To reduce your costs, look at your alloys, pouring procedures and equipment.

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In today’s economic climate, many metalcasters are looking for ways to reduce their costs. One of the most energy and cost intensive areas of the metalcasting facility is the melt department, making it one of the areas of the plant where the most savings are possible.

1 Substitute Alloys
The first place to look at reducing your costs is in the alloys you buy. In some cases, less expensive alloys can be substituted for more expensive alloys. For instance, many aluminum metalcasting facilities produce a lot of A356 castings. They purchase A356.2 ingot, when they might be able to substitute A356.1 or recycled A356 material with 0.15-0.18% iron. The substitute alloy contains slightly higher iron content in the ingot than A356.2, but it would still meet the casting specification in many cases. The substitution would save the metalcasting facility $0.01/lb. or more.

If the metalcasting facility is making 319.1 parts, it might talk to the customer about using an A319.1 alloy with 3% zinc maximum. The alloy is $0.02-$0.03 cheaper per pound, and it has the same mechanical properties as the standard 319.1 alloy.

2 Review Purchasing Specifications
Quite often, buyers will specify “narrowed ranges” or “reduced maximums.” For example, the buyer might want 319.1 aluminum with elevated copper. Or, the 319 purchaser might prefer a 0.65% iron maximum instead of the standard 0.80% iron maximum. These specification alterations often add costs without a corresponding quality benefit. Currently, copper costs approximately $4/lb. If you request an extra 0.5% copper, it costs $0.02/lb., or about $800 per truckload.

Silicon additions also increase costs. When you have an alloy such as 319.1 or 356.1, your castings will come out just as well with the silicon at 6.7% as it will at 7.3%, but by specifying the higher content, the alloy will cost more.

Strontium modification is another area to examine. Customers often specify a strontium modification when it is unnecessary. If it isn’t required to enhance mechanical properties, don’t buy alloy that includes strontium. For those castings that do require it, you can modify the material in-house and save as much as $0.015/lb.

3 Refine Yourself
Grain refinement increases costs. A number of metalcasting facilities specify in their purchasing requirements 0.1% minimum titanium, which adds about $0.01/lb. Grain refinement can be achieved with a fresh addition of 0.01-0.02% titanium, regardless of the starting titanium content in the alloy. The metalcaster can make this addition in-house and save.

4 Rely on the Standard
Open your purchasing to more suppliers by cutting out special packaging requirements, such as extra bands and odd-sized stacks. Consider purchasing standard alloys like 319.1 or 356.1 in a standard 2,000-lb. bundle. All of the major alloy suppliers can deliver this material, so request quotes from multiple companies. The cost competition will lower your prices.

5 Don’t Skim
Every time you skim, you lose metal. If you have a crucible-type furnace or a pouring well, just skim it once and allow the operator to back-fill the ladles carefully. If your pour-off operator has to skim the hand ladles, his technique is poor. For a frame of reference, 1-1.5% melt loss on a truckload of 319.1 is around $600-$700 dollars of materials lost.

6 Never Over-Pour
Use hand ladles that hold only the amount of metal required to pour the mold so that your operators will not over-pour. Exceeding the capacity of the mold and having to pour the additional metal back into the furnace causes melt loss. Train your metal pourers not to slop over the top.
of the mold and stop when the riser is full. Any metal that’s poured over the top of the mold will have to be re-melted, and you will incur a second melt loss, as well as a second round of energy to melt the material.

### Maintain Your Melters

Perform regular furnace maintenance. Seal any air leaks. If you have a crucible where the combustion air blows across the metal surface or a reverb or stack melter that isn’t air tight, extra oxygen will be introduced into the liquid metal, and your melt loss will increase. You must also regularly tune your burners. If they are overly oxidizing, you’ll burn up more metal. If they’re too reducing, you’ll lose energy because you won’t burn all of the fuel.

### Use Clean Metal

Maintain a clean metal charge. Leaving core butts or sand in your gates, runners and scrap castings increases melt loss. If you run this material through a shot blast or other cleaning mechanism for one minute, you will see improved recoveries.

### Charge Properly

Once you have clean charge material, make sure you use it properly. Charge the clean scrap onto a skimmed surface and submerge it into the bath quickly for the optimum recovery rate. Piling metal up in a crucible furnace or a charge well and letting it melt in is not cost effective. As the charge material heats up while exposed to the atmosphere, it oxidizes and causes recovery loss.

### Reduce Pouring Temps

In many metal-casting facilities, the pouring temperature is too high. The operator will maintain the high temperature to avoid misruns or to pour additional castings out of one ladle. However, if you reduce the temperature to just the amount you need to pour, assuming the operator pours the casting correctly, and pour fewer good castings as opposed to more defective castings, you will see savings. Less energy will be consumed, less melt loss incurred, and the quality of your castings will be better.

### Melt Less

Run only those furnaces required for daily production. Many casters keep several full furnaces in case they are needed. The majority of the time, these furnaces sit idle, consuming energy and producing melt loss.

### Receive More for Your Scrap

You are going to produce scrap, so it’s important that you keep it segregated. If you mix alloys, the value of your scrap is going to fall to the purchase ingot in standard bundles, rather than making special packaging requests, such as extra bands and odd-sized stacks.

### In some cases, less expensive alloys can be substituted for more expensive alloys.

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value of the lowest cost alloy. For example, if you mix 319.0 and 356.0 aluminum, for every pound of 356.0 contained in the mixture, the value will be reduced by the $0.05-$0.10/lb. difference between the alloys. Keep the materials you want to sell clean. If you have aluminum chips you want to sell, keep miscellaneous scrap iron out of them. If you have iron contamination, the scrap dealer and/or the alloy manufacturer will penalize you at least $0.025 cents per pound to remove it. Also be sure to keep your scrap free of other materials like trash or wood. Scrap dealers or alloy manufacturers must perform extra processing to remove the contamination and will penalize the seller accordingly. Also, seek new markets for your scrap. For example, saw chips or grindings might be sold to the chemical or flux industry for use as a catalyst in certain chemical reactions or exothermic fluxes. Exothermic flux manufacturers may pay much more for the aluminum than scrap buyers, so investigate those markets, as well.

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**Consider a New Furnace**

Continue to look at new technology, particularly melting technology. Commercially available technology such as isothermal melting can melt aluminum at 552 BTUs per pound with only 0.4% melt loss. These furnaces use half of the amount of energy used by stack melters and with one-third the melt loss.

**Consider a New Ladle**

New technology also can help improve your ladling procedures. Commercially available electrically heated transfer ladles will stay hot between metal transfers.

There is no loss of temperature when metal is tapped into the ladle, and they have the ability to maintain the metal's temperature during degassing and fluxing treatment and transport. This capacity eliminates the need for superheating in the furnace. For example, one company using such a ladle has reduced the temperature of its 80,000-lb. furnace by 50F. The result is significantly lower energy consumption and melt loss.

**Don't Let Dross Be a Loss**

Commercially available dross processing units can allow the metalcaster to treat dross before offering it for sale or sending it out for processing. The skim or dross coming off crucible furnaces, charge wells or transfer ladles can contain as much as 80% metallic material. Dross removed from the burner chamber or dry hearth often contains 40-80% metal. By utilizing in-house dross processing technology, the caster can recover up to 80% of the entrapped metal in the dross as alloy that can be returned to the furnace. This can create significant savings in alloy costs and outside dross processing costs.

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**About the Author**

Brian Cochran is president of Brian P. Cochran Associates LLC, Wabash, Ind. He has 20 years of experience offering technical advice on melting, metal treatment, metal handling, alloy selection, improving recovery, defect analysis and scrap reduction.

**For More Information**

