FORCAM™ FORCE

Version 5.9

Overview

Product Description

Document:	**Product Description - FORCAM FORCE™ Overview**
Created:	**2016-07-18**
Last changes:	**2019-07-02**
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Product Description

FORCAM FORCE™ consists of a basis system and a range of modules for the collection of machine and operating data and for shop floor management. The FORCAM FORCE™ basis system consists of a run-time system and a database with core data for shop floor management including all configurations. It represents the run-time environment for collection and input systems, provides web-based communications functions for shop floor terminals and Office clients and is required for the configuration of the basic functions of all modules. The system administration allows users and roles to be set up, core data from workplaces and/or systems and machines to be maintained, workplaces hierarchies to be set up, shifts to be set up and maintained, and languages to be managed.

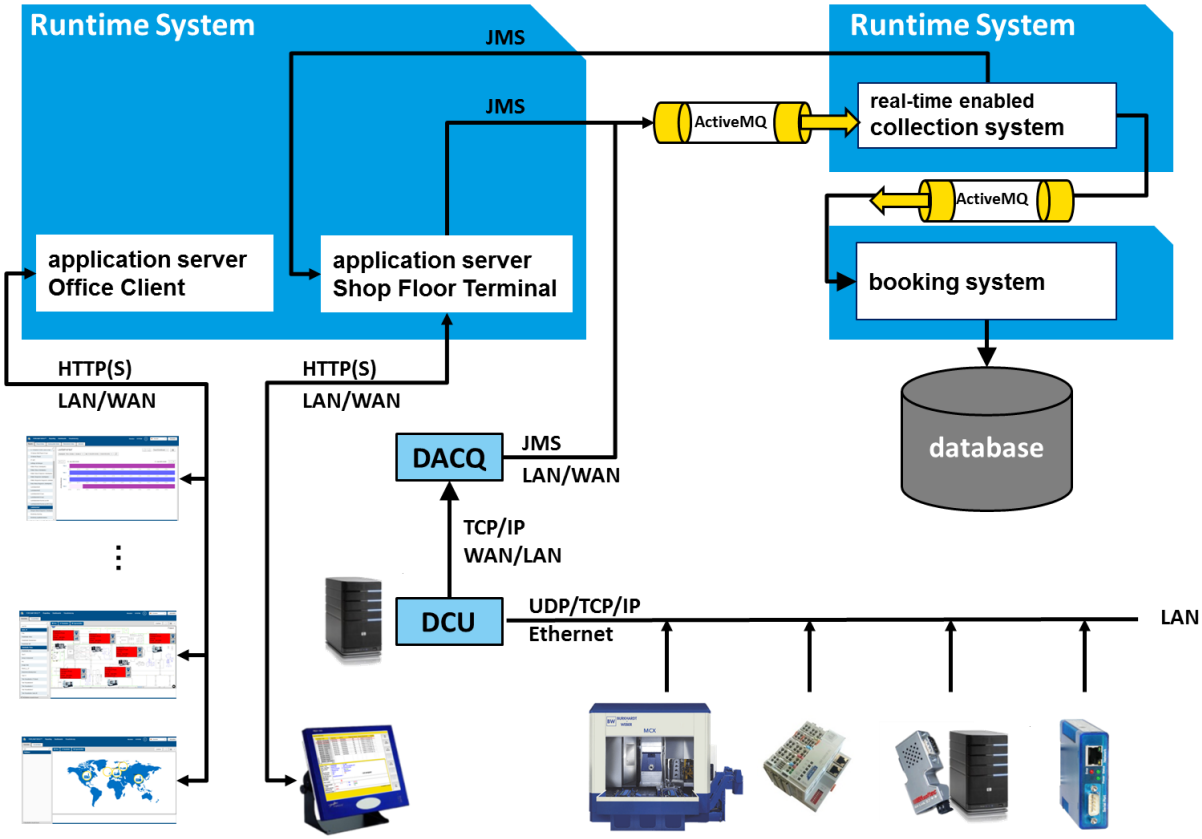
Module Overview

FORCAM FORCE™ supports connection of the following modules:

ⓘ The FORCAM FORCE™ modules support the setup of HTTPS. For this purpose, a corresponding HTTPS certificate must be provided by the customer.

- FORCAM FORCE™ **Analysis** with reporting, visualization and dashboard for shop floor management as well as alerts for an immediate response to stoppages, faults or delays in production
- FORCAM FORCE™ **Machine Interface** links heterogeneous machine parks
- FORCAM FORCE™ ERP Interface applies production orders and workplace shifts from the higher-level ERP system and transfers feedback to the ERP system
- FORCAM FORCE™ **Shop Floor Terminal** serves as an information hub for production staff and for the collection of operating data
- FORCAM FORCE™ **Production Control** with order and work process management
- FORCAM FORCE™ **Production Data Management** including DNC

System Overview

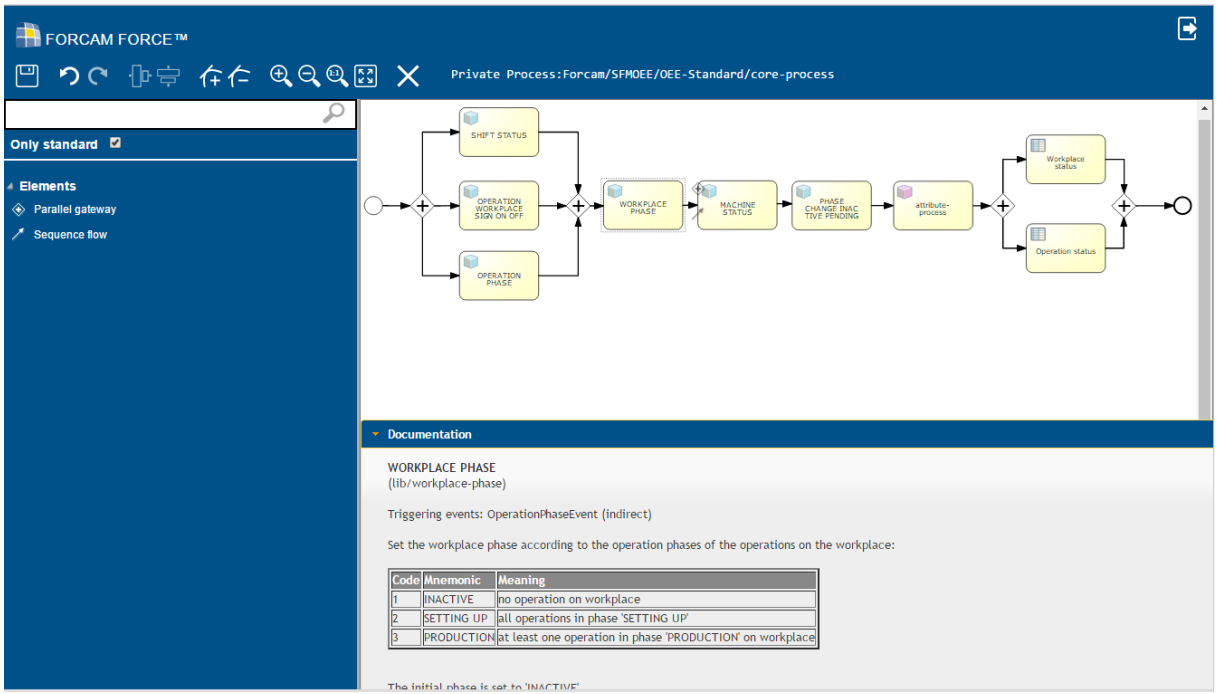


Run-time system

The FORCAM FORCE™ run-time system consists of a real-time capable collection system and a down-stream input system. The former is for collecting and permanently storing all machine signals coming in from production as well as notifications actuated on shop floor terminals. Determination of the operating states displayed on shop floor terminals is also carried out in real time within the collection system. The determination of other condensed information, as required for example for feedback to an ERP system or for reporting, and the permanent storage of this information are, however, only carried out once within the downstream input system. In addition, the application servers for the shop floor terminal and Office client are part of the run-time system.

Complex Event Processing in Rule Engines

Real-time capable processing of all production data into condensed and highly diagnostic information is made possible by complex event processing (CEP) technology. CEP is implemented within configurable controllers, so-called rule engines. These are configured in the process editor on the basis of pre-defined logic units using BPMN (business process model and notation), for example to define the operating states of workplaces form of a template and corresponding to a variable collection and input logic.



Templates for collection and input logic

Three different templates for collection and input logic are supplied.

OEE standard:

Automatic collection and processing of machine stroke reports, machine quantity reporting and machine status reporting to determine operating states and quantities produced. In the case of stroke reports, the quantities produced are calculated from the product of reported strokes and the stroke factor.

Collection of AVO phase reports (setup, production, rest) registered on the shop floor terminal as well as the AVO quantity reports (yield, rework, waste) stored there also. Machine status correction reports are also processed on the shop floor terminal for the purposes of explaining stoppages and dividing up a state interval.

OEE Auto Status:

Automatic collection and processing of machine stroke reports and calculation of quantities produced from the product of strokes reported and the stroke factor. Determining machine status using the stroke signals coming in. If strokes cease, stoppage status of the machines is assumed.

Collection of AVO phase reports (setup, production, rest) registered on the shop floor terminal as well as the AVO quantity reports (yield, rework, waste) stored there also. Machine status correction reports are also processed on the shop floor terminal for the purposes of explaining stoppages and dividing up a state interval.

OEE Operation Free:

Order-independent automatic collection and processing of machine status reports for determining operating times.

Template-based workplace configuration

Defining templates that can be allocated to any number of workplaces (production systems and machines) via workplaces configuration simplifies the configuration and management of workplaces. Templates for collection and input logic can be defined as an input type both for workplaces and workplaces templates. The same applies to causes of stoppage, waste and rework. This means that identical or similar systems and machines don't need to be configured more than once.

Workplace hierarchy and shift management

Workplaces can be assigned to up to three hierarchies with up to seven hierarchy levels. All hierarchy levels can be activated or blocked for specific groups of users. A special workplace hierarchy is supplied for the purposes of shift allocation. In addition to a direct, daily pro rata shift transfer from the ERP, shifts can also be maintained and calculated on a daily pro rata basis in FORCAM FORCE™ within the multi-level workplace hierarchy (FORCAM FORCE™ ERP Interface is required for transferring shifts from the ERP).

Role-based user and permissions management

Not all users have the same permissions to amend or even call up data. In order to ensure controlled access to data, functions can be activated or blocked for specific groups of users in a role-based manner. Every role (user group) can be assigned any number of functional permissions.

Operational data collection and shop floor management

FORCAM FORCE™ enables a two-tier operating state vector to be set up and maintained (operating state plus an itemization level). Any number of fault causes or other details can be defined for a more precise specification of individual operating states. It is also possible to assign a specific production condition to production during a break in shift. Stoppages and other operating states can be immediately viewed, differentiated and explained in the status history on the shop floor terminal.

Similarly, when qualifying the quantities collected as waste or rework, a cause of waste or rework can be selected directly in the shop floor terminal from a range of causes that can be configured to suit a specific workplace. To this end, it is also possible to record any number of causes of waste and rework in the core data.

Operating states are also determined through simultaneous registering of several operations at one workplace in keeping with the configured input logic. Furthermore, automatic reports for several operations are supported by a block report on the shop floor terminal (manual reports need only be made once for each management process). In doing so, the operations transferred from the ERP system need to be highlighted correspondingly.

If a stroke factor is recorded with the operations, FORCAM FORCE™ helps determine quantities via the reported strokes / pulses which are multiplied by a stroke factor, for example by presses or injection molding machines (stroke factor corresponds to mold cavity).

Alerts sent by email enable a rapid response to unwanted operating states (FORCAM FORCE™ Analysis is required for implementation). For example, an email can be sent to one recipient or a group of

recipients if a particular operating state continues for longer than a specified time. Similarly, reports can be sent by email at specified intervals. The ticket system also encourages the automatic generation of a ticket when commenting on the specification of waste or specific operating states.

Corrections

The faults, partial quantities, logging on and off of operations as well as the strokes and/or quantities inputted during the collection of operating states can be corrected retrospectively in FORCAM FORCE™ Workbench. All reports to the ERP can also be corrected. All reports are assigned a unique ID for this reason. This makes it possible to clearly identify changes in FORCAM FORCE™ in the adapter for SAP and to cancel them there in order to then generate them afresh. If the input fails, this is fed back to FORCAM FORCE™ and the correction is then also rescinded in FORCAM FORCE™ and marked as faulty (FORCAM FORCE™ ERP Interface is required for feedback to the ERP).

Data security via data buffering

Every collection module (DACQ) in FORCAM FORCE™ is assigned a queue from which it receives reports. The queue can be held either on the RAM or on the hard drive of the computer on which the module is running. This configurable queuing mechanism increases data security even further and prevents the loss of reports in the system even with short-term failures of the network or server.

Report log

The individual actions in FORCAM FORCE™ can be logged. This adjusts the wealth of information to specific requirements using configuration parameters. Data is recorded in the event log in an application-oriented manner.

Unicode, independence of time zone and language

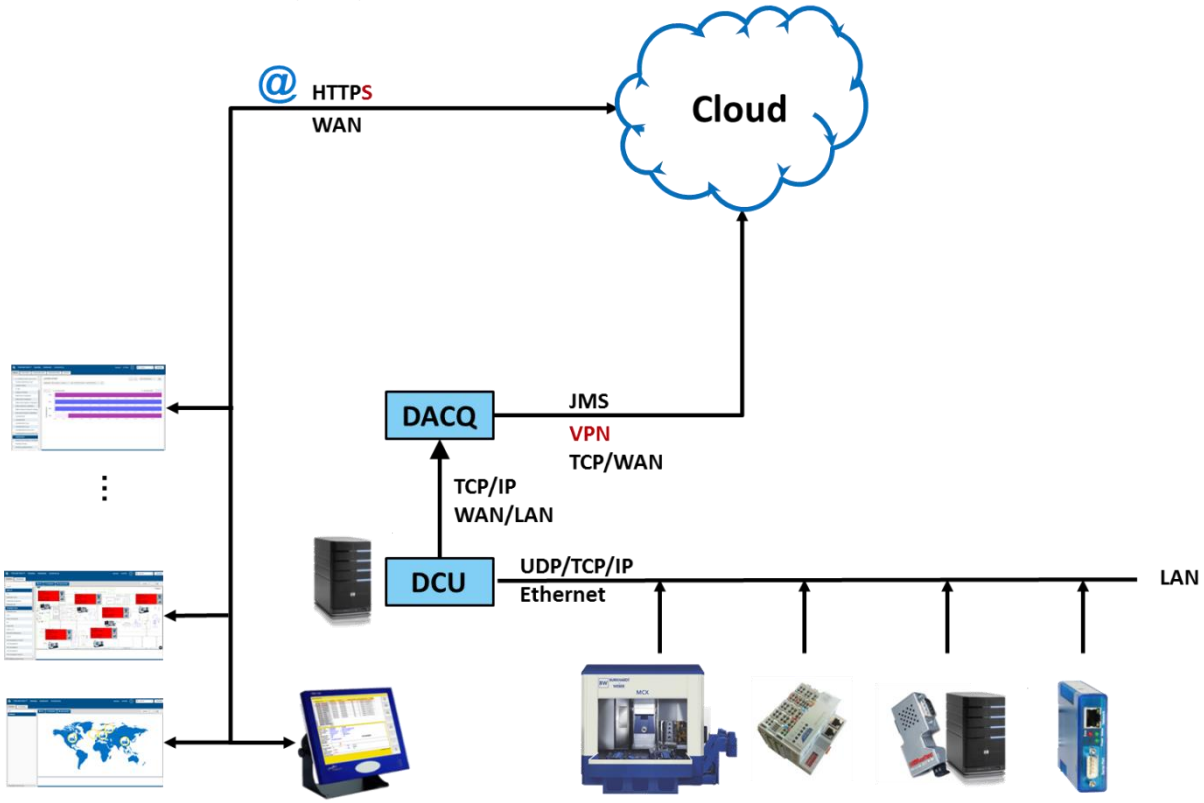
The Office client and shop floor terminal can be shown in any language. The desired language can be selected when logging in to the shop floor terminal. The languages used for FORCAM are German, English and Chinese. Customers can set up any number of languages themselves. Updates do not overwrite the customer's own language settings. Time zone independence supports the mobile and global application of FORCAM FORCE™.

Java and web technology, support for smartphones and tablets

The consistent use of Java and web technology ensures the platform independence of FORCAM FORCE™ and the implementation of all Office client applications in a browser on mobile or even on less powerful devices (Workbench and Shop Floor Client require the support of Java applets via the browser)

Ready for Cloud (PaaS)

FORCAM FORCE™ provides the option of being hosted on a private or public cloud, allowing customers to benefit from secured availability, reduced cost and greater flexibility which are the advantages of Platform as a Service (PaaS).



Feature Specification

User management

- Setting up users with passwords
- Merging functions into roles and assigning roles to individuals

Workplace hierarchies

- Work place can be assigned to up to three hierarchies with up to seven hierarchy levels.
- All hierarchy levels can be activated or blocked for specific groups of users.

Shift management

- Set up, amend, delete shift models
- Specify time frames for shifts
- Shift models spanning days
- As many shifts per day as required
- Complete integration (machine interface, operating data collection)
- Allocation of machines to shift models
- Allocation of shift models to calendar days
- Integrated calendar (no manual intervention necessary)
- Assignment of shifts to any hierarchy levels, whereby assignment to a lower level overwrites or extends that to a higher level.

Transfer of core data

- Transfer of shift models from the ERP or maintenance in FORCAM FORCE™ (FORCAM FORCE™ ERP Interface is required for implementation).

Operating states

- Maintenance and setup of a two-tier operating state vector (operating state plus an itemization level)
- Applying any causes of stoppage
- Template-based allocation to several workplaces possible
- Separate operating state for production during breaks
- Configuration management with import and export function
- Configuration manager for alerts, threshold monitoring and sending emails (FORCAM FORCE™ Analysis required for implementation).
- Merging of operating states with respect to the phases of an operation into time bases that can be used for different evaluations. In doing so different operating conditions can be distinguished that occur during setup and production.

Qualified quantities

- Maintenance and setup of different quantity categories (waste, rework)
- Create any causes of waste or rework
- Template-based allocation to several workplaces possible

Languages

- The three system languages German, English and Chinese as well as other languages individually maintained by the customer can be managed using an efficient language editor (Literal Editor).
- Switching languages in the Office client is possible at any time during operation.

Special features

- Support of block reports when operations transferred from the ERP system are marked correspondingly
- Incorporation of stroke factor recorded in the ERP system alongside operations.

Web server/Java version

- Implementation conforming to J2EE with Apache Tomcat version 7.0.61 or higher
- Java 7

Databases

- ORACLE 12
- MS-SQL 2012

Devices

- Support of any – including mobile – devices with Internet Explorer 10 or higher or Google Chrome 41 or higher in the Office client
- Support of all mobile devices with Internet Explorer 10 or higher for the shop floor terminal and Workbench (requires support of Java applets via the browser)

Encrypted Transmission

- The FORCAM FORCE™ modules support the setup of HTTPS. For this purpose, a corresponding HTTPS certificate must be provided by the customer.