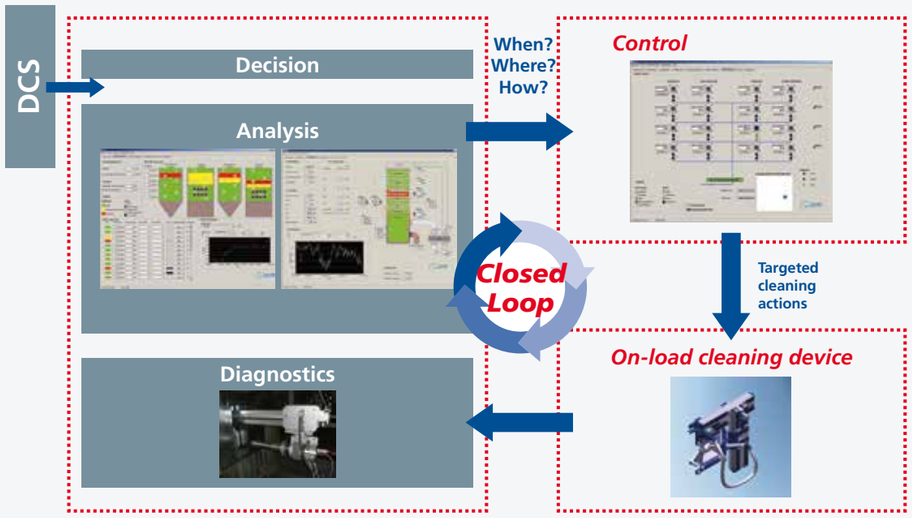
SMART FURNACE & SMART INFRASCAN

Intelligent on-load furnace cleaning

CLYDE BERGEMANN



SMART InfraScan with rotating working infrared sensor and pneumatically operated linear travel device

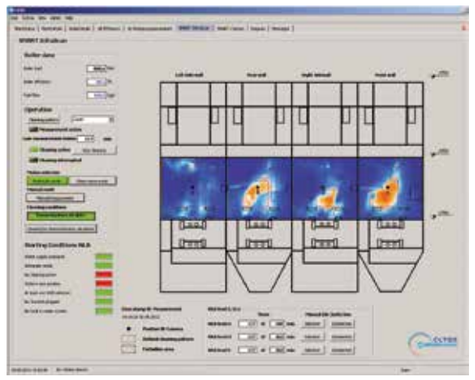
Maximum cleaning effect with minimum impact to the combustion process

320x240 measuring points per sensor for an excellent high resolution

The situation

The high furnace temperatures as well as the combustion process itself lead to build-up of deposits which can sometimes turn into hard to remove slagging. The formation of deposits is subject to many influencing factors which may continuously vary. Due to the multitude of influencing factors and their interdependencies, there cannot be a global, once defined and always applicable cleaning strategy.

Therefore, an intelligent on-load furnace cleaning is needed that triggers cleaning devices like water cannons, always adjusted to the current deposit situation.



SMART Furnace: Display of all relevant information about the deposit situation and the operating status of the cleaning devices

Our solution

We combine diagnostics and analysis. SMART InfraScan measures the surface temperature of the boiler wall in the furnace using infrared sensors. The thicker the deposit, the higher the surface temperature – which means that high temperatures are an indicator of heavily slagged areas.

Based on these measurements, SMART Furnace continuously monitors and evaluates the deposit situation in the furnace. The measurements are carried out with 320x240 measuring points per sensor which provides an excellent high resolution. This enables SMART Furnace to calculate dynamically, cleaning figures and parameters of the water cannons depending on the deposit level. The cleaning parameters are always assigned to each cleaning figures individually.

This highest level of flexible on-load furnace cleaning avoids thermal overload of the pipe walls and results in maximum cleaning performance. The cleaning actions are carried out automatically and demand-driven.

Engineering for boiler specific infrared thermography by SMART InfraScan

The number of infrared sensors required varies depending on the furnace design and the visibility conditions of the infrared range. The visual range in the infrared spectrum is primarily restricted by the ash content and the coal dust. The wavelength is selected to suit the existing furnace atmosphere. It is made use of the fact that the furnace atmosphere in the mid-wavelength infrared has a much higher transparency than the visible spectral range.

The single thermal images combined show the surface temperature distribution of the whole furnace.

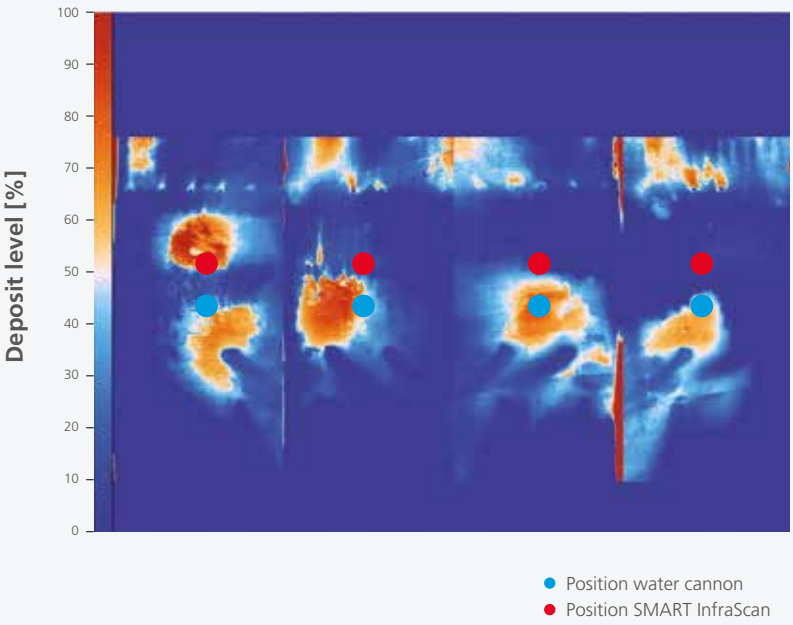
The data transfer to the software module SMART Furnace is done via ethernet cable.

Made for power plants

The infrared sensor is part of a camera unit which has an air and water cooled probe mounted in front of the unit. The probe filters the infrared signals by means of specific lenses. The probe and camera unit is moved into the boiler by a linear travel device. Self-closing snap locks seal against flue gas. A ball-bearing supported rotating device ensures that the probe reaches the measuring positions to scan all furnace walls. At the end of the measurement, the linear travel device pulls back the probe and the camera unit to the stand-by position outside the boiler.

Safety function

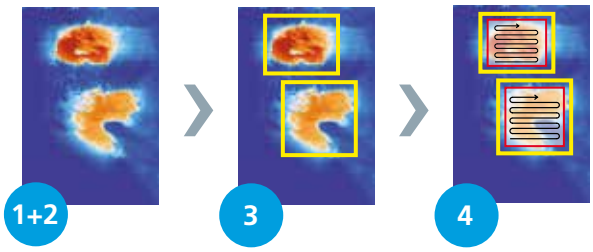
If the cooling water and/or compressed air fails or the threshold temperatures are exceeded, the travel device carries out an emergency withdrawal to the stand-by position.



Dynamic calculation of cleaning figures and cleaning parameters

Exemplary mode of operation

1. SMART InfraScan directly measures the surface temperature of the membrane walls.
2. SMART Furnace converts the measuring values to a false colour image of the deposit distribution.
3. Rectangular cleaning zones are formed for different areas of the membrane walls. The most heavily contaminated spots are the starting point. Cleaning zones always end where the deposit level falls below a specific threshold.
4. SMART Furnace calculates the cleaning figures and cleaning parameters based on the coordinates of the cleaning zones. By doing this, SMART Furnace considers the relevant boiler and system parameters. Following that, the cleaning devices are activated with the dynamically calculated cleaning figures by the control system.



Your benefits:

- Demand-driven on-load furnace cleaning
- Targeted cleaning and adjusted to the current slagging level avoids thermal overload of the pipe walls
- Less process impact due to optimised cleaning sequences
- Automatic activation of the cleaning actions and therefore deposit removal in time
- Optimum cleaning results

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