

Thermal Imaging camera system for 'FurnaceSpection'

Erhard Niessner* discusses how special filters have allowed for accurate temperature measurement in glass melting furnaces.

A new generation of 'FurnaceSpection' thermal imagers by LumaSense are equipped with a borescope optic system. This system enables monitoring of the temperature distribution inside the glass melting furnace through the furnace wall.

A resolution of more than 300,000 pixels can be achieved by using optics and the borescope lens system is available in a number of different lengths to suit most applications.

The use of an 8mm diameter viewing port and the provision of positive air pressure across the end of the borescope will ensure that the lens is protected while the system is inserted into the process.

For furnace temperatures above 1400°C, the air cooling system can be supplemented with the addition of a water cooling system.

In the event of cooling water or air medium failures, a specially developed camera retraction system will automatically withdraw the camera from the process to prevent it being damaged by excessive heat, giving the user peace of mind that their valuable asset is protected 24/7, 365 days a year.

The FurnaceSpection imager provides users with a real-time tool, which identifies the process abnormalities before they develop into problems that can lead to unplanned outages.

This radiometrically-calibrated imager accurately measures the temperature of the products and refractories inside natural gas-fired furnaces. In addition to both standard for stationary (SD) and mobile (MB) versions, it can be customised to meet application needs.

For glass melting tanks, this is a critical tool to ensure that refractories remain intact and that the melting process

is working at its optimum efficiency.

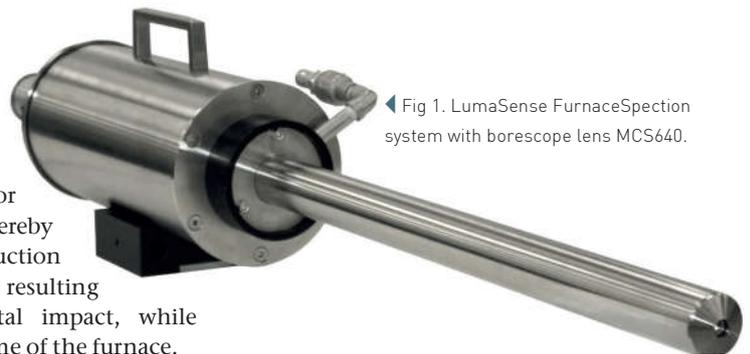
The user is also able to monitor flame condition, thereby reducing the production of NO_x pollution, resulting in less environmental impact, while maximising the lifetime of the furnace.

At a cost of several thousands of dollars per furnace and re-tubing costs in the millions, a large amount of capital can be lost if a furnace failure goes unnoticed or if the refractory linings are retired too early or too late.

FurnaceSpection helps operators to monitor and control process temperature uniformity through streaming images and powerful software for analysis and historical trending. Digital and analogue outputs are available to broadcast images of the plant's local network.

Once a suitable installation position of the camera outside the furnace has been established, the special optics allow the user to monitor temperature distribution inside the glass furnace itself, a feature which cannot be achieved using more traditional thermocouples.

With the addition of special spectral filters, the negative influences caused by burner firing can be avoided. Alternatively, a different setup of the camera with another spectral filter can be used, whereby the flame image is visible. The data communication between the



◀ Fig 1. LumaSense FurnaceSpection system with borescope lens MCS640.



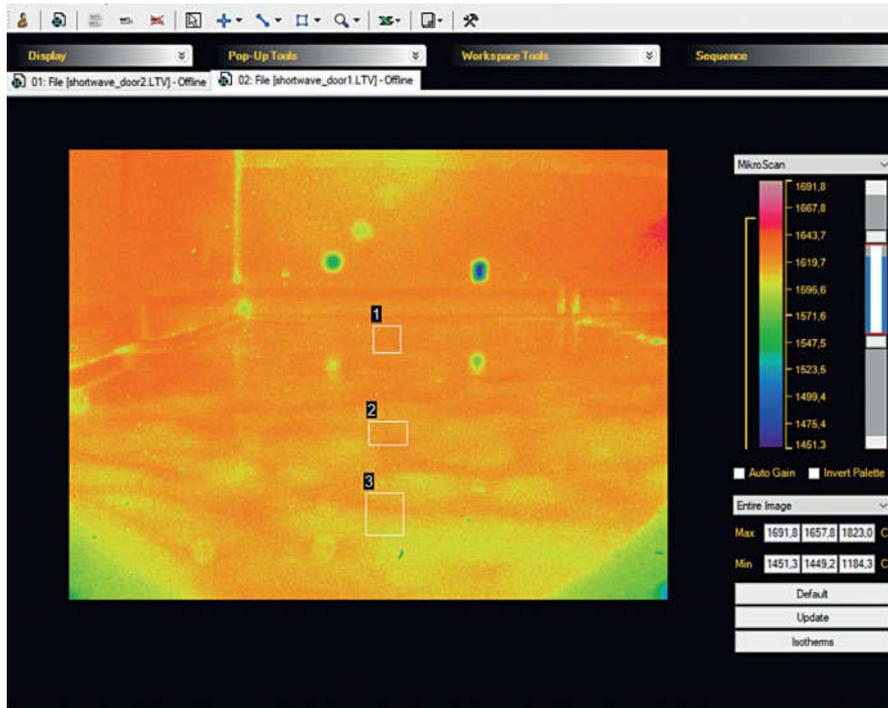
▼ Fig 2. Thermal camera.

thermal camera and a PC takes place via Ethernet, allowing the representation of the respective thermal images even at a remote location.

The dedicated 'LumaSpec Software', enables the capture and recording of image sequences or frames that are event-driven. Measuring points as well as measuring zones can be freely selected by defining 'Minimum', 'Maximum' or 'Average' values, which can then be used for closed loop process control. The measured data can be provided via I/O modules with analogue or digital outputs. Alternatively, all measured values can

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Inspection



▲ Fig 3. Thermal Image of a furnace with LumaSpec RT software.

be transmitted via TCP/IP, Fieldbus systems, Profibus, Profi-Net or Modbus. LumaSense has developed industrial grade thermal imaging solutions for more than 20 years, and has deployed custom

systems around the globe to monitor processes and assets in glass plants. Its products are supported by experienced field service and application engineering teams. ■



▲ Fig 4. (small) Specially designed camera retraction system.



▲ Fig 5. Specially designed camera retraction system [2].

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