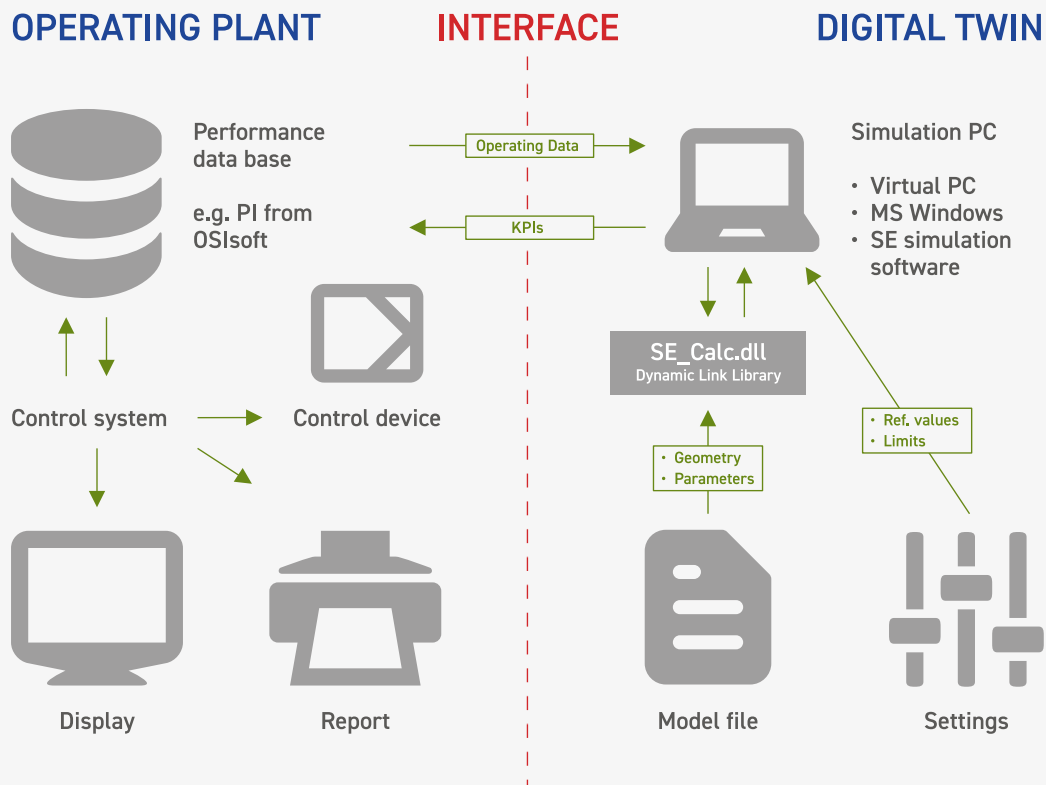


Application for monitoring, diagnostic and performance optimization

This service comprises the supply of an industrial plant's digital twin, which operates in parallel with the actual plant and simulates the production process. The comparison between actual performance values and simulation results of the digital twin enables various assistance services.



Description

The Digital Twin is a process simulation software that runs in parallel with the actual plant. It is designed to evaluate and record operating conditions and to detect deviations from regular respectively optimal performance.

In a continuous cycle with adjustable time intervals measurement values are received from the control system's data base, process calculations are performed and KPIs (= Key Performance Indicators) are returned.

Based on inlet flow conditions the simulation determines the internal and outlet flow conditions that can be expected according to the plant's design and control philosophy. KPIs, defined as relations between actual and expected parameters, indicate a malfunction of the plant, if they are found outside of a certain confidence range.

Based on the received KPIs the analysis software of the control system's data base can then be used to trace tendencies, generate reports and display advice and warnings with escalating severity levels.

In an advanced application the digital twin is utilised for optimisation of control loops, e.g. condition based operation of cleaning devices, in order to operate the plant at its techno-economical optimum.

MAIN FEATURES	CUSTOMER BENEFITS
<ul style="list-style-type: none"> ▪ Monitoring the plant condition ▪ Discovering the parameters that cannot be directly measured (e.g. fouling and evaluation factors) ▪ Computing KPIs ▪ Identifying the causes of deviations in the performance 	<ul style="list-style-type: none"> ▪ Confidence in plant performance ▪ Early detection of anomalies ▪ Higher plant availability due to timely counter-measures ▪ Increased efficiency, e.g. due to appropriate operation of cleaning devices ▪ Longer lifetime and less wear, e.g. due to avoidance of unnecessary operation of cleaning devices

REFERENCE PROJECT

PRS - Process Related Sootblower operation in a Power Plant

The digital twin consists of a virtual PC (PRS_PC), on which the simulation tool is installed. The measured data of the plant is transferred with the help of the interface to the PRS PC. The simulation will run using the measured data and other parameters that are either implemented in the model e.g. geometry parameters or other input, which the user has defined. The results and the KPIs will be then transferred with the interface to the plant and can be used for monitoring and reporting.

The results of the simulation are also used for the optimization of the plant. By comparing the current results and the corresponding reference state, optimization recommendations are specified and if necessary commands can be passed to the control system.

Operation control of sootblowers is an important feature of this service. Elapsed time between two consecutive cleaning processes and calculated fouling values are considered as the role-playing parameters. An appropriate time interval and/or an acceptable fouling range can be set for each set of sootblowers, i.e. each group of heating surfaces. Based on these input parameters, recent sootblowing sequence and calculated fouling of heating surfaces, corresponding signals are sent to the control system in order to activate the cleaning devices.

PRS software consists of various modules that communicate with each other, such as:

- **PRS_KM:** communication module for connecting the modules with each other and also with the control system
- **PRS_DimBo:** thermodynamic model for the boiler calculations
- **PRS_MW:** module for examining and preparing the measured data
- **PRS_IDB:** module for accessing the data base to save the measured data and simulation results
- **PRS_Input:** module for inserting boiler inputs and taking the reference parameters
- **PRS_RB:** module for sootblower activation with inputs for time interval for each sootblower group and also for the fouling factor

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