FACT SHEET

There are a lot of issues in the operation of a coal fired power plant that are typically not addressed by distributed control systems (DCS). Examples for such issues are flue gas temperature imbalance, critical metal temperatures or excessive CO emissions, just to name a few. PiT Navigator addresses exactly these complex issues by tuning decisive set-points based on the original DCS values. This leads to a more uniform combustion and thus higher energy efficiency.

PiT Navigator Combustion Optimization

Motivation

The wide spread use of DCS allows pulverized coal fired power plants to be operated 24/7 automatically under all normal process conditions. Based on characteristic curves a calculated coal mass flow and corresponding air volumes are fed to the boiler to meet the actual load demand and to keep the Oxygen content on a safe level. The same is true for the distribution of combustion air to the burners and the air inlets. The characteristic curves are based on technical design data of the boiler and experiences gathered during commissioning or later optimization phases.

Such designed characteristic curves are optimally suited for the design case. However, when the process deviates from the design case (changed coal quality, wear and tear or fouling) those static characteristic curves lead to a reduced control quality.
In contrast PiT Navigator is a high-level Advanced Process Control (APC) system to optimize operations even under suboptimal conditions. Based on sophisticated process models (artificial neural networks) it continuously calculates optimized settings for the operation of all active mills and the combustion air system as well as the spray water injection. These settings are fed directly back to the DCS to bias the original set-points.

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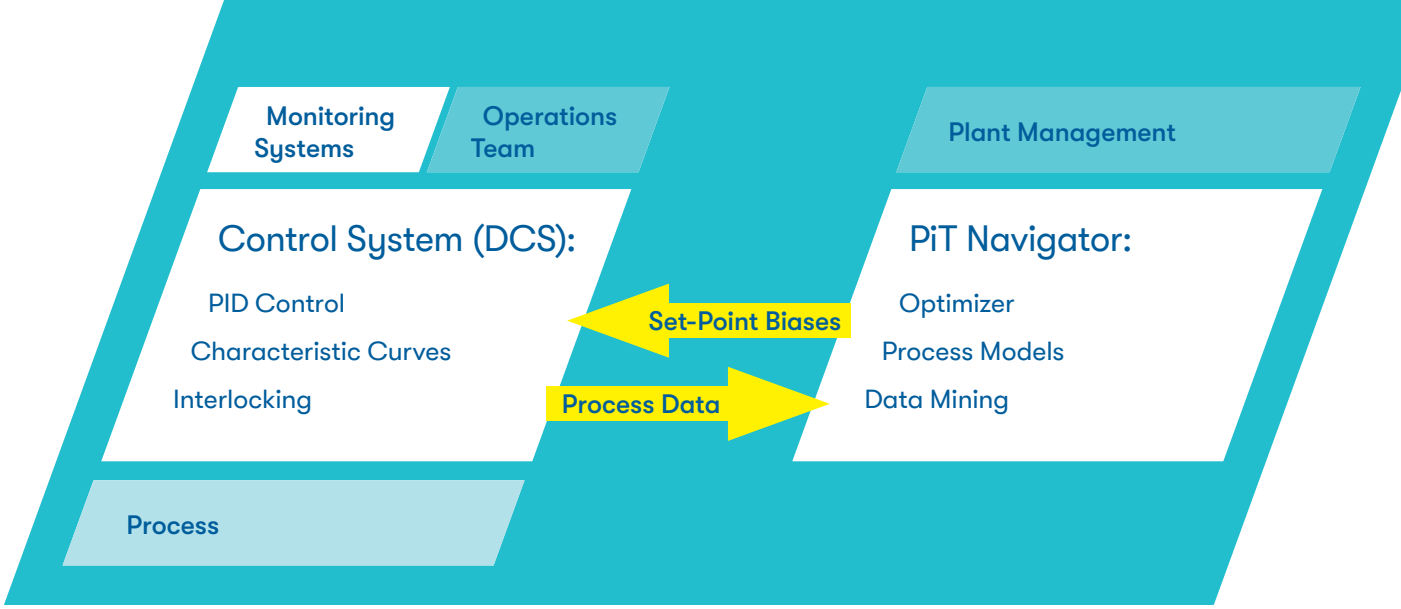
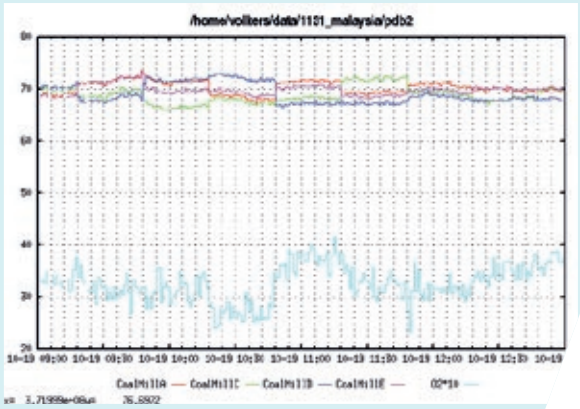


System Overview



Application

PiT Navigator has been used in many applications ranging from smaller 200 MW_{el} to 750 MW_{el} pulverized coal fired power plants. Typical optimization targets were:

- Minimization of excess Oxygen content.
- Minimization of CO or built NO_X.
- Minimization of flue gas temperature imbalances.
- Minimization of RH tube temperature excursions.

The above named targets have been achieved and shown in long term operation.

Project outline

A project starts with a definition of the optimization targets and an estimation of the expected results based on a set of representative historical process data or explicitly executed tests. The scope of supply contains a high performance computer to run the PiT Navigator software, the interface to the DCS and services like engineering and commissioning. The typical overall project time period from order to functional tests is three to six months.

The most important project tasks are:

- Kick-off Meeting
- Linking PiT Navigator to the existent DCS communication processor.
- Automated exploration of the process.
- Engineering and setup of the control structure.
- Developing the initial process models and setup of automatic model tuning.
- Starting, monitoring and optimizing the system.
- Takeover by the client.

During all phases STEAG Energy Services GmbH supports the execution of the project by an experienced project manager.

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