

SmartMelter® Blind Trial at a Tableware Furnace

智慧窑炉®在器皿玻璃窑炉盲试

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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.

利比玻璃有一座器皿玻璃窑炉计划放水并冷修, SmartMelter智慧窑炉®对这座窑炉的相关池壁砖状况监测已连续进行了两年,但是由于池壁砖以外的其它区域情况使得窑炉不得不提前冷修,在窑炉放水之前SmartMelter智慧窑炉®团队对池壁砖液位线处厚度及池壁保温处是否有玻璃渗透进行了探测,并在窑炉关闭前提交了检测报告。

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.

在窑炉放水冷却后,几块砖被直接取出并进行实地测量以便于SmartMelter智慧窑炉®探测数据进行对比,实测工作由利比玻璃的人员来完成,包括Jon Wechsel以及Elmer Sperry 在现场目击了每次测量过程。

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.

SmartMelter智慧窑炉®的报告准确告知了没有玻璃液渗入池壁保温层中,而且对17个有效测量点的实测数据与SmartMelter智慧窑炉®的探测池壁砖厚度数据误差在0-5mm。

INTRODUCTION 介 绍



MEASUREMENT SPOTS 测 量 点

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)

电熔AZS耐火砖的测量点选择在左右池壁，端墙及加料口墙的液位线处来测量厚度（如图1）

Figure 1
Furnace Layout and Measurement Spots.

图 1
窑炉布局及测量点分布



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

图 2
池壁液位线处典型的被侵蚀特征





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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图 4
SmartMelter®智慧窑炉® 团队人员在
液位线处探测

SIDEWALL REFRACTORY THICKNESS RESULTS 池壁耐火砖厚度测量结果

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.

取出部分测量点的耐火砖并使用尺子实地测量液位线处的厚度，共做了17个点。

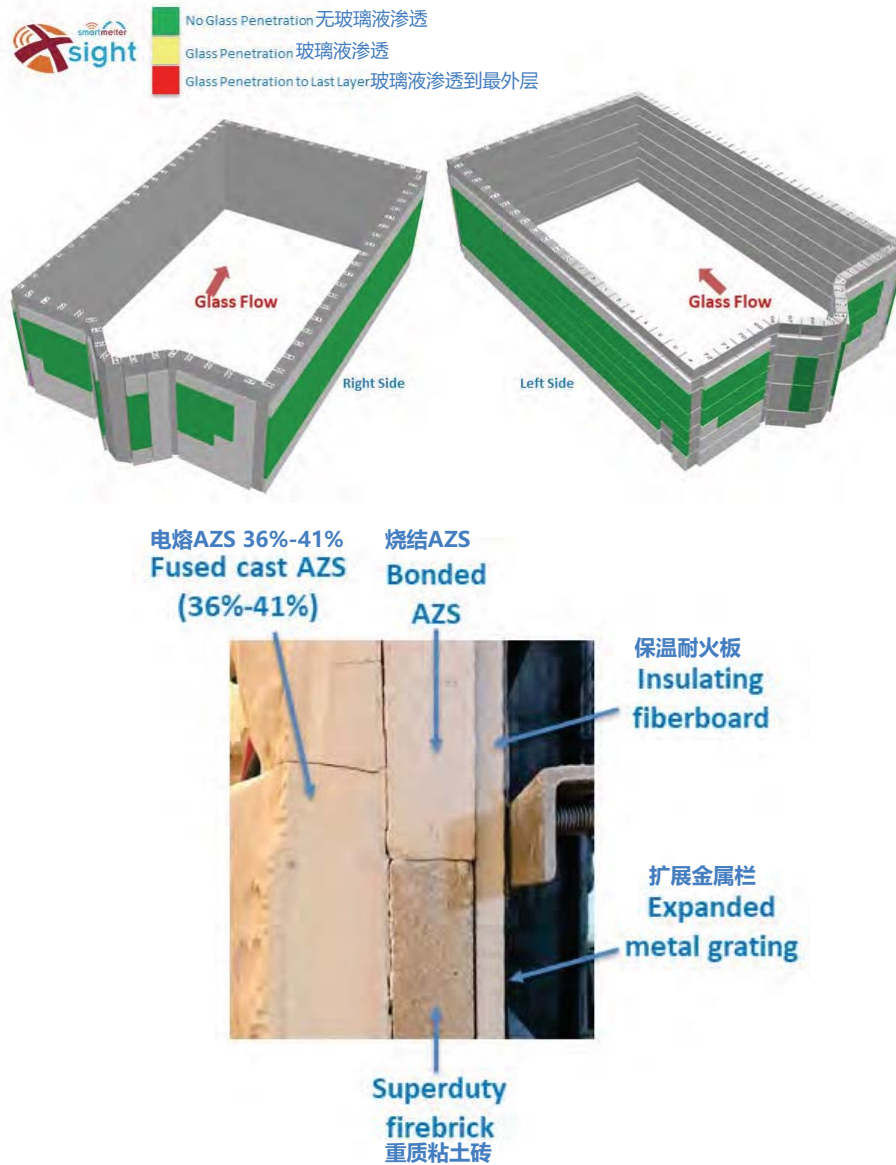
Table 1
Comparison of Actual Block Thickness With SmartMelter Measurements.

表 1
实测砖厚度与SmartMelter探测数据对比

Block Number 砖号	SmartMelter® Measurement 测量	Physical Measurement 实测	Difference 误差
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.

在窑炉放水拆炉后，去除保温层通过内部观察发现玻璃液并未渗透进入池壁保温层，SmartMelter智慧窑炉®的报告也同样未发现玻璃液渗透情况。从窑炉内部观察AZS池壁砖接缝处有侵蚀，但都保持完整无破损。



SIDEWALL INSULATION INSPECTION RESULTS 池壁砖保温层检测

Figure 5
Visualization of Sidewall Insulation Inspection in Xsight software.

图 5
通过Xsight软件对池壁保温层探测结果的可视化

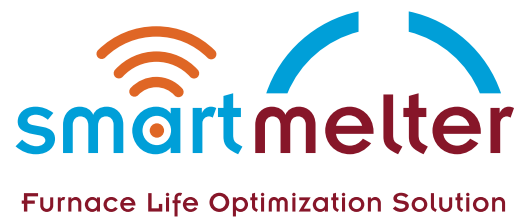
Figure 6
Sidewall Insulation: 76 mm superduty firebrick or 76 mm Bonded AZS with 25 mm Insulating Fiberboard with Expanded Metal.

图 6
池壁保温层: 76 mm 重质粘土砖或76mm烧结AZS, 外贴25mm保温耐火板及金属护栏

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

本次盲试清楚地展示了SmartMelter智慧窑炉®在运行的器皿玻璃窑炉上监测电熔AZS砖壁厚和判断玻璃液渗透保温层的准确性。

CONCLUSION 结论



smartmelter.com

PaneraTech, Inc.
帕尼罗科技公司

info@smartmelter.com

P +1 703.719.9666

4125 Lafayette Center Drive, Ste 200, Chantilly, VA 20151 USA

美国弗吉尼亚州拉斐特中心大道4125号尚蒂利200室 邮编20151

