



Furnace Life Optimization Solution

Cardinal Glass Avoids an Expensive Surprise with **SmartMelter**[®]

Cardinal Glass is a leading supplier in the production of glass for windows and doors. Cardinal's product line includes insulating, coated, laminated, tempered, and float glass, manufactured across thirty seven U.S. glass plants. When Cardinal FG decided to try SmartMelter® technology to inspect a furnace bottom, they made an important discovery. The expected life of their furnace was too optimistic, and the cold repair schedule in place would almost certainly result in a glass leak. Kelly Busch, Vice President of Cardinal FG, and Mark Purcell, Production Manager, shared how SmartMelter® monitoring kept a surprise maintenance issue from becoming a costly disaster.

Previous Inspection Methods

Mr. Purcell described a close call on a furnace bottom at another plant just six years earlier. A repair was scheduled without any information about the condition of the furnace bottom. Five months before the scheduled repair, they had reason to drill a hole to check the block. In the spot they drilled, only six and a half inches of block was left; when the furnace was shut down, the same area had just over two inches of material left. "Had that date been six months out or a year out, we wouldn't have made it," he explained. "We dodged a bullet."

Because Cardinal wanted more information on which to base their repair decisions, they began using a system of Thermal Scans and Triplex Thermocouples (TC) that would measure temperatures at three different levels of the block. When a lower-level TC increased in temperature, they would know that the bottom was thinning. While this greatly improved their knowledge about the furnace bottom, it was still limited. Measurements were only taken on specific blocks, and there was still guesswork to determine which areas to measure. A block that was dangerously thin could simply be missed. The expensive platinum TC's also had to be wired back to the control system, leaving them vulnerable to water damage from cooling systems.

The SmartMelter® Inspection

PaneraTech had been presenting SmartMelter®'s validated ability to identify high-risk areas and accurately measure residual thickness in furnace sidewalls. Cardinal reached out to PaneraTech to see if the technology they had been using on AZS block could be used to inspect a clay flux furnace bottom. Cardinal provided information on the chemical composition, density, and electrical properties of the clay block, and the two companies worked together to develop a successful sensor that could monitor the condition of the entire furnace bottom.

The first full inspection on a float glass furnace bottom revealed some shocking information. There were areas that were worn much thinner than expected. The expectations for the furnace life of this specific furnace design placed the next rebuild date at least three years away. However, according to the SmartMelter® data, a cold repair would be necessary in less than a year.



Prepared Instead of Surprised

Because of the SmartMelter® report, Cardinal was able to avoid the cost and chaos of an unexpected leak. They scheduled a cold repair in eight months, but were prepared to shut down for repair sooner if necessary. The contract was ready, labor was scheduled, and materials were ordered and on site a few months in advance. Cardinal employed maintenance techniques to slow the erosion and monitored the condition of the furnace bottom with regular SmartMelter® inspections. The furnace remained in operation until the new scheduled repair date, and all customer orders were fulfilled.

Time and Money Saved

Mr. Busch pointed out that if they had not known about the weak areas, the cost of reacting to a leak would have been considerably higher. Production would have halted for months, as they would have been unprepared for the repair work. Refractory materials would have been rush-ordered at a more expensive price. Lost product and potential damage from leaked glass would have compounded the financial loss. Because Cardinal was informed and ready, what could have been a catastrophe became a simple change in the maintenance schedule.

Validation and Confidence

When the furnace was drained for repairs, all of the SmartMelter® measurements were validated within 5 mm. “That gave us a lot of confidence in the system,” Mr. Busch explained. Because of this confidence, Cardinal FG decided to make SmartMelter® monitoring a standard part of their inspection and maintenance program.



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