



Maximum Plant Efficiency by Means of Predictive Analytics and AI-Based Combustion Control & Optimization

steag

We help you master
every challenge.



The importance of thermal waste treatment is growing world-wide. Increasingly, the energy contained in the waste is put to reasonable use for generating electricity and heat. While the first waste incineration plants were optimized in terms of the highest utilization rate, today's trend is to design these plants to be extremely efficient too. Not only higher steam parameters are required in this context, but also integrative concepts that digitalize and thus optimize thermal waste treatment plants by means of expert solutions or that turn waste into green fuel.

One partner for all challenges

As a world-wide pioneer, technology leader, and expert problem solver, we not only provide support from the first draft, via the design, implementation, and operation management right up to the plant optimization. We also set new standards regarding your specific requirements that you need to master in your daily operational business.

The highly specialized digital solutions developed by us have one common goal: making plants as efficient as possible.

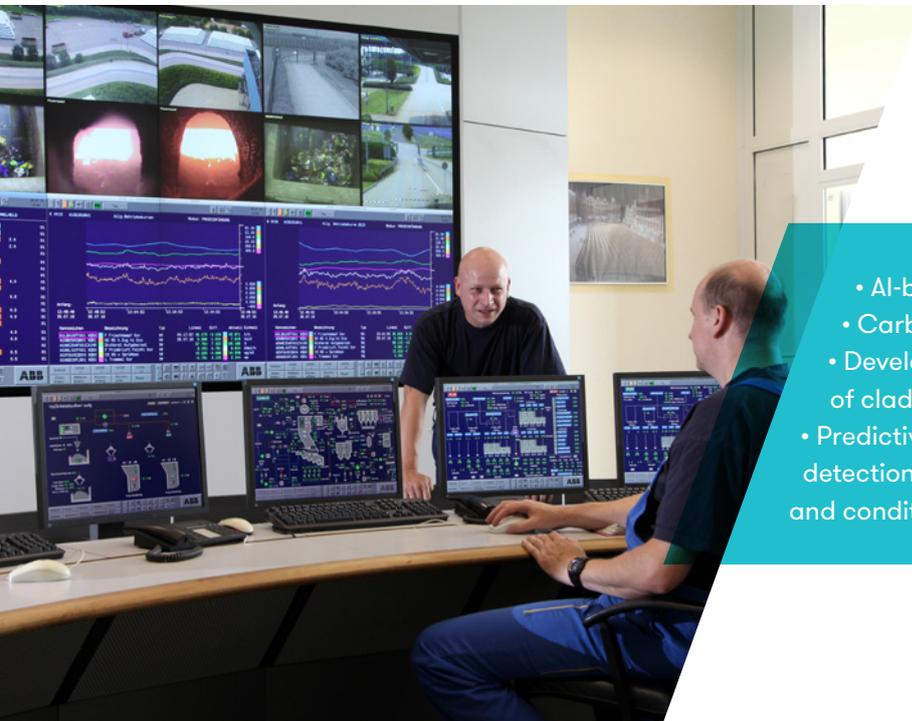
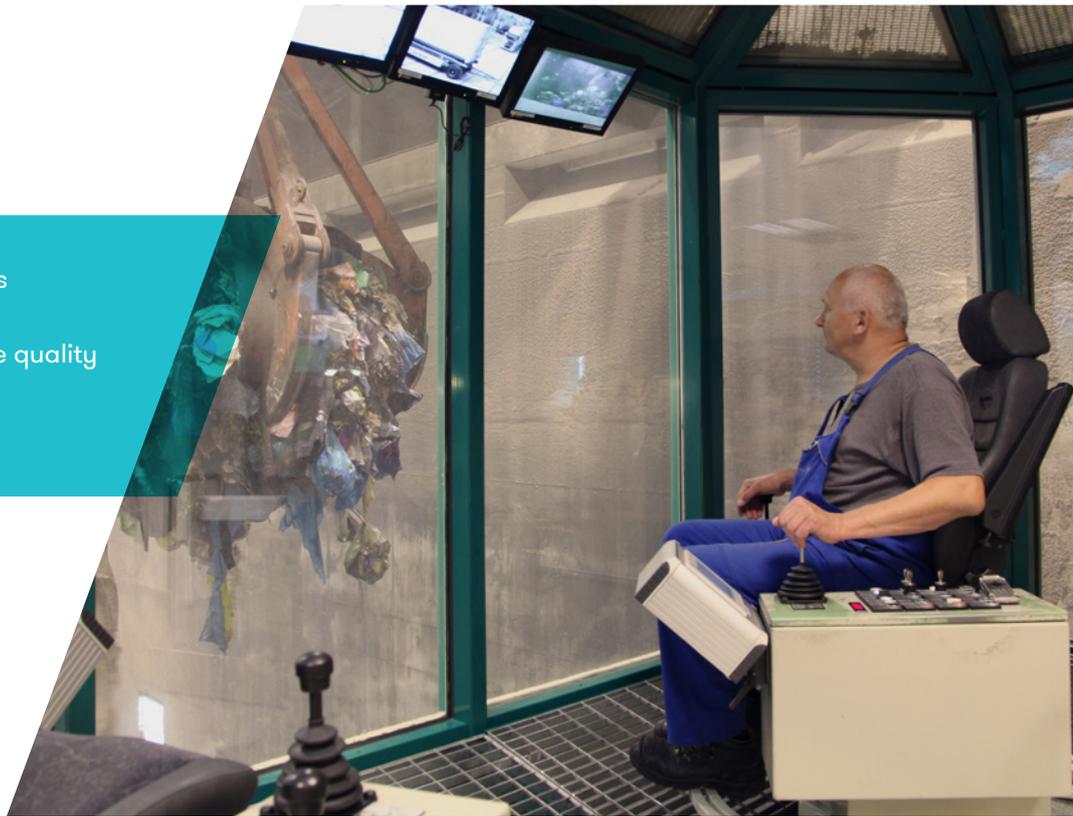
With our solutions, we analyze complex processes in detail. We ensure that technical information is always available up-to-date. Our highlight topics for you in this brochure:

Our early warning system SR::SPC is clever and can analyze the key data on processes and main components from the vast amount of data from the DCS/SCADA system so that creeping and critical changes can be detected early and reliably.

Our AI-based solution PiT Navigator Waste helps you to ensure a continuous feed and combustion process in spite of fluctuating waste quality and thus to achieve a constant steam capacity.

Your challenges:

- Observing emission limits
- Maximum throughput
- Major changes of the waste quality
- Reduced steam deviation
- Reliable burnout



Our highlight topics:

- AI-based combustion control & optimization
- Carbon capture solutions
- Development and implementation of cladding concepts
- Predictive analytics for the early detection of changes in the process and condition

Our services for waste-to-energy plants:



Planning & development

- Preliminary and design planning
- Project development studies
- Approval planning
- Procurement (tenders, bid comparison, award negotiation)



Construction & commissioning

- Project inspection and design review
- Project management
- Detailed planning and implementation planning
- Quality management
- Management / supervision
- Owner's engineer



Operation & maintenance

- Operation management support
- Operation management control
- Comprehensive operation management
- Troubleshooting
- Plant optimization
- Cladding
- Maintenance & repair
- Training



Monitoring & optimization

- AI-based combustion control & optimization
- Operation management system
- Online monitoring system
- Predictive analytics / maintenance
- Analysis & optimization

AI-Based Combustion Control & Optimization Makes Waste Incineration More Efficient

The combustion of waste to generate heat, steam, and electricity is a highly complex process as the fuel is nonhomogeneous. This may lead to faults or suboptimal combustion. By means of digital methods, the quality of the feed as well as of the production process and thus the efficiency of the entire plant can be increased significantly.

The software solution PiT Navigator ensures a continuous feed and combustion process

The solution consists of a combination of video camera and thermographic camera in a refractory housing and is oriented from the rear towards the endmost combustion zones. The recorded thermographic images are digitally evaluated. They allow to determine the current temperatures in the furnace, which in turn have an impact on the speed of the feed system, the fan control, and ultimately the emission values. The process runs automatically owing to the use of AI components.

All process values are improved

The goal of this furnace capacity control is to keep the steam power that drives the turbine to supply steam to the district heating network or to adjacent industries as constant as possible. Thus if the gross calorific value is insufficient, the speed of the feed will be increased. If the combustion process does not run optimally, which manifests itself e.g. in the emergence of hotspots or a fuel imbalance between the right and the left part of the grate system, the speed will be adjusted as well and the fan will be regulated accordingly. This, in turn, helps to prevent emission peaks of carbon oxides and nitrous oxides and to reduce their emission in general.

Technologically unique solution to date

The combination of a steam prognosis two to five minutes in advance by means of neural networks, enhanced process control, and intelligent data processing is technologically unique to date. It still allows to manually influence the process at any time.

Both, the intelligent control of the combustion process and the experience of the staff members in the case of manual influence, lead to an optimal control of the mutually influencing target variables in the waste incineration process and the steam generation.

Success figures achieved in a project in Spain:

 - 25 %

reduction of
steam fluctuations
(achieved: 45 %)

 + 3 %

increase in
steam quantity

 + 3 %

higher waste throughput
(by stabilizing the steam
power)

Predictive Analytics for the Early Detection of Process and Condition Changes

The permanent monitoring of the plant's health status is of particular importance as due to continuous changes in the operating behavior of thermal waste treatment plants, components are subject to wear and fouling. This affects the condition of the plant; consequential financial losses incur due to increased fuel use, lower throughput as well as lower production rates and qualities. In the event of a total failure of a plant, high repair costs and, in a worst-case scenario, loss of profit as a result of the production stop will often occur as well.

Monitoring plant processes – from now on that's mere child's play!

However, monitoring a dynamic process makes special demands on you as the operator because usually, only fixed limit values exist in the control system. Our solution is the intelligent early warning system SR::SPC for the automatic detection of creeping process and condition changes of technical assets. Thus the system supports you in the optimal operation of your plant.

State-of-the-art data analysis (machine learning and artificial intelligence) on the basis of existing performance values is the fundament of SR::SPC. With predictive analytics as one of the currently most important big data trends, the current condition of the plant or component is compared to reference conditions from the past: the automatic detection of process and condition changes allows to continuously acquire the key operating parameters in their mutual impact and history. Changes are reported in a reliable way (e. g. by e-mail).

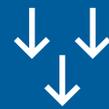
Availability and efficiency

Transparency owing to processed data and derived KPIs

- Early detection of inefficiency and damaged infrastructure
- Prevention of consequential damage
- Improved maintenance planning as well as spare part supply chain
- Optimization of the staff deployment
- Improved availability and efficiency



Increasing the
availability and
efficiency



Decreasing
OPEX





“MVV has evaluated STEAG’s predictive analytics IT solution, has proven its economic added value and rolled it out fleet-wide. We are delighted with the tool and the cooperation with the team of STEAG.”

Sascha Schmitt, planning engineer, Department for Technology, Engineering, and Digitalization, MVV Umwelt GmbH

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