STEAG Powitec
Intelligent Solutions for Process Optimization

www.steag-powitec.com
Complex Challenges

The requirements to conventional power plants have risen in recent years. This has led to new and complex challenges regarding efficiency increase and profitability.

Some of the particular challenges are:
- Changing coal types on the world market
- Load sequence requirements by feeding renewables
- Higher availability and service life

Intelligence for process control

These and other challenges can be managed by increased process monitoring in combination with intelligent process management.
Not just the sum of the experiences
Intelligence results from experiences. When further experiences are added to the knowledge already acquired, intelligence grows. Therefore STEAG Powitec has developed a software that learns constantly, that autonomously finds the overall optimum in the process and continuously and autonomously adjusts its strategy to it. Acquired knowledge is saved and adjusted to process changes self-sufficiently without further external support. This allows for intelligent and fast reactions.

Increased efficiency by intelligent optimization
- Increasing the process monitoring and thus improving the descriptiveness of the process
- Continuous control of the local fuel/air ratios depending on fuel qualities, mill status, and boiler status
- Autonomously self-adjusting and continuously improving control strategy
- The result: increased efficiency with less undesired effects due to improved fire control
Process Optimization in the Closed Control Loop
STEAG Powitec develops and implements sensor-based solutions for the fully automatic and self-learning process optimization in the closed control loop of power plant processes.

**Eyes, ears, and brains for the control system**

The solutions by STEAG Powitec complement the power plant control (system). For this, process data are collected and subsequently analyzed by means of intelligent data correlation considering the data from the Powitec sensors. These data are then processed in predictive and self-learning controller models (nonlinear model predictive control), from which real-time predictions of process reactions to simulated actuations can be generated.

The analysis of the valid predictions leads to an optimal plan for the correction of several actuating variables that decisively influence the process. These corrections are then fed back into the process control system to achieve optimal modes of operation that consist of a weighted combination of different individual targets.

Thus the process control system virtually receives eyes, ears, and brains.
Robotic Systems for Power Plant Technology

Automation is often in context with robotics. STEAG Powitec introduces system intelligence developed for robotics into power plant technology.
A multitude of reasons for solutions by STEAG Powitec

Self-optimizing:
Process models regularly and autonomously adjust to changed situations, thus expanding their knowledge

Continuous:
The process is optimized around the clock and thus continuously, even in the case of good process conditions that still have room for improvement

Flexible:
Optimization goals can be changed at any time without re-programming or re-parametrization

Intelligent:
Target-oriented data correlation and intelligent data processing in a self-learning, predictive, and self-optimizing controller system

These solutions are a combination of Advanced Process Control with intelligent data processing and acoustic and optical sensors developed by STEAG Powitec for this particular purpose. The core systems are the combustion optimization in the closed control loop, the 3D temperature analysis, and the SNCR control.

The results:
- Increase in efficiency
- Increase in energy efficiency
- Decreasing emissions
- Decreasing operating costs
- Higher temperature homogeneity in the furnace
- Higher availability and service life of the plants
- Higher profitability of power plants
About STEAG Powitec

The company:
- Founded in 2001 as Powitec Intelligent Technologies GmbH
- Sites in Essen (head office) and Ilmenau, Thuringia
- Ca. 30 staff members with a wide and varied experience regarding complex combustion processes
- For more than 10 years STEAG Powitec has been intensively cooperating with the Technical University Ilmenau, Department of Neuroinformatics and Cognitive Robotics. In the context of cooperation agreements, software techniques for further increasing the efficiency of complex industrial combustion processes have been advanced.
- Integration into STEAG Energy Services GmbH in October 2012

Our solutions:
STEAG Powitec are leaders in technology in the development and implementation of dynamic control systems for the automation of complex production processes. The STEAG Powitec optimization approach consists of a software-based process control in the closed control loop with the help of statistical models (nonlinear model predictive control, NMPC) and is used in highly diverse complex industrial processes.

Benefits:
- Lasting improvements regarding energy efficiency
  - emissions
  - production and process stability

Target plants:
- Power plants
- Waste incineration plants
- Cement works
- Lime works
- Chemical plants
Reference Projects Worldwide

References:
- E.ON power plant Schkopau (450 MWel)
- ENEL power plant Vojany (2 x 110 MWel)
- STEAG power plant MKV Fenne (195 MWel)
- STEAG power plant HKV Fenne (210 MWel)
- STEAG CHP plant Herne (500 MWel)
- Tanjung Bin Malaysia (750 MWel)
- Vattenfall power plant Tiefstack (2 x 252 MWel)
- Vattenfall R&D Department
- Vedanta Jharsuguda (600 MWel)
As well as 28 further installations in the waste-to-energy industry and more than 110 installations in the cement and lime industries.