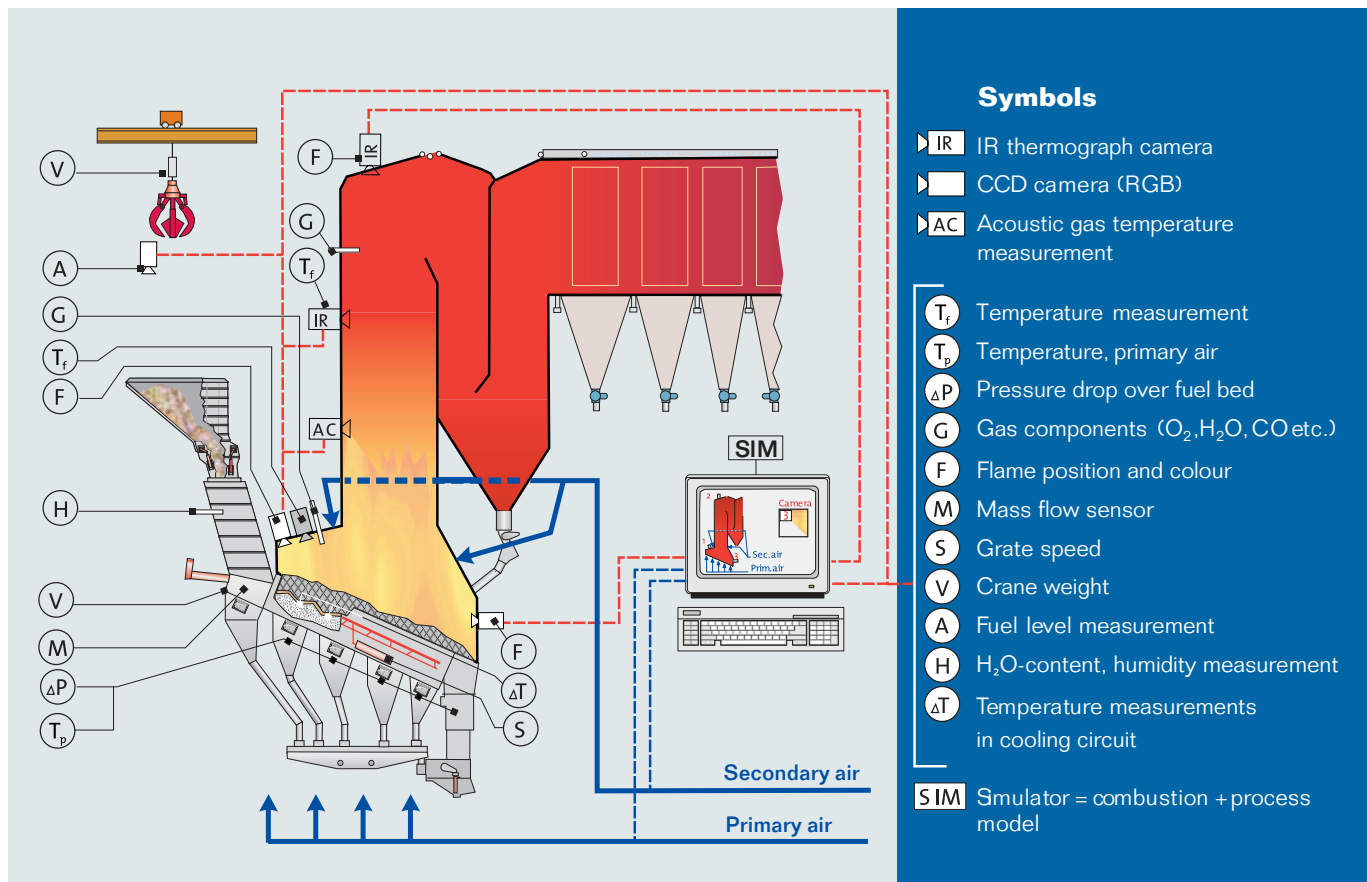


Advanced regulation systems for increased operational stability, energy output, availability and earnings

Control and regulation



Symbols

- ▶ IR IR thermograph camera
- ▶ CCD camera (RGB)
- ▶ AC Acoustic gas temperature measurement
- T_f Temperature measurement
- T_p Temperature, primary air
- ΔP Pressure drop over fuel bed
- G Gas components (O₂, H₂O, CO etc.)
- F Flame position and colour
- M Mass flow sensor
- S Grate speed
- V Crane weight
- A Fuel level measurement
- H H₂O-content, humidity measurement
- ΔT Temperature measurements in cooling circuit
- ◻ SIM Simulator = combustion + process model

The illustration shows that there are many instruments and sensors that can be used to improve regulation.

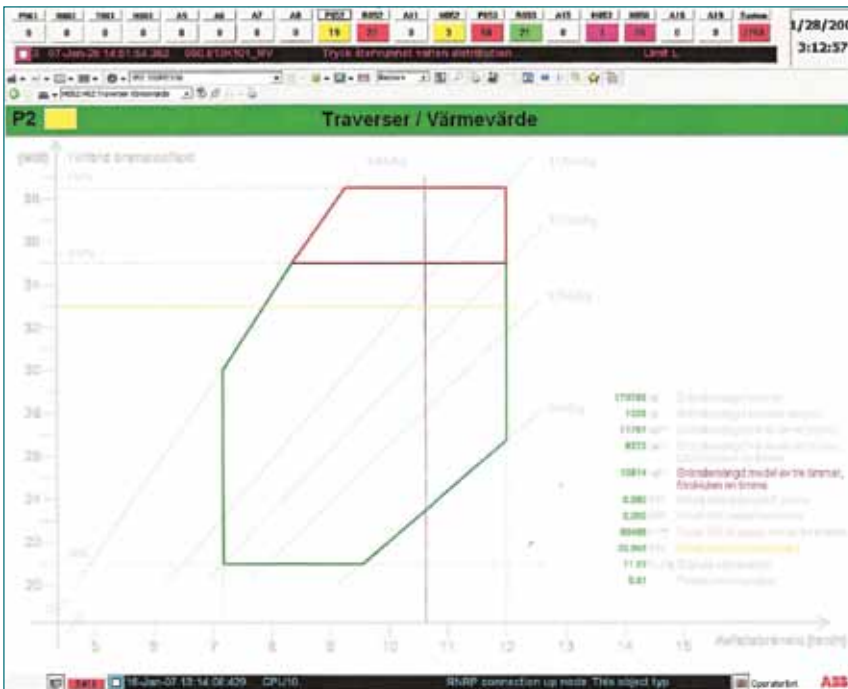
A good investment:

With a production increase of 2%,
the payback time is 6-12 months.

In our work to continuously improve the plants' efficiency and productivity, Babcock & Wilcox Vølund has developed a new concept based on advanced PID control for regulation of waste-fired grate plants.

The goal is to optimise energy production, increase availability, meet design parameters and comply with emission standards.





ASC is for plants with calculated calorific values. The ASC programme can visualise the capacity diagram and load setpoint.

Our four regulation models

1. MCR - Maximum Continuous Rating

MCR protects the plant from mechanical overload by registering the amount of fuel introduced. In the event of overloading, the load is reduced.

This function is the primary means of ensuring burnout of the bottom ash from difficult fuels.

MCR can be independently implemented, under the condition that there is a crane weight calculation.

2. ASC - Automatic Setpoint Control

ASC is a registration system that sets the maximum load setpoint in accordance with the plant's capacity diagram and the fuel's calorific value.

The programme ensures that the plant is always set to the optimum and maximum load setpoint allowed, depending on the quality of the fuel.

3. FSR - Fast Stoker Response

FSR controls the grate's dynamic load online. This function controls the waste layer's relative height on the grate and thereby ensures that there is always fuel available for the desired energy production.

FSR has a significant influence on the plant's production stability.

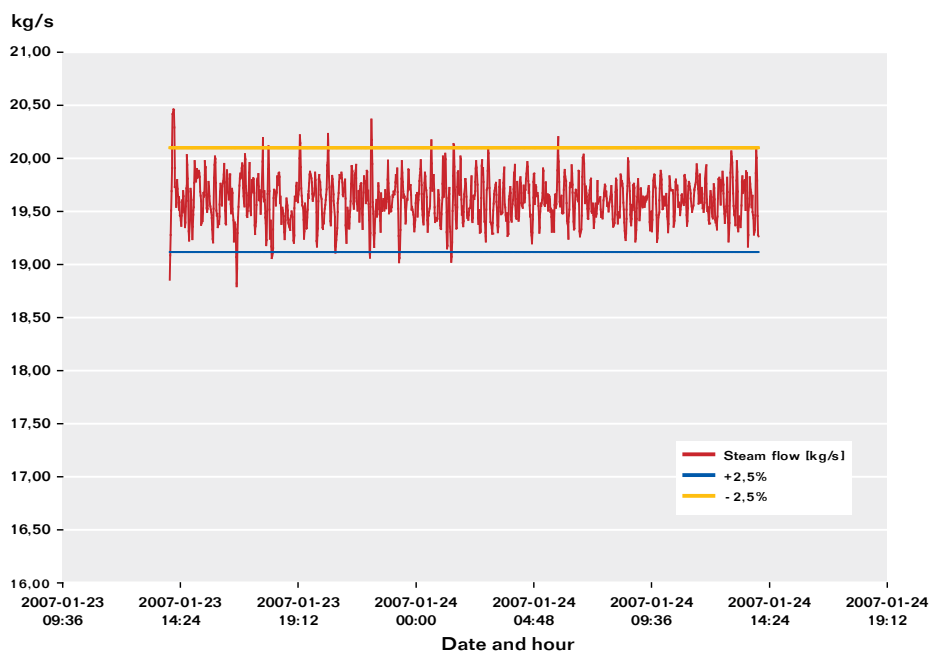
4. ERM - Energy Release Management

ERM is a programme that actively monitors energy production and sends signals for the correction of grate and combustion air. By doing so, it controls and stabilises overall production.

The function is an operation optimising link to the other modules.

The practical implementation of the regulation modules shows that an approximate +/- 5% reduction of existing load variations can be achieved. The reduced variation alone results in increased production, and the load setpoint can be increased up to the maximum output allowed.





The result of the Sundsvall plant, which has been regulated from the beginning, +/- 2.5%

Our new regulation

The main goals for our new regulation:

- Easy and less time consuming operation
- Stable and increased energy production
- Consideration of guarantees and emissions
- Compliance with design data
- Prevent overloading and accompanying consequences
- Enable increased availability
- Optimise the investment.

The operator

With the regulation concept, production is automatically adjusted and adapted to the waste's characteristics and the plant's physical condition. The result is automated operation, in which the operator's interference is limited to correcting errors.

MCR brake

When overloading is not possible, production is improved. Reducing the setpoint decreases the immediate energy output, but prevents prolonged overload breakdowns.

ASC

Maximising energy production must be implemented within the plant's capacity diagram. Increased production can only be justified and maintained once it has been ensured that the plant is not overloaded and that emission limits are respected.

This function substitutes MCR in new installations.

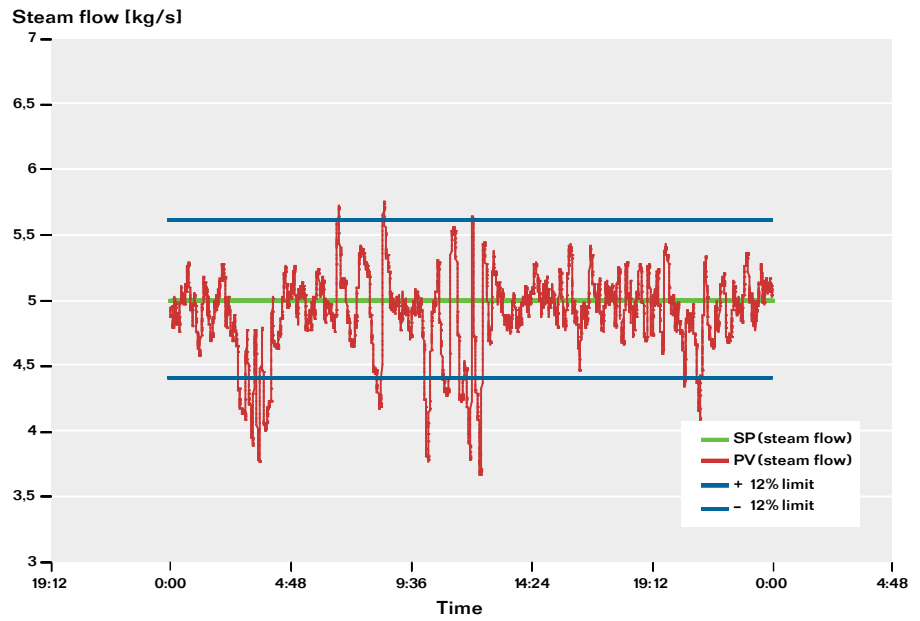
Regulation from the beginning on the Sundsvall plant

The Sundsvall plant (Sweden) is newly built and equipped with the new regulation function. This results in a variation of +/- 2.5% in steam production in 95% of the confidence interval.





Renosyd, WTE plant, Denmark.



Steam flow before modification of the control system at Renosyd

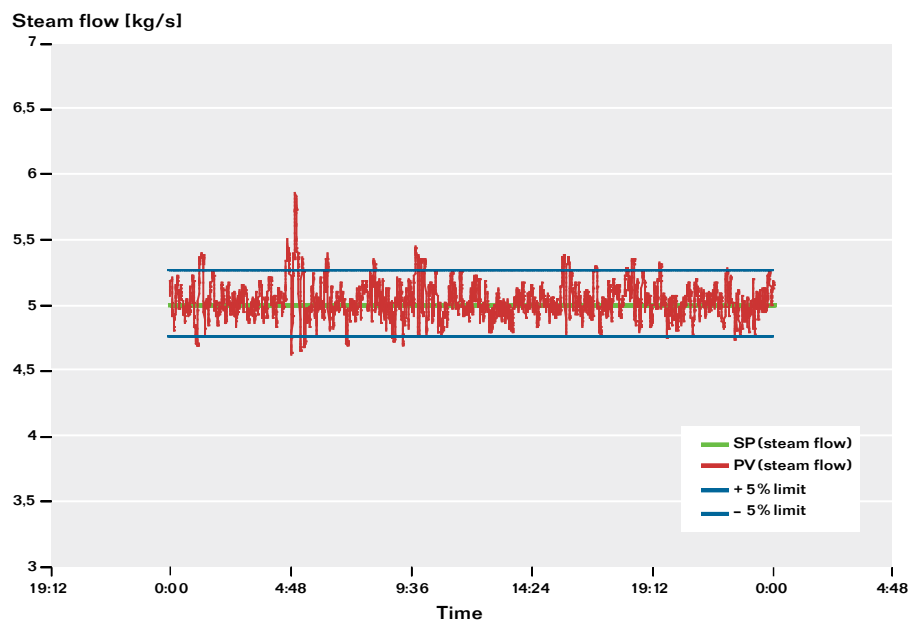
**Energy optimisation
FSR and ERM**

With improved control of the waste flow at the plant and the dynamic intervention in energy production, the production is stabilised and overloading is minimised. This can result directly in an increased setpoint, and thereby the most visible economic parameter.

Stable operation in the plant's capacity diagram allows for:

- More uniformed conditions for the flue gas treatment plant
- Greater availability for the boiler
- Longer service life for components
- Decreased consumption of primary electricity and other consumables
- Increased treatment capacity/MWh
- Increased earnings.

For further information, please contact our service department.



Steam flow after modification of the control system at Renosyd

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