

C. Melt Loss – Dross

Dross is inherent to non-ferrous metalcasting operations. It represents wasted non-productive energy, and is sold back to the smelter for 10-20 percent of the original purchase price of the ingot. It must undergo an energy-intensive reclamation process. In some cases, the presence of any dross renders the entire container to be labeled “all dross.” Thus, the profitability of a nonferrous operation is definitely affected by the amount of dross generated at the facility and the way that dross is handled. For a number of metallurgical and thermodynamic reasons, dross is not an issue with ferrous metalcasting facilities.

1. Aluminum: Dross is generated as a result of melting and holding aluminum. All aluminum metalcasting facilities generate dross. This is different than the ferrous metalcaster, in which the great density difference between the molten iron and molten slag results in the slag floating on the iron surface, virtually free of iron. Metallic aluminum (Al) and aluminum oxide (Al_2O_3) have similar densities, and the high-melting point oxide does not float free of the molten aluminum. Melt loss (dross) in aluminum casting facilities ranges between 3-7 percent of the purchased pounds. This dross normally contains about 60-65 percent by weight of metallic aluminum. The quantity of dross can be minimized through melting with a stack-melter, utilizing the latest melting equipment and/or utilizing fluxes to “free-up” the metallic portion of the dross. However, a number of metalcasters expressed a reluctance to use fluxes because of environmental concerns. Thus, this dross is sent back to the smelter for recovery. However, all energy associated with the initial melting of the aluminum is lost and then the smelting process must heat the dross to extract the molten metallic aluminum.

2. Copper: Dross for the copper-based metalcaster is also a source of energy loss. It appears that the typical dross loss is in the range of 6-9 percent. This includes actual dross generated from the melting/holding operations, and also some miscellaneous material, such as grinding swarf. Both metalcasters reported a smelter recovery level of around 35 percent by weight copper.

3. Zinc: As it occurred with both the aluminum and copper-based metalcasting facilities, dross is not an insignificant consumer of energy. This zinc die casting facility returns approximately 6-8 percent of the original purchased ingot as dross. This dross is sold to the secondary smelter for approximately one-third of the original purchase cost. The dross contains 30 to 40 percent metallic zinc. There is reluctance at this and other die casters to utilize flux or other dross recovery techniques because of possible changes in chemistry of alloy, environmental concerns and other reasons. Again, dross recovery offers considerable cost and energy savings.