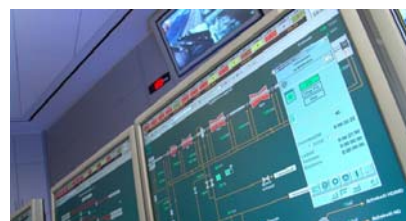


# Electrical, I&C and Optimization Technology for the Rothensee Waste-Incineration Cogeneration Plant



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## The Plant

Between 2001 and 2006, MHKW Müllheizkraftwerk Rothensee GmbH erected a state-of-the-art plant for thermal energy recovery from residual waste where around 630,000 tons of residual waste can be burned and utilized per year. The waste has a heating value ranging from 7,200 to 15,000 kJ/kg. The waste-incineration cogeneration plant consists of 4 combustion lines, each with a rated capacity of 22.0 Mg of residual waste per hour. The furnace thermal rating is 66.7 MW per line. The plant supplies electricity to some 40,000 households and district heat to about 44,000 households in Magdeburg. This waste-incineration cogeneration plant is one of Germany's largest waste-to-energy plants.

## Electrical Equipment

ABB engineered, delivered and installed all required electrical systems. These included:

- Connections to the public 30kV grid, including generator leads and generator connections
- Switchgear for all voltage levels, including the associated circuit breakers and other switchgear
- Unit and auxiliaries transformers
- Substation control, recording and protection systems
- Backup supply network, including emergency power and auxiliary power supply
- Frequency converters and motors



LV switchgear

## Control Equipment

ABB integrated the instrumentation, the electrical and control equipment, the boiler protection system and the operation management into an overall concept and created a technically optimized full-scale solution. The specific requirements regarding the implementation were:

- User-friendly and consistent user interfaces
- Plant-wide and company-wide easy access to information
- A high level of engineering quality and efficiency
- Low operating and maintenance costs
- A clear system architecture
- State-of-the-art technology
- Electric actuators using Profibus

Electrical Systems	Qty.
Unit transformers 30/10.5 kV	2
Auxiliary transformers 30/10 kV	4
LV transformers 10/0.4 kV	12
30kV switchbays	11
10kV switchbays	24
LV switchbays	92
Inverters	4
DC/DC converters	4
220V batteries	4
Frequency converters	18
Emerg. 1.6MVA diesel generators	2
Generator leads	2

I&C Functions	Qty.
Analog signal conditioning	883
Binary signal conditioning	1553
Serial interfaces	28
Parallel interfaces	92
Local control stations	42
Drive controls	787
Function groups	393
Single-loop analog controls	40
Master controllers	4
Electronics cabinets	55
Monitors	15
Mimic and trend displays	425

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## Instrumentation

ABB was in constant touch with the process equipment suppliers in order to optimally engineer, deliver and install the analog instrumentation, including the mechanical measuring equipment, for the Rothensee Waste-Incineration Cogeneration Plant. The scope of instrumentation covered:

- Instrumentation for pressure, differential pressure, flow rate and filling-level measurement
- Temperature measurement
- Water/Steam analyzers
- Flue gas analyzers
- Emission measurement
- Emission computer

The equipment installed included innovative ABB products, such as the 2600T product family for pressure/differential pressure measurement. The magnetic-inductive FXE4000 series flowmeters were used for the flow-metering. For measuring the pH/redox and conductivity parameters, ABB chose AX400 instruments — a low-maintenance ABB analyzer series. Field-proven ABB 9437 analyzers were installed for measuring dissolved oxygen.

All transducers operate on a two-wire principle. They are fitted with HART interfaces and support the standardized FDT/DTM technology. This way, the staff can configure and monitor the transducers from a central location.



ABB pressure transducers

## Optimization Technology

ABB installed a high-performance Plant Information Management System (PIMS). History data as well as process and company data are collected from different sources and securely archived. Where necessary, data is shown to the operators in the form of explanatory information, e.g. about the accumulated operating times of drives, or about the demand meters of generators or the auxiliary power supply.

Accurate computation of the heating value of the waste is crucial for optimizing the plant operation. The heating value of the waste is computed on the basis of a heat balance.



PIMS optimizes plant operation

## Factors for Successful Implementation

For both the process equipment suppliers and the plant owner, it was a great help that ABB coordinated the implementation of the electrical, I&C and optimization technology. This reduced the amount of work necessary for harmonizing interfaces in this complex project, and - in combination with ABB's experienced Project Management - made it possible that the work was completed six weeks ahead of schedule.

With the completion of combustion lines 3 and 4, the control room equipment for lines 1 and 2 had to be relocated to a joint control room for all the lines. ABB was able to accomplish these extensive activities within 72 hours.

In addition, ABB integrated a district-heat system 800m away with the Rothensee district-heating plant into the control concept and into the operating and monitoring levels of the waste-incineration cogeneration plant.

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**ABB AG**  
**Power Technology Systems**

P.O. Box 10 03 51  
68128 Mannheim  
GERMANY

Phone: +49 (0) 621 381-3000  
Fax: +49 (0) 621 381-2645  
E-mail: [powertech@de.abb.com](mailto:powertech@de.abb.com)  
Internet: <http://www.abb.com/pt>

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