FORCAM FORCE

Reporting

Version 5.11

Manual

Document:	Manual - Reporting.docx
Release date:	2022-05-03
Document version:	1
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FB_8-41 Created: 15.09.21 Last Changes: 22.05.03 Version: V103.05.2209.05.22
APPROVED BY: HEAD OF TTE AUTHOR: TECHNICAL WRITER CLASSIFICATION: PUBLICATION

Content

1 Concept

This user manual explains and describes the reports in FORCAM FORCE IIOT. Reports condense the data collected in production and turn it into meaningful information. They are used for creating a variety of operational evaluations. They can be displayed in tabular or graphical form. Several reports can be summarized with their displays in a so-called multi-report.

FORCAM FORCE IIOT supplies a number of predefined reports. These offer a comprehensive set of tools for providing a detailed performance analysis.

Additionally, FORCAM offers the possibility to create custom reports based on all recorded data using a report editor (see the manual Report Editor). However, this requires in-depth knowledge of SQL programming and the FORCAM FORCE IIOT database structures. Where appropriate, it is recommended to contact FORCAM's Professional Service for assistance.

The key figures used in this document are in accordance with the VDMA standard publication 66412-1 of October 2009. However, to reflect operational practice, FORCAM uses SAP terms. Terms such as **processing time** are therefore interpreted according to SAP usage.
The key figures are derived from common operational practice. Thus, the **performance rate** here is a measure of efficiency and not of effectiveness as suggested in the VDMA standard specification.
Availability and **utilization rate** are used synonymously for practical purposes. The VDMA distinguishes between **utilization rate** and **efficiency rate**. This distinction can lead to misunderstandings. Therefore, **availability** is used throughout FORCAM FORCE IIOT.
The **technical utilization rate** defined in the VDMA standard does not correspond to the usual definition of technical utilization rate. In this case, we call the key figure **process availability**, since it refers to the availability of the plant during the machining process. This does not reflect purely technically induced malfunctions but is also lowered by organizationally induced malfunctions.
To arrive at a consistent key figure system for OEE, FORCAM FORCE IIOT also considers **setup reduction**. It is 100 percent when all internal setup times have been eliminated. As a result, losses in availability are further subdivided into losses caused by there being no order on the plant/machine (**occupancy rate**, in the VDMA standard sheet **efficiency rate**), losses due to internal setup times (**setup reduction**) and losses due to interruptions and malfunctions during the machining process.

2 Basic functions

Path: Performance analysis > Reporting > Reports

Reports can be displayed in different ways. A drill-down makes it possible to view a report in different degrees of detail.

2.1 Filtering and displaying datasets

Reports usually represent larger amounts of data. If predefined values are displayed automatically, it could unnecessarily increase the loading time. Therefore, an element in the navigation area will only be displayed after selecting corresponding filters and clicking **Refresh reports** (the button on the bottom right of the display area).

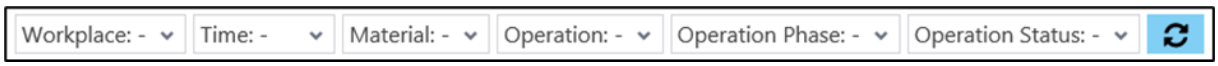


Fig. 1: Filter bar in the display area

The filters influence each other. A left filter always influences the right one. Depending on what left filter is selected, the selection options of the right filter are restricted or adjusted.
Example based on Fig. 1: Materials M1, M2 and M3 can be selected initially. After selecting workplace A, only material M2 remains available for selection, since only M2 is produced at this workplace.

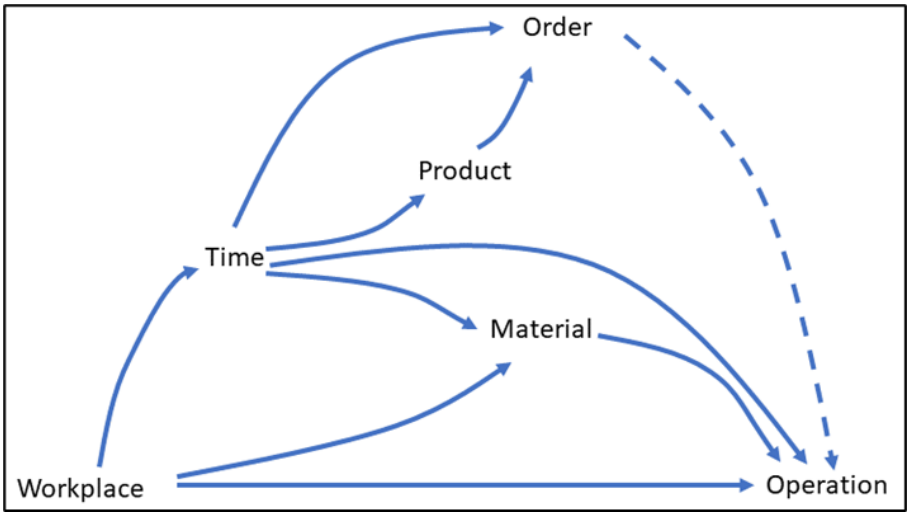


Fig. 2: Filters dependencies

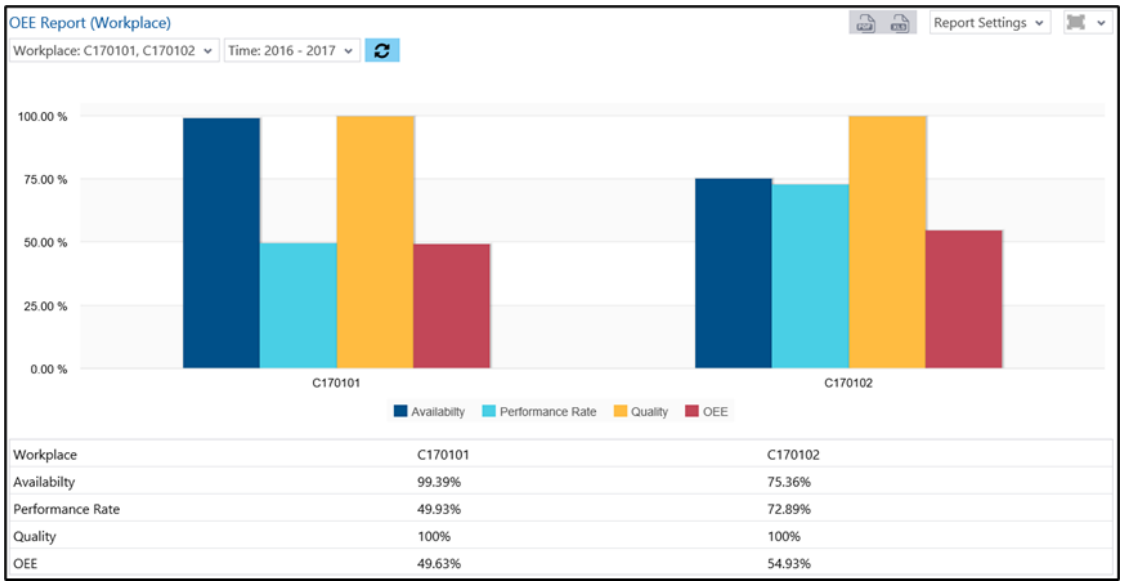
The workplace filter is not dependent on other filters. By contrast, the time filter requires the workplace filter, for example, to display a specific shift, and so on.
The operation filter is not necessarily dependent on the order filter. If, however, an order is selected in the order filter, the operation filter can use this data. It will then display only the operations of the selected order.

To display a dataset:

1. Open the drop-down menu for desired filters.
2. Select or enter the desired parameters.
3. Click on the **Refresh report** icon.

2.2 Hide or show values

Many charts and tables have a legend showing labels for the colors used. Clicking on an element in the legend hides or shows the corresponding value in the display.



Workplace	C170101	C170102
Availabilty	99.39%	75.36%
Performance Rate	49.93%	72.89%
Quality	100%	100%
OEE	49.63%	54.93%

Fig. 3: Legend of an image

2.3 Tables

In tabular reports, data sets are displayed in one row. The data type determines the content and appearance of columns.

	1021400		1021401		1056550		1056551
Operating state	Duration (HH:mm)	Duration (%)	Duration (HH:mm)	Duration (%)	Duration (HH:mm)	Duration (%)	Duration (HH:mm)
Free capacity inside of shift					955:16	87,72%	910:30
Undefined stoppage	637:00	87,38%	637:00	87,38%			
Break	92:00	12,62%	92:00	12,62%	133:44	12,28%	178:30
Setup							
Disorder Electric. Supply							
Σ	**729:00**	**100%**	**729:00**	**100%**	**1089:00**	**100%**	**1089:00**

Fig. 4: Tabular report

- Change sequence of columns:
  The order of columns can be changed per drag-and-drop at the column header.
- Changing sequence of rows:
  The column is sorted hierarchically by clicking on a column header. The sort order is based on the content of the column.

2.4 Bar and column charts

Bar and column charts are ideal for displaying multiple data above or next to each other. Thus, the data are clearly arranged and enable a direct comparison at a glance.

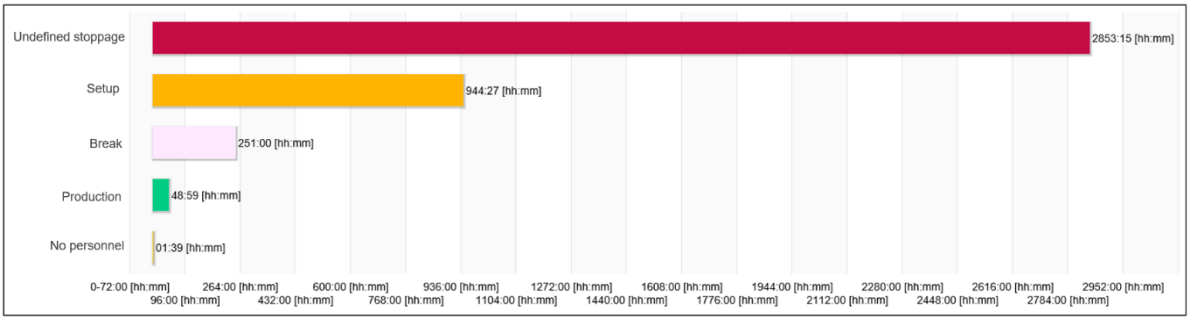


Fig. 5: Display as a bar chart

2.5 Timeline diagrams

Timeline diagrams visualize reporting events that are related to workplaces, operations or persons within a time period. The colored visualization can correspond to any defined operating states (e.g. workplace phases, workplace status or operation phases).

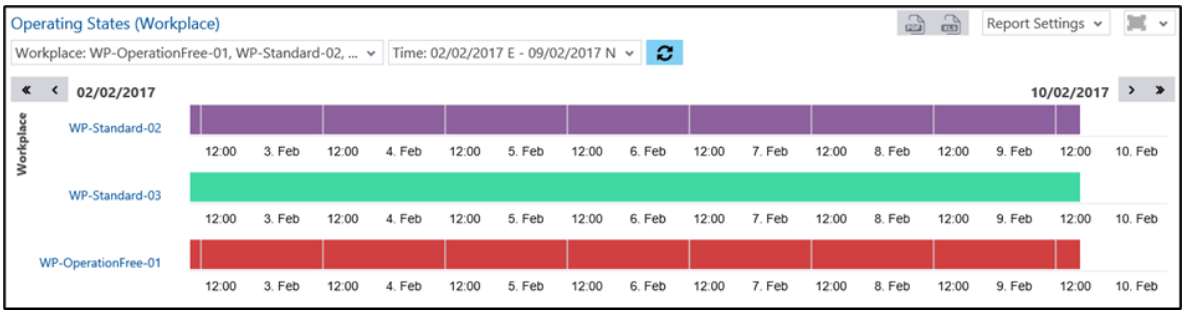


Fig. 6: Display as timeline

Highlighting an interval within a timeline zooms into the timeline. Clicking **Reset zoom** in the upper right corner of the screen resets the zoom.
The following figure 7 shows the status Gantt diagram from figure 6 with a zoom to the interval between 04:00 and 16:00 on 04.02.2017:

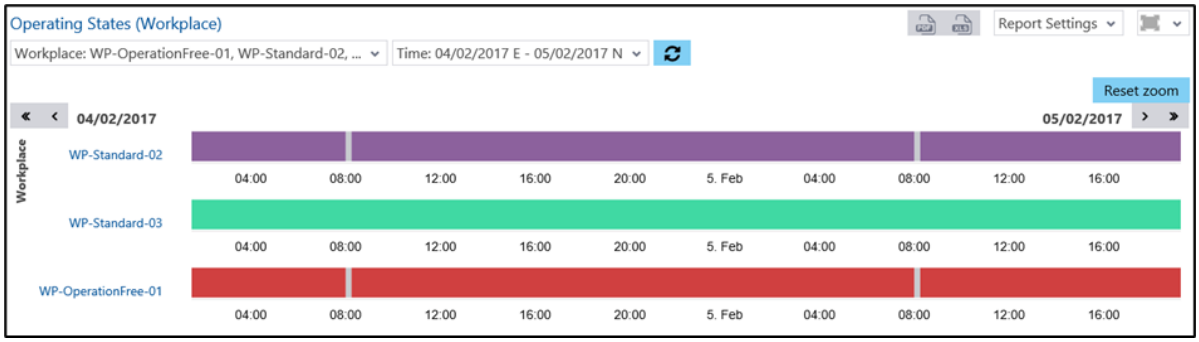


Fig. 7: Zoom into an interval of a timeline

2.6 Call up drill-down

Some reports offer a drill-down option. A drill-down opens a pop-up dialog to a specific and detailed target report, which calls up more details about a particular row as a sub-report.

ⓘ To configure a drill-down, see Manual – Report Editor.

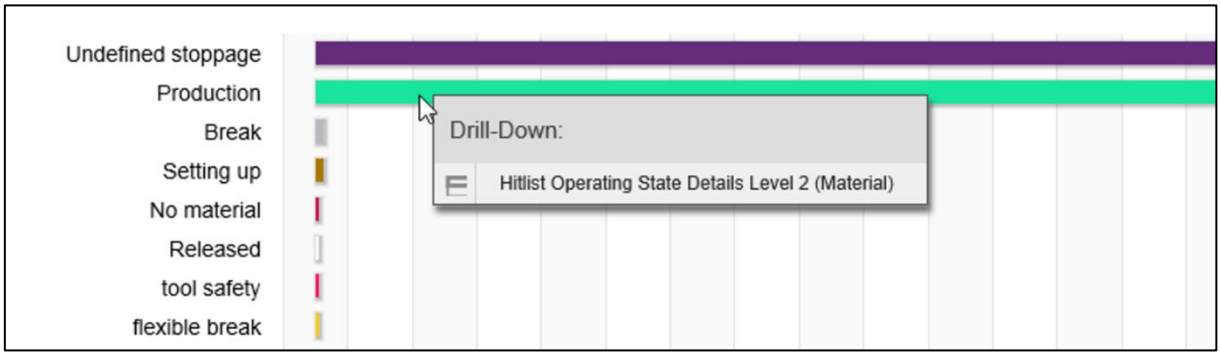


Fig. 8: Drill-down

When configured, a drill-down can lead to another drill-down. The next drill-down opens in the same pop-up dialog and a breadcrumb bar appears above the filters. All drill-downs are arranged in a row in the bar. The drill-down being displayed currently is highlighted in bold in the bar. By clicking on an element in the bar, the view changes to the corresponding drill-down.

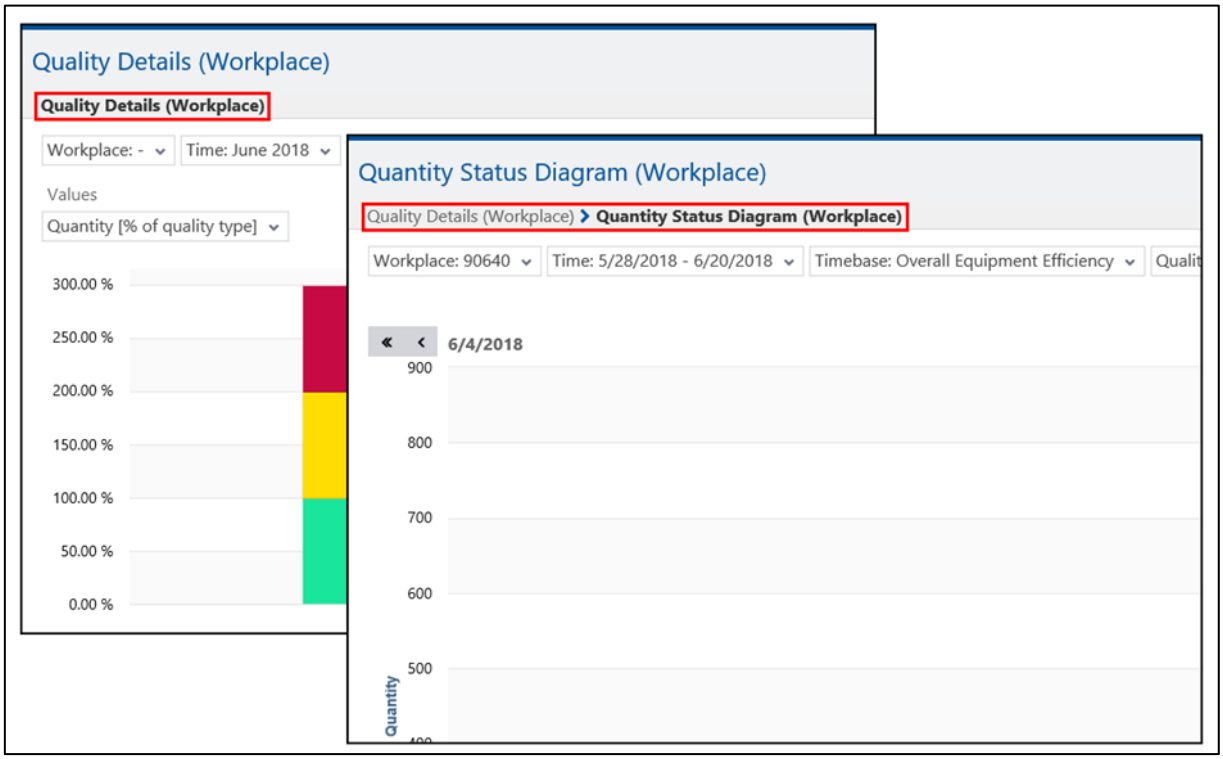


Fig. 9: Breadcrumb bar for consecutively called up drill-downs

To call up a drill-down:

1. Call up the context menu in the desired area of a report.
   Call up the context menu in tables by right-clicking, and in columns/bars by left-clicking.
2. Click on the desired subreport in the context menu.
3. Return to the report via icon **Back** at the top right of the screen.

ⓘ For technical reasons, calling up the context menu depends on the display type. Drill-downs from tables are called up by right-clicking and those from graphics by left-clicking.

The following reports include a drill-down:

- Order overview
- Hitlists
- Reports on operating state classes

2.7 User settings

Path: Performance analysis > Reporting > User settings

The **User settings** tab provides some configurations that affect the usability of the Reporting module. The configurations are saved for the logged in user account. The following configurations are currently possible:

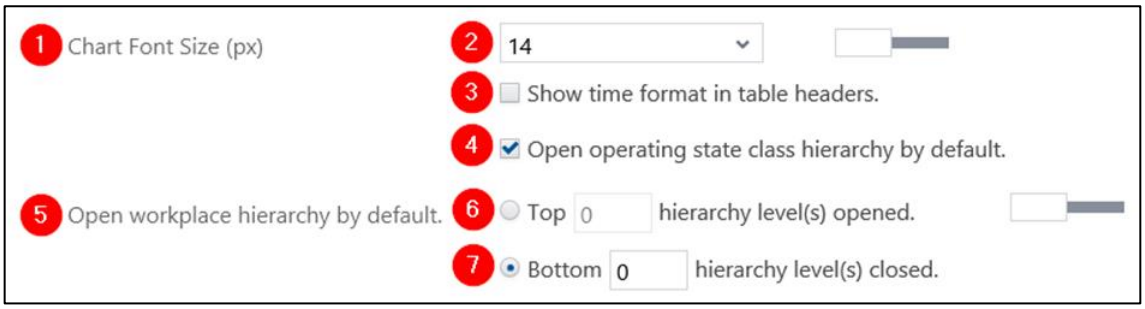


Fig 10: Configuration options in the user settings

(1) Sets the font size of the x and y axis labels on diagrams.
If the slider is active, the default size of 14 px is used. Changing the font size automatically applies to all diagrams after saving.
(2) Font size selection is between 6 and 36 px.
1 point equals approx. 1.3 px.
(3) If a check mark is set, the time format is displayed in table headers with durations (e.g. hh:mm:ss, see fig. 11).
(4) If a check mark is set, all state classes in each operating state filter are opened by default (see fig. 12).
(5) Determines the number of expanded levels in the hierarchy tab of the workplace filter.
If the slider is active, all levels will be expanded.
(6) Determines the number of levels to be expanded from the top.
Example: If 2 is entered, only the two uppermost levels are expanded (see fig. 13).
(7) Determines the number of levels to be collapsed from the bottom.
Example: If 1 is entered, only the lowest level is collapsed.

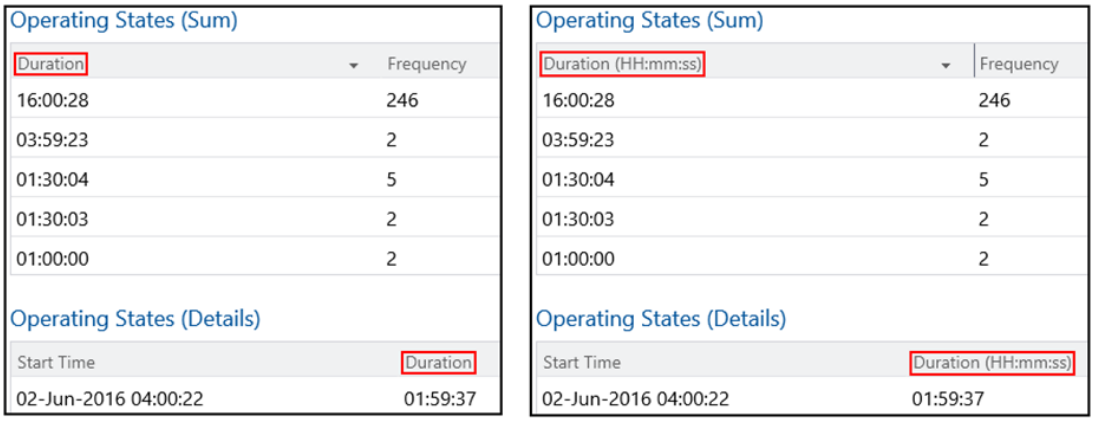


Fig. 11: Time format for durations hidden and displayed

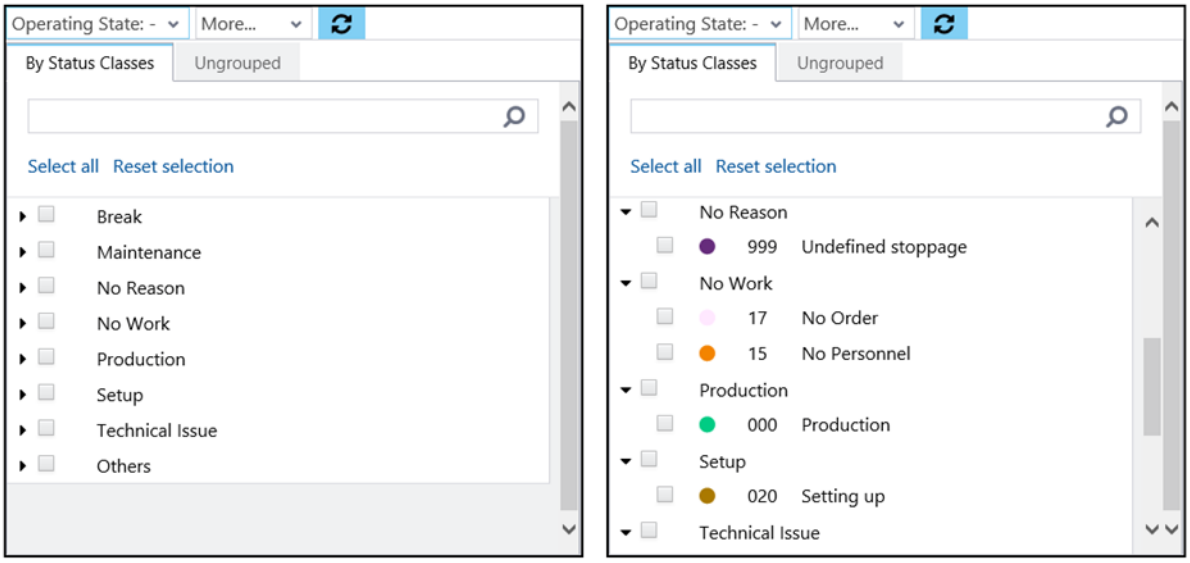


Fig. 12: Operation state classes collapsed and opened

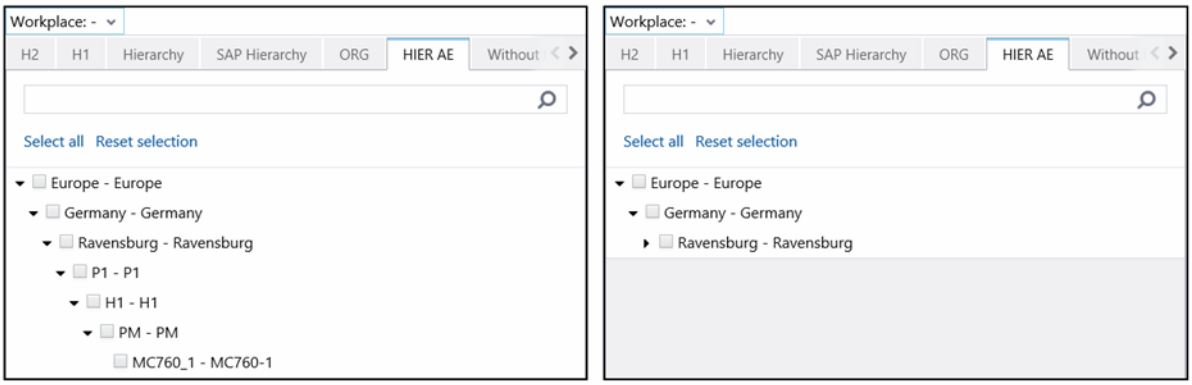


Fig. 13: Two top hierarchy levels collapsed

2.8 Downloading or emailing reports and tickets

Reports and tickets can be exported and downloaded or sent by email.
Reports can be exported as PDF or XLS files, tickets can also be exported as CSV files.

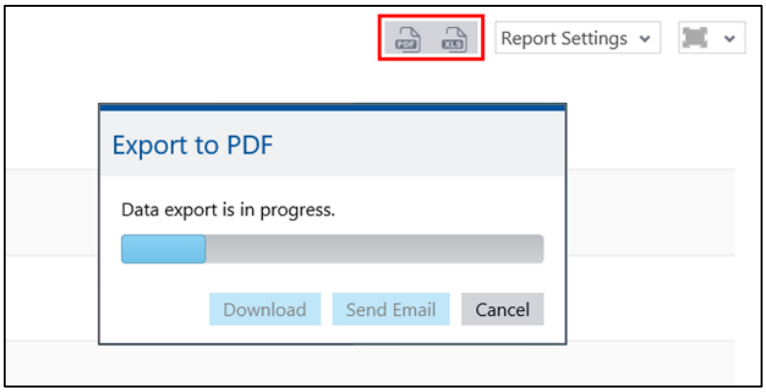


Fig. 14: Exporting a report to PDF format

When exporting multi-reports to PDF format, each subreport is displayed on a new page.
If a graphic comes before or after a table in a multi-report, both graphical elements are displayed on the same page.
Example: The multi-report **OEE (overall view)** consists of two subreports with a column chart at the top and an exponent table at the bottom. Both subreports will be displayed on one page during the PDF export in this case.

To export a report:

1. Click on the desired target format in the upper right corner of the screen.

➔ The report or ticket will be exported.

2. Click on **Download** and follow the browser instructions.
   or
   Click on **Send email** and add recipient and text in the next dialog.

2.9 Saving settings

Each report allows you to save the selected option as a setting. In tabular reports, the width and order of the columns are saved in a table.

To save a report setting:

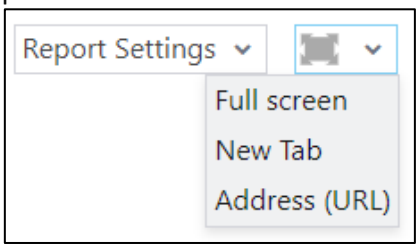
1. Open the drop-down menu in the upper right corner of the screen that is located within **Report settings**.
2. Click **Save settings** in the context menu.
3. Enter name of settings.
4. Click on **Save**.

ⓘ If **Mark as global** is checked, the settings are available for other users.
The following additional options are available in the drop-down menu within **Report settings**:

- Save settings as:
  Saving the settings already saved under a different name
- Delete settings
- Edit settings:
- Rename settings

2.10 Display options

FORCAM FORCE IIOT offers various display options to ensure optimal visualization across devices and platforms.



2.10.1 Full screen

Reports, visualizations and dashboards can be displayed in full screen mode. When in full screen mode, the content fills the entire browser page. The navigation bar and breadcrumb bar are hidden.

To activate the full screen mode:

1. Select the desired content (report/visualization/dashboard).
2. Click on the **View** icon.
3. Click **Fullscreen** in the drop-down menu.
4. Exit the full screen mode by clicking the **Close full screen** icon.

2.10.2 New tab

Reports, visualizations and dashboards can be opened in a new tab. The content in the new tab fills the entire browser page. The navigation bar and breadcrumb bar are hidden.

To open content in a new tab:

1. Select the desired content (report/visualization/dashboard).
2. Click on the **View** icon.
3. Click **New tab** in the drop-down menu.

ⓘ In some browsers, the content will open in a new window.

2.10.3 Export address (URL)

FORCAM FORCE IIOT is a web application. In it, reports, visualizations and dashboards have a separate and independent URL. The URL can be exported.

To export the URL of a visualization:

1. Select the desired visualization.
2. Click on the **View** icon.
3. Click on **Address (URL)** in the drop-down menu.

➔ The URL of the visualization will be displayed. The URL is selected and can be copied.

To export the URL of reports or dashboards:

1. Select the desired report/dashboard.
2. Click on the **View** icon.
3. Click on **Address (URL)** in the drop-down menu.
4. Select desired filter setting.
   The selected filter setting will be applied to the report/dashboard. Once the URL has been created, the setting cannot be changed.
5. Set override parameters.
   If a check mark is set at **Overwrite URL parameters**, the URL can be edited after creation (see section 2.10.3.1).
6. Click on **Generate link**.

➔ The URL of the report/dashboard will be displayed. The URL is selected and can be copied.

To export the URL of subreports:

1. Select the desired subreport in the report editor.
2. Go to the **Reports** tab.
3. Click on the **View** icon.
4. Click on **Address (URL)** in the drop-down menu.
5. Select desired filter setting.
   The selected filter setting will be applied to the subreport. Once the URL has been created, the setting cannot be changed.
6. Set override parameters.
   If a check mark is set at **Overwrite URL parameters**, the URL can be edited after creation (see section 2.10.3.1).
7. Click on **Generate link**.

➔ The URL of the subreport will be displayed. The URL is selected and can be copied.

2.10.3.1 GET Parameters

GET parameters can be added to an exported URL so the displayed content can be edited. Multiple GET parameters can be added to the URL one by one. The parameters are separated by an & symbol. The following GET parameters are supported:

- language=[Language code]
  Sets the displayed language of the content. The language code is based on ISO 639.
  Example: language=de-DE
- filter_mode=[edit|show|hide]
  Changes the display of the filter of a report/dashboard:
  - edit: The filter is displayed and editable.
  - show: The filter is displayed and is not editable.
  - hide: The filter is hidden.

  Example: filter_mode=edit
- show_title=[true|false]
  The title of the report/dashboard is displayed/hidden.

Example of a URL with multiple GET parameters:
http://fctestfactory05.cloudapp.net:19080/ffnewoffice/#!authorized.link?key=7243bd4c-daeb-4fc9-b3af-bb7c38c91de8&language=de-DE&filter_mode=hide&show_title=false

2.10.3.2 Incorporate into HTML code

✓ URL of the desired content is available (see section 2.10.3)

FORCAM FORCE IIOT supports incorporating reports, dashboards, and visualizations into any web page. The URL is embedded in the source code of an HTML page using the iframe tag.

Source code of a sample page:

```
<html>

<h2> My page </h2>

</br>

<h3> Report </h3>

<iframe
src="http://fctestfactory05.cloudapp.net:19080/ffnewoffice/#!authorized.link?filter_mode=hide&show_title=false&language=en-gb&key=dcc2803a-ad29-44b8-bea5-7134d5d1709a" height="500"
width="800"></iframe>

<html>
```

Display of the sample page:

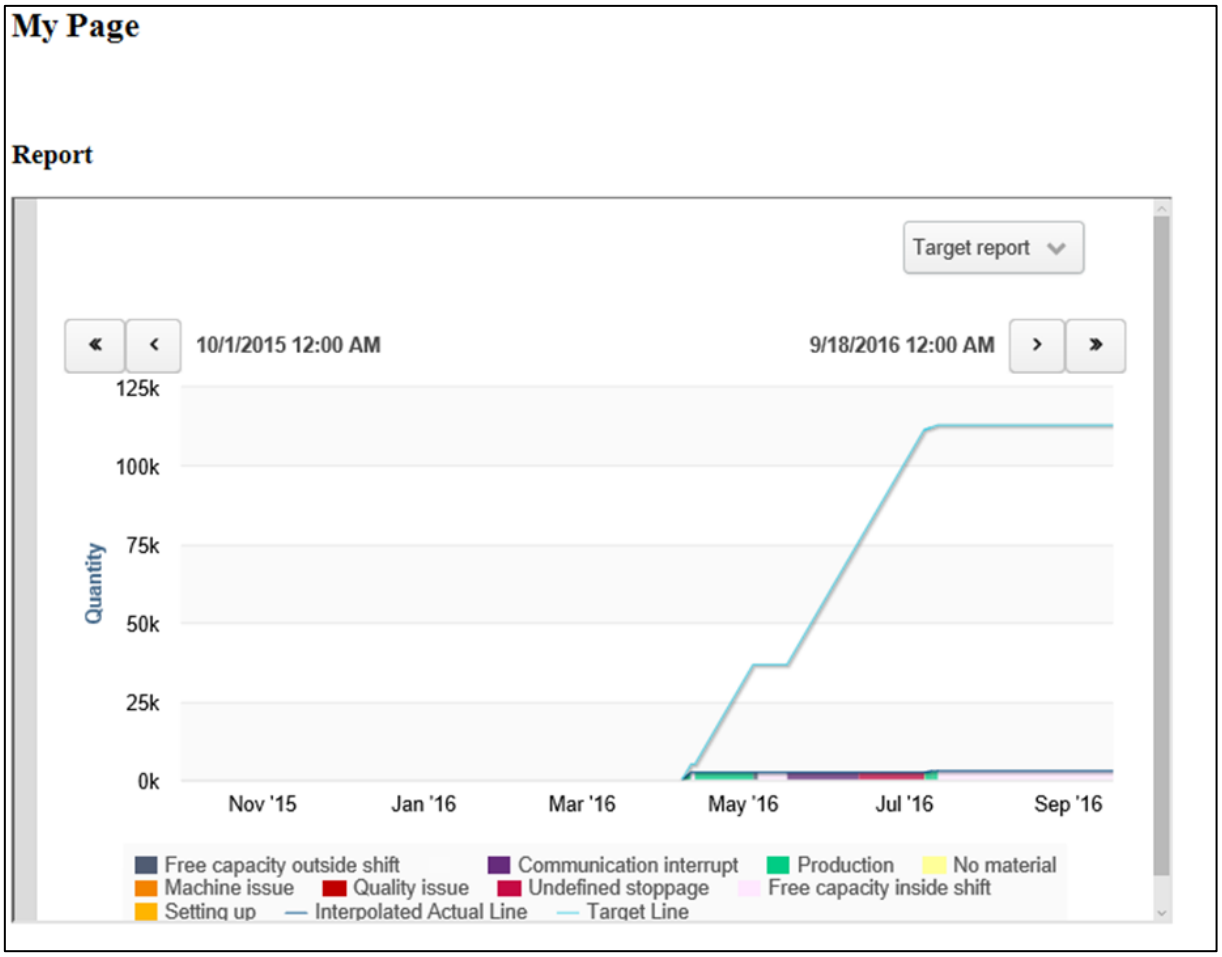


Fig. 15: Report embedded into a web page

2.11 Entering descriptions in several languages

Entries such as name and description can be entered in other languages besides German. FORCAM FORCE IIOT is displayed in the language with which the user logs in. Entries can be added in additional languages if the **Open entry mask** icon is next to the input field.

To add an entry in another language:

1. Click on the **Open entry mask** icon.
2. Make entry in desired languages.
3. Click on **Done**.

2.12 Using search field

The navigation area has an active search field. All reports and data sources in the navigation area can be found by entering search words. Any entries not matching the search words will be hidden. Search results appear as you type. It is not necessary to completely write out search words.

The search field also allows searching by catchwords. When searching for catchwords, results are displayed where the catchword is part of the description text of the content being searched for. Thus, the descriptions serve as metadata and identify corresponding content.
Searching by catchwords is recommended, for example, if the reports in FORCAM FORCE IIOT use different designations for e.g. parameter values compared to other IIoT platforms.

The search field is case-insensitive.

2.13 Exporting and importing in XML

FORCAM FORCE IIOT lets you export and import data to/from XML. The following data can be exported/imported:

- Visualizations
- Additional fields
- Dashboards
- Reports
- Data sources
- Filter criteria
- Data formats

2.13.1 Export

Path: Performance analysis > Reporting/Visualization/Dashboard > Export

It is possible to have interdependency between data. For example, reports require certain data sources, dashboards contain certain reports, etc. If a file is selected to be exported, all dependent or required data will be automatically selected as well. If the selection for a required file is cancelled, an error message appears (see fig. 16). The export is still possible after that, but the XML file may cause errors in further processing or display.

ⓘ Additional fields (see the manual Report Editor) have no specific database dependency. Therefore, if a visualization is selected, the additional fields used in it are not included in the selection. The additional fields may have to be selected individually.

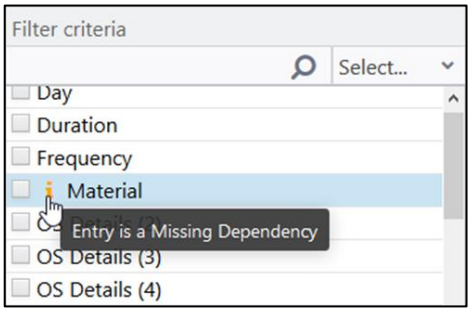


Fig. 16: Error message of a removed dependency

To export a file:

1. Select file to be exported.
   Several files can be selected.
2. Click on **Export** in the lower left edge of the screen.
3. Save the file as desired.

2.13.2 Import

Path: Performance analysis > Reporting/Visualization/Dashboard > Import

After an import file is selected, all contained entries (reports, data sources, etc.) are displayed. A consistency check indicates entries that are already in the system (see fig. 17). The entries already contained can be temporarily overwritten but will be replaced by the original entries after the module is restarted again.

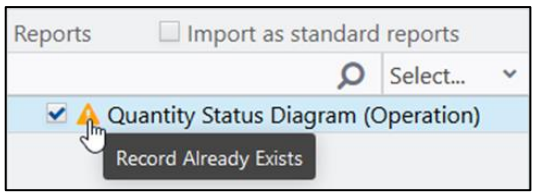


Fig. 17: Already existing entry of an import file

To import a file:

1. Click on **Select import file**.
2. Select and confirm the desired XML file on the computer hard drive.

➔ All entries of the file are displayed. Inconsistent entries are selected.

3. Deselect inconsistent entries.
4. Click on **Import** in the lower left edge of the screen.

➔ A message confirms the successful import.
The imported file will be added to its category (a report to reports, a data source to data sources, etc.).

ⓘ If there is a check mark at **Import as standard reports**, the imported report will be added to the standard reports.

2.14 Report-specific filters

2.14.1 Filter by values

Reports on quality details have an additional value filter. This filter gives a more precise indication of quality types and quality details.

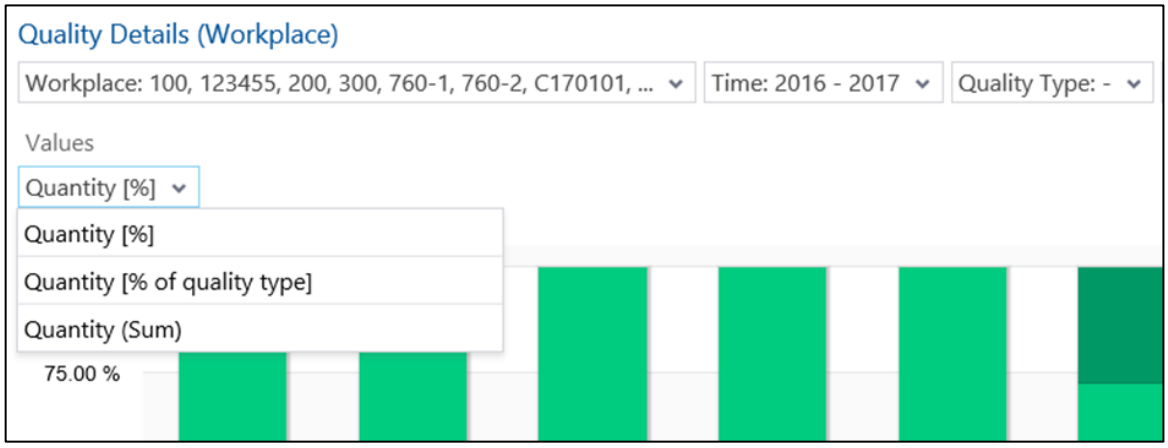


Fig. 18: Value filter

The following displays are possible:

- Quantity [%]:
  Percentage share of quality types and quality details in the total quantity.
  If a quality type is selected, the share is given only for this type.
  If a quality detail is selected, the share is given only for this detail.
- Quantity [% of quality type]
  Percentage share of quality details in the respective quality type. Each type is equivalent to a value of 100%. The details of the respective type are shares of this value.
  If a quality type is selected, the details are given only for this type.
  If a quality detail is selected, only the share of this detail in the type is indicated.
- Quantity (sum):
  Sum of the total quantity of a material with proportional shares for quality types and quality details.
  If a quality type is selected, the quantity is given for that type only.
  If a quality detail is selected, only the quantity of the detail is indicated.

2.14.2 Filter by duration

Reports on operating states as part of **availability analysis** have an additional duration filter. This filter lets you specify the percentage distribution of durations by operating states.

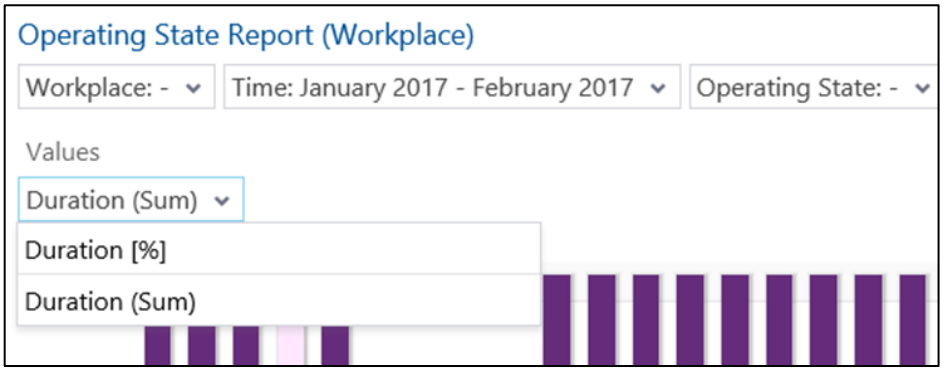


Fig. 19: Duration filter

The following displays are possible:

- Duration [%]:
  Percentage share of operating states in the total duration. The share only applies to the operating states that belong to the selected time base. If no time base is selected, duration [%] and duration (sum) are identical.
  If an operation state is selected, only the share for that state is given.
- Duration (sum):
  Total sum of the durations of the operating states in the format hh:mm.
  If an operation state is selected, only the sum of the duration of this state is given.

2.14.3 Filter by operating state class

Reports on operating states within **availability analysis** have a filter for operating states. It is possible to select operating states individually (ungrouped) and also to select state classes. State classes group operating states under a superordinate class.
Each operating state class must have at least one operating state. The following operating state classes are defined by default:

Table 1: Operating state classes defined by default

Abbreviation	Operating state class	Subordinate operating state (example)
ORG	Interruption due to organizational issues	No personnel/tools, etc.
TEC	Disruption due to technical issue	Malfunction hydraulics/supply, etc.
BRK	Break	Not planned, flexible
FC	Free capacity	Within shift
MNT	Planned maintenance	Planned repair/maintenance, etc.
STP	Setup	Setup, post setup
PRD	Production	Production

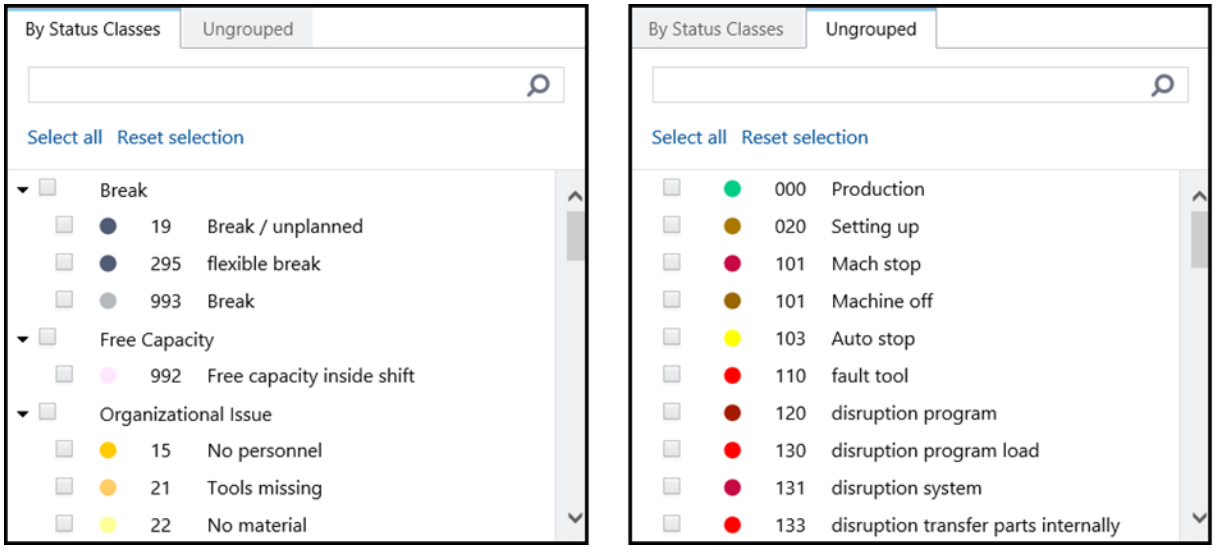


Fig. 20: Filter according to operating state classes and ungrouped operating states

If an operating state class is selected/deselected, all subordinate operating states are automatically selected/deselected as well.
If a state class is selected and individual subordinate operating states are deselected, the state class is automatically deselected. A state class can only be selected if all subordinate operating states are also selected.

2.14.4 Filter by operations

Reports that visualize data from operations have an operation filter for selection (e.g. operation details, quality report (operation), etc.). All available operations are listed here and can be selected.

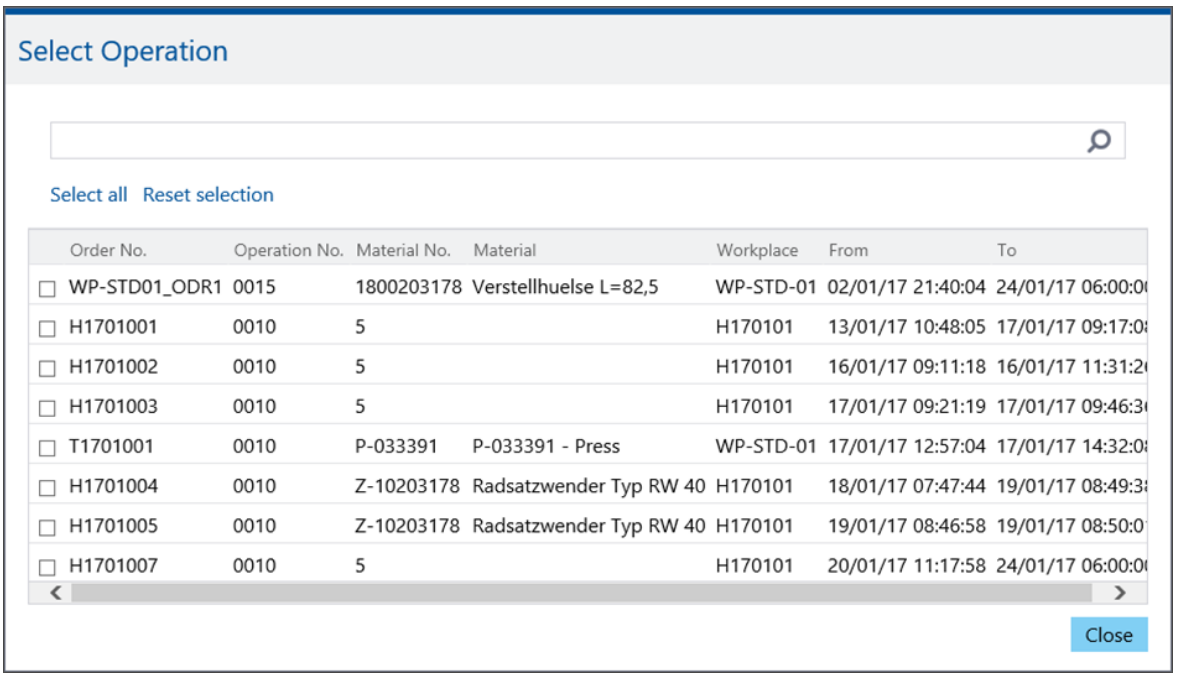


Fig. 21: Operation filter (example)

The following data is displayed for each operation, if it has been entered:

- Order number
- Operation number
- Material number
- Text (material description)
- Workplace
- Time span of the operation (from ... to)

Visualized operations can be in different stages. Depending on the phase, the time span is calculated from different values. Table 2 below shows the calculation of the values for each phase:

Table 2: Different phases of an operation and calculation of the respective time span

Operation stage	From	To
Not started yet	Planned start time	Planned end time
Started but not yet completed	Start time	Max. (planned end time, now + remaining time + time of shift breaks)
Completed	Start time	End time

2.14.5 Filter by personnel

Some reports that access the personnel master (e.g. the personnel activity log or the personnel operations log) offer different filter variants for selecting the personnel groups to which the report is to be applied.

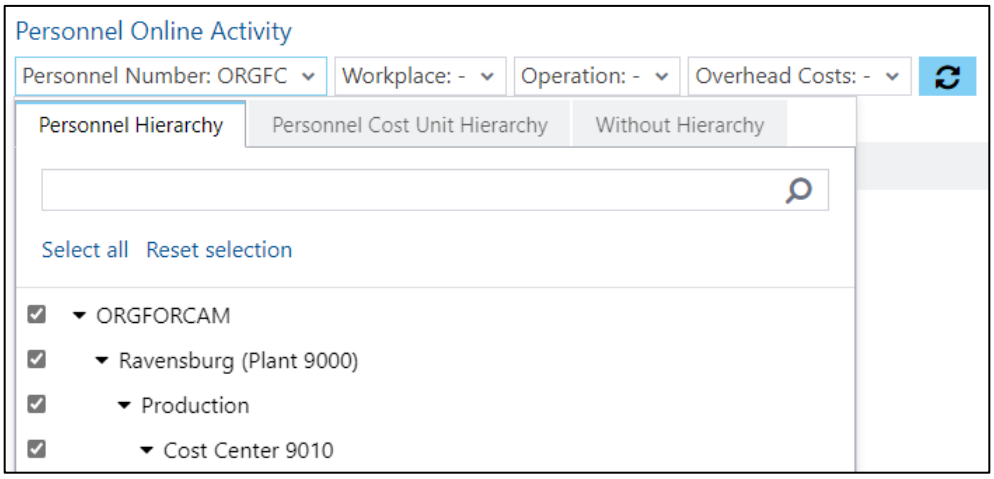


Fig. 22: Personnel filter

The following personnel filters are available:

- Personnel hierarchy
  Filtering using the "PERS HIER" personnel hierarchy configured in the Workbench master data.
- Personnel cost center hierarchy
  Filtering using the "PERS COST HIER" personnel hierarchy configured in the Workbench master data.
- Without hierarchy
  Direct selection of individual employees to define the personnel group for filtering.

In some cases, you can also use a slider in personnel reports for selecting the hierarchy level to which the selection is to be narrowed down.

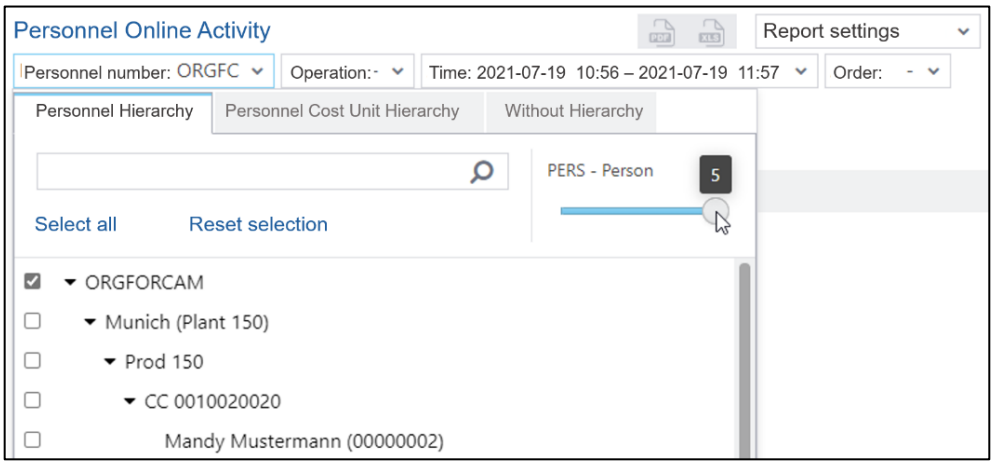


Fig. 23: Personnel filter with delimitation of hierarchy level

ⓘ The personnel cost center hierarchy in FORCAM FORCE IIOT version 5.11 uses only the current actual assignments of personnel, i.e. it does not use history here.

By default, filtering based on individuals is disabled.

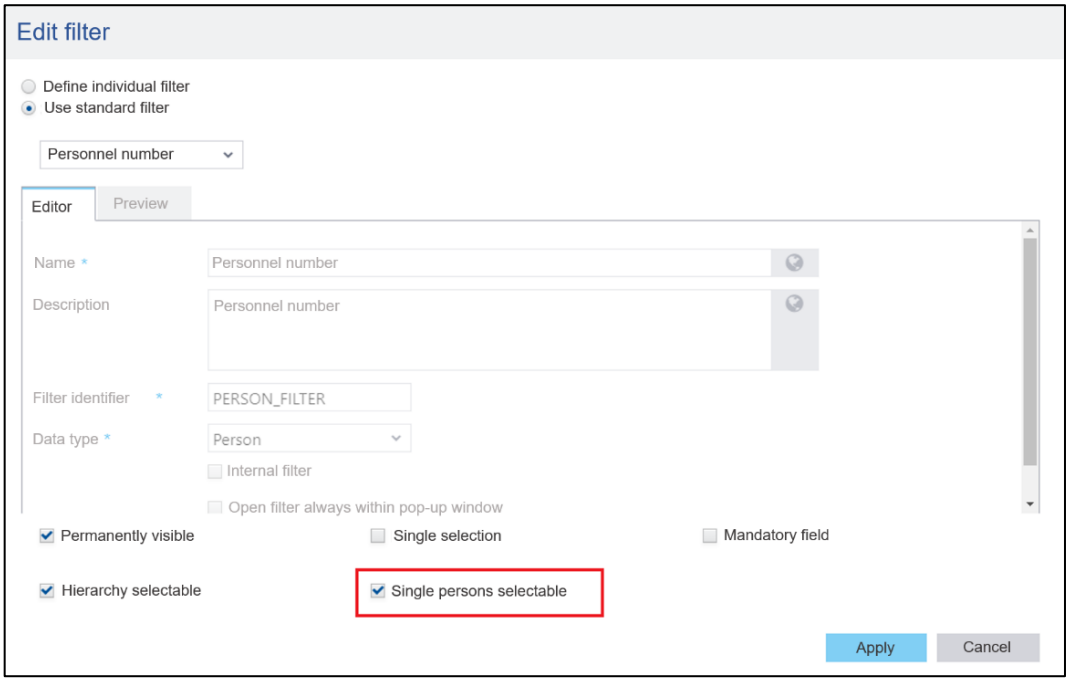


Fig. 24: Enable filter on individuals

To activate the individual filter:

1. Under **Data sources**, select the desired personnel report.
2. Select **Copy** to create a new report based on the selected report.
3. In the editor, select the filter **Personnel number** and go to **Edit**.
4. Place a check mark next to **Single persons selectable**.

⚠ Before single person filtering is activated, it must be checked under local labor law if the collection of single person-related data is permissible.

2.15 Select time zone

Selecting the time zone in FORCAM FORCE IIOT is no longer done in the login page as of version 5.7.1. Users can set the time zone in the user settings after logging on. UTC is predefined by default.

ⓘ All times specified in FORCAM FORCE IIOT refer to the selected time zone.

To select a time zone

✓ A user is logged in.

5. Open the drop-down menu in the upper right area.
6. Click on the globe icon.
   The designation next to the icon indicates the currently selected time zone.
7. In the next dialog, select the desired time zone and click **Apply**.

➔ The system updates itself and applies the new time zone.

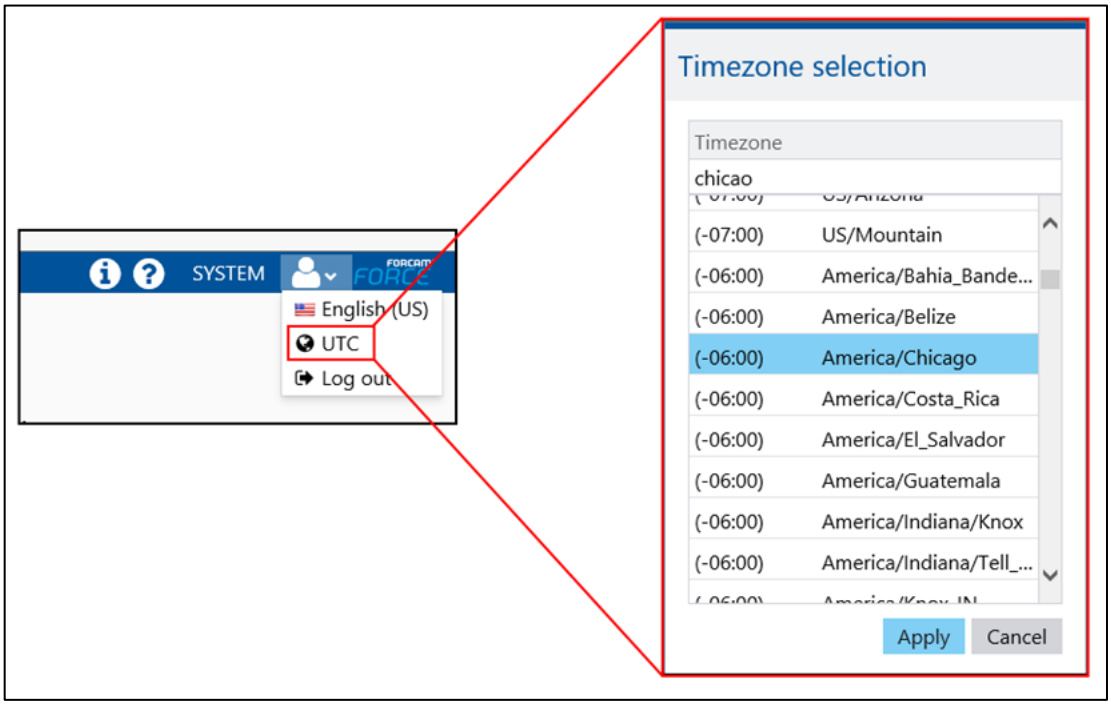


Fig. 25: Selecting a time zone

2.16 Change history

FORCAM FORCE IIOT provides a function to log the changes made by users. This function is available in the visualization and dashboard area and in the Report editor. There, the **Change history** button can be used to display data about the last change made by a user.

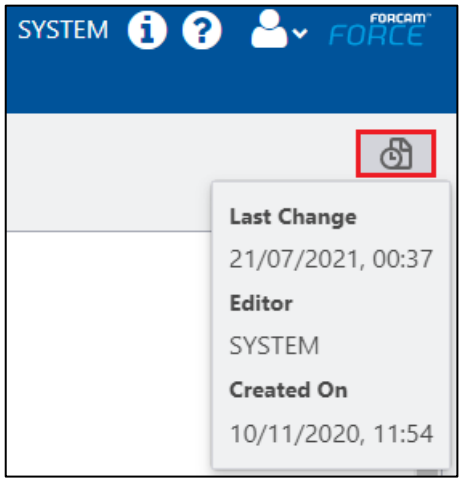


Fig. 26: Display of the last change

3 Predefined reports

Various reports are already predefined in FORCAM FORCE IIOT and can be used immediately. All reports described in this chapter are included in the standard application.

⚠ The maximum number of rows in reports is limited by the system to avoid crashes, performance issues and overloads. The limit can be increased manually in the system settings of the Workbench (see the manual Master Data and System Configuration): **Configurations > System > Modules > NewOffice > Render Reports**.

The reports in table 3 are used for the exact analysis of all recorded data from production, as primarily required for the daily evaluation of the production processes of the previous day or the previous shift. Logs can also be used to analyze the current shift in realtime. They allow for better insight into detailed stoppage or scrap reasons.

ⓘ A user with write permissions automatically has read permissions for all reports.
ⓘ All reports are displayed in browser time.

Table 3: Online logs

Report	Description
Quantity status diagram	Realtime display of quantities and the operating state development of operations and a workplace within a freely selectable time period as a ramp chart with display of a target line for a target/actual comparison of the produced quantity
Operating state timeline	Realtime display of operating states of selected workplaces, orders and operations within a freely selectable time period as a time bar diagram
Operating state log	Realtime representation of the operating states for a workplace within a freely selectable time frame
Quantity log	Realtime representation of the quantities of all operations at a workplace during a definable period
Shift book	Echtzeitdarstellung von Mengen, Betriebszuständen und Vorgängen an einem Arbeitsplatz während einer Schicht
Shift log	Realtime representation of the operations within a shift and the total number of strokes of an operation, as well as the frequency distribution of the operating states within the respective shift
Daily log	Realtime representation of cumulated strokes of operations within a day and the total number of strokes of an operation, as well as the frequency distribution of the operating states within the day involved
Messages	Realtime representation of all messages received within a freely selectable period from one or more workplaces (machines or Shopfloor Terminal)

The reports in table 4 display the operating states in condensed form. They are therefore suitable for evaluating the degree of availability within larger periods (e.g. weekly, monthly or annual review) and also facilitate comparing different plants and production areas.

Table 4: Availability analysis

Report	Description
Availability (overall view)	Occupancy rate, process availability (processing share of execution time), setup reduction and availability, for viewing the entire plant or individual plant areas within a predefined time range
Operating state class report	Cumulated durations of state classes for workplaces, materials, orders and operations within a predefined period
Operating state class development	Development over time of the operating state classes for workplaces and materials within a predefined period
Operating state report	Cumulated durations of operating states of workplaces or hierarchy levels, orders, operations and of operating states that occurred during production of materials within a predefined period
Operating state development	Time development of operating states of workplaces or hierarchy levels and of operating states that occurred during the production of materials within a predefined period
Hit list operating states	Duration and frequency of operating states at individual workplaces or hierarchy levels, operations, orders, and of operating states in which production of individual materials or items occurred within a predefined period

The reports in table 5 summarize the OEE as an overall view, report or development.

Table 5: Overall Equipment Effectiveness (OEE)

Report	Description
OEE (overall view)	OEE evaluation of all or selected workplaces for a definable period
OEE Report	OEE-compliant evaluation as column chart to compare individual workplaces or hierarchy levels and operations within a predefined period
OEE Development (workplace)	Time development of the OEE evaluation for selectable accumulation periods (shift, day, week, month, quarter, year) within a predefined period

The reports in table 6 represent the OPE. In addition to an overall view of OPE, the individual key performance indicators are available as reports.

Table 6: Overall Process Efficiency (OPE)

Report	Description
OPE (overall view)	OPE evaluation of all or selected products or orders for a definable period
Production process ratio (overall view)	Display of the production process ratio for one or more workplaces for a definable period. The production process ratio is the product of order throughput efficiency, process availability and setup reduction.
Order analysis	Detailed information about an order for a definable period
Operation analysis	Detailed information of one or more operations for a definable period

The following reports display the produced quantities in condensed form. They are also suitable for evaluating the degree of availability within larger periods and also facilitate comparing different plants and production areas.

Table 7: Quality analysis

Report	Description
Quality report	Cumulated quantities per workplace, per operation or per material, within a definable period
Quality details	Quality details (scrap and rework reasons) for workplaces (with development), materials (with development), and operations
Quality development	Development over time for quantities cumulated per workplace or material within a definable period
Hit list quality details	Quality details (scrap and rework reasons) for workplaces, materials, and operations, ranked by frequency

Table 8: Performance rate analysis

Report	Description
Hit report (workplace)	Strokes cumulated at one or more workplaces within a definable period
Hit development (workplace)	Development over time of the number of strokes cumulated at one or more workplaces within a definable period
Performance report (operation)	Evaluation of the performance rate of individual operations

The reports in table 9 present the data for resource allocation. Reports indicate the allocation of workplaces or machines.

Table 9: Resource allocation

Report	Description
Planned allocation	Realtime representation of shifts at one or more workplaces within a selectable time
Workplace allocation	Display of one or more workplaces and the respective operations/orders in progress for a definable period
Workplace availability	Display of one or more workplaces and the respective operating states for a definable period
Shift schedule	Realtime representation of shifts for a definable period as Gantt chart and table for one or more workplaces:

The following reports provide overviews of orders with production-related data, not started, ongoing, interrupted and completed operations.

Table 10: Order overview

Report	Description
Order overview	Tabular overview of all orders with all production-relevant data on material, quantity, production dates and ERP status
Order details	Tabular overview of orders with production-relevant data and supplementary details for each order
Order backlog	Tabular overview of operations not yet started
Operations in progress	Tabular overview of ongoing and interrupted operations
Completed operations	Tabular overview of completed operations
Operation details	All operation details from planned dates, target durations of individual operation phases and target quantities to actual dates, durations and quantities of the material to be produced, including target/actual comparisons and a range of key performance indicators

The reports in table 11 show maintenance times for selected workplaces. The development of maintenance over a time period allows, e.g., conclusions to be drawn about which maintenance efforts were used to optimize the OEE, if any.

Table 11: Maintenance

Report	Description
Maintenance report	Graphical and tabular display of the maintenance time rate and the proportion of unplanned maintenance to total maintenance per workplace. The maintenance time rate is the proportion of planned maintenance to total maintenance.
Maintenance development	Graphical and tabular display of the development of the maintenance time rate and the proportion of unplanned maintenance to total maintenance
Malfunction reason development	Graphical and tabular display of malfunction reasons over time. In addition to frequency, percentage and absolute duration of malfunction reasons, MTBF and MTTR are displayed.

The following reports provide overviews of the attendance and activities performed by individual Employees.

Table 12: Personnel

Report	Description
Personnel activity log	Tabular display of detailed activities for one or more persons with listing of attendance times of employees at the workplace and usage durations regarding individual operation phases.
Personnel operation log	Tabular listing of the operating states for each operation per workplace and person over specific periods of time

3.1 Cross-reference of time bases in reports

Some reports will access time bases in order to calculate the required values. Table 13 lists all reports that require a time base for calculation and indicates which time base is used in each case.

ⓘ For the configuration of time bases, see the manual Master Data and System Configuration.

Table 13: Reports and their required time bases

Abbreviations	OEE	PROD	SETUP	MAL-FUNCTION	MAINT	U/M
FORCAM designation	Scheduled operating time	Production time	Setup time	Interruption time due to malfunction	Maintenance time	Unplanned maintenance time
REFA designation	Production tool basic time	Main operating time	Secondary operating time for setup	Malfunction induced utilization interruption	-	-
Quantity status diagram (workplace)	-	✓	-	-	-	-
Quantity status diagram (operation)	-	✓	-	-	-	-
OEE Report (workplace)	✓	✓	-	-	-	-
OEE Development (workplace)	✓	✓	-	-	-	-
OEE (overall view)	✓	✓	✓	-	-	-
Availability (overall view)	✓	✓	✓	-	-	-
Operation details	✓	✓	✓	-	-	-
Maintenance report	-	-	-	-	✓	✓
Maintenance development	-	-	-	-	✓	✓

3.2 Online logs

This section describes all reports that are updated in realtime. These types of reports are designated as online logs.

ⓘ All online logs are only available until the time of the latest archiving. Only condensed reports are written to the archive during archiving. The online logs will be lost. For archiving and its settings, see the manual Master Data and System Configuration.

3.2.1 Workplace

3.2.1.1 Quantity status diagram (workplace)

Path: Performance analysis > Reporting > Reports > Online logs > Workplace > Quantity status diagram (workplace)

✓ The **production** time base is configured.

Quantity and operating state development for the selected period for a workplace in realtime. The quantity produced up to this point defines the height of the bars (zero point = start time).
The **interpolated actual line** marks the limit of the operating states and relates to the left Y-axis (yield quantity). The **target time per unit** curve results from the duration of the respective operating state multiplied by the **time per unit** stored at the respective operation and also relates to the left Y axis. If no **time per unit** is defined in the operation, the last time transmitted by the connected ERP system is used in the operation data (e.g. via a time per unit).

The quality type influences the slope of the actual line. At ongoing operations, the quantity in the quantity status diagram grows with the quantity not yet qualified (in realtime). The quantity not yet qualified is displayed when selecting scrap and rework as well as yield quantity. Once the quantity is qualified, it will then only be displayed under the relevant quality type.

The time base influences the slope of the target line. This grows only within the selected time base, and in accordance with the stored time per unit. If no operation is logged, the target line does not grow any further, since no target time per unit is defined and therefore no slope of the target line can be determined. When selecting the **production time base**, the relation of actual line and target line corresponds to the performance rate in the OEE. Only in this case does the efficiency curve correspond to the average performance rate up to the respective time (the performance given here is not identical to the performance rate in the OEE report for different times per unit). When selecting the **OEE time base**, the difference between the target line and the actual line reflects the sum of efficiency losses and effectiveness losses. Quality losses are also considered, depending on whether only the yield is considered.

ⓘ Interpolation is a procedure for approximating an unknown function value using known function values in place of adjacent ones. This means that the increase in the quantity produced is displayed steadily, instead of a stepwise increasing at the time of the quantity feedback.

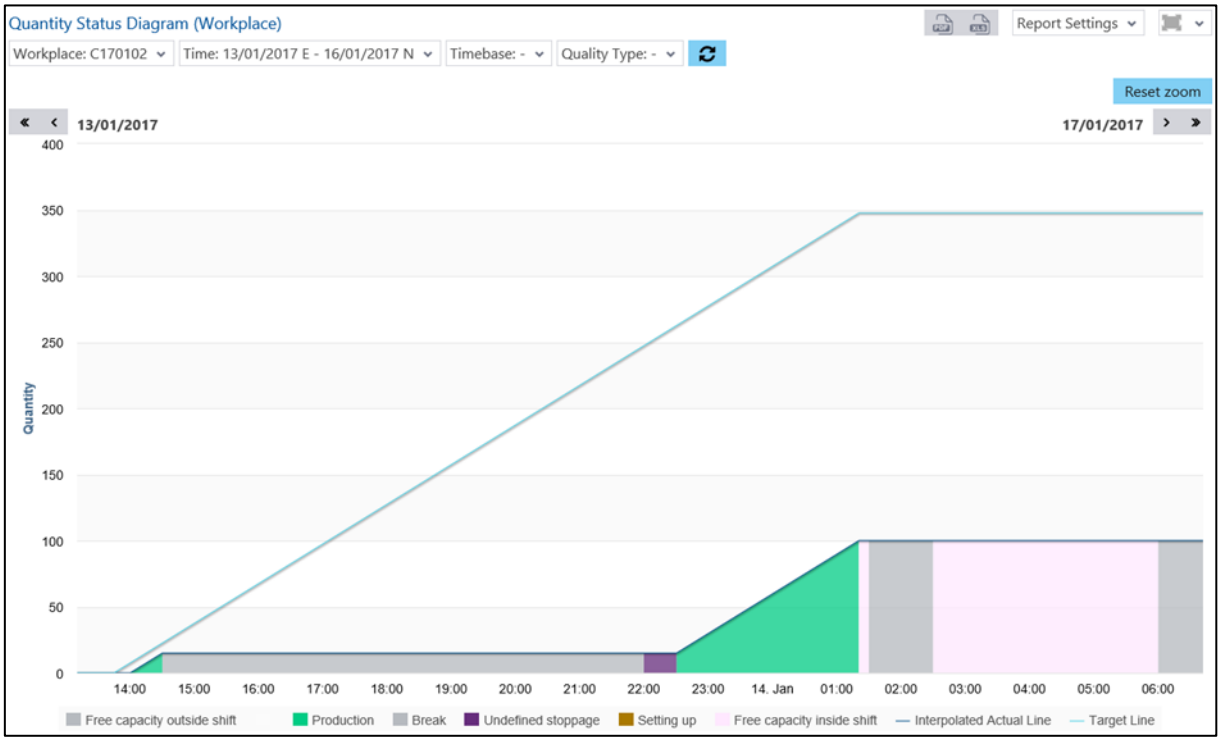


Fig. 27: Quantity status diagram (workplace)

ⓘ Only operating states which are associated to the selected time base cause an increase of the **target time per unit**.

3.2.1.2 Operating state timeline (workplace)

Path: Performance analysis > Reporting > Reports > Online logs > Workplace > Operating state timeline (workplace)

Gantt chart of *one* or *more* workplaces with operating states for the selected period in realtime:

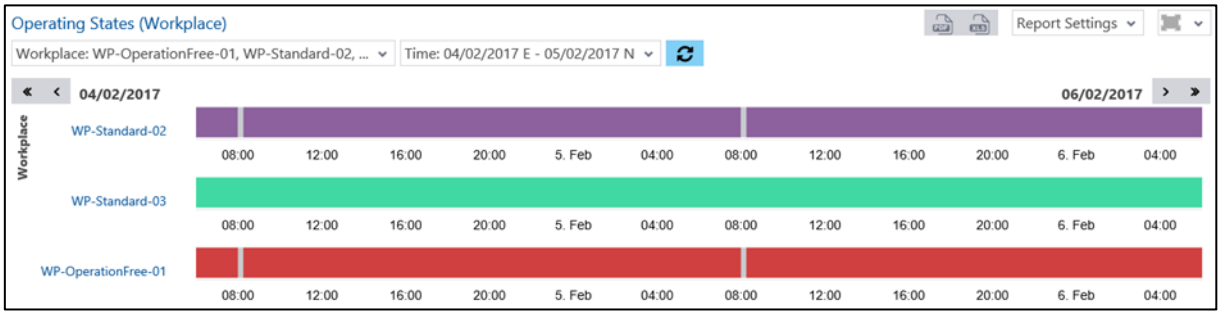


Fig. 28: Operating states (workplace) as Gantt chart

ⓘ Highlighting an interval within a timeline zooms into the timeline. Clicking **Reset zoom** in the upper right corner of the screen resets the zoom.

3.2.1.3 Operating state log (workplace)

Path: Performance analysis > Reporting > Reports > Online logs > Workplace > Operating state log (workplace)

Multi-report with operating states, their duration and frequency for *one* workplace in realtime:

- Operating states (sum) (fig. 29):
  Sum of the duration of operating states with the occurred frequencies for the selected period
- Operating states (details) (fig. 30):
  List of operating states with their respective start time and duration

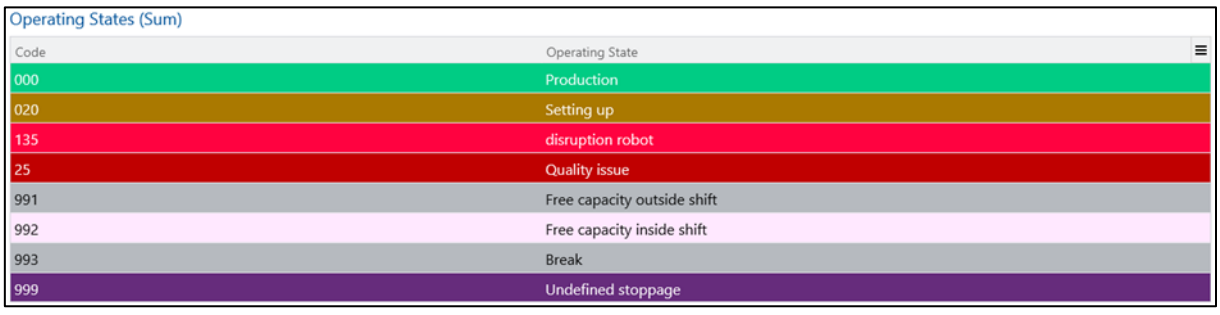


Fig. 29: Operating states (sum)

Operating States (Details)

Start Time	Duration (HH:mm:ss)	Code	Operating State
11-Jan-2017 05:20:...	00:39:09	992	Free capacity inside shift
11-Jan-2017 03:00:...	02:20:09	000	Production
11-Jan-2017 02:30:...	00:30:40	999	Undefined stoppage
11-Jan-2017 02:00:...	00:29:19	993	Break
11-Jan-2017 01:30:...	00:30:40	000	Production
11-Jan-2017 01:00:...	00:29:23	000	Production
11-Jan-2017 00:30:...	00:30:00	135	disruption robot
11-Jan-2017 00:30:...	00:00:00	999	Undefined stoppage
11-Jan-2017 00:00:...	00:30:00	020	Setting up
10-Jan-2017 22:00:...	02:00:35	992	Free capacity inside shift

Fig. 30: Operating states (details)

3.2.2 Operation

3.2.2.1 Quantity status diagram (operation)

Path: Performance analysis > Reporting > Reports > Online logs > Operation > Quantity status diagram (operation)

✓ The **production time base** is configured.

Quantity and operating state development for the selected period for operations in realtime. The quantity produced up to this point defines the height of the bars (zero point = start time).
The **interpolated actual line** marks the limit of the operating states and relates to the left Y-axis (quantity). The **time per unit curve** results from the duration of the respective operating state multiplied by the time per unit stored at the order and also relates to the left Y-axis. The **OEE curve** shows the OEE performance at a glance and relates to the right Y-axis.

The quality type influences the slope of the actual line. At ongoing operations, the quantity in the quantity status diagram grows with the quantity not yet qualified (in realtime). The quantity not yet qualified is displayed when selecting scrap and rework as well as yield quantity. Once the quantity is qualified, it will then only be displayed under the relevant quality type.

The time base influences the slope of the target line. This grows only within the selected time base, and in accordance with the target time per unit stored on the operation. If no operation is logged, the target line does not grow any further, since no target time per unit is defined and therefore no slope of the target line can be determined. When selecting the **time base for production**, the relation between the actual line and the target line corresponds to the performance rate in the OEE. Only in this case does the performance curve correspond to the average performance rate up to the respective time. When selecting the **OEE time base**, the difference between the target line and the actual line reflects the sum of efficiency losses and effectiveness losses. Quality losses are also considered, depending on whether only the yield is considered.

ⓘ Interpolation is a procedure for approximating an unknown function value using known function values in place of adjacent ones. This means that the increase in the quantity produced is displayed steadily, instead of a stepwise increasing at the time of the quantity feedback.

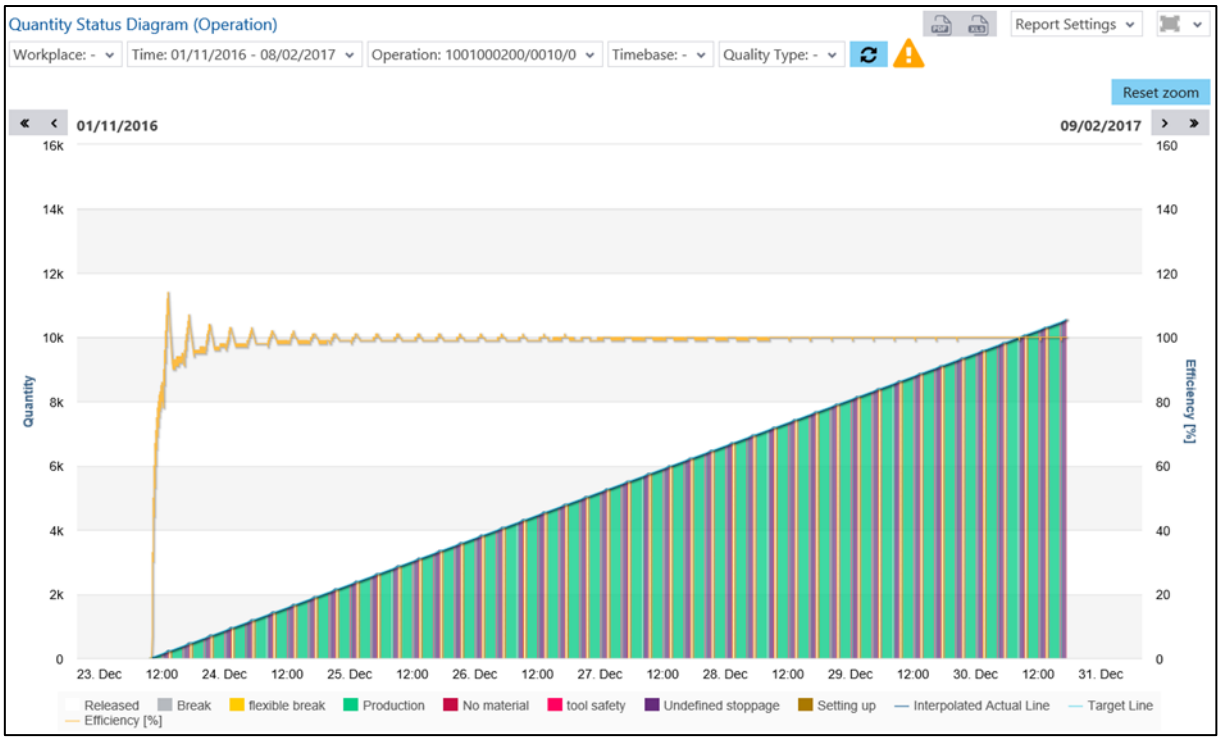


Fig. 31: Quantity status diagram (operation)

ⓘ Only operating states which are associated to the selected time base cause an increase of the **target time per unit**.

3.2.2.2 Operating state timeline (operation)

Path: Performance analysis > Reporting > Reports > Online logs > Operation > Operating state timeline (operation)

Gantt chart of *one* or *more* operations with operating states for the selected period in realtime:

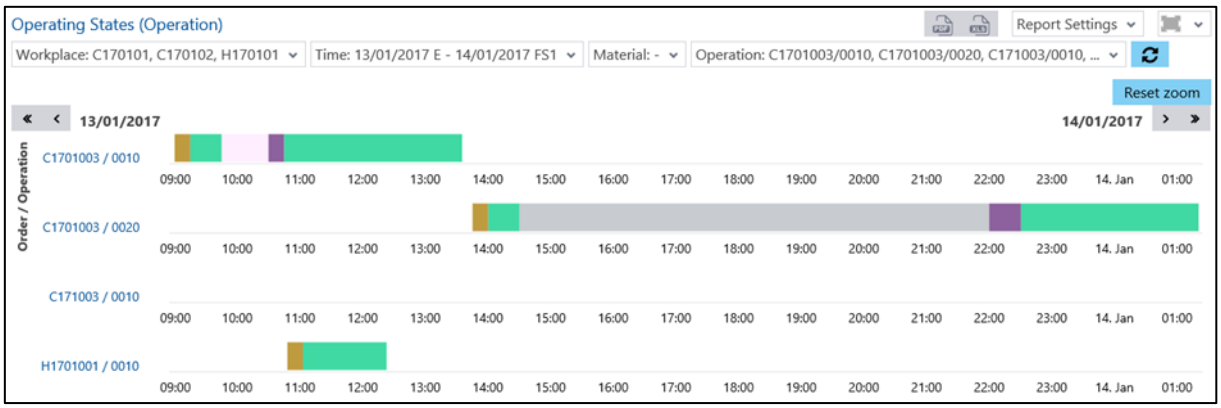


Fig. 32: Operating states (operation)

3.2.3 Order

3.2.3.1 Operating state timeline (order)

Path: Performance analysis > Reporting > Reports > Online logs > Order > Operating state timeline (order)

Gantt chart of *one* or *more* orders with operating states for the selected period in realtime:

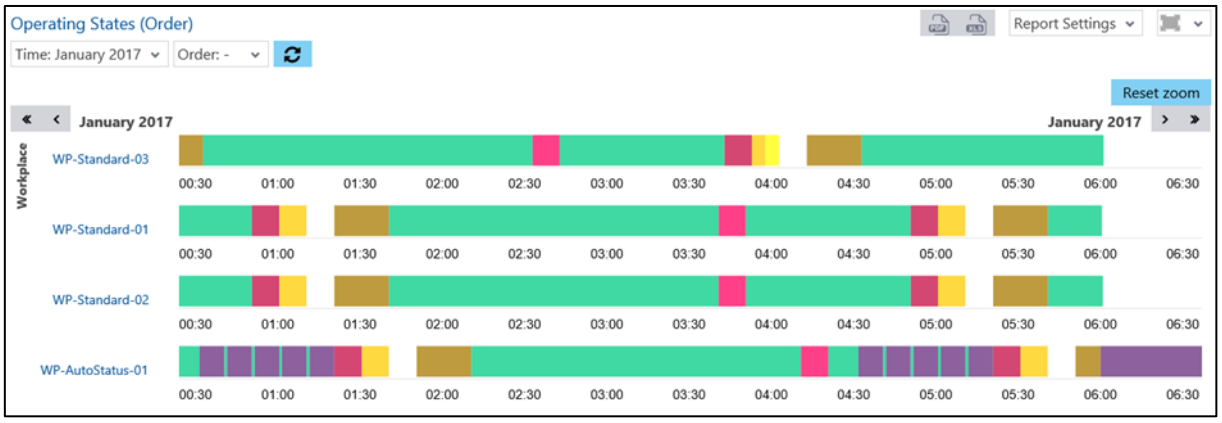


Fig. 33: Operating state timeline (order)

3.2.4 Reports

3.2.4.1 Quantity log

Path: Performance analysis > Reporting > Reports > Online logs > Reports > Quantity log

Multi-report with tabular realtime representation of quantities of all operations at a workplace for a period:

- Quantity sum of the operation (fig. 34):Fig. 34: Output quantity
  Quantity information with start and end time of an operation, quality and target time per unit for an operation
- Quantity log with quality details (fig. 35):Fig. 35: Quantity log with quality details
  Quantity information with type, reason and booking time for one operation

ⓘ **Target time per unit** is an average value.

Fig. 34: Output quantity

Quality Details

Booking Time	Quantity	Quality Type	Quality Details
13.01.2017 11:05:05	1	Yield quantity	Yield quantity standard
13.01.2017 11:06:06	1	Scrap quantity	Material Surface
13.01.2017 11:07:36	1	Rework quantity	Material Surface
13.01.2017 11:09:06	1	Rework quantity	Dimensional Precision
13.01.2017 11:11:06	1	Yield quantity	Yield quantity standard
13.01.2017 11:13:06	1	Yield quantity	Yield quantity standard

Fig. 35: Quantity log with quality details

3.2.4.2 Shift book

Path: Performance analysis > Reporting > Reports > Online logs > Reports > Shift book

Multi-report with tabular realtime representation of quantities, operating states and operations at a workplace during a shift:

Shift Book

Report Settings

Workplace: 90420, 90520 | Time: 12/12/2017 T - 12/12/2017 S

90420 (1)
90520

12/12/17 [T]: 21:00 - 5:00 | 12/12/17 [F]: 5:00 - 13: (2) | 12/12/17 [S]: 13:00 - 21:00

Actual Quantity (3)

Total Quantity	Yield Qty.	Yield [%]	Scrap Qty.	Scrap [%]	Rework Qty.	Rework [%]
80	80	100%	0	0%	0	0%

Operating States (4)

Code	Operating State	Frequency	Duration	Duration [%]
000	Production	2	01:07:53	14.14%
020	Setup	1	00:01:20	0.28%
230	Missing material	1	00:00:26	0.09%
992	Free capacity inside of shift	4	06:20:19	79.23%
993	Planned break	1	00:30:00	6.25%

Operations (5)

Order	Operation	Material	Target Qty.	Yield Qty. [Shift]	Scrap Qty. [Shift]	Rework Qty. [Shift]	Yield Qty. [Operation]	Scrap Qty. [Operation]	Rework C
1001000101	1001000101 / 0040	M-15223675	2000	80	0	0	265	0	0

Operation: 1001000101 / 0040

Operation Details (6)

Start Time	Duration	Yield Qty. [Shift]	Yield Qty. [Operation]	Scrap Qty. [Shift]	Scrap Qty. [Operation]	Rework Qty. [Shift]	Rework Qty. [Operation]	Total C
Dec 12, 2017 2:46:08 PM	00:01:20	0	0	0	0	0	0	0
Dec 12, 2017 2:47:28 PM	00:01:33	0	0	0	0	0	0	0
Dec 12, 2017 2:49:02 PM	00:00:26	0	0	0	0	0	0	0

Fig. 36: Shift book report

(1) Listing of all selected workplaces.
If only one workplace is selected in the filter, this column is hidden.
(2) Tab per shift.
Each tab indicates data for one shift. The number of tabs or shifts depends on the selected time filter.
(3) Output quantity:
Total quantity produced with quality information (yield, scrap or rework quantity)
(4) Shift totals of the operating states:
Operating states with respective frequency and duration
(5) Shift book overview of operations:
Detailed information on quantities, strokes, target times and operating states of operations

(6) Operation details with subtotals:
Detailed information of an operation such as duration, quality, strokes, remarks, operating state with detailing depth of up to 6 levels

3.2.4.3 Shift book (strokes calculated from quantities)

Unlike the normal shift book report, this report determines a stroke factor from the quantities produced and uses this to calculate the number of strokes.

3.2.4.4 Shift log

Path: Performance analysis > Reporting > Reports > Online logs > Reports > Shift log

ⓘ If no workplace is selected in the filter, datasets for all workplaces are loaded. This may result in increased loading time due to the amount of data that occurs.

Multi-report with tabular realtime representation of stroke sum and frequency distribution of operating states for a workplace:

- Stroke sum for operations of a shift (fig. 37):
  Start and end time of an operation with the total number of strokes; related to one shift
- Frequency distribution of operating states within the shift (fig. 38):
  List of operating states, their frequency and duration for the selected shift

Sum of Hits

Order	Operation	Start Time	End Time	Material	Hits [Shift]	Hits [Operation]
H170105_ODR2	H170105_ODR2 / 1	08-Feb-2017 07:30:18	08-Feb-2017 10:48:32	M2	30	30

Fig. 37: Stroke sum for operations of a shift

Operating States

Code	Operating State	Frequency	Duration	Duration [%]
000	Production	71	02:58:14	37.13%
020	Setting up	1	00:05:00	1.04%
101	Machine stop	1	00:05:00	1.04%
19	Break / unplanned	1	00:05:00	1.04%
25	Quality issue	1	00:00:00	0%
992	Free capacity inside shift	2	03:11:28	39.89%
993	Break	1	00:05:00	1.04%
999	Undefined stoppage	2	01:30:18	18.81%

Fig. 38: Frequency distribution of the operating states of a shift

3.2.4.5 Shift log (strokes calculated from quantities)

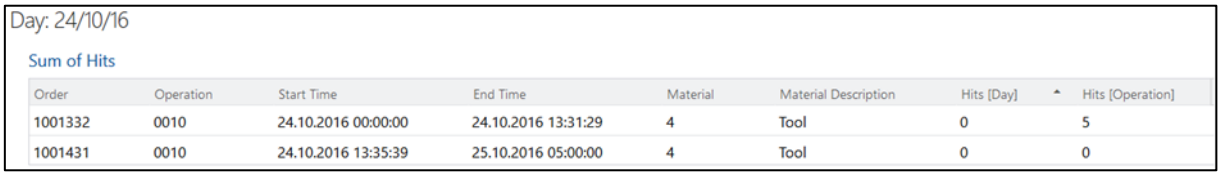
Unlike the normal shift log report, this report determines a stroke factor from the quantities produced and the number of strokes is calculated from this.

3.2.4.6 Daily log

Path: Performance analysis > Reporting > Reports > Online logs > Reports > Daily log

Multi-report with tabular realtime representation of stroke sum and frequency distribution of operating states for a workplace:

- Stroke sum for operations of a day (fig. 39):
  Start and end time of an operation with the total number of strokes and indications of the material; related to one day
- Frequency distribution of operating states within the day (fig. 40):
  List of operating states, their frequencies and durations for the selected day

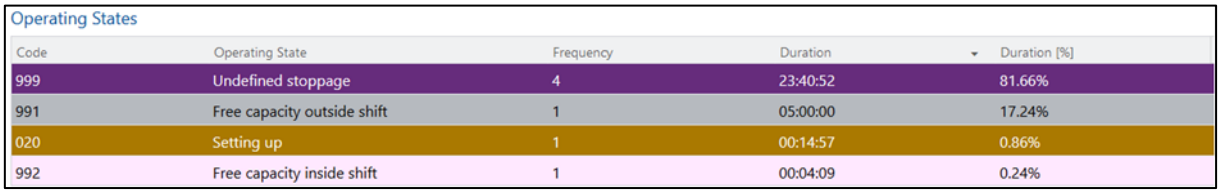


Day: 24/10/16

Sum of Hits

Order	Operation	Start Time	End Time	Material	Material Description	Hits [Day]	Hits [Operation]
1001332	0010	24.10.2016 00:00:00	24.10.2016 13:31:29	4	Tool	0	5
1001431	0010	24.10.2016 13:35:39	25.10.2016 05:00:00	4	Tool	0	0

Fig. 39: Stroke sum for operations of a day



Operating States

Code	Operating State	Frequency	Duration	Duration [%]
999	Undefined stoppage	4	23:40:52	81.66%
991	Free capacity outside shift	1	05:00:00	17.24%
020	Setting up	1	00:14:57	0.86%
992	Free capacity inside shift	1	00:04:09	0.24%

Fig. 40: Frequency distribution of the operating states of a day

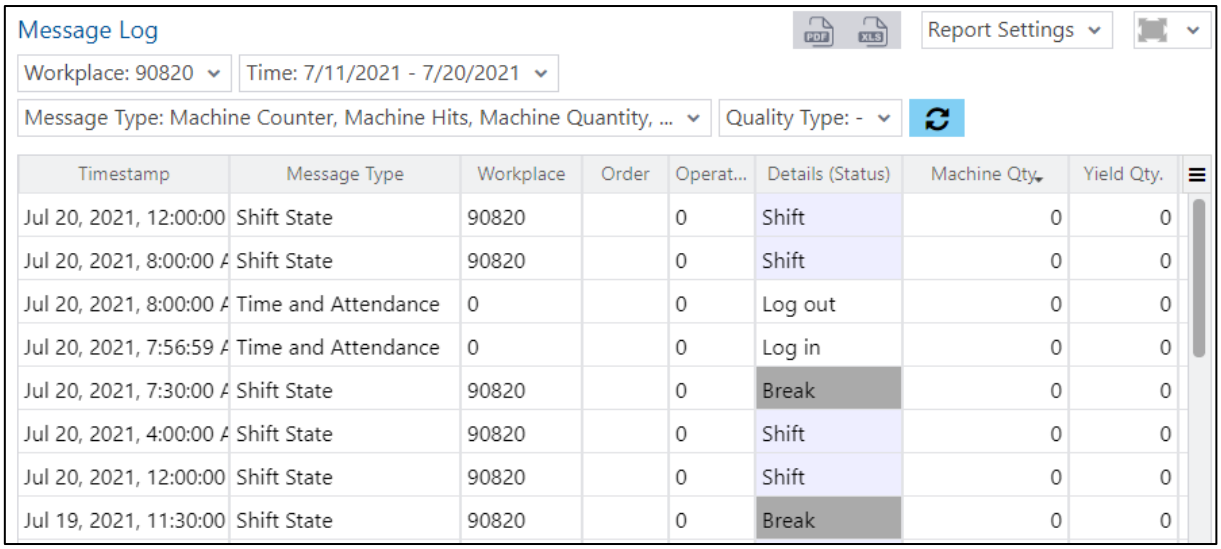
3.2.4.7 Daily log (strokes calculated from quantities)

Unlike the normal daily log report, this report determines a stroke factor from the quantities produced and uses this to calculate the number of strokes.

3.2.4.8 Messages

Path: Performance analysis > Reporting > Reports > Online logs > Messages

Messages from one or more workplaces with time and message type as well as further details such as order number, operation number, status change, quantity bookings or details to the worker in realtime. Depending on the message types selected in the filter, the changes in the status of persons or objects are displayed under the **Details (Status)** column. For example, the message type **Shift status** displays when a shift starts or pauses, or the message type **Time and attendance** displays when a person logs in or out of the system.



Timestamp	Message Type	Workplace	Order	Operat...	Details (Status)	Machine Qty.	Yield Qty.
Jul 20, 2021, 12:00:00	Shift State	90820		0	Shift	0	0
Jul 20, 2021, 8:00:00 A	Shift State	90820		0	Shift	0	0
Jul 20, 2021, 8:00:00 A	Time and Attendance	0		0	Log out	0	0
Jul 20, 2021, 7:56:59 A	Time and Attendance	0		0	Log in	0	0
Jul 20, 2021, 7:30:00 A	Shift State	90820		0	Break	0	0
Jul 20, 2021, 4:00:00 A	Shift State	90820		0	Shift	0	0
Jul 20, 2021, 12:00:00	Shift State	90820		0	Shift	0	0
Jul 19, 2021, 11:30:00	Shift State	90820		0	Break	0	0

Fig. 41: Messages from workplaces as a table

Messages are signals that represent a change in the Shopfloor Terminal. These are booked centrally via FFRuntime, interpreted and prepared for Reporting or ERP. The following message types are available:

- Machine counter
  Increments in the counter for produced pieces on a machine. Output in the Details (Status) column.
- Machine strokes
  Strokes performed on a machine.
- Machine quantity
  Unqualified quantity bookings.
- Machine status
  Changes in machine status (e.g. production or stoppage). Output in the Details (Status) column.
- Operation clamping status.
  Changes of the clamping status in the clamping sequence. Output in the Details (Status) column.
- Operation phase
  Changes to the operation phase (e.g. setup, processing, interrupted, completed). Output in the Details (Status) column.
- Operation production status
  Changes in the status details of operations (e.g. in production or in stoppage due to specific malfunctions). Output in the Details (Status) column.
- Operation quantity
  Quantity bookings regarding yield, scrap or rework quantity with corresponding reasons (e.g. defects in geometry or surface). Output in the Details (Status) column.
- Overhead costs control
  Logging in and out of overhead costs objects. Output in the Details (Status) column.
- Personnel status change
  Logging people in and out of operations. Output in the Details (Status) column.

- Personnel workplace status change
  Logging in and logging out of persons at the workplace. Output in the Details (Status) column.
- Shift status
  Status changes generated by the shift generator in the shift (e.g. shift, break). Output in the Details (Status) column.
- Time and attendance
  Logging in and logging out of the system for recording the actual working or attendance time. Output in the Details (Status) column.
- Time and attendance break
  Break messages for recording break times. Output in the Details (Status) column.

3.3 Overall Equipment Effectiveness (OEE)

This section covers OEE evaluations. OEE is determined from the key figures availability, performance and quality and is the product of these figures. The availability results from the operating states and is the quotient of production time / scheduled operating time. The performance is an actual/target comparison of the time per unit/piece. The quality is determined by the quality types (yield, scrap, rework (quantity)) and is the quotient of yield/total quantity output.

ⓘ Production within breaks is included in the OEE evaluation. Production in free shifts is not included as they are not scheduled times.

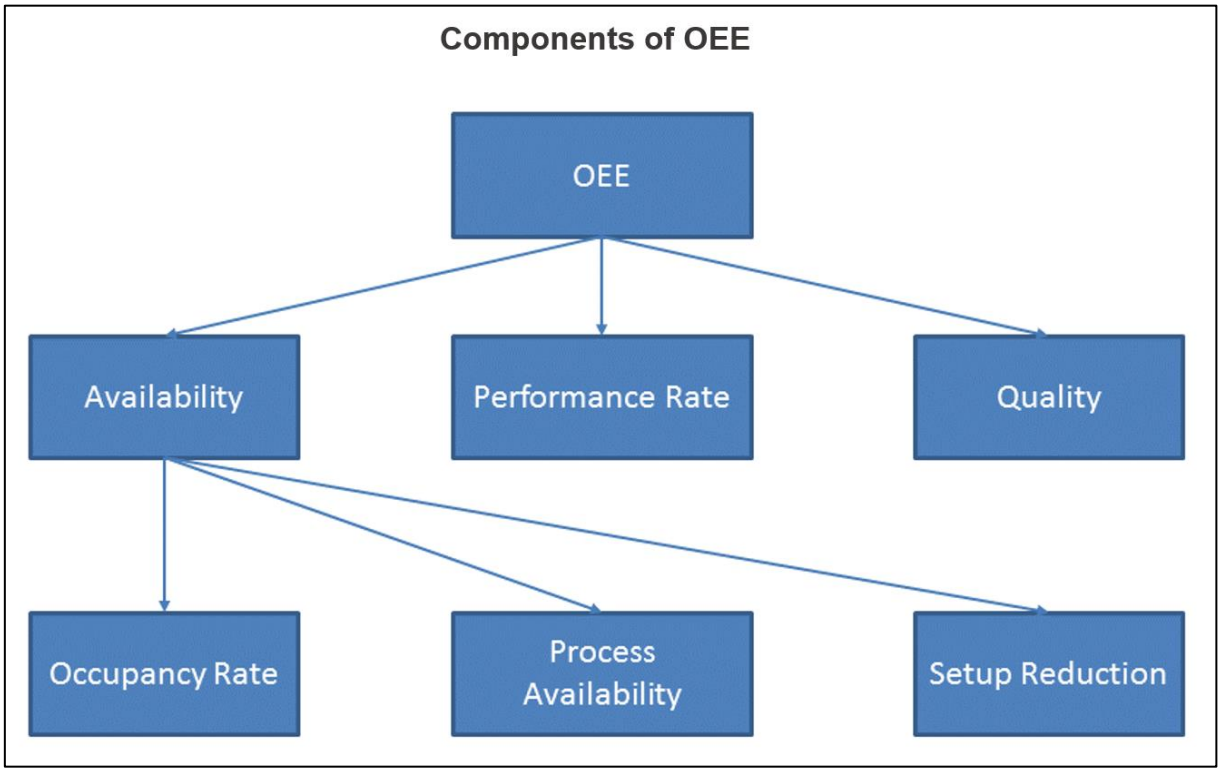


Fig. 42: Components of OEE

ⓘ For OEE reports on a weekly basis (time filter week) a drill-down to the corresponding OEE report on a daily basis is available by left-clicking on a column in the column chart.

3.3.1 OEE (overall view)

Path: Performance analysis > Reporting > Reports > Overall Equipment Effectiveness (OEE) > OEE (Overall view)

✓ The time bases **OEE** and **production** are configured.

Multi-report with OEE-compliant evaluation of all or selected workplaces of a plant or group for a selected period. If no workplace is selected, the evaluation refers to all workplaces:

- OEE (overall view) as a column chart (fig. 43):
  Displays availability, performance level, quality and the resulting OEE in a group of columns.
- OEE (overall view) as a table (fig. 44):
  Displays availability, performance level, quality and the resulting OEE in tabular form.

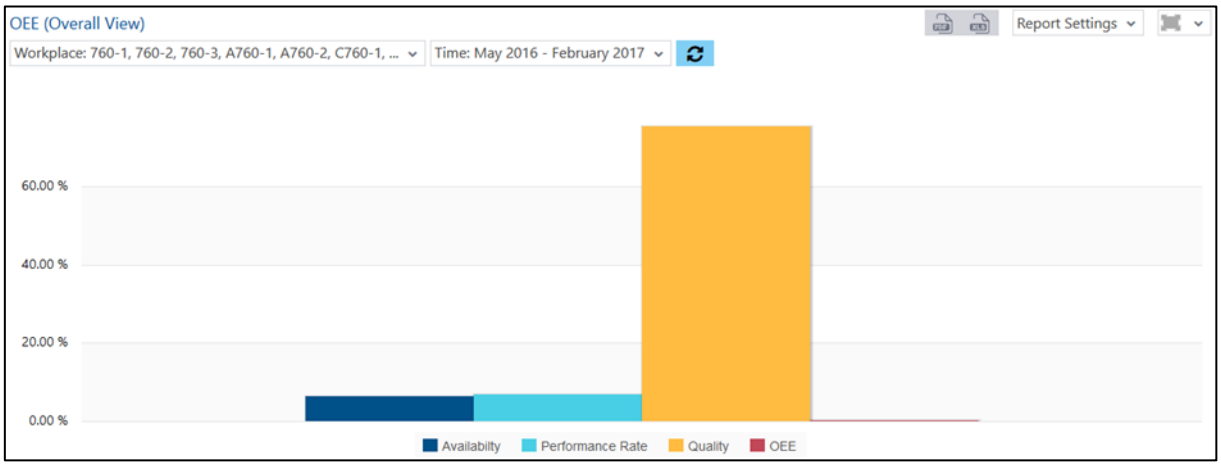


Fig. 43: OEE (overall view) as column chart

Availabilty	6.64%
Performance Rate	7.19%
Quality	75.52%
OEE	0.36%

Fig. 44: OEE (overall view) as a table

3.3.2 Workplace

3.3.2.1 OEE Report (workplace)

Path: Performance Analysis > Reporting > Reports > Overall Equipment Effectiveness (OEE) > Workplaces > OEE Report (Workplace)

✓ The time bases **OEE** and **production** are configured.

Multi-report with OEE-compliant evaluation of one or several workplaces for comparison over the selected period:

- OEE report (workplace) as column chart (fig. 45):
  Displays availability, performance level, quality and OEE determined from these in column groups for each workplace.
- OEE report (workplace) as a table (fig. 46):
  Displays availability, performance level, quality and the resulting OEE for each workplace in tabular form.

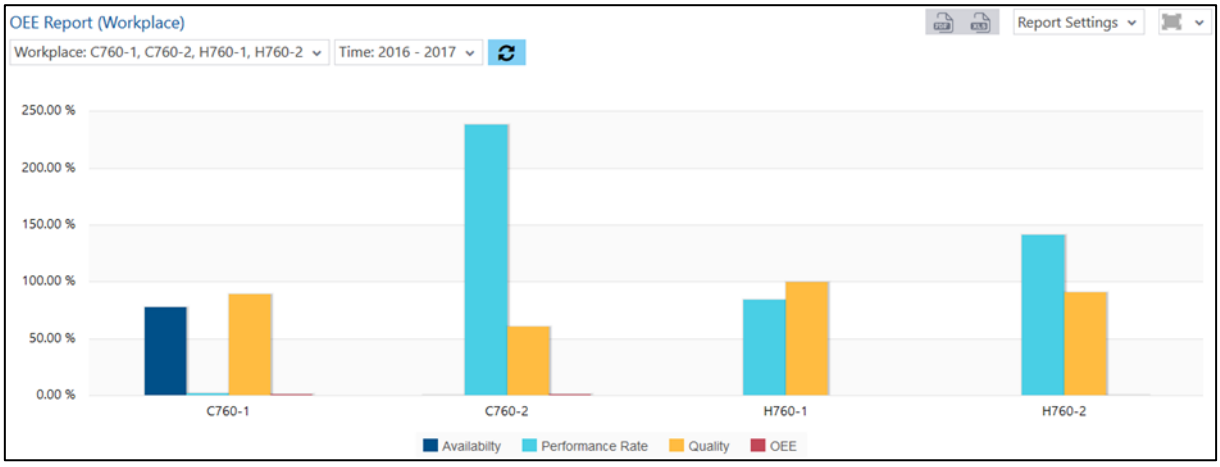


Fig. 45: OEE report (workplace) as column chart

Workplace	C760-1	C760-2	H760-1	H760-2
Availabilty	78.57%	0.86%	0.08%	0.38%
Performance Rate	2.31%	239.06%	84.75%	141.54%
Quality	89.42%	61.16%	100%	90.91%
OEE	1.62%	1.26%	0.07%	0.49%

Fig. 46: OEE report (workplace) as a table

3.3.2.2 OEE Development (workplace)

Path: Performance analysis > Reporting > Reports > Overall Equipment Effectiveness (OEE) > Workplaces > OEE Development (workplace)

✓ The time bases **OEE** and **production** are configured.

Multi-report with time development of the OEE evaluation for one workplace over the selected time period:

- OEE Development (workplace) as column chart (fig. 47):
  Shows the development of availability, performance level, quality and the resulting OEE in columns. Each column group represents the data for a time range. The right column group represents an average of the data.
- OEE Development (workplace) as a table (fig. 48):
  Displays the development of availability, performance level, quality and OEE determined from this in tabular form. Each column represents a time range.

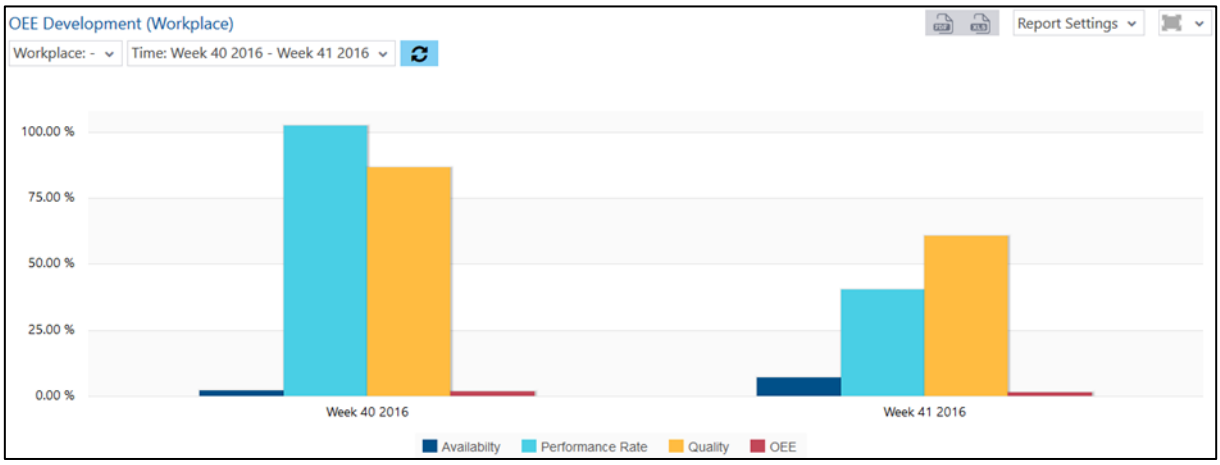


Fig. 47: OEE Development (workplace) as column chart

Date	2016/40	2016/41
Availabilty	2.35%	7.47%
Performance Rate	102.92%	40.74%
Quality	87.04%	61.04%
OEE	2.11%	1.86%

Fig. 48: OEE Development (workplace) as a table

3.3.3 Operation

3.3.3.1 OEE Report (operation)

Path: Performance Analysis > Reporting > Reports > Overall Equipment Effectiveness (OEE) > Operation > OEE Report (operation)

✓ The time bases **OEE** and **production** are configured.

Multi-report with OEE-compliant evaluation of one or more operations for comparison over the selected period:

- OEE report (operation) as a column chart (fig. 49):
  Display of availability, performance rate, quality and OEE determined from these in column groups for each operation.
- OEE report (operation) as a table (fig. 50):
  Displays availability, performance level, quality and the resulting OEE for each workplace in tabular form.

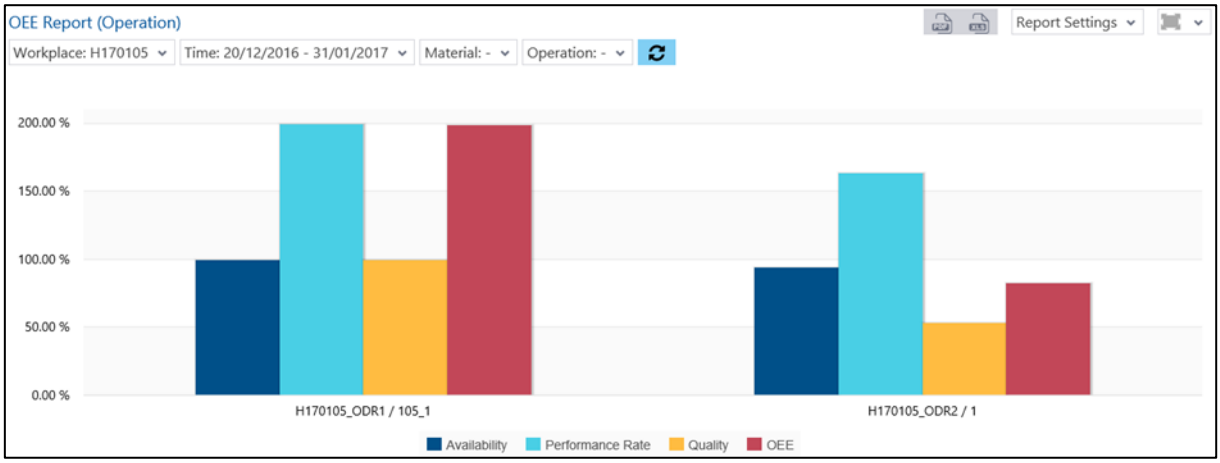


Fig. 49: OEE report (operation) as column chart

Order / Operation	H170105_ODR1 / 105_1	H170105_ODR2 / 1
Availability	99.6%	94.69%
Performance Rate	199.94%	163.83%
Quality	100%	53.42%
OEE	199.15%	82.87%

Fig. 50: OEE report (operation) as a table

3.4 Availability analysis

The reports in this section involve operating states.

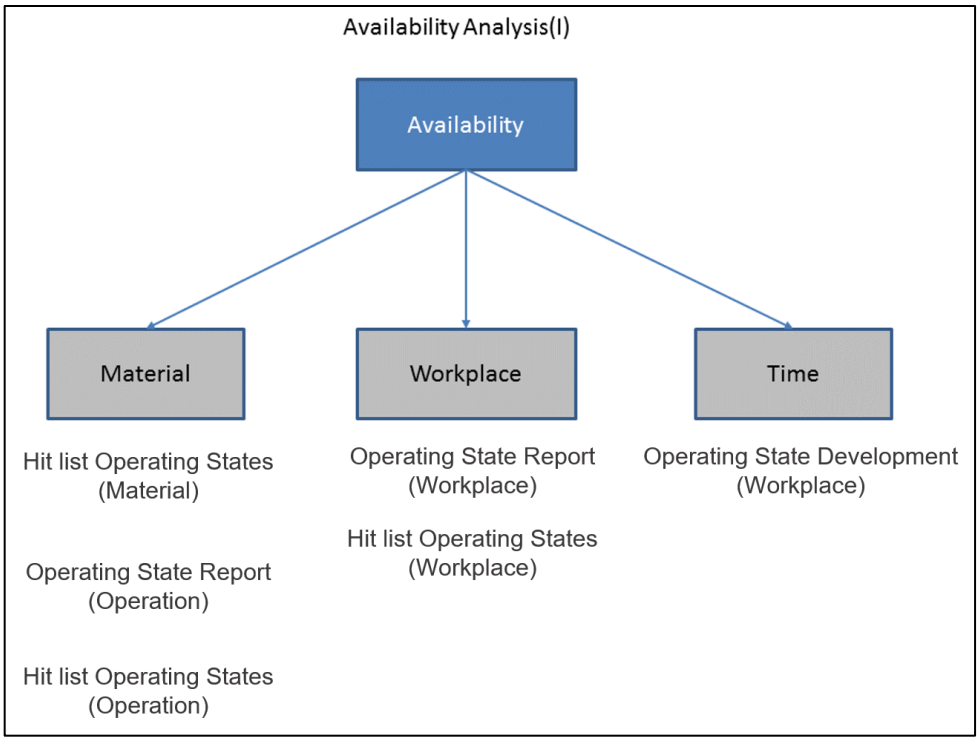


Fig. 51: Components of the availability analysis

3.4.1 Availability (overall view)

Path: Performance analysis > Reporting > Reports > Availability analysis > Availability (overall view)

✓ The time bases **OEE**, **production** and **setup** are configured.

The availability is the product of the occupancy rate, process availability and setup reduction.

- Occupancy rate:
  Allocative component of availability that can be improved through production scheduling. The occupancy rate is the quotient of the busy time of a workplace / scheduled operating time according to the shift model.
- Process availability:
  Technical component of availability that can be significantly increased with methods of advanced shopfloor management. The process availability is the quotient of the production time (time base production) / processing time including technical issues.
  Setup is not part of the processing time of an operation and is therefore considered in a third component.
- Setup reduction:
  Reaches 100% when setup times are completely eliminated and is determined as the quotient of processing time / occupancy time of the operations on a workplace.

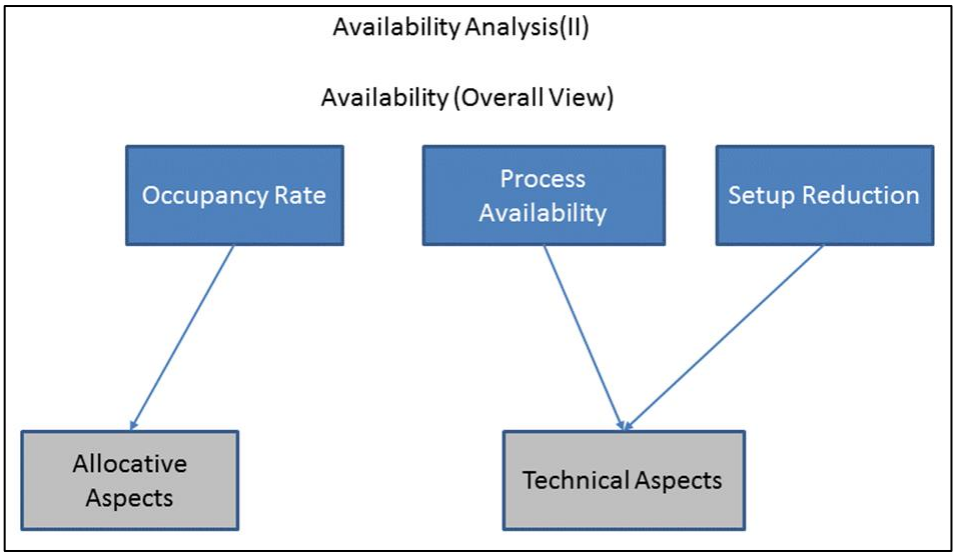


Fig. 52: Aspects of availability

Multi-report with the display of availability for *one* or *more* workplaces for a period. The percentages given indicate the proportion based on optimal (100%) availability.

- Availability as a column chart (fig. 53):
  Occupancy rate, process availability, setup reduction and the availability calculated from this shown as columns.
- Availability as a table (fig. 54):
  Tabular listing of occupancy rate, process availability, setup reduction, the availability calculated from these and the setup rate.

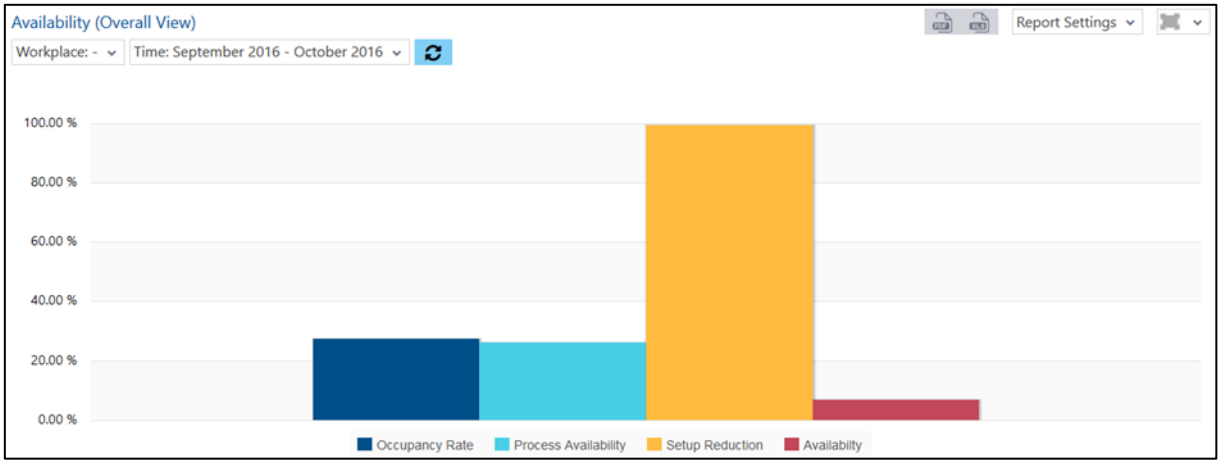


Fig. 53: Availability as bar chart

Occupancy Rate	27.83%
Process Availability	26.32%
Setup Reduction	99.6%
Availabilty	7.3%

Fig. 54: Availability as a table

3.4.2 Workplace

3.4.2.1 Operating state class report (workplace)

Path: Performance analysis > Reporting > Reports > Availability analysis > Workplace > Operating state class report (workplace)

✓ Operating state classes are configured.

Multi-report with the display of operating state classes for one or more workplaces for a period:

- Operating state class report (workplace) as column chart (fig. 55):
  Duration of operating state classes shown proportionally as columns. Each column represents the duration for a selected workplace. Depending on the selection in the value filter, the duration is either a percentage (of total value or planned operating time) or in minutes.
- Operating state class report (workplace) as a table (fig. 56):
  Tabular listing of operating state classes. Indicates the duration either as a percentage (of total or planned operating time) or in minutes. The columns correspond to workplaces. The value filter does not affect this table.

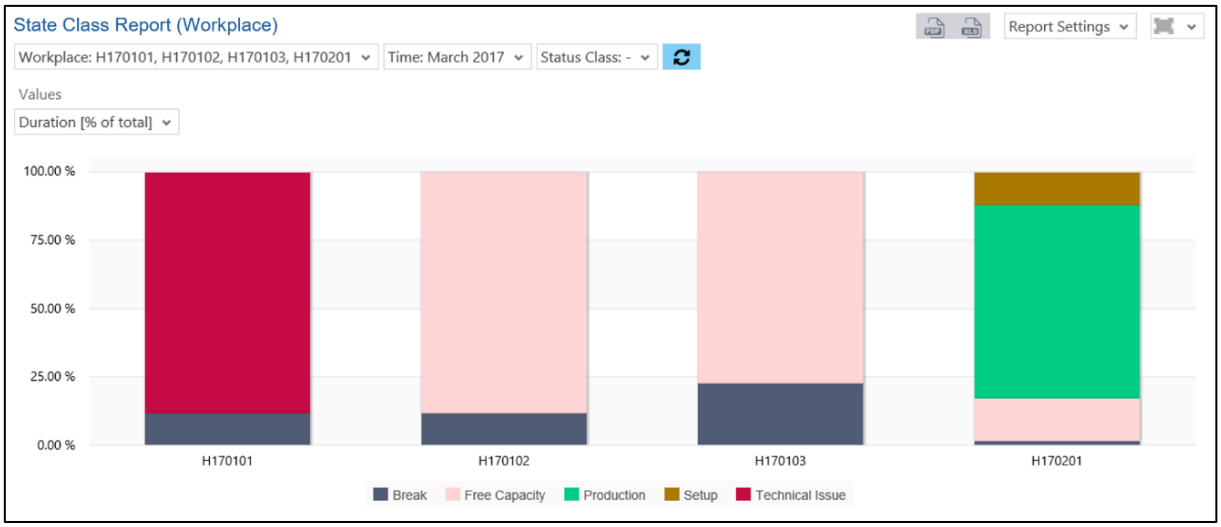


Fig. 55: Operating state class report (workplace) as column chart

	H170101			H170102			H170103			H170201	
Status Class	Duration	Duration [% of SOT]	Duration [% of total]	Duration	Duration [% of SOT]	Duration [% of total]	Duration	Duration [% of SOT]	Duration [% of total]	Duration	Duration [% of
Technical Issue	59:30	100%	88.15%								
Break	08:00	13.45%	11.85%	08:00	13.45%	11.85%	02:00	29.63%	22.86%	01:07	1.71%
Free Capacity				59:30	100%	88.15%	06:45	100%	77.14%	10:30	15.82%
Production										47:51	72.12%
Setup										08:00	12.06%
∑	67:30	113.45%	100%	67:30	113.45%	100%	08:45	129.63%	100%	67:30	101.71%

Fig. 56: Operating state class report (workplace) as a table

ⓘ If an operating state class is selected in the filter, the report only displays data for this class.

A drill-down to operating state report (workplace) is available by left-clicking on a column.

3.4.2.2 Operating state class development (workplace)

Path: Performance analysis > Reporting > Reports > Availability analysis > Workplace > Operating state class development (workplace)

✓ Operating state classes are configured.

Multi-report showing the development of operating state classes for one or more workplaces over a selected time period:

- Operating state class development (workplace) as column chart (fig. 57):
  Duration of operating state classes shown proportionally as columns. Each column represents the duration for a selected period (e.g. month, calendar week, etc.). Depending on the selection in the value filter, the duration is either a percentage (of total value or planned operating time) or in minutes. The data comes from all the selected workplaces.
- Operating state class development (workplace) as a table (fig. 58):
  Tabular listing of operating state classes. Indicates the duration of all operating state classes, of the planned operating time (PBZ) either as a percentage or in minutes. The data comes from all the selected workplaces. Columns relate to selected periods (e.g. month, calendar week, etc.). The value filter does not affect this table.

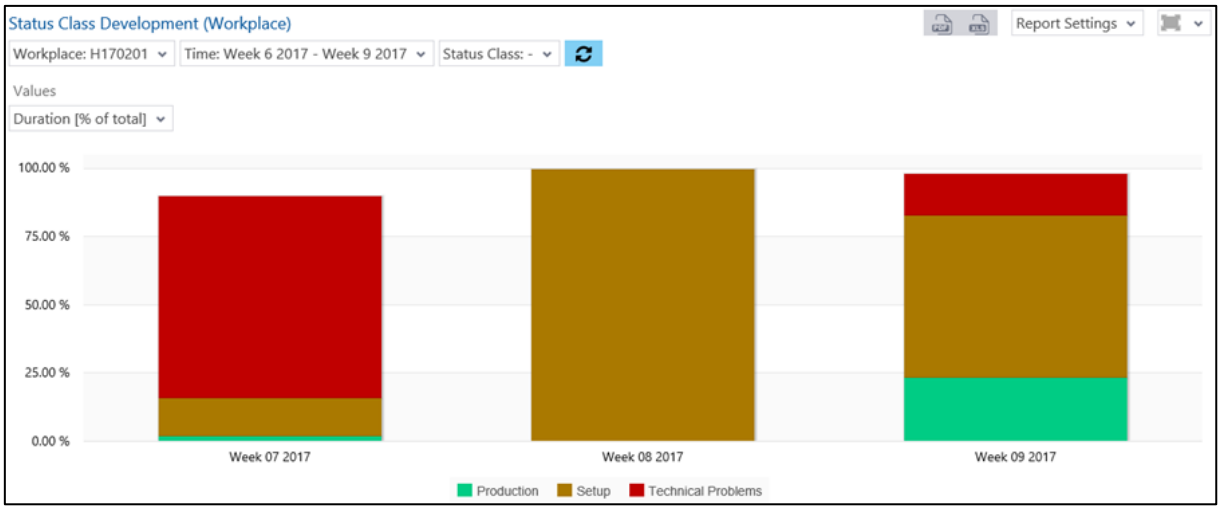


Fig. 57: Operating state class development (workplace) as column chart

	Week 07 2017			Week 08 2017			Week 09 2017		
Status Class	Duration	Duration [% of PPT]	Duration [% of total]	Duration	Duration [% of PPT]	Duration [% of total]	Duration	Duration [% of PPT]	Duration [% of total]
Production	01:40	2.29%	2.06%				15:51	23.91%	23.5%
Setup	11:16	15.45%	13.92%	96:00	100%	100%	40:00	60.27%	59.26%
Technical Problems	60:03	82.27%	74.14%				10:30	15.82%	15.56%
∑	73:00	100%	90.12%	96:00	100%	100%	66:22	100%	98.32%

Fig. 58: Operating state class development (workplace) as a table

ⓘ If an operating state class is selected in the filter, the report only displays data for this class.

A drill-down to operating state development (workplace) is available by left-clicking on a column.

3.4.2.3 Operating state report (workplace)

Path: Performance analysis > Reporting > Reports > Availability analysis > Workplace > Operating state report (workplace)

Multi-report with (proportional) durations of operating states for one or more workplaces for a period:

- Operating state report (workplace) as column chart (fig. 59):
  Operating states as columns per workplace. Each column represents operating states in proportion to the total operated period of use.
- Operating state report (workplace) as a table (fig. 60):
  Listing of operating states and detailed duration information for each workplace with proportional duration, average, and total sum.

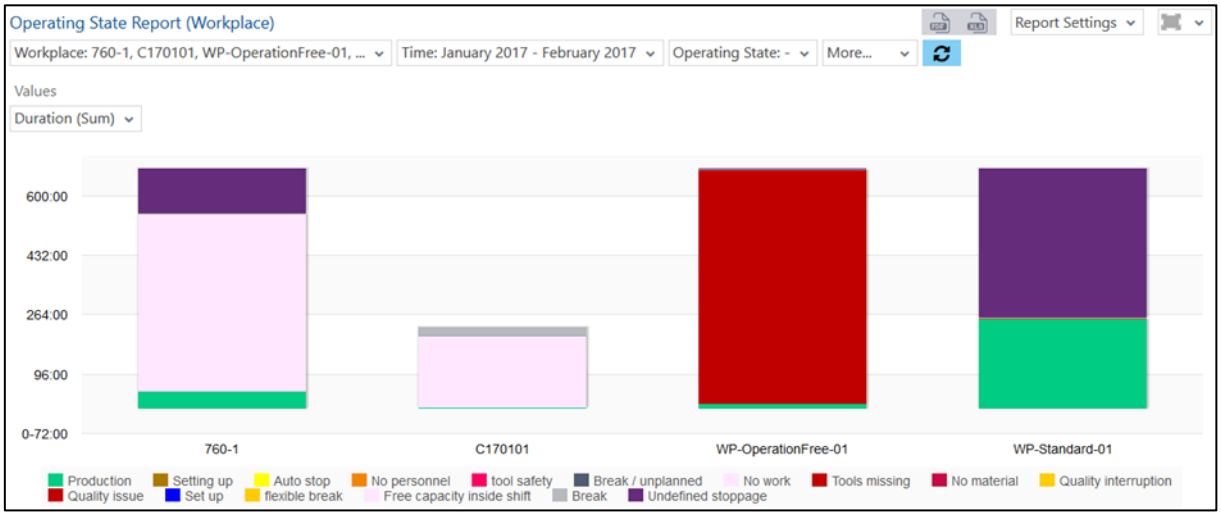


Fig. 59: Operating state report (workplace) as column chart

	760-1		C170101		WP-OperationFree-01		WP-Standard-01		Total Ø	Total ∑
Operating State	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration (HH:n
Production	46:54	6.9%	01:20	0.58%	11:51	1.74%	252:21	37.11%	78:06	312:27
Break	02:15	0.33%	29:00	12.5%	02:15	0.33%	02:15	0.33%	08:56	35:45
Undefined stoppage	128:00	18.82%	00:00	0%	02:56	0.43%	421:56	62.05%	138:13	552:52
Free capacity inside sh...	502:50	73.95%	201:39	86.92%	00:05	0.01%	00:02	0%	176:09	704:37
Break / unplanned					00:02	0%			00:00	00:02
No work					00:04	0.01%			00:01	00:04
No personnel					00:04	0.01%			00:01	00:04
Tools missing					661:53	97.34%			165:28	661:53

Fig. 60: Operating state report (workplace) as a table

3.4.2.4 Operating state development (workplace)

Path: Performance analysis > Reporting > Reports > Availability analysis > Workplace > Operating state development (workplace)

Multi-report with the development of operating states for one or more workplaces for a period:

- Operating state development (workplace) as column chart (fig. 61):
  Operating states as columns per selected time unit. Each column displays the development of operating states of selected workplaces over the selected period.
- Operating state development (workplace) as a table (fig. 62):
  Listing of operating states and detailed duration information for the selected time period with proportional duration, total sum, and average. The data corresponds to all the selected workplaces.

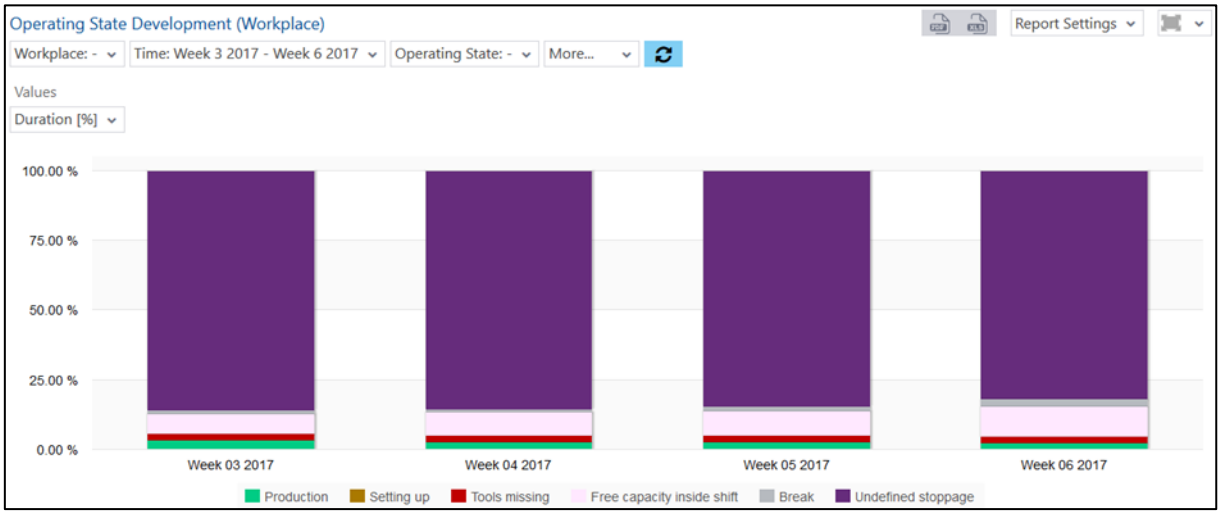


Fig. 61: Operating state development (workplace) as column chart

	Week 03 2017			Week 04 2017			Week 05 2017			Week 06 2017	
Operating State	Duration (HH:mm)	Duration (%)	Duration [%]	Duration (HH:mm)	Duration (%)	Duration [%]	Duration (HH:mm)	Duration (%)	Duration [%]	Duration (HH:mm)	Duration (%)
Setting up	00:05	0%	0%								
Production	152:21	3.21%	3.21%	112:00	2.57%	2.57%	144:00	2.57%	2.57%	80:00	2.41%
Break	66:00	1.39%	1.39%	50:00	1.15%	1.15%	98:30	1.76%	1.76%	93:00	2.8%
Undefined stoppage	4070:01	85.79%	85.79%	3722:00	85.37%	85.37%	4740:30	84.53%	84.53%	2714:00	81.75%
Free capacity inside sh...	335:46	7.08%	7.08%	364:00	8.35%	8.35%	482:00	8.59%	8.59%	354:00	10.66%
Tools missing	119:45	2.52%	2.52%	112:00	2.57%	2.57%	143:00	2.55%	2.55%	79:00	2.38%
∑	4744:00	100%	100%	4360:00	100%	100%	5608:00	100%	100%	3320:00	100%

Fig. 62: Operating state development (workplace) as a table

3.4.2.5 Hit list operating states (workplace)

Path: Performance analysis > Reporting > Reports > Availability analysis > Workplace > Hit list operating states (workplace)

Multi-report with operating states and detailed duration and frequency information for one or more workplaces for the selected time period:

- Hit list operating states (workplace) as bar chart (Fig. 63):
  Display of selected operating states and their total duration as columns. The operating states correspond to all selected workplaces.
- Hit list operating states (workplace) as a table (Fig. 64):
  Listing of selected operating states per workplace with duration and frequency for the selected time period. Proportion of frequency to the total frequency of all operating states.

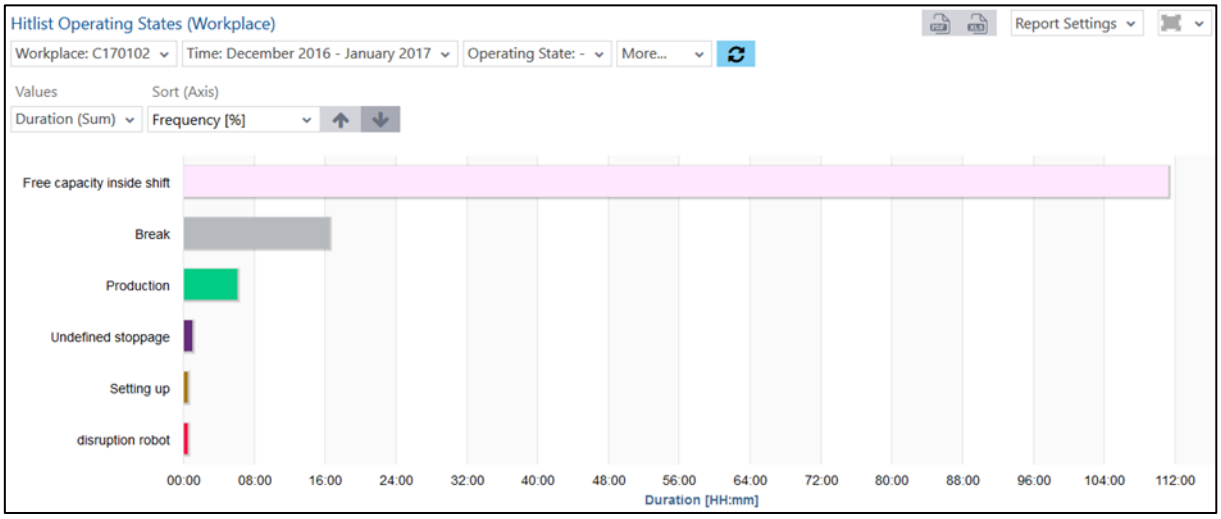


Fig. 63: Hit list of operating states (workplace) as bar chart

Workplace	Code	Operating State	Frequency	Frequency [%]	Duration (HH:mm)	Duration [%]	Duration [% absolute]	Duration [Ø] (HH:mm)
C170102	992	Free capacity inside shift	33	56.9%	111:19	81.85%	81.85%	03:22
C170102	993	Break	17	29.31%	16:29	12.12%	12.12%	00:58
C170102	000	Production	3	5.17%	06:10	4.54%	4.54%	02:03
C170102	999	Undefined stoppage	3	5.17%	01:01	0.75%	0.75%	00:20
C170102	135	disruption robot	1	1.72%	00:30	0.37%	0.37%	00:30
C170102	020	Setting up	1	1.72%	00:30	0.37%	0.37%	00:30
			58	100%	136:00	100%	100%	07:44

Fig. 64: Hit list of operating states (workplace) as a table

ⓘ The selected operating state in the filter is only displayed if a booking was made at the corresponding workplace in the selected period.

If **Duration** is selected under **Other filters**, only the operating states corresponding to the entered duration are displayed (e.g. all operating states with a duration >95 hours).
If **Frequency** is selected under **Other filters**, only the operating states corresponding to the entered frequency are displayed (e.g. all operating states with a frequency >= 2).

ⓘ The frequency is shift related, so an operating state that spans two shifts is counted twice here.

The following drill-down is available by clicking on an operating state (right-click in table, left-click on a bar):

- Hit list operation state details layer 2 (workplace):
  Detailing of the selected operating state in a table or bar chart:
  - Hit list operating states (workplace) layer 2 as bar chart (fig. 65):
    Display of the selected operating state as bars with the total duration, taken from all workplaces in which the state occurs.
  - Hit list operating states (workplace) layer 2 as a table (fig. 66):
    Only the selected operating state is displayed in a table. Each row corresponds to one workplace.
    Frequency: frequency of operating state on respective workplace.
    Frequency [%]: Proportion of the frequency to the total frequency of the selected operating state.
    Duration (hh:mm): Total duration of the operating state per workplace.
    Duration [%]: Proportion of the duration to the total duration of the selected operating state.
    Duration [% absolute]: Proportion of the duration to the total duration of all operating states.

ⓘ A drill-down is only possible for malfunction reasons (e.g. **undefined stoppage** or **no connection**, etc.), not during **production** or **setup**.

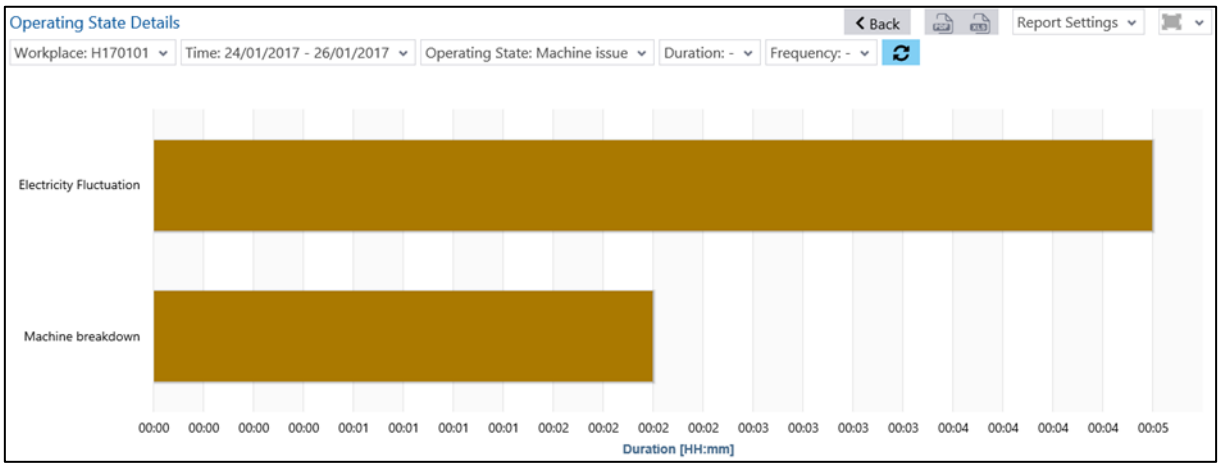


Fig. 65: Hit list of operating states (workplace) layer 2 as bar chart

Code (2)	Details (2)	Frequency	Frequency [%]	Duration	Duration [%]	Duration [%absolute]
M231	Machine breakdown	3	75%	00:02	33.35%	0.26%
M232	Electricity Fluctuation	1	25%	00:04	66.65%	0.52%
		4	100%	00:07	100%	0.78%

Fig. 66: Hit list of operating states (workplace) layer 2 as a table

3.4.3 Material

3.4.3.1 Operating state class report (material)

Path: Performance analysis > Reporting > Reports > Availability analysis > Material > Operating state class report (material)

✓ Operating state classes are configured.

Multi-report displaying operating state classes for one or more materials for a period:

- Operating state class report (material) as column chart (fig. 67):
  Duration of operating state classes shown proportionally as columns. Each column represents the duration for a selected material. Depending on the selection in the value filter, the duration is a percentage (of total value) or in minutes.
- Operating state class report (material) as a table (fig. 68):
  Tabular listing of operating state classes. Specify the duration as a percentage (of total) or in minutes. The columns correspond to materials. The value filter does not affect this table.

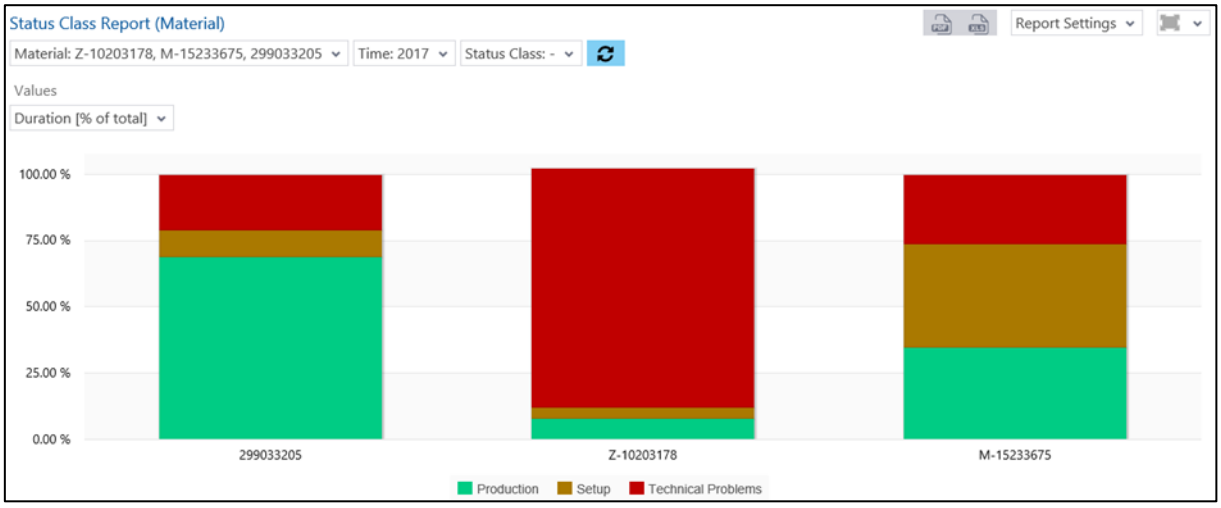


Fig. 67: Operating state class report (material) as column chart

	299033205		M-15233675		Z-10203178	
State Class	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]
Production	03:20	68.83%	00:40	34.81%	00:48	7.98%
Setup	00:30	10.31%	00:45	39.11%	00:25	4.15%
Technical Problems	01:00	20.86%	00:30	26.08%	09:05	90.36%
∑	04:50	100%	01:55	100%	10:18	102.49%

Fig. 68: Operating state class report (material) as a table

ⓘ If an operating state class is selected in the filter, the report only displays data for this class.

A drill-down to operating state report (material) is available by left-clicking on a column.

3.4.3.2 Operating state class development (material)

Path: Performance analysis > Reporting > Reports > Availability analysis > Material > Operating state class development (material)

✓ Operating state classes are configured.

Multi-report showing the development of operating state classes for one or more materials over a selected time period:

- Operating state class development (material) as column chart ():
  Duration of operating state classes shown proportionally as columns. Each column represents the duration for a selected material. Depending on the selection in the value filter, the duration is a percentage (of total value) or in minutes. The data comes from all selected materials.
- Operating state class development (material) as a table ():
  Tabular listing of operating state classes. Specify the duration as a percentage (of total) or in minutes. The data comes from all selected materials. Columns relate to selected periods (e.g. month, calendar week, etc.). The value filter does not affect this table.

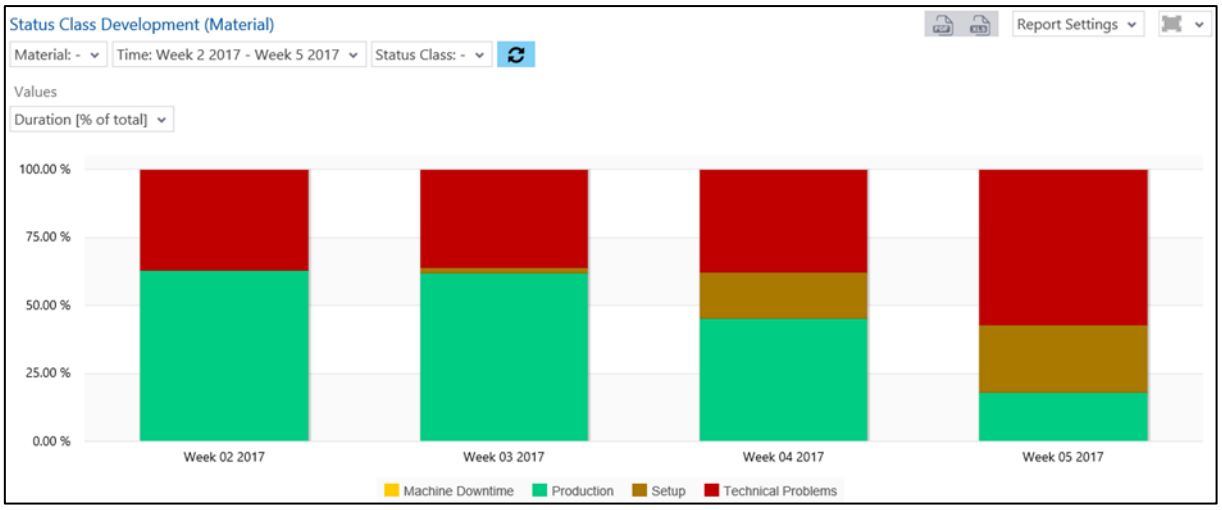


Fig. 69: Operating state class development (material) as column chart

	Week 02 2017		Week 03 2017		Week 04 2017		Week 05 2017	
State Class	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]
Production	262:24	62.84%	255:32	61.85%	208:48	45.39%	57:25	17.9%
Setup	00:30	0.12%	08:38	2.09%	76:50	16.7%	80:04	24.97%
Technical Problems	154:39	37.04%	149:13	36.12%	174:09	37.86%	183:15	57.13%
Machine Downtime							00:25	0.13%
∑	417:34	100%	413:24	100.06%	459:48	99.96%	321:10	100.13%

Fig. 70: Operating state class development (material) as a table

ⓘ If an operating state class is selected in the filter, the report only displays data for this class.

A drill-down to operating state development (material) is available by left-clicking on a column.

3.4.3.3 Operating state report (material)

Path: Performance analysis > Reporting > Reports > Availability analysis > Material > Operating state report (material)

Multi-report with (proportional) durations of operating states for one or more materials for a period:

- Operating state report (material) as column chart (fig. 71):
  Operating states as columns per material. Each column represents operating states in proportion to the total operated period of use.
- Operating state report (material) as a table (fig. 72):
  Listing of operating states and detailed duration for each material with proportionate duration, average and total.

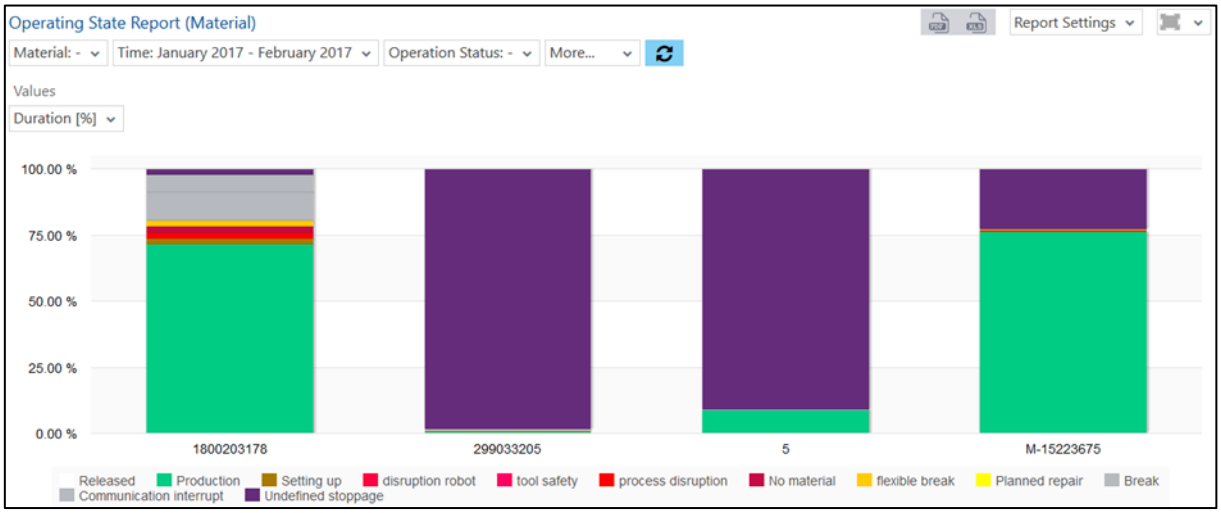


Fig. 71: Operating state report (material) as column chart

	1800203178		299033205		5		M-15223675		Total Ø	Total ∑
Operating State	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration (HH:mm)
Released	00:00	0%	00:03	0.01%			02:40	0.21%	00:40	02:43
Setting up	00:10	2.17%	00:33	0.13%			05:00	0.4%	01:25	05:43
Production	05:30	71.74%	03:20	0.78%	49:44	8.96%	950:42	76.07%	252:19	1009:17
Break	00:50	10.88%	02:44	0.64%	02:15	0.41%	00:15	0.02%	01:31	06:04
Undefined stoppage	00:09	2.16%	421:46	98.32%	503:23	90.64%	283:05	22.65%	302:06	1208:26
Communication interrupt	00:30	6.52%							00:07	00:30
No material	00:10	2.17%					02:40	0.21%	00:42	02:50

Fig. 72: Operating state report (material) as a table

3.4.3.4 Operating state development (material)

Path: Performance analysis > Reporting > Reports > Availability analysis > Material > Operating state development (material)

Multi-report with the development of operating states for one or more materials for a period:

- Operating state development (material) as column chart (fig. 73):
  Operating states as columns per selected time unit. Each column displays the development of operating states of selected material over the selected period.
- Operating state development (material) as a table (fig. 74):
  Listing of operating states and detailed duration information for the selected time period with proportional duration, total sum, and average. The data corresponds to all selected materials.

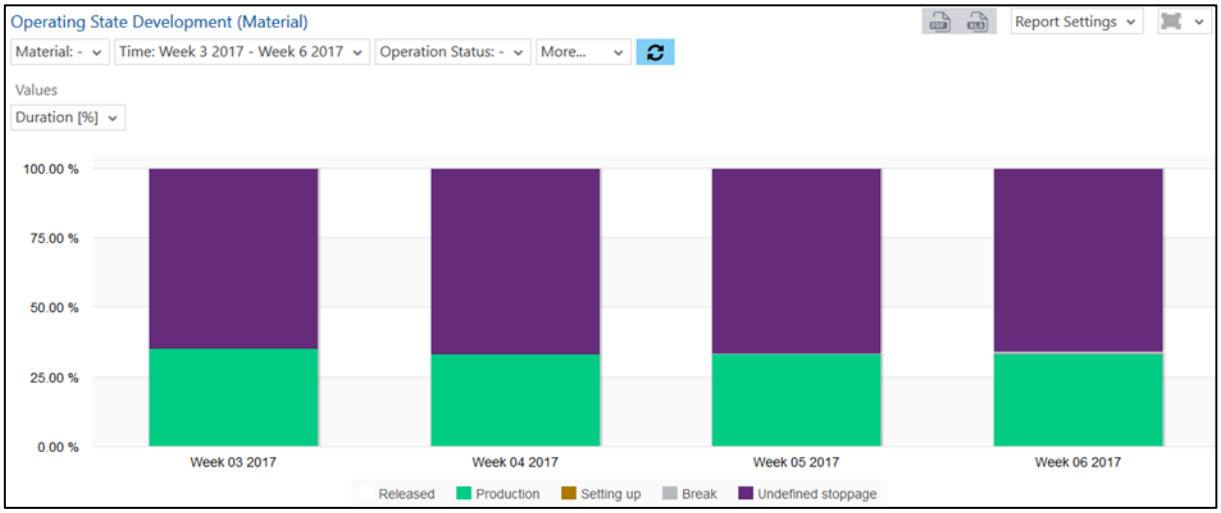


Fig. 73: Operating state development (material) as column chart

	Week 03 2017		Week 04 2017		Week 05 2017		Week 06 2017		Total ∑	Total Ø	Total
Operating State	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration (HH:mm)	Durati
Released	00:03	0.01%							00:03	00:00	0%
Setting up	00:05	0.02%							00:05	00:01	0.01%
Production	152:21	35.27%	112:00	33.33%	144:00	33.33%	80:00	33.33%	488:21	122:05	33.91
Break	00:45	0.17%			02:00	0.46%	02:00	0.83%	04:45	01:11	0.33%
Undefined stoppage	278:46	64.53%	224:00	66.67%	286:00	66.2%	158:00	65.83%	946:46	236:41	65.75
∑	432:01	100%	336:00	100%	432:00	100%	240:00	100%	1440:01	360:00	100%

Fig. 74: Operating state development (material) as a table

3.4.3.5 Hit list operating states (material)

Path: Performance analysis > Reporting > Reports > Availability analysis > Material > Hit list operating states (material)

Multi-report with operating states and detailed duration and frequency for one or more materials for the selected period:

- Hit list operating states (material) as bar chart (fig. 75):
  Display of operating states and their total duration as bars. The operating states correspond to all selected materials.
- Hit list operating states (material) as a table (fig. 76):
  List of operating states per material with duration and frequency for the selected period. Proportion of frequency to the total frequency of all operating states.

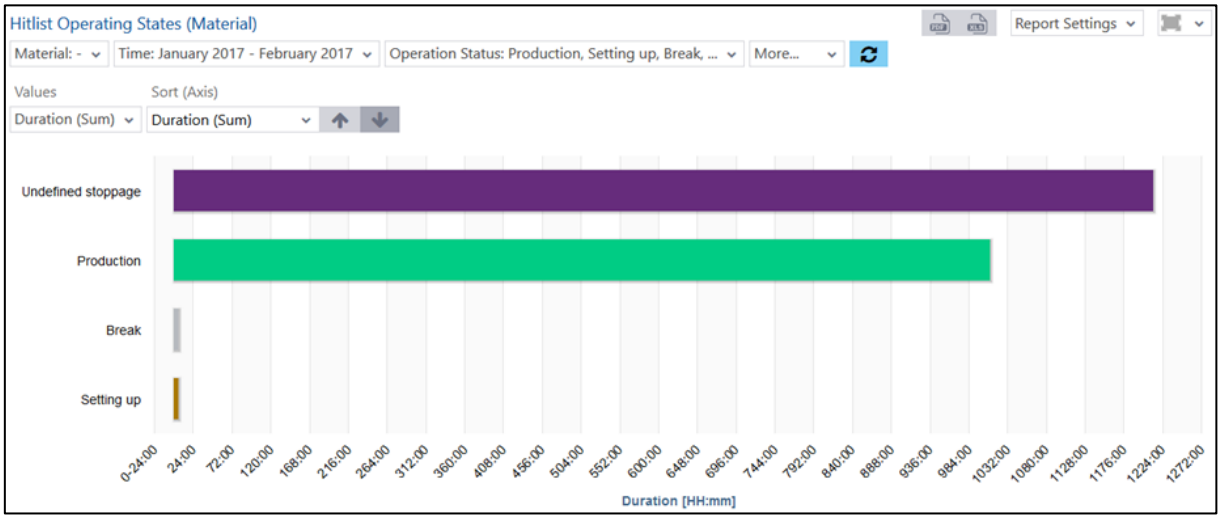


Fig. 75: Hit list of operating states (material) as bar chart

Material	Material Description	Code	Operating State	Frequency	Frequency [%]	Duration (HH:mm)	Duration [%]	Duration [% absolute]	Duration [Ø] (HH:mm)
299033205	Rear Flap	999	Undefined stoppage	13	7.83%	423:44	18.96%	18.85%	32:35
299033205	Rear Flap	000	Production	2	1.2%	03:20	0.15%	0.15%	01:40
299033205	Rear Flap	993	Break	10	6.02%	02:44	0.12%	0.12%	00:16
299033205	Rear Flap	020	Setting up	3	1.81%	00:33	0.02%	0.02%	00:11
1800203178	Verstellhuelse L=82,5	000	Production	4	2.41%	05:30	0.25%	0.24%	01:22
1800203178	Verstellhuelse L=82,5	993	Break	1	0.6%	00:50	0.04%	0.04%	00:50
1800203178	Verstellhuelse L=82,5	020	Setting up	1	0.6%	00:10	0.01%	0.01%	00:10

Fig. 76: Hit list of operating states (material) as a table

If **Duration** is selected under **Other filters**, only the operating states corresponding to the entered duration are displayed (e.g. all operating states with a duration >45 hours).

If **Frequency** is selected under **Other filters**, only the operating states corresponding to the entered frequency are displayed (e.g. all operating states with a frequency >= 12).

ⓘ The frequency is shift related, so an operating state that spans two shifts is counted twice here.

The following drill-down is available by clicking on an operating state (right-click in table, left-click on a bar):

- Hit list operating state details layer 2 (material):
  Detailing of the selected operating state in a table or bar chart:
  - Operating state details (material) as a table (fig. 77):
    Only the selected operating state is displayed in a table. Each row corresponds to one material.
    Frequency: Frequency of operating state related to corresponding material.
    Frequency [%]: Proportion of the frequency to the total frequency of the selected operating state.
    Duration (hh:mm): Total duration of operating state related to corresponding material.
    Duration [%]: Proportion of the duration to the total duration of the selected operating state.
    Duration [% absolute]: Proportion of the duration to the total duration of all operating states.
  - Operating state details (material) as bar chart (fig. 78):
    Display of the selected operating state as bars with the total duration, taken from all materials where the state occurs.

ⓘ A drill-down is only possible for malfunction reasons (e.g. **undefined stoppage** or **no connection**, etc.), not during **production** or **setup**.

Code (2)	Details (2)	Frequency	Frequency [%]	Duration	Duration [%]	Duration [%absolute]
M231	Machine breakdown	3	75%	00:02	33.35%	0.26%
M232	Electricity Fluctuation	1	25%	00:04	66.65%	0.52%
		4	100%	00:07	100%	0.78%

Fig. 77: Hit list of operating states (material) layer 2 as a table

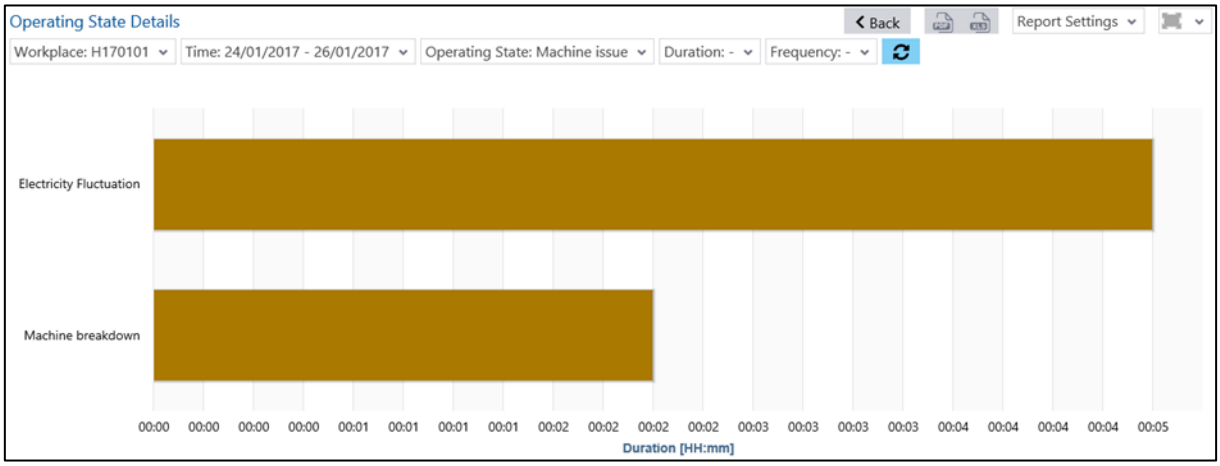


Fig. 78: Hit list for operating states (material) layer 2 as bar chart

3.4.4 Order

3.4.4.1 Operating state class report (order)

Path: Performance analysis > Reporting > Reports > Availability analysis > Order > Operating state class report (order)

✓ Operating state classes are configured.

Multi-report with the display of operating state classes for one or more orders for a period:

- Operating state class report (order) as column chart (Fig. 79):
  Duration of operating state classes shown proportionally as columns. Each column displays the duration for a selected order. Depending on the selection in the value filter, the duration is a percentage (of total value) or in minutes.
- Operating state class report (order) as a table (Fig. 80):
  Tabular listing of operating state classes. Specify the duration as a percentage (of total) or in minutes. The columns correspond to orders. The value filter does not affect this table.

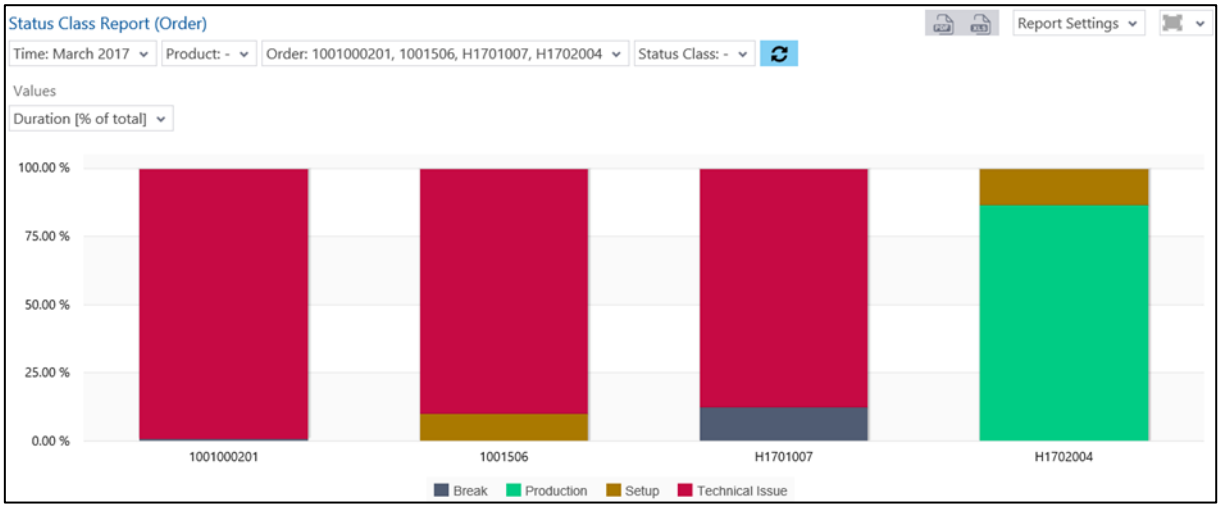


Fig. 79: Operating state class report (order) as column chart

	1001000201		1001506		H1701007		H1702004	
State Class	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]
Technical Issue	150:15	98.85%	00:01	89.87%	63:00	87.5%		
Break	01:45	1.15%			09:00	12.5%	00:02	0.08%
Setup			00:00	10.13%			08:00	13.24%
Production							52:21	86.68%
∑	152:00	100%	00:02	100%	72:00	100%	60:24	100%

Fig. 80: Operating state class report (order) as a table

ⓘ If an operating state class is selected in the filter, the report only displays data for this class.

A drill-down to operating state report (order) is available by left-clicking on a column.

3.4.4.2 Operating state report (order)

Path: Performance analysis > Reporting > Reports > Availability analysis > Order > Operating state report (order)

Multi-report with (proportional) durations of operating states for one or several orders for a time range:

- Operating state report (order) as column chart (fig. 81):
  Operating states as columns per order. Each column represents operating states in proportion to the total operated period of use.
- Operating state report (order) as a table (fig. 82):
  Listing of operating states and detailed duration information for each order with proportional duration, average, and total sum.

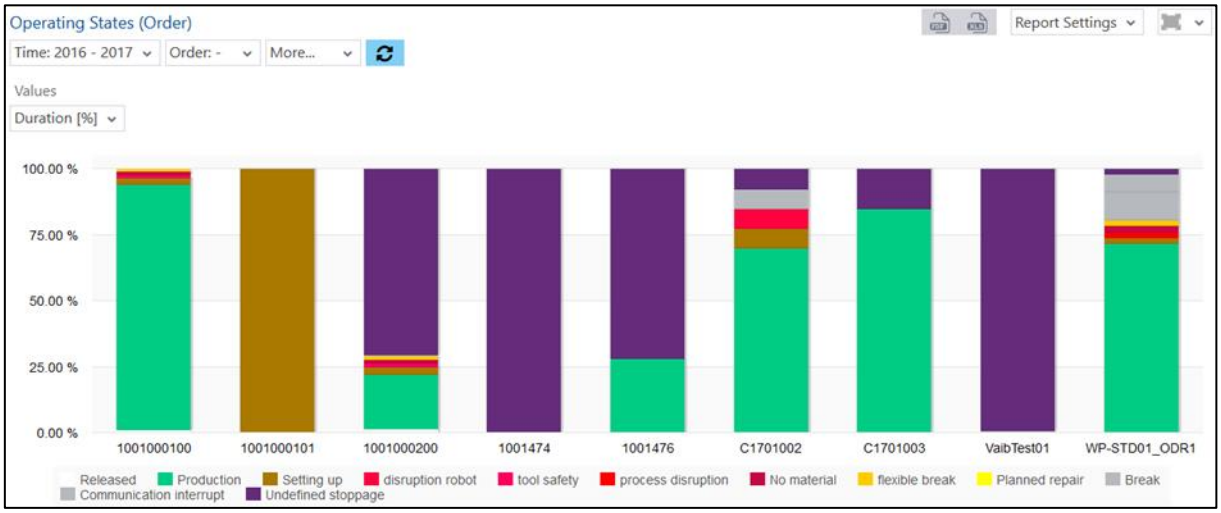


Fig. 81: Operating state report (order) as column chart

	1001000100		1001000101		1001000200		1001474		1001476		C1701
Operating State	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Durati
Break					00:15	0.06%	02:00	0.52%	00:15	0.15%	00:29
Communication interrupt											
No material	15:40	1.19%			06:40	1.52%					
Planned repair	01:00	0.08%									
Production	1225:05	92.81%			90:05	20.47%			46:54	27.91%	04:40

Fig. 82: Operating state report (order) as a table

3.4.4.3 Hit list operating states (order)

Path: Performance analysis > Reporting > Reports > Availability analysis > Order > Hit list operating states (order)

Multi-report with operating states and detailed duration and frequency for *one* or *more* orders for the selected period:

- Hit list of operating states (order) as bar chart (fig. 83):
  Display of selected operating states and their total duration as columns. The operating states correspond to all selected orders.
- Hit list operating states (order) as a table (fig. 84):
  Listing of selected operating states per order with duration and frequency for the selected time period. Proportion of frequency to the total frequency of all operating states.

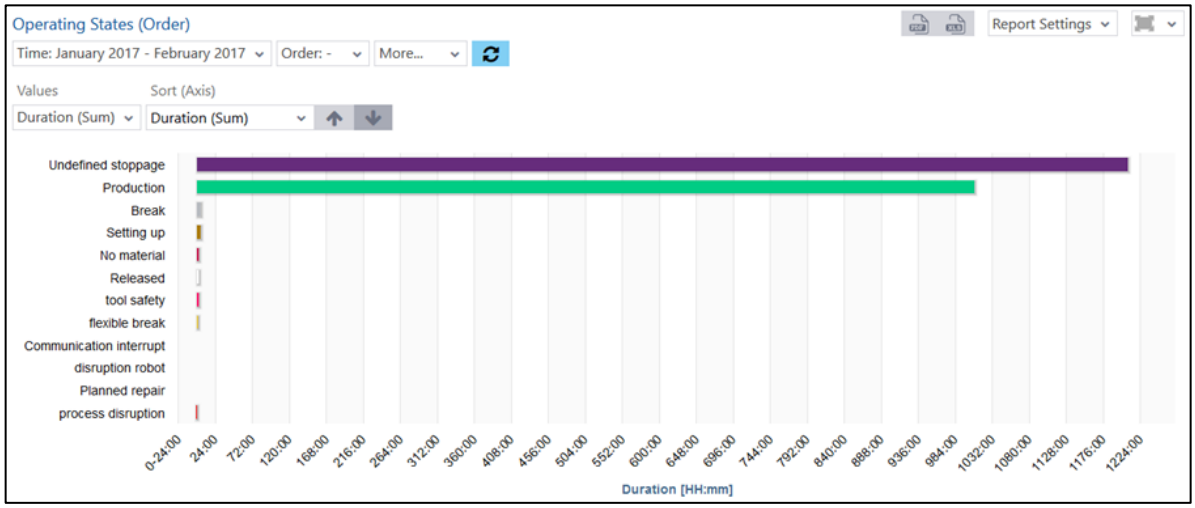


Fig. 83: Hit list of operating states (order) as bar chart

Order	Code	Operating State	Frequency	Frequency [%]	Duration (HH:mm)	Duration [%]	Duration [% absolute]	Duration [Ø] (HH:mm)
1001000200	999	Undefined stoppage	23	9.54%	283:05	12.63%	12.63%	12:18
1001000200	000	Production	28	11.62%	09:00	0.4%	0.4%	00:19
1001000200	020	Setting up	4	1.66%	00:58	0.04%	0.04%	00:14
1001000200	180	tool safety	4	1.66%	00:40	0.03%	0.03%	00:10
1001000200	-	Released	4	1.66%	00:40	0.03%	0.03%	00:10
1001000200	22	No material	4	1.66%	00:40	0.03%	0.03%	00:10
1001000200	295	flexible break	4	1.66%	00:40	0.03%	0.03%	00:10

Fig. 84: Hit list of operating states (order) as a table

If **Duration** is selected under **Other filters**, only the operating states corresponding to the entered duration are displayed (e.g. all operating states with a duration >5 minutes).

If **Frequency** is selected under **Other filters**, only the operating states corresponding to the entered frequency are displayed (e.g. all operating states with a frequency >= 2).

ⓘ The frequency is shift related, so an operating state that spans two shifts is counted twice here.

3.4.5 Operation

3.4.5.1 Operating state class report (operation)

Path: Performance Analysis > Reporting > Reports > Availability analysis > Operation > Operating state class report (operation)

✓ Operating state classes are configured.

Multi-report with the display of operating state classes for one or more operations for a period:

- Operating state class report (operation) as a column chart (fig. 85):
  Duration of operating state classes shown proportionally as columns. Each column represents the duration for a selected operation. Depending on the selection in the value filter, the duration is a percentage (of total value) or in minutes.
- Operating state class report (operation) as a table (fig. 86):
  Tabular listing of operating state classes. Specify the duration as a percentage (of total) or in minutes. The columns correspond to operations. The value filter does not affect this table.

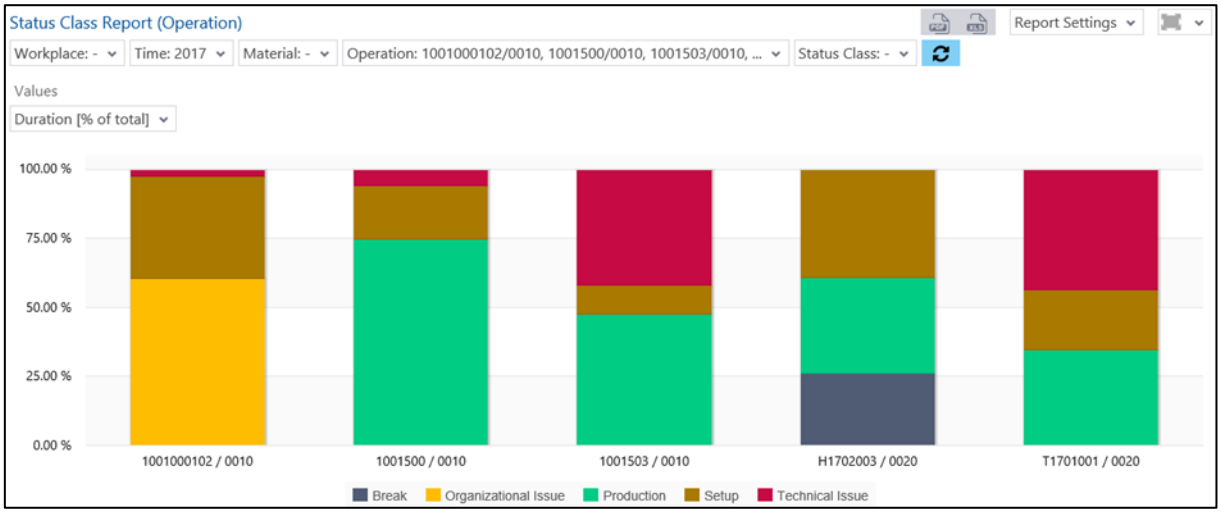


Fig. 85: Operating state class report (operation) as column chart

	1001000102 / 0010		1001500 / 0010		1001503 / 0010		H1702003 / 0020		T1701001 / 0020	
Status Class	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	Duration [% of total]	Duration	D
Setup	00:01	36.93%	00:01	19.46%	00:00	10.44%	00:45	39.11%	00:25	2
Technical Issue	00:00	2.59%	00:00	5.91%	00:03	41.83%	00:00	0%	00:50	4
Organizational Issue	00:02	60.48%								
Production			00:04	74.63%	00:04	47.73%	00:40	34.81%	00:40	3
Break							00:30	26.08%		
∑	00:03	100%	00:06	100%	00:09	100%	01:55	100%	01:55	1

Fig. 86: Operating state class report (operation) as a table

A drill-down to operating state report (operation) is available by left-clicking on a column.

3.4.5.2 Operating state report (operation)

Path: Performance Analysis > Reporting > Reports > Availability analysis > Operation > Operating state report (operation)

Multi-report with (proportional) durations of operating states for operations:

- Operating state report (operation) as a column chart (fig. 87):
  Operating states as columns per operation. Each column represents operating states in proportion to the total operated period of use.
- Operating state report (operation) as a table (fig. 88):
  Listing of operating states and detailed duration for each operation with proportional duration, total, and average.

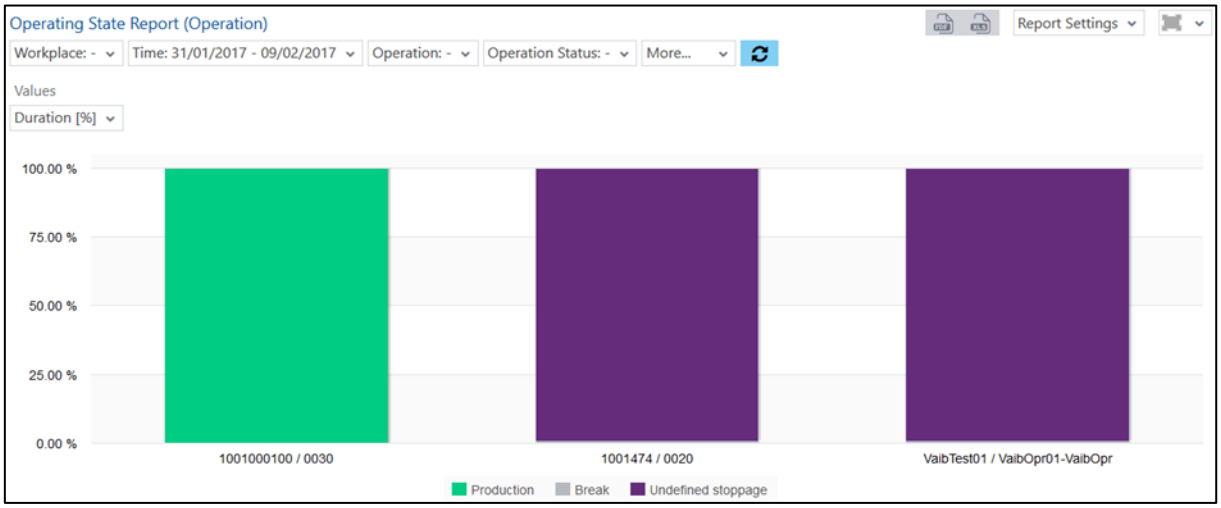


Fig. 87: Operating state report (operation) as column chart

	1001000100 / 0030		1001474 / 0020		VaibTest01 / VaibOpr01-VaibOpr		Total ∑	Total Ø	Total %
Operating State	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration [%]	Duration (HH:mm)	Duration (HH:mm)	Duration
Production	208:00	100%					208:00	69:20	33.33%
Break			02:00	0.96%	02:00	0.96%	04:00	01:20	0.64%
Undefined stoppage			206:00	99.04%	206:00	99.04%	412:00	137:20	66.03%
∑	208:00	100%	208:00	100%	208:00	100%	624:00	208:00	100%

Fig. 88: Operating state report (operation) as a table

ⓘ The workplace selected in the filter restricts selectable operations.

3.4.5.3 Hit list operating states (operation)

Path: Performance Analysis > Reporting > Reports > Availability analysis > Operation > Hit list of operating states (operation)

Multi-report with operating states and detailed durations and frequencies for *one* or *more* operations for the selected period:

- Hit list for operating states (operation) as a bar chart (fig. 89):
  Display of selected operating states and their total duration as columns. The operating states correspond to all selected operations.
- Hit list for operating states (operation) as a table (fig. 90):
  List of selected operating states per operation with duration and frequency for the selected period. Proportion of frequency to the total frequency of all operating states.

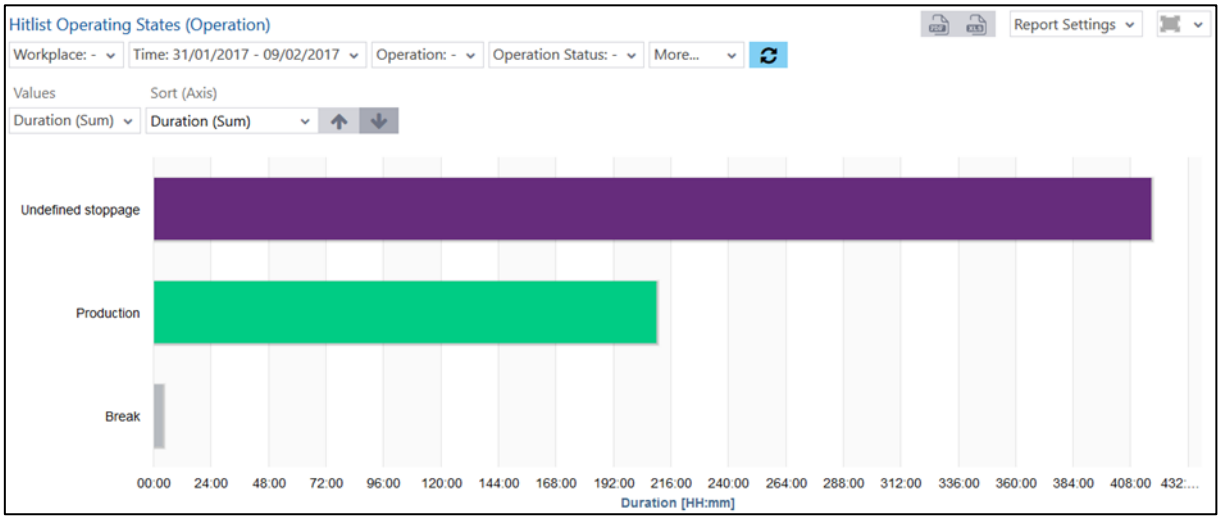


Fig. 89: Hit list of operating states (operation) as bar chart

Order	Operation	Code	Operating State	Frequency	Frequency [%]	Duration (HH:mm)	Duration [%]	Duration [% absolute]	Duration [Ø] (HH:mm
1001000100	0030	000	Production	1	2.86%	210:21	33.33%	33.33%	210:21
1001474	0020	999	Undefined stoppage	9	25.71%	208:21	33.02%	33.02%	23:09
1001474	0020	993	Break	8	22.86%	02:00	0.32%	0.32%	00:15
VaibTest01	VaibOpr01-VaibOpr	999	Undefined stoppage	9	25.71%	208:21	33.02%	33.02%	23:09
VaibTest01	VaibOpr01-VaibOpr	993	Break	8	22.86%	02:00	0.32%	0.32%	00:15
				35	100%	631:05	100%	100%	257:09

Fig. 90: Hit list of operating states (operation) as a table

ⓘ The workplaces selected in the filter determine the available operations and the selected operations determine the available operation statuses.

If **Duration** is selected under **Other filters**, only operating states with a duration corresponding to the entered duration are displayed (e.g. all operating states with a duration >5 minutes).

If **Frequency** is selected under **Other filters**, only the operating states corresponding to the entered frequency are displayed (e.g. all operating states with a frequency >= 2).

ⓘ The frequency is shift related, so an operating state that spans two shifts is counted twice here.

The following drill-down is available by clicking on an operating state (right-click in table, left-click on a bar):

- Hit list of operating state details layer 2 (operation):
  Detailing of the selected operating state in a table or bar chart:
  - Operating state details (operation) as a table (fig. 91):
    Only the selected operating state is displayed in a table. Each row corresponds to one operation.
    Frequency: Frequency of operating state on respective workplace.
    Frequency [%]: Proportion of the frequency to the total frequency of the selected operating state.
    Duration (hh:mm): Total duration of the operating state per workplace.
    Duration [%]: Proportion of the duration to the total duration of the selected operating state.
    Duration [% absolute]: Proportion of the duration to the total duration of all operating states.
  - Operating state details (operation) as a bar chart (fig. 92):
    Display of the selected operating state as bars with the total duration, taken from all operations in which the state occurs.

ⓘ A drill-down is only possible for malfunction reasons (e.g. **undefined stoppage** or **no connection**, etc.), not during **production** or **setup**.

Code (2)	Details (2)	Frequency	Frequency [%]	Duration (HH:mm)	Duration [%]	Duration [%absolute]
M231	Machine breakdown	3	75%	00:02	33.35%	2.32%
M232	Electricity Fluctuation	1	25%	00:04	66.65%	4.64%
		4	100%	00:07	100%	6.97%

Fig. 91: Operating state details (operation) as a table

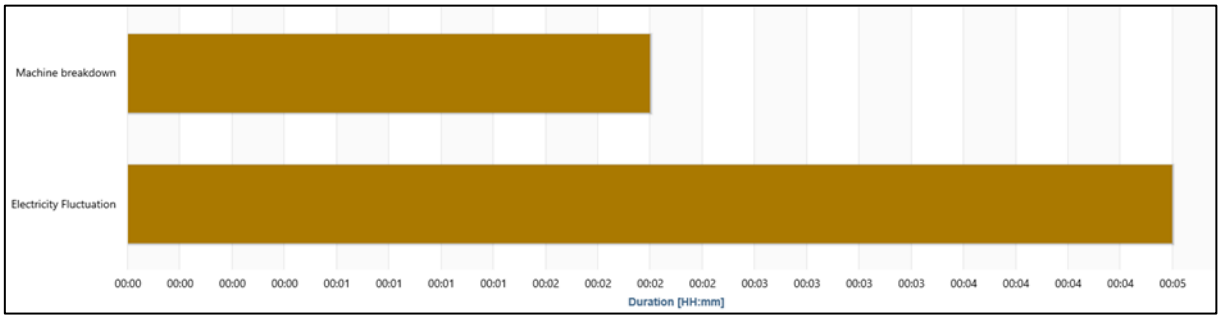


Fig. 92: Operating state details (operation) as bar chart

3.5 Performance rate analysis

The following reports correspond to strokes.

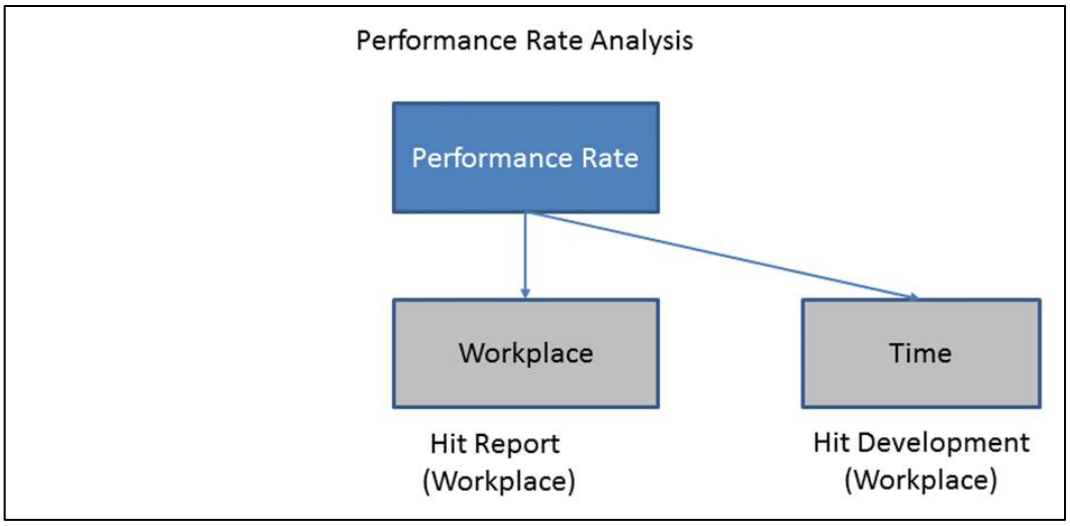


Fig. 93: Components of the performance rate analysis

3.5.1 Workplace

3.5.1.1 Hit report (workplace)

Path: Performance analysis > Reporting > Reports > Performance rate analysis > Workplace > Hit report (workplace)

Multi-report with the total number of strokes for one or more workplaces for the selected period:

- Hit report (workplace) as bar chart (fig. 94):
  Display of the total number of strokes per workplace as columns.
- Hit report (workplace) as a table (fig. 95):
  Total number of strokes per workplace. Each column shows the count for one workplace.

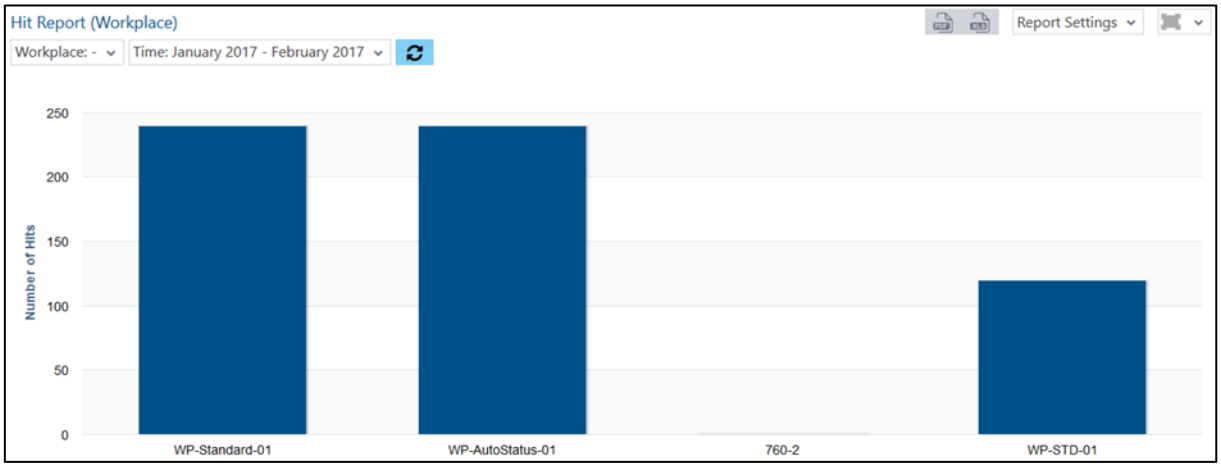


Fig. 94: Hit report (workplace) as bar chart

Workplace	WP-Standard-01	WP-AutoStatus-01	760-2	WP-STD-01
Number of Hits	240	240	1	120

Fig. 95: Hit report (workplace) as a table

3.5.1.2 Hit report (workplace) (hits calculated from quantities)

Unlike the Hit report (workplace), this report determines a stroke factor from the quantities produced and the number of strokes is calculated from this.

3.5.1.3 Hit development (workplace)

Path: Performance analysis > Reporting > Reports > Performance rate analysis > Workplace > Hit development (workplace)

Multi-report displaying the development of strokes over time. Total number of strokes for one or more workplaces over the selected period:

- Hit development (workplace) as column chart (fig. 96):
  Total number of strokes as columns. Each column shows the count for a period (e.g. month). The count corresponds to the selected workplaces.
- Hit development (workplace) as a table (fig. 97):
  Total number of strokes over the selected period. Each column shows the count for a period (e.g. calendar week). The count corresponds to the selected workplaces.

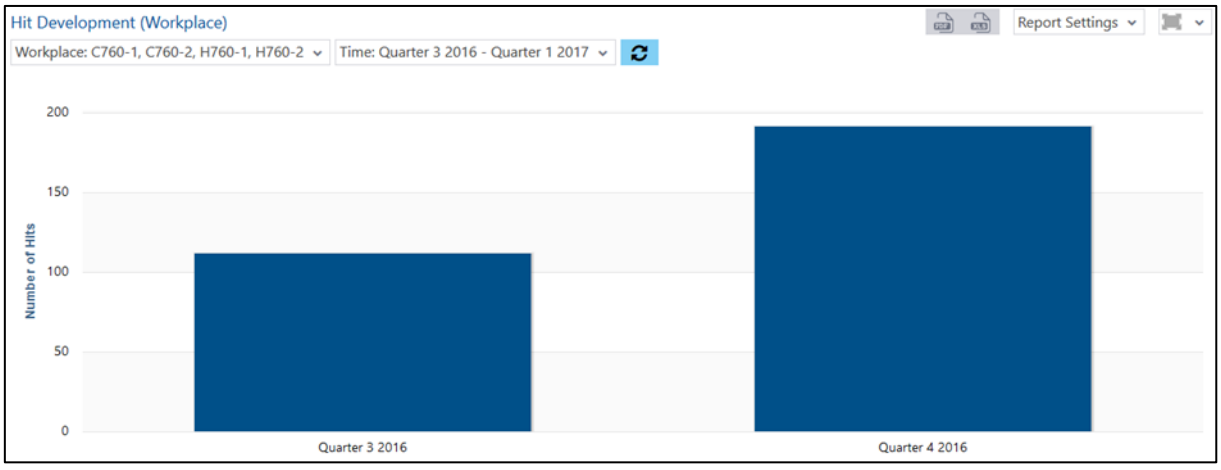


Fig. 96: Hit development (workplace) as column chart

Period of Time	2016/04	2016/04	2016/03	2016/04	2016/03
Number of Hits	60	120	2	12	110

Fig. 97: Hit development (workplace) as a table

3.5.1.4 Hit development (workplace) (hits calculated from quantities)

Unlike the Hit development (workplace), this report determines a stroke factor from the quantities produced and the number of strokes is calculated from this.

3.5.2 Operation

3.5.2.1 Performance report (operation)

Path: Performance analysis > Reporting > Reports > Performance rate analysis > Operation > Performance report (operation)

Multi-report showing the performance rate for one or more operations for the selected period:

- Performance report (operation) as a column chart (fig. 98):
  Display of the performance rate percentage for each selected operation as columns.
- Performance report (operation) as a table (fig. 99):
  Tabular display of operations and performance rate percentage with quantities and times indicated.

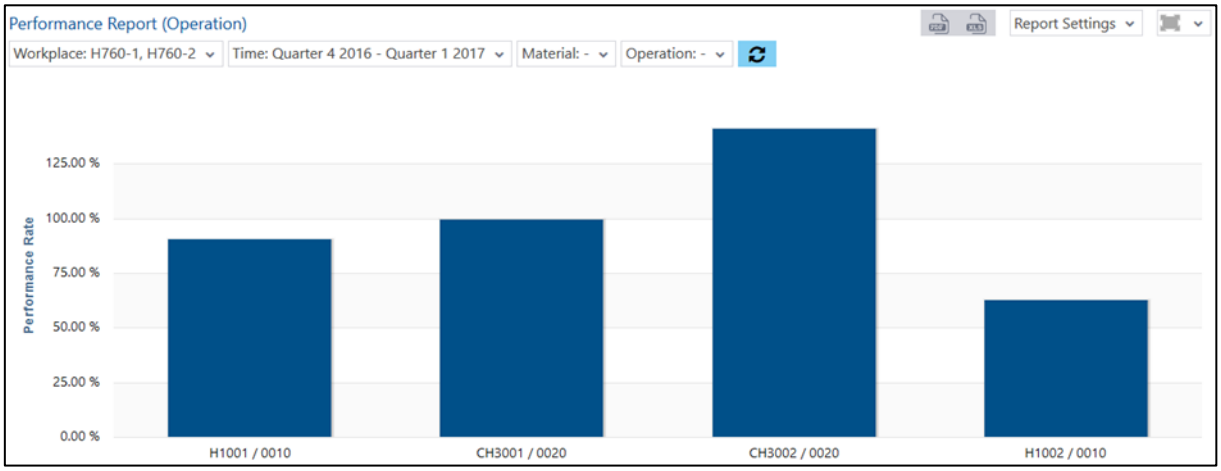


Fig. 98: Performance report (operation) as column chart

Order / Operation	CH3001 / 0020	CH3002 / 0020	H1001 / 0010	H1002 / 0010
Material	4	4	4	4
Unit	ST	ST	ST	ST
Performance Rate	99.92%	141.54%	90.59%	63.1%
Target Quantity	10	100	100	10
Total Quantity	10	110	2	12
Yield Qty.	10	100	2	12
Target Time per Unit	00:05:00	00:06:00	00:05:00	00:02:00
Time per Unit	00:05:00	00:04:14	00:05:31	00:03:10
Production	00:50:02	07:46:18	00:11:02	00:38:02
Actual/Target Deviation (Time per Unit)	00:00:00	-00:01:45	00:00:31	00:01:10
Actual to Target Time per Unit [%]	0.08%	-29.35%	10.39%	58.48%

Fig. 99: Performance report (operation) as a table

3.6 Quality analysis

The following reports display the produced quantities in condensed form.

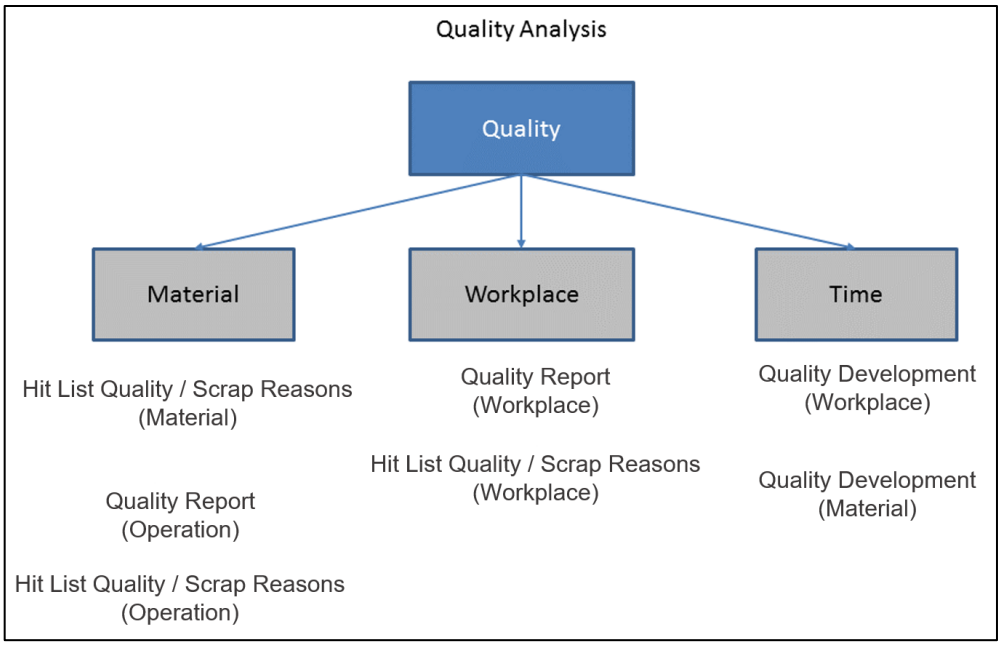


Fig. 100: Components of the quality analysis

3.6.1 Workplace

3.6.1.1 Quality report (workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Quality report (workplace)

Multi-report displaying produced quantities. Quality types and details for one or more workplaces for the selected time range:

- Quality report (workplace) as column chart (fig. 101):
  Quality types with percentage for each workplace as columns.
- Quality report (workplace) as a table (fig. 102):
  Quality types with exact number and percentage for each workplace as a table.

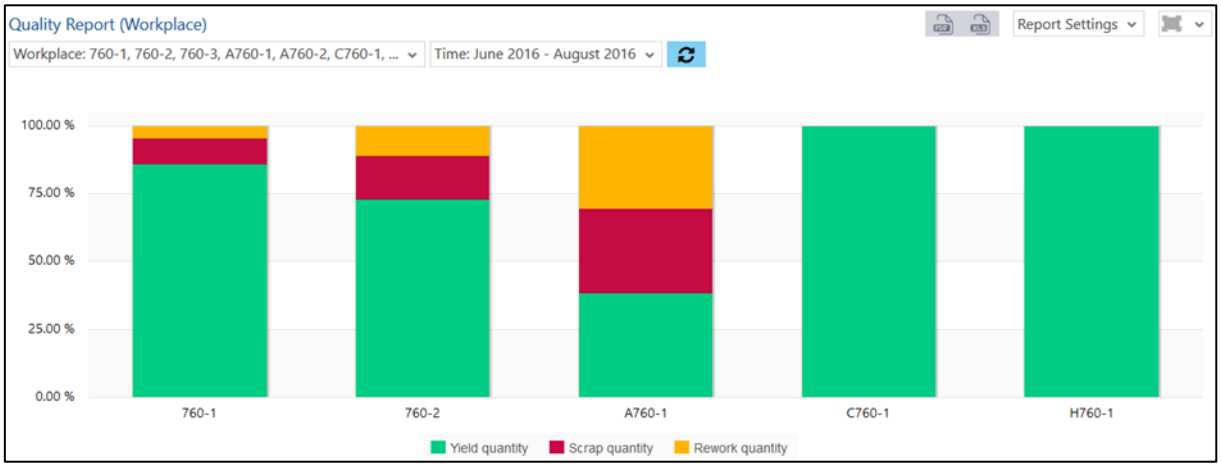


Fig. 101: Quality report (workplace) as column chart

	760-1		760-2		A760-1		C760-1		H760-1		Total ∑	Total %
Quality Type	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity
Yield quantity	111	86.05%	46	73.02%	100	38.61%	89	100%	2	100%	348	64.21%
Scrap quantity	12	9.3%	10	15.87%	80	30.89%					102	18.82%
Rework quantity	6	4.65%	7	11.11%	79	30.5%					92	16.97%
∑	129	100%	63	100%	259	100%	89	100%	2	100%	542	100%

Fig. 102: Quality report (workplace) as a table

3.6.1.2 Quality details (workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Quality details (workplace)

Multi-report displaying produced quantities. Quality types and corresponding quality details for one or more workplaces for the selected period:

- Quality details (workplace) as column chart (fig. 103):
  Quality details with percentage of total quantity as bars.
- Quality details (workplace) as a table (fig. 104):
  Quality types and quality details with precise number and percentage for each workplace as a table.

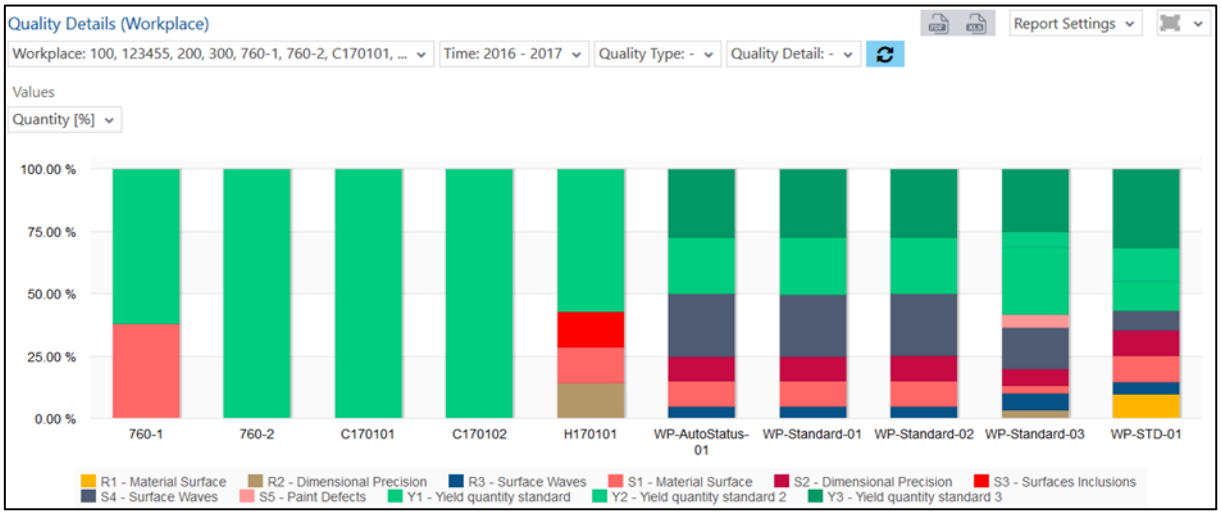


Fig. 103: Quality details (workplace) as a column chart

		760-1		760-2		C170101		C170102		H170101		WP-AutoStatus-01	
Quality Type	Quality Details	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]
Yield quantity	Yield quantity standard	13	61.9%	2	100%	41	100%	200	100%	20	57.14%	2160	22.5%
Scrap quantity	Material Surface	8	38.1%							5	14.29%	960	10%
Scrap quantity	Surfaces Inclusions									5	14.29%		
Rework quantity	Dimensional Precision									5	14.29%		

Fig. 104: Quality details (workplace) as a table

3.6.1.3 Quality development (workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Quality development (workplace)

Multi-report displaying the development of quantities produced over time. Quality types and details for one or several orders for the selected time range:

- Quality development (workplace) as a column chart (fig. 105):
  Percentage of quality types in the total quantity. Each column shows the quantities for the period (e.g. quarter).
- Quality development (workplace) as a table (fig. 106):
  Quantities produced over the selected period, broken down into quality types. Each column shows the quantities for the period (e.g. quarter).

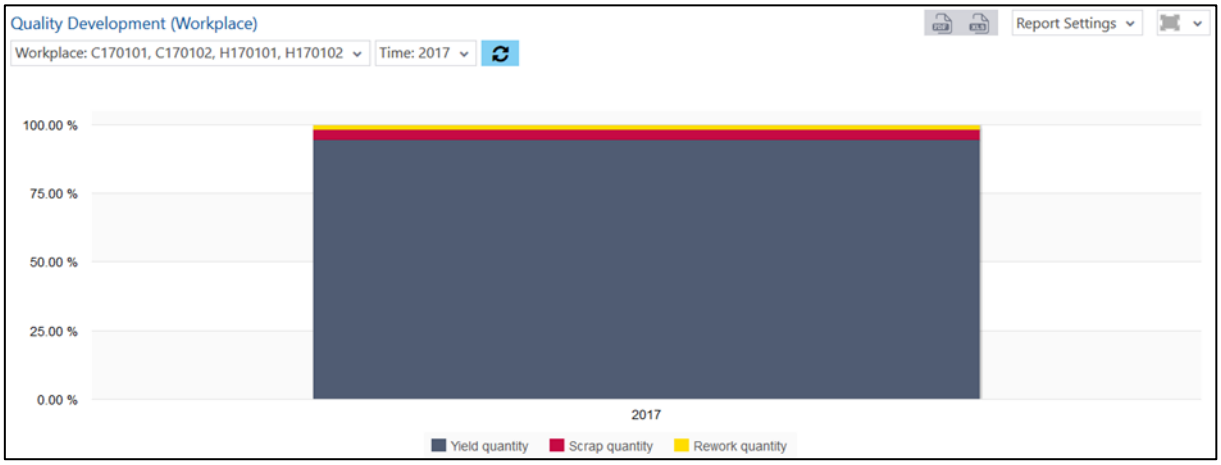


Fig. 105: Quality development (workplace) as a column chart

	2017		Total ∑	Total %
Quality Type	Quantity	Quantity (%)	Quantity	Quantity
Yield quantity	261	94.57%	261	94.57%
Scrap quantity	10	3.62%	10	3.62%
Rework quantity	5	1.81%	5	1.81%
∑	276	100%	276	100%

Fig. 106: Quality development (workplace) as a table

3.6.1.4 Quality details (development per workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Quality details (development per workplace)

Multi-report with time-based displays of produced quantities. Quality types and corresponding quality details for one or more workplaces for the selected period: If no workplace is selected, the numbers refer to all workplaces:

- Quality details (development per workplace) as a column chart (fig. 107):
  Quality details with percentage of total quantity as bars. Each bar represents the quality details for a selected time period (week, months, year, etc.).
- Quality details (development per workplace) as a table (fig. 108):
  Quality types and quality details with precise number and percentage for a selected time period (week, month, year, etc.).

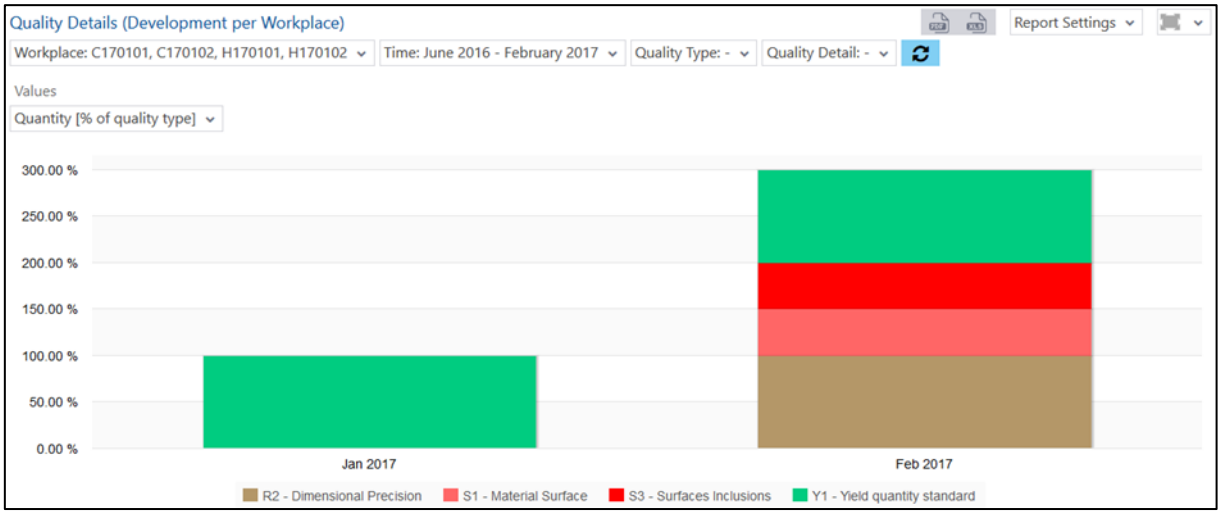


Fig. 107: Quality details (development per workplace) as a column chart

		Jan 2017		Feb 2017		Total ∑	Total Ø
Quality Type	Quality Details	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]
Rework quantity	Dimensional Precision			5	14.29%	5	250%
Scrap quantity	Material Surface			5	14.29%	5	250%
Scrap quantity	Surfaces Inclusions			5	14.29%	5	250%
Yield quantity	Yield quantity standard	241	100%	20	57.14%	261	13050%
∑		241	100%	35	100%	276	13800%

Fig. 108: Quality details (development per workplace) as a table

3.6.1.5 Hit list quality details (workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Hit list quality details (workplace)

Multi-report displaying produced quantities. Quality details for one or more orders for the selected time range in comparison:

- Hit list quality details (workplace) as a bar chart (fig. 109):
  Quality details with an exact quantity for each detail, sorted by frequency of occurrence. The quantity information refers to the frequency of occurrence of the detail for all selected workplaces.
- Hit list quality details (workplace) as a table (fig. 110):
  Quality types and quality details with exact quantity for each detail. Each row shows how often the detail appears on a workplace.

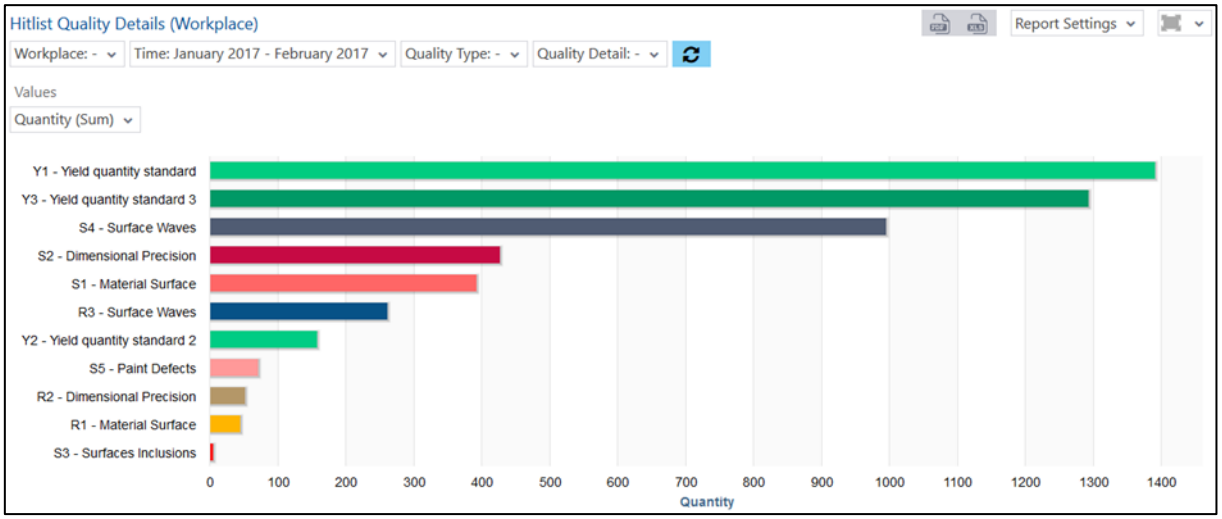


Fig. 109: Hit list quality details (workplace) as a bar chart

Workplace	Quantity	Quality Type	Quality Details
WP-AutoStatus-01	216	Yield quantity	Yield quantity standard
WP-AutoStatus-01	264	Yield quantity	Yield quantity standard 3
WP-AutoStatus-01	96	Scrap quantity	Material Surface
WP-AutoStatus-01	96	Scrap quantity	Dimensional Precision
WP-AutoStatus-01	240	Scrap quantity	Surface Waves
WP-AutoStatus-01	48	Rework quantity	Surface Waves
WP-STD-01	54	Yield quantity	Yield quantity standard

Fig. 110: Hit list quality details (workplace) as a table

3.6.1.6 Quality detail class report (workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Quality detail class report (workplace)

Multi-report displaying produced quantities. Quality detail classes for one or more workplaces for the selected period:

- Quality detail class report (workplace) as a column chart (fig. 111):
  Quantities per quality detail class with percentage for each workplace as columns.
- Quality detail class report (workplace) as a table (fig. 112):
  Quantities per quality detail class with percentage for each workplace as a table.

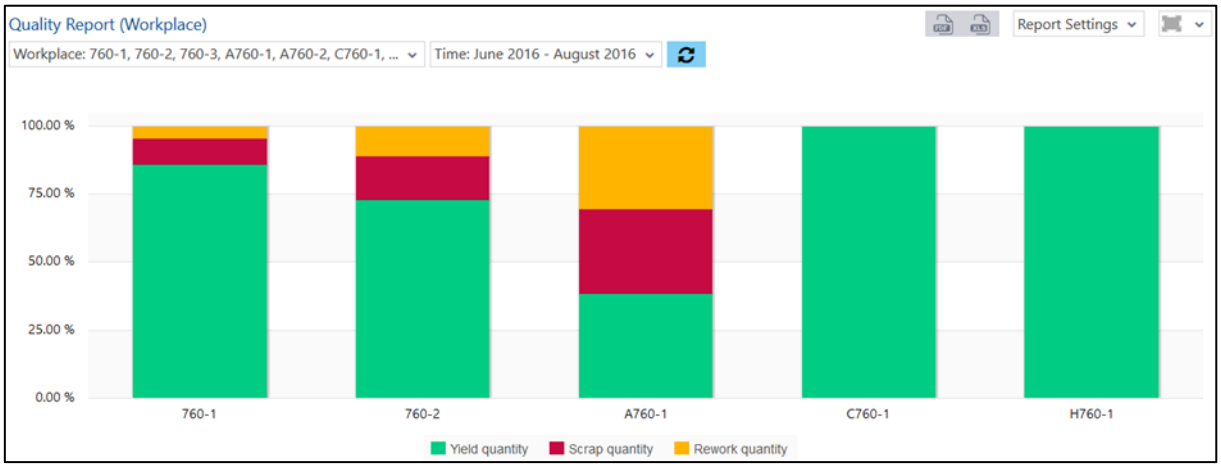


Fig. 111: Quality detail class report (workplace) as a column chart

	760-1		760-2		A760-1		C760-1		H760-1		Total ∑	Total %
Quality Type	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity
Yield quantity	111	86.05%	46	73.02%	100	38.61%	89	100%	2	100%	348	64.21%
Scrap quantity	12	9.3%	10	15.87%	80	30.89%					102	18.82%
Rework quantity	6	4.65%	7	11.11%	79	30.5%					92	16.97%
∑	129	100%	63	100%	259	100%	89	100%	2	100%	542	100%

Fig. 112: Quality detail class report (workplace) as a table

3.6.1.7 Quality detail class development (workplace)

Path: Performance analysis > Reporting > Reports > Quality analysis > Workplace > Quality detail class development (workplace)

Multi-report displaying produced quantities. Quality detail classes for one or more workplaces for the selected period:

- Quality detail class development (development per workplace) as a column chart (fig. 113): Quality detail classes with percentage of total quantity as bars. Each bar represents the quality detail classes for a selected time period (week, month, year, etc.).
- Quality detail class development (development per workplace) as a table (fig. 112): Quality detail classes with precise number and percentage for a selected time period (week, month, year, etc.).

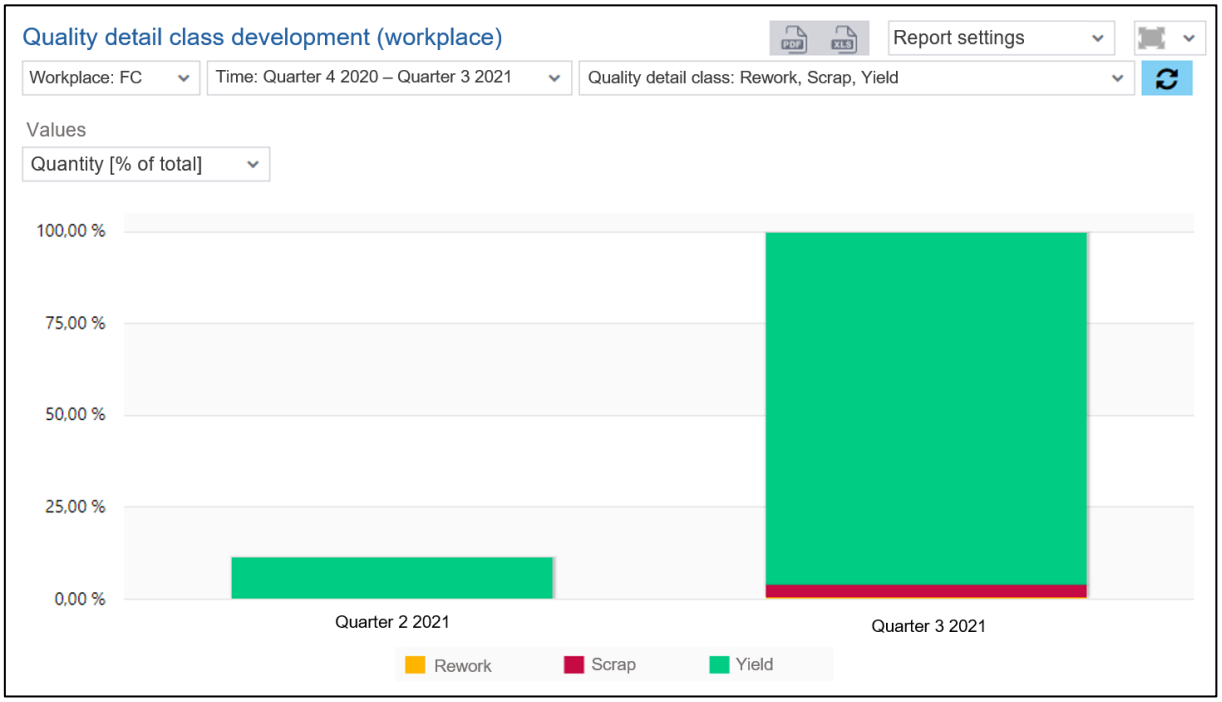


Fig. 113: Quality detail class development (workplace) as a bar chart

	Quartal 2 2021		Quartal 3 2021		Gesamt Σ	Gesamt %
Qualitätsdetailklasse	Menge	Menge [% von Gesamt]	Menge	Menge [% von Gesamt]	Menge	Menge [% von Gesamt]
Rework Class	27	0,04%	37	0,77%	64	0,72%
Scrap Class	58	0,08%	151	3,15%	209	2,89%
Yield Class	8500	11,59%	4607	96,08%	13107	96,39%
Σ	**8585**	**11,7%**	**4795**	**100%**	**13380**	**100%**

Fig. 114: Quality detail class development (workplace) as a table

3.6.2 Material

3.6.2.1 Quality report (material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Quality report (material)

Multi-report displaying produced quantities. Quality types and details for one or more materials for the selected period:

- Quality report (material) as a column chart (fig. 115):
  Quality types with percentage for each material as columns.
- Quality report (material) as a table (fig. 116):
  Quality types with precise number and percentage for each material as a table.

Fig. 115: Quality report (material) as a column chart

	100000001		100000002		100000049		100000051		material number		Total Σ	Total %
Quality Type	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity
Rework	595	4.25%	100 ST	25%	1 ST	2.86%			36 Stk	19.89%	732	5.01%
Scrap	1345	9.62%	200 ST	50%	4 ST	11.43%	2 ST	9.09%	73 Stk	40.33%	1624	11.11%
Yield	12045	86.13%	100 ST	25%	30 ST	85.71%	20 ST	90.91%	72 Stk	39.78%	12267	83.89%
Σ	13985	100%	400 ST	100%	35 ST	100%	22 ST	100%	181 Stk	100%	14623	100%

Fig. 116: Quality report (material) as a table

3.6.2.2 Quality details (material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Quality details (material)

Multi-report displaying produced quantities. Quality types and corresponding quality details for one or more materials for the selected period:

- Quality details (material) as a column chart (fig. 117):
  Quality details with percentage of total quantity as bars.
- Quality details (material) as a table (fig. 118):
  Quality types and quality details with precise number and percentage for each material as a table.

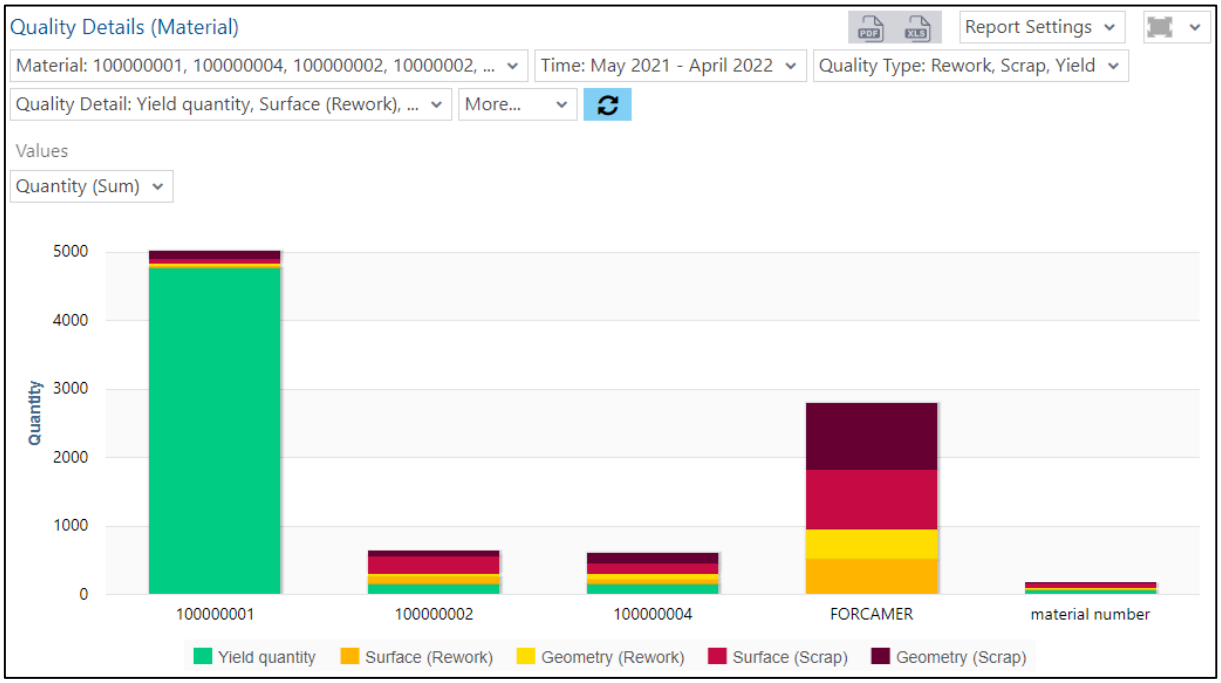


Fig. 117: Quality details (material) as a column chart

		100000001		100000002		100000004		FORCAMER		material number		Total Σ	Total %
Quality Type	Quality Details	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity
Rework	Surface (Rework)	42 ST	0.83%	100 ST	15.9%	80 ST	13.22%	500 L	17.87%	14 Stk	7.73%	736	7.94%
Rework	Geometry (Rework)	25 ST	0.5%	60 ST	9.54%	70 ST	11.57%	450 L	16.08%	22 Stk	12.15%	627	6.77%
Scrap	Surface (Scrap)	81 ST	1.61%	250 ST	39.75%	160 ST	26.45%	880 L	31.45%	63 Stk	34.81%	1434	15.48%
Scrap	Geometry (Scrap)	118 ST	2.34%	80 ST	12.72%	150 ST	24.79%	960 L	34.31%	10 Stk	5.52%	1318	14.22%
Yield	Yield quantity	4766	94.71%	155 ST	24.64%	150 ST	24.79%	8 L	0.29%	72 Stk	39.78%	5151	55.59%
Σ		**5032**	**100%**	**645 ST**	**102.54%**	**610 ST**	**100.83%**	**2798 L**	**100%**	**181 Stk**	**100%**	**9266**	**100%**

Fig. 118: Quality details (material) as a table

3.6.2.3 Quality development (material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Quality development (material)

Multi-report displaying the development of quantities produced over time. Quality types and details for one or more materials for the selected period:

- Quality development (material) as a column chart (fig. 119):
  Percentage of quality types in the total quantity. Each column shows the quantities for the period (e.g. month).
- Quality development (material) as a table (fig. 120):
  Quantities produced over the selected period, broken down into quality types. Each column shows the quantities for the period (e.g. month).

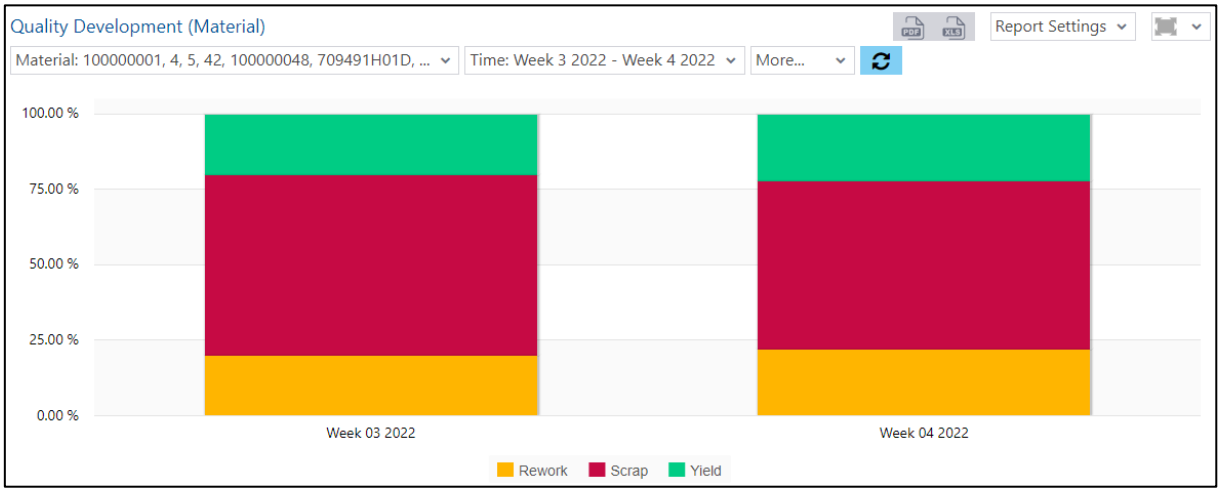


Fig. 119: Quality development (material) as a column chart

	Week 03 2022		Week 04 2022		Total Σ	Total %
Quality Type	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity
Rework	10 ST	20%	20 ST	22.22%	30 ST	21.43%
Scrap	30 ST	60%	50 ST	55.56%	80 ST	57.14%
Yield	10 ST	20%	20 ST	22.22%	30 ST	21.43%
Σ	**50 ST**	**100%**	**90 ST**	**100%**	**140 ST**	**100%**

Fig. 120: Quality development (material) as a table

3.6.2.4 Quality details (development per material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Quality details (development per material)

Multi-report with time-based displays of produced quantities. Quality types and corresponding quality details for one or more materials for the selected period. If no material is selected, the numbers refer to all materials:

- Quality details (development per material) as a column chart (fig. 121):
  Quality details with percentage of total quantity as bars. Each bar represents the quality details for a selected time period (week, months, year, etc.).
- Quality details (development per material) as a table (fig. 122):
  Quality types and quality details with precise number and percentage for a selected time period (week, month, year, etc.).

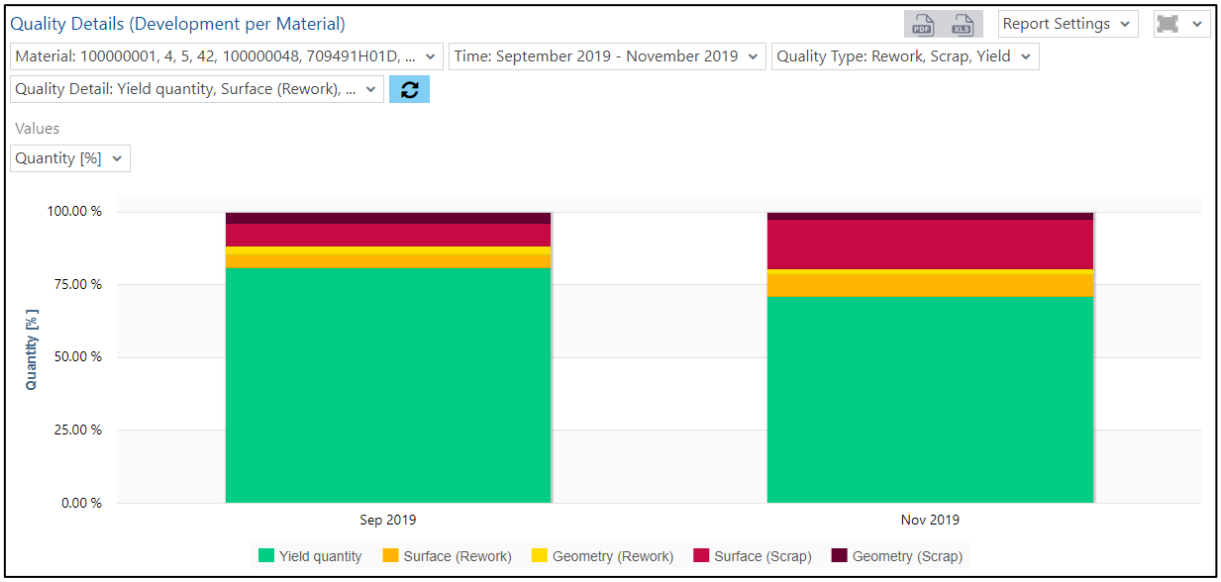


Fig. 121: Quality details (development per material) as a column chart

		Sep 2019		Oct 2019		Nov 2019		Total Σ	Total %
Quality Type	Quality Details	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity
Rework	Surface (Rework)	3 ST	0.71%	39 ST	4.51%	126 ST	7.36%	168 ST	5.6%
Rework	Geometry (Rework)	2 ST	0.47%	26 ST	3.01%	37 ST	2.16%	65 ST	2.17%
Scrap	Surface (Scrap)	22 ST	5.2%	67 ST	7.75%	291 ST	17%	380 ST	12.67%
Scrap	Geometry (Scrap)	16 ST	3.78%	34 ST	3.94%	40 ST	2.34%	90 ST	3%
Yield	Yield quantity	380 ST	89.83%	698 ST	80.79%	1218 ST	71.14%	2296 ST	76.56%
Σ		**423 ST**	**100%**	**864 ST**	**100%**	**1712 ST**	**100%**	**2999 ST**	**100%**

Fig. 122: Quality details (development per material) as a table

3.6.2.5 Hit list quality details (material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Hit list quality details (material)

Multi-report displaying produced quantities. Comparison of quality details for one or more materials for the selected period:

- Hit list quality details (material) as a bar chart (fig. 123):
  Quality details with an exact quantity for each detail, sorted by frequency of occurrence. The quantity information refers to the frequency of the detail for all selected materials.
- Hit list quality details (material) as a table (fig. 124):
  Quality types and quality details with exact quantity for each detail. Each row shows how often the detail appears on a material.

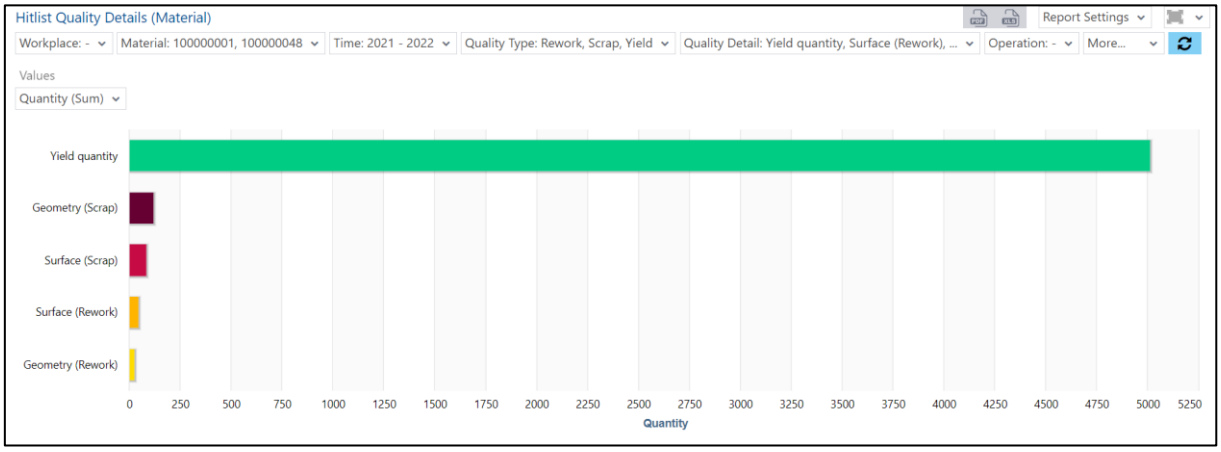


Fig. 123: Hit list of quality details (material) as a bar chart

Material	Quantity	Quality Type	Quality Details
001	121 ST	Scrap	Geometry (Scrap)
001	86 ST	Scrap	Surface (Scrap)
001	27 ST	Rework	Geometry (Rework)
001	45 ST	Rework	Surface (Rework)
001	5013	Yield	Yield quantity

Fig. 124: Hit list of quality details (material) as a table

3.6.2.6 Quality detail class report (material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Quality detail class report (material)

Multi-report displaying produced quantities. Quality detail classes for one or more materials for the selected period:

- Quality detail class report (material) as a column chart (fig. 125):
  Quantities per quality detail class with percentage for each material as columns
- Quality detail class report (material) as a table (fig. 126):
  Quantities per quality detail class with percentage for each material as a table

Fig. 125: Quality detail class report (material) as a column chart

	100000001		4		709491H01D		Total Σ	Total %
Quality Detail Class	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]
Geometry	492	5.77%	250 ST	1.9%			742	2.56%
Surface	650	7.63%	191 ST	1.45%			841	3.03%
Yield	7371	86.48%	12687 ST	96.64%	148 ST	100%	20206	94.41%
Σ	**8513**	**99.88%**	**13128 ST**	**100%**	**148 ST**	**100%**	**21789**	**100%**

Fig. 126: Quality detail class report (material) as a table

3.6.2.7 Quality detail class development (material)

Path: Performance analysis > Reporting > Reports > Quality analysis > Material > Quality detail class development (material)

Multi-report displaying produced quantities. Quality detail classes for one or more workplaces for the selected period:

- Quality detail class development (development per material) as a column chart (fig. 127): Quality detail classes with percentage of total quantity as bars. Each bar represents the quality detail classes for a selected time period (week, month, year, etc.).
- Quality detail class development (development per material) as a table (fig. 128): Quality detail classes with precise number and percentage for a selected time period (week, month, year, etc.).

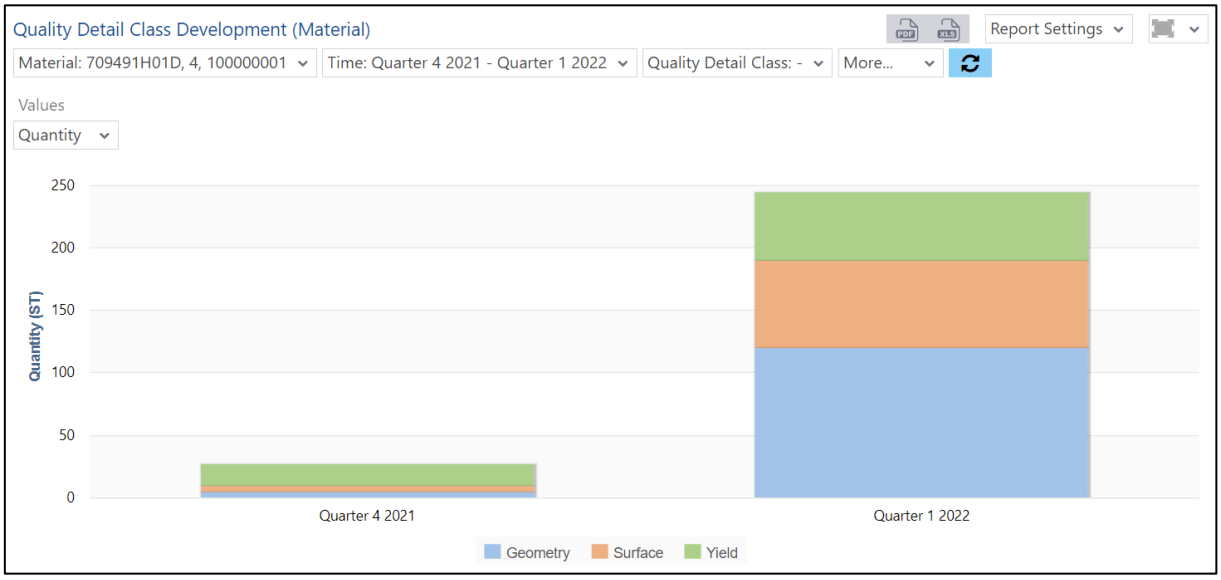


Fig. 127: Quality detail class development (material) as bar chart

	Quarter 4 2021		Quarter 1 2022		Total Σ	Total %
Quality Detail Class	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]
Geometry	5 ST	18.52%	120 ST	48.98%	125 ST	33.75%
Surface	5 ST	18.52%	70 ST	28.57%	75 ST	23.54%
Yield	17 ST	62.96%	55 ST	22.45%	72 ST	42.71%
Σ	**27 ST**	**100%**	**245 ST**	**100%**	**272 ST**	**100%**

Fig. 128: Quality detail class development (material) as a table

3.6.3 Operation

3.6.3.1 Quality report (operation)

Path: Performance Analysis > Reporting > Reports > Quality analysis > Operation > Quality report (operation)

Multi-report displaying produced quantities. Quality types and details for one or more operations for the selected time range:

- Quality report (operation) as a column chart (fig. 129):
  Quality types with percentage for each operation as columns.
- Quality report (operation) as a table (fig. 130):
  Quality types with exact number and percentage for each operation as table.

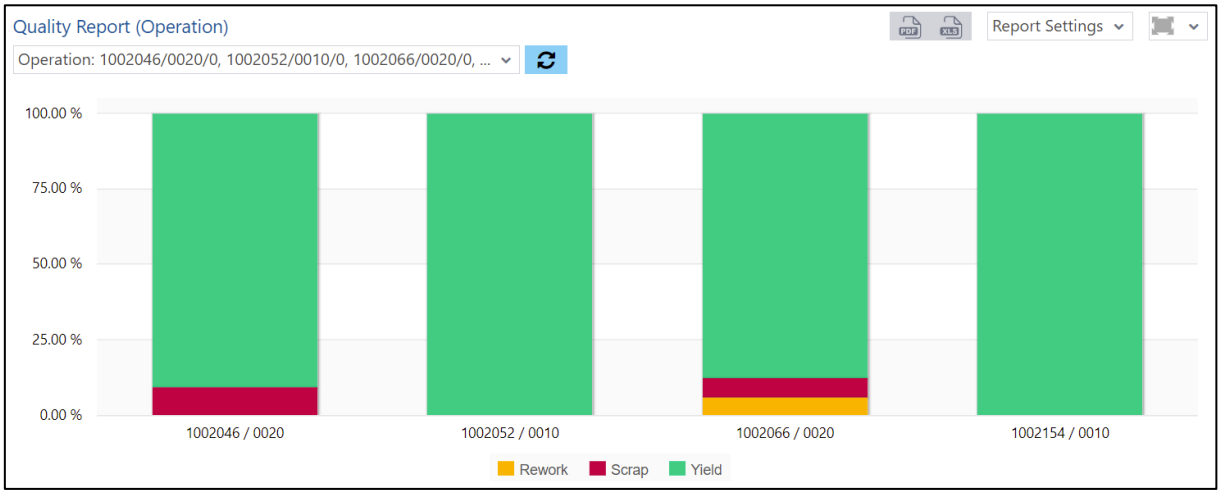


Fig. 129: Quality report (operation) as a column chart

	1002046 / 0020		1002052 / 0010		1002066 / 0020		1002154 / 0010		Total Σ	Total %
Quality Type	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity (%)	Quantity	Quantity
Rework			1 ST	0.03%	4 ST	6.25%			5 ST	0.14%
Scrap	2 ST	9.52%	4 ST	0.11%	4 ST	6.25%			10 ST	0.27%
Yield	19 ST	90.48%	3539 ST	99.86%	56 ST	87.5%	50 ST	100%	3664 ST	99.59%
Σ	**21 ST**	**100%**	**3544 ST**	**100%**	**64 ST**	**100%**	**50 ST**	**100%**	**3679 ST**	**100%**

Fig. 130: Quality report (operation) as a table

3.6.3.2 Quality details (operation)

Path: Performance analysis > Reporting > Reports > Quality analysis > Operation > Quality details (operation)

Multi-report displaying produced quantities. Quality types and corresponding quality details for one or more materials for the selected period:

- Quality details (operation) as a column chart (fig. 131):
  Quality details with percentage of total quantity as bars.
- Quality details (operation) as a table (fig. 132):
  Quality types and quality details with precise number and percentage for each operation as a table.

Fig. 131: Quality details (operation) as a column chart

		1001000100 / 0010		1001000100 / 0020		1001000100 / 0030		1001000200 / 0010		Total ∑	To
Quality Type	Quality Details	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Quantity [%]	Quantity	Qu
Rework quantity	Surface Waves	494	4.99%	494	5.01%	288	6.67%	480	5%	1756	43
Rework quantity	Dimensional Precision					144	3.33%			144	36
Scrap quantity	Material Surface	988	9.99%	988	10.02%	144	3.33%	960	10%	3080	77
Scrap quantity	Dimensional Precision	988	9.99%	988	10.02%	288	6.67%	960	10%	3224	80
Scrap quantity	Surface Waves	2460	24.87%	2460	24.95%	720	16.67%	2400	25%	8040	20
Scrap quantity	Paint Defects					216	5%			216	54

Fig. 132: Quality details (operation) as a table

3.6.3.3 Hit list quality details (operation)

Path: Performance analysis > Reporting > Reports > Quality analysis > Operation > Hit list quality details (operation)

Multi-report displaying produced quantities. Comparison of quality details for one or more operations for the selected period:

- Hit list quality details (operation) as a bar chart (fig. 133):
  Quality details with an exact quantity for each detail, sorted by frequency of occurrence. The quantity refers to the frequency of the detail for all selected operations.
- Hit list quality details (operation) as a table (fig. 134):
  Quality types and quality details with exact quantity for each detail. Each row shows how often the detail appears on an operation.

Fig. 133: Hit list quality details (operation) as a bar chart

Operation	Workplace	Quantity	Quality Type	Quality Details
H170103_ODR1 / 103_1	H170103	109	Scrap quantity	Generic failure
H170103_ODR1 / 103_1	H170103	327	Yield quantity	Yield quantity standard 2
H170103_ODR1 / 103_1	H170103	1	Scrap quantity	Dimensional Precision
H170103_ODR1 / 103_3	H170102	455	Scrap quantity	Dimensional Precision
H170103_ODR1 / 103_3	H170102	455	Rework quantity	Dent repaired
H170105_ODR1 / 105_1	H170105	372	Yield quantity	Yield quantity standard 2
H170102_ODR1 / 102_1	H170102	120	Scrap quantity	Dimensional Precision
H170102_ODR1 / 102_1	H170102	120	Rework quantity	Dent repaired

Fig. 134: Hit list quality details (operation) as a table

3.6.3.4 Quality detail class report (operation)

Path: Performance analysis > Reporting > Reports > Quality analysis > Operation > Quality detail class report (material)

Multi-report displaying produced quantities. Quality detail classes for *one* or *more* operations for the selected period:

- Quality detail class report (operation) as a column chart (fig. 125):
  Quantities per quality detail class with percentage for each operation as columns
- Quality detail class report (operation) as a table (fig. 126):
  Quantities per quality detail class with percentage for each operation as a table

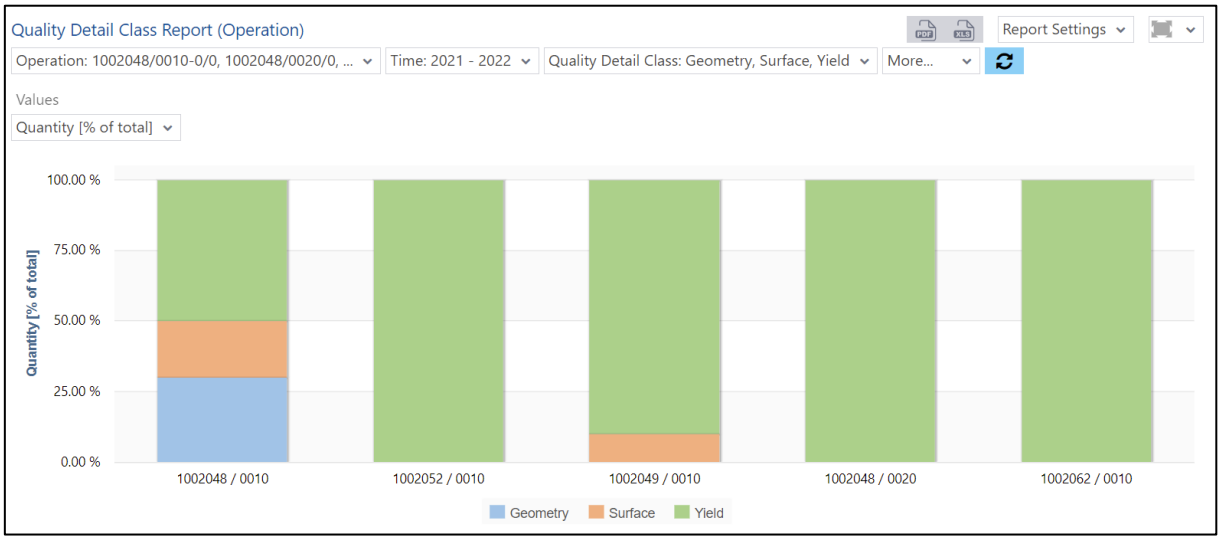


Fig. 135: Quality detail class report (operation) as a column chart

	1002048 / 0010		1002048 / 0020		1002049 / 0010		1002052 / 0010		1002062 / 0010	
Quality Detail Class	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]	Quantity	Quantity [% of total]	Quantity	Qua
Geometry	3 ST	30%					2 ST	0.06%		
Surface	2 ST	20%			1 ST	10%	3 ST	0.08%		
Yield	5 ST	50%	180 ST	100%	9 ST	90%	3539 ST	99.86%	12564 ST	
Σ	**10 ST**	**100%**	**180 ST**	**100%**	**10 ST**	**100%**	**3544 ST**	**100%**	**12564 ST**	

Fig. 136: Quality detail class report (operation) as a table

3.7 Overall Process Efficiency (OPE)

This section contains the OPE evaluation. OPE is determined from the key figures production process ratio, performance rate and quality and is the product of these figures. The production process ratio is the product of throughput efficiency, process availability and setup reduction. The performance rate is a target/actual comparison of the piece time. The quality is determined by the quality types (yield, scrap, and rework quantity) and is the quotient of yield/total quantity.

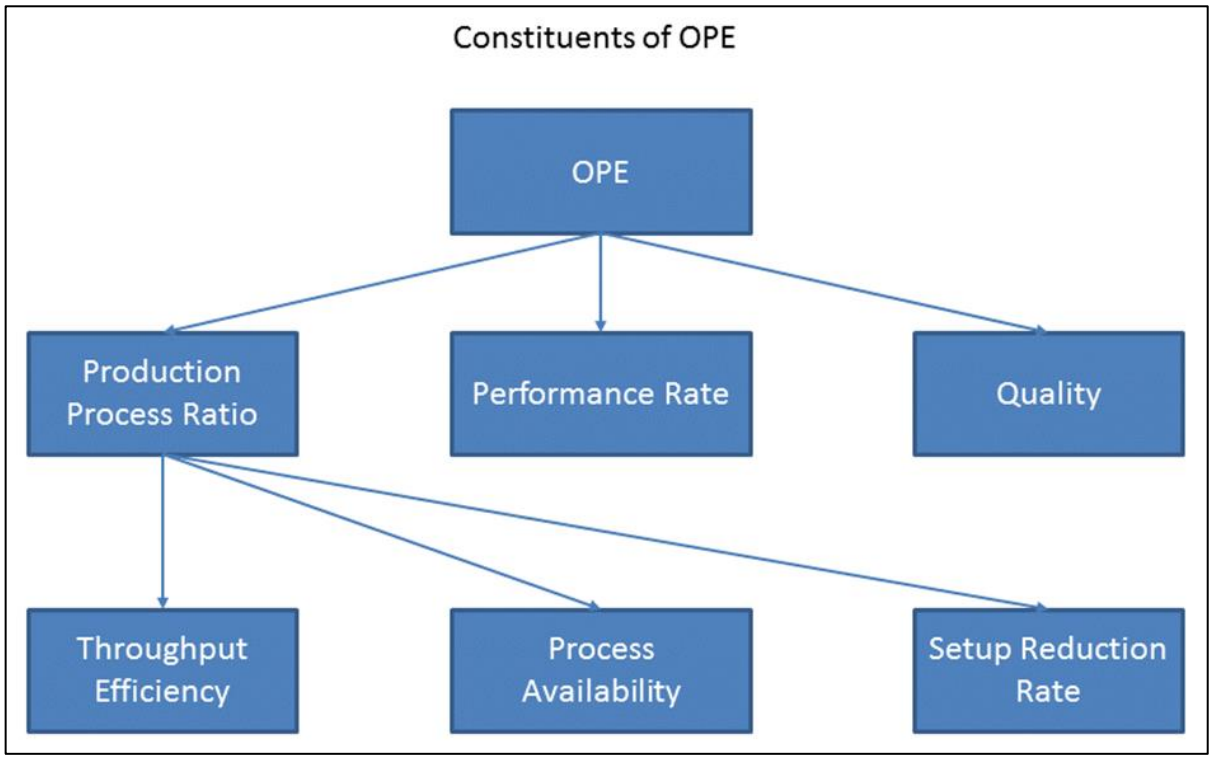


Fig. 137: Components of OPE

3.7.1 OPE (overall view)

Path: Performance analysis > Reporting > Reports > Overall Process Efficiency (OPE) > OPE (overall view)

✓ The time bases **OEE** and **Production** are configured.

Multi-report with OPE-compliant evaluation of all or selected orders for a selected period. If no order is selected, the evaluation refers to all orders:

- OPE report as a column chart (fig. 138):
  Displays production process ratio, performance rate, quality, and the resulting OPE in a group of columns.
- OPE report as a table (fig. 139):
  Displays production process ratio, performance rate, quality, and the resulting OPE in tabular form.

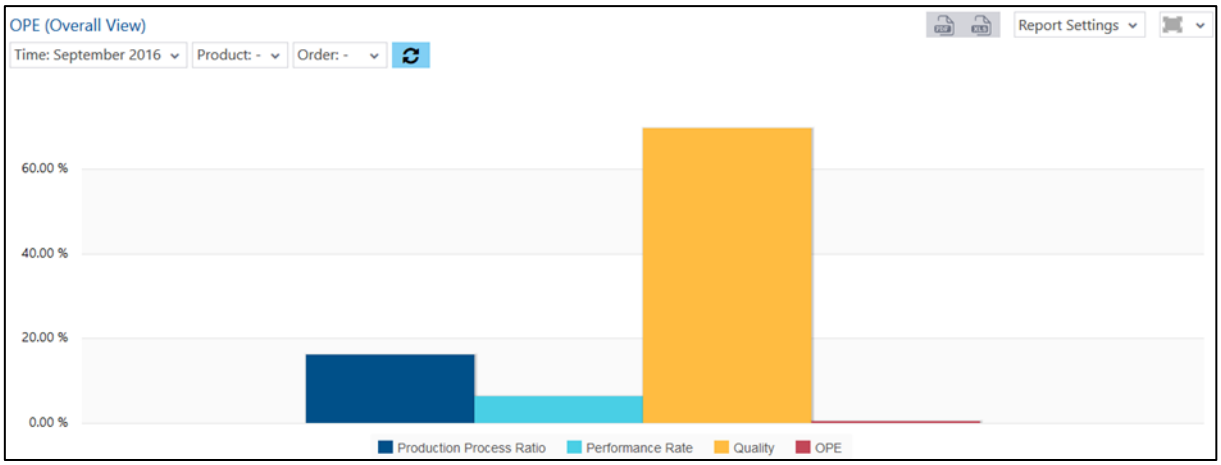


Fig. 138: OPE report as a column chart

Production Process Ratio	16.35%
Performance Rate	6.51%
Quality	69.91%
OPE	0.74%

Fig. 139: OPE report as a table

3.7.2 Production process ratio (overall view)

Path: Performance Analysis > Reporting > Reports > Overall Process Efficiency (OPE) > Production process ratio (overall view)

✓ The time bases **OEE**, **Production** and **Setup** are configured.

The production process ratio is the product of order throughput efficiency, process availability and setup reduction.

- Throughput efficiency:
  Allocative component of availability that can be improved through production scheduling. Throughput efficiency is the quotient of execution time/lead time of a production order.
- Process availability:
  Technical component of availability that can be significantly increased with methods of advanced shopfloor management. The process availability is the quotient of the production time (time base production) / processing time including technical issues.
  - Setup is not part of the processing time of an operation and is therefore considered in a third component.
- Setup reduction:
  Reaches 100% when setup times are completely eliminated and is determined as the quotient of processing time/execution time of the operations on a workplace.

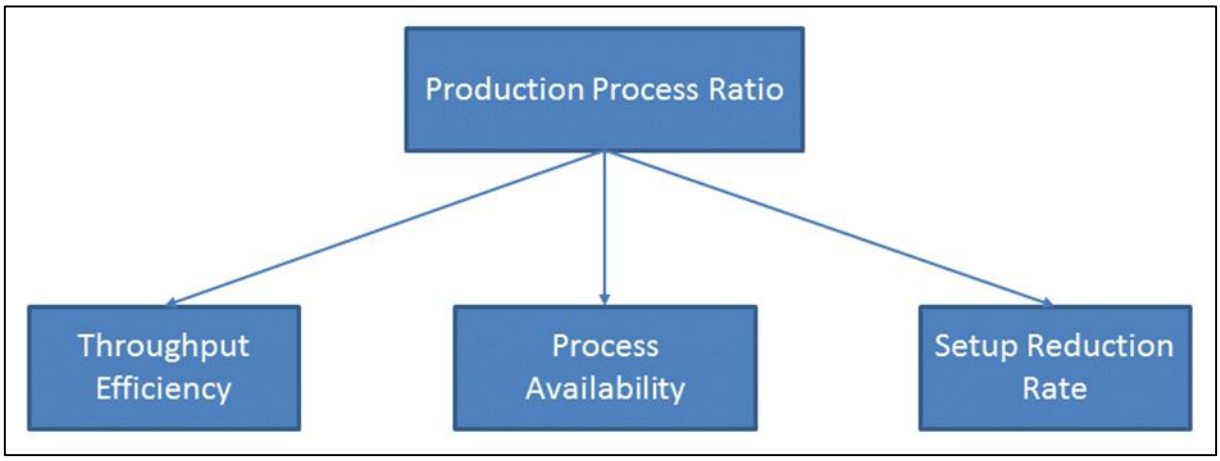


Fig. 140: Components of the production process ratio

Multi-report displaying the production process ratio for one or more workplaces for a period. The percentages given indicate the proportion based on an optimal (100%) production process ratio.

- Production process ratio (overall view) as a column chart (fig. 141):
  Throughput efficiency, process availability, setup reduction and the production process ratio calculated from them shown as columns
- Production process ratio (overall view) as a table (fig. 142):
  Tabular listing of throughput efficiency, process availability, setup reduction, and the resulting calculated production process ratio

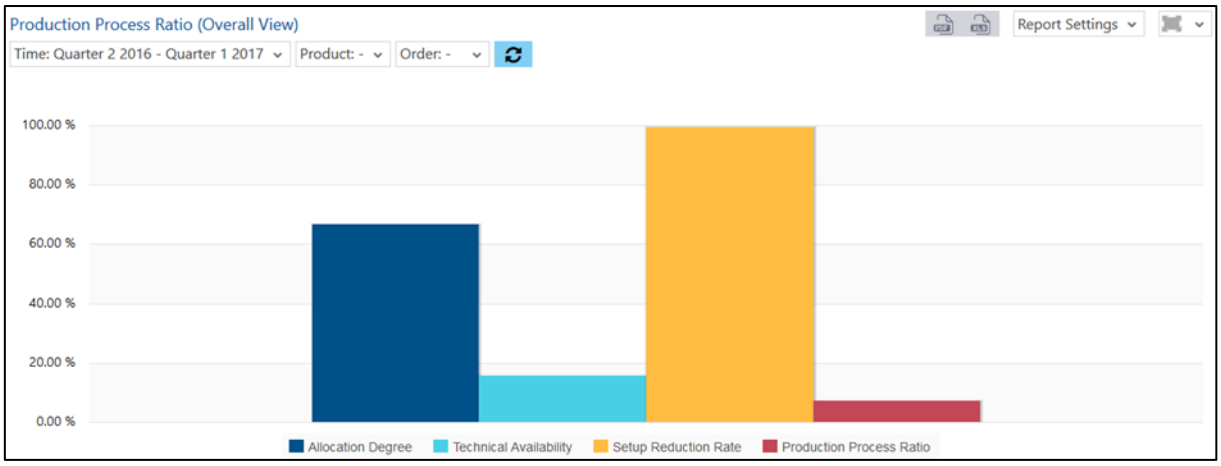


Fig. 141: Production process ratio (overall view) as a column chart

Allocation Degree	66.92%
Technical Availability	15.83%
Setup Reduction Rate	99.63%
Production Process Ratio	7.52%

Fig. 142: Production process ratio (overall view) as a table

3.7.3 Order analysis

Path: Performance Analysis > Reporting > Reports > Overall Process Efficiency (OPE) > Order analysis

✓ The time bases **OEE**, **Production** and **Setup** are configured.

Multi-report with detailed information about an order for the selected period. The data corresponds to all the selected orders:

- Order analysis as timelines (fig. 143):
  Timeline with operating states over the selected period for each selected order. The same order can be on several workplaces/operations.
- Production times of the order (fig. 144):
  Exact production time of the order, key figures and the resulting OPE
- Quantity data of the order (fig. 145):
  Production details with information on quantities, times compared to target times, key figures and the resulting OEE

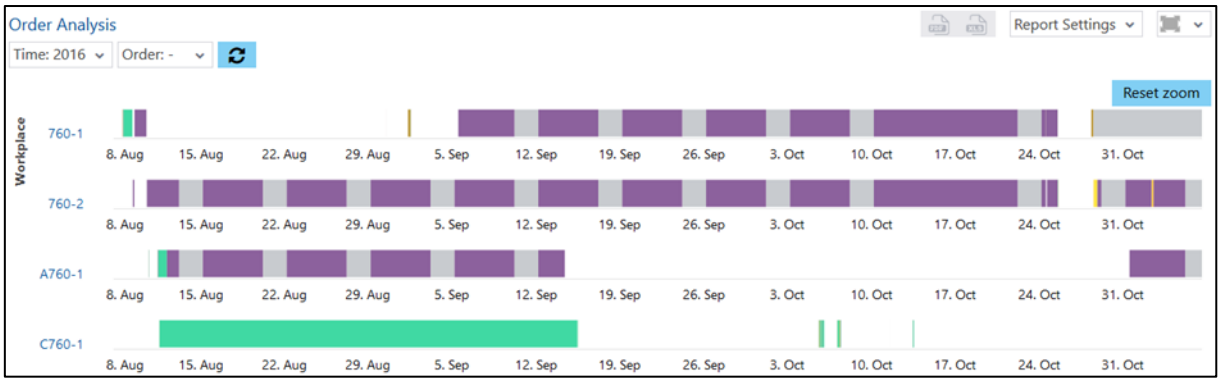


Fig. 143: Order analysis as timeline

Actual Production Time	09:40:42
Processing Time	09:25:41
Execution Time	09:40:42
Lead Time	26:50:33
Throughput Efficiency	95.65%
Process Availability	99.12%
Setup Reduction	97.42%
Production Process Ratio	34.8%
Performance Rate	57.09%
Quality	100%
OPE	19.87%

Fig. 144: Production times of the order

Order / Operation	H170103_ODR5 / 0010	H170103_ODR5 / 0020	H170103_ODR5 / 0030
Operation Phase	Finished	Finished	Finished
Operation Status	Finished	Finished	Finished
Workplace	H170103	H170103	H170103
Material	M1	M3	M2
Target Quantity	50	50	50
Total Quantity	50	50	60
Yield Qty.	50	50	60
Scrap Qty.	0	0	0
Rework Qty.	0	0	0
Start Time	02/02/17 10:44	02/02/17 12:44	03/02/17 06:29
End Time	02/02/17 12:44	03/02/17 06:29	03/02/17 13:35
Production	01:40:08	01:40:08	06:00:13
Downtime	00:00:00	16:00:02	00:04:57
Target Time per Unit	00:02:00	00:02:00	00:02:00

Fig. 145: Quantity information of the order

3.7.4 Operation analysis

Path: Performance analysis > Reporting > Reports > Overall Process Efficiency (OPE) > Operation analysis

✓ The time bases **OEE**, **Production** and **Setup** are configured.

Multi-report with detailed information about one or more operations for the selected period.

- Operation analysis as timelines (fig. 146):
  Timelines with operating states over the selected period for each selected operation
- Operation analysis as a table (fig. 147):
  Production details with information on quantities, times compared to target times, key figures and the resulting OEE. Each column shows the respective data of a selected operation.

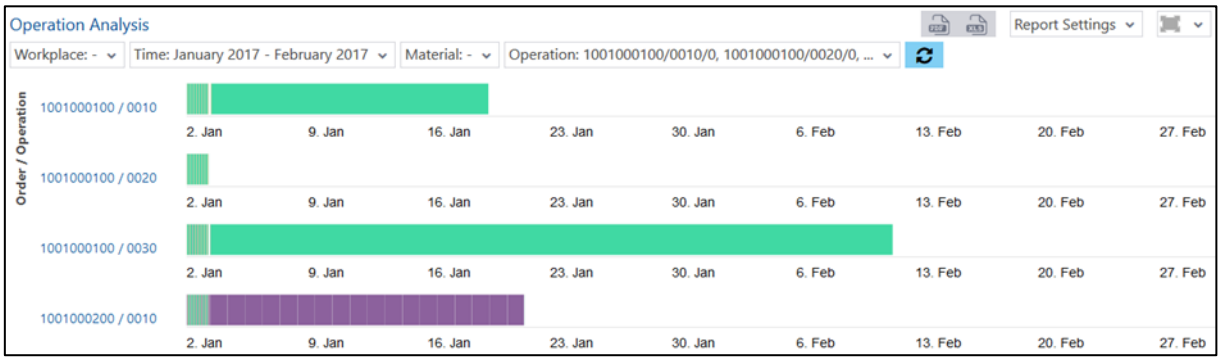


Fig. 146: Operation analysis as timeline

Order / Operation	1001000100 / 0010	1001000100 / 0020	1001000100 / 0030	1001000200 / 0010
Operation Phase	Finished	Finished	Production	Finished
Operation Status	Finished	Finished	Production	Finished
Workplace	WP-Standard-01	WP-Standard-02	WP-Standard-03	WP-AutoStatus-01
Material	M-15223675	M-15223675	M-15223675	M-15223675
Target Quantity	2000	2000	2000	2000
Total Quantity	14493	14460	6030	14161
Yield Qty.	7268	7240	3550	7081
Scrap Qty.	6500	6496	1872	6372
Rework Qty.	725	724	608	708
Start Time	22/12/16 06:10	22/12/16 06:12	30/12/16 12:11	23/12/16 09:40
End Time	18/01/17 06:21	02/01/17 06:00	10/02/17 08:15	20/01/17 07:18
Production	583:28:54	202:55:49	985:10:55	132:58:53
Downtime	30:20:11	30:10:11	08:47:59	503:09:04
Target Time per Unit	00:01:00	00:01:00	00:01:00	00:01:00

Fig. 147: Operation analysis as a table

3.8 Resource allocation

Resource allocations provide detailed information on the availability and allocation of orders. Shift schedules provide an accurate overview of all shifts in a workplace.

3.8.1 Scheduled operating time

Path: Performance analysis > Reporting > Reports > Resource allocation > Planned allocation

Realtime representation of shifts for a definable period as a Gantt chart for one or more workplaces (fig. 148):

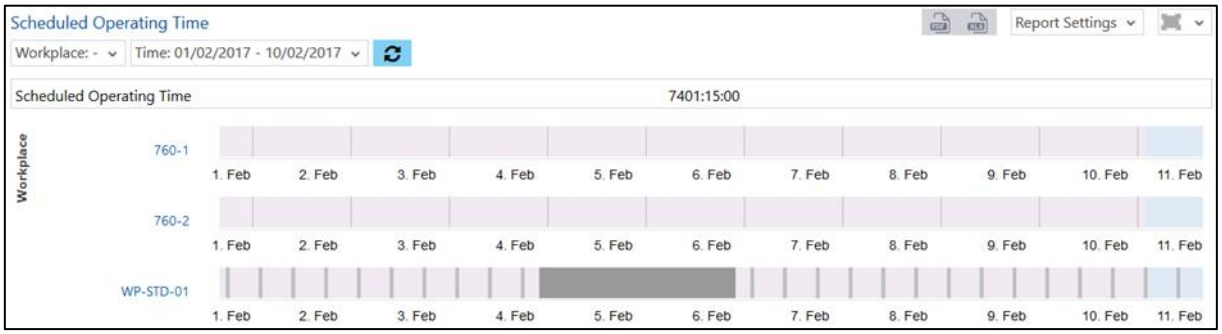


Fig. 148: Scheduled operating time

3.8.2 Workplace allocation

Path: Performance analysis > Reporting > Reports > Resource allocation > Workplace allocation

Multi-report displaying *one* or *more* workplaces and the respective ongoing operations/orders for a definable period:

- Workplace allocation as a table (fig. 149):
  Occupancy time, scheduled operating time and occupancy rate for all selected workplaces summed up
- Workplace allocation as timeline (fig. 150):
  Timelines for each selected workplace over the selected period. The bars correspond to operations/orders and are on the time period when they are running on corresponding workplaces. The bars that are in the past correspond to operating states. The bars that are in the future are planned operation phases.

Busy Time	00:00:00
Scheduled Operating Time	624:00:00
Occupancy Rate	0%

Fig. 149: Workplace allocation as a table

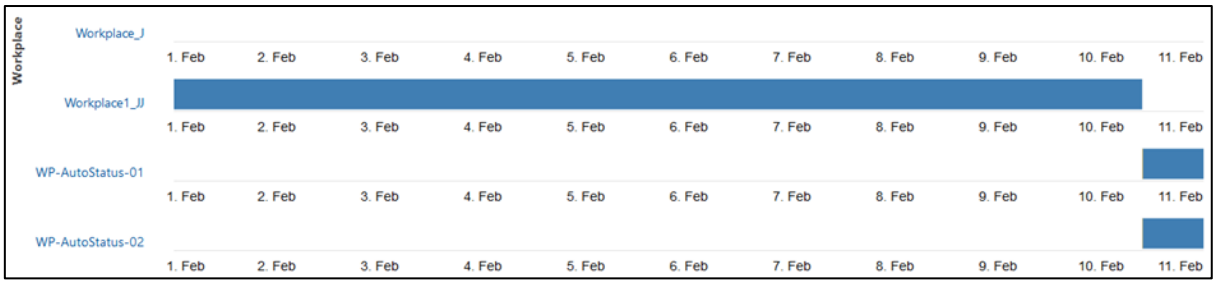


Fig. 150: Workplace allocation as timeline

3.8.3 Workplace availability

Path: Performance analysis > Reporting > Reports > Resource allocation > Workplace availability

Multi-report displaying *one* or *more* workplaces and their respective operating states for a definable period.

- Workplace availability as a table (fig. 151):
  Summed up times for availability for all selected workplaces
- Workplace availability as timelines (fig. 152):
  Timelines for each selected workplace over the selected period. The bars correspond to operating states with information to the respective operations/orders and are on the time period when they are running on corresponding workplaces.

Actual Production Time	00:00:00
Processing Time	416:00:00
Busy Time	416:00:00
Scheduled Operating Time	559:30:00
Occupancy Rate	74.35%
Process Availability	0%
Setup Reduction	100%
Availabilty	0%

Fig. 151: Workplace availability as a table

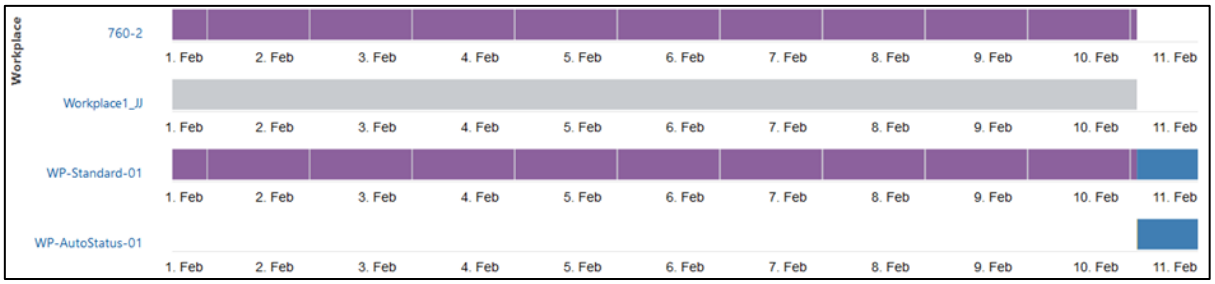


Fig. 152: Workplace availability as timeline

3.8.4 Shift schedule

Path: Performance analysis > Reporting > Reports > Resource allocation > Shift schedule

Realtime representation of shifts for a definable period as Gantt chart and table for *one* or *more* workplaces:

- Shift overview as Gantt chart (fig. 153):
  Listing of workplaces with detailed information on shifts and their times as Gantt chart
- Shifts as a table (fig. 154):
  Listing of shifts for each workplace with information about start and end time and shift type

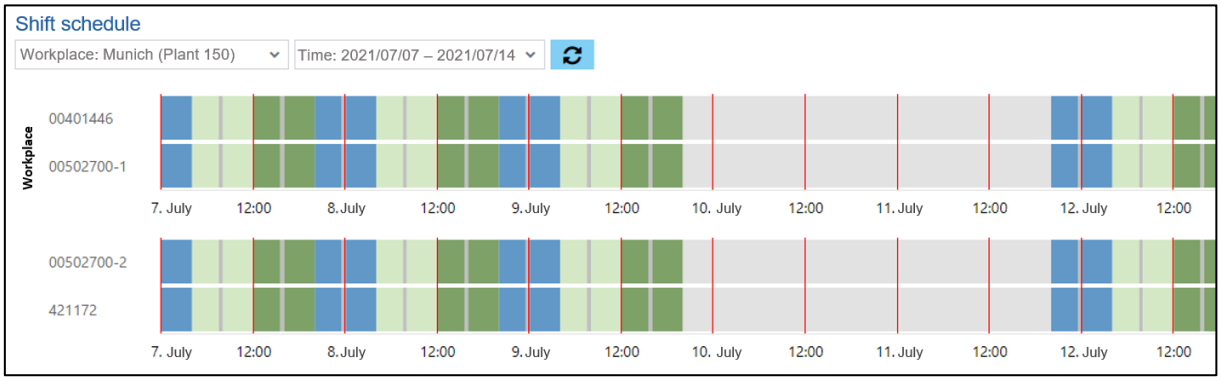


Fig. 153: Shift overview as Gantt chart

Workplace	Shift Date	Start Timestamp	End Timestamp	Shift	Description
WP-Standard-01	10-Feb-2017	10-Feb-2017 22:00	11-Feb-2017 06:00	N	Night shift
WP-Standard-01	10-Feb-2017	10-Feb-2017 14:00	10-Feb-2017 22:00	L	Late shift
WP-Standard-01	10-Feb-2017	10-Feb-2017 06:00	10-Feb-2017 14:00	E	Early shift
WP-Standard-01	09-Feb-2017	09-Feb-2017 22:00	10-Feb-2017 06:00	N	Night shift
WP-Standard-01	09-Feb-2017	09-Feb-2017 14:00	09-Feb-2017 22:00	L	Late shift
WP-Standard-01	09-Feb-2017	09-Feb-2017 06:00	09-Feb-2017 14:00	E	Early shift
WP-Standard-01	08-Feb-2017	08-Feb-2017 22:00	09-Feb-2017 06:00	N	Night shift

Fig. 154: Shifts as a table

3.9 Order overview

The order overview provides detailed summaries of orders and operations. All available information is displayed in condensed form and can be limited if required to retain only relevant information.

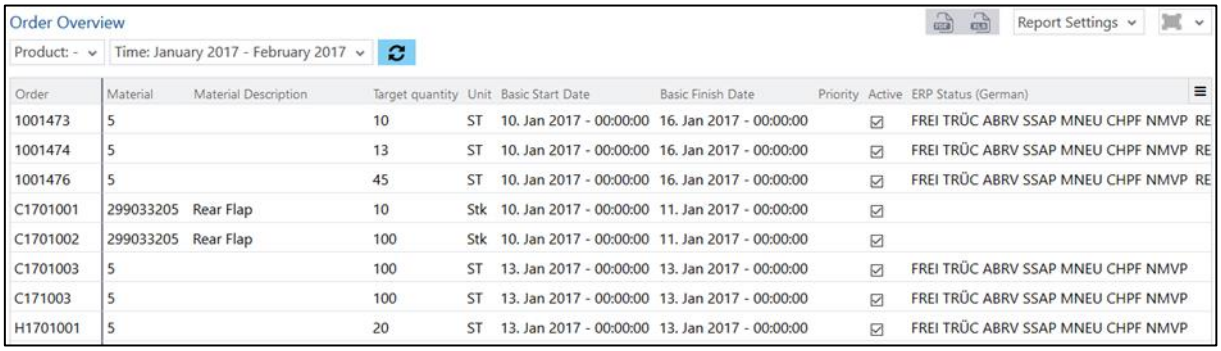
3.9.1 Order

3.9.1.1 Order overview

Path: Performance analysis > Reporting > Reports > Order overview > Order > Order overview

Tabular listing of all orders with all production-relevant data. The table summarizes all orders where the selected products are running at the selected times (fig. 155):

- Information on material and quantity
- Production dates
- ERP Status (production order status)
- Execution data



Order	Material	Material Description	Target quantity	Unit	Basic Start Date	Basic Finish Date	Priority	Active	ERP Status (German)
1001473	5		10	ST	10. Jan 2017 - 00:00:00	16. Jan 2017 - 00:00:00		☑	FREI TRÜC ABRV SSAP MNEU CHPF NMVP RE
1001474	5		13	ST	10. Jan 2017 - 00:00:00	16. Jan 2017 - 00:00:00		☑	FREI TRÜC ABRV SSAP MNEU CHPF NMVP RE
1001476	5		45	ST	10. Jan 2017 - 00:00:00	16. Jan 2017 - 00:00:00		☑	FREI TRÜC ABRV SSAP MNEU CHPF NMVP RE
C1701001	299033205	Rear Flap	10	Stk	10. Jan 2017 - 00:00:00	11. Jan 2017 - 00:00:00		☑	
C1701002	299033205	Rear Flap	100	Stk	10. Jan 2017 - 00:00:00	11. Jan 2017 - 00:00:00		☑	
C1701003	5		100	ST	13. Jan 2017 - 00:00:00	13. Jan 2017 - 00:00:00		☑	FREI TRÜC ABRV SSAP MNEU CHPF NMVP
C171003	5		100	ST	13. Jan 2017 - 00:00:00	13. Jan 2017 - 00:00:00		☑	FREI TRÜC ABRV SSAP MNEU CHPF NMVP
H1701001	5		20	ST	13. Jan 2017 - 00:00:00	13. Jan 2017 - 00:00:00		☑	FREI TRÜC ABRV SSAP MNEU CHPF NMVP

Fig. 155: Order overview

A drill-down to order details is available by right-clicking on a row.

3.9.1.2 Order details

Path: Performance analysis > Reporting > Reports > Order overview > Order > Order details

Tabular listing of orders with production-related data and supplementary details for each order. The tables summarize all orders where the selected products are running:

- Overview of all orders (see fig. 155):
  - Information on material and quantity
  - Production dates
  - ERP status
  - Execution data
- Supplementary details for orders (fig. 156):
  - Identification of orders, operations, material and workplace
  - Production times
  - Quantities and quality details
  - Target vs. actual times
  - Phases
  - Personnel-related times

Order	Operation	Material	Material Number	Material Description	Operation Phase	Operation Status	Status since	Last Logout	Last Login	Time Remaining	Worl
1001332	0010	4	4	Tool	Finished	finished	24/10/16 13:...	24/10/16 13:...	05/09/16 12:...	00:00:00	
1001332	0020	4	4	Tool	Released	not assigned	08/08/16 11:...			01:22:00	
1001333	0010	4	4	Tool	Released	not assigned	08/08/16 11:...			01:23:00	
1001333	0020	4	4	Tool	Released	not assigned	08/08/16 11:...			01:22:00	
1001333	11111-11111	4	4	Tool	Released	not assigned	14/12/16 08:...			01:23:00	
1001334	0010	1000000...	100000002	TEST finished material 2	Released	not assigned	08/08/16 11:...			01:02:00	
1001334	0020	1000000...	100000002	TEST finished material 2	Released	not assigned	08/08/16 11:...			01:02:00	

Fig. 156: Supplementary order details

3.9.2 Operation

3.9.2.1 Order backlog

Path: Performance analysis > Reporting > Reports > Order overview > Operation > Order backlog

Tabular listing of operations not yet started with detailed information on times, material, quantities and OEE:

Order Backlog

Workplace: - More... Report Settings

Order	Operation	Material	Operation Phase	Operation Status	Workplace Group	Workplace	Planned Starting Date	Planned Finishing ...	Target Quant
1001332	0020	4	Released	not assigned			10/08/16 04:38	10/08/16 06:00	20
1001333	0010	4	Released	not assigned			10/08/16 03:15	10/08/16 04:38	20
1001333	0020	4	Released	not assigned			10/08/16 04:38	10/08/16 06:00	20
1001334	0010	100000002	Released	not assigned			12/08/16 03:56	12/08/16 04:58	20
1001334	0020	100000002	Released	not assigned			12/08/16 04:58	12/08/16 06:00	20
1001335	0020	100000002	Released	not assigned			01/09/16 04:52	01/09/16 06:00	22

Fig. 157: Order backlog

3.9.2.2 Operations in progress

Path: Performance Analysis > Reporting > Reports > Order overview > Operation > Operations in progress

Tabular listing of ongoing and interrupted operations with detailed information on times, material, quantities and OEE:

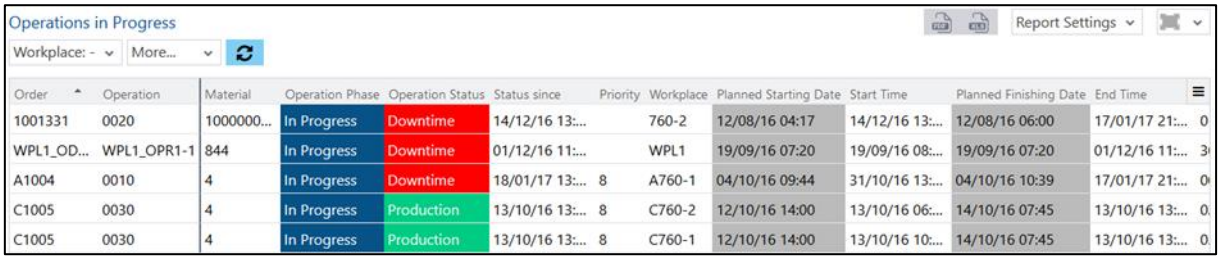


Fig. 158: Operations in progress

3.9.2.3 Completed operations

Path: Performance analysis > Reporting > Reports > Order overview > Operation > Completed operations

Tabular listing of completed operations with detailed information on times, material, quantities and OEE:

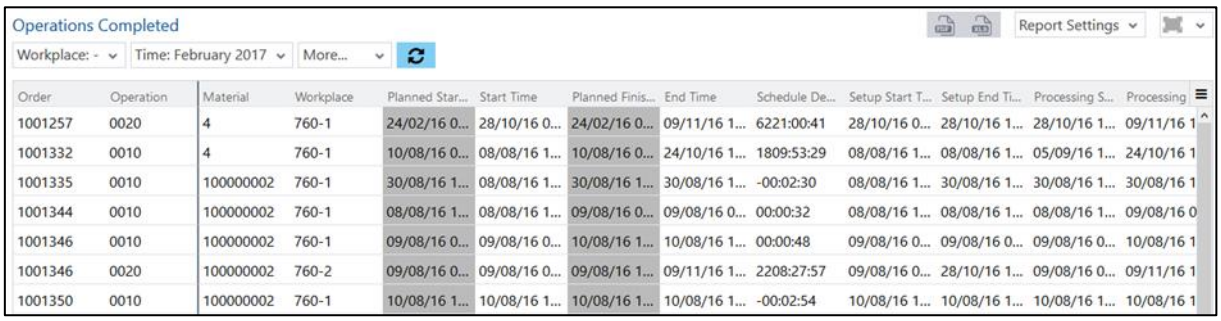


Fig. 159: Completed operations

3.9.2.4 Operation details

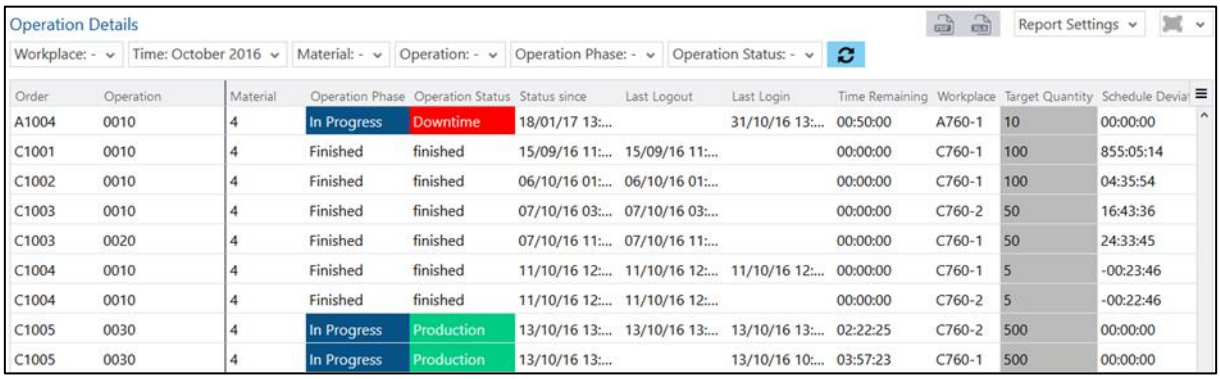
Path: Performance analysis > Reporting > Reports > Order overview > Operation > Operation details

✓ The time bases **OEE**, **Production** and **Setup** are configured.

Tabular display of all details of one or more operations:

- Order
- Operation
- Material
  Material number, material description
- Operation phase
- Operation status
- Status since
  Status start time
- Last logged off
- Last logged on
- Remaining time
- Workplace
  The workplace is labelled with * if the operation has been distributed to several workplaces. Accordingly, quantities and times are exported cumulated.
- Workplace group
- Quantity
  Target quantity, total quantity, yield quantity, scrap quantity, rework quantity, open quantity, actual/target deviation, actual/target comparison
- Unit
  e.g. piece, kg, etc.
- Times per unit
  Time, target time, actual/target deviation, target/actual comparison
- Priority
- Start time/End time
  Real start, real end, planned start, planned end, schedule deviation
- Strokes
  Stroke Factor, Stroke time, Target stroke time, HPH (stroke per hour), PPH (piece produced per stroke), target/actual deviation, target/actual comparison
- Setup time
  Start time, end time, recorded setup time, target setup time, actual/target deviation, target/actual comparison, setup rate
- Processing time
  Start time, end time, recorded processing time, target processing time, actual/target deviation, actual/target comparison
- Execution time
  Actual execution Time, Target execution time, target/actual deviation, target/actual comparison
- Lead time
  Actual lead time, planned lead time, target/actual deviation, target/actual comparison

- Production process ratio
- Availability
- Performance rate
- Quality rate
- OEE
- Personnel hours



Order	Operation	Material	Operation Phase	Operation Status	Status since	Last Logout	Last Login	Time Remaining	Workplace	Target Quantity	Schedule Deviat
A1004	0010	4	In Progress	Downtime	18/01/17 13:...		31/10/16 13:...	00:50:00	A760-1	10	00:00:00
C1001	0010	4	Finished	finished	15/09/16 11:...	15/09/16 11:...		00:00:00	C760-1	100	855:05:14
C1002	0010	4	Finished	finished	06/10/16 01:...	06/10/16 01:...		00:00:00	C760-1	100	04:35:54
C1003	0010	4	Finished	finished	07/10/16 03:...	07/10/16 03:...		00:00:00	C760-2	50	16:43:36
C1003	0020	4	Finished	finished	07/10/16 11:...	07/10/16 11:...		00:00:00	C760-1	50	24:33:45
C1004	0010	4	Finished	finished	11/10/16 12:...	11/10/16 12:...	11/10/16 12:...	00:00:00	C760-1	5	-00:23:46
C1004	0010	4	Finished	finished	11/10/16 12:...	11/10/16 12:...		00:00:00	C760-2	5	-00:22:46
C1005	0030	4	In Progress	Production	13/10/16 13:...	13/10/16 13:...	13/10/16 13:...	02:22:25	C760-2	500	00:00:00
C1005	0030	4	In Progress	Production	13/10/16 13:...		13/10/16 10:...	03:57:23	C760-1	500	00:00:00

Fig. 160: Operation details

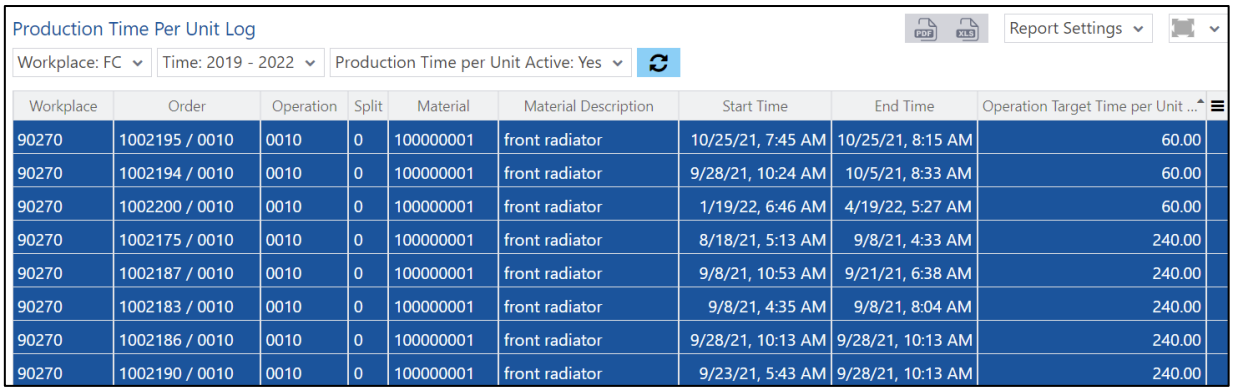
3.9.3 Production time per unit

3.9.3.1 Production time per unit log

Path: Performance analysis > Reporting > Reports > Order overview > Production time per unit > Production time per unit log

Tabular display of processing times per unit of material produced:

- Workplace
- Order
- Operation number
- Split
  Number of operation split or 0, if the operations are not split between several workplaces
- Material
  Material number and material description of the produced material
- Start/end time of an operation
- Target time of an operation per unit
  The predefined target time per unit produced
- Production time of an operation per unit
  The actual time required for processing the operation per produced unit
- Production time of an operation per active unit
  Recording of the Production time of an operation per unit, activated or deactivated


Production Time Per Unit Log

Workplace: FC | Time: 2019 - 2022 | Production Time per Unit Active: Yes | Report Settings

Workplace	Order	Operation	Split	Material	Material Description	Start Time	End Time	Operation Target Time per Unit ...
90270	1002195 / 0010	0010	0	100000001	front radiator	10/25/21, 7:45 AM	10/25/21, 8:15 AM	60.00
90270	1002194 / 0010	0010	0	100000001	front radiator	9/28/21, 10:24 AM	10/5/21, 8:33 AM	60.00
90270	1002200 / 0010	0010	0	100000001	front radiator	1/19/22, 6:46 AM	4/19/22, 5:27 AM	60.00
90270	1002175 / 0010	0010	0	100000001	front radiator	8/18/21, 5:13 AM	9/8/21, 4:33 AM	240.00
90270	1002187 / 0010	0010	0	100000001	front radiator	9/8/21, 10:53 AM	9/21/21, 6:38 AM	240.00
90270	1002183 / 0010	0010	0	100000001	front radiator	9/8/21, 4:35 AM	9/8/21, 8:04 AM	240.00
90270	1002186 / 0010	0010	0	100000001	front radiator	9/28/21, 10:13 AM	9/28/21, 10:13 AM	240.00
90270	1002190 / 0010	0010	0	100000001	front radiator	9/23/21, 5:43 AM	9/28/21, 10:13 AM	240.00

3.10 Maintenance

The reports in this section map maintenance times on selected workplaces.
Unplanned maintenance shows the effectiveness of planned maintenance: the lower the value of unplanned maintenance, the more effective the planned maintenance.
The PPM (proportion of planned maintenance) degree enables you to draw conclusions about the OEE: the lower the value of the PPM degree, the better the development or optimization of the OEE.
Table 14 below shows the calculation of PPM degree and unplanned maintenance:

Table 14: Calculation of values for maintenance14

Value	Calculation	Explanation
PPM degree	Planned maintenance/scheduled operating time *100%.	Proportion of planned maintenance to total shift time
Unplanned [% of total]	Unplanned maintenance/total maintenance *100%	Proportion of unplanned maintenance to total maintenance

ⓘ Reports for maintenance require the time bases for **Maintenance** and **Unplanned maintenance**.

3.10.1 Maintenance report

Path: Performance analysis > Reporting > Reports > Maintenance > Maintenance report

✓ The **maintenance** and **unplanned maintenance** time bases are configured.

Multi-report displaying the duration of maintenance on one or more workplaces for a period:

- Maintenance report as a column chart (fig. 161):
  PPM degree and unplanned maintenance as columns for each workplace. Depending on the selection in the value filter, the columns are displayed individually or as a pair.
- Maintenance report as a table (fig. 162):
  Tabular listing of maintenance durations in minutes. Indication of total PPM, scheduled and unscheduled PPM, scheduled operating time and PPM degree. The columns correspond to workplaces. The value filter does not affect this table.

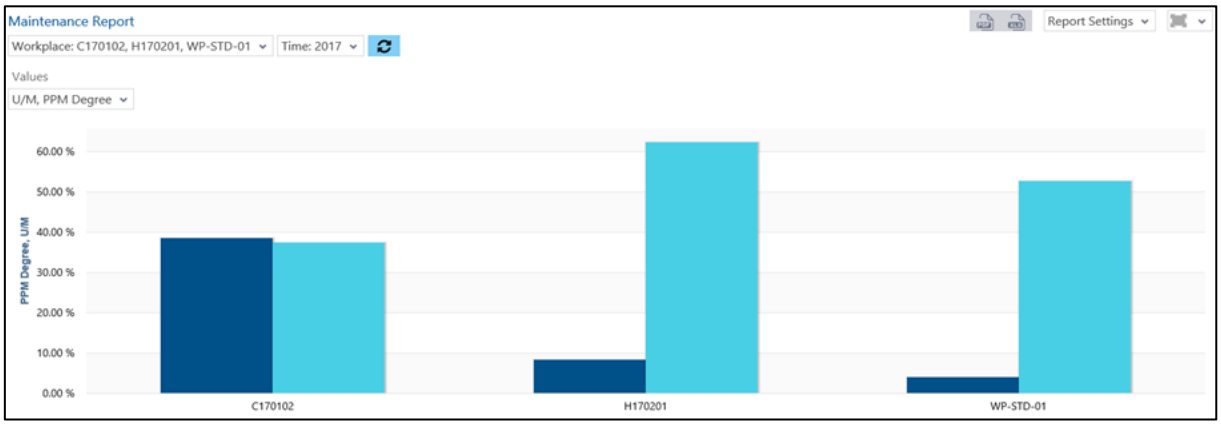


Fig. 161: Maintenance report as a column chart

Workplace	C170102	H170201	WP-STD-01
Maintenance	435:39	100:15	104:55
Scheduled	272:18	37:34	49:27
Unscheduled	163:21	62:40	55:27
Scheduled Operating Time	705:50	447:06	1195:24
PPM Degree	38.58%	8.4%	4.14%
U/M	37.5%	62.52%	52.86%

Fig. 162: Maintenance report as a table

3.10.2 Maintenance development

Path: Performance analysis > Reporting > Reports > Maintenance > Maintenance development

✓ The **maintenance** and **unplanned maintenance** time bases are configured.

Multi-report displaying the development of the maintenance duration on one or more workplaces over a time period:

- Maintenance development as a column chart (fig. 163):
  PPM degree and unplanned maintenance as columns. Depending on the selection in the value filter, the columns are displayed individually or as a pair. Each column/pair represents the duration for a selected period (e.g. month, calendar week, etc.). The data comes from all the selected workplaces.
- Maintenance development as a table (fig. 164):
  Tabular listing of maintenance durations in minutes. Indication of total PPM, scheduled and unscheduled PPM, scheduled operating time and PPM degree. The data comes from all the selected workplaces. Columns relate to selected periods (e.g. month, calendar week, etc.). The value filter does not affect this table.

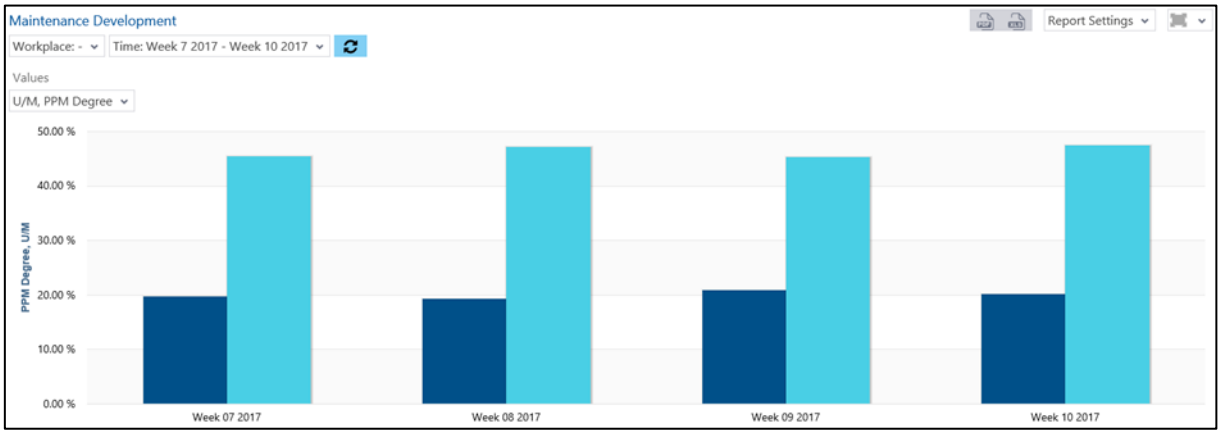


Fig. 163: Maintenance development as a column chart

Period of Time	2017/07	2017/08	2017/09	2017/10
Maintenance	2273:37	2295:55	2381:01	742:25
Scheduled	1236:55	1210:15	1300:50	388:49
Unscheduled	1036:42	1085:40	1080:10	353:35
Scheduled Operating Time	6252:37	6233:34	6184:26	1915:41
PPM Degree	19.78%	19.42%	21.03%	20.3%
U/M	45.6%	47.29%	45.37%	47.63%

Fig. 164: Maintenance development as a table

3.10.3 Status detail development

Path: Performance analysis > Reporting > Reports > Maintenance > Status detail development

✓ The **maintenance** and **unplanned maintenance** time bases are configured.

Multi-report displaying the time development of status details for one or more workplaces over a selected period:

- Status detail development as a column chart (fig. 165):
  Development of status details proportionally as columns. Each column represents the duration for a selected period (e.g. month, calendar week, etc.). Depending on the selection in the value filter, the development is displayed either as duration (in minutes or percent), frequency (number or percent), MTBF or MTTR. The data comes from all the selected workplaces.
- Status detail development as a table (fig. 166):
  Tabular listing of the development of status details. Indicates the development as duration (in minutes or percent), frequency (number or percent), MTBF or MTTR. The data come from all selected workplaces. Columns relate to selected periods (e.g. month, calendar week, etc.). The value filter does not affect this table.

Fig. 165: Status detail development as a column chart

	Week 23 2021						Week 25 2021		
Status detail	Duration	Duration [% absolute	Frequency	Frequency [% absolute]	MTBF	MTTR	Duration	Duration [% absolute]	Freque
Missing material	06:28	0,21%	1	0,31%	13:58	06:28			
Tool defect	07:30	0,25%	1	0,31%	13:58	07:30			
Missing personnel									
Missing tool									
Quality problem (raw material)							07:30	0,2%	
Repair mechanic									
Tool life expired							07:30	0,2%	
Malfunction hydraulic/pneumatic									
Malfunction mechanic									
Unplanned cleaning							07:30	0,2%	
Σ	**13:58**	**0,46%**	**2**	**0,62%**	**27:56**	**13:58**	**22:30**	**0,61%**	

Fig. 166: Status detail development as a table

ⓘ If one or more status details are selected in the filter, the data will relate to that status detail only.

3.11 Energy data acquisition

The reports in the scope of energy data acquisition provide information on energy consumption or energy costs incurred as well as CO2 emissions in production. The data is sourced from the Track & Trace module. Therefore, the appropriate Track & Trace extension must be purchased and installed in order to utilize the reports.
For details on the reports, see the **Manual - Energy Analysis**.

3.12 Personnel

The reports in the scope of personnel provide information about the work times, activities and productivity of the employees.

3.12.1 Personnel overview (details)

3.12.1.1 Personnel activity log

Path: Performance analysis > Reporting > Reports > Personnel activity log

The report **Personnel activity log** is a multi-report and displays the activity log in sum and in details of operation phases (aggregation) for one or more persons without details of operating states.
The activity log **Sum** indicates the logon and usage duration for all selected persons for operation phases.
The activity log **Details** gives detail information of the activity log sum. This lists logon intervals and durations for each person. In addition, the workplace, order/operation, material and the corresponding operation phase are displayed.

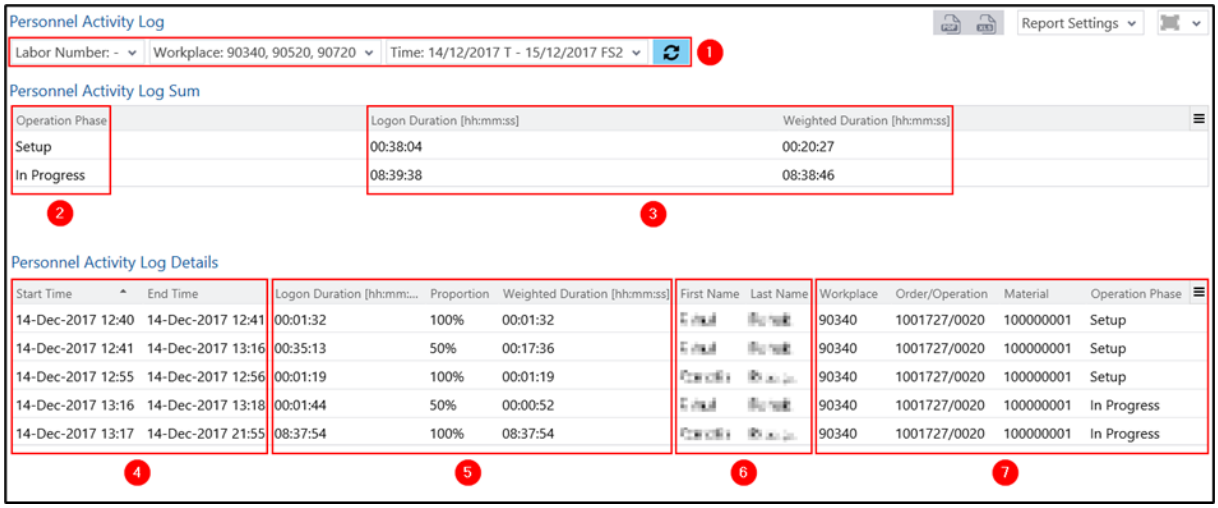


Fig. 167: Structure of the Personnel activity log report

(1) Selectable filters of the report:

- Personnel number:
  Selecting one or more persons whose logon data is to be listed on active operations
- Time:
  Selection of a time period for which logon data is to be listed on a person's active operations
- Workplace:
  Selection of one or more workplaces whose assigned persons are to be listed on active operations

(2) Operation phases that existed during the specified time and on which the person was logged in
(3) Information about logon/usage duration for all selected persons as a sum in the format [hh:mm:ss]:
The logon duration indicates the total time people have been logged in to the workplace on one or more operations.
Usage duration, from a financial perspective, is the time the person was actually at a workplace on that operation. Usage duration is used to map the time distribution for multiple machine operation from a cost perspective.
If the logon duration is equal to the usage duration, the persons were fully active at the assigned workplace. If the persons have logged on to another workplace and active operation, the logon duration is unequal to the usage duration.
(4) Time period of a phase for which operating states are to be listed for each operation, workplace and person:
The total time signed on is indicated by a start and end time and corresponds to an interval.
(5) Information about logon/usage duration per person in format [hh:mm:ss]:
The evaluation is calculated from the number of operations on which a person is logged on at the same time (factor 1:n, where n is the number of parallel active operations on which the person is logged on).
Example: Person A logs in on operation 110. The evaluation is 100% because the person is only logged in at this operation. A minute later, person A logs in on operation 210. The evaluation is 50% in each case, since two operations are now logged in parallel (1:2).
(6) Information on persons who are signed in:
For each operating state, one signed in person is displayed with first and last name.
(7) Listing of workplace, order/operation, material and operation phase:
The corresponding number is displayed for each column in this group.
The specified operation phase was present on the corresponding operation during the period.

3.12.1.2 Personnel operation log

Path: Performance analysis > Reporting > Reports > Personnel > Personnel overview (details) > Personnel operation log

Tabular listing of the operating states for each operation per workplace and person over the selected period. Only past data up to the current date are logged and displayed.

Workplace	First name	Last Name	Start Time	End Time	Logon ...	Weighte...	Order	Opera...	Operating State
Manual_workplace	Jane	Doe	Jan 26, 2022, 4:00 A	Jan 26, 2022, 8:0	04:00:00	04:00:00	PM1140-	0001	Malfunction mechanics 2345
Manual_workplace	Jane	Doe	Jan 26, 2022, 3:30 A	Jan 26, 2022, 4:0	00:30:00	00:30:00	PM1140-	0001	Planned break
Manual_workplace	Jane	Doe	Jan 26, 2022, 2:23 A	Jan 26, 2022, 3:3	01:06:52	01:06:52	PM1140-	0001	Malfunction mechanics 2345
Manual_workplace	Jane	Doe	Jan 26, 2022, 2:22 A	Jan 26, 2022, 2:2	00:00:41	00:00:41	PM1140-	0001	Quality issue (raw material)
Manual_workplace	Jane	Doe	Jan 26, 2022, 2:22 A	Jan 26, 2022, 2:2	00:00:04	00:00:04	PM1140-	0001	Missing material
Manual_workplace	Jane	Doe	Jan 26, 2022, 2:22 A	Jan 26, 2022, 2:2	00:00:04	00:00:04	PM1140-	0001	Production Operation Status
Manual_workplace	Jane	Doe	Jan 26, 2022, 2:22 A	Jan 26, 2022, 2:2	00:00:14	00:00:14	PM1140-	0001	Setup

Fig. 168: Personnel operation log

4 Annex

4.1 Change log

Table 15: List of all changes with release version 5.11.16

Date	Type	Description	Section
2019-07-16	Added	Explanatory text about PDF export	2.8
2021-07-28	Created	Content of this manual transferred from Manual - Performance Analysis and revised according to introductory text	
2021-07-28	Removed	Listing of filters in the predefined reports without explanation	3
2021-07-28	Added	Warning that defines a scope of deeper knowledge of SQL and database structures of FORCAM FORCE	1
2021-07-28	Added	Note that after filter selection it is necessary to click on **Refresh reports**	2.1
2021-07-28	Added	Additional filter by personnel	2.14.5
2021-07-28	Added	Additional function: display of the last change	2.16
2021-07-28	Added	Additional reports: **Personnel activity log** and **Personnel operation log** in the product standard	3
2021-07-28	Edited	Corrected the application of the attribute **time per unit**	3.2.1.1
2021-07-28	Added	Report: Shift book (strokes calculated from quantities)	3.2.4.3
2021-07-28	Added	Report: Shift log (strokes calculated from quantities)	3.2.4.5
2021-07-28	Added	Report: Daily log (strokes calculated from quantities)	3.2.4.7
2021-07-28	Edited	Report: Messages	3.2.4.8
2021-07-28	Added	Note about drill-down to OEE report on a daily basis	3.3
2021-07-28	Edited	Report: Hit list operating states regarding duration and **additional** filters	3.4.2.5, 3.4.3.5, 3.4.4.3 and 3.4.5.3
2021-07-28	Added	Hit report (workplace) (strokes calculated from quantities)	3.5.1.2
2021-07-28	Added	Report: Hit development (workplace) (strokes calculated from quantities)	3.5.1.4
2021-07-28	Added	Quality detail class report (workplace)	3.6.1.6
2021-07-28	Added	Report: Quality detail class development (workplace)	3.6.1.7

2021-07-28	Added	Quality detail class report (material)	3.6.2.6
2021-07-28	Added	Report: Quality detail class development (material)	3.6.2.7
2021-07-28	Added	Quality detail class report (operation)	3.6.3.4
2021-07-28	Edited	Report: Operation details	3.9.2.4
2021-07-28	Added	Production time per unit	3.9.3
2021-07-28	Edited	Renamed malfunction reason development to status detail development or malfunction reason to status detail	3.10.2
2021-07-28	Added	Reference to external manual for energy data acquisition reports (not included in product standard)	3.11

4.2 Table of figures