



# Functional Release Notes

Version 5.11.23

## Release Information



Document: Force-5-11-23-Functional-Release-Notes.docx



Release date: 2021-12-20



Document version: 1



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## Overview

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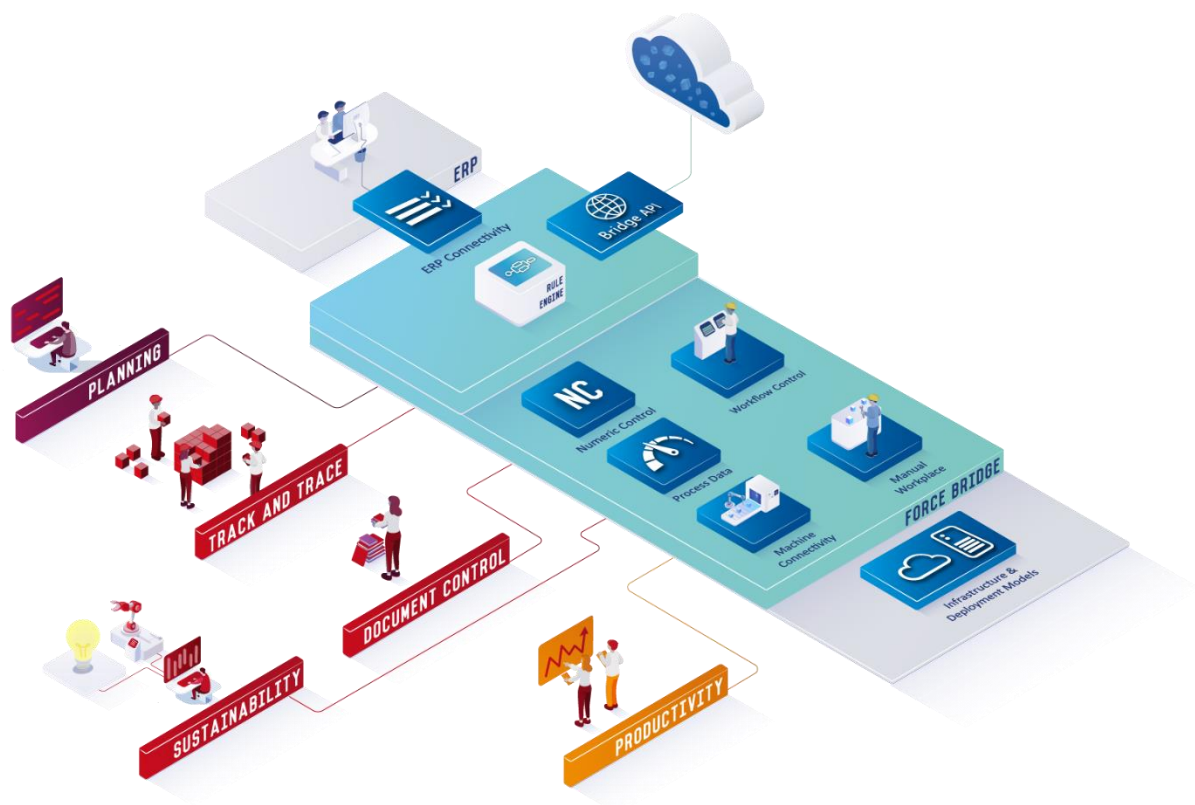
## 1 Overview

FORCAM provides companies with all the information they need to control and optimize their production. The modular IIoT solution FORCAM FORCE™ IIOT is as flexible as the needs of customers. With a variety of production apps, FORCAM helps companies to make their processes more transparent and improve their workflows. In this way, companies create the basis for optimization measures and sustainable success, thereby ensuring their competitiveness.

FORCAM is always endeavored to optimize the solution FORCAM FORCE™ IIOT further, to enrich it with functions, offering customers consistent growth and greatest possible use. For this purpose, several releases are published throughout the year.

This document lists functions that have been added or changed during the **5.11.23** release. It serves as an overview of the most important features to use FORCAM FORCE™ IIOT in the best possible way.

Detailed descriptions of the individual functions can be found in the respective product documentation.



## 2 FORCAM FORCE™ COMMON

### 2.1 SSO - State Monitor Updating Only on Refresh

Affected module	Affected area	Status
Workbench	Digital Planning Board	New

In order to make SSO working with AJP (Apache JServ Protocol), the user needs to use “longpolling” component from Captain Casa.

SSO is not working with AJP with websocketpolling from Captain Casa.

### 2.2 FORCAM FORCE™ and the Adapter for SAP

Please note that one or more updates within this release documentation are related to updates for the FORCAM FORCE™ Adapter for SAP.

The following functional change of chapter 3.2 about “Implementation of Location Identifier” requires the following Adapters for SAP:

- SAP ECC (release 21.11.0)
- SAP S/4 HANA (release 21.12.0)

The following chapter(s) require an update of the Adapter for SAP (release 21.11.0):

- 5.1 “Operation Correction Affects ERP System”

### 2.3 HTTPS Protocol and Encrypted System Credentials

Affected module	Affected area	Status
FFAuth	Tomcat Server Configuration	Changed

The keystore password defined for the SSL connector in the server.xml of the tomcat must now be stored in an encrypted format.

## 2.4 Installation for BridgeAPI: Scalability of ffwebservices

Affected module	Affected area	Status
Connectivity	BridgeAPI	New

With release 5.11.16, we introduced the possibility to operate multiple ffwebservices for scalability reasons. Now FFSetup is extended to configure new properties for scalable webservices during the installation routine.

For this purpose, a new editor page “Application Endpoints” is available which allows the user to configure the following properties: JMX RMI Ports, Jolokia Ports, Client ID.

Application Endpoints			
	Jms Client Id	Jolokia Port	JMX Rmi Port
FFAUTH	ffauth		
FFCONNECT	ffconnect	21087	
FFDNC	ffdnc	14087	
FFIGNITE	ffignite	12087	10098
FFMDESIMULATOR	ffmdesimulator	13087	
FFMODELLER	ffmodeller		
FFNEWOFFICE	ffnewoffice	19087	
FFNEWOFFICE_BACK...	ffnewoffice-backgro	19587	
FFRUNTIME	ffruntime	10087	10099
FFSCHEDULING	ffscheduling	21088	
FFSIMULATION	ffsimulation	16087	

The webservice editor page is extended to allow Akka Seed Node configuration. This will connect multiple webservice instances running on different machines.

There is at least one entry which is always the local instance of ffwebservices. You can additionally configure remote webservice instances as well.

Akka Seed Nodes	
Host	Port
localhost	24051
<div>   </div>	
<div>Add</div>	

Finally, there is an additional flag that determines which queues to setup for ActiveMQ. This will setup the required queues. Enable it if you want to use more than one webservice instance.

☐ Use Multi-Node Installation?

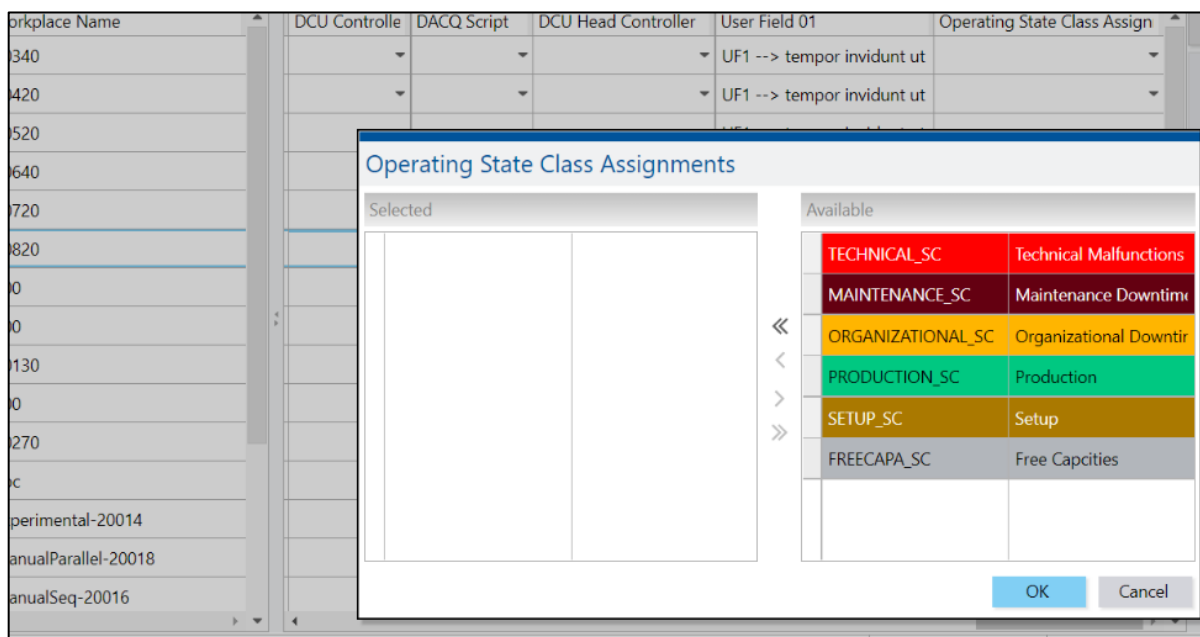
## 3 Cross-Platform

### 3.1 Operating State Classes for the SFT

Affected module	Affected area	Status
Workbench	Shopfloor Terminal/Master Data	New

Presently, operating state classes exist as master data in FORCAM FORCE™ IIOT and are used in the Reporting as a data view and filter. Operating state classes are now introduced in all relevant SFT activity steps for workplaces as a selection drop-down list.

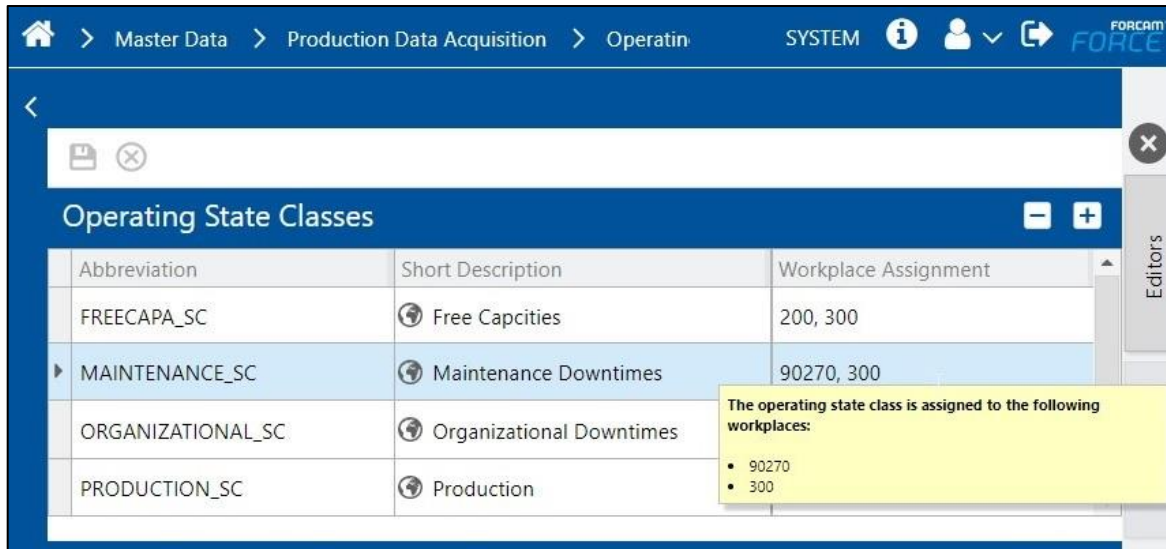
In the Workplace configuration page (Workbench > Master Data > Workplace Configuration), a new column “Operating State Class Assignments” is available. Here, the user can assign the operating state class to a workplace. The operating state class can also be added via template.



New assigned workplace names are included as a separate column inside the operating state classes master data (Workbench > Master Data > Production Data Acquisition > Operating State Classes).

Workplace also shows as a tooltip.

When the user deletes an operating state class, the reference is deleted from the assigned workplace configuration and template configuration.

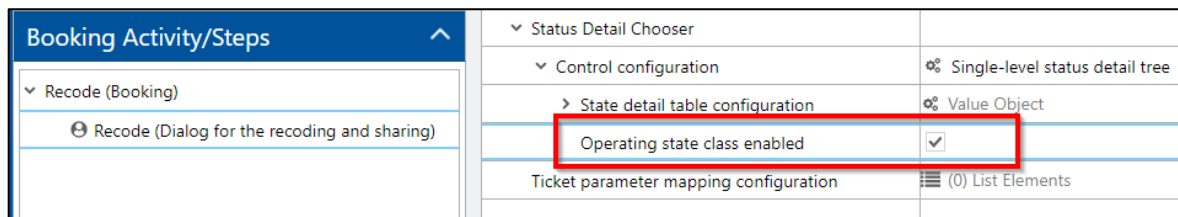


Abbreviation	Short Description	Workplace Assignment
FREECAPA_SC	Free Capacities	200, 300
MAINTENANCE_SC	Maintenance Downtimes	90270, 300
ORGANIZATIONAL_SC	Organizational Downtimes	
PRODUCTION_SC	Production	

The operating state class is assigned to the following workplaces:

- 90270
- 300

For recoding activity steps in the SFT (including all its variants), a new combo-box is introduced to filter the status detail categorized by its operating state class. If this configuration is enabled, the filter will be available in the step pop-up dialog which can be used to filter the status details. However, if not configured, it does not change the existing behavior. By default, this configuration is disabled. The configuration is only available for single level recoding feature.



Booking Activity/Steps	
▼ Recode (Booking)	▼ Status Detail Chooser
● Recode (Dialog for the recoding and sharing)	▼ Control configuration
	State detail table configuration
	Operating state class enabled <input checked="" type="checkbox"/>
	Ticket parameter mapping configuration

The following activity steps are enhanced:

- Dialog for the recoding and sharing - recoding variant
- Dialog for the recoding and sharing - split variant
- Dialog to report workplace malfunction
- Select status detail
- Select status detail for multilevel or single-level detail tree
- Select split time for status detail

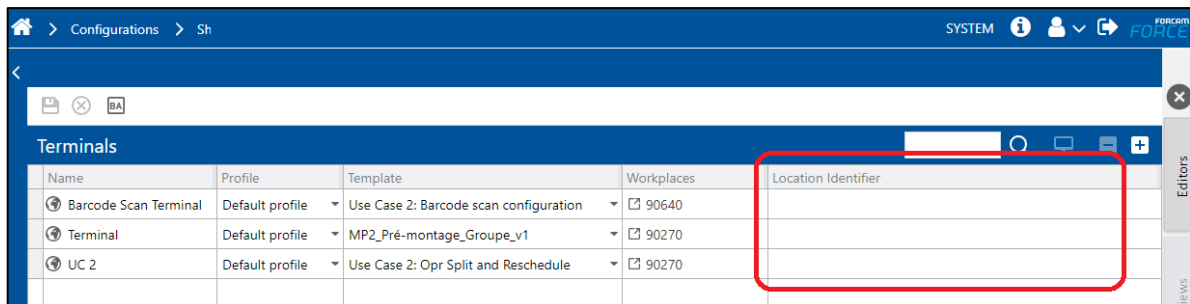


## 3.2 Implementation of Location Identifier

Affected module	Affected area	Status
Workbench/Office	Shopfloor Terminal/ERP/Reporting	New

### SFT Configuration

The terminal configuration is enhanced with a new column “Location Identifier” where an identifier string (up to 32 characters) can be configured. This identifier can be used to differentiate between various physical terminals.



Name	Profile	Template	Workplaces	Location Identifier
Barcode Scan Terminal	Default profile	Use Case 2: Barcode scan configuration	90640	
Terminal	Default profile	MP2_Pré-montage_Groupe_v1	90270	
UC 2	Default profile	Use Case 2: Opr Split and Reschedule	90270	

### ERP Messages ("Upload") with Location Identifier

Messages sent to ERP can contain information about the location identifier of the terminal that caused the message to be sent. This identifier is only sent if the ERP message is clearly associated with a single event; for example, starting an operation.

ERP messages which are potentially aggregated over several events (like most quantity or duration messages) do not carry a LOCID (location identifier).

For the generic XML Upload, the location identifier is presented as <locationIdentifier>.

The mapping of LOCIDs is part of the standard XSLT for communication to the ERP-Adapter to SAP. Migration of XSLT is not done automatically, in this case the customer or consultant must add the information for LOCID manually in XSLT.

### Office

Added a new string-based value filter for a location identifier. Enhanced “Message Log” and “Personnel Online Activity Log” reports with the new filter and location identifier column.

### 3.3 Track & Trace data buffer on EDGE

Affected module	Affected area	Status
Workbench/Office	fftracing-acquisition, fftracing-processing, ffnewoffice, ffworker, ffworkbench	Changed

Refactored fftracing-acquisition and fftracing-processing to establish/support uni-directional cloud/edge deployments of Track & Trace:

- Communication between fftracing-acquisition to fftracing-processing is fully based on ActiveMQ Queues.
- There is no communication between fftracing-acquisition to the SQL database nor MongoDB nor Ignite cache.
- Buffering - in the event of an unavailable ActiveMQ - is based on a file-based caching.
- Changes related for the VPIE and any other collection are communicated to fftracing-processing as a MongoDB change event.
- Deprecated TraceConfigurationService removed and integrated into TraceAccessService.
- Deprecated configuration in ffworkbench related to the promoted/activated VPI has been removed (now only available in VPIE).
- Reorganization of tracing modules: BulkEditService, Groovy Scripting, CAQ calls, Units, Process Data, Trace Data, Reporting

## 4 Platform & Connectivity

### 4.1 New APIs for Recorded Attendance Times

Affected module	Affected area	Status
Connectivity	BridgeAPI	New

Added new APIs to add, update, and delete past recorded attendance times and breaks.

New Bridge APIs:

- GET /staffMembers/{staffMemberId}/recordedAttendanceTimes
- GET /staffMembers/{staffMemberId}/recordedAttendanceTimes/{intervalId}
- GET /staffMembers/{staffMemberId}/recordedAttendanceBreakTimes
- GET /staffMembers/{staffMemberId}/recordedAttendanceTimes/{breakId}

New Command APIs:

- POST /staffMembers/{staffMemberId}/recordedAttendanceTimes
- PUT /staffMembers/{staffMemberId}/recordedAttendanceTimes/{intervalId}
- DELETE /staffMembers/{staffMemberId}/recordedAttendanceTimes/{intervalId}
- POST /staffMembers/{staffMemberId}/recordedAttendanceBreakTimes
- PUT /staffMembers/{staffMemberId}/recordedAttendanceBreakTimes/{breakId}
- DELETE /staffMembers/{staffMemberId}/recordedAttendanceBreakTimes/{breakId}

### 4.2 MQTT Enhancement

Affected module	Affected area	Status
Connectivity	MQTT plugin	Changed

The MQTT plugin was enhanced with the following:

- The controller parameters (topic) can now be up to 4000 characters long.
- The password for MQTT communication can now be 622 characters long.
- There is now a logfile for each day.

### 4.3 Jarvis Version Number Logged

Affected module	Affected area	Status
Connectivity	DCU/DACQ	New

In the DCU (javis\_dcu-overall.log) and DACQ log (javis\_dacq-overall.log), the version number is now written to the log file when the services are started, as it is currently already the case with, e.g., ffWorkbench.

### 4.4 FANUC Supports Windows 64 Bit

Affected module	Affected area	Status
Connectivity	FANUC plugin	FANUC plugin

ffDNC can now also load FANUC libraries for Windows 64 Bit. Previously, only 32 Bit was possible.

## 4.5 Access to Error Code ID in a Global DACQ Variable

Affected module	Affected area	Status
Workbench	Error Code Mapping	New

If an error code ID cannot be read from a machine control as a number, but only embedded in a string, it is now possible to supply the error code ID to the error code mapping in FORCAM FORCE™ by a global variable. This solution guarantees, that the error code mapping (only type 3) will work with any MDC plugin, as long as a controller can provide alarm IDs.

This global variable is used (set and read) from a DACQ script. The value that is written into this global variable is or can be a parsed string. For example, in case of Heidenhain, the values are strings that contain the error code ID in a comma-separated (cryptic) format. The DACQ script can extract the real error code ID from this string and can write it into the global variable. This global variable is then used in the error code mapping (variant 3) as shown in the screenshot below. The global variable can make use of the @|WPL|@ and @|PLC|@ placeholders, but it is not mandatory.

Error Code Mapping: AlarmcodeMapping

Variant
Variant 3
SPA Address
%N%@|WPL|@ALARMCODE

Configuration			Status Detail Mapping	
	Error Code	Error Text	Error Code Group	
1	1001	Alarm 1	1	110 - Malfunction
2	1002	Alarm 2	1	

### Restrictions:

- The solution with the global DACQ variables only works for variant 3 of the error code mapping.
- If the placeholders @|WPL|@ and @|PLC|@ are used in the signal address of the error code mapping (variant 3 only), then this will only work if the workplace name is composed of the following: A-Z, a-z, 0-9 and the underscore (\_).
- The value in such a global variable must always be a number, not a string.
- Global variables can be persistent (as presently); this depends on the configuration.
- The solution will only work with global variables, not local variables.
- The author of the DACQ script is responsible for the global variable to be unique (e.g., in case of a head controller, the PLC name is not unique over multiple workplaces).

## 5 Productivity

### 5.1 Operation Correction Affects ERP System

Affected module	Affected area	Status
Workbench	Corrections – Operation End/Interrupted	Changed

When changing (correcting) the operation phase from “Completed” to “Interrupted”, the Rule Engine is now sending an “OPSTR” message to the ERP system (OPSTR with status “Interrupted” (89)).

Processing of this information with “IDOC-Upload” to SAP happens in conjunction with the updated ERP Adapter for SAP ECC and for SAP S/4 HANA version 21.11.0 (and higher):

The IDoc is processed and reverts latest “final confirmation” (with status CNF) of the operation.

### 5.2 Additional Personnel reports

Affected module	Affected area	Status
Office	Reporting	New

Added additional Personnel reports which can show metrics aggregated by time intervals and enhance the person filter to also respect person cost unit history information.

The unproductive time shown in the reports can average out within the used time interval(s), i.e., within the time range selected in the report “Personnel Report (Cost Unit/Personnel Grouping) (Online)”, or within the interval steps defined by the filter tab (hour, day, ...) in the report “Personnel Development (Cost Unit/Personnel Grouping) (Online)”. However, the value is always limited to the non-negative range.

Example:

Evaluated time range	Attendance time	Operation-related or overhead cost time	Unproductive time
day 2	7h	8h	-1h*
day 1 + day 2	15h	15h	0h
day 1 + day 2	15h	15h	0h
day 1	8h	7h	1h

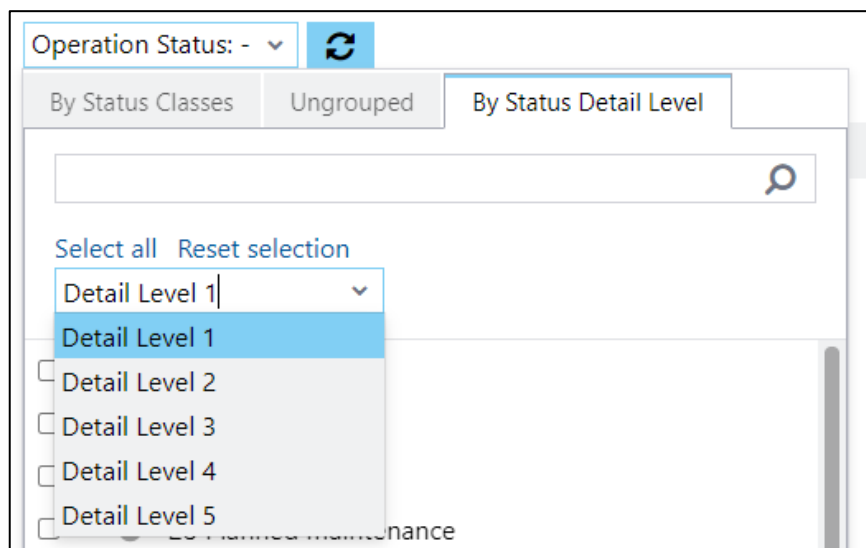
\* The unproductive time shown for day 2 in the report will be 0 since negative unproductive times are not allowed. However, when summing up the contributions from both days, the positive and negative contributions average out.

### 5.3 New Reports & Operation State Detail Levels

Affected module	Affected area	Status
Office	Reporting	New/Changed

Added the functionality to analyze all detail levels of operation states in the same report.

The filters “Operating State” and “Operation Status” have a new optional tab, which allows the selection of status details from lower levels. A drop-down shows the available status detail levels and after selecting a certain level, the table will show the available status details from that level:



To use the status detail level filtering, the columns of the status detail level IDs need to be added as parameters to the filter in the SQL `@<FILTER_IDENTIFIER>”(ID1, ID2, ..., ID7)`. The column which is used for filtering is determined by the selected status detail level. There is also a '\$' macro for the filter `$<FILTER_IDENTIFIER>(COL1, COL2, ..., COL7)`. It will be replaced by the parameter at the position of the selected status detail level (note: If the selected status detail level is higher than the number of parameters, an exception will be raised).

### Edit Filter

☐ Define Custom Filter
 ☒ Use Standard Filter

Operation Status

Editor
 Preview

Name \*
 Operation Status

Description
 Default filter for Operation Status

☒ Permanently Visible
 ☐ Mandatory

☒ Display Status Detail Level Filter


☐ Internal Filter

The following standard reports have been enhanced to use the new filter tab:

- Operating State Development (Workplace)
- Operating State Development (Material)

The following new reports were added to the standard reports:

- Hitlist Operating States (Workplace) Detail Level
- Hitlist Operating States (Material) Detail Level
- Hitlist Operating States (Operation) Detail Level
- Hitlist Operating States (Order) Detail Level
- Operating State Development (Material)
- Operating State Development (Material)

-  Some columns are formatted as the data type “Operation Status”. A default format needs to be defined for this data type in the data format editor. The data format “Operation Status” (ID: f350d566-f733-4030-96f1-2d3ab99f71f3) is provided with the standard reports and can be used as the default format.

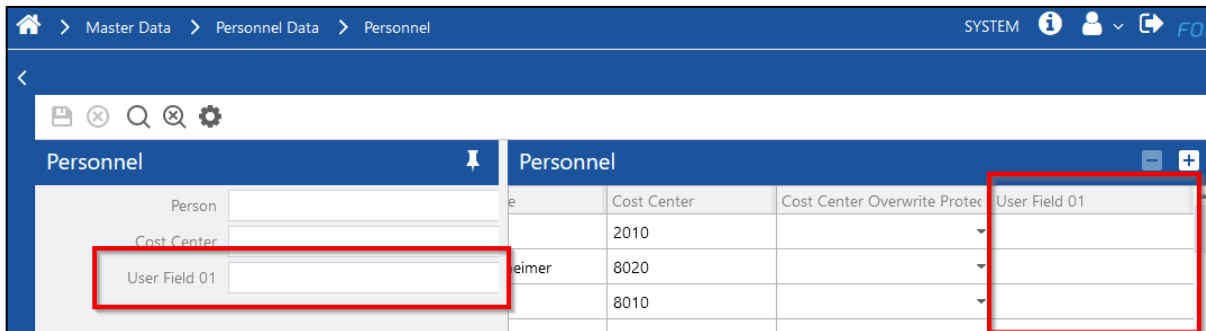


## 5.4 User Fields for Personnel Master Data

Affected module	Affected area	Status
Workbench	Master Data – Personnel	New

Added user fields to personnel master data.

The user fields are configurable in the personnel master data UI and visible in the data table. The user fields of a person are searchable (plain input character search) and configurable in the filter configuration.



The screenshot shows the SAP Personnel Master Data UI. The breadcrumb navigation at the top indicates the path: Master Data > Personnel Data > Personnel. The main area displays a table with the following columns: Person, Cost Center, Cost Center Overwrite Protection, and User Field 01. The 'User Field 01' column is highlighted with a red box. The table contains three rows of data, with the first row showing a person named 'Leimer' and a cost center of '8020'.

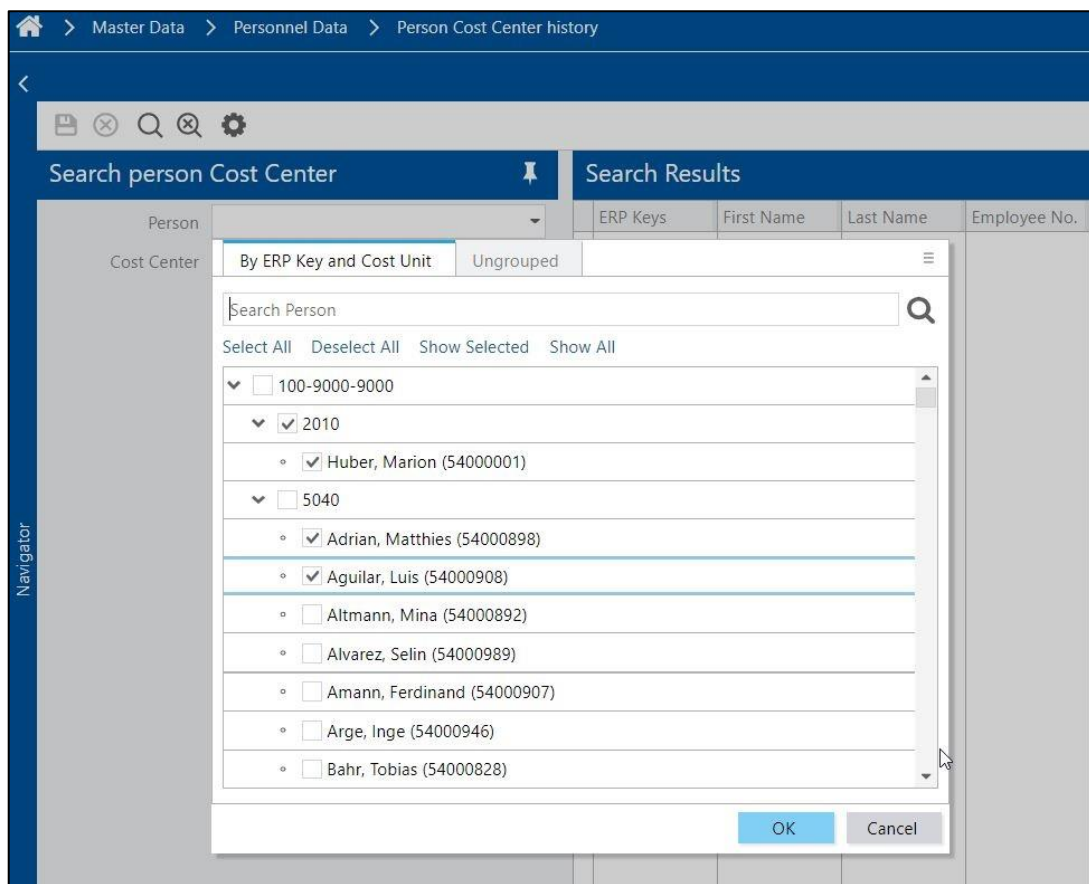
### ERP Download

The person ERP download has been enhanced and provides the possibility to supply personnel user fields by providing the element "UserFields" with the person data.

## 5.5 New Personnel and Cost Center Filters

Affected module	Affected area	Status
Workbench	Master Data/Corrections	New

Implemented new personnel cost unit filters and personnel filters with tabs and a generally better structure into different Workbench UIs. Example for Person Cost Center History:



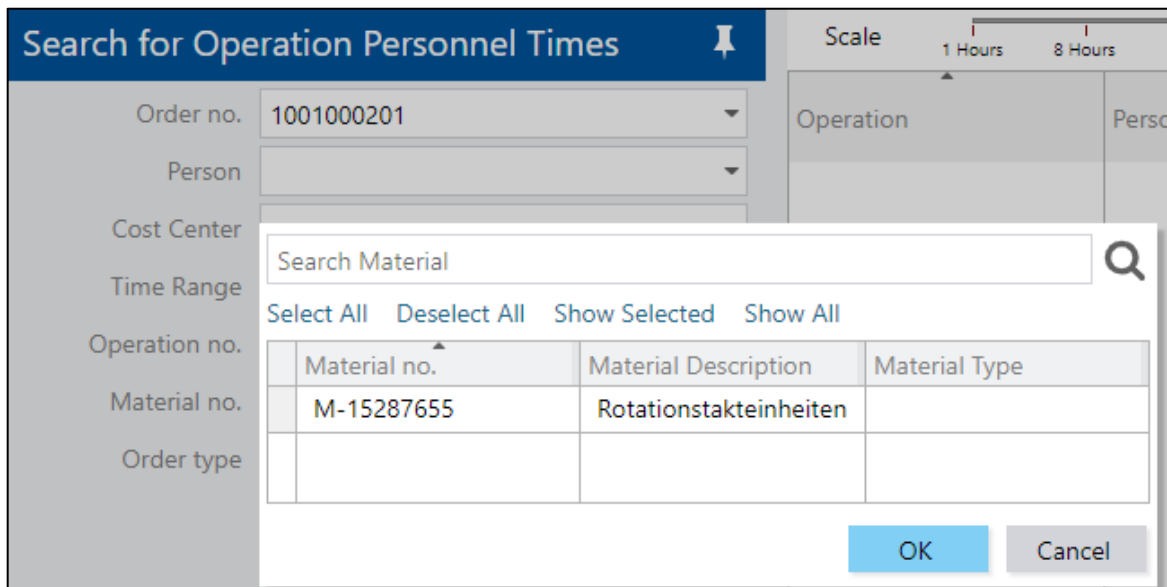
The filters are implemented into the following Workbench UIs:

- Master Data > Personnel Data > Person Cost Unit History
- Master Data > Personnel Data > Personnel
- Corrections > Operation Related Times
- Corrections > Workplace Personnel Times
- Corrections > Attendance break
- Corrections > Attendance Time
- Corrections > Overhead Cost Times

## 5.6 Coupling Filter for Operation-Related Times

Affected module	Affected area	Status
Workbench	Correction – Operation-Related Times	Changed

The filters for material, order, and operation for the “Operation Related Times” correction UI are now coupled. The materials are filtered according to the selected orders and operations. If there is no selected order/operation, then all materials will be visible inside the material filter. Example: Order 1001000201 with material M-15287655 is selected. The user can only select M-15287655 in the material selection dialog.



## 5.7 OEE Time Base Config for Personnel Reports

Affected module	Affected area	Status
Office	Reporting	Changed

The personnel reports below now respect the current OEE time base configuration, i.e., operation-related timeline contributions for each category are only included in the report if they are in the OEE time base. The mapping to the operating state categories “Setup” and “Production” is based on the corresponding current time base configurations.

The following reports have been enhanced:

- Personnel Report (Cost Unit/Personnel Grouping) (Online)
- Personnel Development (Cost Unit/Personnel Grouping) (Online)

## 6 SFT Configuration

### 6.1 Barcode Scan of Split Operations in Activities with Multi-Search-Result-Dialog

Affected module	Affected area	Status
Workbench	Shopfloor Terminal	New

The barcode scan behavior for the steps mentioned below is enhanced to handle the scenario where multiple operation rows are matched to a scanned barcode. Previously, the first matched row was selected. After this extension, (only if configured) the user is presented an operation selector dialog to select from multiple matched results. However, if not configured, it does not change the existing behavior.

Selection of operation				
Order Number	Oper.	Material	Phase	
1001000110	0050	M-15223675	Released	
1001000111	0050	M-15223675	Released	
1001000112	0050	M-15223675	Setup	
1001000113	0050	M-15223675	Released	
1001000114	0050	M-15223675	Released	
1001000115	0050	M-15223675	Released	
1001000116	0050	M-15223675	Released	
1001000117	0050	M-15223675	Released	

This affects the following activity steps:

- Dialog for the palette assignment
- Dialog for the operation block assignment
- Dialog for the operation priority assignment

This enhancement is done for all barcode types: single value scan, multiple value scan sequential & composed scan value.

## SFT Configuration

Template Editor (Use Case 2: Data Collection Acquisition with Production Orders/Operations)

Identifier	Value
Assignable Operation Phases	Selected (3), Available (4)
Barcode scan configuration	Multiple value scan sequential
Auto close scan dialog	<input checked="" type="checkbox"/>
Input pattern of valid barcode scans	(2) List Elements
Result dialog width	600
Result dialog height	400
Auto close search result dialog	<input checked="" type="checkbox"/>
Timer value for auto closing search result dialog [s]	5
Multi result selection table	Operation table
Upper table - available operations	No multi result table <small>No multi result table representation. In case of multiple</small>
Control configuration	Operation table <small>Representation of operation with and without workp</small>
Lower table - assigned operations	

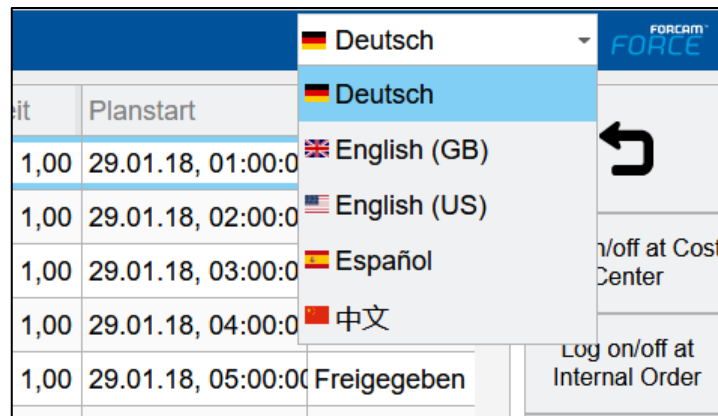
The barcode scan configuration is enhanced with the parameters below:

<b>Result dialog width</b>	The width of the operation selector dialog
<b>Result dialog height</b>	The height of the operation selector dialog
<b>Auto close search result dialog</b>	Check box whether the operation selector dialog is to be auto closed after a row is selected
<b>Timer value for auto closing search result dialog[s]</b>	Time in seconds for when the operation selector dialog is to be auto closed. This auto close is treated as cancelling the selection process.
<b>Multi-result selection table:</b>	
<b>No multi-result table</b>	Default selection, no operation selector dialog is configured. The first matched row is selected (existing behavior).
<b>Operation table</b>	Operation grid configuration

## 6.2 Language Display Instead of Countries

Affected module	Affected area	Status
Workbench/SFT	Shopfloor Terminal	Changed

The language selection drop-down menu in the SFT profile configuration as well as the language selection in the SFT itself now display language names instead of countries



## 6.3 Preset Expression for Quantity Booking

Affected module	Affected area	Status
Workbench	Shopfloor Terminal	New

The operation quantity booking step is enhanced with an “Expression” configuration below a “Quality type configurations for active operation” node:

- (Root node) Expression:  
This node is read only. It displays the value of the reference field of the child expression below.
- (Child node 1) Expression for preset only:  
If a checkmark is set, then the expression will be calculated only when the quantity booking dialog box is opened. When the user then deletes the value, it will not recalculate with the expression, the dialog will accept the user's input.
- (Child node 2) Expression:  
Displays the formulated expression. The field is of the string input type.

## 7 Planning

### 7.1 Operation Blocks

Affected module	Affected area	Status
Workbench	Digital Planning Board	New

Previously, the Digital Planning Board could only plan single operations. It is now possible to also plan operation blocks at once with specific rules and multi-level grouping. The following changes apply:

- Operation blocks are characterized by a common ID or multiple IDs (block numbers).
- Operation blocks are produced/planned parallel or sequential, depending on the grouping.
- Operation blocks are marked in the Gantt chart and in the operation table as a group.
- Operation blocks are always moved as a whole (all operations at once) when they are manually planned.
- Target start and end of each operation are calculated according to its block.

The operation blocks and operation block groups can be created and edited by an editor in the Digital Planning Board.

### 7.2 Colored Cells for State/Status

Affected module	Affected area	Status
Workbench	Digital Planning Board	Changed

Previously, the color for operating state, operation status & phase was displayed in a separate column or row (e.g. "State Color"). The color will now be displayed directly in the text fields.

Operating state code	Phase	Phase Mnemonic	Phase code
Q	Q	Q	Q
1	Released	45	1

## 8 Process


### 8.1 Auto-Assignment of Containers in Assembly

Affected module	Affected area	Status
Shopfloor Terminal	Track & Trace	New

Permanently registered containers/components are now getting auto-assigned once an assembly dialog is opened and an assembly is done. That means, the following flow is performed by an operator on the shopfloor:

- Components can be registered within inventory or production containers at the beginning of an operation.
- When opening the assembly dialog, the already registered containers are automatically assigned to the respective component positions if the component number matches.
- The appearance of a component in the assembly dialog and the saving of the data in the trace tree is regulated here via the flag in the ERP component list. This flag already exists and is named “trace needed”.
- In case of production containers, they can only be auto-assigned if:
  - Component number matches
  - Container has yield quantity
  - This quantity has been booked
  - This quantity has finished goods (i.e., last operation of a production order)

The described feature is deactivated by default and can be activated in the SFT assembly dialog with a new flag named “Automatic assignment of containers”.

 Once the operator confirms the assembly dialog, the quantities in the used containers are decremented accordingly. However, in practice, the real component consumption of the container can deviate from this retrograde count. With large quantities of the container, this would probably only become apparent after logging off from the operation. FORCAM FORCE™ cannot ensure that the physical count and the theoretical count of a container match 100 % and thus, cannot be in charge.



## 8.2 Switch Production Order for Assembly

Affected module	Affected area	Status
Shopfloor Terminal	Track & Trace	Changed

In an assembly, it is now possible to switch the production order, even if the current production order for a certain master piece has not yet been completed.

- i** FORCAM FORCE™ system will not ensure the correct working process based on this requirement, so it may be possible that errors could occur in the overall assembly process. In addition, the following restrictions must be considered:
- This requirement will only work for a so called “one piece flow”. That means that only production orders are supported that have a target quantity of 1. However, the system will not ensure that this condition is respected.
  - The system cannot differentiate between different order types. That means that for the system there is no “rework order”. The system can only know that it is a different order; nothing more. If a customer requires a logic based on an order type, this must be solved by the customer itself, e.g., with a customization of the system.
  - The required functionality will only be available for the standard assembly plan, not for “Without master piece” or “Commissioning” modes.

## 9 Appendix

Abbreviation/Term	Meaning
<b>AJP</b>	Apache JServ Protocol
<b>DACQ</b>	Data Acquisition
<b>DCU</b>	Data Collection Unit
<b>DNC</b>	Distributed Numerical Control
<b>ERP</b>	Enterprise Resource Planning
<b>FFAuth</b>	FORCAM FORCE™ Authentication (single sign-on solution from FORCAM FORCE™)
<b>HTTPS</b>	Hyper Text Transfer Protocol Secure
<b>IDoc</b>	Intermediate Document (SAP document format)
<b>LOCIDs</b>	Location identifier
<b>SFT</b>	Shopfloor Terminal
<b>SQL</b>	Standardized query language for databases
<b>SSL</b>	Secure Sockets Layer
<b>SSO</b>	Single Sign-on
<b>VPI</b>	Virtual Process Image
<b>VPIE</b>	Virtual Process Image Editor
<b>XSLT</b>	XSL transformation (programming language for transforming XML documents)