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BF2RA Project Aims

This presentation will focus on flame monitoring.
Stoker Furnaces
Stoker Furnace Operation

- 5-25mm solid fired fuel
- Dusty, ashy environment compared to PF furnace
- Ash LOI - 5 - 30%
- Residence Time - 30-45min
- Industrial scale (i.e. sugar industry)

Types of stokers

- Three main types
  - Underfeed
  - Spreader - Fireball
  - Travelling Grate – Firing Wall

- Air fed from below

- Most imaging systems have focussed on gas or PF flame furnaces
Camera Types
Visual cameras use CCD technology

Detects brightness of flame

Temperatures inferred from calibration

1000-2000°C

Angled water cooled lenses

Temperature recorded along lines and regions of interest

(Durag VTA-200) - Visible Range

- Have been used in spreader stoker furnaces before.
- Can be used to identify problem areas in the furnace. This helps avoid thermal damage to the furnace.
Mirion Systems - Infrared Imaging

- IR imaging
- Emissivity of materials
- Continuous single point temperature measurement and continuous calibration.
- Can see past/through debris
- Customisable ROI
- Has been used in South American sugar factories

M540™ Lynx High Temperature Black and White IR Camera Series (mirion.com)
Camera Footage
Example IR Camera – Colombian Furnace (Video)

- Successful installation and measurement of temperatures.
Example IR Camera – Colombian Furnace

- Successful installation and measurement of temperatures.
- Temperature measurement zones displayed.
Stoker Furnace Trial – British Sugar

- Birdseye view looking at the whole travelling grate
- Able to see flame front
- Feasible with travelling grate stoker
- Visual image of the coal and ash on the grate.
- Enabled areas of inadequate air/fuel supply.
Software and Thermography Trial – British Sugar

- Heat lamp used to simulate furnace temperatures.
- Successful temperature measurement.
- Average temperature management in customised zones.
Future work

- Data from control systems compared against temperature data
- Image processing and seeking correlations between images.
Conclusions

Thermography systems can be used to generate images of dusty furnace environments.

Thermal data can be inferred from flame brightness for visual camera systems.

Thermal data can be measured directly using IR systems.

Cameras can be used to identify problem areas within furnaces.
Thank you for listening

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