



Furnace Life Optimization Solution

**SmartMelter Reduces Repair Costs**  
by more than 30% for Cardinal Glass

**SmartMelter智慧窑炉为卡迪安玻璃节省了**  
超过30%的维修成本

Cardinal Glass, a leading glass manufacturer in the United States, was an important industry partner in developing the SmartMelter® sensor for inspecting furnace bottoms. Cardinal's first experience using SmartMelter® on the bottom of a float glass furnace turned a potential surprise leak into a well-planned repair, keeping customer orders on track and saving both time and money.

卡迪安是一家美国的领先玻璃制造商，也是SmartMelter智慧窑炉® 探测窑炉底部的重要的工业合作伙伴，卡迪安第一次使用SmartMelter智慧窑炉®对其浮法玻璃窑炉底部进行探测就发现了玻璃液泄露的意外情况，从而提前做好的冷修计划保证了客户的定单延续并节约了时间和金钱。

After validating the accuracy of the SmartMelter® data in this first case, Cardinal FG made SmartMelter® Monitoring a new standard in their maintenance program. Kelly Busch, Vice President of Cardinal FG, and Mark Purcell, Production Manager, explained how this implementation discovered unexpected wear at another plant and cut repair costs by over forty percent.

由于首次的探检测验证了SmartMelter智慧窑炉®的精确性，卡迪安浮法玻璃将SmartMelter智慧窑炉®探测监控作为他们的一个新的维护标准。卡迪安浮法玻璃副总裁Kelly Busch，生产经理Mark Purcell描述了在另一个工厂这个应用如何为他们节省超过40%的维修成本。

### The Risk of Inaccurate Furnace Life Estimates 不准确的窑龄估计带来的风险

A second float glass furnace was found to have extensive wear in select areas that would not last until the next scheduled rebuild date. Although the expected furnace life was at least three more years, the SmartMelter® data showed that a repairs were necessary much sooner.

第二座浮法玻璃窑炉在探测选择的区域也发现了过早的侵蚀，以至于不能坚持到计划的冷修日期，尽管期望窑龄至少还要运行三年，但是SmartMelter智慧窑炉®探测结果数据显示需要尽快进行冷修。

"We would have been sitting there not knowing, typically...but now we had a very accurate system, that's proven, that would say this is wearing at a pretty good rate, this is what's left-we've got to repair," Mr. Busch explained, "If we would have waited until 2021 to repair this and not monitored it, it could have dropped to the basement, and that could have been catastrophic, cost-wise and penalty-wise."

Busch先生说到“我们不会坐在哪里无谓猜测，现在...我们有非常精确的系统，是已经被证实过的，可以肯定这个侵蚀会很快，我们必须尽快去维修，如果我们不去监控探测，等到2021年冷修，那么玻璃会穿透漏到地下室去，那将是个灾难，成本与惩罚高昂。



## Targeted Repairs Create Significant Savings 有目的计划的维修可节约大量成本

Mr. Busch estimated the typical cost of a cold repair to be about fifty-five million dollars. But the data from SmartMelter® monitoring showed the specific areas that were damaged along with the actual thickness remaining. This changed the scope of the repair. It also allowed Cardinal to slow the wear of the damaged area while preparing for the repair date. Water coolers were placed over the top and sprays were added to the bottom. Regular SmartMelter® inspections were performed to monitor the erosion progress. Finally, a very focused repair was planned that left the healthy area of the furnace intact.

Busch先生预计一次典型窑炉冷修的成本在5500万美元, 由于确信SmartMelter智慧窑炉®所探测区域的被侵蚀的数据与实际耐火砖残余厚度是一致的, 他们改变了维修的范围, 同时卡迪安在为冷修计划做准备时也能够放心地去延缓侵蚀损坏的区域, 如使用水冷贴板并在底部喷水, 定期 SmartMelter 智慧窑炉®监控全部侵蚀过程, 最终一个非常有针对性的冷修计划将窑炉健康区域得以保留。

“Instead of repairing the crown, or the ports, or the breast walls, we are just going to make access ways to go in and repair the area that’s damaged, and then start back up and reuse it .And that is a significant difference in cost and time,” Mr. Busch said. He added, “Typically a repair is 90-100 days, and we are looking at no more than 45 days

Busch先生说道“不像大碓, 小炉或胸墙的维修我们只需接近损坏的部位来直接维修焊补, 而且很快就能恢复并再维修, 池底的维修在时间和金钱成本上完全不同, 一般的冷修需要90-100天时间, 但是这次我们仅用了不到45天。”

Mr. Purcell and Mr. Busch both agreed that this process saved more than 30% on the furnace cost alone, not counting production time saved and other costs that are incurred with a furnace repair. The total savings after all costs is even higher.

Purcell先生和Busch先生都认为这一维修过程仅就窑炉成本来说就比原来节省了30%, 这不包括生产时间及其它维修所关联的成本的节省, 如果全部计算在内节约的成本会更多。

### SmartMelter®’s Role in Cardinal’s Maintenance Program 智慧窑炉®在卡迪安维修程序的作用

SmartMelter® inspections continue to identify important data. The company is changing the design of their furnace bottoms in an effort to reduce or eliminate hotspots. Newer furnaces now receive an annual baseline inspection using SmartMelter®, and Cardinal is now adding sidewall inspections to their program. SmartMelter智慧窑炉®探测, 公司正在改进窑炉底部的设计以防止危险点的产生, 新的窑炉正在接受基于年定期 SmartMelter智慧窑炉®探测的维护程序, 同时卡迪安也在将池壁砖探测也加入到定期维护程序中。

“From a furnace maintenance standpoint, I’m looking forward to that, because that will help us schedule those projects as well,” Mr. Purcell commented about the sidewall inspections. “You know, that’s a routine to go through and place overcoat block, and often times that’s done just on visual observations - how bright the block is, the condition of it. But being able to establish a baseline and monitor that on an annual basis will allow us to schedule out those projects more appropriately and maybe be able to push them off an extra year from what we thought, or move them up if need be to avoid a bigger problem

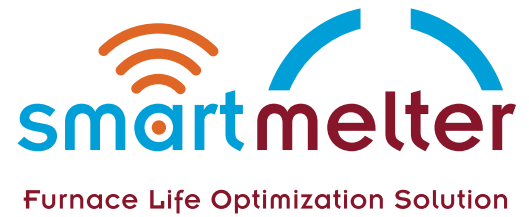
对于池壁砖的检查, Pursch先生说道“从窑炉维护的角度, 我们非常期望这个探测程序能帮助我们更好的规划冷修项目,你们知道, 池壁砖的热补是贴砖, 经常是在出现肉眼观察池壁砖发红发亮的情况下才会贴砖。但是如果建立起一种机制能够每年有计划地让我们了解这些侵蚀进展详细情况, 那么将有可能比我们推测想象的要多一年的窑龄, 或则及时对它们进行更换以避免更大问题。

Mr. Busch also expects SmartMelter® monitoring to become a standard recommendation in their insurance agreement. He has found a willingness to factor in the reduced risk of SmartMelter® monitoring when determining rates.

Pursch先生还希望SmartMelter智慧窑炉® 监控探测程序在他们的保险协议中成为一个标准的推荐程序, 由于Smart-Melter智慧窑炉®的参与他们找到了自愿降低窑炉风险确定率的因素。

“It’s a new tool that we never had before to handle the maintenance programs for the furnace and prolong or actually determine the life of the tank,” Mr. Busch summarized. “It’s an easy system to use and it works great.”

“这是一个新工具, 我们从前的窑炉维修程序从来没有认为能够确定窑炉的寿命, 但是目前看起来这个系统非常简单实用并且效果很好。”



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