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Furnace Life Optimization Solution

Refractory Thickness Sensor (RTS) **Blind Trial at a Container Glass Furnace**

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CONTENT

INTRODUCTION

International Partners in Glass Research (IPGR) approached PaneraTech to demonstrate accuracy of the SmartMelter Refractory Thickness Sensor (RTS) at a blind trial with one of its members. IPGR members include major regional container glass manufacturers such as Sisecam, Vidrala, Fevisa, Gallo, Vetropack, Wiegand-glas, Bangkok Glass, Nihon Yamamura and Orora Limited. Among the members, Vidrala had a furnace in their plant in Marinha de Grande, Portugal that was scheduled for cold repair. The furnace was 13.5 years old.

SmartMelter RTS measurements were performed five days before the furnace drain. PaneraTech submitted a report of the measured wall thicknesses to Vidrala prior to the drain, and then the furnace was drained and blocks were recovered to compare the RTS measurements with actual wall thicknesses at the glass line.

Figure 1
Trial Team: Representatives from Vidrala (Diego Ochoa Escalona, Vidrala Corporate Furnace Production Manager, Pedro Andrade, Vidrala Plant Batch and Furnace Manager, Andre Grilo furnace operator) and PaneraTech (Yakup Bayram CEO and Alex Ruege, Principal Engineer)

MEASUREMENT SPOTS

The Vidrala furnace was an end port-fired furnace. Measurements were taken at two spots near the left doghouse, two spots on the left sidewall, and three spots on the right sidewall. There were also four spots measured in between the two throats. Altogether, eleven areas of the furnace were measured by the RTS sensor.

Figure 2
Furnace Layout and Measurement Spots

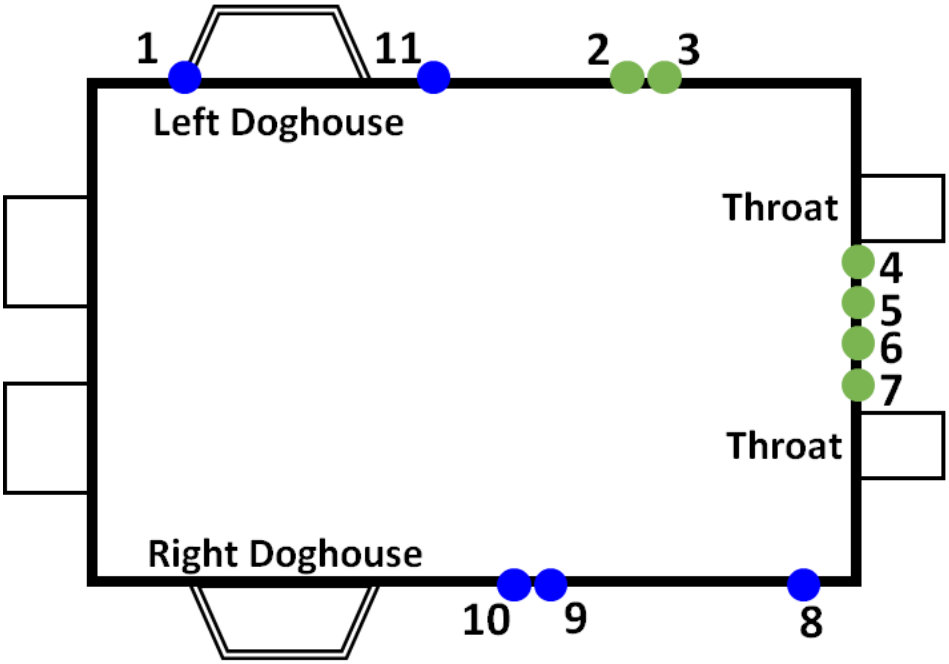

Figure 3
Each measurement spot was marked properly

WALL STRUCTURE AND MEASUREMENTS

The measurements were taken with the RTS sensor through fused-cast AZS overcoat blocks (32% AZS) at the metal line. The configuration of the blocks and the measurement process is shown in Figure 4. The PaneraTech team measured through the overcoat blocks at locations shown in Figure 3. Gratings that were holding the overcoat blocks in place were cut prior to measurements to allow for access to the exposed AZS (see Figure 3).

The RTS sensor thickness profile is a vertical scan. It starts about 45 mm (1.7 in) from the very top of the overcoat block to 100 mm (4 in) where the glass line was expected.

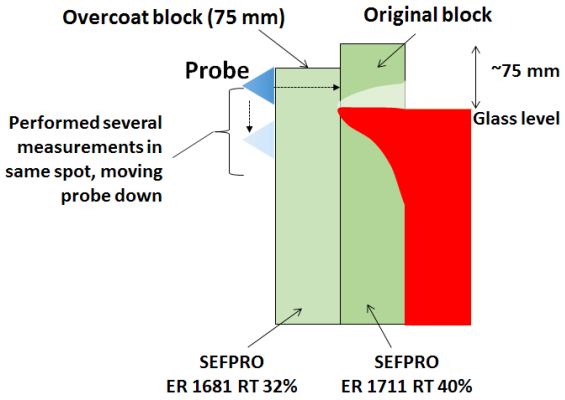

Figure 4
Wall layout at Vidrala furnace

Figure 5
PaneraTech team member taking measurements on the furnace

THE RESULTS

After the drain, five blocks were successfully recovered. The other blocks could not be recovered due to the limitation by the construction schedule at the factory. The RTS measurement and actual thickness of one of the spots measured is shown in Figure 6.

These actual block thickness were measured with Vidrala team as seen in Figure 7.

The recovery of the blocks shortly after the furnace drain revealed that the glass was in direct contact with the overcoat block in these areas.

The original tank block had completely eroded at the glass level at the measurement spots. The RTS measurements taken from the probe corresponded with the actual erosion profile found in the recovered blocks. The RTS sensor successfully measured the thickness of the residual AZS at the glass line for these five spots within 4 mm (0.15 inch) accuracy as shown in Table I

Figure 6
Comparison of actual block thickness (69 mm) with RTS sensor measured thickness (67 mm) at Spot # 6

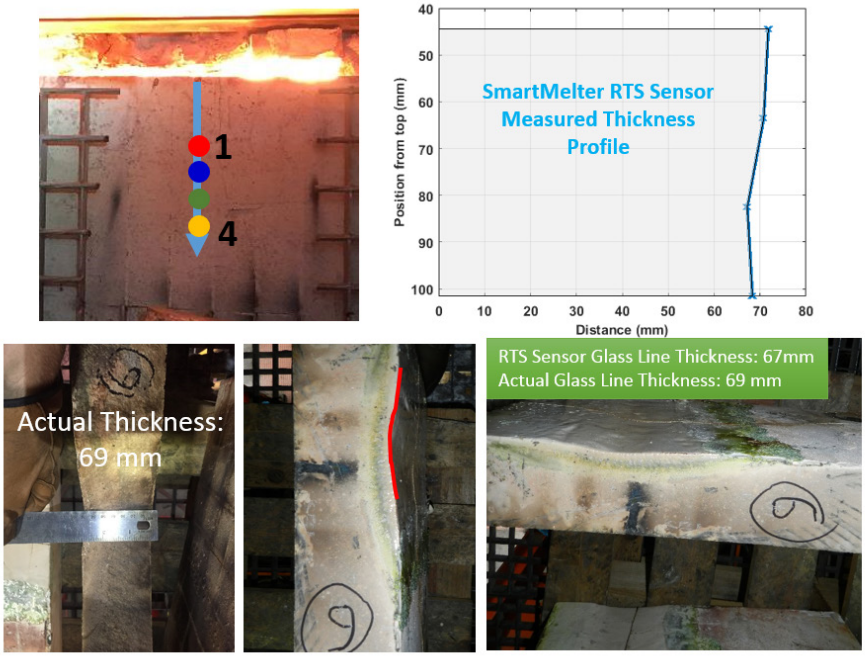

Figure 7
Vidrala and PaneraTech team measuring actual wall thickness after the recovery of the blocks.

Spot Number	SmartMelter RTS Sensor Reading	Actual AZS Block Thickness	Difference
2	73 mm	73 mm	0 mm
3	75 mm	71 mm	4 mm
5	65 mm	69 mm	4 mm
6	67 mm	69 mm	2 mm
7	63 mm	67 mm	4 mm

Table 1
Comparison of Actual Block Thickness with RTS Sensor Measurements

CONCLUSION

This blind trial clearly demonstrated the accuracy of the RTS sensor for measuring fused-cast AZS thickness on an operational container glass furnaces.

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