

Ultimate Guide to Making a Cheap but Effective Aluminium Forge.

by **Shark500** on December 4, 2007

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Intro: Ultimate Guide to Making a Cheap but Effective Aluminium Forge.

There are many guides and many ideas I've collected and, being that I completed this (the first one... I made a completely new setup just for this instructable... you should feel special.) within two days and most importantly... cheaply.

My [cousin /assistant / camera man](#) and I created this instructable so we could share our wonderful smelting experience and win [the hearts and minds of the instructable community](#).

DISCLAIMER

This instructable includes fire and molten metal.
BE CAREFUL and USE SAFETY EQUIPMENT!

Also; If you mortally wound yourself while duplicating this instructable, please delete this from your history internet history before dieing. i don't want to be held liable.

BACK ON TOPIC!

We shall begin.



Image Notes

1. Aluminum Ingot.
2. Aluminum Can.

step 1: Parts / Tools

In retrospect, the parts / tools list quite long but it should be things that are easily available.

The most expensive thing was the torch. I'm really cheap but it turned out to be a rewarding investment.

The other parts are as follows:

- Quick Setting Quickrete (I got a 20 lb bucket for under 10 bucks)
- Something to mix the Quickrete in
- Something to stir the Quickrete with
- Large Coffee Can (6 inch)
- Small Coffee Can (4 inch)
- Hack Saw (or any metal cutting tool)
- Drill (or metal punch or improvised hole making tool)
- An empty 14.1 oz propane tank (make sure it's competently empty)
- Scrap steel bar like from a printer, about a foot long (you can buy 5/8 steel bar at lowes)
- A sharpie (or any marking tool)
- Tape
- Cardboard
- Short (about 2 or 3 inches) iron or steel tube that the torch head fits in. (optional)
- A ball peen hammer (any hammer will suffice)
- Some propane gas (i buy the ones for camping stoves because their \$4.38 for a 2 pack of 16.4 oz tanks.)
- An oven (optional)
- A vice. (kinda optional. you could find another way but i find the vice necessary)
- A mini muffin tin (optional. you just need something to pour the aluminum into.)
- Some cheap thin steel wire (1/8 diameter max. but strong enough to hold some weight)

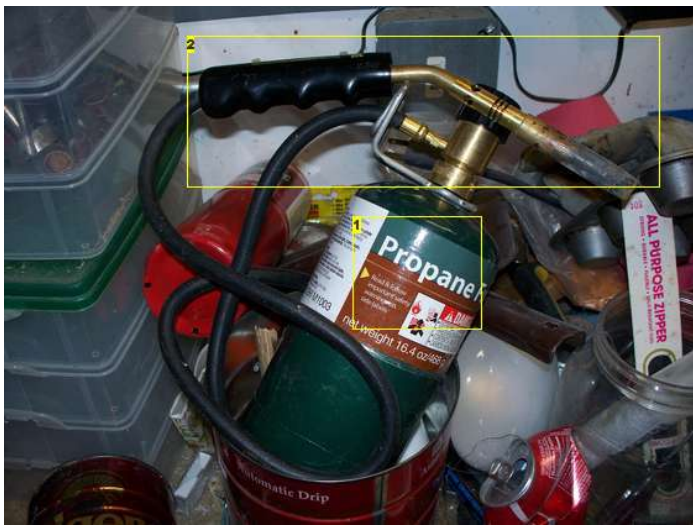


Image Notes
 1. Fuel
 2. torch



Image Notes
 1. 20 lbs



Image Notes
 1. 12 inches



Image Notes
 1. 20 lbs



Image Notes
 1. Empty



Image Notes
 1. steel

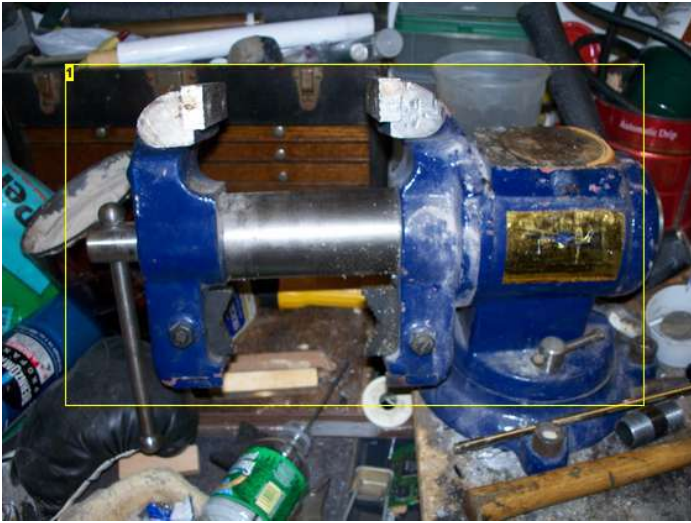


Image Notes
1. A vice is nice.

step 2: A Suitable Crucible

So I took the empty 14.1oz and put it in the vice.

We used my hack saw to cut just under the seam then de-burred the edges.

If you look at the bottom you should see 4 holes. Use a marker to draw a line up the side in line with a hole.

Use the ball peen hammer (or any hammer) and bang out where the line is. This will make a spout. (may take a little working to get it right but as long as it's there, pouring will be easier)

Now draw lines up the sides from the holes adjacent from the side with the spout.

About 1/4 inch from the top, mark the line, and drill at that mark on both sides.

I used a drill but anything number of things could be used.

Make sure your metal bar fits in the holes.

Put on a pair of leather work gloves.

Now mark the center of the bar.

Heat it up over the torch.

When the metal turns red, bend it in half to make an acute angle but not completely in half. (see picture)

Quench the metal in some water and heat up the ends one at a time. Bend them in so they face each other.

Quench the ends and re heat the center bend. Unbend it and rebend it so the ends that you bent in fit into the holes in your half of a propane tank.

Quench the center bend and ensure that your new handle moves freely in it's holes.

You are now the proud parent of a crucible.



Image Notes
1. Cut Here



Image Notes
1. this one



Image Notes
1. draw line

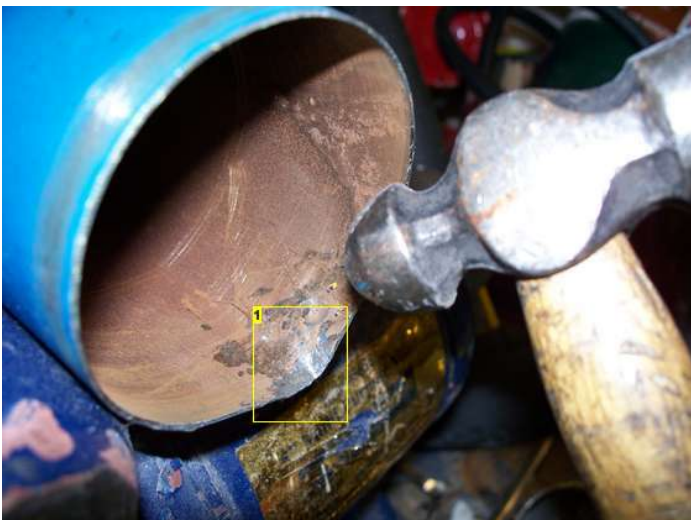


Image Notes
1. taking shape



Image Notes
1. now that's a spout!

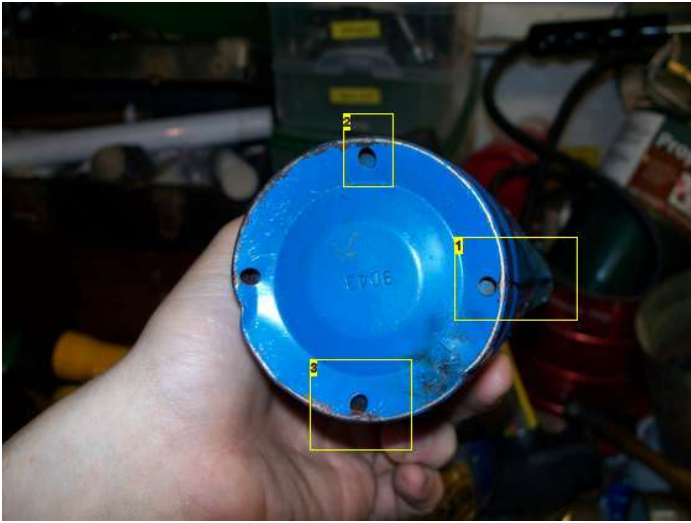


Image Notes
 1. spout
 2. this one
 3. and this one



Image Notes
 1. that's where we drill



Image Notes
 1. that's where we drilled



Image Notes
 1. it fits



Image Notes
 1. center... ish...

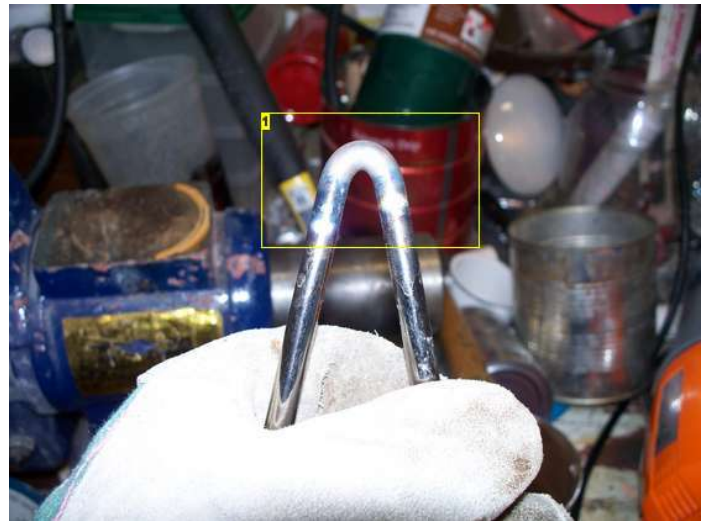


Image Notes
 1. bent over fire

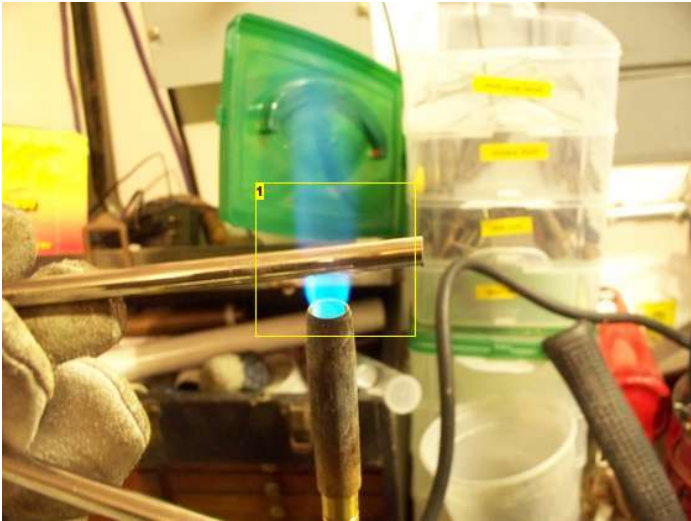


Image Notes
1. one of the ends

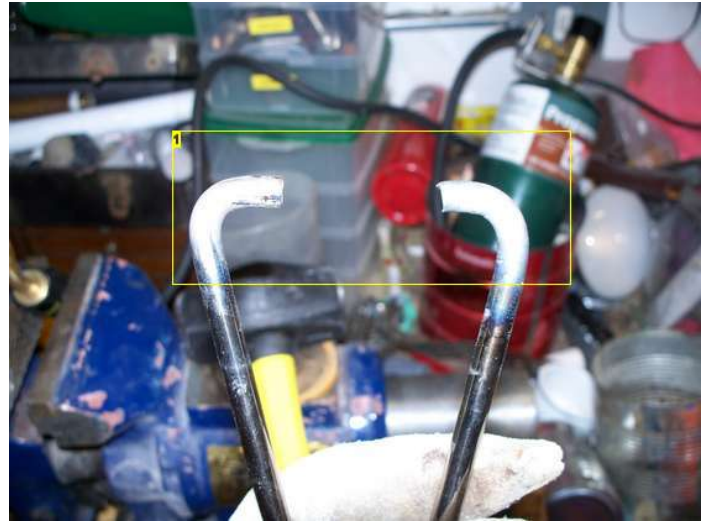


Image Notes
1. ends bent in

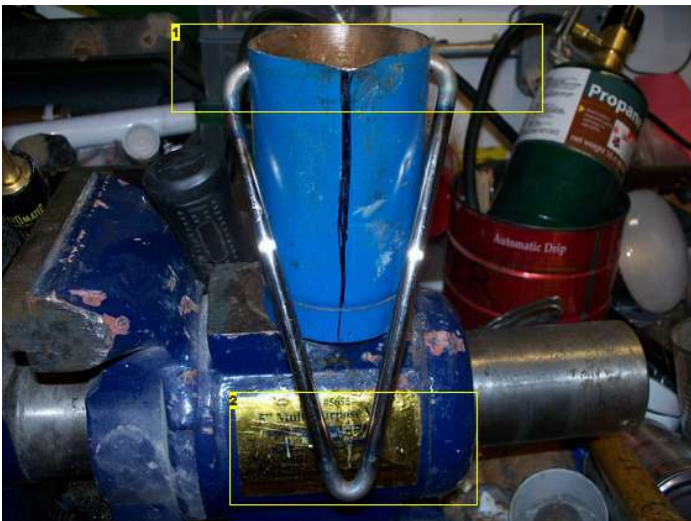


Image Notes
1. it fits
2. un bent then re bent.

step 3: The Forge

This is kind of difficult but has few steps.

Cut a hole in the side of the big can about an inch from the bottom.

Make sure the pipe fits. (you could use a piece of rolled up paper or cardboard.)

Use a can opener on the bottom of the small coffee can and cut a mouse hole shaped hole in the lower side. (make sure the pipe fits)

Wrap the small can in cardboard. (this is to make it easily removable.) and cut out the mouse hole in the cardboard.

Mix the quickrete. We used 11 cups of quickrete and about 2.5 cups of water.

Pack the quickrete tightly in the bottom of the can and up to the bottom of the hole.

Place the pipe in the hole and the small can in the big can with the pipe in the mouse hole. Try to center the small can.

You want the pipe to go in diagonally. This will help create a spiral of flames. (see picture)

Fill up the sides with quickrete and pack tightly.

We let it set for a bit then put it in the oven and set it to 400.

After 30 minutes take it out and pull out the small can and the cardboard.

<http://www.instructables.com/id/Ulimate-Guide-to-Making-a-Cheap-but-Effective-Alu/>

Put it back in the oven for 2 hours. This will help eliminate the moisture.

Use oven mitts and take it out of the oven. and bring it to our work area.

Lite the torch and stick it in the pipe.

I suggest wearing eye protection.

This first firing is just to eliminate moisture. You may see steam coming from the cement.

Let it fire for about half an hour then let it dry overnight.

We put the crucible in during the first fire to help burn off the paint.



Image Notes

1. hole in can



Image Notes

1. 6 inch
2. 4 inch



Image Notes

1. this was the only can i had available. i had removed the bottom so it's pretty much a tube. it worked . i just cut a little mouse hole in the bottom.



Image Notes

1. wrap can in cardboard and tape it.

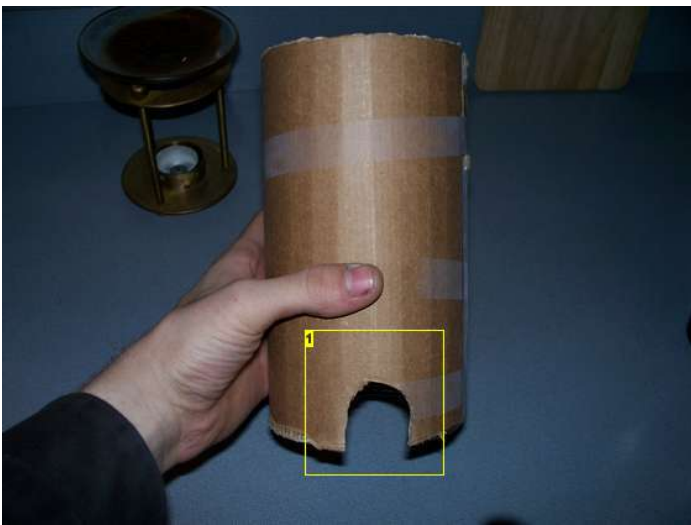


Image Notes
1. cut out the cardboard

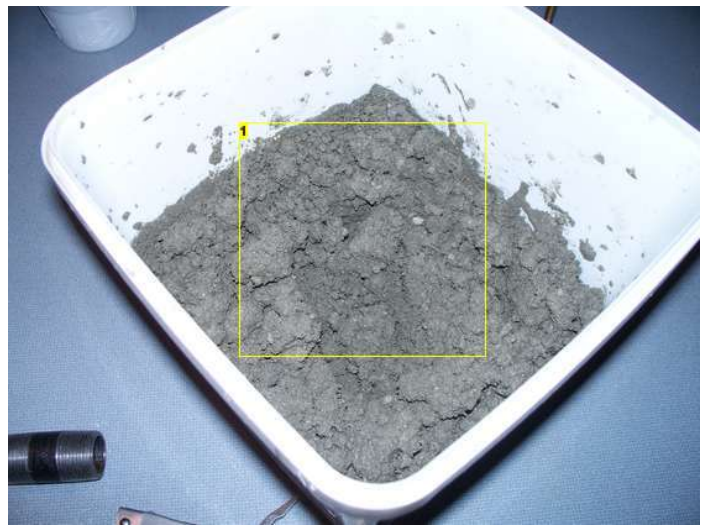


Image Notes
1. mix the quickrete. it says 5.5 parts cement with 1 part water but i would suggest 1.5 to 2 parts water. mix thoroughly.



Image Notes
1. fill bottom with Quickrete up to the hole. pack well



Image Notes
1. put the pipe and cardboard covered can in the can and fill the sides with quickrete. make sure to pack well



Image Notes
1. after it firmed up a bit i threw it in the oven and set it to 400. i left it in there for half an hour then took it out and pulled out the smaller can and cardboard.



Image Notes
1. after i took the can out i put it back in the oven for 2 hours to try to eliminate the moisture.



Image Notes

- 1. fire up the torch and stick it in the pipe



Image Notes

- 1. fire it up for a test burn. a pair of safety glasses are highly recommended. it may crack a little but what we're worried about is a small explosion of hot water vapor.



Image Notes

- 1. oven mits
- 2. crucible fits nicely. i let it go for about half an hour. i do this to eliminate moisture and burn off some paint.



Image Notes

- 1. not perfectly even but suitable. did that after a few minutes.

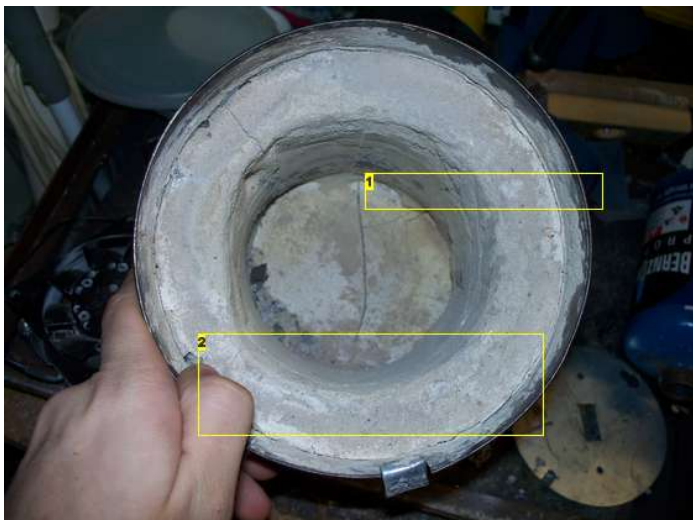


Image Notes

1. this box is how you want the pipe to fit in the can
2. this is my first forge.

step 4: Melting Aluminium

This is pretty much the most dangerous part so have water near by and wear thick leather or welding gloves as well as safety glasses and make sure the area is well ventilated.

You're going to want to fire it up and put in your crucible.

I'd wait until the bottom of the crucible is red hot. (just a personal preference.)

Start out with small pieces of aluminum. (I had "pipes" from an old wind chime.) You could use cans but they tend to have a lot of slag. I'd wait until you have a nice quantity of aluminum before using cans.

You'll probably have a rough start so go slow. After you get a good quantity of aluminum it will be able to maintain a melting temperature and you can melt down large pieces in seconds. I have found an old knock off of a razor scooter in the back of my garage that has worn out it's usefulness. I found a new use for it's aluminum.

I have found covering the crucible with the top half of the empty propane tank helps keep the heat in and keeps things moving along nicely.

I had a troublesome piece of scooter that didn't want to release it's steel screw so I dunked it in the pool of molten madness and that half didn't come back. A mallet made short work of the obstructing piece of metal and allowed us to make a deposit in our crucible.

After you either fill up your crucible or run out of aluminum, you need to scrape off the slag. The slag will be floating on the top and will look a little different than the metal underneath.

We used a scrap piece of metal to scrape off the slag. We used the same scrap to make a hook to pick up the crucible and another piece to fit in the holes on the bottom of the crucible so you can easily pour it. You could use a small screw driver for this.

Make sure you have something to pour the aluminum into. I am just going to save them for later so I'm pouring them into one of those "mini muffin" tins just because they're small and fit in the crucible. You could just use an impression in wet sand or something. Muffin tins are faster. But don't expect to use them for muffins again.

Pour gently into the mold of your choice. IT IS HOT! WEAR PROTECTIVE EQUIPMENT!

Because I'm impatient, I wait until the aluminum in the tins are solid then throw them into a can of water. The water may boil violently after a short delay. It is a sight to behold but dangerous.

You now have aluminum ingots.

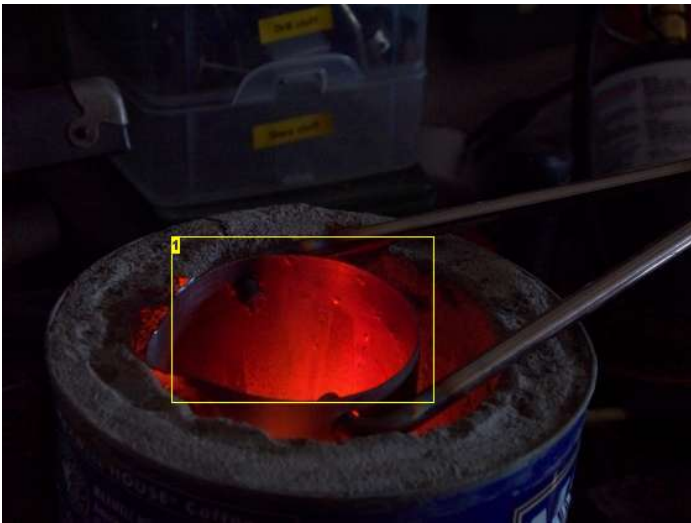


Image Notes

1. Red Hot.



Image Notes

1. glove
2. small piece of aluminum
3. FIRE!



Image Notes
1. new lid?



Image Notes
1. that'll never melt!!!



Image Notes
1. WAIT! WHERE'S IT GONG!!!



Image Notes
1. IT'S LIKE MAGIC!!



Image Notes
1. I AM SO AMAZED!

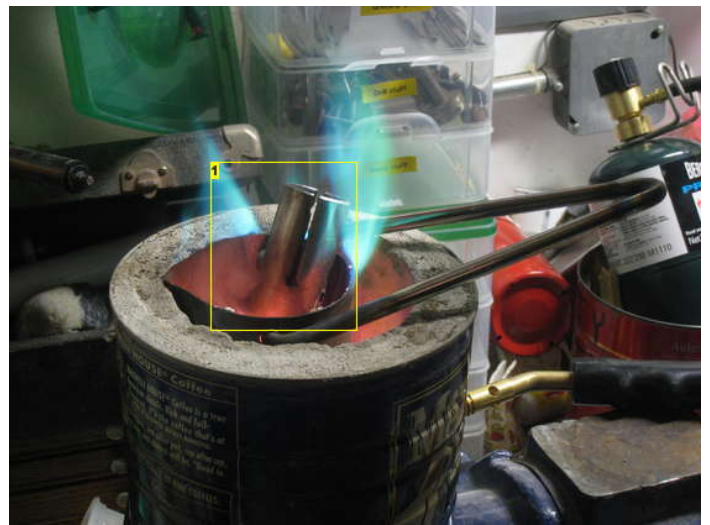


Image Notes
1. piece of scooter. sticker is flaring up.

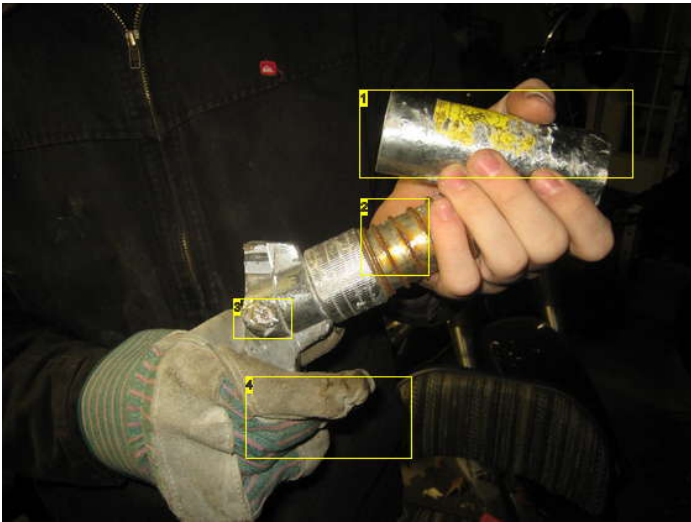


Image Notes

1. didn't fit in crucible.
2. didn't come off
3. THIS SCREW TORMENTED ME.
4. the screw was recovered after we finished pouring the ingots.



Image Notes

1. sweet justice

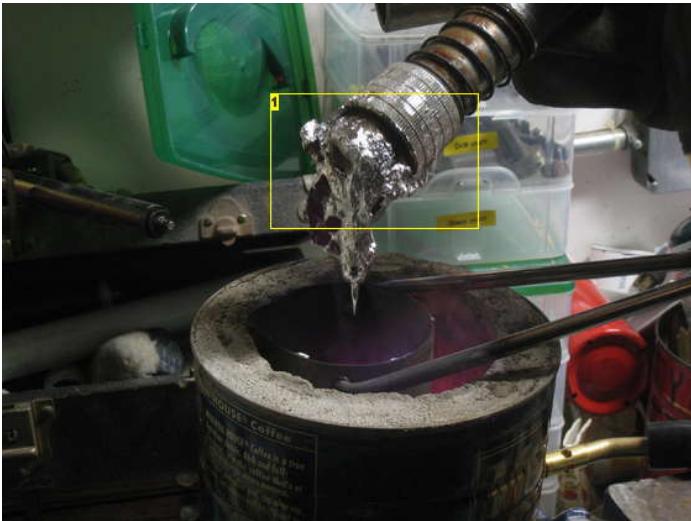


Image Notes

1. i showed that screw who's boss.

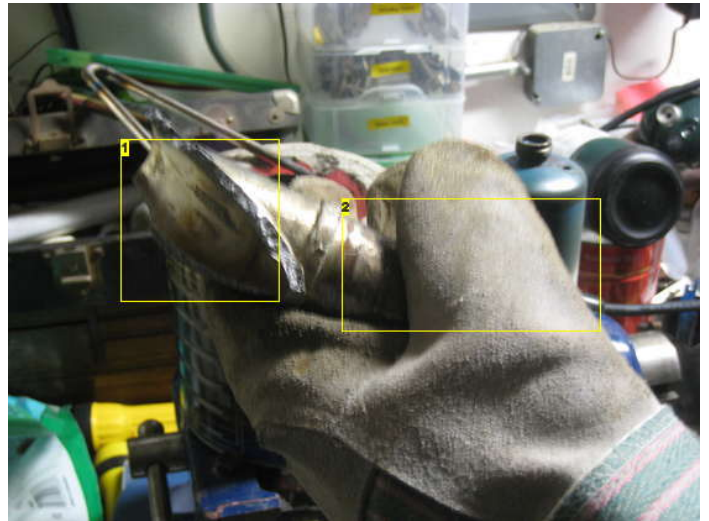


Image Notes

1. made short work of that protruding piece with a mallet.
2. The rest of it was almost solid aluminum.

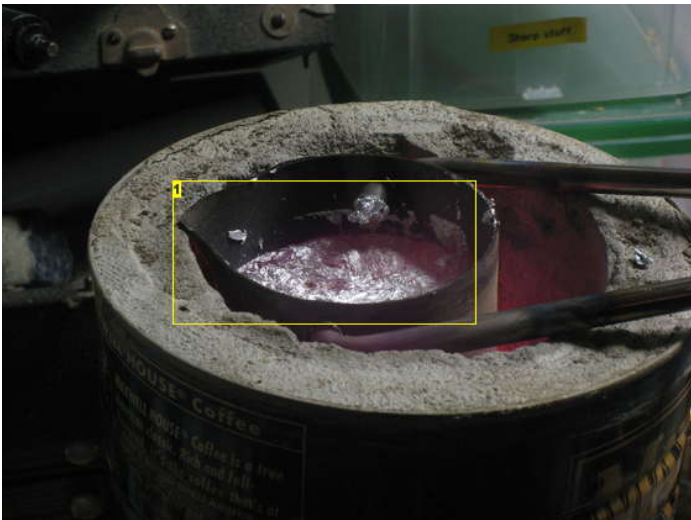


Image Notes

<http://www.instructables.com/id/Ultimate-Guide-to-Making-a-Cheap-but-Effective-Alu/>

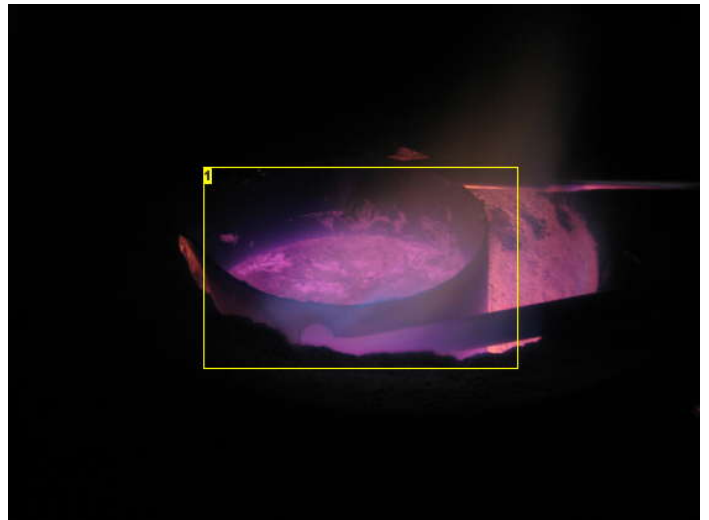


Image Notes

1. that's a lot of aluminum



Image Notes
1. scraping slag

1. we turned the lights out for this one. Dangerous but awesome.



Image Notes
1. a lot of slag.



Image Notes
1. it's actually more red in color.
2. hook for pouring



Image Notes
1. Best picture of pouring

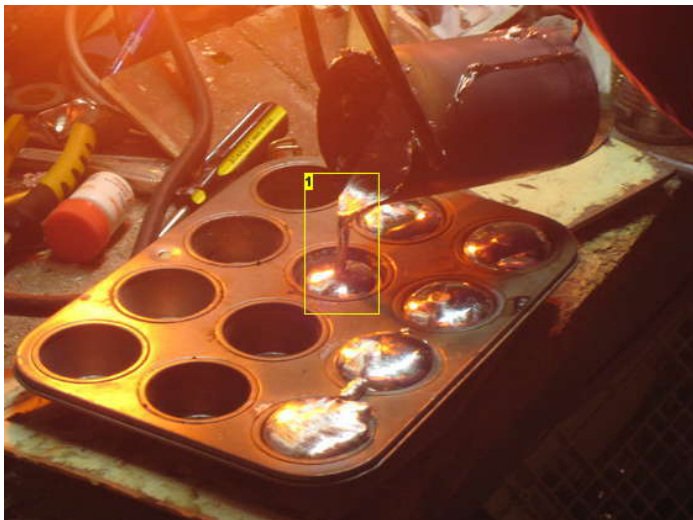


Image Notes



Image Notes

1. 2nd best picture of pouring.

1. I'm impatient so I sped up the cooling process. I would advise against it.



Image Notes
1. INGOTS!

step 5: Now What?

We now have a lot of ingots. You now can use the rest of your free time planning on how to get a hold of a harbor freight micro-mini-lathe for \$250.

I figure we could cast some blanks that can be worked in a tiny lathe but that's for later.

We'll Make an instructible on casting aluminum when we get it down to a simple science.

We hope you enjoyed this instructible and happy smelting.



Image Notes
1. A lot of ingots.
2. disco?

Related Instructables



Build a foundry and sand-cast aluminum. by Ferris The bbw



Aluminum Foundry by StaticPhocus



Casting Aluminum Ingots (slideshow) by dbc1218



Press Aluminum Cans into Ceiling and Wall Tiles by robbtoberfest



Quick and cheap aluminum



Coffee Can Aluminum Foundry by 2k4u



Pizza Sauce Can Furnace by fjr122



artistic design by somebullcrap


Comments

50 comments [Add Comment](#)

[view all 394 comments](#)

 **russian5** says: Oct 28, 2009. 4:48 PM [REPLY](#)
Would this work for gold/silver and pewter?


 **madscientist167** says: Oct 22, 2009. 5:29 PM [REPLY](#)
you **will** be held responsible partially


 **tacamaral** says: Oct 12, 2009. 5:55 PM [REPLY](#)
I don't have Quikcrete in my country, only plain old concrete. I know I shouldn't use it, so I'd really like some ideas. :) Do you guys think if I let a thick steel pipe inside the foundry, with a nice layer of sand between the center steel pipe and the outer can (or larger steel pipe, let's say) it would work? If I'm not work, sand is an insulating substance.

About the scrapyard question: not worth it, guys. It would be better if you just crunched the cans up and took them to the scrapyard - they're sending it to be recycled, which is what you're doing here (except theirs is going to be a bit cleaner, since it's induction melting). :)


Nice instructable. Faved. :)

 **junits15** says: Sep 27, 2009. 7:12 PM [REPLY](#)
how much do you think a scrapmetal yard would pay for these?

 **cowscankill** says: Oct 5, 2009. 6:17 AM [REPLY](#)
I found that a pound of aluminum is about \$1.26 (USD). Is that good? I mean, free cans into money is good enough for me, but I wonder if it is worth the effort...

 **junits15** says: Oct 5, 2009. 1:42 PM [REPLY](#)
well considering it would take a lot of work and cans to make that, but then again, you might get different rates depending on what scrapmetal yard you go to. The real thing to do would be to try and forge old copper pipes, that's where the real money is!

 **cowscankill** says: Oct 5, 2009. 2:07 PM [REPLY](#)
Yeah, like 3 times as much for copper! (\$3 and something)

 **pinkhairkid** says: Sep 9, 2009. 4:29 PM [REPLY](#)
question
does it have to be quickcrete?
could you use just concrete mix?

 **sharlston** says: Sep 30, 2009. 7:41 AM [REPLY](#)
it has to be quick crete concrete has bubbles and bubbles explode

 **1up** says: Sep 27, 2009. 8:01 PM [REPLY](#)
"We'll Make an instructable on casting aluminum when we get it down to a simple science."
Here, Make did it for you! :D
http://blog.makezine.com/archive/2009/09/make_projects_-_cast_metal_pyramid.html

 **superhubbardman** says: Sep 19, 2009. 4:49 AM [REPLY](#)
Delicious, delicious alumuffins
:D
good ible, 5 * and faved



Kaiouss says:

Sep 11, 2009. 8:31 AM [REPLY](#)

In the beginning of step 4, something you might consider mentioning is using a sand pit for safety, as well. While water is good for tools, if your crucible slips, the foundry tips, or any other seemingly unlikely and therefore freak-out-worthy event occurs, it's easier to dash everything in a big tub full of sand and let it cool than try and land it in a bucket of water that could also spill or erupt in to a boil. Nothing makes a stressful event worse than pieces of metal, boiling water, molten aluminum, and hot metal tools flying everywhere in an environment littered with tripping hazards. I think both sand and water are good to have around simultaneously. You can never have too many back up plans.



kingcr3b says:

Sep 3, 2009. 2:19 PM [REPLY](#)

a few words, FUN FUN FUN!

But with the ingots can you re melt them so you can make valve covers, engine blocks, heads etc. as long as you have the sand castings. because I want to build a F1 engine... maybe... I drink a lot of canned drinks and i steal some out of everyones waste management recycle bins. oh or can i just make little parts out of aluminum?



hodwooker says:

Aug 28, 2009. 3:31 PM [REPLY](#)

You need to look into a few books on metal casting. The best source I know of is Lindsay publications www.lindsaybks.com/ the best books they have for the beginner are by Dave Gingery. He has a great book on a charcoal foundry that leads into building a complete home machine shop. Also there are many other books on foundry skills and practices.



albylovesscience says:

Aug 7, 2009. 6:23 PM [REPLY](#)

sweet ohh can i ask a question do they let some one under 14 buy a soldering iron



history323 says:

Aug 18, 2009. 1:16 PM [REPLY](#)

yeah i bought mine 2 years ago and in 13!



x z i t says:

Aug 8, 2009. 2:54 PM [REPLY](#)

PROLLY NOT. ASK YOUR MOM



albylovesscience says:

Aug 8, 2009. 5:16 PM [REPLY](#)

thanks



qballcat says:

Aug 14, 2009. 11:31 AM [REPLY](#)

of course they can,i was allowed to buy a propane torch and im 13 CANADA FTW



albylovesscience says:

Aug 14, 2009. 11:39 AM [REPLY](#)

my dad's getting me one on monday



albylovesscience says:

Aug 14, 2009. 11:38 AM [REPLY](#)

grrrr Canada rocks that's why BACONNNNNNNNY GOODNESS



qballcat says:

Aug 14, 2009. 11:41 AM [REPLY](#)

HELL YA BACON, also this may be stereotypical but the maple syrup (the real stuff) is amazing!!!!



albylovesscience says:

Aug 14, 2009. 12:13 PM [REPLY](#)

i did not mean to be stereotypical i just prefer Canadian bacon over any type including the pepperd one MMMMMMMMMMMMM



JamesRPatrick says:

Aug 28, 2009. 12:42 PM [REPLY](#)

But Canadian bacon is just smoked ham. It's not crispy or anything special. Oh well, I guess I'm just too used to American style. I'm waiting for my propane tank to run dry.



seltzer10 says:

Aug 13, 2009. 12:55 PM [REPLY](#)

hey alby i really hope you can get a soldering iron ,

hopefully people who read my comment about iron oxide know what im talking about



albylovesscience says:

thanks im so excited to enter the world of soldering and burning myself with 500 degree metal

Aug 14, 2009. 12:16 PM [REPLY](#)



xinx says:

unless he is pouring powdered rust into the crucible, I wouldn't be too worried. A bit of iron oxide residue won't hurt anybody. Oh and by the way, EVERYBODY on this site besides the stupid 13 year olds knows what Thermite is and how to make it, so don't act like it's forbidden knowledge.

Aug 14, 2009. 10:25 AM [REPLY](#)



history323 says:

dude im 13 and ive known what thermite is and how to make it since I was like 11! It is a mixture of iron oxide Fe_2O_3 (rust) and aluminum powder. When it is ignited the aluminum powder reacts with the O3 part of the rust in a highly exothermic reaction, the resulting product is molten iron. duh the mix is 76.3% iron oxide and 27.3% aluminum powder :)

Aug 18, 2009. 1:15 PM [REPLY](#)



Sora_1_2 says:

Hmmm well either someone uses google alot, or really needs to get laid.

Aug 19, 2009. 8:51 AM [REPLY](#)



seltzer10 says:

dear god whatever you do NOT use tools with any IRON OXIDE on them please it will end BADLY

Aug 13, 2009. 12:52 PM [REPLY](#)

nice instructable btw



justin55 says:

im not sure exactly what the cause was but last weekend i had a propane torch and i decided to heat a penny with it and discovered that it melts, then i did it on my wet carport and it exploded all over my face and it looks like i scraped up my face really bad, i could have been blinded easily and i recommend being very careful with water!!!!!!!

Jan 2, 2008. 6:26 AM [REPLY](#)



leebyruk says:

It's the same reason that you don't place water onto a grease fire. The water rapidly (very, very rapidly) turns into a vapor. When it turns to a vapor it expands and moves outwards. In the case of a very hot liquid, the water turns into water gas and pushes everything outwards. There is no need for a chemical reaction. Rather, the physical transition between phases is what causes the explosion.

Mar 24, 2008. 5:34 PM [REPLY](#)



snowdruid says:

actually if the grease or oil is hot enough the water decomposes into hydrogen an oxygen instantly ignites and creates a huge fireball might look cool but is very dangerous

Aug 7, 2009. 2:33 PM [REPLY](#)



leebyruk says:

Water decomposes into hydrogen and oxygen around 3,000C. Then plasma incineration.

Aug 7, 2009. 5:34 PM [REPLY](#)

Cooking oil (such as canola) top out around 500F. So it is simply a phase transition. As a solid or liquid transitions to a gas they expand and occupy much more room. When this transition and expansion happens very quickly it is termed as an explosions.

A bomb undergoes a chemical reaction that gives off heat and gas at the same time which makes it occupy more room very quickly. Gundpowder is a great example. Just a tiny bit can hurl a tank shell for miles.

Water thrown into a 500F fire immediately and rapidly expands into a gas. This transition throws oodles of burning oil into the air. Not a lot of fun to be around. But no chemical reaction is necessary.



Jonny Appleseed says:

some pennies melt because at some point they started making them out of zinc (someone correct me if I'm wrong) that explosion was probably the concrete exploding underneath the molten metal when it was heated, because there is still small amounts of water in the cured concrete...when you heat it, that water turns to steam, creating lots of pressure, eventually it explodes due to built up pressure, thats why you use so little water in the cement when you make this furnace, you also have to ram it in to eliminate any air pockets.

Jan 4, 2008. 3:37 PM [REPLY](#)



jasantimmer says:

In 1982 they switched from basically pure copper pennies to copper coated zinc. In fact, pre-1982 pennies are worth more as scrap copper than they are as pennies.

Apr 1, 2009. 12:42 AM [REPLY](#)



morgantheblack says:

1944-1982, US pennies were 95% copper. 82 and newer are a zinc blank, with a copper wash.

Mar 24, 2008. 3:33 PM [REPLY](#)

Wikipedia on Pennies



Shark500 says:
well put

Jan 5, 2008. 5:54 PM [REPLY](#)



Shark500 says:
ya probably shouldn't have done that. ;) chicks dig guys with scars.

Jan 2, 2008. 7:12 PM [REPLY](#)

be safe, be well, and thanks



idon says:

hahah true that, Hockey player here. split my chin open 4 times now. 9 stiches each time. funny thing is, i didnt realize i cut it till the EMT came up to me and was like, your going to need stiches. i looked in his mirror and i had blood all the way down my neck. happens evrey time.. i still get some hot *** biznatchesss

Mar 26, 2008. 3:30 PM [REPLY](#)



K.hall86 says:

shark,
this is a pretty sweet setup! I have a little bit of experience with melting aluminum and brass in a oxygen blown concrete forge. one thing that i see could help out would be to make a concrete lid. all the forges that i have used, incorporate a two to three inch thick donut shaped lid that can be lifted and swung away from the combustion chamber. with an insulating lid you will be able to reach melting temp much faster, and also provide a safety feature.

Dec 10, 2007. 8:19 PM [REPLY](#)

I think that if you produced a forge that used two torches, (one on the opposite side of the can) it would provide even heating and potentially higher temperatures.

Also, in my reading, i am not sure if i read correctly, but it appeared that you said to preheat the crucible, and then add the metal....this is, in my opinion, a bad idea. although it is not commonly heard of, Aluminum can create air pockets that will in essence pop like bacon grease in a hot skillet...all metal that is to be melted should be placed in the crucible, inside the forge before lighting. i only say this in caution....i have seen a raindrop sized spec of molten Al burn through a denim shirt and half an inch into a co-worker's back...1400 deg. F is no laughing matter.

aside from that, i do indeed like your design! and hope to see more from you.

P.S. when you get into the casting phase, be sure to preheat molds as well...hot molds allow for greater details.



Shark500 says:

Thanks. it's good to hear from people with experience. That's pretty much what instructables is about.

Dec 11, 2007. 4:33 PM [REPLY](#)

The only reason i preheat is because I'm afraid the aluminum will sink away all the heat especially with large pieces. I didn't know of the potential hazard so thank you for the tip.

My cousin also suggested the twin blower design but they are quite pricey.

He also suggested a lid but the handle I put on the crucible gets in the way.

If I had a welder I could make a better design but this is pretty much a minimalist (cheap) guide. lol I'll look into other possibilities to better facilitate a lid.

I really appreciate our input.

Thanks for the comment



NewB007 says:

I agree with K.hall86 about the preheating. If you want to add more aluminum after you already have a melt, though, you can place the new material near the heat and pre-heat the aluminum to drive out any moisture before adding it to the crucible. Give it several minutes, and add it slowly.

Aug 7, 2009. 4:15 PM [REPLY](#)



aqwiz says:

there's an instructable for an arc welder from three old microwaves you know :p

Apr 16, 2009. 7:14 AM [REPLY](#)



butthead95 says:

yeah just make 2 indents in the lid for the hndles

Jan 30, 2009. 6:28 PM [REPLY](#)



srilyk says:

Use your cardboard method to create "bumps" to put over top of the handles - that will get you the best of both worlds.

Dec 14, 2007. 10:37 AM [REPLY](#)

You're right about wanting to eliminate moisture -- even one small drop (even, say trapped soda), if it's *below* the melting aluminum, will most likely create a large explosion firing molten aluminum, slag, and most likely bits of forge everywhere.

I've heard of carts being blown to pieces and wheels thrown through/into metal walls. So be careful!

I'm not sure how your speed quench will affect the strength (or weakness) of the aluminum - often times too fast will create metal that's brittle -- weakened by the thermal shock. And then there's the possibility for slight explosions - you're right about it being dangerous, but it can also negatively affect the metal - I'd do some research on the topic before continuing with my impatience ;)

Great Instructable though!



fgleich says:

From what I've read, letting the metal cool normally makes it really hard (Aluminum of course), and quenching it suddenly like that softens it. This is the opposite of steel

Apr 23, 2009. 5:03 PM [REPLY](#)



Shark500 says:

meh, it's going to be melted down again anyway.

We use full face shields and do cover the crucible so i assume the damage would be minimal. we haven't had a blowout yet but... meh. que serra serra.

thanks for the comment

Dec 14, 2007. 3:19 PM [REPLY](#)



solidification says:

"Smelting" is a little different from what you are doing. Take the "S" off and you've got it. (Smelting is more related to reducing the element from its mineral compounds.)

Some words of advice:

you can preheat the metal or just stick it into your "crucible", its all the same. (although you might as well just put it into the "crucible" so it retains the heat a little better rather than acting like a heat sink)

dont worry about the Al sucking away heat while its in the crucible. It all needs the same amount of energy to melt.

When I charge a melt in the #30 I use, I place a very small amount of Aluminum(356) into the base of the crucible so its not touching the sides at all. I allow this to become liquid after about 10-15 min and add the rest of the charge so long as it does not touch both walls at the same time. The advantage to letting a small amount become liquid before adding more metal, is the liquid has greater surface contact with the new metal. The liquid Al has much better thermal conductivity than the hot gasses in the crucible, such that it aids in heating the rest of the added charge.

As for adding more metal.. do not drop/plop metal into the crucible. use some longer tongs to feed it in. This will avoid spatter.

Also, the reason for not allowing pieces to touch the walls of the crucible is due to the thermal expansion of the metal. In a ceramic crucible, the added stress on the walls leads to deterioration of the walls with cracking and eventually failure. (a steel cup might not have as much of an issue with that).

As for the crucible you have, you might not realize it, but you are transferring iron from the can into the liquid Al. It might seem strange because its not hot enough to melt steel, but diffusion happens even at room temperature(just... really really really slowly). At warmer temps like 660C, iron can diffuse quite a bit more rapidly.

for future considerations, you might want to stay away from galvanized steels*. Placing them into the furnace is bad for two reasons: 1. Safety. Zinc Oxide is pretty bad for you. 2. Zinc diffuses very quickly into the steel (faster than you can burn it off if you tried). there is a degree of LME which takes place, but its more about the brittle intermetallics that form and are prone to failure.

*you can easily remove the zinc with warm/hot lemon juice or vinegar if you can stomach the smell.

A propane setup is your best bet for DIY home stuff. it is pretty cheap still and create heat quickly. Propane + small blower will get you nicely into the superheating range for bronze.

a welding unit (oxy/acet, stick) is a great investment for someone who wants to create and explore science and make stuff. MIG/TIG are nice things too, but perhaps not worth the investment for you just yet. (it is difficult to justify \$500 or \$1500 on something you might not use very often) (and oxy/acet and stick offer a wide variety of applications... even joining aluminum or bronze castings...)

You could save up and drop money into a manufactured furnace and probably save some \$\$ in the long run... BUT... nothing beats those evenings of running your own backyard furnace (the fifth or sixth version of that furnace probably), roasting some marshmallows and sitting back listening to that baby roar as the sun sets.

Keep it up.

Dec 13, 2007. 10:54 PM [REPLY](#)



Shark500 says:

Wow thanks for the info..

How does the iron in the aluminum affect it?

How much does a professional furnace cost (about)?

This is a lot of useful information. I've just started my journey into the world of metal smithing so this very valuable to me. This is one of the best things about instructables. That people can share ideas and learn from more experienced people.

Thanks for the info.

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