Refractory 4.0

PaneraTech now has thickness data from half a million refractory measurements collected from more than 300 furnace inspections. Yakup Bayram* discusses how they are using this data to predict the reliability of glass furnace by establishing wear performance over time.

What is the most important metric for a glass manufacturer? There are many factors that are high on the list. Product yield, risk management, asset life optimisation, and safety are all important considerations that are discussed whenever major decisions are made.

When industry 4.0 is discussed, the first thing that usually comes to mind is improving product yield. In this case, the focus is placed on the process and how to fine-tune it to produce the highest yield.

However, it is just as important to make sure that all assets in the plant are in good health so that these processes can take place.

PaneraTech is the first company to release an industry 4.0 compliant solution dedicated to the reliability of the refractory. XSight, our refractory 4.0 platform, enables customers to prepare their refractories for 4.0, primarily focusing on furnace reliability.

When we first started working with glass manufacturers, our focus was on using radar inspections to give an accurate assessment of the refractory condition. This was a successful effort, and it quickly became a new industry standard. FM Global, a US insurance provider, recently included radar inspections in its guidelines for furnace health management.

The radar inspection gives you a snapshot of the refractory condition at one point in time. This alone has reduced speculation and given glass manufacturers a new level of objectivity. But now that we have three years of data from performing these inspections, we can add predictive assessments to that data.

When we present the results of a SmartMelter inspection and show our customers thickness measurements, we can now give more insight into what these numbers mean.
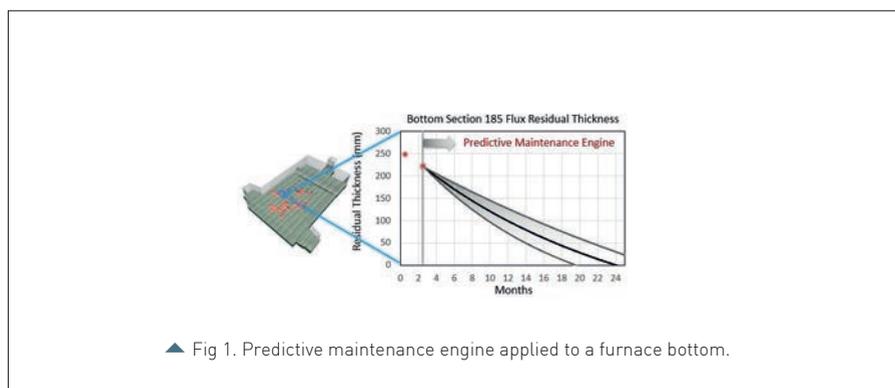
▲ Fig 1. Predictive maintenance engine applied to a furnace bottom.

We can assess the reliability of that furnace and tell manufacturers how quickly they need to act. This also means that we can use the data to assign risk profiles to each furnace and help manufacturers prioritise their maintenance decisions.

Our software platform takes this important insight and integrates it with other furnace records to provide specific benefits to glass manufacturers.

Centralised Corporate Record

The knowledge and experience of plant personnel are often a valuable resource when managing furnace reliability. Good plant managers often know the history a furnace well and often have great observational skills.

However, the labour force is changing, and turnover is more common than ever before. What happens when the person with the knowledge of the furnace history is no longer available?

When furnace maintenance and health data is stored in one place, you have a permanent corporate memory that can be accessed whenever it is needed, even if your best manager has retired or otherwise moved on.

Our refractory 4.0 platform does recognise the importance of human observation.

The human eye is still one of the most important sensors used in furnace health management. But XSight provides a way to track this data by providing a central place for images, notes, and observations.

Standardisation and Consistency of Risk Management

When evaluating an entire furnace portfolio, it can be hard to prioritise maintenance decisions without standardised data. If records are kept in different formats and health is assessed in different ways, it is impossible to compare the condition of furnaces objectively.

However, if a consistent risk definition is applied to every furnace, then data can be used to rank each furnace according to its risk profile. This means that objective, data-driven decisions can be made about maintenance.

XSight enables manufacturers to standardise a corporate-wide risk definition based on risk appetite and business objectives.

A corporate-wide risk definition framework can be applied to each asset across the entire organisation or individual assets in each plant.

This removes subjectivity by the operator during data entry, creating objective risk data entry.
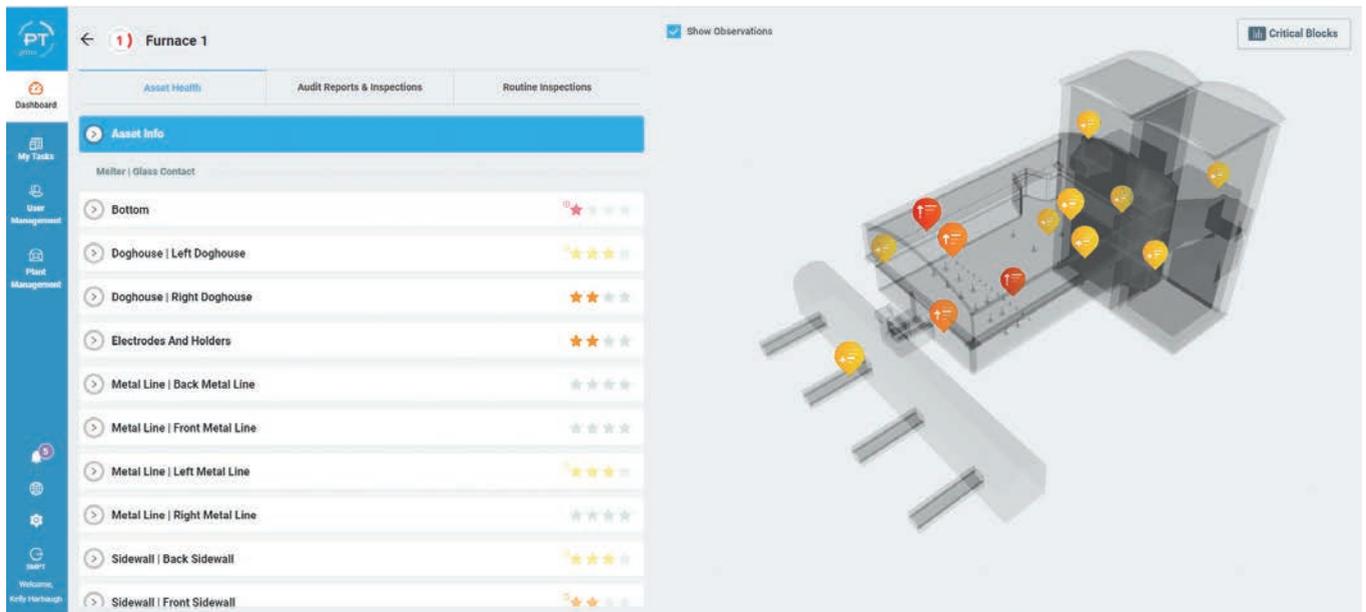
Fig 2. 3-D view of furnace model in XSight software.

Transparent Risk Presentation

Sometimes communication can be key barrier to standardised risk management. Even when communication is excellent between the corporate office and the plant, this is usually done with multiple phone calls or emails, taking valuable time from everyone involved.

XSight provides a dashboard of the entire furnace portfolio with real-time data that can be viewed in detail. This creates transparent risk assessment across the entire organisation that is specific to each asset. Everyone in the organisation can be on the same page, looking at the same objective data.

Sensor and Production-Driven Risk Framework

When a glass manufacturer is already using sensors on their assets, the data from these sensors can be specifically tracked and viewed as well. This data can be incorporated into the risk profile.

XSight software enables risk categorisation based on each sensor category, including human eye. The manufacturer can categorise risk based on critical health-related production data.

Cost Savings

What does access to all of this data mean? Ultimately, it allows glass manufacturers to make data-driven decisions about where and when to spend maintenance and repair dollars. Money can be allocated to the highest priority areas, and action can be taken precisely when and where it is needed. This saves money in audit and inspection management.

As the glass industry adopts 4.0 technology, improvements will be made in all areas of production. PaneraTech is already helping manufacturers prepare for this shift by improving the metric that supports all others: reliable production. ∎

*CEO, Paneratech, Chantilly, VA, USA
https://www.paneratech.com/
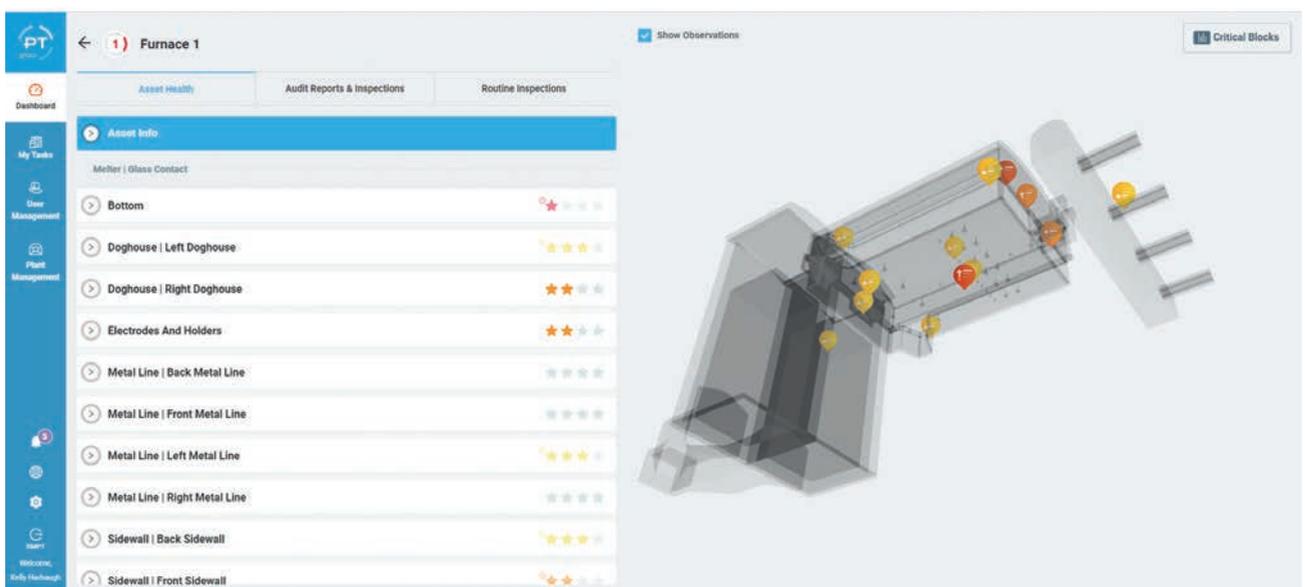
Fig 3. 3-D view of XSight furnace model, rotated to bottom view.

REFEL