

# CASE STUDY

## BORESCOPE HELPS IMPROVE FURNACE OPERATIONS FOR GLASS PRODUCER HOLOPHANE

### INTRODUCTION

Holophane, a leader in lighting solutions since 1921, has implemented AMETEK Land's new Near Infrared Borescope (NIR-B) Glass, an enhanced thermal imager, at its plant in France and now is reaping major benefits by accurately measuring temperature within its glass melt tank.

### ABOUT HOLOPHANE

For nearly a century, Holophane has produced and transformed glass for technical applications, specifically glass optical components for automotive lighting. It has set itself apart by its excellent understanding of both pressed glass and optics and its ability to combine these two skills is unique.

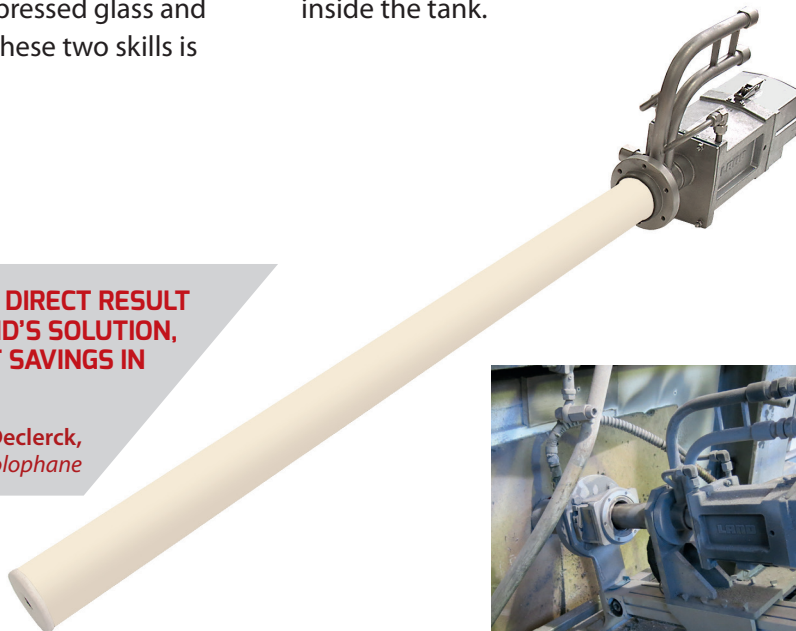
### THE CHALLENGE

When it rebuilt the 33m<sup>2</sup>, 85-ton, end-fired regenerative furnace in 2014 at its Les Andelys plant in Northern France, Holophane looked to replace its existing visual camera system with innovative thermal imaging technology to provide continuous "on line" temperature measurement.

AMETEK Land recommended its Near Infrared Borescope (NIR-B) Glass with an auto retraction system, which can operate effectively at the extremely high ambient temperatures adjacent to the glass melt tank, while providing real-time, high-quality thermal images and temperature data from inside the tank.

**"WE ARE CONFIDENT THAT AS A DIRECT RESULT OF IMPLEMENTING AMETEK LAND'S SOLUTION, WE ARE ACHIEVING SIGNIFICANT SAVINGS IN ENERGY USAGE."**

**Emmanuel Declerck,**  
*Industrial Director, Holophane*



NIR-B Glass inserted through melt tank wall

# BORESCOPE HELPS IMPROVE FURNACE OPERATIONS FOR GLASS PRODUCER HOLOPHANE



## NIR-B GLASS

Near Infrared Process Imaging  
For the Glass Industry  
1000 to 1800 °C / 1832 to 3272 °F

### THE SOLUTION

Developed specifically to operate in the demanding environment of a glass melt furnace, the NIR-B Glass is designed to withstand the high ambient temperatures. It features an integral cooling system plus a specially designed air purge that keeps the 90° lens clear of contaminants to provide 24/7 data to the plant. Even at very high furnace temperatures, it delivers high-definition (656 x 494 pixel) thermal images to generate highly accurate traceable temperature measurements in the 1000 to 1800 °C (1832 to 3272 °F) range.

This advanced technical solution is suitable for float, container, borosilicate, fibre glass and speciality glass furnaces that also made it an ideal solution for Holophane's Les Andelys plant requirements.

At the Les Andelys plant, the NIR-B Glass was installed above the throat of the tank in a location with a very high ambient temperature of over 60 °C. For this installation, AMETEK Land recommended a heat shield below the borescope to reduce the heat coming directly from the throat.

The solution also incorporated an auto-retract mechanism that provides the instrument with additional protection with instantaneous automatic retraction from the furnace wall in the event of failure of air purge, water cooling, and mains power or if there is an over-temperature condition detected at the borescope tip.



*NIR-B Glass retracted from the glass melt tank*

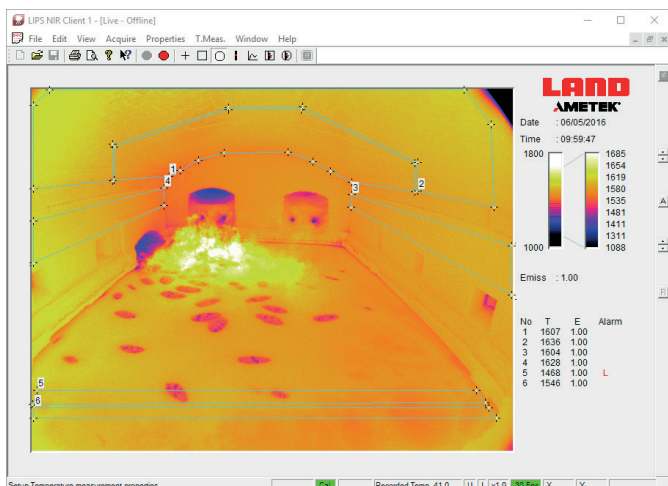
## CASE STUDY

## OUTCOME

Among the borescope's major benefits to Holophane is its ability to provide a 90-degree wide angle thermal image with clear "visual" definition, combined with a continuous temperature readout. This helps the operators maintain furnace control and therefore optimise productivity. In a revolutionary development, the NIR-B Glass has been used to continuously monitor the optical profile (temperature profile) along the furnace walls to optimise the location of "hotspots" and to monitor areas of the crown for high temperature with alarms to prevent overheating.

AMETEK Land's Cyclops optical pyrometer, which has been the industry standard for single optical pyrometer temperature measurements in furnaces for decades, was used as the basis for the technology incorporated into the NIR-B Glass and hence the reliability of the temperature measurement.

With over 324,000 available temperature measurement points in the field of view, the borescope also can be used to monitor for drift in crown roof thermocouples by assigning emissivity values for a specific or range of data points.



*NIR-B Glass thermal image of inside the glass melt tank*

The clear, wide angle thermal image provided by the NIR-B Glass has helped Holophane operators to monitor glass batch line and batch flow from the charging end up to the throat. With configurable outputs, it is possible to create an alarm if the batch crosses the desired melt line. By utilising an area function in the advanced LAND Image Processing Software (LIPS) Holophane also is able to monitor foam.

In addition, the NIR-B Glass alerts the operator to any air leakage or ratholes/cracks in the melt tank as well as corrosion areas near the chargers or burners. The instrument allows an operator the option to see the difference in temperature gradients when the burners are not operating correctly, which may be an indication that the burner needs to be cleaned, re-aligned or air-to-gas ratio adjusted.



*Holophane Control Room*

Emmanuel Declerck, Industrial Director at Holophane explains, "The borescope helps greatly to maintain the right quality flames with good turbulence and shape, therefore optimising the quality of our end products along with our energy usage. The images provided by the instrument are particularly important at the exit, near the throat, where temperature profiles are routinely monitored by operators."

"We are confident that as a direct result of implementing AMETEK Land's solution, we are achieving significant savings in energy usage," adds Mr Declerck.

## CONCLUSION

Combining crystal clear "video" images with continuous real-time temperature data, has allowed the NIR-B Glass to replace Holophane's traditional CCTV cameras and provide a full optical profile every reversal.

The NIR-B Glass solution offers Holophane's plant operators the ability to clearly "see" cold spots from air leaks in the structural refractory, making it easier to detect cracks and enable prompt repair. In addition, its operators can visualise flames to optimise the flame patterns and thermal efficiency and overlay thermal profiles across the crown and along the melt for more accurate batch line control, production throughput optimisation, and batch transit time recording.

# SPECIFICATIONS

<b>Measurement Range:</b>	1000 to 1800 °C / 1832 to 3272 °F
<b>Spectral Response:</b>	0.85 to 1.05 µm
<b>Frame Rate:</b>	30 fps (Gigabit Ethernet)
<b>Image Pixels:</b>	656 x 494
<b>Accuracy:</b>	1%
<b>Sealing:</b>	IP 65 / NEMA 4
<b>Repeatability:</b>	1 °C
<b>Data Out:</b>	Digital data over Gigabit Ethernet
<b>Software:</b>	Complete Land Image Processing Software (LIPS) package for Windows
<b>Standard Accessories:</b>	Power supply, cables, software, water cooled and air purged mounting and tube
<b>Field of View (Horizontal):</b>	90° x 67.5°
<b>Instantaneous Field of View:</b>	2.4 mrad (90°)
<b>Focus Range:</b>	1 metre to infinity
<b>Probe Length:</b>	610 or 915 mm (24" or 36")
<b>Probe Diameter:</b>	63 mm (2.48")
<b>Mountings:</b>	Multi-fitting Flange, Dual 3" ANSI and PN16 DN80/JIS
<b>Dimensions:</b>	305 x 155 x 1014 mm (or 1329 mm) 12 x 6 x 40" (or 52")
<b>Power Rating:</b>	24 V dc, 3 watts
<b>Weight:</b>	19.5 kg (for 610mm / 24" variant)
<b>Cable:</b>	Choice of high temperature cable length of 25 or 50 m (82 ft or 164 ft) - cables designed to resist up to 160 °C (320 °F)
<b>Auto Retract (Optional):</b>	Consists of the retract mechanism (24V), control box (IP65 rated and includes PLC, UPS and customer connection terminals) and inter connects. The UPS provides the power to retract the borescope in the event of either air purge fail, water cooling fail, power fail, or an over-temperature condition at the probe tip. If the stored energy in the UPS falls to a certain level, the borescope automatically retracts. Dimensions (inc. Borescope): 486 x 709 x 1900 mm / 19 x 28 x 75" Weight (inc Borescope): 95 kg / 223 lb

SEE OUR RELATED LITERATURE FOR THE NIR BORESCOPE GLASS:

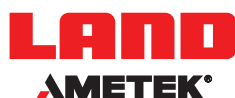


NIR BORESCOPE GLASS

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