ENISCO FORCAM
smart factory experts

FORCE MES LITE

FORCE MES LITE
“Availability” package

Version 5.12

Manual

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Contents

1 Concept

FORCAM supplies companies with all the information they need to control and optimize their production. Through a variety of production apps, FORCAM helps to make processes more transparent and improve workflows. This provides companies with the basis for optimization measures and sustainable success, ensuring their competitiveness.

FORCE MES LITE (hereafter simply referred to as MES LITE) is a By default preconfigured package out of the box for particularly fast and easy integration into the customer's infrastructure. Preconfigured modules include the **Office** module with reports and visualizations, the **Workbench** for configuring master data, and an out-of-the-box **Shopfloor Terminal** as a web-based user interface for workers. The corresponding links to these modules are part of the scope of delivery. The graphical user interface (GUI) of the Workbench also provides access to the Office module.

Fig. 1: Module overview of FORCE MES LITE “Availability” package

This manual contains information about the configuration and application of the mentioned modules.

ⓘ For better readability, we generally use the generic masculine in the text. These formulations, however, are equally inclusive of all genders and intended to address all persons equally.

2 User administration

Path (Workbench): User Administration > User Editor

The User Editor is where user accounts for FORCE MES LITE can be created. A user account authorizes the user to use Workbench and Office module.

The User Editor also regulates permissions: Users can be divided into different groups with different rights. These groups are referred to as roles (e.g., manager, foreman, etc.). Rights or functions that are required for the respective task can be assigned to each role. If no role is assigned, the user will not be able to perform any functions.

All existing user accounts are listed by clicking on the search function (magnifying glass symbol).

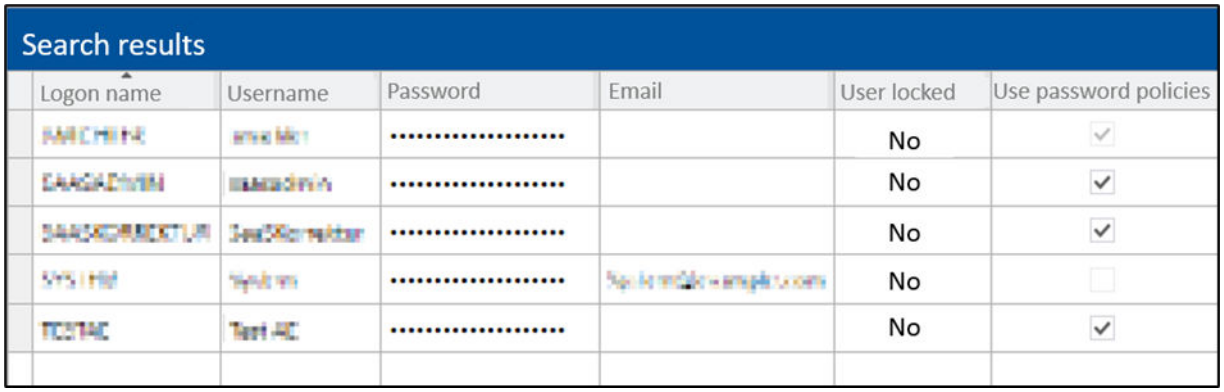

Fig. 2: Configuration of user accounts

To create a new user account:

1. Right-click in the results table and click **Create new user** in the context menu.
2. Enter **logon name, username** and **password**.
3. Optional: Enter other settings as necessary.
4. Save.

ⓘ Before assigning a role to a new account, the account must first be saved.

All columns of the user table are listed and described in the table below.

Table 1: Parameters and description from the user table

Parameter	Description
Logon name	Name used to log the user into all modules. May only contain a combination of upper and lower case letters and underscores (_).
Username	Option to specify a full name for the username
Password	Password used along with the logon name to log in to all modules.
Email	User email address
Apply password rules	A check mark indicates that a password rule is preconfigured and applied. This setting cannot be changed in MES LITE. The same applies to password rules, which cannot be changed here.
Password changeable	If a check mark is set, the user password can be changed later. Otherwise, the originally assigned password must remain in use.
Assigned roles	Roles (actions and permissions) assigned to the user account
Time zone	Option to select a time zone. The time zone is then valid for the entire module only for this user account. The outputs, e.g. for reporting and visualizations, are adapted to this specific time zone.
Last login	Indicates when the user was last logged into the Workbench.

Users are assigned appropriate roles depending on their function. The local MES administrator has a central function in this context. The MES administrator must also be assigned to the appropriate organizational unit (branch of the organizational hierarchy **ORGHIER**, see section **0**. The assignment essentially defines which hierarchy and branches of a hierarchy the local administrator is allowed to see and pass on (assign) to users via roles.

To assign a role to a user account:

1. Right-click under **Assigned Roles** and click **Edit Role Assignments** in the context menu.
2. In the next screen, right-click **Roles** in the upper left area and click **Assign Role(s)** in the context menu.
3. In the pop-up dialog, drag and drop the desired roles into the left field and confirm.

➔ The lower area **Assigned rights** shows which actions and permissions are possible for this role.

4. Right-click on **Organizational Units** in the upper right panel and click on **Add Organizational Workstation Unit** in the context menu.
5. Select a workplace or hierarchy level to be linked to the role in the pop-up dialog and confirm.
6. Save.

ⓘ It may take up to an hour for changes to user accounts to take effect throughout the system.

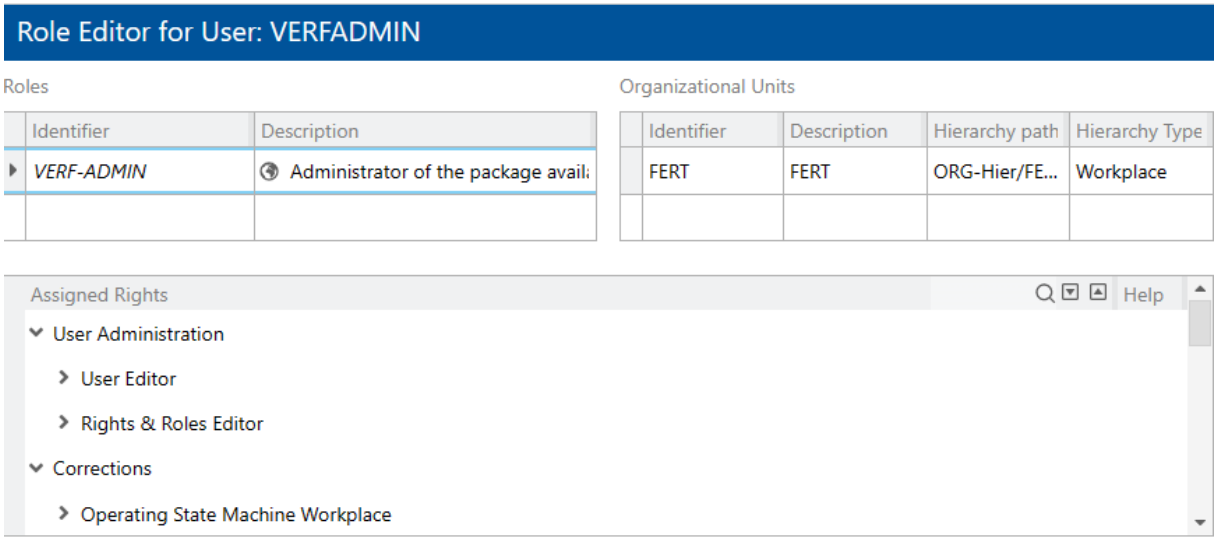

Fig. 3: Permissions and roles editor

The following allocatable roles are available in FORCE MES LITE:

Table 2: User roles and related permissions

Role	Permissions
VERF-KORREKTUR	Corrections to operating states and shifts
VERF-SCHICHT	Configuration of the master data shift calendar (shift definitions and working time assignments), production data acquisition (operating state classes, status details) as well as workplace hierarchies (description and grouping).
VERF-REPORTS	Creating and editing visualizations and dashboards as well as evaluation of reports
VERF-ADMIN	All previously mentioned permissions plus access to the user administration (including password rules)

3 Shift model

Path (Workbench): Master data > Shift calendar

The shift calendar of the Workbench enables the definition of individual shifts and the assignment of workplaces. It can digitally represent a company's shift model for use in planning and deploying resources or displaying events. It is possible to create and configure shift weeks, e.g. for scheduling non-working days.

3.1 Shift type definition

Path: Master data > Shift calendar > Shift type definitions

The shift type definition specifies abbreviations and descriptions of shifts, e.g. F = Early shift.

Some shift types are predefined in FORCE MES LITE. Once created, shift types cannot be deleted, but they can be renamed.

Fig. 4: Configuration of shift types

(1) Short form description of the shift type.
Appears at the first position in the shift definition (see section 3.2).
(2) Longer description of the shift type.
Used for differentiation (only appears in this page).
(3) Defines sorting order of all shift types.
A number may be added to a type for easier sorting in this page.
(4) If a check mark is set, the shift is outside of the working time.
This setting cannot be changed in MES LITE.
(5) Code specified by the system for a shift type.
Used internally in the system for identification.
(6) Add icon for creating a new shift type.

To create a new shift type:

1. Click on the Add icon in the upper right corner.
2. Enter short description and description.
3. Optional: Enter the desired number under **Sort order**.
4. Save.

3.2 Shift definition

Path: Master data > Shift calendar > Shift definitions

The shift definition specifies the working and break times for a shift type, e.g. early shift = 6 am - 2 pm. It is also possible to create shift weeks and to place shifts on different days of the week. A shift may not be longer than 24 hours.

3.2.1 Defining shifts

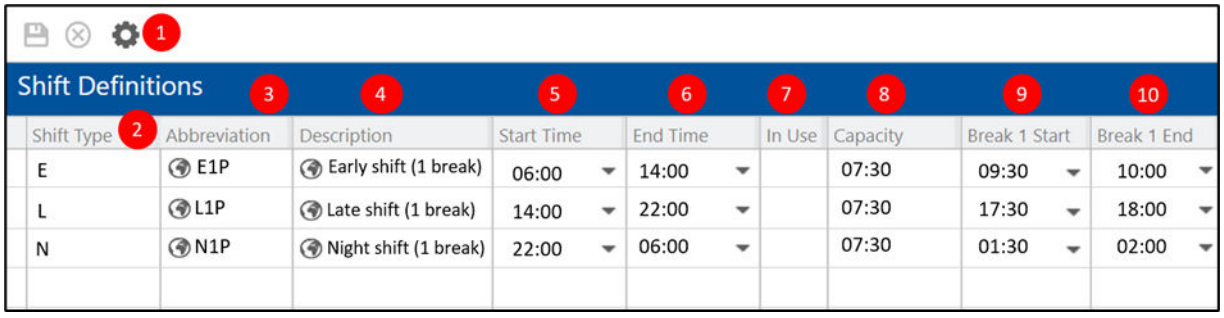

Fig. 5: Defining shifts

(1) Change the configuration for the shift model.
This is where the number of breaks is set.
(2) Shift type of the shift.
This drop-down menu contains all types configured in the shift type definitions. The shift model for this type is defined as follows.
(3) Shift abbreviation.
Appears under the corresponding day for the shift week in the week definition (see section 3.2.3).
(4) Optional shift description.
Option for additional explanatory description.
(5) Desired shift start
(6) Desired shift end
(7) If it is checked, the shift is currently in use in a weekly model.
The check mark is automatically set as soon as the shift is selected in the weekly model.
(8) Summed up time that is available for the relevant shift.
It is calculated from the start time + end time, minus break(s).
If only the start time is selected, the end time is counted as 0:00 (24 h) and the capacity will show the difference minus the breaks. As soon as an end time is also selected, the capacity is updated according to the new difference.
(9) Start of the break
(10) End of the break

To define a new shift:

1. Right-click inside or outside the table and click on **Add shift definition** in the context menu.
2. Select a shift type from the drop-down menu in the **Shift type** column.
3. Enter abbreviation.
4. Optional: Enter description.
5. Enter shift start time and end time.
6. Enter break times.
7. Save.

3.2.2 Defining shift weeks

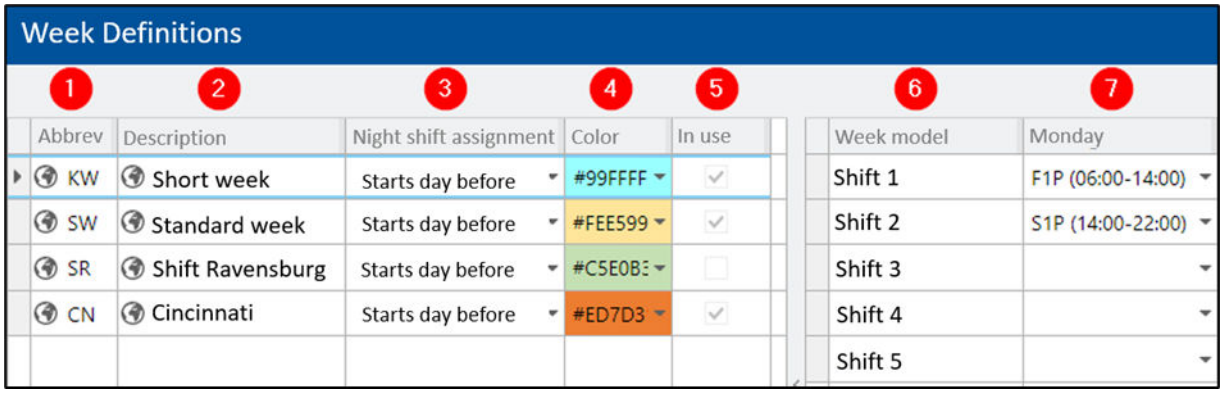

Fig. 6: Definition of shift weeks

(1) Shift week abbreviation.
Appears in the **week model** column (see (6)).

(2) Longer description of the shift week.
Appears in the work time assignment drop-down menu to select a weekly model (see section 3.2.3).

(3) Definition of the beginning or end of a night shift.

- Starts on the previous day:
  The night shift(s) in the shift week start on the previous day.
  Example: If a night shift is scheduled for a Monday with the definition = 22:00 - 06:00, the night shift starts at 22:00 pm on Sunday and ends at 06:00 am on Monday.
- End on the following day:
  The night shift(s) in a shift week end on the following day.
  Example: If a night shift is scheduled for a Monday with the definition = 22:00 - 06:00, the night shift starts at 22:00 pm on Monday and ends at 06:00 am on Tuesday.

(4) Color of shift week.
The shift week is displayed in this color in the work time assignment (see section 3.2.3).

(5) If it is checked, the shift week is currently in use in a work time assignment.
The check mark is automatically set as soon as the shift week is selected in the work time assignment (see section 3.2.3).

(6) Currently selected week model

(7) Shows which shift type and what times have been selected for the respective day.

ⓘ To ensure the correct functioning of the reports (see chapter 7), it is important to define the beginning and end of the night shift, because this is where the exact delimitation of the shift days takes place.

To define a new shift week:

1. Right-click inside or outside the table and click **Add week definition** in the context menu.
2. Enter abbreviation and description.
3. Determine the beginning or end of the night shift in the drop-down menu under **Night shift assignment**.
4. Optional: Select the color of the shift week.
5. Select the desired shift in the right area of the table under each day of the week.
6. Save.

3.2.3 Work time assignment

In the work time assignment, shifts or weekly models can be added to a workplace hierarchy. Shifts of a higher hierarchy level, such as those of a plant, are inherited by all lower levels. However, it is also possible to configure an individual shift for each level of the hierarchy.

ⓘ Only future shifts are maintained here. Past shifts can be maintained via the correction module (see chapter 6).

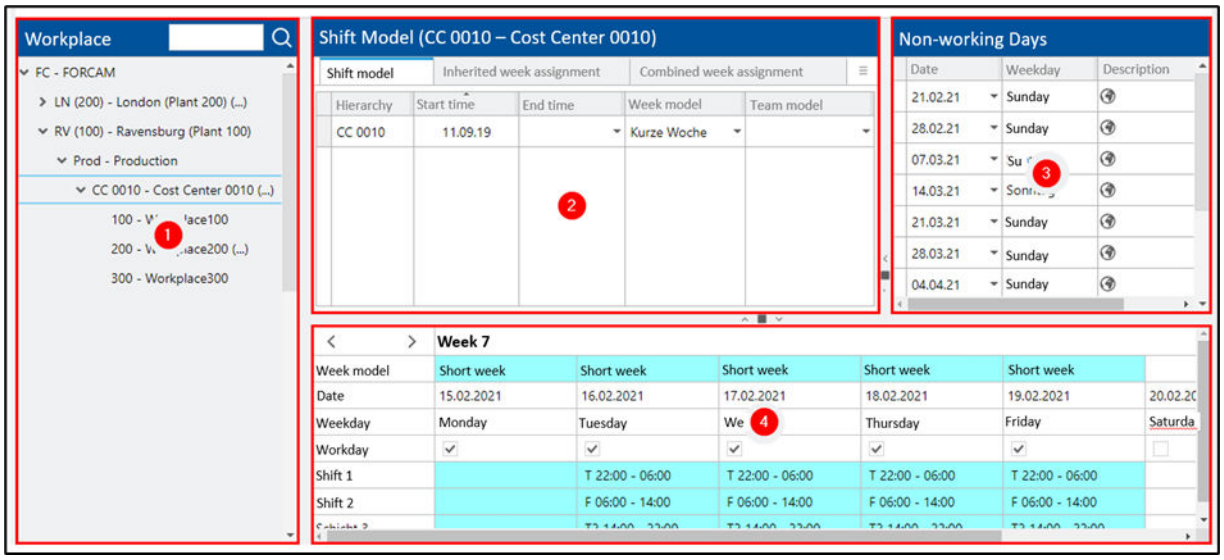

Fig. 7: Segments of the "work time assignment" configuration screen

(1) Represents the workplace hierarchy (work time hierarchy HIER) (see section 0).
A level for which a shift model has been configured is marked with **(...)**.

(2) Shows the valid shift model for a selected hierarchy level:

- Shift model:
  The week model that has been configured individually for this level
- Inherited week assignment:
  A week model that was inherited from a higher level and therefore adopted for that level. If an individual model was configured, it takes precedence over inheritance and is the valid model.
- Combined week assignment:
  Listing of all configured week models including those inherited from higher levels. If an individual model was configured, it takes precedence over inheritance and is the valid model.

(3) Shows all the days that there is no work for a selected level of the hierarchy.
Non-working days are added to a shift week. In turn, no shifts can be added to non-working days.

(4) Depicts the current week.
The shift model configured for the corresponding hierarchy level is displayed for each day. If no individual shift model has been configured at this level, the shift model of the next higher level with a configured shift model will be adopted.

3.2.3.1 Add shift model

ⓘ A shift model can only be added or removed in the **Shift model** tab. The tabs **Inherited Week Assignment** and **Combined Week Assignment** are read-only.

To add a shift model:

1. Select a level for which you want to add a shift model in the left section **Workplace Hierarchy.**
2. Right-click in the middle upper table and click **Add Week Assignment** in the context menu.

➔ The selected workplace in the hierarchy tree appears in the **week assignment** field.
The Hierarchy column displays the name of the selected level.

3. Select start time of the shift model.
   The shift applies to the selected level from this date.

ⓘ The start time cannot be earlier than the current day.

4. Optional: Select end time.
   If no end time is selected, the shift is set to last indefinitely.
5. Select the desired week model.

➔ The shift for the selected time appears in the calendar in the color it was assigned earlier.

6. Save.

3.2.3.2 Add non-working days

To add a non-working day to a shift model:

1. Right-click on **non-working days** in the right section and click on **Add non-working day** in the context menu.
2. In the context menu click on **Add non -working day** and select the desired day.
   The day cannot be before the current time.
   or
   In the context menu, click on **Add Saturdays/Sundays**.

➔ This will add all future Saturdays/Sundays of the current year.

3. Save.

3.2.3.3 Add fixed shift

It is possible to add or remove a fixed shift to a day in the shift week. In this case, a previously defined layer can be selected or it can be modified.
The week is then supplemented or shortened for this shift.
A fixed shift is a manually entered shift which is outside the defined weeks. The shift to be added must be defined beforehand.

ⓘ A shift type can only occur once per day.
The shift to be removed or added may not be a past one.

To add a fixed shift to a day:

1. Right-click on the desired day in the bottom weekly calendar and click **Add fixed shift** in the context menu.
2. Select the desired shift definition template in the next dialog.
   Existing shift configured in the shift definition.

➔ The data of the selected shift definition (shift type, times, breaks) are automatically entered for that day.

3. Or, if necessary, edit shift.
4. Confirm dialog.

➔ The fixed shift is added to the day.

5. Save.

➔ The fixed shift is a different color.

ⓘ If the checkmark for workday is removed, the corresponding day is no longer considered a workday and the stored shift times are removed.

4 Status details

A status defines the state of a machine or a workplace. The status can be active or inactive.
A status detail justifies this status with a reason. If a reason is to be given for an inactive machine, the user selects a reason for the stoppage in the SFT, for example **Malfunction Electrics**.
This accuracy of data collection can be used to generate reports later on, which clearly show these different status details and provide information about the machine conditions.

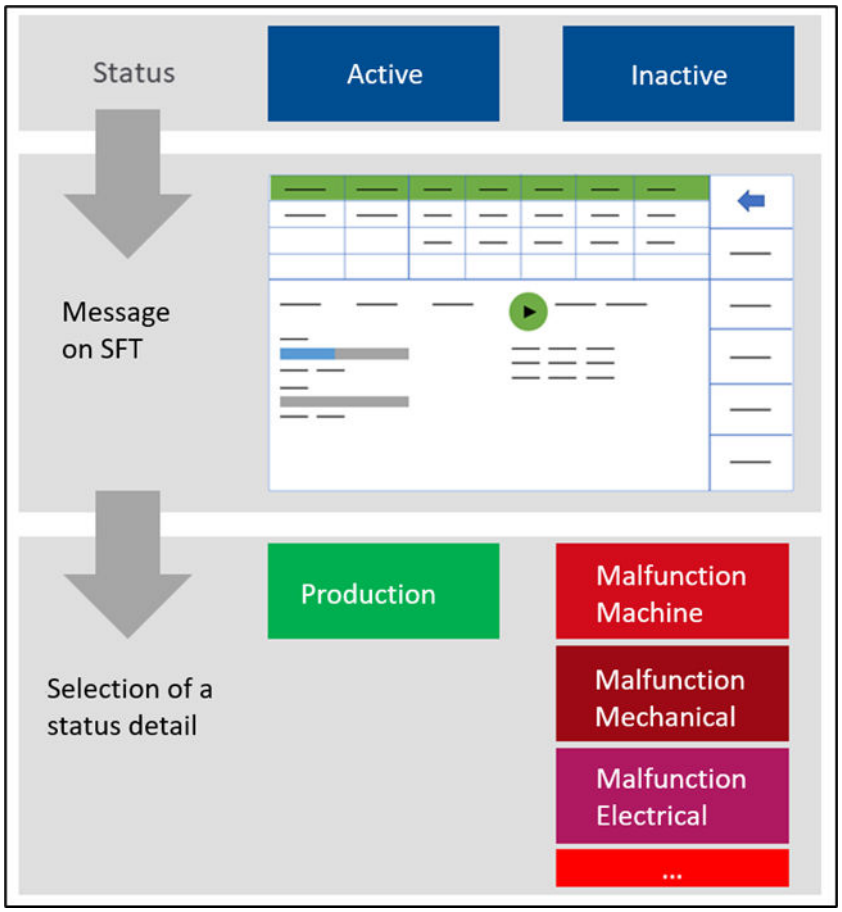

Fig. 8: Procedure for reporting a status detail in MES LITE.

4.1 Add status detail

Path (Workbench): Master data > Production data acquisition > Status details

The status detail table is a standard table in the MES LITE Workbench that can be edited. It offers various functions that make it user-friendly and simplify the work within the table. The following figure shows the most important functions.

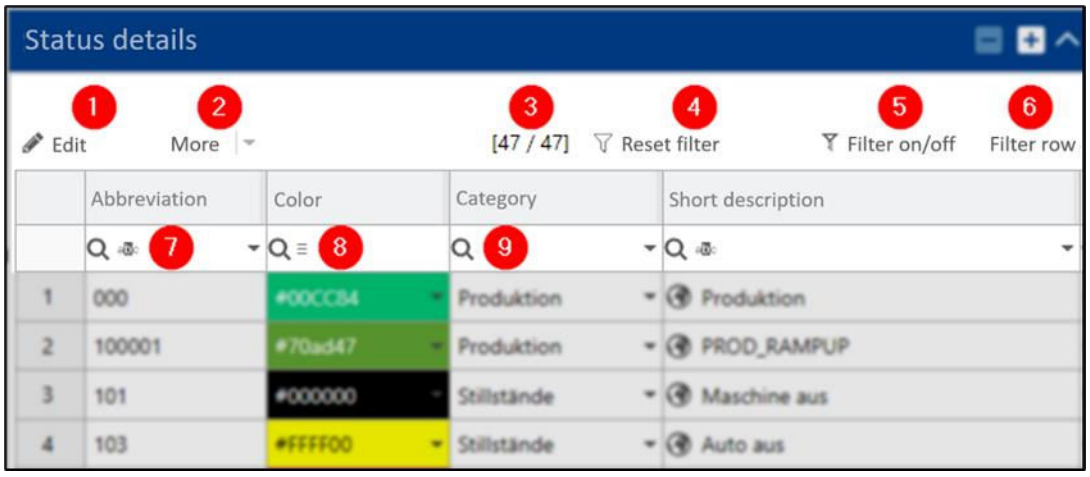

Fig. 9: Layout of the status detail table

(1) Locks/unlocks the table for editing.
(2) More display options:
- Show row data in dialog:
  Displays the selected row in a pop-up dialog.
- Reset column sort order:
  If a column header is clicked, the table is sorted alphabetically based on this column. This button resets the sort order.

(3) Indicates how many rows are currently displayed in the table.
Automatically updates after applying filters.
(4) Resets all the filters applied to the filter rows
(5) Hides all filters applied to the filter row.
The filters are still in place, only their effect is hidden.
(6) Shows/hides the filter row
(7) Filter with operators to include or exclude characters.
(8) Filter for selecting colors
(9) Filter with a drop-down list of selectable entries

All columns of the status detail table are listed and described in the table below.

Table 3: Parameters and description from the status detail table

Parameter	Description
Abbreviation	Abbreviation of the status detail. Appears in the SFT for example. A sequence of numbers is usually used, but alphabetic characters are also permitted. The same abbreviation can be used more than once. The abbreviation is the only mandatory field in this table.
Short description	Option for short description of the status detail
Description	More detailed description of the status detail. Appears in the SFT for example.
Color	Status detail color. It is displayed in this color in the SFT.
Category	Determines the category of the status detail. The relevant status detail appears as a selection option in the Shopfloor Terminal under this category. Malfunctions such as **Malfunction Electrics**, for example, are grouped in the **Stoppage** category. If a stoppage occurs, one of these malfunctions can then be selected.
Recodable	If a check mark is set, the status detail in the SFT can be changed to another status detail.
Splitable	If a check mark is set, the duration of a status detail can be split in the SFT. Status details can be assigned for each of the split durations.
Annotatable	If a check mark is set, a remark can be added to the status detail in the SFT. This feature is not relevant in FORCE MES LITE, as the ticket system is deactivated.
Sort order	Determines the sequence of the status detail in the SFT
Code	A unique ID of the status detail, which is automatically assigned by the system
Customer code	This is where a customer-side status code from the ERP system, for example, can be assigned to a status detail. Enables the selection of the customer-side code in the SFT. This function is not relevant in FORCE MES LITE.

To add a status detail:

1. Click on the Add icon in the upper right corner.
➔ A previously selected status detail is copied and its settings are adopted.
2. Enter abbreviation.
3. Optional: Enter short description and description.
4. Optional: Select color.
5. Optional: Select status detail level.
6. Optional: Set necessary checkmarks for coding, splitting and annotating.
7. Optional: Enter sort order.
8. Save.
➔ The newly created status detail is added to the status details table.

5 Workplace

In MES LITE, the workplace is the most important source of information and signals. A comprehensive configuration and integration in all relevant areas ensures that data is correctly obtained and then processed.

5.1 Workplace configuration

Path (Workbench): Master data > Workplace > Workplace configuration

In MES LITE, customer workplaces are preconfigured and can therefore only be viewed here.

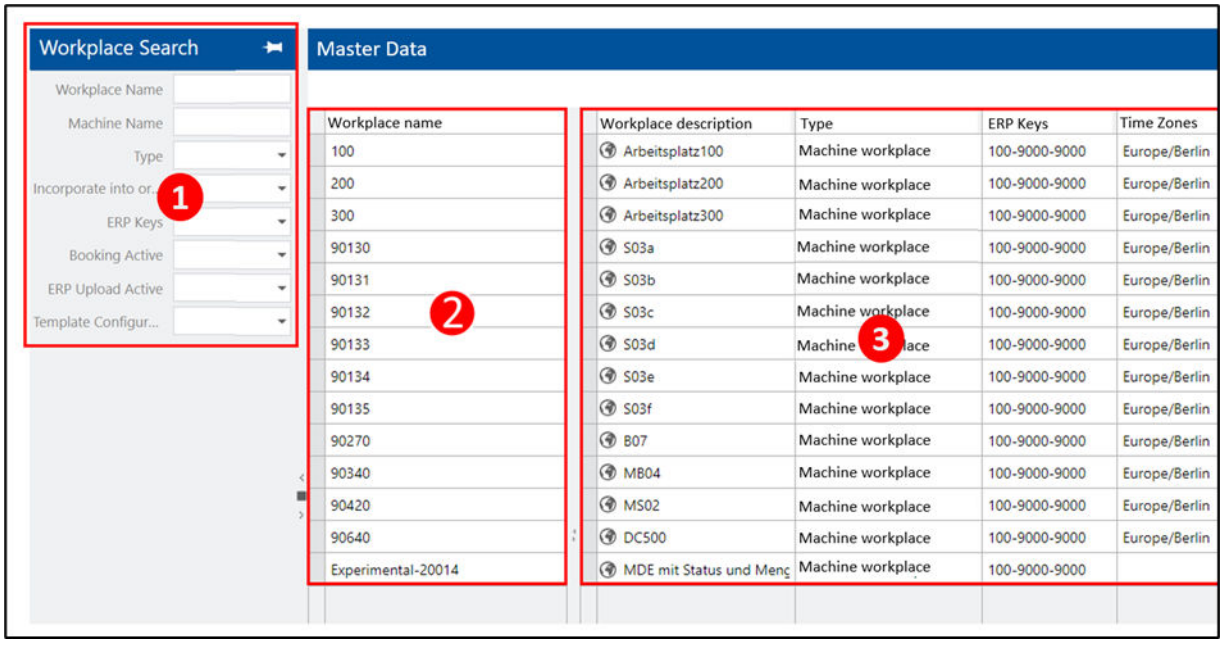

Fig. 10: Layout of the workplace configuration

(1) Search area.
Limits the displayed results in the workplace table if desired
(2) List of all workplaces.
Fixed window that does not scroll horizontally for better usability
(3) Workplace table.
Lists each workplace and includes additional information such as ERP key, booking logic, machine name, etc.
The ERP key is fixed.

ⓣ The **number of workplaces** in the upper right corner indicates with the first number how many workplaces are created in MES LITE. The second number indicates how many workplaces are licensed in total.

5.2 Template configuration

Path (Workbench): Master data > Workplace > Template configuration

The standardized template configuration in MES LITE offers the possibility to make and save various settings for all workplaces or machines centrally. In this dialog, only the status detail mapping can be edited.

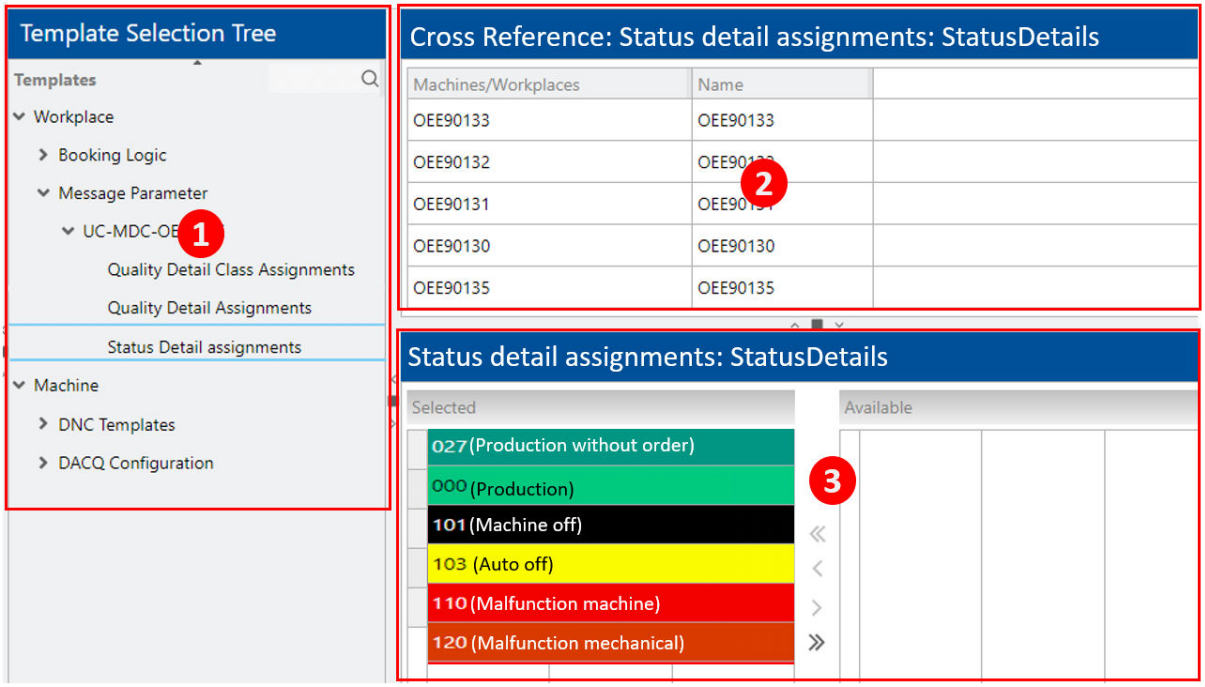

Fig. 11: Layout of the template configuration

(1) List of all configuration possibilities by topics.
The lowest node of each branch contains the template configuration for the respective topic.
(2) Indicates which machines/workplaces use the template configuration. In FORCE MES LITE, this includes are all machines/workplaces available in the master data.
(3) Configuration based on the example of the status detail mapping.

The status details defined in production data acquisition (see chapter 4) must be selected in the status detail mapping so that they are available at the workplaces or machines.

To create the status detail mapping:

1. In **Template selection tree**, select the **Status Detail Assignments** node.
2. In the **Status Details Assignments: StatusDetails** section, move one or more statuses to the left field.
3. Save.

ⓘ In order for the change to show up in the Shopfloor Terminal, it must be refreshed or updated.

5.3 Workplace hierarchy

Path (Workbench): Master data > Workplace configuration > Workplace hierarchy

The workplace hierarchies reflect the hierarchical structure of workplaces up to the corporate level. The hierarchies provide a structure and precise localization of workplaces and substantially aid visualization.
In MES LITE, workplace hierarchies are preconfigured according to the workshops held and the questionnaire prepared. The number of hierarchy levels cannot be changed. However, the descriptions of the hierarchy levels and the branches or nodes in the hierarchy tree can be edited. The hierarchy tree can also be rearranged and new branches can be added.

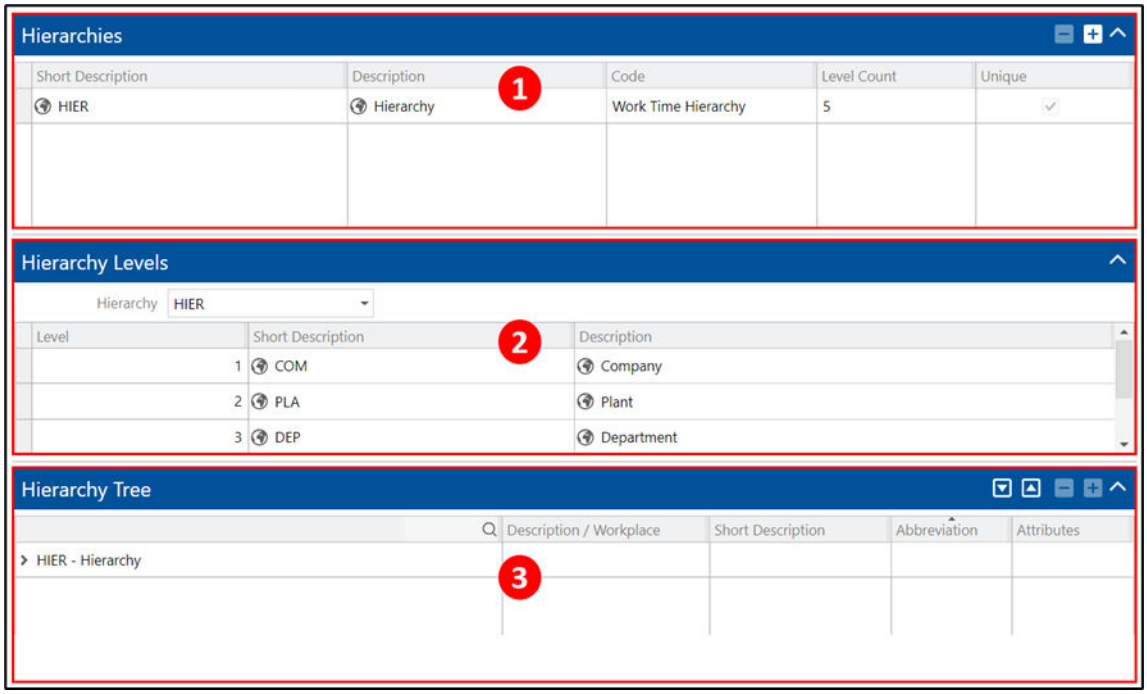

Fig. 12: Sample of Workplace hierarchies

(1) Lists the available hierarchies:
- HIER:
  Digital replica of a physical organizational hierarchy from the company to the individual workplace. Indicates how many levels the respective hierarchy has. This hierarchy is used for planning shifts in the work time assignment.
- ORGHIER:
  System hierarchy in which all workplaces must be incorporated. This ORG hierarchy serves as a framework for managing workplaces organizationally and maintaining them internally within the system.

(2) Lists all hierarchy levels of the selected hierarchy

(3) Displays the respective hierarchy and associated nodes as a tree structure. The + and - buttons can be used for creating new branches and removing branches. Selected branches and nodes of the tree, including workplaces, can be moved using the arrow buttons.

The workplace hierarchies are used in Reporting (see chapter 7) when the workplaces are selected.

6 Corrections

Path (Workbench): Corrections

FORCE MES LITE allows later correction of operating states and shifts. Corrections are effective immediately after saving and become visible in reports after a new login or an update.

Configurable settings for corrections appear after selecting the edit icon (gear symbol).
In the **Configure Search Options** section, for example, it is possible to specify the search period, i.e., to restrict the time frame for displaying correctable data sets.

ⓘ In FORCE MES LITE the correction period is defined as a fixed format, i.e. the period during which corrections can be made is not adjustable retrospectively.

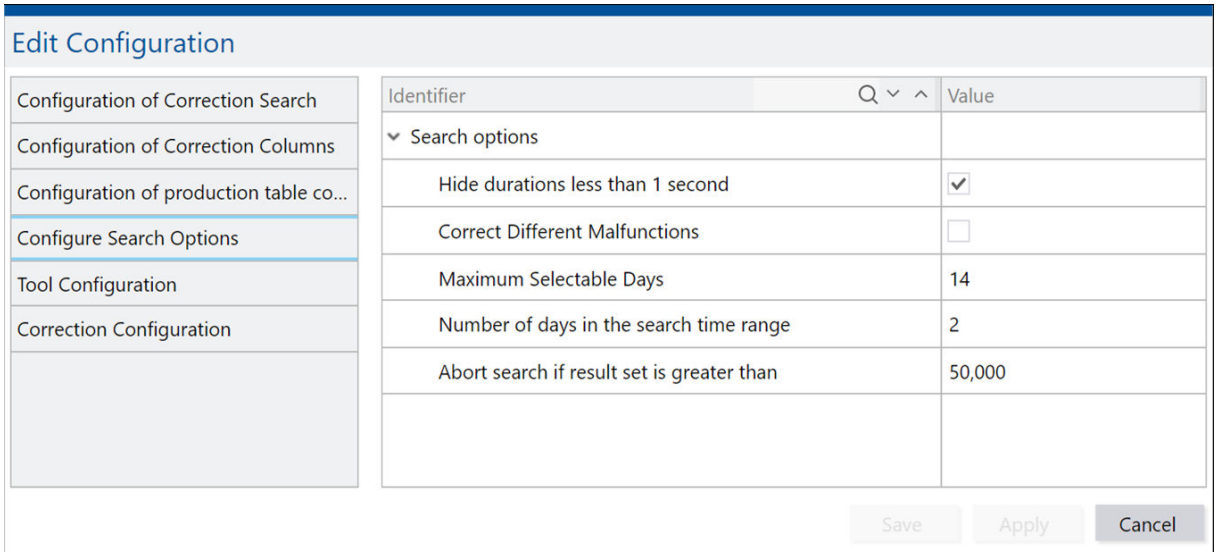

Fig. 13: Set search options for corrections

6.1 Correcting operating states

Path (Workbench): Corrections > Machine workplace operating state

During the correction of operating states, another state can be selected for a certain state in the past, i.e. The state can be changed. It is also possible to divide (split) an operating state. Here it is possible to define which new state should be present starting from the split.

ⓘ The **Production**, **Break** and **Setup** operating states cannot be changed or split. Likewise, no malfunction in setup and production mode can be changed. Breaks can be changed via the shift correction.

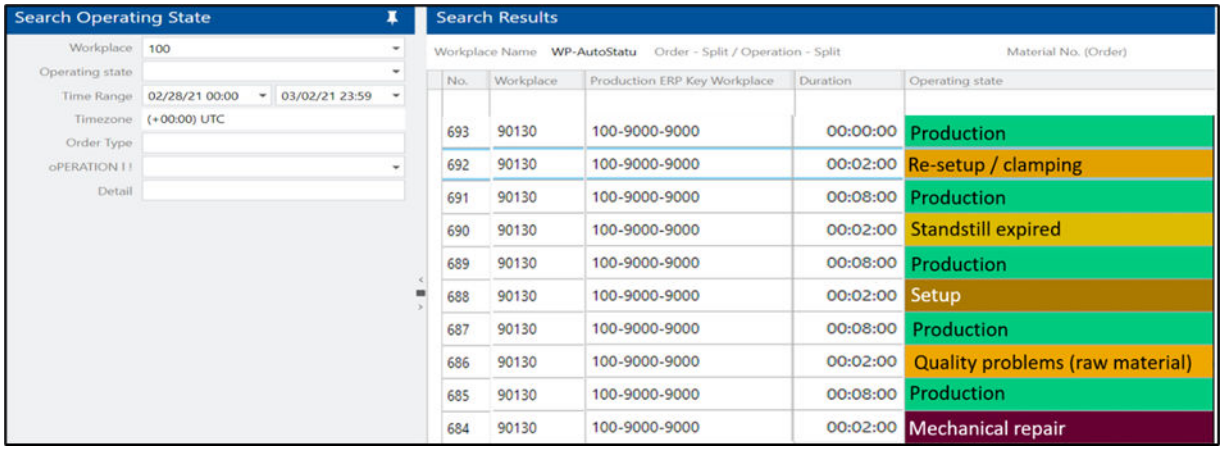

Fig. 14: List of operating states in the correction page

To correct an operating state:

1. Search for desired workplace.
2. Right-click on an operating state in the results table and click **Change operating state** in the context menu.

➔ The next dialog shows all available data of the operating state.
The state to be changed is highlighted under **Correction environment**. The rows above and below indicate the previous and subsequent state, respectively.

3. Make the desired change to the operating state under **State correction**.
The following changes are possible:
   - Category:
     Changes the category of the state (e.g. production, setup, etc.)
   - Operating state:
     Changes the state itself. The list of available states is based on the category that was previously selected.
   - Comment:
     Option to add a remark, for example to comment on the change of the states
4. Save.

To split an operating state:

1. Search for desired workplace.
2. Right-click on an operating state in the results table and click **Split operating state** in the context menu.

➔ The next dialog shows all available data of the operating state.
The state to be split is highlighted under **Correction environment**. The rows above and below indicate the previous and subsequent state, respectively.

3. Make the desired change to the operating state under **State correction**.
The following changes are possible:
   - Slider and time input field:
     Sets the time for splitting the operation via the slider or directly as an input in format DD.MM.YYYY SS:MM.
     From this point on, the operation is given the state that is selected subsequently.
   - Category:
     Changes the category of the state (e.g. production, setup, etc.)
   - Operating state:
     Changes the state itself. The list of available states is based on the category that was previously selected.
   - Comment:
     Option to add a remark to the corresponding state, regardless of whether other changes are made
4. Save.

6.2 Correcting shifts

Path (Workbench): Corrections > Machine workplace operating state

When correcting shifts, a shift can be changed, added or deleted for a specific day in the present, future or past.

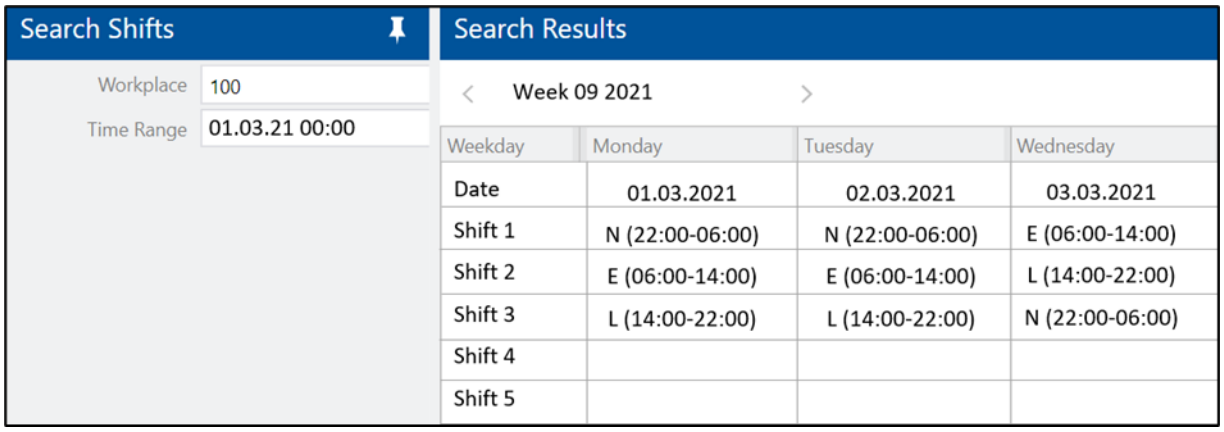

Fig. 15: List of shifts in the correction page

To correct a shift:

1. Search for desired workplace.
2. Right-click on a shift in the results table and click **Edit** in the context menu.

➔ A pop-up dialog shows all available data of the shift.

3. Enter the desired change and confirm the dialog.
   The following changes are possible:
   - Shift type:
     Changes the shift type to another configured type
   - Start time/End time:
     Changes start/end of shift
   - Breaks
     Option to add or remove a break or change its start/end time
4. Save.

To add a shift:

1. Search for desired workplace.
2. Right-click on a day in the results table and click **Add** in the context menu.
3. Enter the desired data for the new shift in the next dialog and confirm the dialog.
   The following entries are possible:
   - Shift type:
     Changes the shift type to another configured type
   - Start time/End time:
     Changes the start/end of shift
   - Breaks
     Option to add or remove a break or change its start/end time
4. Save.

7 Reports

Path (Office): Performance analysis > Reporting > Reports

The FORCE MES LITE performance analysis module provides flexible and targeted data evaluations in the form of reports. Reports take the data collected in production and transform 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 combined with their displays in a multi-report or a dashboard.

ⓘ Some reports, called online reports or online logs, are based on uncondensed raw data and are updated in realtime. Hence, online reports are only available up to the time of the last archiving (aggregation).

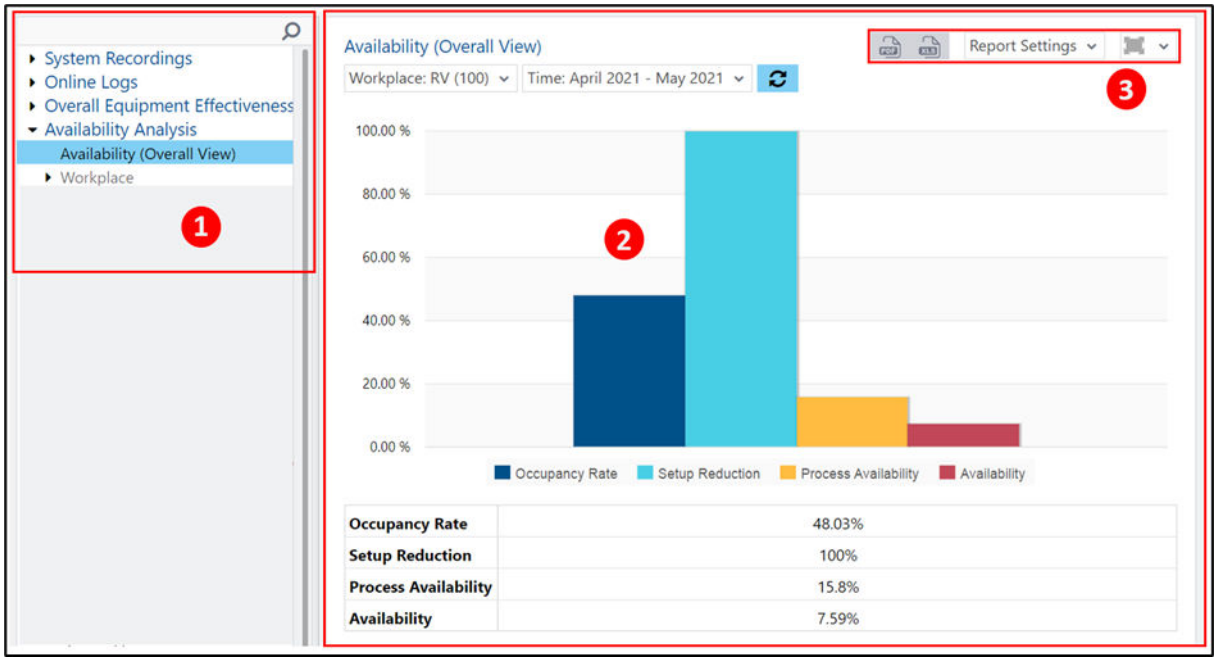

Fig. 16: Layout of Reporting

(1) Navigation Area:
Lists all the available reports.
(2) Display area:
Shows the selected report.
(3) Setting range:
Offers various display settings, such as exporting or output as URL.

7.1 Standard reports

MES LITE offers the following reports by default:

Table 4: Standard reports in FORCE MES LITE

Report	Displayed information
Operating state timeline (workplace)	Gantt charts of *one* or *more* workplaces with operating states for the selected time period in realtime (online log)
Operating state log (workplace)	Multireport with operating states, their duration and frequency for *one* workplace in realtime (online log): – Operating states (sum): Sum of the duration of operating states with the occurred frequencies for the selected period – Operating states (details): List of operating states with their respective start time and duration
Messages	Messages from *one* or *more* workplaces with time period, machine status and shift status in realtime (online log)
Availability (overall view)	Multi-report showing availability for *one* or *several* workplaces for the selected time period. The percentages given indicate the proportion based on optimal (100%) availability. – Availability as a column chart: Occupancy rate, process availability, setup reduction and the availability calculated from this shown as columns – Availability as a table: Tabular listing of occupancy rate, process availability, setup reduction, and the availability calculated from these data The availability is the product of the occupancy rate, process availability and setup reduction.
Operating state class report (workplace)	Multi-report showing operating state classes for *one* or *several* workplaces for the selected time period: – Operating state class report (workplace) as a column chart: 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: 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.

Report	Displayed information
Operating state class development (workplace)	Multi-report showing the time history of operating state classes for *one* or *several* workplaces for the selected time period: – Operating state class development (workplace) as a column chart: Duration of operating state classes shown proportionally as columns. Each column represents the duration for a selected time 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: Tabular listing of operating state classes. Indicates the duration either as a percentage (of all operating state classes, of the planned operating time (PBZ)) or in minutes. The data comes from all the selected workplaces. The columns correspond to the selected period (e.g. month, calendar week, etc.). The value filter does not affect this table.
Operating State Report (Workplace)	Multi-report showing (proportional) durations of operating states for *one* or *several* workplaces for the selected time period: – Operating state report (workplace) as a column chart: 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: Listing of operating states and detailed duration information for each workplace with proportional duration, average, and total sum.
Operating State Development (Workplace)	Multi-report showing the operating state development for *one* or *several* workplaces for the selected time period: – Operating state development (workplace) as a column chart: Operating states as columns per selected time unit. Each column represents the operating state development of the selected workplaces. – Operating state development (workplace) as a table: 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.
Hitlist Operating States (Workplace)	Multi-report with operating states and detailed duration and frequency information for *one* or *several* workplaces for the selected time period: – Hitlist operating states (workplace) as column chart: Display of selected operating states and their total duration as columns. The operating states correspond to all selected workplaces. – Hitlist operating states (workplace) as a table: 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
Scheduled Operating Time	Realtime display of shifts for a selectable time period as a Gantt chart for *one* or *more* workplaces.

Report	Displayed information
Shift schedule	Realtime display of shifts as Gantt chart and table for *one* or *more* workplaces for the selected time period: – Shift overview as Gantt chart: Listing of workplaces with detailed information on shifts and their times as Gantt chart – Shifts a table: Listing of shifts for each workplace with information on start and end time as well as shift type
Status detail development	Multireport showing the time history of failure reasons for *one* or *more* workplaces for the selected time period: – Malfunction reason history as a column chart: History of malfunction reasons shown proportionately as columns. Each column represents the duration for a selected time period (e.g. month, calendar week, etc.). Depending on the selection in the value filter, the history is displayed either as duration (in minutes or percent), frequency (number or percent), MTBF or MTTR. The data comes from all the selected workplaces. – Malfunction reason history as a table: Tabular listing of malfunction reason development. 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. The columns correspond to the selected period (e.g. month, calendar week, etc.). The value filter does not affect this table.

7.2 Basic functions in Reporting

7.2.1 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. This means that the descriptions serve as metadata to indicate the corresponding content.

The search field is case-insensitive.

7.2.2 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.

7.2.3 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 shown in the display area when the corresponding filters have been selected and **Refresh reports** was clicked (button on the right).

Fig. 17: Example of a filter area in Reporting

7.2.4 Downloading reports

Reports can be exported and downloaded.
Reports can be exported in the formats PDF, XLS and CSV.

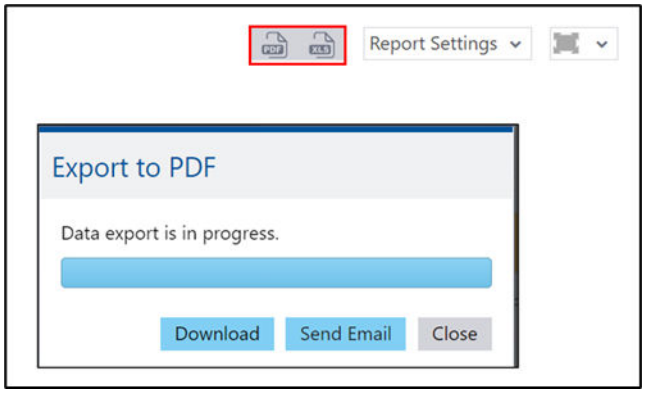

Fig. 18: Exporting a report to PDF format

When exporting multireports to PDF format, each sub-report 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 multireport **Availability (overall view)** consists of two sub-reports with a column chart at the top and an exponent table at the bottom. In this case, both sub-reports will be displayed on one page in the PDF export.

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.

7.2.5 Saving report properties

Each report allows you to save the selected option as a setting. In table based 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

7.2.6 Display options

FORCE MES LITE offers various display options to ensure optimum visibility across devices and platforms.

7.2.6.1 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 in the upper right corner.
3. Click **Fullscreen** in the drop-down menu.

ⓘ To deactivate the full screen mode again, click on Close full screen in the upper right corner. Click **Fullscreen**.

7.2.6.2 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 in the upper right corner.
3. Click **New tab** in the drop-down menu.

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

7.2.6.3 Export address (URL)

FORCE MES LITE is a web application. Reports, visualizations and dashboards have a separate and independent URL within this application. The URL can be exported.

To export the URL of reports or dashboards:

1. Select the desired report/dashboard.
2. Click on the View icon in the upper right corner.
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 **Override URL parameters** is checked, the URL can be edited after creation (see below).
6. Click on **Generate link**.

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

⚠ The generated link is an authorized link with the user rights that the URL was created with. It will not be necessary to log in again to access the link. Therefore, it is recommended to share the link only with authorized persons.

Incorporate into HTML code

✓ URL of the desired content is available (see section 7.2.6.3)

FORCE MES LITE 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_titl
e=false&language=en-gb&key=dcc2803a-ad29-44b8-bea5-7134d5d1709a" height="500" width="800"></iframe>

</html>
```

Display of the sample page:

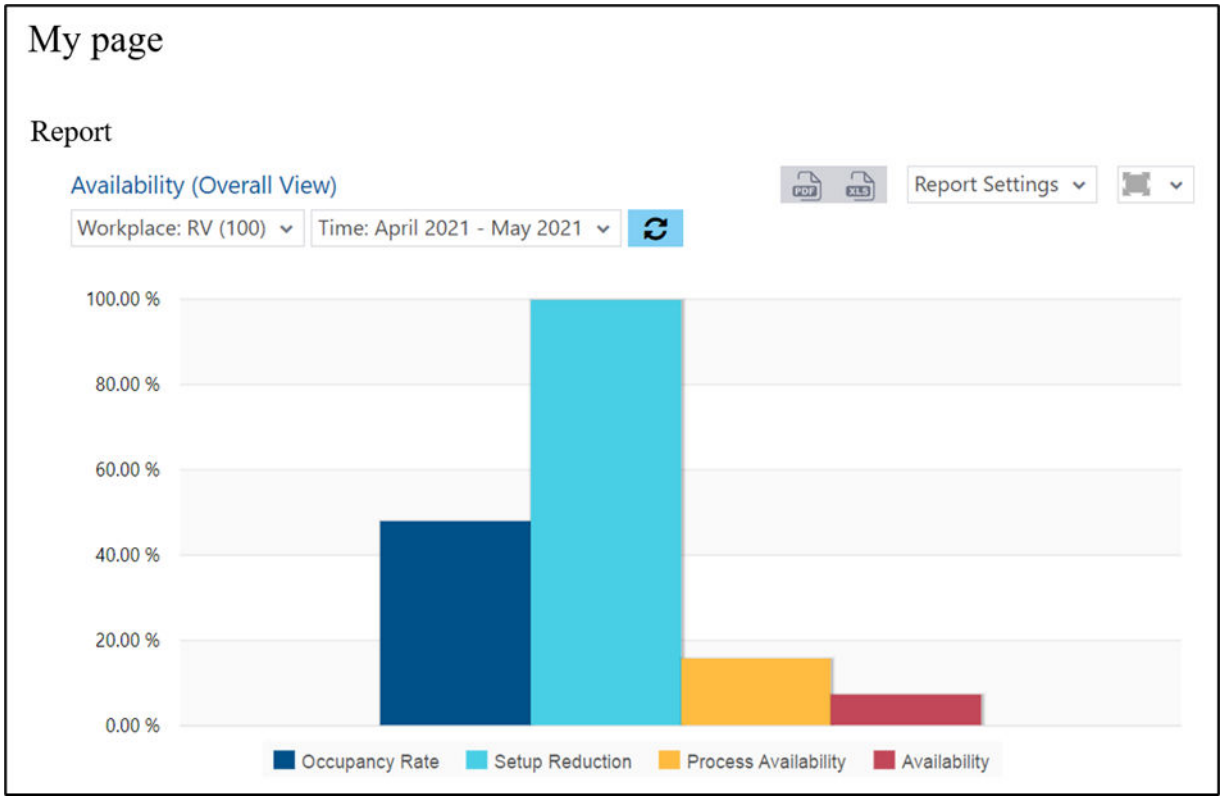

Fig. 19: Example of a report as HTML page

7.2.7 Tables

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

Status Class	100			200			300
	Duration (HH:mm)	Duration [% of SOT]	Duration [% of total]	Duration (HH:mm)	Duration [% of SOT]	Duration [% of total]	Duration (HH:mm)
Free Capacities	149:10	0%	4.22%	96:34	0%	2.43%	217:16
Maintenance Downtimes							
Organizational Downtimes							03:30
Production	1154:04	32.61%	32.61%	2530:48	63.61%	63.61%	03:01
Setup	00:00	0%	0%				00:00
Technical Malfunctions	02:30	0.07%	0.07%				
Σ	1305:44	32.68%	36.9%	2627:23	63.61%	66.04%	223:48

Fig. 20: Example of a table within a 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.

7.2.8 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.

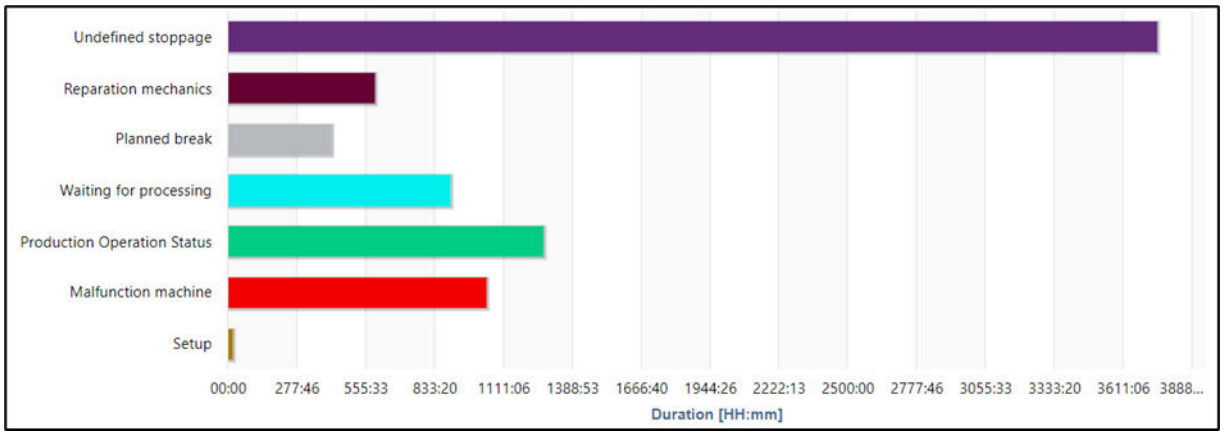

Fig. 21: Example of a bar chart within a report

7.2.9 Timeline diagrams

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

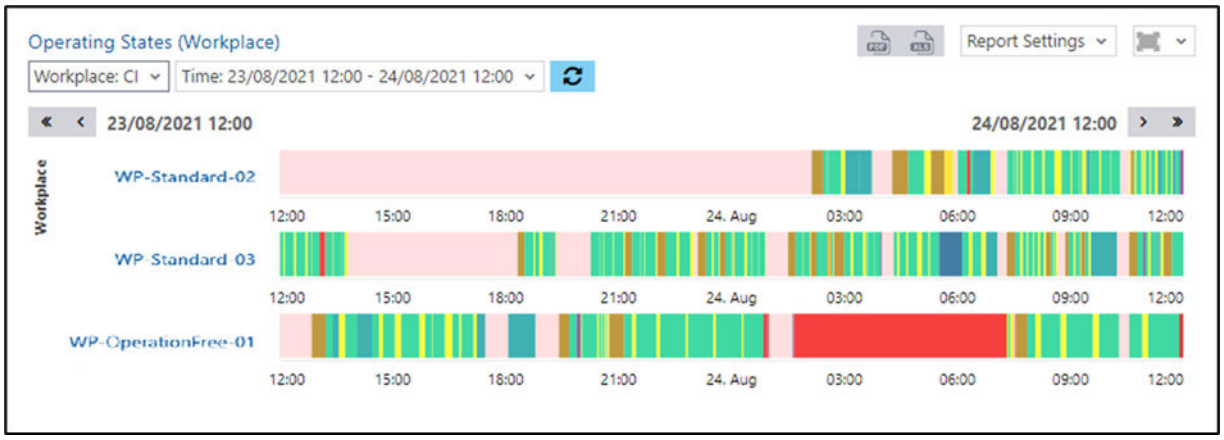

Fig. 22: Example of a timeline diagram within a report

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 image shows the status Gantt diagram from the top image with a zoom to the interval between 05:45 and 08:45 on 8/24/2021:

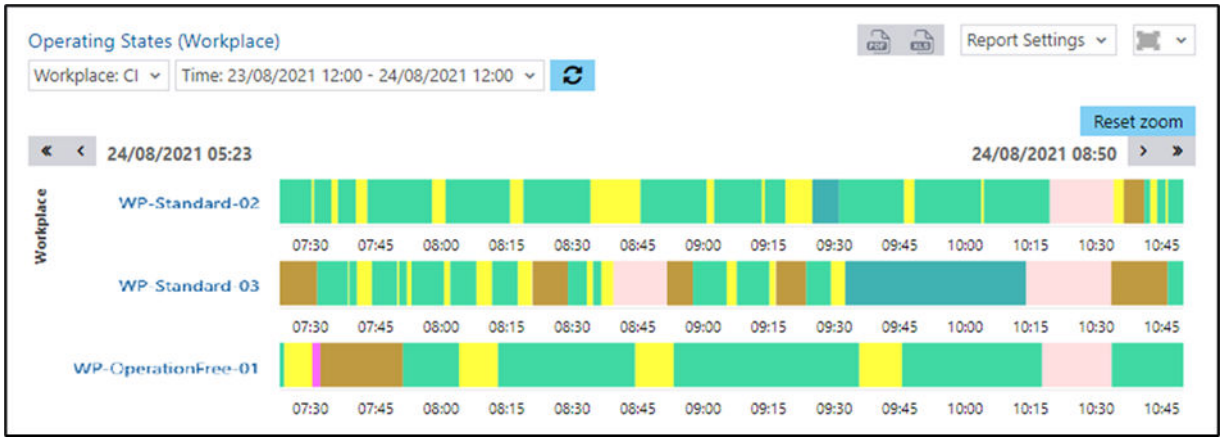

Fig. 23: Timeline diagram with zoom on a time period

7.2.10 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.

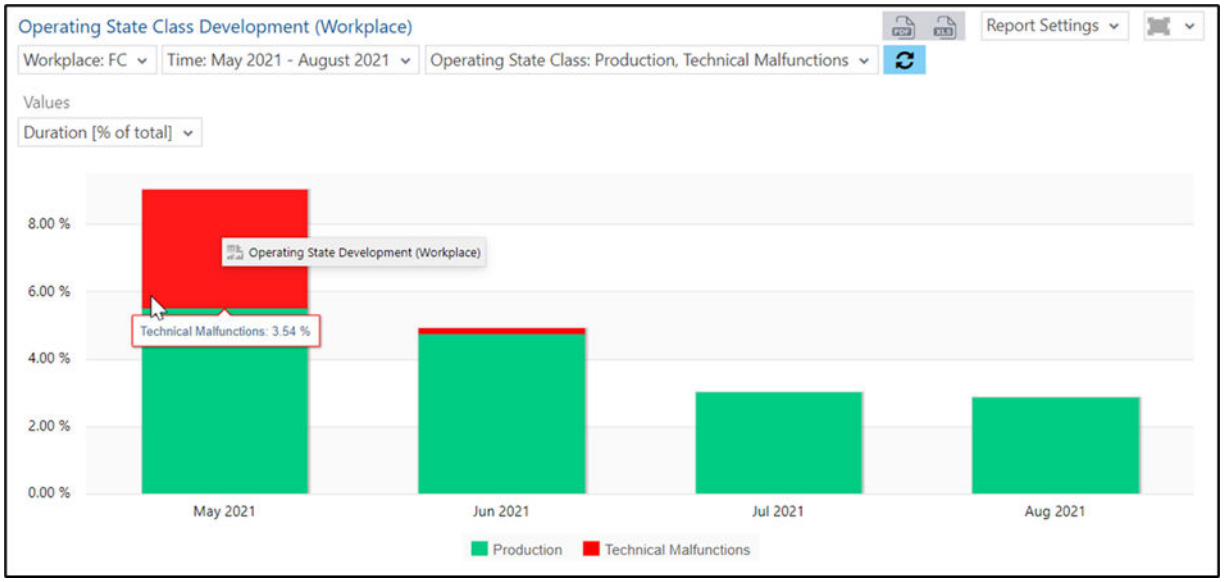

Fig. 24: Drill-down of a report into a deeper data level

If 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.

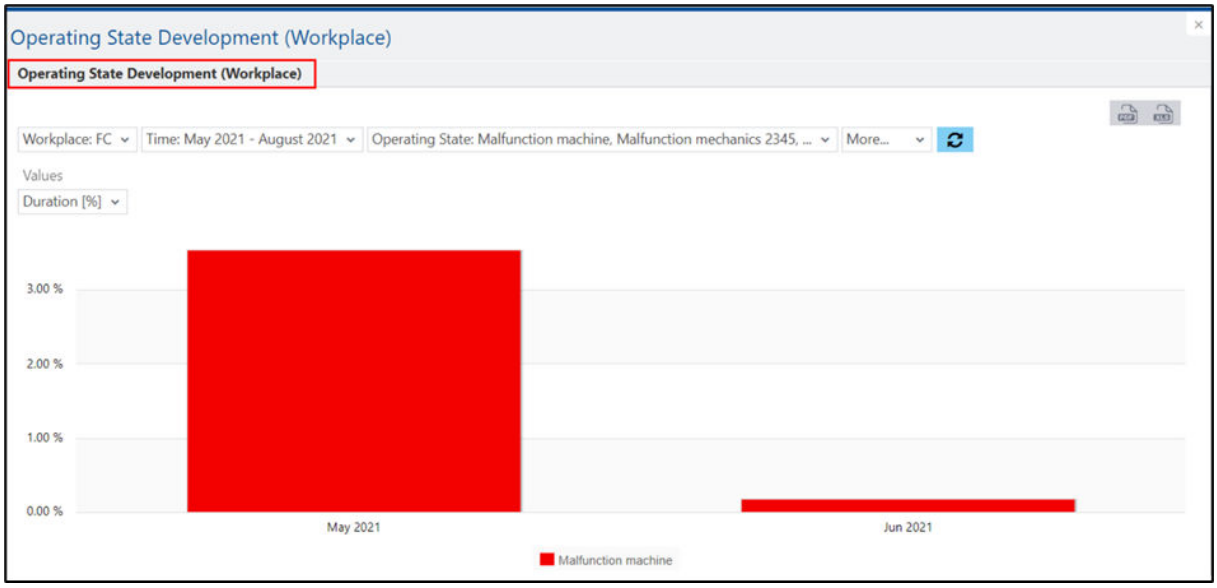

Fig. 25: Breadcrumb bar after a drill-down

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.

8 Visualizations and dashboards

Path (Office): Performance Analysis > Visualization
Path (Office): Performance Analysis > Dashboard

While reports allow the representation and analysis of long-term processes in manufacturing, visualizations provide a clear realtime representation of the current situation in manufacturing.

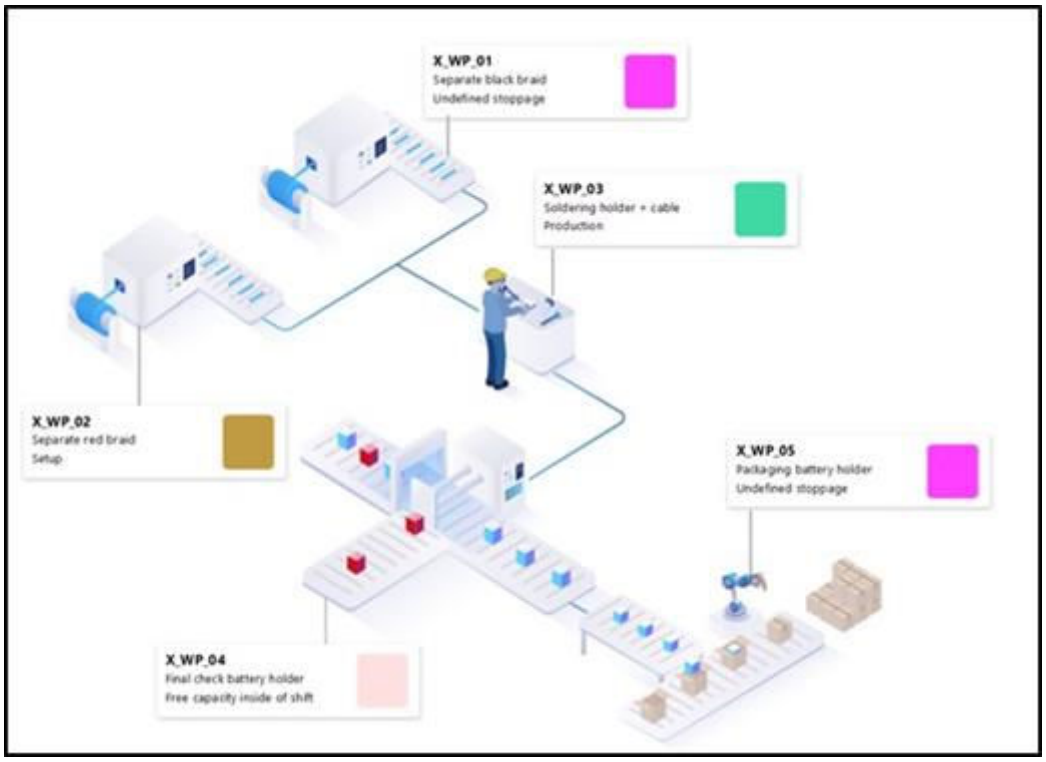

Fig. 26: Example of a simple visualization

Furthermore, dashboards are more complex displays that show multiple reports and visualizations in one overall view. A dashboard can be composed of existing reports and visualizations.

ⓘ See the “Visualization and Dashboard” manual for more information on how to create and edit visualizations and dashboards.
Note that some functions described in this manual can only be used to a limited extent in MES LITE.

9 Shopfloor Terminal

Path (SFT): Use Case Machine Data Collection

The Shopfloor Terminal is run in a browser environment and serves as a central source of information for production personnel and for recording operating states. Various manufacturing data are displayed from here in realtime. In FORCE MES LITE, the terminal is preconfigured by default and allows for setup, displaying a report and reasoning of stoppages.

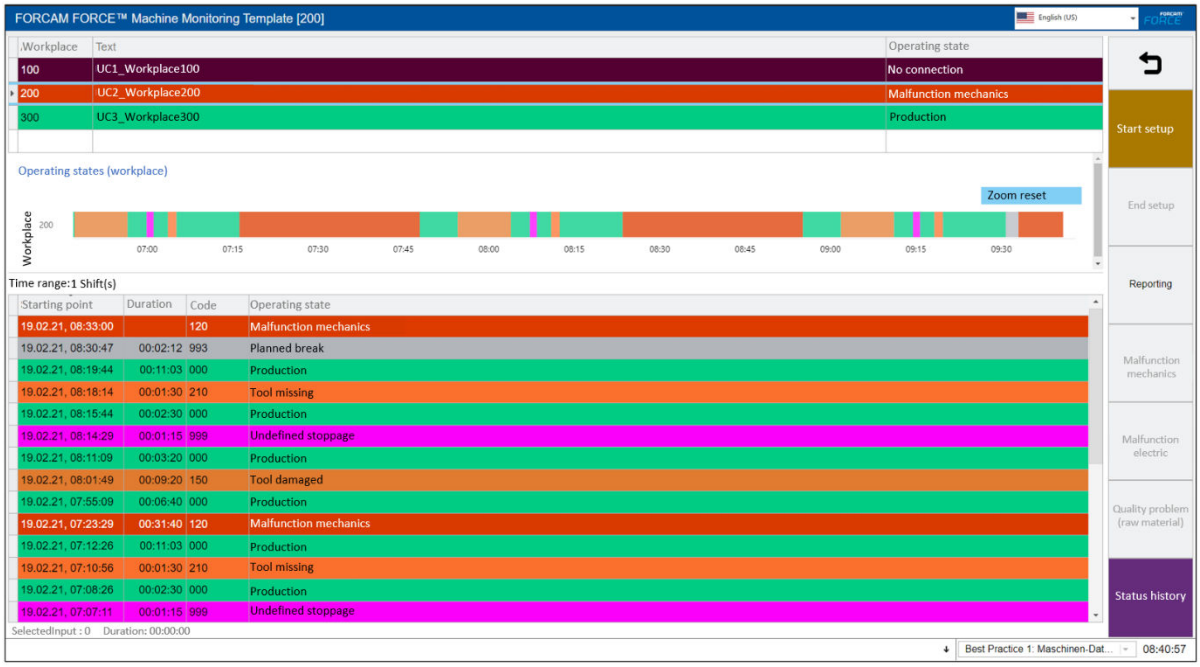

Fig. 27: Sample start page of the Shopfloor Terminal

The terminal is operated directly via the interface, either by mouse or by touch input, depending on the display device used. The following is a more detailed description of the user interface layout.

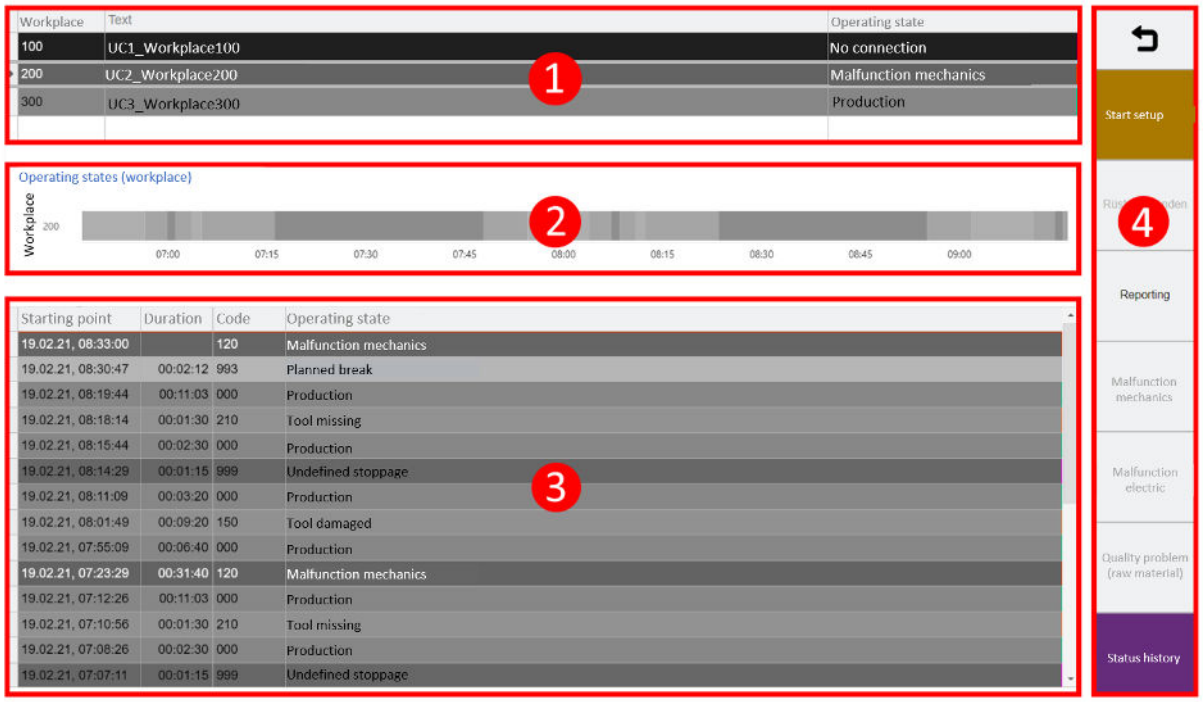

Fig. 28: Layout of the Shopfloor Terminal start page

(1) Workplace table:
Lists workplaces with their names and description and indicates the current operating state in the corresponding color.
All data displayed below refers to the currently selected workplace.

(2) Operating states report
Timeline for the selected workplace in hours. Displays the operating states according to their color, duration and sequence.
Hovering the mouse over an operating state displays the state designation.
An area in the timeline can be dragged by holding down the mouse button, and the timeline will then zoom in on this area.
The report is automatically updated at an interval of 20 seconds.

(3) Table of operating states
Lists operating states of the selected workplace in the order in which they occurred. Each operating state has information on the exact start time and is displayed in its corresponding color.

(4) Button bar
Interactive buttons that carry out commands depending on the configuration. The following buttons are preconfigured in FORCE MES LITE:

Table 5: Standard buttons in the SFT of MES LITE

Button	Function
Back	Exits the start page of the SFT and returns to the login screen
Start setup	Starts the setup phase for the selected workplace. All machine signals are ignored during setup, i.e. they are discarded and thus not recorded. This means, for example, that the machine can be started and stopped during the setup phase without this being registered. ⚠ The setup phase must be manually ended on time, otherwise important production data may not be recorded and will be lost.
End setup	Ends the setup phase for the selected workplace
Reporting	Switches to the reporting page of the SFT. A new button bar enables calling up various reports directly in the terminal.
Malfunction mechanics	The button is only active if a stoppage is selected for a workplace in the table of operating states (3). Reasons the stoppage with the operating condition **Malfunction mechanics**[1].
Malfunction electrics	The button is only active if a stoppage is selected for a workplace in the table of operating states (3). Reasons the stoppage with the operating condition **Malfunction electrics** [2].
Quality issue (raw material)	The button is only active if a stoppage is selected for a workplace in the table of operating states (3). Reasons the stoppage with the operating condition **Quality issue (raw material)**[3].
Status history	Switches to the status history page of the SFT, where all workplace statuses are listed with start time and duration. A new button bar enables editing of operating states (see below).
Configuration parameters of the status history page	
Select all	Highlights all selectable operating states in the table
Time range	Determines over which time period the operating states are to be displayed (e.g. for the last 3 shifts). The maximum time period here is one week.
Hide short intervals	If a check mark is set, those operating states with intervals that are too short and therefore not relevant for an evaluation are hidden. By default, no interval is defined as too short.
Only recodable intervals	If a check mark is set, only operating states that can be changed are displayed.
Change (button)	Calls up a dialog for selecting an operating state from a list that is used to change the corresponding operating state in the table.
Split (button)	Calls up a dialog via for selecting an operating state from a list, which is used to change the corresponding operating state in the table as of the desired time period For example, if **Tool defect** is selected, the operating state previously selected in the table will be changed to **Tool defect** from the time configured in the dialog.
Status: All (button)	Shows all operating states in the table. The button is only active if the **Unspecified** button was pressed previously.

[1] [2] [3] This changes the previous operating state (undefinded stoppage) to the new operating state.

Button	Function
Unspecified (button)	Displays only operating states where the stoppage has not been reasoned in more detail ("undefined stoppage" state).

10 Annex

10.1 Document conventions

Table 6: Fonts, formatting and characters used

Conventions	Description
Bold type	Buttons and options names are written in bold type.
Italics	Highlighted words are in italics.
Path	Each speficied **Pfad** refers to FORCE MES LITE. The respective module is listed in parentheses.
Values/Quantities	Values/Quantities that are not specified in more detail (e.g. by additions such as target/actual) refer to recorded data.
Icons	For a function that is represented by an icon, the icon is referenced as the object.
Alternative action step	Alternative action steps are separated by Or.
Substeps of an action	Substeps of an action are indented and have unified symbols per action level. The sequence order of the level is: 1. a. i. 1: Etc.
Action result	Action results are indicated by ➔.
Prerequisites	Prerequisites are indicated by ✓.
Warnings	Warnings are indicated by ⚠.
Notes	Notes are indicated by ⓘ.
Tips	Tips are indicated by ⓣ.

10.2 Abbreviations

Table 7: Abbreviations used

Abbreviation	Description
BZ	Operating state
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
SFT	Shopfloor Terminal
UTC	Coordinated Universal Time

10.3 Table of figures