



Furnace Life Optimization Solution

Libbey Furnace Using SmartMelter®
在利比玻璃使用 SmartMelter® 智慧窑炉
Increases Campaign Life by 25%
延长窑龄25%

Libbey Glass has played a key role in the development of SmartMelter® technology. Mr. Sperry, Global Furnace Leader at Libbey Glass, first connected with PaneraTech CEO Yakup Bayram at the Glass Problems Conference in 2010 and has worked alongside the PaneraTech team with Libbey's support since that time. They built several test furnaces, have done several furnace trials, and have gone through several sensor developments. Mr. Sperry shared how the use of SmartMelter® technology led to the delay of a furnace rebuild and increased production in a Shreveport furnace.

Libbey玻璃在SmartMelter智慧窑炉®技术研发中起了关键作用，Sperry先生是利比玻璃的窑炉全球总监，他在2010年的玻璃问题年会上第一次与PaneraTech帕尼罗科技公司CEO执行总裁Yakup Bayram先生接触并随后开始与PaneraTech帕尼罗科技公司的团队一同协作，他们建立了几座实验炉，做了一些窑炉探测实验，共同研发和改进了一些探测传感器。Sperry先生分享了利用SmartMelter智慧窑炉®技术在Shreveport工厂延迟窑炉重修并提高生产的实例。

A Comprehensive Furnace Health Program 一个综合性窑炉健康项目

As part of its comprehensive review of overall furnace health, Libbey uses a robust furnace inspection methodology to predict furnace rebuild dates. First, they look at operational data and compare it to historical data. They also do regular interior inspections with an endoscope camera and exterior inspections with infrared camera. This process now includes a SmartMelter® inspection to examine sidewall thickness and to check for glass penetration into the insulation.

作为对窑炉整体健康性评估项目的一部分，利比玻璃使用了一套强有力的窑炉检测方法理论来预测窑炉的冷修日期。他们会查看操作日期并与历史日期进行对比，并且会定期使用内窥镜进行窑内检查，使用红外相机进行窑外观测，现在又添加了使用SmartMelter® 进行池壁砖厚度及玻璃是否泄露入保温层的检查。

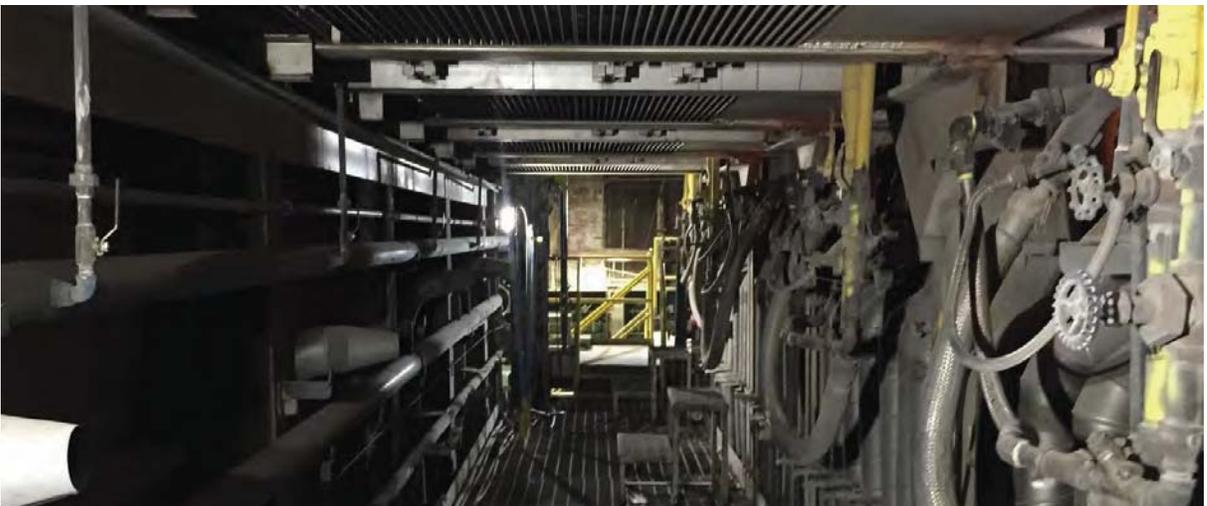
Delaying the Overcoat 延缓贴砖计划时间

The furnace at Shreveport is a tableware furnace that melts low-iron, oxidized soda-lime glass. The furnace was scheduled, based on operational data, for overcoat maintenance in December 2015. Libbey was concerned that the current operational mode was significantly different from the historical operation, enough that the historical data would not be sufficient for accurately determining a scheduled rebuild date.

Shreveport工厂的窑炉是一座熔解生产低铁，氧化钠钙器皿玻璃窑，根据操作的运行数据，这座窑炉计划在2015年准备贴砖，利比玻璃意识到当前的操作运行模式与以往的操作模式有很大不同，即使充足的历史数据也不能预测冷修的准确具体日期。

In October 2015, two months before the scheduled overcoat, a SmartMelter® inspection was performed on the furnace. The data from the inspection showed that over two inches (50 mm) of thickness remained at the metal line and the sidewall insulation was secure. Because of this clear picture of the furnace's state and the capability they now had for regular inspection, Libbey made a more confident maintenance decision to postpone the overcoat for another year with a commitment to monitor the metal line and insulated areas regularly.

在2015年10月准备贴砖计划的前两个月，SmartMelter®探测在这个窑炉上展开，探测的数据结果显示池壁砖液位线处的残余厚度都超过两英寸(50mm)且池壁保温砖处也是安全的，根据清晰的窑炉状态报告结果以及他们自己的常规检查的经验，利比玻璃做出了自信的贴砖维修计划延迟一年的决定，这个决定基于对池壁液位线及保温砖处的定期检查及监控。



Delaying a Cold Repair 推迟冷修计划

Throughout the next year, the metal line AZS thickness and sidewall insulation was continuously monitored to ensure that the scheduled overcoat would not be needed before December 2016. The overcoat was performed as scheduled on the sidewalls at the end of the year. However, this led to another important decision. The furnace cold repair was pushed to a later date.

在随后的一年中，AZS砖池壁液位线处厚度及保温层处被持续监控以确保贴砖规划日期不会早于2016年12月份，最后确实贴砖的规划日期被延迟到这年的年底，而且这也直接引导了另一个决定，整个窑炉的冷修计划被推迟到更晚的日期。

“The Smart melter monitoring allowed us to have confidence to go further and postpone the rebuild further,” Mr. Sperry explained. He continued, “One of the things I like about the technology is checking the heavily insulated areas of the furnace below the metal line, making sure that the sidewall containment and bottom is in good shape. I mean I’ve had a couple of instances of phone calls in the middle of the night saying ‘We’ve got glass leaking out through one side.’ When I can go around and check the melter integrity, it gives me more confidence to push out the repair date. Of course, when we are making these decisions, we also take into account the health of the superstructure and regenerators as well. With the technology we are getting longer, more secure campaign life length.”

Sperry先生表示：“智慧窑炉SmartMelter监测项目让我们有了信心将窑炉冷修重建推迟”，他继续说道：“还有一个就是这项探测技术可以检查窑炉液位线以下的保温层区域，确信池壁下方及池底是否在良好状态，我曾经有好几次在半夜接到紧急电话说我们的窑炉一侧出现了玻璃泄露，而现在用这项技术走完窑炉一次就可以完成对熔化池整体情况的检查，给了我维修日延长的信心，当然我们做这些维修决定时也会考虑其它情况入上部结构及蓄热室的健康状况，有了这项技术我们可以延长窑龄并更加安全。”

Data-driven Decisions 数据驱动决定

Mr. Sperry point out that these results affect other decisions as well. “Extending the time between cold repairs is not without added intermediate and cold repair costs,” he explained. “These longer campaigns are causing us to review our furnace construction design in all areas, upgrade materials and change design so we can securely extend life on the next campaign. The technology has the added effect of improving furnace design.”

Sperry指出这些数据结果也影响了其它的决定，他解释道：“延长冷修之间的间隔不仅仅是缩短中间过程及节省冷修成本，对于窑龄的延长使得我们可以审视我们窑炉设计中所有结构区域，提升材质或更换设计可以延长下一个窑龄，这项技术对于延长窑龄有益。

Increased Production提升生产

Libbey regularly monitors the sidewall insulation and overcoat thickness using SmartMelter®, and this will continue until the furnace is shut down. SmartMelter® monitoring is part of a holistic evaluation that also takes into account the health of the superstructure and regenerators.

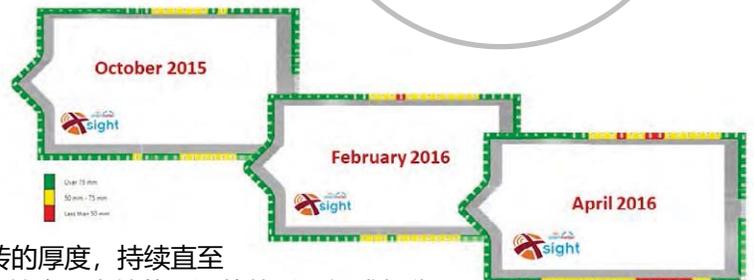
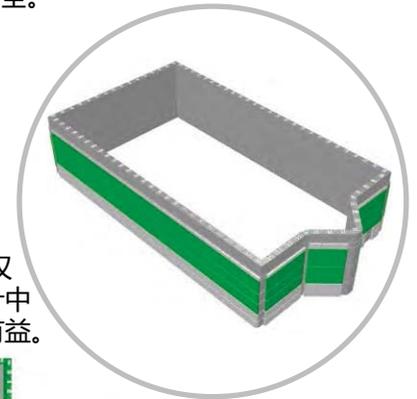
Libbey玻璃使用SmartMelter®来定期监测池壁保温砖及贴砖的厚度，持续直至窑炉关停。现在SmartMelter®监测程序与上部结构及蓄热室检查是窑炉状况评估的重要组成部分。

“This furnace will have melted 25 percent more glass at the end of its campaign than any other Libbey furnace in history,” Mr. Sperry commented. “We think we’ve got the risks contained to do that. So that’s how we’re using the technology.”

Sperry先生还提到：“这座窑炉在至窑龄末期比利比历史上其它窑炉多熔化生产了25%的玻璃，我想我们值得去冒险，这就是我们为什么使用这项技术的原因。”

Furnace Health Monitoring with SmartMelter® has made a significant impact on furnace campaign life and productivity at Libbey Glass. Secure containment in the areas of the furnace that they cannot monitor accurately gives the company confidence to extend repair significantly past the repair dates that are indicated by historical furnace data. This leads to longer campaigns and larger return on their assets.

使用SmartMelter®来定期监测窑炉的健康状况对利比玻璃的窑龄及生产能力产生了重大影响，对窑炉的不能直接监测的部位在过去无法通过历史数据和经验给予公司信心去延长预期维修时间来说，它提供了安全测控的保障，这直接引发了窑龄的延长及更大的资产回报。





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

