DURAG GROUP

West Fraser

WHITE PAPER

COMBUSTION OPTIMIZATION IN BIOMASS GRATE FIRING WITH VIDEO AND THERMOGRAPHY SYSTEM

End user: West Fraser

Projekts:

Grande Prairie, Alberta Canada
Chambord, Quebec Canada
Allendale, South Carolina USA

1 INTRODUCTION

The West Fraser company, a leading manufacturer of OSB boards (OSB = Oriented Strand Board), operates biomass grate furnaces at 17 locations worldwide.

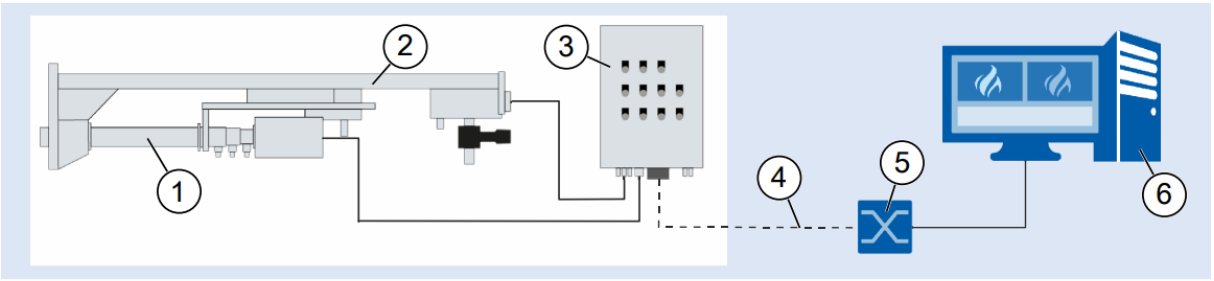
To produce OSB panels, the wood chips must be dried. This is done in a flue gas-heated drum dryer. The required amount of flue gas is generated by burning wood residues such as bark in a reciprocating grate furnace.

Fire grate systems from manufacturers such as Standardkessel, Buettner, GTS and Teaford are used. The focus is on efficiency and optimal use of fuel.

To optimize the combustion, one cameras for each furnace with thermography and flame front determination were installed first on two West Fraser lines at the Grande Prairie, Alberta plant in 2018.

In the past 5 years, West Fraser (previously Norbord) equipped additionally to Grande Prairie the OSB Mill in Chambord, Quebec and Allendale, South Carolina with this system.

1.1 SYSTEM DESIGN HARDWARE VIDEO AND THERMOGRAFIE SYSTEM



1	Furnace camera D-FS	4	Fibre optic cable
2	Retraction unit D-RU	5	FOC Ethernet converter
3	Sensor control unit D-SCU	6	Video and thermography soft-ware D-VT/D-VTA with PC

Figure 1 Overview Video and Thermography System

A video and thermography system always consists of a furnace camera and visualization software, although the applications and appropriate systems for them are highly industry-dependent. All West Fraser installations were equipped with water cooled D-FS2 VIS120 furnace cameras, with a special wide viewing angle of 120 ° diagonal.

Video and thermography solutions from the DURAG GROUP visualize the combustion process at combustion plants and show the operator a detailed picture of the current combustion situation. 24/7 real-time videos from the combustion chamber and an analysis of the flame temperature

distribution provide all of the information required for the best possible monitoring and control of the combustion process.

1.2 SYSTEM DESIGN THERMOGRAPHY SOFTWARE

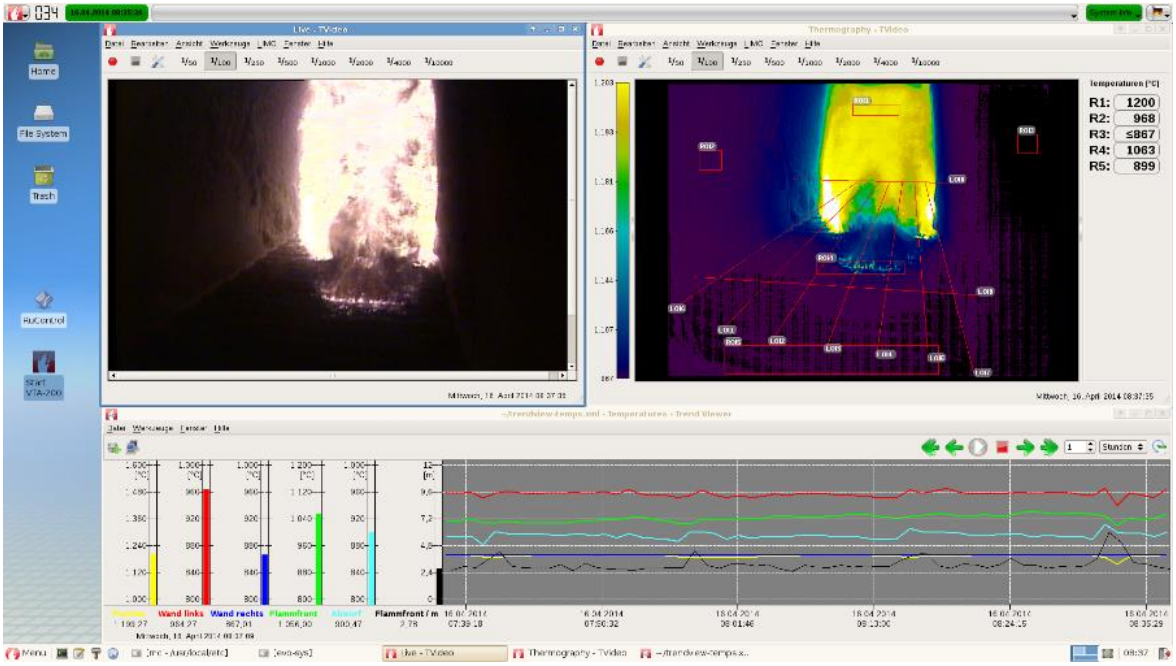


Figure 2 Overview Video and Thermography Software

The DURAG thermography software will be delivered as standard installed on a dedicated 19 " industrial PC. It shows the live video and the calculated temperature distribution from one or more furnace cameras, includes long-term data storage, video recording, configurable trend displays, offers digital interfaces to process control systems and can be expanded with additional modules.

Measurement points (Region of Interest, ROIs) can be freely defined in the temperature image and their values can be transferred to the plant control system via digital interfaces.

If necessary, two or four furnace cameras can be connected to one D-VTA 200 system PC.

Thermography:

- Live video and thermography image with colored temperature distribution
- Temperature range with visual furnace cameras: 600 ... 2,000 °C
- Temperature accuracy against a black body > 99%

1.3 INSTALLATION IN GRAND PRAIRIE

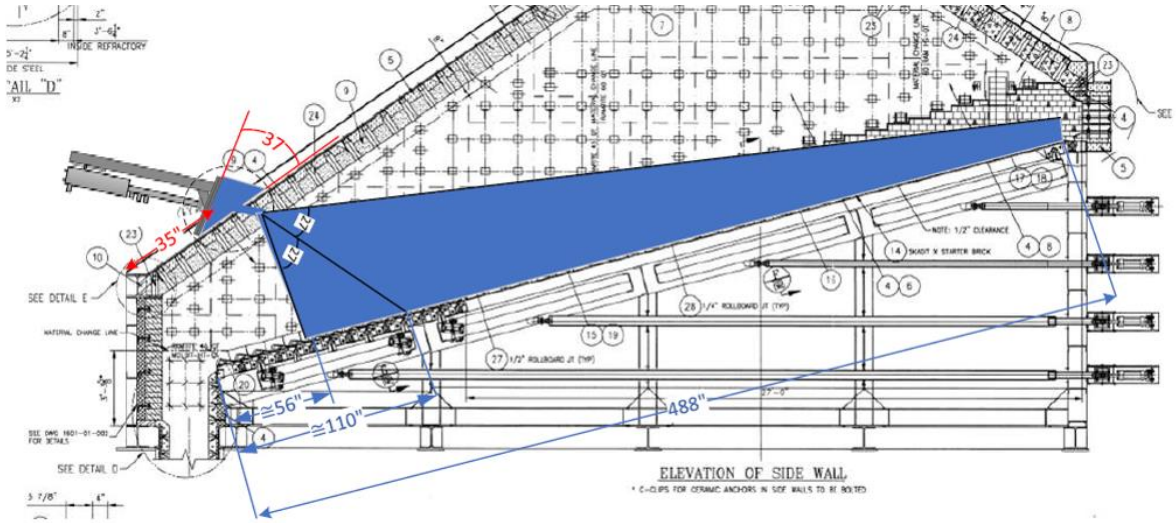


Figure 3 Installation in Grande Prairie, Alberta Canada

Figure 3 shows the installation position of the furnace camera and the field of view on the side. Selecting the optimal position for installing the furnace camera is very important and largely determines the chances of success of firing automation based on the camera data.

Figure 4 Installation in Grande Prairie, Alberta Canada

1.4 FURNACE CAMERA WITH WIDE VIEW INSIDE

In all West Fraser projects, a water cooled furnace camera D-FS2 with retraction unit is used. Due to the large and compact combustion system with a very wide combustion grate, a furnace camera with a wide-angle endoscope (92° horizontal viewing angle) was developed specifically for this application. With the increased opening angle, it is possible to monitor the entire grate with one furnace camera and to have all parts of the grate necessary for automation in view. To ensure sufficient light and good optical resolution, an endoscope with a 40 mm diameter was used. It is also important for the application that the furnace camera moves into the combustion chamber and does not need to be maintained or cleaned for a long time. This aspect had caused significant problems in other plants with different systems in the past.

1.5 "GRANDE PRAIRIE" INSTALLATION RESULTS

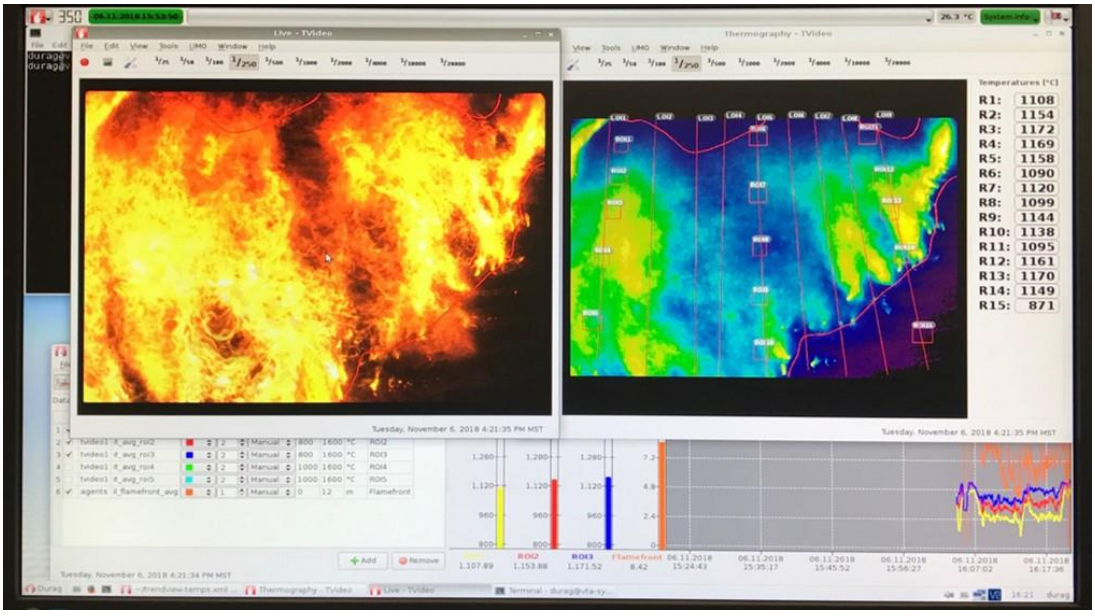


Figure 5 Thermography image before optimization in Grande Prairie, Alberta Canada

The above figure 4 shows the system with the fire front without optimization. The fire is unsymmetric and didn't end before drop of region.

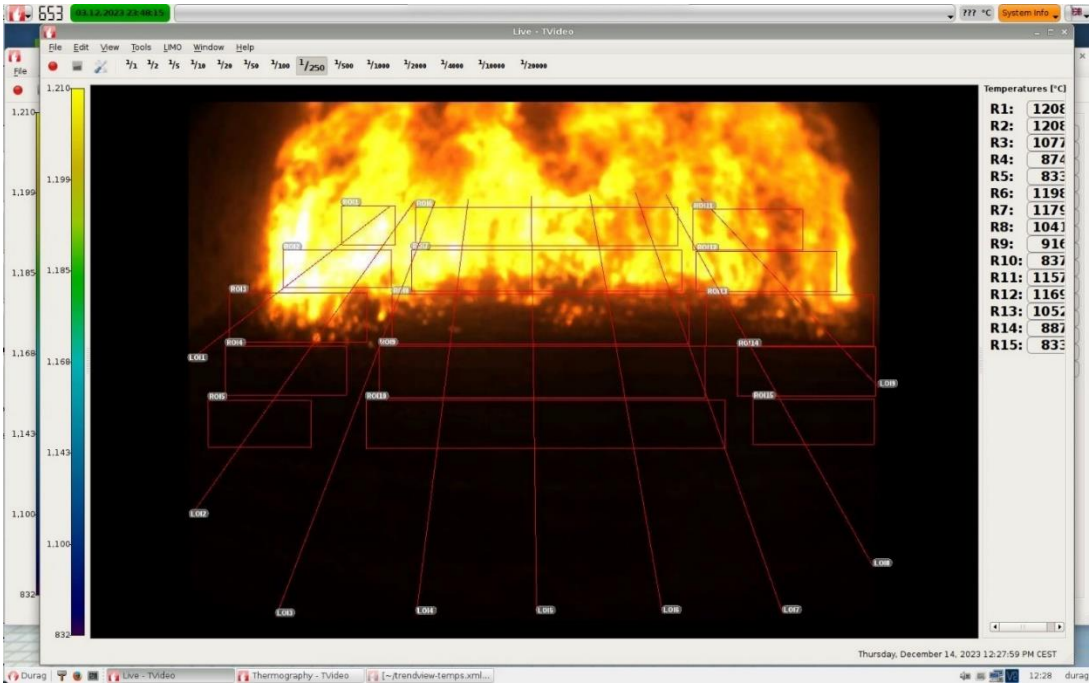


Figure 6 Thermography image after optimization in Grande Prairie, Alberta Canada

Now figure 5 shows the fire front after optimization. The data from the furnace cameras is transferred to the control system and used to automatically control the individual zones (left, middle, right). In the image in Figure 6 you can see the three rows with 5 ROIs each for (left, middle, right) and the LOIs for determining the position of the flame front. The result for the flame front alone was not a resounding success. Only the combination of the temperature zones (ROIs) in conjunction with the LOIs made it possible to design controls so that the flame front remains nailed in one position regardless of the load level.

The two furnace cameras at the Grande Prairie, Alberta plant are integrated into the fire output control and this is operated automatically around the clock. A straight and continuous fire front is achieved via both the temperature zones (ROI) and the flame front detection (LOIs, fine tuning), regardless of the load level of the system. This reduces the workload on operating personnel and allows them to concentrate on other production processes.

By implementing the video and thermography software in the existing virtual machine, West Fraser is able to carry out troubleshooting and remote maintenance quickly and effectively. On-call technicians can respond immediately to disruptions - even from home - and thus avoid production downtimes. Selected personnel, e.g. from central automation, have worldwide access to maintain and optimize the system.

1.6 BENEFITS

With the above automation of the fire output control based on the DURAG video and thermography system West Fraser get as a main benefit:

- Increased efficiency:
  West Fraser was able to increase the drying level of the wood chips from 80% to over 90%.
- Operater independent
  With the firing automation based on the DURAG video and thermography system the grate firing in the West Fraser plants are mostly independent from the knowledge and experience of the operators.

- Reliable and maintainable:
  The system is more than 5 years in operation in Grande Prairie, and the firing automation is used more then 90 % of the time. Due to modern server management and data backup strategies, there is a significantly improved almost 100% availability.