Preparation versus surprise: A difference of millions of dollars

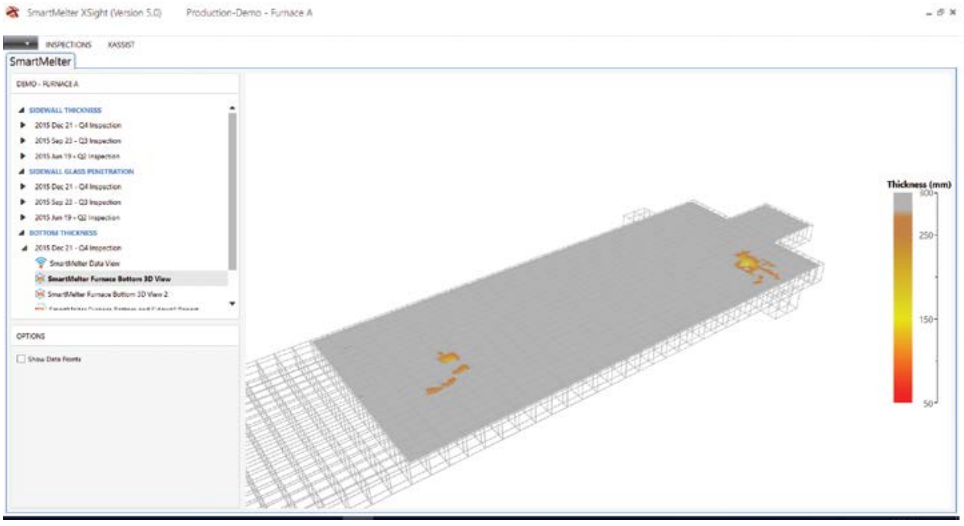
Dr Yakup Bayram explains how SmartMelter helps customers save millions of dollars by using deterministic data to carefully plan rebuild and repair dates.

There is a considerable cost difference between a planned repair that runs on schedule and an unplanned repair that is a reaction to a glass leak. First, revenue is lost as production is halted for several months. Then, refractory materials have to be rush-ordered at a premium price. Lost product and potential damage from leaked glass only compound the financial loss. How much would be saved if the manufacturer was alerted to the vulnerability early?

A much different scenario occurred when Cardinal Glass began using SmartMelter Monitoring. 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.

When a glass manufacturer is informed and ready, what could have been a catastrophe becomes a simple change in the maintenance schedule and the cost and chaos of an unexpected leak can be avoided. The contract can be prepared, labour can be scheduled and materials can be ordered and on-site a few months in advance. Maintenance techniques can be applied to slow the erosion, while monitoring the condition of the furnace bottom with regular SmartMelter inspections.

In this particular case, Cardinal Glass scheduled a cold repair in eight months but the company was prepared to shut down for repair sooner if necessary. The furnace remained in operation until the new scheduled repair date. When the furnace was drained, a blind validation trial was performed. All of the SmartMelter measurements were validated within 5mm.



3D visualisation of a furnace bottom.

3D visualisation of a furnace bottom (side view).

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SmartMelter inspection of a furnace bottom.

"That gave us a lot of confidence in the system" explained Kelly Busch, Vice President of Technology at Cardinal Glass. "Because of this confidence, Cardinal FG decided to make SmartMelter monitoring a standard part of its inspection and maintenance programme."

Monitoring methods

Manufacturers have tried various methods of monitoring furnace bottom health and make repair decisions. One option that provides some insight is to use a system of thermal scans and triplex thermocouples (TC) that measure temperatures at three different levels of the block. When a lower level TC increases in temperature, the manufacturer knows that the bottom is thinning.

While this greatly improves knowledge about the furnace bottom, this method is still very limited. Measurements are only taken on specific blocks and there is still guesswork to determine which areas to measure. A block that is dangerously thin could simply be missed. The expensive platinum TCs also have to be wired back to the control system, leaving the furnace vulnerable to water damage from cooling systems.

SmartMelter Monitoring surveys the entire furnace bottom, identifying the exact areas of glass penetration and measuring residual thickness. Manufacturers can view a three-dimensional model of their furnace in SmartMelter's XSight software that gives clear insight into the health of the furnace. When a vulnerability is found, the frequency of inspections can be increased to monitor glass progression closely, while repairs are scheduled. The guesswork is removed from the process and the manufacturer can avoid the expensive process of a rushed response.

SmartMelter Monitoring is performed using two patented sensors built on advanced radar technology. The Refractory Thickness Sensor (RTS) measures the residual refractory thickness to the glass interface. The RTS sensor operates in direct contact with refractories such as fused-cast AZS. The Furnace Tomography Sensor (FTS) is used to map early stage glass penetration into insulation layers and measure residual insulation thickness. It is used on the sidewall insulation and furnace bottoms. SmartMelter can also be used to monitor the furnace throat and crown and it has been used successfully on specialty block. ●

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