

TEMPERATURE MEASUREMENTS FOR BIOMASS BOILER OPTIMISATION

Iñaki Araquistain

Regional Sales Manager - AMETEK Land Spain
inaki.arquistain@ametek.com | +34 629 27 75 75

Héctor Cordal

Responsable Desarrollo de Negocio - Grupo Álava
hcordal@grupopalava.com | +34 607 96 94 10

THE CHALLENGE OF TEMPERATURE MEASUREMENT

Thermal imaging and temperature measurement in biomass boilers face several challenges due to harsh conditions and biomass combustion characteristics:

- 1. High Temperatures:** Traditional sensors may not withstand the extreme temperatures and variations in biomass boilers.
- 2. Corrosive Environment:** Corrosive by-products like sulphur compounds and chlorides can degrade sensors, necessitating specialised materials and coatings.
- 3. Ash and Particulate Build-up:** Accumulated ash and particulates can affect sensor accuracy and response time, requiring regular cleaning and maintenance.
- 4. Variability in Fuel Composition:** Different biomass fuel compositions lead to fluctuating combustion temperatures, demanding accurate sensors for optimal efficiency.
- 5. Uneven Temperature Distribution:** Uneven temperatures within the boiler necessitate strategic sensor placement for representative readings.

To address these challenges, it is essential to select appropriate temperature measurement devices, ensure proper sensor placement and maintenance, and integrate advanced control systems. Collaboration with experienced engineers and suppliers is crucial for reliable temperature measurement and optimal boiler performance.

FURNACE EXIT GAS TEMPERATURE

Furnace Exit Gas Temperature (FEGT) refers to the temperature of the gases leaving a furnace or boiler, and is another opportunity to monitor the combustion efficiency of a boiler.

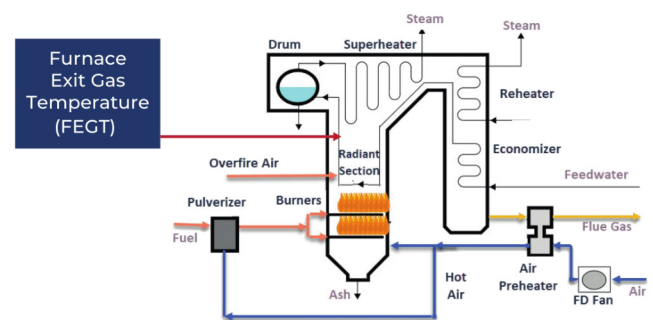
Achieving the optimal FEGT helps balance energy consumption and production requirements while minimizing environmental impact.

TOO HIGH

Reduce life of boiler tubes.
Deposit ash on tubes and reduce heat transfer.
Corrosion.

TOO LOW

Reduced thermodynamic efficiency.
Increased costs.
Increased CO₂ emissions.



THE SOLUTION RADIOMETRIC THERMAL IMAGING

RADIOMETRIC THERMAL IMAGING

Radiometric thermal imaging can deliver clear, live images of the boiler interior, even through smoke and hot furnace atmospheres which would obscure visual furnace camera systems, whilst taking accurate temperature measurements, showing the temperature distribution across the boiler.

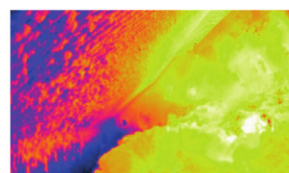
AMETEK Land's solution for this application is the MWIR-B-640, a mid-wavelength infrared thermal imager using a borescope design which builds upon more than 20 years of experience with this type of technology.

The MWIR-B-640 allows highly accurate and fully radiometric temperature measurements to be taken, stored, and trended over the lifetime of the boiler. It utilises advanced IMAGEPro thermal imaging-processing software for long term data trending and analysis, enabling the early detection of leaks and temperature variations, and achieving effective process optimisation. Measure Fuel flow and slag buildup in a sloping grate boiler.

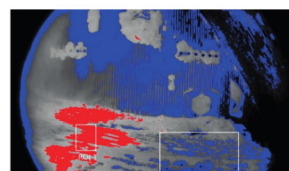
Operators are provided with a clear view of the critical boiler areas, with more than 300,000 accurate point temperatures, measuring in the range of 500-1800 °C (932-3272 °F). IMAGEPro software also facilitates advanced digital communications, allowing easy monitoring of the boiler to identify hot and cold areas and visualise any uneven heating in real-time.

The MWIR-B-640's high-resolution image, combined with its wide-angle field of view (90°), allows multiple areas to be imaged and measured simultaneously, with the live image data viewed from the safety of the control room. Only a small opening in the wall is required for the MWIR-B-640 to accurately profile the temperature of the entire furnace wall, so the furnace atmosphere and energy consumption are not affected.

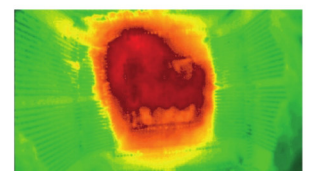
The MWIR-B-640 is an invaluable tool in prolonging furnace and boiler lifetime, optimising production throughput and reducing energy consumption, and improving stock temperatures.



Measure Fuel flow and slag buildup in a sloping grate boiler.



Isotherm view makes it easy to identify which areas in the image are the hottest and which are cooler.



Viewed from the top, it is easy to see the temperature and surface conditions in a bubbling fluidised bed boiler.