

Dr. Die Cast



Oxides are Inevitable, Hard Spots are Not!

This edition of Dr. Die Cast is addressed to aluminum die casters in particular.

Oxides in Aluminum are inevitable. My dear friend, Bill Peters best described them as a “Swimming pool full of water balloons”. The easy material to identify is the dross or “light oxides” that float on the surface of the bath. They are easy to remove by skimming and generally add no wear to the furnace lining. Other than building up on the ladle if allowed to remain in the dip well, it is relatively easy to manage. Worst case, if dross is poured into the shot well, expect bad castings.

Hard spots: (Corundum)

Castings that require heavy machining will find the oxides. Typically, “hard oxides, often referred to as “Inclusions” will destroy carbide and diamond tooling. Damaged cutting tools are expensive to replace and create down time. In extreme cases, the damage can extend to knocking the fixture out of position requiring realignment.

Prevention:

Furnace cleaning sounds simple. It is highly underrated. I visited a plant that had 3 reverb style melter/holders. I asked the company owner how often they relined their furnaces. He was bewildered by the question and responded with, “We never have, how often should we?” I immediately asked to see his furnaces and after opening the doors to inspect them, I saw that they looked like they were only a year old or less. I learned that

they were in fact 15 years old and had never been relined. I told him, whatever you do, make sure you keep that furnace operator.

He had a daily routine of cleaning the furnace that included fluxing the bath and the sidewalls of the furnace. Scrapping dross buildup off the walls, dragging the heavy oxides off the floor and skimming any and all dross from both the bath and the dip-well. The savings to the company was nearly incalculable: savings in furnace repair, reliability of the castings to the machining department, savings in melt loss, etc.

Planning:

Tool handle Roller:

There should be a roller in front of the door so that the tool handles do not have to drag across the refractory. This will make it easier for the operator as well as extend the refractory life.

Access to the furnace must be unencumbered by other machinery or walls. The rakes and scrappers must be able to easily reach the far wall of the furnace and still have enough handle extending outside the furnace so that the furnace operator has the leverage to easily maneuver the tool. One worst case installation had the furnace so close to the wall that there was only a foot of handle outside the furnace when extended all the way. The operator had no leverage to control the hoe. The result was a poorly cleaned furnace that generated hard spots by the thousands.



The photo shows a well-maintained 60,000# furnace. There is a tray to catch the oxides as they are raked from the furnace floor.

Ergonomics:

Where sill height is above a person’s chest, platforms must be built so the operator can work with minimal strain.

Melt loss and metal cleaning:

This article has focused on prevention. However, high melt loss is a by-product of poor furnace cleaning. By fluxing properly, the amount of good metal sent out in the dross truck is greatly reduced. When one company implemented a disciplined fluxing and furnace cleaning routine, they found that their dross barrel weights were reduced by 50%. The reduction was the good metal that was now remaining in their furnace that was previously being shipped out as dross.



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