

Here goes..... I am VERY fussy with my ingots. From the sounds of it, I would NOT WANT some of the ingots that some of you produce. Not clean enough for my guns.

Here's the basis for how I do it: I want as close to PURE alloy as I can get. NO GRIT remaining. NONE. Every bit of grit that you allow to enter an ingot becomes abrasive that wears out your barrel. At a commercial lead processing plant, they use very expensive ceramic filters that get all grit out. We hobby smelters can't afford the expensive ceramic filters, so we have to FLUX like crazy to get the lead as clean as possible.

So, here's my system:

1) I always leave the last inch of molten lead in the pot from the previous smelt. I allow that to cool, and mark what it is, with a Sharpie. Next time I smelt that alloy, I put that disk back in the pot, which maintains 100% contact with the smelting pot, and therefore melts fast, giving me a good lead puddle for the boolits/range lead to melt into. If you skip that step, the edges of the range lead have little contact with the smelting pot, and will take longer to start melting.

2) I add a couple of inches of range lead into the pot, and allow that to come up to temperature and melt. I DO NOT fill up the smelting pot..... To do so would introduce too much copper jackets and other debris that needs to get skimmed off. I do my adding in layers, and that goes very fast. Add/Skim/Add/Skim, etc. Continue adding and skimming the big stuff off the top until you have a pot pretty full. The previous comment about the strength of the stand is worth paying attention to. One summer day a couple of year ago, I was smelting 200 pound batches and was horrified when I noticed that the stand leg had started to sink into the hot top, and the stand was dangerously leaning. I had to be very careful to not knock it over while fluxing. Once you have a safe pot full of molten lead, with only the BIG STUFF skimmed off, it's time to start fluxing.

3) The fluxing is the process or technique for separating the grit and

other small debris from the metal. You want to end up with as clean a metal as you can, for the sake of the longer life of your guns. The lead is not only heavy, but very **dense**. The larger stuff that you skimmed off had enough **flotation ability** to float itself to the surface. **The smaller grit does NOT have enough flotation to push itself easily through the dense metal.** That's what the fluxing techniques does..... it opens pathways through the dense metal for the small grit to make it's way to the surface.

4) Stirring and the addition of fluxing agents assists with making pathways. It also, and this is an important aspect of fluxing..... it also provides "bonding agents" for the small grit particles to stick and adhere to, clumping them into bigger pieces, for easier removal. So, stirring with anything, a metal spoon, a wooden stick.... when done correctly, will open eddy currents (think whirlpool action) that will allow the grit to make it's way to the top for skimming. And, agents like sappy pine, motor oil, pine sticks (dual purpose), old candle wax, paraffin wax, etc act as perfect fluxing agents for the other part of the fluxing action. Pine saw dust is just about one of the best fluxing agents you could use. It's sappy enough to provide the sap agent that allows the grit to stick to it. And, the small particle size assists with creating nice pathways to the surface, when stirred into whirlpools through the lead. Hard wood saw dust isn't as good, but better than nothing. Get bales of pine sawdust at your local feed and grain store. They use it as horse bedding. You could also use pine shavings, but it's not quite as good as pine sawdust.

5) I grab a handful of pine sawdust, and toss it onto the surface of the molten lead. I use a stainless steel slotted spoon with a long handle (bbq type spoon) and start stirring right away. I stir right to the bottom of the pot, pulling up all the grit I can from the bottom. Keep stirring.... The sawdust will eventually become charcoal, and will soon burn into ash. You want to skim the charcoal and all the grey powder grit that floats to the top off the lead with the edge of your spoon, **before it turns to ash**. Go slow with moving the edge of the spoon through the lead, and you will see that it's easy to pick up the skimmed material. Pull it slowly towards the edge of the pot, and turn your wrist, and you'll

see the grit (grey powder) in the spoon. When you are done with the initial sawdust flux, the top surface of the lead should be somewhat shiny. However, the lower portions of the lead are still nasty! I do this sawdust flux about 4-5 times, or until I start to see dramatic reductions in the amount of grit I am picking off the surface. For some really sandy range lead, I have been known to flux with the pine sawdust as many as 10 times before moving to the next step. Be as fussy as you want to be. It's your lead! And, your guns!

6) Once I have achieved some level of cleanness with the pine saw dust fluxing, I switch over to paraffin wax, which is finer agent, and will get more of the smaller particles out. Old candles are always plentiful. Yard sales are a great place to get them for almost free. I cut them into peanut sized pieces, and toss a piece onto the top of the molten lead. The candle wax will start to melt, and then, because of it's lower flame point, will burst into flame. Be aware it will happen, and don't get startled. The paraffin will consume itself almost completely (no ash), so be sure to stir whirlpools aggressively as soon as you can. Skim off whatever grit that develops, and repeat as many times as you feel that you need to to get to as clean as you'd like. I like to flux with paraffin wax 4-5 times. By then, the metal is pretty darn clean by my fussy standards. (including the pot surfaces, which I have been scraping the whole time).....

7) When using your ladle to remove the lead from the smelting pot, push the ladle through the surface of the lead, and allow the ladle to "back fill" with only shiny metal. Even though you have done this immense amount of fluxing, you will always see some additional crud floating to the surface as you ladle, and you want to avoid introducing that into the ingots you are making. The back filling technique with the ladle is the best way to keep the grit out of the ingots you are making. When you get to a point where the grit really starts to be a nuisance, and it will..... do some more paraffin fluxing.....

8) Continue making ingots until you get down to that 1" or so of lead left in the pot, and stop. Or, if you have more to smelt, stop making ingots when you have a couple of inches of lead still in the pot. That

will give you the good lead puddle for melting.

Notes: Some folks have used motor oil as a fluxing agent. I have used it in tests and find it smelly and full of carcinogens. It works OK, but I still prefer to use the candle or store bought paraffin wax. The store bought version is usually sold in the jam making supplies area of the store. Comes in a one pound package of four blocks, and is very pure, and translucent clear. It's more expensive than cheap used candles. I'm already saving money making my own boolits, and I feel no compulsion to go extra cheap on fluxing agents. I want/demand very highly clean lead to run through my guns. Don't be in a hurry when smelting. It's hard on the back, and hot on a summers day. I find that by pacing myself in a slower pace, I get better alloy because I am taking care to flux well. You cannot flux alloy too much..... You just can't. The more, the better/cleaner the alloy will be. By constantly stirring, you will keep any tin and antimony in the mix. You can't really skim out those metals, nor do you want to. However, if you stop stirring aggressively, and perhaps have the heat too high, you will allow the tin and antimony to come out of solution with the lead, where it will float to the surface in it's typical yellow/gold and purple hues. Don't skim off the yellow/golds or the purples. Turn the heat down a bit, and stir those back into the lead.

My advice has been primarily relating to range lead because that's what you asked about. The same process is used when I smelt clip on wheel weights. However, it's especially important to add weights slowly to the molten puddle to avoid accidentally melting in any zinc to the pot. Zinc will float, but only if you have added a thin enough layer to allow them to float. If you bury zinc weights under 60 pounds of lead weights, and have the pot too hot, you will get zinc contamination. So, my advice for adding new material to the pot slowly and in thin layers holds true whether for range lead or for wheel weights.

I've touched on many of the points that others have made, but I don't think anyone else has covered it as completely, in one place as I have. My system isn't perfect, but it works really well for me. I get good clean alloy. And, I know my bores (barrels) will have longer lives from the

extra trouble I take getting the clean alloy.

Perhaps this post/thread might make a good sticky. I'd be happy to amend my post should anyone think of anything additional idea that would improve my system even more. We have many great casters here. And their system works for them. I take no exception to any of that. However, in my quest for CLEAN alloy, my system gets me there.