



FORCE MES LITE – “OEE” package

Version 5.12

Product Description



Document: Product Description -
FORCE MES LITE – “OEE” package



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Introduction

This document describes the scope of services and the added value of the FORCE MES LITE application (hereafter simply referred to as MES LITE) in combination with the **OEE** package. The package contains the machine connection via I/O controller, the production order context and the OEE evaluation.

This MES LITE **OEE** package includes the **Availability** package (see the product description for that package). Therefore, this document only describes the additional scope and added value of the MES LITE **OEE** package as extended version.

This primarily includes:

- Functionalities and additional reports to determine, display and track the OEE key figure (*OEE = Overall Equipment Effectiveness*)
- The management of additional quality attributes such as **quality type, detail** and **detail classification** for collecting and classifying the quality of produced material (e.g., as yield, scrap or rework)
- The option to create and manage production orders, operations (AVOs) and material using the **Order Management** module
- The collection and management of produced quantities
- Possibilities to correct quantities and change operating states later on

The machine connection for the collection of the OEE-relevant data is preconfigured and ready-to-use in MES LITE. This allows machines to be connected to the system quickly and easily. It is also possible to connect additional machines at any time.

The documentation and the basic structure are designed as a "ready to run" standard product that enables the customer to perform a largely independent rollout in production. The scope of delivery also contains a "*FORCE MES LITE Quick Start*" guide, the installation with machine connection can therefore be carried out by the customer in a guided and target manner.

Glossary

Term	Description	Notes
Shopfloor Terminal (SFT)	Browser-enabled hardware on the machine for interaction initiated by the worker. It is supplied by the customer.	See "System requirements"
License model	The license model is an on-premise model. The required hardware is provided by the customer, according to FORCAM's system requirements. The reference values for licensing are the number of workstations and the released packages for the MES LITE version.	We offer the <i>Purchase plus maintenance</i> licensing variant.
Operating state	Machine state in production (running) or stoppage (not running), with stoppage reason for the cause.	
Office Client	Web application for displaying manufacturing data as reports, visualizations and dashboards.	
FORCAM I/O Controller	Device to be installed in a control cabinet for tapping the electrical machine signals.	For rail mounting refer to the manual " <i>Connecting a FORCAM I/O Controller</i> ".
Data Collection Server	Device that connects the production network (LAN) to the application server.	FORCAM I/O controllers send data to this device for normalization/standardization and, finally, for data transfer to the application server.
Workplace	A workplace corresponds to a machine, in this case in a 1: 1 relationship.	
Order	An order consists of data and instructions for the production of material or a final product in a specific quantity and within a specific time frame.	Connected to your ERP system via order interface. The connection is done by the customer, FORCAM can support this process.
AVO/Operation	An AVO (operation) is a sub-step of an order and consists of data and instructions for the production or processing of a material at a specific workplace.	An order generally consists of several operations that can be processed sequentially or in parallel.
Temp. Quantity	Quantity counted by the FORCAM I/O controller, but not yet qualified.	Machine data collection (MDC) counts an unqualified quantity that the worker later qualifies (e.g., as yield, scrap, or rework).

Scope of functions

Machine connection

Within the range of machine connection, an additional signal for the registration of the processed or produced **quantities** is added to the existing 4 signals for the machine status. This signal is necessary to determine the quantities. The qualification of the captured quantities (yield/scrap/rework) is then manually done by the worker at the Shopfloor Terminal (SFT).

Software scope of delivery

Machine Data Collection

- The additional signal **Quantities** is already present and preconfigured on the FORCAM I/O controller. The wiring is done in the same way as machine data collection, by the customer.

Master data configuration

- The system already contains an example order with several AVOs for further processing. This can be edited directly or used as a template for further orders.
- The system's processing logic is predefined.

Corrections


- The quantity feedbacks qualified by the worker can be corrected later (e.g., by the foreman).
- Finished operations can be re-released for processing (e.g. by the foreman).

Order/Operation generation

- The additional Office module **Order Management** allows for manually creating and editing orders, operations, and material. This enables the user to capture and evaluate the target specifications for calculating the OEE and other key figures and to use them for CIP measures.

Order interface based on XML

- For the external input of orders and operations, an XML-based interface is available for connecting an ERP system. In this case, datasets related to orders are exchanged between the ERP system (e.g., abas, pro Alpha, MS Dynamics SAP, etc.) and MES LITE via HTTP or HTTPS protocol, by way of XML datasets. Suitable programming samples can be found on GitHub.
- Operation status, quantity and time feedback can also be reported back to external systems via an XML-based interface. Suitable programming samples can be found on GitHub (**FORCAM FORCE Bridge API™ SDKs & Samples - GitHub**). These feedbacks are disabled at delivery. Please contact FORCAM should you wish to enable these feedbacks.

 Instructions for creating and editing orders, operations, and material and for making corrections can be found in the *“Manual– FORCAM FORCE MES”*, which is included in the delivery.

MES LITE (OEE) - Module overview



Figure 1: MES LITE module overview



Machine Data Collection (MDE) in MES LITE provides data and information about the current state of a workplace (machine or plant). The MDC recording enables analyzing developments and trends in a differentiated way and comparing different workplaces with each other.

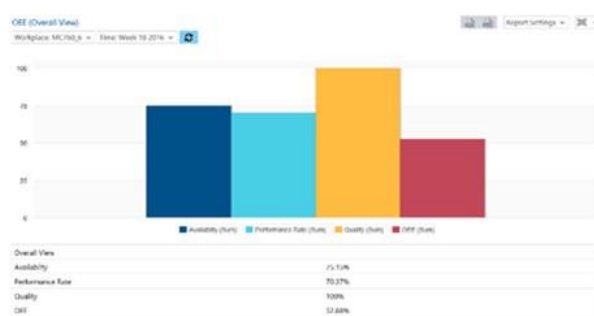
The worker at the machine is able to qualify unfounded stoppages by the actual reason. The supervisor/foreman can also still make corrections. Together with the shift maintenance (nominal state), the actual machine availability can be determined objectively.

i Quantities are only ever booked to active operations in MES LITE. The operator must ensure that an active operation is always selected during production.

Added value OEE

- Automatic collection and processing of machine quantity messages and machine status messages to determine operating states and quantities produced
- Collection of the operation phase messages (setup, production, break) reported at the Shopfloor Terminal and of the operation quantity messages (yield, rework, scrap) registered there
- Machine status correction messages for defining stoppages or for sharing a status interval are processed on the Shopfloor Terminal

Additional reports in the performance analysis



OEE (overall view)

Graphical and tabular display of the OEE-compliant evaluation as column chart, for monitoring the entire plant or individual plant areas within a specified time period. The OEE figure is calculated from availability, performance and quality.



OEE Report

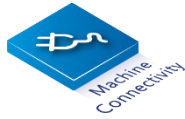
Graphical and tabular display of the OEE-compliant evaluation as column chart, to compare individual workplaces or hierarchy levels within a specified time period.



OEE History

Graphical and tabular display of the timeline development of the OEE evaluation for selectable accumulation periods (day, week, month, quarter, year) within a given time period. The display can be related to individual workplaces as well as to any hierarchy levels.

Machine Connectivity (OEE)



The **Machine Connectivity OEE** captures **quantity** in addition to machine status signals and then forwards this value to the worker for qualification into yield, scrap or rework.

Shopfloor Terminal




The **Shopfloor Terminal** is used to visualize and specify or qualify operating states and quantities, and also to edit the operations. It is the link between the machine data collection and the worker at the machine.

- **X = Piece = good**
- **Y = Scrap (with reasons)**
- **Z = Rework (with reasons)**
- **Start operation, report quantity, interrupt, end**

Additional Shopfloor Terminal functions

- The accruing unqualified quantity is automatically counted via the quantity signal (if available) and displayed to the worker at the Shopfloor Terminal.
- The **setup** operating state is a special state: Setup is activated via the Shopfloor Terminal and remains active until it is deactivated again at the terminal. During setup, the system completely suppresses the recorded machine quantities.
- Operations can be edited, interrupted or ended by the worker.
- The Shopfloor Terminal of the **OEE** displays the MDC reports, a quantity state diagram and a list of past operating states.

 Instructions on how to configure operating states, shift models and reports can be found in the provided “Manual - FORCE MES LITE”.

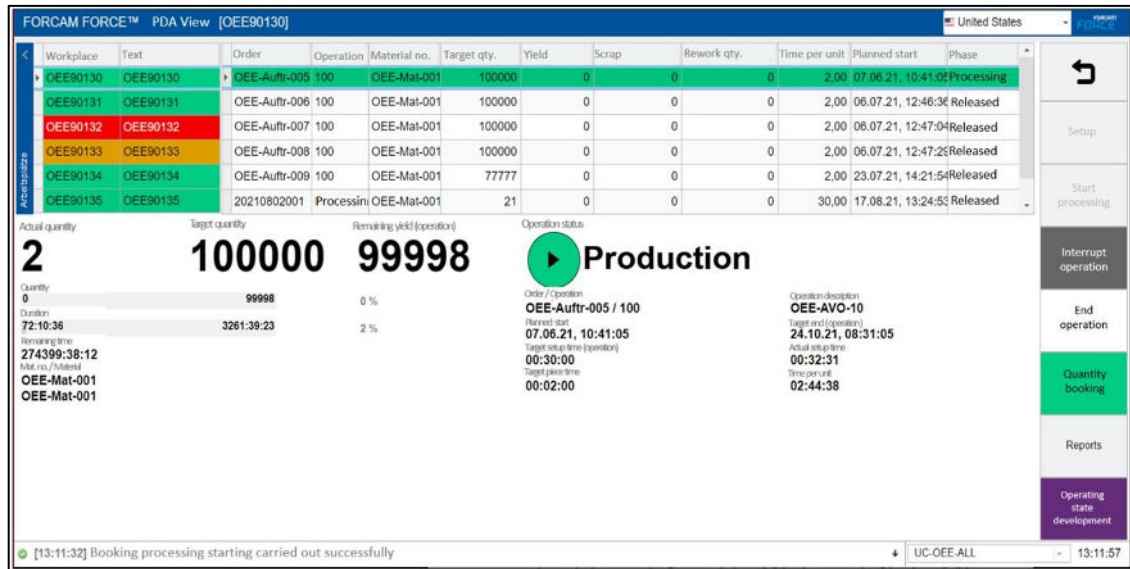


Figure 2: Start page of the Shopfloor Terminal

The figure above shows a sample terminal with preconfigured buttons that the worker can use, for example, to make bookings, recode states, and edit operations (AVOs) and their quantities. The actual delivery may differ from this example.

Reporting processes and functions

The browser-based OEE Shopfloor Terminal enables the user to perform the following **additional** functional operations:

- Additional “quantity state diagram” reports
- Three new ways to start, pause, and stop operations
- The operator can manually classify the quality of the temporary quantities counted by the FORCAM IO controller.

Performance analysis



The FORCAM **Performance Analysis** application consists of **reporting, visualization** and **dashboard**.

The basic configuration is part of the scope of supply and can be customized by the customer.

The following **additional** reports are available for evaluating the machine data collection:

- Operating state timeline (order)
- OEE (overall view)
- OEE report (workplace)
- OEE history (workplace)
- Operating State Report (order)
- Quality report (workplace)
- Hitlist quality details (workplace)
- Quality report (operation)
- Completed operations

A dashboard with quality-related key performance indicators is preconfigured in the system. It can be used as a template for customer-specific dashboards.

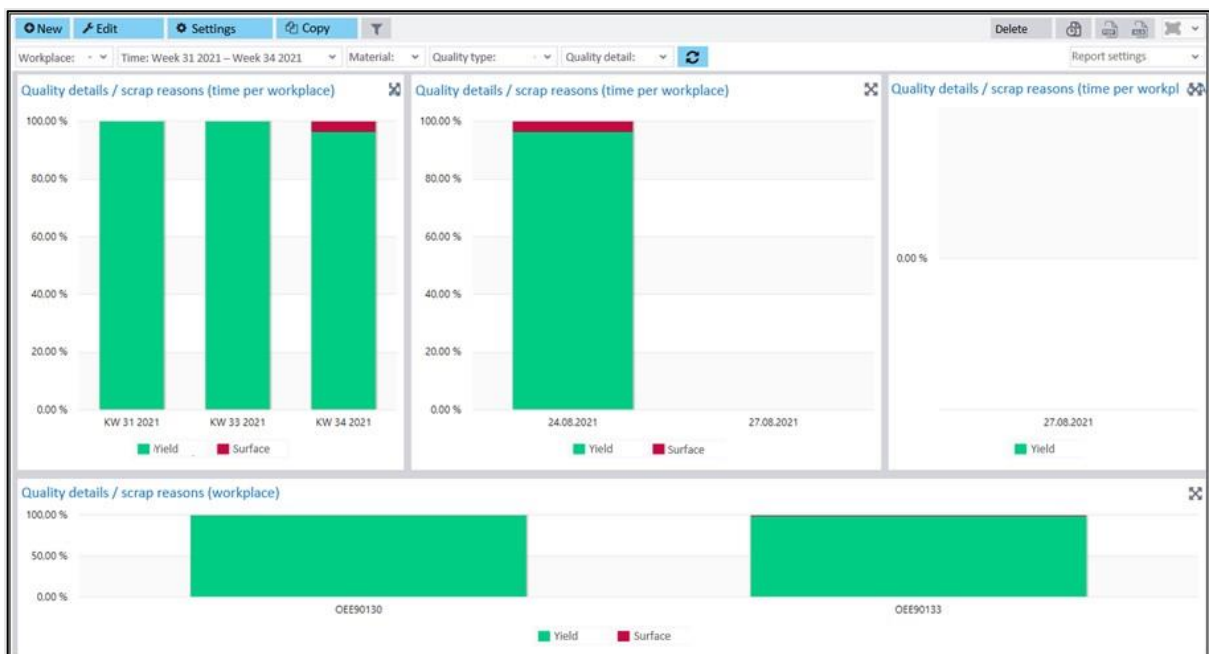


Figure 3: “DB quality”, displayed in a dashboard with multiple reports

The following visualization is preconfigured:

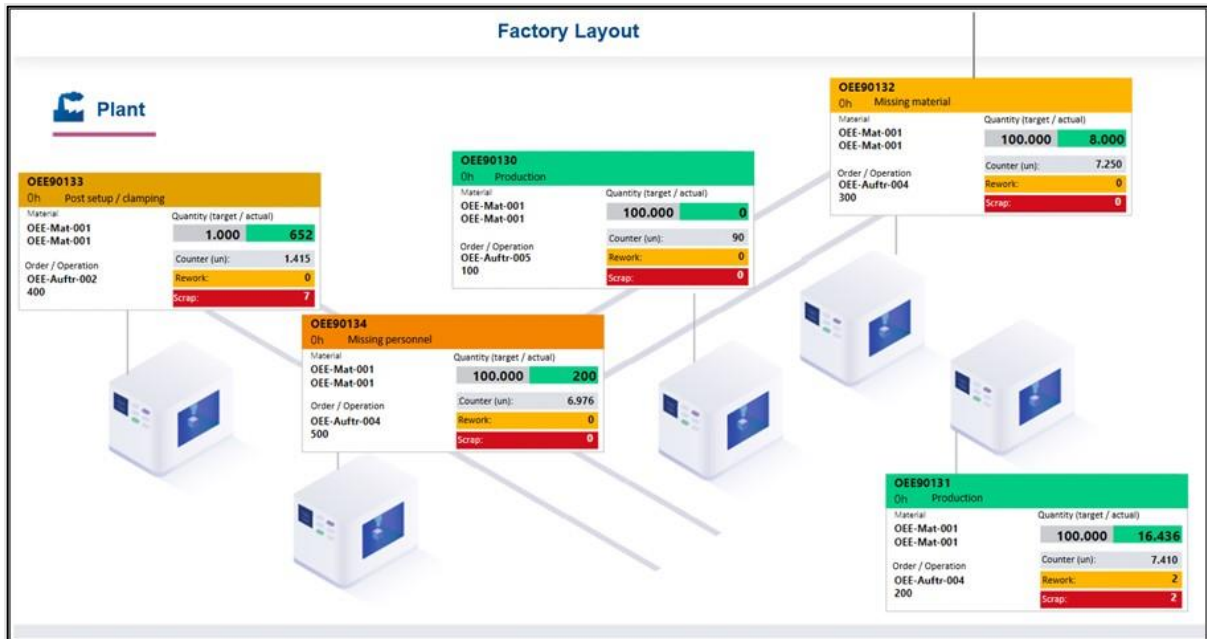


Figure 4: Visualization to display production facilities with workplaces

Services

Consulting services for implementation and continuous improvement (CIP)

In this context, we conduct one workshop before installation, in which we define the basic system parameters, and one CIP workshop within the first 3 month. With this, we aim for the best possible CIP, based on your data and processes.

The following topics are addressed:

- Machine list questionnaire
- Lean management, stakeholders and responsables
- Understanding reports and identifying target groups
- Integrating reports in CIP activities
- Process steps for increasing productivity

Possibilities for extension

We offer a flexible and seamless extension of the FORCAM FORCE product family. Extensions are available in the following areas:

- Planning
- Document control
- NC programs
- Track and trace
- Integration of external systems (from our ecosystem)

If you are interested, we will be happy to further advise and inform you without obligation.