Becoming a Fruit Picker in a Die Casting Operation

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Finding the "low hanging fruit" is a popular expression when discussing cost reduction opportunities. The implication is that simple or obvious improvements will yield abundant and immediate returns. In this and following issues of **Die Casting Engineer**, I will address some of the most common issues.

If you have an average size aluminum operation, you have a remelt furnace. The size, condition and operation of that furnace can be a profit center or the vortex into which you pour your profits.

There are many ways to waste energy and material in the melt department:

- *Clogged air-filters*
- *Improperly adjusted burners*
- *Dirty metal*
  - *Cleaning not regularly performed.*
  - *Walls and bottom not thoroughly cleaned.*
  - *Air leaks around doors and openings.*
  - *Charging dirty metal.*
  - *Charging damp metal.*
  - *Charging too much at once.*
  - *Using off-grade material.*

One of the most common situations is that of too little space in the furnace room. I have frequently observed furnace departments that were physically too small for the operator to properly clean the furnace. They simply did not have enough space for a tool that would reach the end of the furnace without hitting the walls of the furnace room. If you have a 21 foot long furnace, you will require at least 21 feet to the nearest wall in order to have enough room to rake the bottom of the furnace properly. In the case listed above you also need to include extra space as this size hoe requires a fork truck to maneuver it.

Some of the problems caused by dirty or improperly adjusted furnaces:

- *Hard spots in the castings resulting in damage to cutting tools. Diamond and carbide cutting tools are particularly susceptible to hard spot inclusions.*
- *Premature failure of the furnace lining.*
- *Excess dross loss.*
- *Higher energy requirement to heat thick layers of dross.*
- *Oxide build-up on the walls and floor of the furnace causes loss of melt capacity as volume is reduced.*
- *Premature failure of die casting dies caused by hard oxides.*
- *Frequent stuck castings due to excess hard oxides.*
- *Premature wash-out under pour hole in cold chamber.*

What are some of the solutions?

It would be an oversimplification to say, "just do a better job of cleaning." It is not only a matter of tools, operators, maintenance or fluxes. It requires support from management and supervision. There are no shortcuts.

Following are some practical suggestions for maintaining clean metal.

Weigh the empty dross container and record for future reference. The furnace and operator will be unavailable for 20 to 30 minutes each shift for the following procedure.

It is best if the operator is dedicated during this process so he can devote his undivided attention.

- *One scheduling option is to have the next shift cover the manufacturing floor while the previous shift cleans the furnace.*
- *No scrap or metal can be added during the cleaning process.*
- *Pour or blow powdered cleaning flux on the dross and side walls of the furnace.*
- *Stir to mix the dross and flux. (How much is a key, it should be proportional to the bath capacity. 0.1% is recommended by some flux suppliers. This equates to 20 pounds in a 20,000 pound furnace. This will seem like a lot at first but when you see the results, it is well worth it.)*
- *Close the door, turn the furnace to "High fire" and let sit for approximately 10 to 15 minutes.*
- *At the end of that time, open the door and scrape off the walls. The dross should scrape off easily. You are only trying to remove loose dross, so quit if you start exposing refractory.*
- *Next skim off the dross into tubs or barrels. Let the clean metal drip-off prior to emptying the skimmer.*
- *Next "dredge" the bottom of the furnace. This will require a "hoe" to reach the extreme end of the furnace.*

- *Large hoes may have to be mounted to a fork truck. If so, they will require extra space to maneuver.*
- *When the dross tub or barrel is full, weigh it. True dross is light, almost "fluffy". Dross that contains pure metal is heavier. Chart this over several weeks and you will demonstrate the effectiveness of your furnace cleaning program.*
- *People have reported dross barrels weighing less than ½ of the amount from the previous methods. The difference was pure metal that remained in the furnace.*
- *No doubt, as you get more efficient at cleaning the dross, the company you sell your dross to won't like it, but they'll get over it.*

Be prepared to be challenged by your purchasing department for using more flux, especially if you have been using it sparingly in the past. When you can document the reduced melt loss and the economic effect that has resulted, you should have no problem justifying your program.

Benefits of a clean furnace:

- *Reduced melt loss, higher yield*
- *Reduced or eliminated hard spots*
  - *No or less frequent breakage of cutting tools.*
  - *Higher up-time on machining centers.*
  - *Ability to maintain tolerances longer between adjustments to compensate for tool wear.*
- *Increased die cast tooling life*
  - *Reduced erosion in gate areas.*
  - *Reduced sticking and soldering.*
- *Longer life for furnace lining. I have observed 7-to-9 year-old remelt furnaces that were used every day and still in near new condition.*
- *Cold chamber and tip life is stable.*

If you need additional assistance or training consider the following resources:

- *NADCA course, EC-302/3 Metal Melting and Handling*
- *Flux suppliers*
- *Metal suppliers*
- *Furnace builders and suppliers*
- *Metal handling equipment suppliers*

With a little training and the right tools, you can have cleaner metal and longer lasting furnaces.

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