Libbey Glass adopts successful approach to furnace inspection

PaneraTech has introduced a revised standard in furnace health monitoring for the glass industry, with the ability to measure refractory thickness and identify any glass penetration through furnace walls. However, the most significant benefits to customers are realised over the course of time, as regular furnace monitoring leads to better informed decision-making. Dr Yakup Bayram describes the successful results achieved at Libbey Glass.

At the 2017 Conference on Glass Problems, Elmer Sperry, Global Furnace Leader at Libbey Glass, presented details of the decisions his company made based on data from the SmartMelter monitoring programme at a furnace in Shreveport. Mr Sperry first connected with PaneraTech CEO Yakup Bayram at the Conference on Glass Problems in 2010. At that time, Dr Bayram was sharing his vision about seeing into the walls of a glass furnace. “After you’ve gone through a couple of glass leaks, that becomes your vision as well” said Elmer Sperry. “I got excited about trying to do this.”

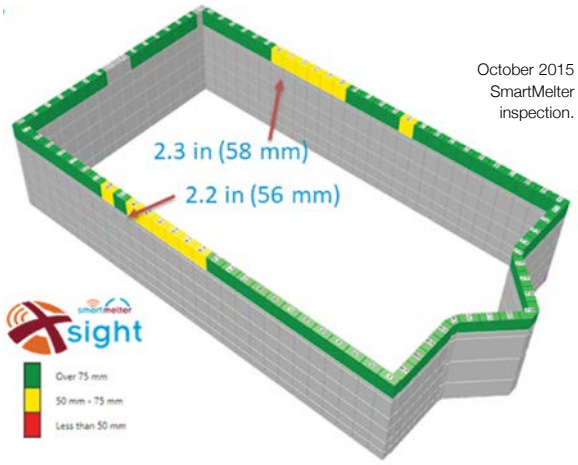
With Libbey’s support for their research, Mr Sperry has worked alongside the PaneraTech team since that time. They built several test furnaces, have done several furnace trials and have gone through several sensor developments. “It’s been a great experience for us at Libbey” Elmer Sperry commented.

As part of its comprehensive review of overall furnace health, Libbey uses a robust furnace inspection methodology to predict furnace rebuild dates. First, the company looks at operational data and compares it to historical data. Regular interior inspections are also performed with an endoscope camera and exterior inspections with an infrared camera. This process now includes a SmartMelter inspection to examine sidewall thickness and to check for glass penetration into the insulation.

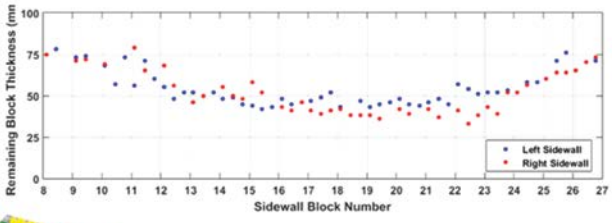
First inspection

The furnace at Shreveport is a tableware furnace that melts low iron, oxidised soda-lime glass. Based on operational data, it was scheduled for overcoat maintenance in December 2015. Libbey was concerned that the current operational mode was significantly different from the historical operation, so much so that the historical data would not be sufficient for accurately determining a scheduled rebuild date.

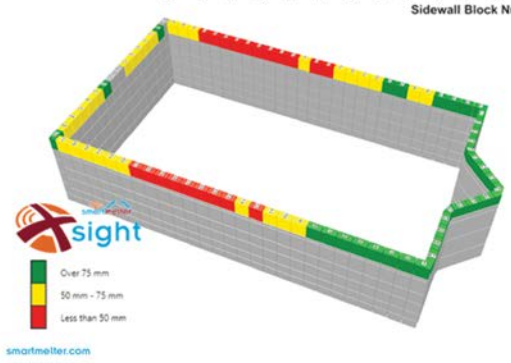
In October 2015, two months before the scheduled overcoat, a SmartMelter inspection was performed on the furnace. Data from the inspection showed that over two inches of thickness remained at the metal line and the sidewall insulation was secure. Because of this clear picture of the furnace’s state and the

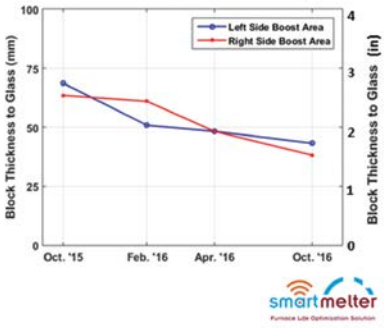


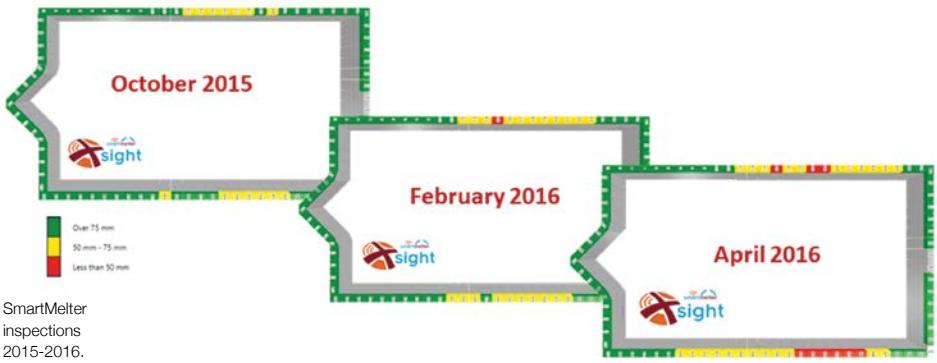
October 2015 SmartMelter inspection.



October 2016 SmartMelter inspection.







SmartMelter inspections 2015-2016.

capability the glassmaker now had for regular inspection, Libbey made a more confident maintenance decision to postpone the overcoat for another year, with a commitment to monitor the metal line and insulated areas regularly.

Furnace monitoring: 2015-2016

Throughout the next year, the metal line AZS thickness and sidewall insulation was continuously monitored to ensure that the scheduled overcoat would not be needed before December 2016. The overcoat was performed as scheduled on the sidewalls at the end of the year. However, this led to another important decision. The furnace cold repair was pushed to a later date.

"The SmartMelter monitoring allowed us to have confidence to go further and postpone the rebuild further" Elmer Sperry explained. "One of the things I like about the technology is checking the heavily insulated areas of the furnace below the metal line, making sure that the sidewall containment and bottom is in good shape. I mean, I've had a couple of instances of phone calls in the middle of the night saying 'We've got glass leaking out through one side.' When I can go around and check the melter integrity, it gives me more confidence to push out the repair date. Of course, when we are making these decisions, we also take into account the health of the superstructure and regenerators as well. With the technology, we are getting longer, more secure campaign life length. Extending the time between cold repairs is not without added intermediate and cold repair costs. These longer campaigns are causing us to review our furnace construction design in all areas, upgrade materials and change design so we can securely extend life on the next campaign. The technology has the added effect of improving furnace design."

October 2017: Continuous monitoring in place

As explained in Mr Sperry's presentation, the Shreveport furnace is still operating. Libbey regularly monitors the sidewall insulation and overcoat thickness using SmartMelter and this will continue until the furnace is shut down.

SmartMelter monitoring is part of a holistic evaluation that also takes into account the health of the superstructure and regenerators. Elmer Sperry shared an image of the latest sidewall inspection. "It's really looking nice and tight, sidewalls look good and we've scheduled the rebuild out to next year. This furnace will have melted 25% more glass at the end of its campaign than any other Libbey furnace in history. We think we've got the risks contained to do that. So that's how we're using the technology."

Furnace health monitoring with SmartMelter has made a significant impact on furnace campaign life and productivity at Libbey Glass. Secure containment in the areas of the furnace that they cannot monitor accurately gives the company confidence to extend repair significantly past the repair dates that are indicated by historical furnace data. This leads to longer campaigns and larger return on their assets. ●

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