FORCE MES FLEX - Productivity

Version 5.12

Product Description

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Overview

The **Productivity** app provides the tools for displaying the data collected from your machines and workplaces in a clear and concise manner.
The range of functions of the Productivity app includes three features:

- Basic package: **Visualization and Reports**
- Add-on: **Shopfloor Management**
- Add-on: **Personnel Hours**

Visualizations and reports let you present data as tables and graphs, which can also be exported or linked. Moreover, you can digitally replicate your own factory floor to instantly see the status of each machine.
The Shopfloor Management add-on extends the app to include the function of displaying both OEE (Overall Equipment Effectiveness) and OPE (Overall Process Efficiency).
The Personnel Hours add-on further supplements the range of functions with the preparation of data for production orders, attendance times, and overhead costs.
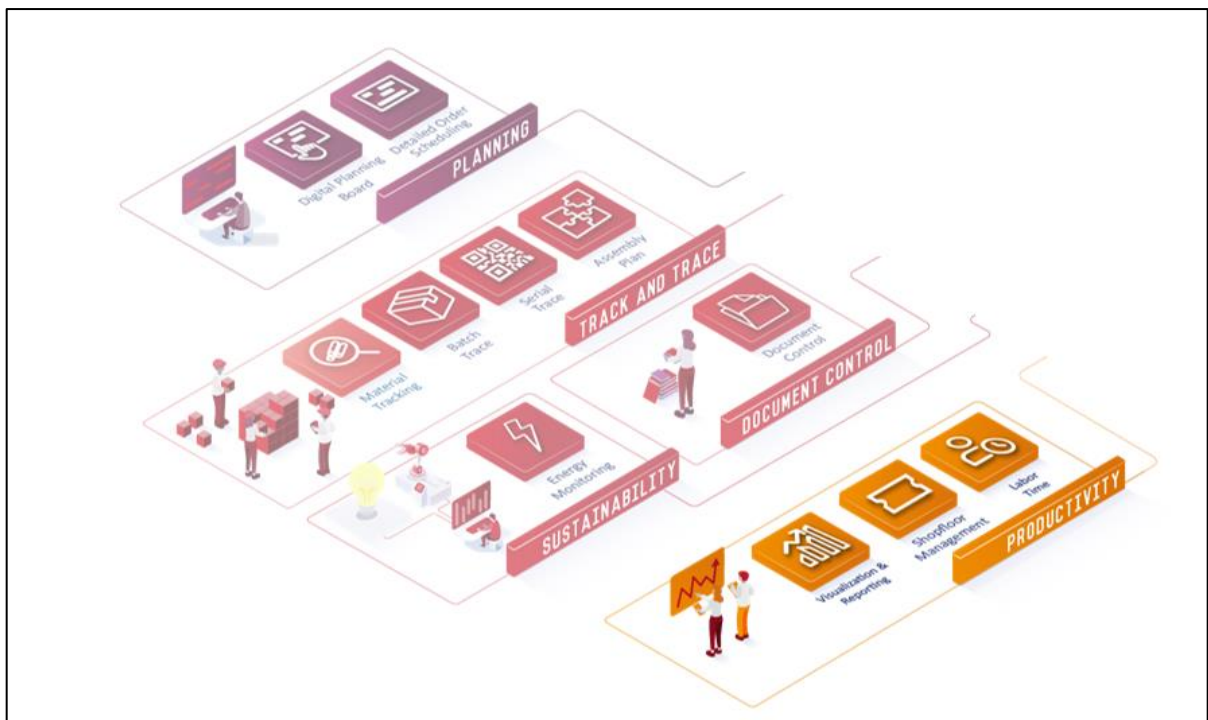
Basic package: Visualization and Reports

The Productivity app contains the connection to the machine data in the basic package. The **Visualizations and Reports** feature lets you display operating states, production times and other production-relevant information as tables and graphics.

The information prepared for reports allows you to analyze and evaluate your manufacturing processes based on previous performance.

Choose from a variety of predefined reports or compile and configure custom reports to meet your needs.

Visualizations are mainly used to display the actual realtime situation in production. They can be compiled together with reports in clearly arranged dashboards.

Auto reporting lets you automatically email reports or dashboards to individuals or groups of people at specified intervals. The scope of functions also includes a flexible ticketing system for recording problems and malfunctions and for initiating and monitoring improvement measures.

Reporting

Reports let you analyze and evaluate manufacturing processes in detail over defined time periods. They display the data in tabular form, but also in various graphical forms (e. g. bars, Gantt, pie chart, etc.).

Operating State	100 Duration	100 Duration [%]	200 Duration	200 Duration [%]	300 Duration	300 Duration [%]	90130 Duration	90130 Duration [%]	90270 Duration	90270 Duration [%]	Total ∅ Duration	Total Σ Duration	Total % Duration
Malfunction electrics					02:06	26.44%					00:25	02:06	6.17%
Malfunction machine	00:39	8.16%	00:36	7.65%	01:37	20.27%					00:34	02:53	8.42%
Missing personnel							00:28	6.01%	01:11	14.83%	00:20	01:40	4.86%
Missing tool							02:22	29.69%	00:29	6.24%	00:34	02:52	8.38%
Production	03:44	46.76%	04:23	54.86%	04:11	52.34%	04:33	57.08%	03:15	40.7%	04:01	20:08	58.73%
Reparation electrics							00:13	2.77%			00:02	00:13	0.65%
Reparation mechanics	01:21	17.04%									00:16	01:21	3.98%
Unplanned cleaning			02:51	35.69%			00:10	2.1%			00:36	03:01	8.82%
Σ	05:45	71.96%	07:51	98.2%	07:55	99.05%	07:48	97.64%	04:56	61.77%	06:51	34:17	100%

A number of predefined reports are provided by default. They comprise all manufacturing-relevant information and can present data based on previous events, but also in realtime. This depends on the respective report. Reports also enable comparisons between different plants and production sectors. Default reports cover the following manufacturing topics:

- Plant availability (overall view)
- Production quantity and machine hits (display quantity unit defined in ERP and display decimal places defined for respective unit)
- Operating states and operating state classes as well as their history
- Scheduled operating times
- Shift schedules, status details

Report Editor
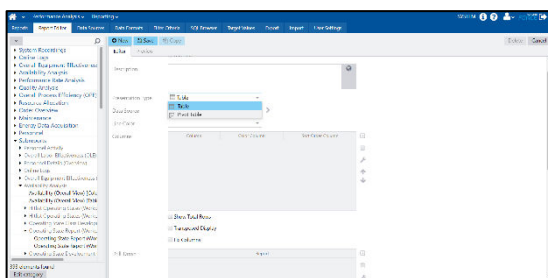
The Report Editor lets you configure custom reports based on predefined data sources. There are default and pivot tables with configurable contents and filter criteria available for this purpose. Additionally, charts in the form of bars, columns, gradients and timelines can be used. A preview integrated in the editor lets you check the result immediately with actual data.

Alarming and Auto Reporting
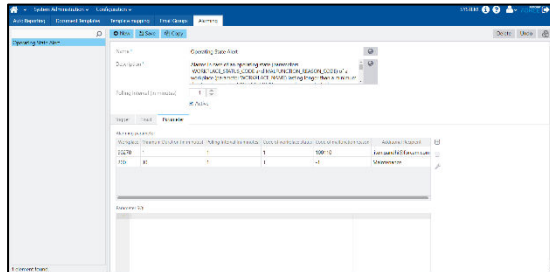
Configure any production data as a trigger to generate an alarm. Specify persons and groups of persons who will be informed immediately via email when an alarm occurs.

The emails may consist of both static and dynamic text. The dynamic element is updated with the corresponding values from the database when the alarm is triggered, e. g. which order is affected and how long the fault is present. Auto Reporting lets you send all existing reports - both predefined reports and custom ones - to desired recipients at specific time intervals. For this purpose, Auto Reporting provides a separate editor.

Possible triggers for alarming/auto reporting:

- Duration of a specific operating state
- Time of the shift end
- Workplace status
- Duration of a configurable time base since shift start
- Yield, scrap and rework quantity or total quantity since shift start, each with or without time base
- Target quantity calculated according to a time base

Ticketing

Ticketing is used to distribute tasks, initiate measures and fetch the respective process status at any time. This means that a worker can react immediately if, for example, required tools are not available which would delay the production progress. They simply enter the following information at their terminal to create a ticket:

- Action required (What is the problem?)
- Person responsible (Who will fix it?)
- Scheduling (When does it need to be finished?)

Action tickets created like this can be distributed via email. Files or graphics can also be added to help illustrate the situation. The status of each ticket (completed/open/working) is visible to all stakeholders at any time.

Visualization

For an effective shopfloor management, visualizations can be used to illustrate the current actual situation on the shopfloor. Some visualization elements are included by default to help you map your own production halls.
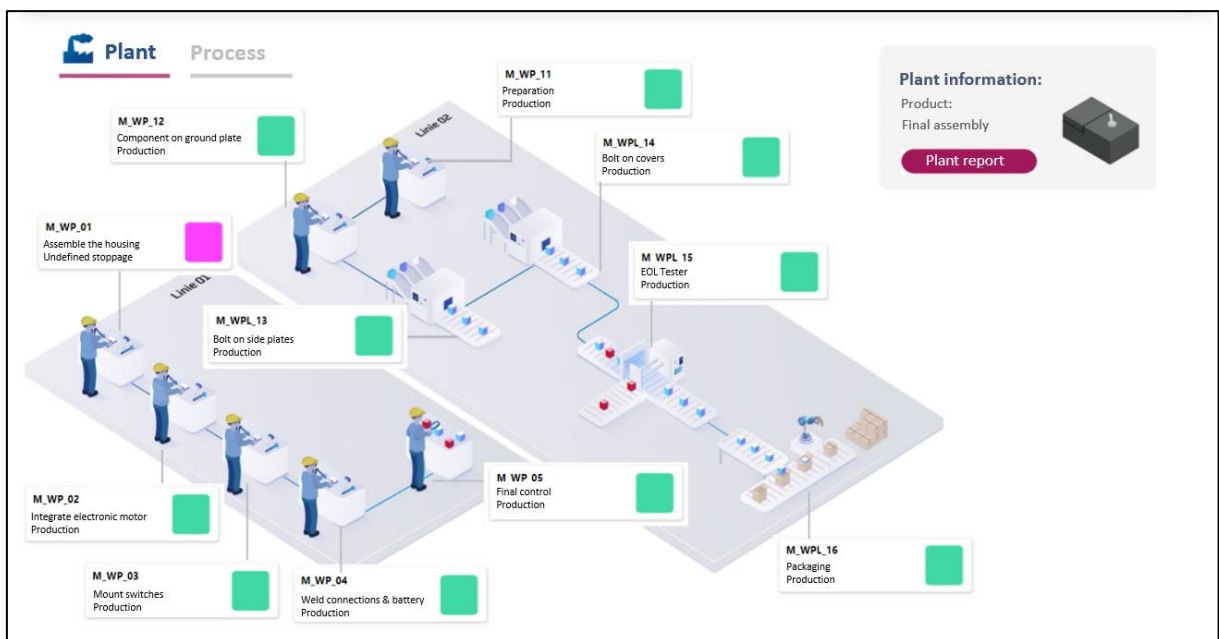
Visualizations allow you to view multiple locations, a single plant, individual factory floors, plants, machines or even individual workplaces. For this, the following data can be used in realtime:

- Machine and plant statuses as well as shift times
- Stoppages and malfunctions with indication of reasons
- Actual data on cycle times, quantities, scrap figures including target/actual comparisons (part of the Shopfloor Management add-on)

Web-based editor
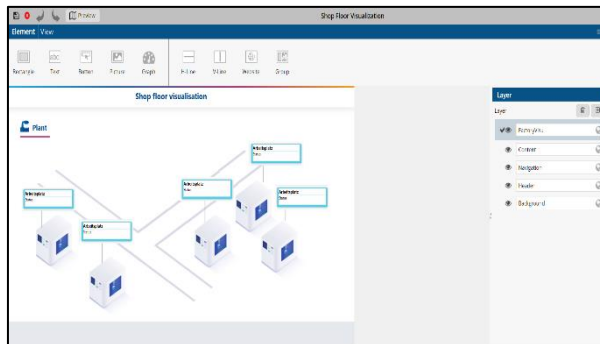
The graphical, web-based editor lets you intuitively implement plant layouts, integrate customized reports, or display measured values, operating states, or produced quantities in real time, for example. Any end device with an appropriate internet browser can be used for display, be it a tablet or a large ANDON tablet.

Plant hall

Visualizations consist of simple basic elements (rectangle, line, text, etc.). You can also include HTML pages, graphics or custom group elements. Moreover, it is possible to integrate graphics in formats supported by browsers (MIME type). It lets you create a preview at the design stage to check the appearance of the final view and whether the correct data will be displayed. This lets you virtually recreate plant halls, production lines or plants according to the building block principle.

Drill down to the operating state history
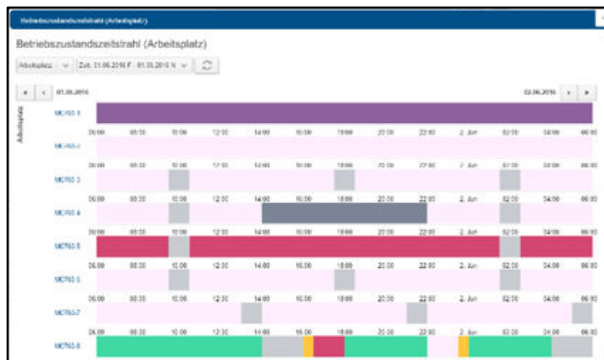
Drill-downs let you navigate, for example, from a world view to individual plants and production halls to a detailed view of individual machines and back again. It also lets you include reports on individual workplaces or shopfloors in the visualization.

Dashboards

You can create visualizations and reports in customized dashboards. A dashboard consists of arbitrary widgets that can display parts of a report or even entire visualizations. It enables you to clearly compile, display and send the production data that is most relevant to you. A dashboard can also be used for periodic direct comparison of different manufacturing sites.
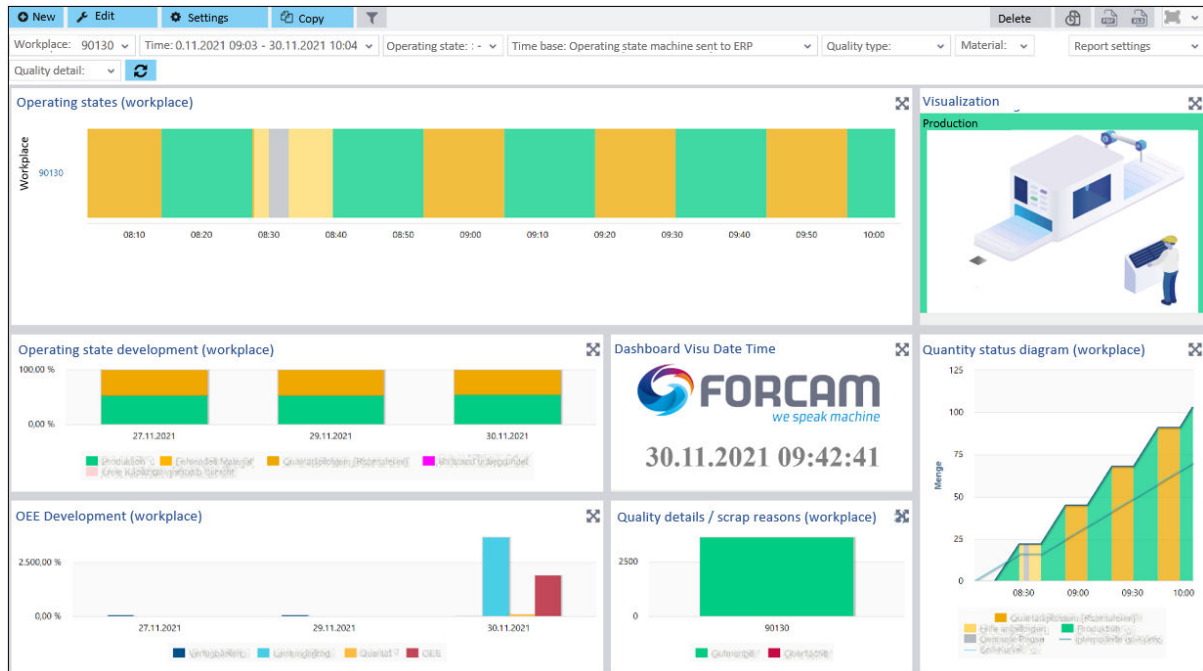
Shopfloor Terminal

FORCAM Productivity's Shopfloor Terminal (SFT) not only provides the prerequisites for effective shopfloor management, but it also offers a central source of information directly at the workplace that can be used by production personnel.
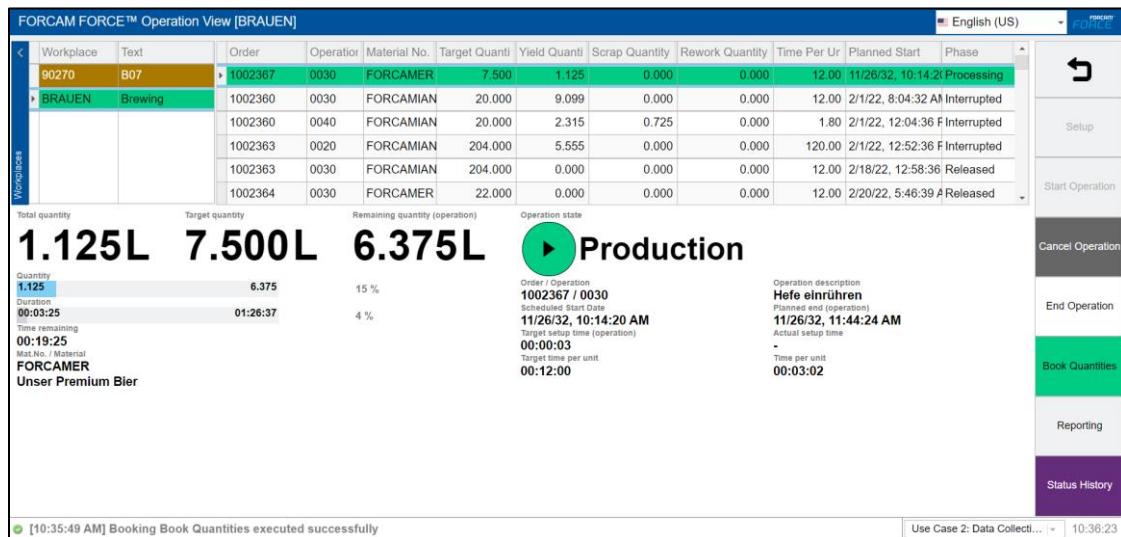
The SFT runs in a browser environment and is designed to be used on Windows-based industrial terminals as well as on Windows tablets.

The layout and the displayed information are fully configurable. Quantity unit defined in the ERP are displayed with decimal places defined for the respective unit.
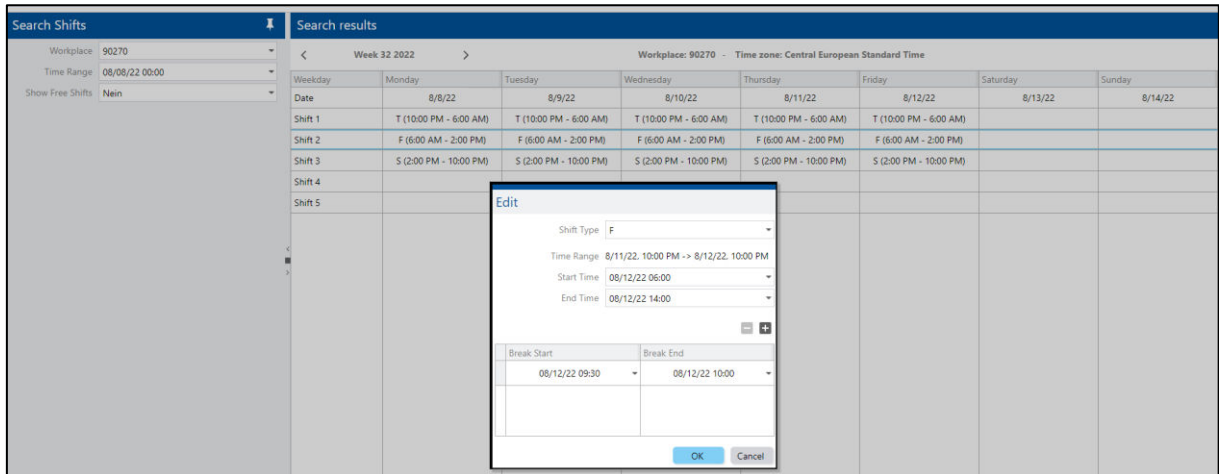
Reports with workplace-related evaluations can be called up directly in the SFT.

There are also pre-configured templates available for various terminal configurations that can be assigned to one or more workplaces.

Corrections

FORCAM Productivity's also provides the various correction. Within the correction, Shift correction, Workplace operating state correction, Quantity correction etc. are possible

Scope of functions

Reports

- Predefined and configurable reports for real-time display of the recorded data from production, including the current shift reference:
  - Operating state log, workplace and operation related operating state timeline
  - Workplace and operation-related quantity status diagram
  - Overview of messages entered for an operation at a workplace (e. g. machine signal, phase, status, quantities, etc.)
- Availability analysis:
  - Operating state class report and history (workplace)
  - Operating state report and history (workplace)
  - Hit list of operating states (workplace)
- Resource allocation:
  - Scheduled operating time
  - Workplace allocation and workplace availability
  - Shift schedule
- Quality analysis:
  - Quality report and details (workplace)
  - Quality class report (workplace)
  - Hitlist quality details (workplace)
- Custom reports based on predefined data sources in the editor requiring no knowledge of SQL
- Custom reports in the editor via freely definable SQL statements to the database

- Various chart types, graphs and tables for designing reports
- Automatically send reports by email

Visualizations

- Plant-wide overview of the production progress, the production statuses of current orders and the current operating states of the machines and systems
- Numerous options for implementing virtual overall views with drill-down options (e.g. from a plant overview to the individual workplace):
  - Overviews of locations (international, national)
  - Overviews of plants, halls and production lines
  - Detailed views of individual plants, machines and workplaces
- This provides a virtual image of production in realtime:
  - Visualization of machine and plant states
  - Visualization of stoppages or malfunctions with indication of reasons
  - Realtime visualization of actual data: Cycle times, piece counts, scrap figures including target/actual comparison, plant and machine operating times.
- Web-based application, executable on large screens, computers and mobile devices
- Dynamic adaptation of the design to the output screen of the respective end device (responsive design theme)
- The visibility of objects depending on the user role makes it possible for several users to display a view differently
- Easily create new views with drag-and-drop support
- Multiple views can be edited or operated independently (e. g. production line or hall layout)
- Live image display during editing: While editing hall layouts and workplace views, they are displayed in the preview just as they are during runtime
- The logical and physical view of signals are separated, whereby knowledge of the database structure is not required by the user
- Import of visualization elements and background images with support of all common graphic formats
- Embedding of any website
- Within a view, reports can be displayed either as a table or a diagram

Dashboards

- Clearly arranged and user-friendly overall views where several selected visualizations can be displayed next to reports

Alarming

Trigger alarming:
- Monitoring of any data at regular time intervals and usage as triggers
- Automatically triggered sending of emails to one or more addressees
- Definition of email templates with static and dynamic text. Dynamic texts are inserted using placeholders (as in self-created reports).
- Automatically calculate values at regular intervals within a shift without affecting the runtime behavior of the visualization

The following triggers can be configured for sending alarms:

- Duration of a specific operating state (preconfigured)
- Time of the shift end
- Workplace status
- Duration of a configurable time base since shift start
- Yield, scrap, rework or total quantity since shift start, with or without time base
- Target quantity calculated according to a time base

Autoreport

- Automatically create reports at regular time intervals
- Send reports as PDF files to individual email recipients or distribution lists

Corrections

The following corrections can be performed:

- Operating state correction – Change (recode) / split operating state for workplace and operation.
- Quantity correction – Total quantity or single quantity correction is possible. Quantity booked of an operation can be changed as a whole.
- Operation end/interrupted – Finished operations can be set to Interrupted phase
- Shift correction – Shift can be changed after they have been created, Shift created in past or active shift or future shifts can be corrected. Based on shift correction, the operating states are also adapted accordingly.
- Personal times correction – Add, edit or delete the personnel time.

Add-on: Shopfloor Management

The Shopfloor Management add-on extends the app to include the order reference which enables evaluation options in terms of two central key figures:

- Overall Equipment Effectiveness (OEE)
- Overall Process Efficiency (OPE)

This add-on makes all manufacturing and value-added processes related to orders, operations and materials transparent and easy to analyze. In addition to target/actual deviations and any problems, targets and planned improvement measures are also visible to all your employees. This makes Shopfloor Management the key tool of your CIP.
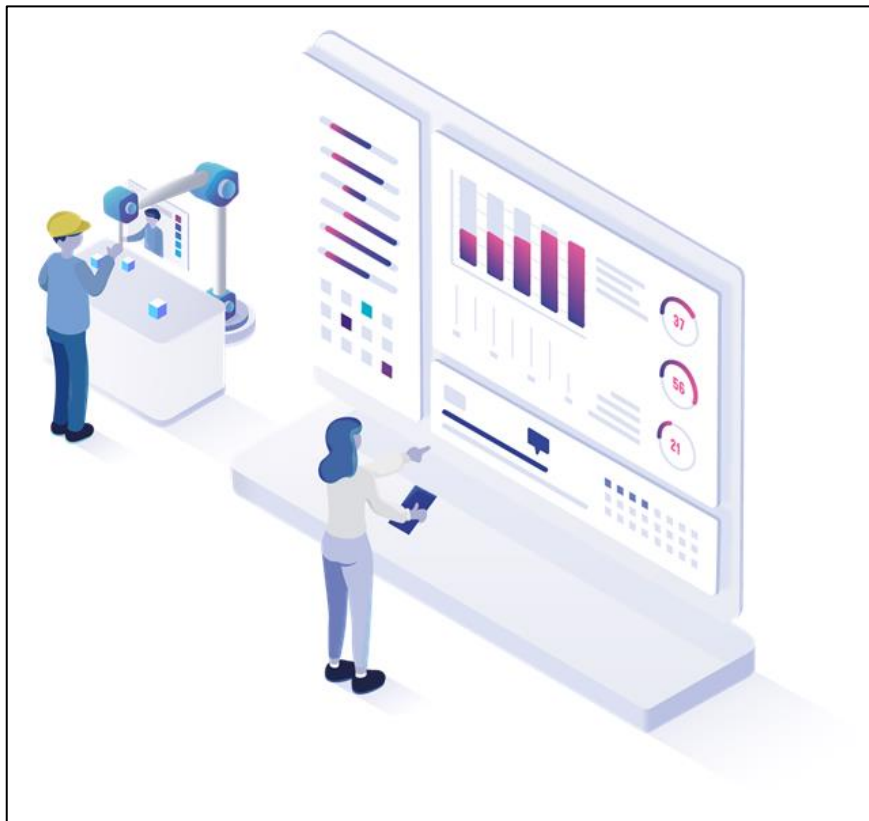
Reporting

By linking to an ERP system, the Shopfloor Management add-on lets you view orders, operations, materials, quantities and progress in addition to machine data. Vice versa, the processing status, quantities and performances are reported back to the ERP system. The add-on contains a number of additional logs and reports for a wide range of parameters. They include, among others:

- Operating states
- Orders
- Workplaces
- Operations
- Materials and quantities
- States (material, order, operation)
- Performance related to operations
- OEE
- Quality
- Shifts

OEE
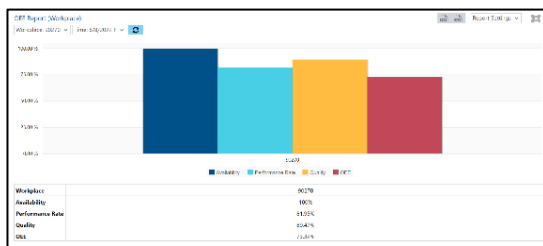
The OEE displays the overall equipment efficiency. It is calculated as the product of availability, performance rate and quality. The OEE evaluation displays each of these key figures as a separate bar, giving a quick and transparent overview for CIP. Reports for OEE evaluation also contain the progression over selectable accumulation periods.

OPE
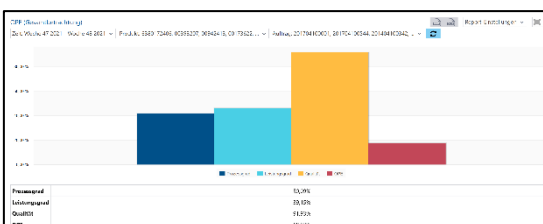
The OPE is the product of the key figures production process ratio, performance rate and quality. The production process ratio is the product of throughput efficiency, process availability and setup reduction. The performance rate is a target/actual comparison of the piece time. The quality is determined by the quality types (yield, scrap and rework quantity) and is the quotient of yield/total quantity. The OPE evaluation is also available as a column chart and table. Further reports go into more detail on OPE analysis (with reference to orders and operations).

Visualization

The Shopfloor Management add-on allows you to visualize, for example, the order/operation currently underway, the machine quantity that has not yet been qualified, or the quantities that have already been qualified by the worker (with the quality type yield, scrap, and rework).
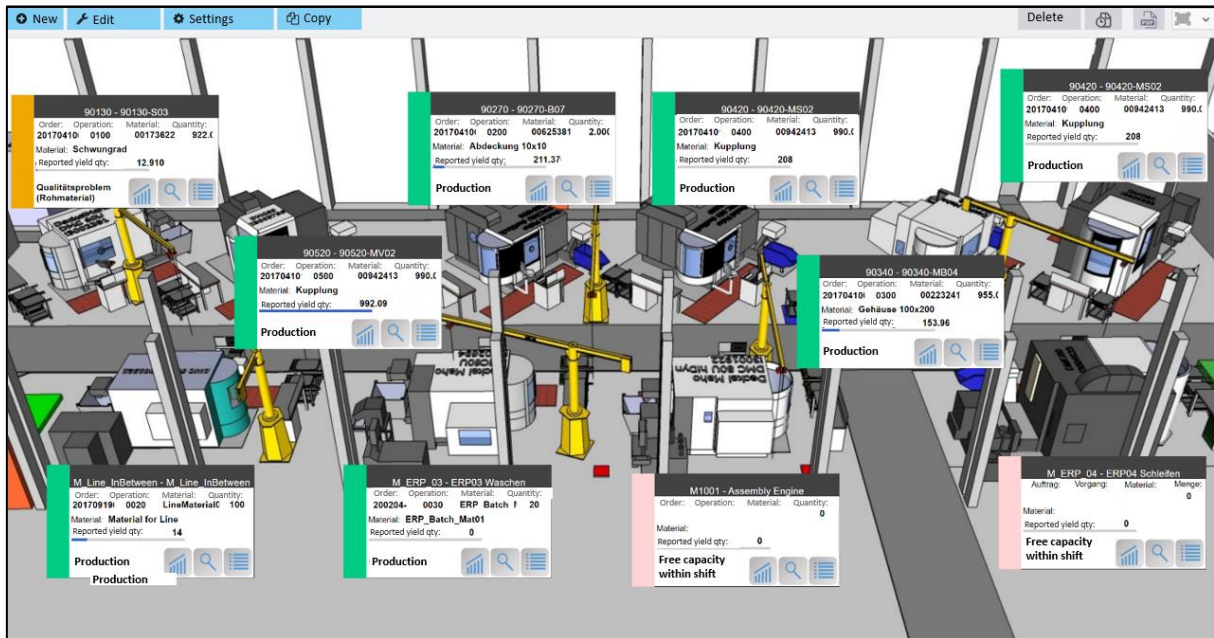
Shopfloor Terminal

For each workplace, the worker can display a list of planned operations in the SFT. When selected, additional detailed information is provided. The worker can also start or stop operations or report setup operations and interruptions, for example.

Reasons for scrap or rework can be easily specified in more detail by selecting from a customizable list in order to document them. In the same way, machine stoppages can be justified. Feedback is sent to a superordinate ERP system in each case.

Scope of functions

Reports

- Predefined and configurable logs for realtime representation of recorded data from the production line:
  - Shift book, shift log, quantity log in realtime with reference to the respective current shift
- Overall equipment effectiveness (OEE) in the overall view and in the development view
- Availability analysis:
  - Overall view of availability with occupancy rate, process availability and setup reduction
- Performance rate analysis:
  - Operation-related performance report as well as workplace-related hit report and hit development
- Quality analysis:
  - Quality report and quality details related to workplaces, materials, and operations
  - Quality and quality detail history related to the workplaces and materials
  - Hit list of quality details or scrap and rework reasons related to workplaces, materials, and operations

- Overall process efficiency (OPE)
  - Overall view including production process ratio, performance rate and quality
  - Overall view of the process rate including throughput efficiency, process availability, setup reduction
  - Order and operation analysis
- Order overview:
  - List of orders, order details and order backlog
  - Ongoing and completed operations and operation details

Add-on: Personnel Hours

For the modern business management, it is vital to consider the question of unit costs. This question can only be answered accurately on the ERP side if personnel times are recorded in addition to machine data (production times, stoppages, cycle times, etc.). The key question is: What personnel costs were incurred per product?

Using electronic recording, the Personnel Hours add-on helps you provide clarity and create a basis for analysis. Automated feedback of the personnel hours to the ERP makes it possible to determine unit costs as well as personnel costs per product. Manual workplaces can also be included in this consideration.

The Personnel Hours add-on focuses on the times incurred in relation to production orders and operations:

 − Personnel hours on production orders

This add-on can also be used as a basis for additional optional entries that provide transparency not only for personnel attendance times, but also for those personnel times that are incurred on internal orders or posted to overhead cost centers:

 − Personnel attendance times
 − Personnel hours on overhead costs

Focusing on these three different types of personnel hours allows you to make the right choice for your business.

Personnel hours on production orders

A first centric view of the personnel hours in production can be obtained by using personnel hierarchies for grouping your production personnel or hierarchies for personnel master cost centers. Production orders or operations can be assigned to employees. This data is then available for analysis, optimization and planning in the reporting and ERP system.

To record personnel hours, each employee can log in via the Shopfloor Terminal either at the workplace or directly to an operation of a production order. When logging in, employees are generally logged on to all currently active operations of a workplace and also logged off again as soon as an operation is canceled or completed.
Recording personnel hours is done in relation to:

  – Order, operation, material
  – Workplace/machine

The feedback of personnel hours to the ERP is only ever made in relation to:

  – Order, operation

If several machines are operated or if individual employees work on several operations at the same time, the personnel hours are distributed and evaluated on a linear basis. The retransfer of actual personnel hours to the ERP can be done either as a total amount (anonymized) or per individual. Personnel hours data is made available by the SFT, via Reporting and feedback confirmation to the ERP.

Personnel Reports

A variety of personnel reports provide you with an overall view of worker logon times and allow you to view and analyze operation-related times based on personnel.
The feature provides the following predefined reports by default:

- Online personnel activity related to person, workplace and order/operation in realtime
    - Reports can be provided to the workers in the SFT
- Personnel activity log
    - Overview of login times on an operation, aggregated to operation phase
    - Logged actual time, if necessary a rated time in case of parallel production
    - Not anonymized, per individual/worker
- Personnel operation log for operation, workplace and person
    - Not anonymized, per individual/worker
- Personnel hierarchy with personnel hours reports/logs
    - System hierarchy - either via the personnel master cost center hierarchy or the user-defined personnel hierarchy for grouping persons
    - The history for each person is incorporated via personnel master cost centers. This is reflected in the evaluations.
- Personnel report for cost center personnel master/personnel group, aggregated personnel hours on operations as well as quantities *
- Personnel history for cost center personnel master/personnel group, aggregated personnel hours on operations, as well as quantities as history *

* Personnel-related quantity bookings are only made when workers explicitly book in the quantities produced (e. g. in the case of incentive wages).

Workplace	First name	Last Name	Start Time	End Time	Login Duration...	Weighted Duration...	Order	Operation	Operating State
ManualSeq-20016			Jul 20, 2022, 4:25 PM	Jul 20, 2022, 4:38 PM	00:12:14	00:12:14	MWS-76336406359	001	Production
ManualSeq-20016			Jul 20, 2022, 4:18 PM	Jul 20, 2022, 4:25 PM	00:06:49	00:06:49	MWS-76336406359	001	Setup
ManualSeq-20016			Jul 20, 2022, 4:11 PM	Jul 20, 2022, 4:37 PM	00:26:26	00:26:26	MWS-67899608429	001	Production
ManualSeq-20016			Jul 20, 2022, 4:10 PM	Jul 20, 2022, 4:11 PM	00:00:18	00:00:18	MWS-67899608429	001	Reparation electrics
ManualSeq-20016			Jul 20, 2022, 4:00 PM	Jul 20, 2022, 5:00 PM	01:00:00	00:30:00	MWS-99169785428	001	Setup

Personnel attendance times

For a comprehensive analysis of personnel costs per product it is equally important to know how much value-adding, productive work is represented by the pure attendance time of workers.
This extension will enable you to compare the times booked to production orders or operations with the attendance hours of personnel and thus determine the proportion of value-added, productive work.

Worker attendance times can be accessed in two ways:
- Via the Shopfloor Terminal
  - The data is transmitted to the ERP, where it can be further booked in a corresponding HR module.
- Via a time tracking system already in use
  - FORCE MES FLEX is only a consumer of employee attendance information.

Time tracking makes it possible to assign personnel hours to production orders or operations as well as attendance times of employees and personnel master cost centers to each other.

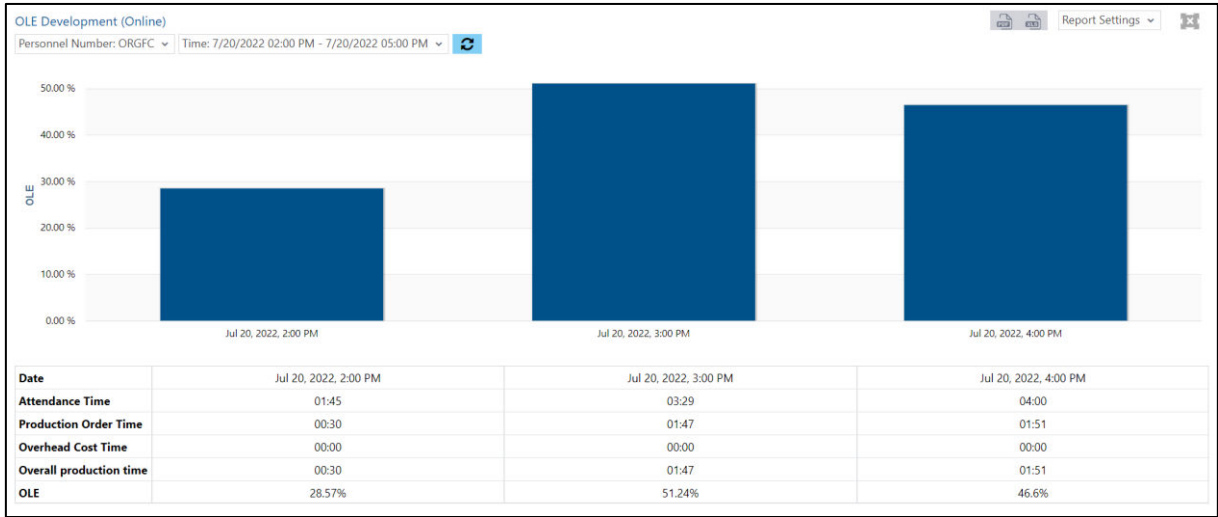Recording personnel hours is done in relation to:
- Order, operation, material
- Personnel attendance times
- Workplace/machine

This data is available for analysis in Reporting. The data is provided via the SFT, in Reporting and via feedback to the ERP.

Personnel Activity Log Details								
Start Time	End Time	Login Duration...	Proportion	Weighted Duration ...	First name	Last Name	Workplace	Type
Jul 20, 2022, 2:00 PM	Jul 20, 2022, 5:00 PM	03:00:00	50%	01:30:00			ManualSeq-20016	Interrupted
Jul 20, 2022, 2:00 PM	Jul 20, 2022, 5:00 PM	03:00:00	50%	01:30:00			ManualSeq-20016	Setup
Jul 20, 2022, 3:33 PM	Jul 20, 2022, 4:12 PM	00:38:49	100%	00:38:49			ManualSeq-20016	Processing
Jul 20, 2022, 3:34 PM	Jul 20, 2022, 4:12 PM	00:38:37	100%	00:38:37			ManualSeq-20016	Processing
Jul 20, 2022, 3:34 PM	Jul 20, 2022, 4:37 PM	01:03:05	100%	01:03:05			ManualSeq-20016	Processing
Jul 20, 2022, 4:18 PM	Jul 20, 2022, 4:25 PM	00:06:49	100%	00:06:49			ManualSeq-20016	Setup
Jul 20, 2022, 4:25 PM	Jul 20, 2022, 4:38 PM	00:12:14	100%	00:12:14			ManualSeq-20016	Processing

Personnel Reports

Reporting is supplemented by the attendance times of personnel with a display of employee productivity and their history (online). This provides you with an important key figure: Overall Labor Effectiveness (OLE)

Date	Jul 20, 2022, 2:00 PM	Jul 20, 2022, 3:00 PM	Jul 20, 2022, 4:00 PM
Attendance Time	01:45	03:29	04:00
Production Order Time	00:30	01:47	01:51
Overhead Cost Time	00:00	00:00	00:00
Overall production time	00:30	01:47	01:51
OLE	28.57%	51.24%	46.6%

Personnel hours on overhead costs

The second optional extension also increases transparency regarding unit costs. It supplements the perspective on personnel hours related to production orders and operations as well as attendance times with personnel hours on overhead costs.
These are incurred for internal orders that are booked to overhead cost centers. Internal orders can be, for example, maintenance or cleaning work. Although such work is inevitable, it is counted as "non-productive" time that affects unit costs.
This second extension now gives complete transparency over all costs that may be incurred in connection with personnel hours. Production orders or operations, attendance times, internal orders and overhead cost centers can now be assigned to employees. This data is fully available for Reporting as well as in the ERP system for planning purposes.

Recording personnel hours is done with this extension in relation to:
- Order, operation, material
- Personnel attendance times
- Internal orders and overhead cost centers
- Workplace/machine

The data is provided via the SFT, in Reporting and via feedback to the ERP.

Personnel Reports

In the following reports, the extension for personnel hours to overhead costs also includes personnel bookings to internal orders or overhead cost centers:
- Personnel activity log
- Online personnel activity related to person, workplace and order/operation in realtime
- Personnel report for cost center personnel master/person group, aggregated attendance times, as well as person-related quantity bookings *
- Personnel history for cost center personnel master/person group, aggregated attendance times as well as person-related quantity bookings as history *

* Personnel-related quantity bookings are only made when workers explicitly book in the quantities produced (e. g. in the case of incentive wages).

Scope of functions

Personnel hours on production orders

Reports

- Online personnel activity related to person, workplace and order/operation in realtime
  - Reports can be provided to the workers in the SFT
- Personnel activity log
  - Overview of login times on an operation, aggregated to operation phase
  - Logged actual time, if necessary a rated time in case of parallel production
  - Not anonymized, per individual/worker
- Personnel operation log for operation, workplace and person
  - Not anonymized, per individual/worker
- Personnel hierarchy with personnel hours reports/logs
  - System hierarchy - either via the personnel master cost center hierarchy or the user-defined personnel hierarchy for grouping persons
  - For each person, the personnel master cost center history is considered and reflected in the evaluations
- Personnel report for cost center personnel master/personnel group, aggregated personnel hours on operations as well as quantities *
- Personnel history for cost center personnel master/personnel group, aggregated personnel hours on operations, as well as quantities as history *

Personnel attendance times

Report

Report with important key figure: Overall Labor Effectiveness (OLE)
- Report on employee productivity and its history (online)

Personnel hours on overhead costs

Reports

Reports with additional consideration of personnel logons to internal orders or overhead cost centers:
- Personnel activity log
- Online personnel activity in realtime (person, workplace and order/operation)
- Personnel report for cost center personnel master/person group, aggregated attendance times, as well as person-related quantity bookings *
- Personnel history for cost center personnel master/person group, aggregated attendance times as well as person-related quantity bookings as history *

* Personnel-related quantity bookings are only made when workers explicitly book in the quantities produced (e. g. in the case of incentive wages).