP), a change of target workplace is not accepted and updating no longer takes place (targetWorkplaceErp, targetWorkplaceGroup, targetWorkplace) in case of change provisioning from ERP.
  All the other data of the operation are updated and adopted by change provisioning.

5 Annex

5.1 Abbreviations and Terms

Table 1: Abbreviations and terminology used

Abbreviation/term	Description
Button	Button in the shop floor terminal which trips an activity step
DNC	Direct Numerical Control (NC machines which are connected to a computer)
OP	Operation
Overdelivery	Excess supply compared with purchase order quantity / target quantity
PDM	Production Data Management
SFT	Shop Floor Terminal (the central source of information for production personnel serving as an operating state acquisition unit)
Split	Division (in this context: the target quantity of an operation)
TDM	Tool Data Management
Underdelivery	Short supply compared with purchase order quantity / target quantity

5.2 Table of Figures