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WTIA National Diffusion Networks
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SUCCESS STORY NUMBER BC04: BETTER WELDING PROCEDURES HELP SCRAP STEEL RECYCLING – *Improved repair methods for molten steel ladles help the steel recycling process, and the comfort of the people involved*

Introduction

At Smorgon Steel's Waratah facility, scrap steel is melted down in an electric arc furnace then moved to the steel making plant using specially constructed ladles.

Smorgon Steel Tube Mills, a member of the Building and Construction Industry Sectoral Project, is a major recycler and supplier of steel products to the Australian market. The company is an active Member of the WTIA's National Diffusion Networks Project which is supported in NSW by the Department of State and Regional Development.

Melt-shop ladles

The melt-shop ladles are built to the guidelines of AS 1210, the Unfired Pressure Vessel Code as they have to cope with the extreme high temperature (~ 1600 Deg C) of the molten metal. They have a refractory lining that is regularly maintained and replaced.



Melt-shop ladles



Issues with the whole maintenance procedure of the ladles have been addressed recently by Glen Allan, WTIA Technology Manager in consultation with Smorgon's staff and contractors.

Firstly, regular removal and replacement or refurbishment of the refractory lining is needed, and this is done mechanically using pneumatic tools that may on occasion damage the underlying ladle material.

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Secondly, under hot metal erosion conditions, the refractory linings are prone to failure, especially cracking around the base assembly and ladle openings with wash-out of the lining leading to subsequent hot metal wash damage to the steel structure of the ladle and in some cases, cracking. These structural failures are repaired using flux cored gas shielded arc welding.

Outcomes

When looking for improved weld procedures for repair of mechanical damage, wash-out and cracks, Glen took into account that the large volume of weld metal deposited traditionally leads to unwanted distortion of the ladle base.

New repair procedures were designed to not only repair the ladles, but distortion control measures were implemented to counteract this unwanted side effect.

Not only that, but a review of the repair sequence allowed incorporation of a number of other improvements to the comfort of the welding staff. By minimising the use of preheat, and planning the repair to maximise working from the outside of the ladle, their conditions were significantly cooler.

New work instructions were drawn up in line with the revised repair sequence and the procedures introduced to the welders at an on-site familiarisation session. The changes were well accepted and ongoing monitoring ensured that all staff were fully understanding of the work to be done.

On-going audits with the contracting company are ensuring that they, their staff and their customer Smorgon Steel, are enjoying a win-win situation.