

Furnace inspection benefits

Dr Yakup Bayram explains how the radar-based SmartMelter monitoring programme is being used at multiple stages of furnace campaigns to make cost saving operational decisions.

The previous applications of furnace inspection were limited. Manufacturers relied on techniques such as temperature monitoring, visual inspection and glass pull history to make informed estimates of the furnace's condition. Because the data from these techniques was speculative, decisions made based on this data had to be made with caution.

However, with the latest standard of furnace inspection available with the radar-based SmartMelter monitoring programme, there are multiple applications available at all stages of furnace life. As PaneraTech works with various customers who have individual needs, more uses for the data SmartMelter collects are discovered. SmartMelter has been used at multiple stages of furnace campaigns to make cost saving operational decisions.

confidently and keep its scheduled rebuild date. When the furnace was drained, SmartMelter measurements were validated within 5mm.

Smart furnace maintenance

The capabilities of furnace maintenance have been greatly expanded with the use of the SmartMelter monitoring programme. Using the detailed data collected, manufacturers can target maintenance to specific areas, often saving millions of dollars that would have been spent on an overall repair. One customer was recently able to save \$14 million on planned maintenance costs by using the programme to identify a more precise scope of the maintenance needed instead of performing a complete cold repair.



SmartMelter inspection of a furnace crown.

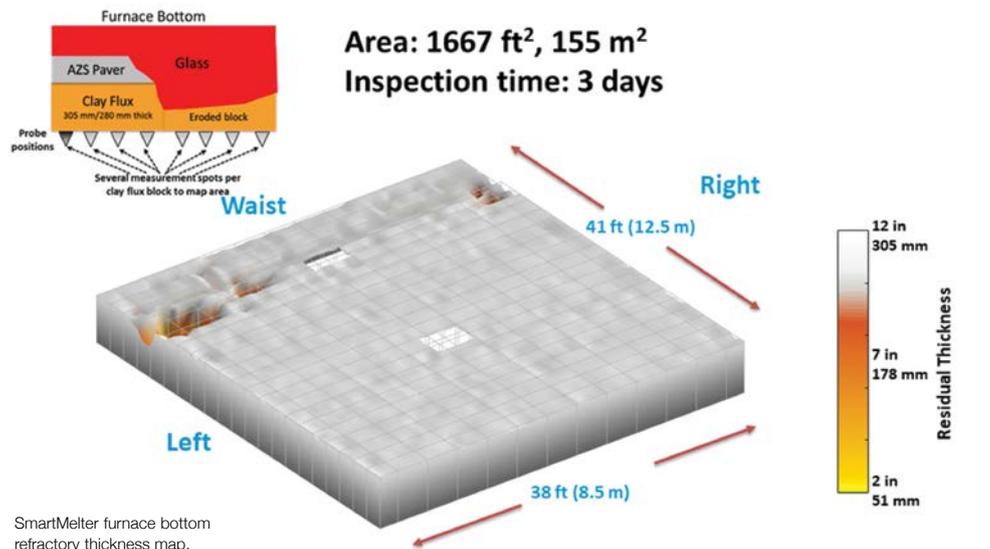
SmartMelter can also help with budget and operations planning. Maintenance needs for the upcoming year can be predicted and scheduled in December to prevent interruption during busier months. By seeing the exact condition of a furnace, a manufacturer can evaluate whether

Critical stage furnace monitoring

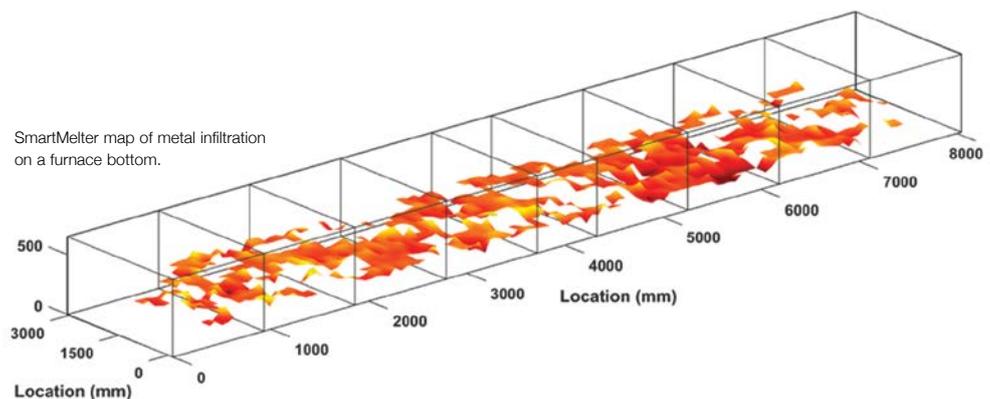
The most common reason for furnace inspection is to monitor a critical stage furnace. In order to optimise furnace life and achieve maximum productivity, the furnace must be watched carefully to prevent a glass leak. Before deterministic data was available, manufacturers often stopped production before it was actually necessary. Risk management was a constant balance between safety and productivity.

The SmartMelter monitoring programme allows manufacturers to measure the actual thickness of refractory walls and visualise areas of glass penetration in 3D. Using this information, furnace life can be pushed with confidence and risk can be managed without speculation.

For example, Cardinal Glass used the SmartMelter monitoring programme for regular inspections of a furnace bottom throughout the last scheduled year of its campaign. The furnace was scheduled to be rebuilt in January 2017 but there were concerns about glass penetration into the furnace bottom and whether this would require an earlier shutdown. With regular SmartMelter inspections, Cardinal was able to operate



SmartMelter furnace bottom refractory thickness map.



SmartMelter map of metal infiltration on a furnace bottom.

a planned overcoat is necessary. This was the case for Libbey Glass, who eventually pushed the cold repair date for another year.

Customers are consistently finding other maintenance applications for the knowledge gained from monitoring. If a hot repair is scheduled, a manufacturer can use SmartMelter to determine exactly how far the glass line needs to be lowered to replace refractory blocks. This minimised time needed for repair and increases efficiency. The data can also be used to evaluate the effectiveness of cooling techniques and make adjustments as necessary to extend the life of the furnace.

Data-driven decisions

When data about the condition of a furnace can be reviewed early, decisions can often be made that will affect furnace operations throughout the campaign. Although a baseline inspection is not required for SmartMelter monitoring, problems can occur with the refractory when the furnace is first heated. Sometimes, expansion joints do not close well and glass leaks through the joints into the insulation. This can cause a leak as early as the first year of operation. Sidewall blocks can delaminate during heat-up and indicate future issues for the furnace. An inspection immediately after heat-up can identify these issues so that proper action can be taken, such as emergency repairs or placing the furnace on a high risk watch list.

The SmartMelter monitoring programme can also identify batching problems early enough to make adjustments. One customer learnt that the batching process was producing uneven wear between two sides of the furnace. One side had eroded significantly more than the other. Because it was early in the life of the furnace, the company was able to change the way the batch was loaded to slow the wear on the most degraded side.

Planning product mix

SmartMelter can help a manufacturer determine whether a furnace is a fit to make the envisioned product mix. For example, flint or low iron clear glass is harsher on the furnace, which could make it a questionable product for a furnace that is many years into its campaign. One manufacturer used the programme to determine whether it made sense to make low iron glass on a relatively old furnace after assessing the furnace's health.

Monitoring metal infiltration

PaneraTech was invited to test its sensors to inspect a furnace bottom for a furnace that used recycled glass. The SmartMelter technology was able to successfully map the infiltration of metal and produce a 3D visualisation of those areas.

Monitoring furnace crowns

SmartMelter can also be used to enhance endoscopy to evaluate the condition of a furnace crown. After problem areas are identified by endoscopy, a targeted SmartMelter inspection of these areas measures the residual thickness of the refractory for greater insight.

As SmartMelter has become the standard in furnace inspection, applications of the technology have been as numerous as customer needs. The PaneraTech team is always willing to work with manufacturers to identify ways to solve their challenges and increase profitability. ●

About the author:

Dr Yakup Bayram is CEO at PaneraTech

Further information:

PaneraTech Inc, Chantilly, VA, USA

tel: +1 703 719 9666

email: info@smartmelter.com

web: www.smartmelter.com