Using Scrap Aluminum
For
Sand Castings

Scrap Metal Sources:

So you are ready to fire up the furnace and start casting some aluminum parts, but don't want to blow the budget on foundry grade aluminum ingots. A good choice is to use scrap aluminum. The stuff is everywhere and is low cost or even free to the alert dumpster diver! But there are a lot of different aluminum alloys out there. Some are good for sand casting and some aren't worth the trouble. So the trick is to find the right stuff, but how do you know what alloy a part is just by looking at it? The simple answer is you will never be 100% certain what alloy you are holding, but you can still manage to sort the "good stuff" from the trash by using a few simple guidelines.

Rule #1: If it was made by a casting process, it will probably work just fine.

Look at your part and see if you can determine how it was made. Do you see a surface that looks like a sand casting? Is there a parting line? Do you see ejector pin marks (small circles that are created by the steel pins that push the newly cast part from the mold)? These are indications that the part was made by sand casting or die casting. These parts are made from alloys that cast well and will provide a good source of metal for you.

An excellent source of cast aluminum is automotive pistons. Typically these are cast parts that have been machined to size and are an excellent grade of aluminum. Aluminum transmission cases are also typically cast parts and of a good grade of material.

The trick to these larger parts is to get them broken down into manageable sizes that will go into your crucible. I have read that you can break up the larger pieces by heating them in a coal fire and then smashing them with a sledge when they reach the "hot short" temperature. This temperature is where the metal will break into smaller pieces with only moderate force of the hammer. Which brings us to:

Rule #2: Don't mess with the small stuff or contaminated material.

If the scrap is too small, say for instance metal chips from machine tools or saw chips, you are going to have a problem. The first problem is that the metal is likely coated with oils or cutting fluids that will carbonize or burn off during melting and introduce a lot of crud and gas into the melt. The second problem is that you are going to spend a heck of a lot of time just getting it all melted down. A pound of machine tool swarf can fill a surprisingly large volume. Getting it into the crucible will be at least a time consuming job and maybe flat out dangerous. Putting cold metal into a puddle of hot metal is inviting disaster from fumes and possible steam explosions. Not worth the risks.

Rule #3: Aluminum Extrusions aren't very good for sand casting.

The first problem with extrusions is related to Rule #2. Extrusions typically are long, slender parts with a lot of surface area and not much volume. Takes a long time to melt them all down. The other problem is that extrusion grades of aluminum are made to be extremely ductile so they can be easily drawn. This ductility makes for difficult machining. If you are casting artwork or something that doesn't need much secondary machining this may not be a problem. However if you are trying to make machine parts you will find that the "gummy" nature of extrusion alloys are a bit difficult to drill, mill and turn. Trying to tap these alloys can be a real challenge and can leave you looking down a hole at the bottom ½ of a tap.....

Rule #4: Avoid Aluminum Beverage Cans.

Aluminum cans violate rules #2 and #3 in the worst way. This material has a huge surface area compared to its volume. Crushing the cans will help, but you are still going to need a heck of a lot of cans to obtain a small volume of molten metal. This problem is made even worse by the fact that as the cans melt the exposed surface will oxidize. This oxidation eats up a lot of the metal resulting in mountains of dross (floating crud) and an amazingly small amount of molten metal! The surface of the cans also has been printed and coated with a variety of chemicals and inks that will release potentially harmful or explosive fumes and will contribute to the mountain of dross. This metal was also designed to be extremely ductile so it can be deep drawn and is very poor to machine.

Now the most serious problem with cans: ***EVEN THE SLIGHTEST AMOUNT OF LIQUID LEFT BEHIND IN A CAN WILL CAUSE A VIOLENT STEAM EXPLOSION IF PUT INTO A CRUCIBLE OF MOLTEN METAL.***

Rule #5: Be sure that your scrap is really aluminum.

There are many materials that cast parts are made of such as aluminum, zinc, magnesium, iron and even plastics. Some of them can be dangerous to melt because of fumes and combustion. Magnesium has a reputation of burning extremely hot and violently.

I've never experienced a metal fire, but I have heard stories of those who have. Always have a pile of DRY sand and a shovel handy to pile onto any thing that starts burning. Never use water to extinguish a fire caused by molten metal. Be sure that what you are melting is aluminum.

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