

Infrared temperature measurement

Richard Gagg looks at how infrared temperature measurement can help improve efficiency and optimise quality within glass production.

Ensuring consistent temperatures in glass melting tanks is an essential part of maintaining high quality glass production and extending the campaign life of the furnace.

Within the furnace, there are a variety of temperature measurements to be taken in different locations and it is important to be able to trend temperature measurements throughout the furnace, such as crown and port arch areas. Also, the temperature of the melt line and batch transit time for recording and comparison, as well as temperature 'visualisation' of cold spots in the refractory wall, which can be indicative of air leaks typically caused by structural issues. There are also considerations such as the impact of fluctuating temperatures on the process and the furnace itself.

REMOTE INFRARED IMAGING

Innovation by remote, infrared imaging technology means that hundreds of thousands of temperature measurement points can be taken every second. This gives the operator better measurements and enhanced control of the temperatures in the melting tank. Technologies like the NIR Borescope (NIR-B) thermal imager provide continuous monitoring and display a high quality visual image that can, for example, be used to optimise flame propagation. This short wavelength infrared borescope imaging camera produces high definition (656 x 494 pixel) thermal images and enables accurate temperature measurement from any point in the image.

There are many advantages to thermal versus visual imaging and point temperature measurements. Using a permanently installed thermal imaging camera that actively records all necessary and useful data means that the video can be stopped at any frame and measurements can be taken of all of the ports at the exact same point in the process so that reversals can be tuned more accurately. In addition, the beginning

of any structural damage caused by out of normal operating range high temperatures can be caught rapidly. For example, if a crack is developing, it may show up as a cold area where air is being pulled in. Identifying as soon as this process begins, using thermal imaging, allows corrective action to be taken before it develops into something far more serious, avoiding potentially dangerous situations, very high repair costs and lost production.

FOCUS ON AREAS OF INTEREST

With the NIR-B, it is possible to accurately image the temperature of a large area of the furnace through only a small opening in the wall, giving the operator access to data that would previously have been either time-consuming or impossible to collect.

This allows the operator to focus on specific areas of interest, measure live data points and store the data for future analysis. By monitoring the live video, operators can begin to improve melting tank efficiency and improve product quality, resulting in reduced process costs. The auto retract version of the NIR-B provides a level of protection from damage by overheating, should water or air services fail, therefore reducing any associated maintenance or replacement costs.

As the latest infrared temperature measurement systems allow real time data to be streamed in time lapse modes, this allows process engineers to visualise the flow of the glass melt batch over the process time. As a result, alarms can be set in the control equipment to alert operators and ensure optimum glass quality production.

EXTENDED LIFESPAN

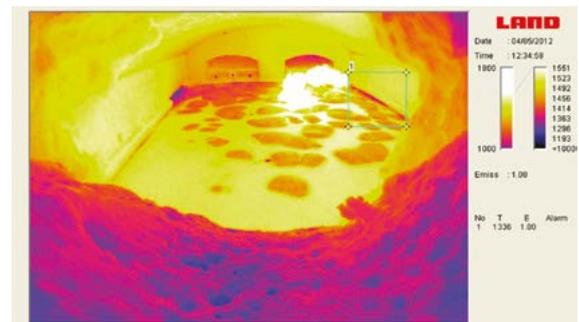
The NIR-B can extend the lifespan of the melt tank and provide greater asset protection through more accurate temperature measurement. Using high accuracy thermal imaging devices to measure, monitor and log refractory temperature allows information to be transmitted instantly and so trigger alarms



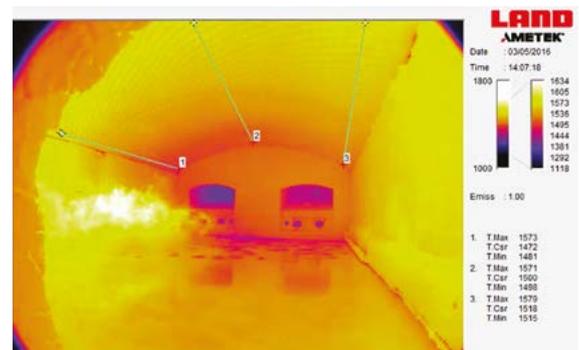
Such technologies as the NIR Borescope thermal imager provide continuous monitoring and display a high quality visual image.

if temperature differences occur. Thermal imaging cameras can also be positioned underneath the melting tank to detect hot spots early, potentially preventing a break-out below the tank. It has therefore been found that infrared borescope equipment, such as NIR-B can extend the lifespan of the furnace and provide greater asset protection through more accurate temperature measurement.

These recent advances in measurement technology are helping plants to make significant improvements in the melting process, both in quality of output and reduction of costs. ■



Thermal image of a furnace structural crack.



Thermal image of an end-fired tank, with three crown profiles.

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