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More Power from Nature

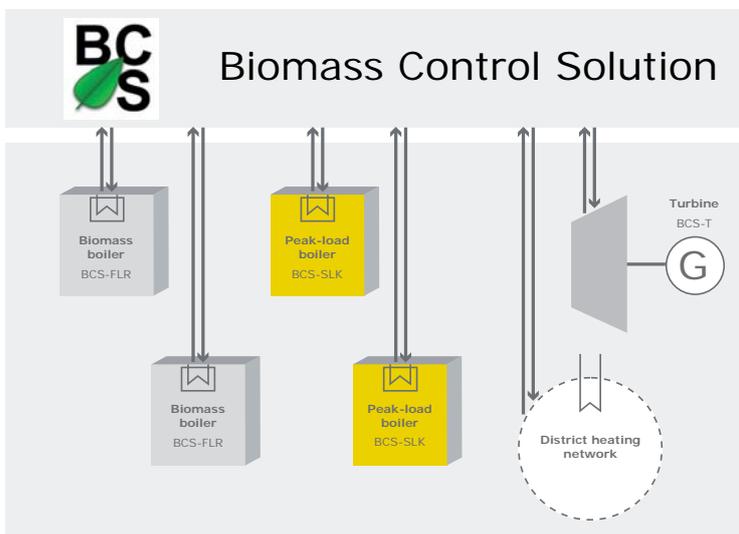
Control technology optimization of
biomass power plants



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VOIGT+WIPP Engineers GmbH (VWE) supplies process and control engineering solutions that focus on increasing the energy efficiency and profitability of industrial processes. The innovative company, with headquarters in Vienna (Austria), links three disciplines, process engineering, control engineering and mechanical engineering, for the implementation of sophisticated systems in many sectors of industry. A plant control system for biomass power plants developed on the Bachmann M1 automation system promises a reduction of fuel consumption by up to 10% with simultaneously optimized energy output.



▲ **Intelligent interconnection:** controlling several biomass and peak-load boilers, as well as the district heating network and the water-steam circuit or the turbine.

The BCS (Biomass Control System) developed on the Bachmann M1 is a standardized plant control system for biomass power plants with grate firing. »The difficulty with the operation of biomass power plants lies in the fluctuating fuel quality and the accompanying inconsistent calorific values,« says Andreas Voigt, the managing director of VWE. This and the necessity of meeting statutory emission limit values represent a great challenge to the operators of biomass power plants. On top of that, there are requirements for prudent operation of the system to ensure the highest level of availability. »Under these general conditions, the efficiency of the plant often falls by the wayside, which usually has considerable financial effects for the operator,« explains Andreas Voigt.

The decisive advantages of the BCSs are the reduction of fuel consumption with simultaneously increased performance of the biomass boilers, as well as the minimization of internal energy consumption and pollutant emission. The gas or oil consumption of the peak-load boilers is likewise reduced to a minimum.

Individually usable

The application range of the BCS runs from 2 MW biomass heating plants to 20 MW biomass power plants. BCS offers regulation of individual or multiple biomass boilers and peak-load burners, as well as the district heating network and the water-steam cycle or the turbine. Individual modules,

e. g. combustion performance regulation or pure peak-load boiler regulation, can be used if needed.

Convincing hardware and software design

The Bachmann M1 is programmed at VWE with CoDeSys IEC 61131. »We can design our own function libraries customized for biomass plants, as well as self-programmed advanced process controllers adapted to the special needs of a power plant,« as Andreas Voigt describes one of the advantages of the Bachmann system.

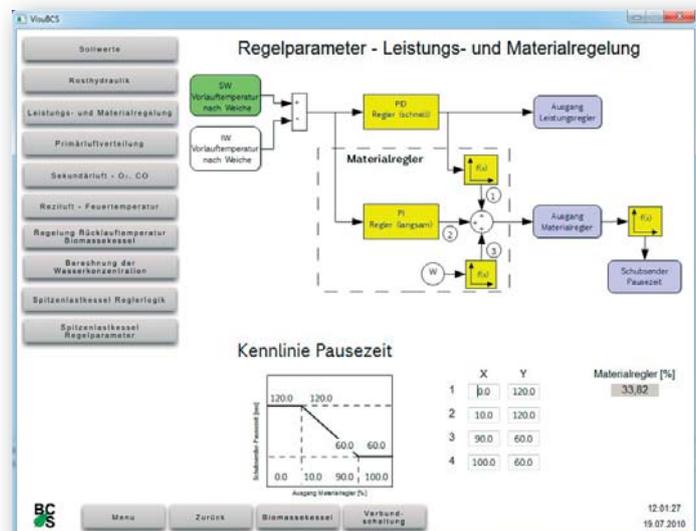
Complex control algorithms are developed at VWE with the MATLAB®/Simulink® program package from The Mathworks Inc. »We get particular value for our work from M-Target for Simulink® from Bachmann,« the engineer says. Thanks to the automatic code generation, it is possible for example to transfer district heating models, which are developed in the simulation environment, for the higher-level, efficiency-optimized district heating control system of the BCS, easily to the M1.

Universal solution

The BCS is completely independent of the automation hardware used on site. The Bachmann M1 system, with the respective customized BCS, is perfectly integrated into the respective hardware environment via, for example, PROFIBUS or another installed bus system. Operation is implemented either via a Bachmann control terminal (e. g., CT200) or as a web-based solution. A visualization with a graphically developed control concept is available to the operator for convenient adjustment of the control parameters.

Fast return on investment

Thanks to the modular structure of the BCS using the Bachmann software environment the effort for adapting to the customer's plant configuration is sharply reduced. This enables a short break-even period. Despite increased performance of the biomass boiler, the BCS is able to achieve a very respectable reduction of fuel consumption by up to 10 percent. At the same time, load variations can be nearly cut in half under favorable conditions and thus the plant availability can be markedly increased. »In one to two years the investment has already paid itself off for the operator,« Andreas Voigt is pleased to report.



▲ **BCS visualization:** The control parameters can be intuitively adjusted via the displayed flow diagrams.

