

SmartMelter® Blind Trial at a Tableware Furnace

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INTRODUCTION

Libbey Glass had a tableware furnace that was scheduled for a drain and rebuild. SmartMelter® had monitored this furnace for about two years and indicated relatively healthy sidewalls; but the condition of other areas, outside the sidewalls, required an earlier rebuild of the furnace. Before the drain, the SmartMelter® team performed surveys of both the sidewall refractory thickness at the metal line and glass penetration into the sidewall insulation. These measurements were reported before shutdown, near end of life for the campaign.

Directly after drain and cooldown, several blocks were physically measured to compare the data with the SmartMelter® results. The physical measurements were done with Libbey Glass staff, including Jon Wechsel and Elmer Sperry, who witnessed each measurement.

SmartMelter® correctly reported that there was no glass penetration into the sidewall insulation. Additionally, physical measurements in seventeen locations validated SmartMelter® measurements of the sidewall refractory thickness withing 0-5mm.



MEASUREMENT SPOTS

Measurements of the fused cast AZS were taken on the left and right sidewalls, doghouse and charging end wall at the metal line for thickness (see Figure 1).

Figure 1
Furnace Layout and Measurement Spots.

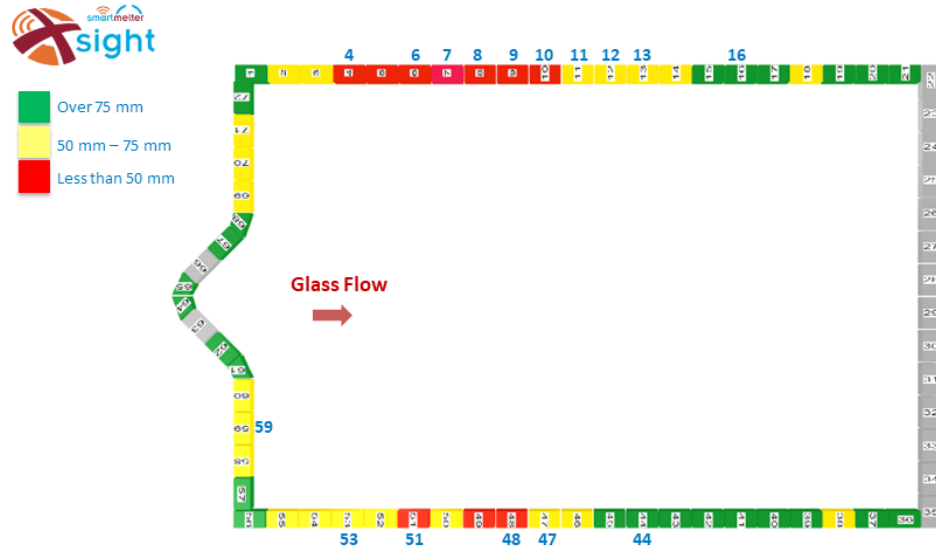


Figure 2
Typical Sidewall Erosion Pattern at the Metal Line..





Figure 3
AZS Thickness at Metal Line. Left
Sidewall at Block 7.

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Figure 4
SmartMelter® Team Member Taking
Measurements at The Metal Line.

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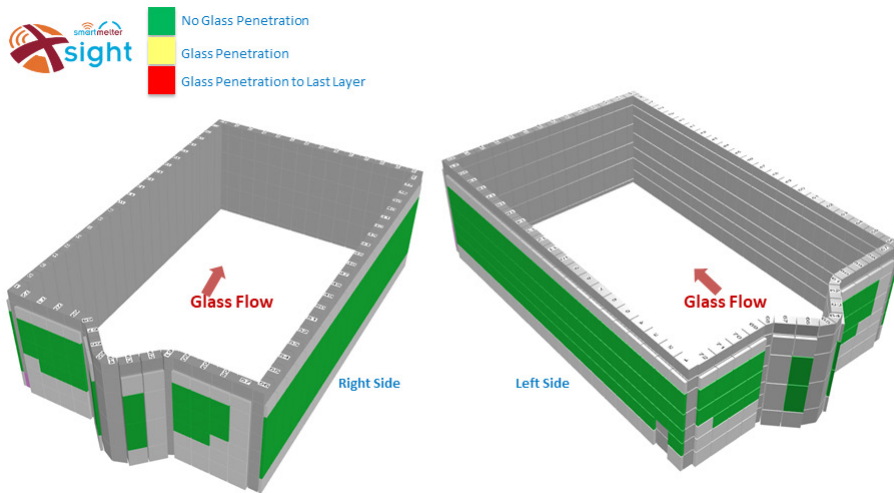
SIDEWALL REFRACTORY THICKNESS RESULTS

Physical measurements at the metal line were performed by removing a portion of some of the measured blocks and measuring the thickness of the block. This was done in 17 locations.

Table 1
Comparison of Actual Block Thickness With SmartMelter Measurements.

Block Number	SmartMelter® Measurement	Physical Measurement	Difference
4	49 mm	44 mm	5 mm
6	43 mm	44 mm	-1 mm
7	42 mm	39 mm	3 mm
8	41 mm	40 mm	1 mm
9	43 mm	43 mm	0 mm
10	44 mm	45 mm	-1 mm
11	54 mm	52 mm	2 mm
12	67 mm	66 mm	1 mm
13	64 mm	67 mm	-3 mm
16	89 mm	88 mm	1 mm
21	Over 100 mm	Over 100 mm	
44	80 mm	80 mm	0 mm
47	56 mm	55 mm	1 mm
48	50 mm	50 mm	0 mm
51	51 mm	53 mm	-2 mm
53	61 mm	59 mm	2 mm
59	64 mm	59 mm	5 mm

There was no glass penetration into the sidewall insulation, indicated by visual inspection from inside the drained furnace and by removal of the insulation during demolition. The SmartMelter® results reported no glass penetration on the furnace. Observations from inside the furnace showed erosion at joints, but all AZS sidewalls were intact and had no breach.



SIDEWALL INSULATION INSPECTION RESULTS

Figure 5
Visualization of Sidewall Insulation Inspection in XSight software.

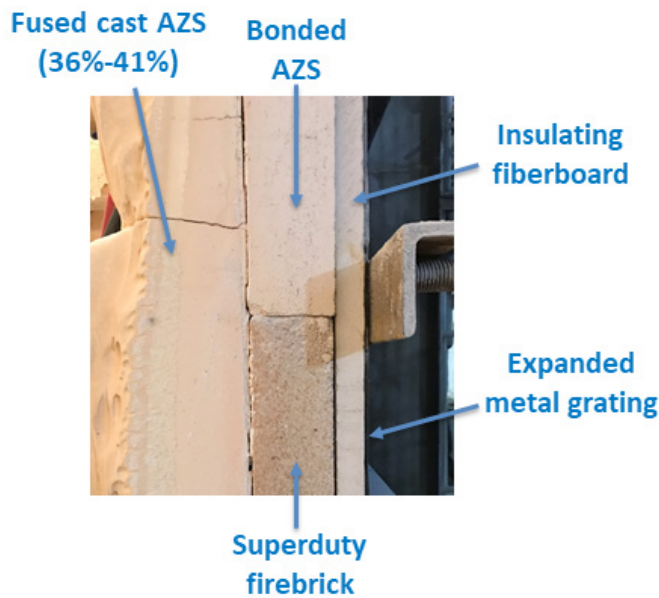
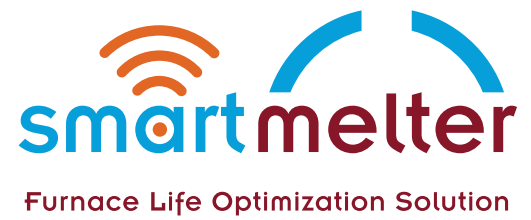


Figure 6
Sidewall Insulation: 76 mm superduty firebrick or 76 mm Bonded AZS with 25 mm Insulating Fiberboard with Expanded Metal.

This blind trial clearly demonstrated the accuracy of SmartMelter® Monitoring for measuring fused-cast AZS thickness and identifying glass penetration into sidewall insulation on operational tableware glass furnaces.

CONCLUSION



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