

Coffee Can Aluminum Foundry

by **2k4u** on May 24, 2008

Table of Contents

Coffee Can Aluminum Foundry	1
Intro: Coffee Can Aluminum Foundry	2
Step 1: Materials and Tools	2
Step 2: Making the furnace shell	3
Step 3: Making the forced air blower assembly	3
Step 4: The Crucible	4
Step 5: Using the furnace	4
Related Instructables	6
Comments	6

Intro: Coffee Can Aluminum Foundry

Here I'll show you how to make a furnace for melting aluminum. The materials can be bought from Wal-Mart and your local hardware store. Cost to build furnace alone: \$23 Cost of furnace and materials + tools to operate it: \$50

*** 5/31/09 *** I will be making a new, revised charcoal foundry instructable as soon as I get some spare money. This setup is adequate, but there's always room for improvement.



Image Notes

1. The complete furnace

Step 1: Materials and Tools

Required to build furnace...

- One normal sized coffee can (6")
- One hair dryer with a cool mode and preferably two speeds
- Duct Tape
- One 1.5" x 10" galvanized/black iron pipe nipple
- One soup can
- Tin snips

Required to operate furnace...

- Long tongs or pliers to grip crucible
- Steel spoon w/ holes in it
- Heavy leather work gloves
- Lighter Fluid
- Charcoal
- Lighter



Image Notes

1. Soup Can
2. Duct Tape
3. Tin Snips
4. Hair Dryer



Image Notes

1. Steel spoon w/ holes
2. Thick leather work gloves
3. Long Pliers



Image Notes

1. Kingsford regular lump charcoal



Image Notes

1. Lighter Fluid

Step 2: Making the furnace shell

Using the tin snips, cut out a square/circle (square is easier!) in your coffee can. Make sure it's big enough to accept your size pipe nipple. (In my case 1.5")



Image Notes

1. Tin snips for cutting metal
2. Hole where pipe nipple will go to supply air

Step 3: Making the forced air blower assembly

To make your blower, take the duct tape and connect the hair dryer to one end of the iron pipe nipple. Turn it on and check for leaks.

Next, use a little piece of tape to make sure the cool button will be held down constantly.



Image Notes

1. Cheap hair dryer with a cool button and low/high speeds



Image Notes

1. Cool air button duct taped down

Step 4: The Crucible

Our crucible here is simply a tin/steel soup can. They're cheap/free, they melt at a higher temperature than aluminum, but they're one time use. Don't attempt to use it twice or it will melt through spilling your precious aluminum on your furnace.

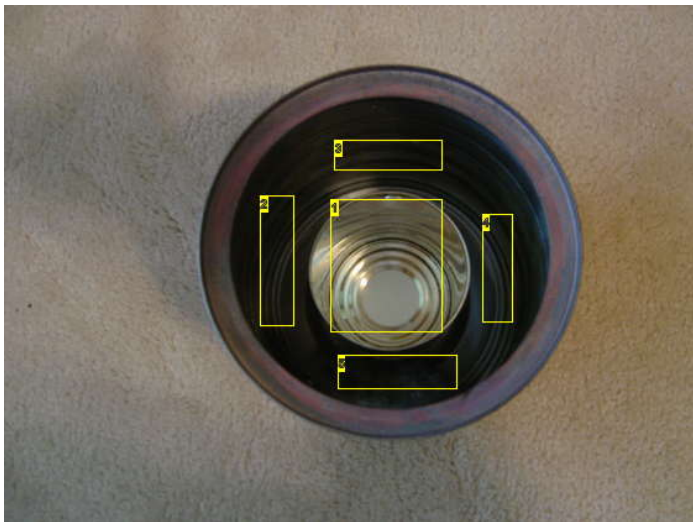


Image Notes

1. Soup can crucible
2. Charcoal goes here
3. And here
4. And here
5. And here

Step 5: Using the furnace

I could make another instructable on using the furnace and melting aluminum but I'll be nice enough to include it in this one. :)

Starting it...

1. In the area between the outer shell (coffee can) and the crucible (soup can) put in your charcoal.
2. Drench it in a generous amount of lighter fluid.
3. Light it.
4. Wait for the lighter fluid to completely burn out before you turn on your blower.
5. The furnace is now ready to use.

Melting Aluminum...

A little info on metalcasting:

Aluminum cans tend to oxidize and burn rather than melt because they are so thin. If possible, find another source of aluminum such as lawn chair tubing, roof flashing, etc. If, like me, you use soda cans, crush them flat first to reduce surface area and they'll melt fine but with a lot of slag.

Soda cans per pound of aluminum they'll give you:

- 12 cans = 1/3 lb.
- 24 cans = 2/3 lb.
- 36 cans = 1 lb.

-Those are not exact numbers, but rather close.

<http://www.instructables.com/id/Coffe-Can-Aluminum-Foundry/>

<http://www.backyardmetalcasting.com> It's the best website I've seen for metal casting, building furnaces, etc.

1. When the furnace is ready and the crucible is glowing red hot, put in your aluminum.
2. Wait for it to fully melt and get very hot so it will all pour it and not remain in your crucible.
3. I pour my aluminum into mini-muffin tins to make ingots, which can be later re-melted.

Warnings...

-The furnace gets VERY, VERY hot during operation. ALWAYS use the leather work gloves.

-Before melting aluminum, let the can heat red hot to make sure it has an oxide coating. If your soup can does not, the aluminum could eat through the can. Getting an oxide coating is as simple as getting the whole thing to red heat. It will take on a dull blue gray color when ready.

-Make sure there is NO water in your source of aluminum. This could result in molten aluminum explosions.

-Use common sense.

-Liquid aluminum is hot enough to burn through many things.

-Keep your hair dryer away from the furnace during operation. I do not fully insert the iron pipe nipple into the furnace because it blows too much air (yes, on the low setting) and it gets too hot. Just aim your blower at the hole you made and it will get very hot. Trust me.

-However, if you choose, you can fully insert your blower into the furnace if you desire that much heat or your crucible requires it. It won't kill your hair dryer as long as you have a 10-inch or more length of iron pipe nipple between the furnace and hair dryer.

-I used a galvanized iron pipe nipple because that's all Home Depot had in stock. I HIGHLY advise against it. When galvanized things reach a certain temperature, they give off extremely toxic fumes which can give you Metal Fume Fever. Use black iron if possible. If you use galvanized, you have 2 options. Don't stick the pipe directly in the furnace, or heat the whole thing up and burn off the coating. If you choose the latter, stay away from it while it's burning off.

Other...

I was thinking this could be used as a mini-forge too. Just don't use a crucible, keep the forced air, and you could heat metal with it. While I don't think it will get it hot enough to actually forge something, I know for a fact it can be used to anneal and harden steel. I make small knives out of shaped and sharpened files with the teeth ground off, and it would work for those. I'll post here in this paragraph if I ever do that.

-Thanks for looking! Watch for more Instructables over time.

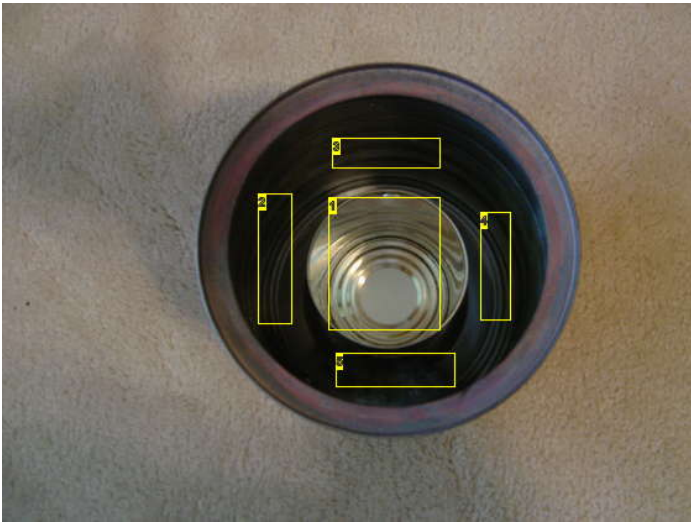


Image Notes

1. Soup can crucible
2. Charcoal goes here
3. And here
4. And here
5. And here



Image Notes

1. Mini sized muffin tin

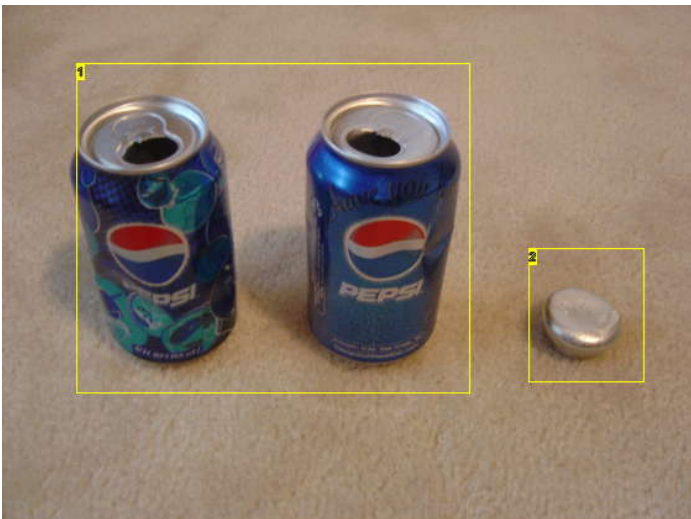


Image Notes

1. Aluminum soda cans, while they do create a lot of slag, are great for casting small things if you can get enough of them. The aluminum in soda cans is also rather shiny compared to other types of aluminum.
2. 3/4 of a full ingot, I dropped a piece of charcoal in my aluminum and had to stop D:

Related Instructables



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



Aluminum Foundry by StaticPhocus



aluminum ring (Photos) by cooldude01



How to make a mini forge out of an Altoids tin by steampirate



Waste-Oil Forge and Foundry by notjustsomeone



Press Aluminum Cans into Ceiling and Wall Tiles by robbtoberfest

Comments

50 comments

[Add Comment](#)

[view all 108 comments](#)



the pro says:

i don't know much about metal works but so why do you need the forced air?

Jul 15, 2008. 7:37 PM [REPLY](#)



n0ukf says:

The forced air increases the heat of the fire, a forced draft rather than natural draft gives more combustion air to the fire. This is part of the same reason blacksmiths have blowers on their forges. As the coal cooks down to coke, it needs that draft air just to stay burning.

Jul 16, 2008. 4:47 PM [REPLY](#)



nutsandbolts_64 says:

u mean the oxygen?

May 29, 2009. 11:46 PM [REPLY](#)



n0ukf says:

Yes, the oxygen is what makes it burn, but air is about 78% nitrogen and only 21% oxygen.

Jun 10, 2009. 11:36 AM [REPLY](#)



nutsandbolts_64 says:

if someone here came up with a way to make pure oxygen, please make an instructable on it. It will help w/ the smelter (can it melt iron by blasting pure O2 into the fire ?)

Aug 16, 2009. 2:03 AM [REPLY](#)



strangebike says:

easiest way is to use hydrogen peroxide from the chemist (you use it to bleach your hair) and then add chopped liver as a catalyst to produce a lot of O2. the higher the vols the more gas produced. If my basic school chemistry is not in error!

Aug 17, 2009. 6:58 AM [REPLY](#)



2k4u says:

While meat and H2O2 will produce some oxygen, it's a very small amount. I saw that experiment in a science fair book. It would never produce enough O2 to fill a balloon, much less help a fire. Common drug store hydrogen peroxide is a mere 3%, which is pretty bad for most experiments...If you have a barber/beauty license, you can get around 10% for bleaching hair...if you find the right chemical supplier, you can get gallons of 20% - 35% for cheap. One of the best chemical ways of making O2 is decomposition of H2O2 by adding MnO2, manganese dioxide. If you can't buy some from a chemical supplier, you can take it out of zinc-carbon battery. But for hobby scale metal melting, you don't need any oxygen. It would likely get too hot and burn up whatever your foundry is made of.

Aug 17, 2009. 9:50 AM [REPLY](#)



Grey_valentine says:

You don't need a beauty license to buy it. I have my cosmetology license but have never needed it to buy anything, and a barber, well they aren't allowed to do any chemical services with their license anyway. A beauty supply store not affiliated with a salon would be your best bet to pick up a lot for cheap.

Jan 21, 2011. 1:36 PM [REPLY](#)



nutsandbolts_64 says:

just wondering if I can use this on ceramic foundries.

Aug 18, 2009. 5:28 AM [REPLY](#)



strangebike says:

yeah I knew there was a another chemical based way but couldn't remember it. thank you for jogging my memory. You are probably right lots of oxygen is going to make one hell of a pool of slag on the floor lol he he

Aug 18, 2009. 1:21 AM [REPLY](#)



nutsandbolts_64 says:

wonder how you'll clean up the mess before it puts a black spot on the ground, haha:))

Aug 18, 2009. 5:32 AM [REPLY](#)



n0ukf says:

Pure O2 is very dangerous. Blacksmith forges use forced air (not pure O2) all the time to soften iron for working into the desired shapes. If you leave it in the forced-air fire too long, it starts melting/burning away. Just before you get to that point, the iron is just soft enough for forge welding.

Jun 18, 2009. 12:54 AM [REPLY](#)



collard41 says:

if you use it on cold setting the air is denser, and therefore you can get more air in the furnace at once and it will burn MUCH hotter:

Sep 20, 2008. 6:59 AM [REPLY](#)



KyleHarima says:

I would highly suggest not using galvanized metal on any surface of a forge. For I looked into the case of Paw Paw Wilson, who died heating galvanized metal.

Sep 12, 2010. 6:46 PM [REPLY](#)



tomtortoise says:

what if i am far away and hold my breath when getting close

Dec 2, 2010. 1:39 PM [REPLY](#)



fragmaster4 says:

Just a safety precaution, Aluminum gives off harmful vapors when melted; Wear some kinda mask at the least.

Jun 2, 2010. 11:23 AM [REPLY](#)



flatcurve says:

The slag is just the paint and PVC lining from the can (and crucible). Aluminum used in soda cans is actually very pure

Mar 10, 2009. 1:20 PM [REPLY](#)



chirman23 says:

I agree but you dont get very much for one can and it is easier to find scrap aluminum.

Feb 22, 2010. 11:53 AM [REPLY](#)



chirman23 says:

The coffee can will eventually burn away. If this is something that you are going to do many times I advise pouring refractory cement between the outer edge and the center where the crucible and coal is held.

Feb 22, 2010. 11:52 AM [REPLY](#)



junits15 says:

what do you do with your aluminum?

Sep 24, 2009. 6:02 PM [REPLY](#)



thepelton says:

Lots of things you can do with the molten metal, such as casting. When I was in high school, we melted some aluminum in a metal shop, and cast some small items by pouring it into molds carved in brick. What occurred to me recently is that I was reading about soapstone, which is easier to carve than brick, and capable of standing a lot of heat. It could be carved into molds in which to pour the molten aluminum.

Oct 16, 2009. 10:26 AM [REPLY](#)

8>)
Don



thepelton says:

You could put your mold in a box surrounded by an inert heavier-than-air gas such as Carbon Dioxide to stop oxidation.

Oct 16, 2009. 10:28 AM [REPLY](#)



Notbob says:

but wouldn't it start to oxidize as soon as it was taken out of the inert heavier-than-air gas and exposed to oxygen?

Jan 10, 2010. 8:46 AM [REPLY](#)



thepelton says:

Well, yes, but it would be slow, and incomplete, much like copper turning green, instead of fast, like burning wood.

Jan 11, 2010. 10:17 AM [REPLY](#)



Notbob says:
do you use anything to "grease" to muffin pan, or is sticking not a problem?

Jan 10, 2010. 8:45 AM [REPLY](#)



thepelton says:
Aluminum, when melted, is very oxygen hungry. Have you thought about how to prevent that?

Apr 15, 2009. 9:51 AM [REPLY](#)



nanoassembler says:
You can minimize oxygen exposure by covering the crucible. It will limit the aluminum's oxygen supply. Just use something that won't be blown off by the air going into (and coming out the top) of the furnace.

Oct 15, 2009. 7:48 AM [REPLY](#)

Caveat : Every time you open the lid, the aluminum's oxygen supply will be replenished.
Solution : If you have to melt a lot of aluminum, cut a hole in the lid large enough (but not too large) to add more metal as it melts in the crucible. Some oxygen will still flow into the crucible through the hole, but it will be much much less than without a cover.



nibbler125 says:
how do you keep the aluminum from mixing with oxygen and oxidizing

Sep 13, 2009. 7:55 PM [REPLY](#)



trf says:
Quite simple, you don't keep it from oxidizing. Aluminum doesn't have a huge issue with that and if you heat it up, as soon as the last piece hits molten stage, give it 3 mins to achieve pouring temperature and pour. Don't wait any longer. It is a MUCH different story with iron. If you are really set on making sure nothing oxidizes, you will need flux. Limestone and Oyster shells work great for flux on iron. So I assume the same would work for aluminum.

Oct 3, 2009. 6:14 AM [REPLY](#)



davidgir123 says:
There is really no info on the slag removal part. I assume that is why we need the steel spoon w/ holes. But are there any better ways?

Aug 25, 2009. 6:17 PM [REPLY](#)



A good name says:
Yeah my question is, is it safe? would the lighter fluid not explode?

May 25, 2008. 8:32 PM [REPLY](#)



2k4u says:
Yes, with proper safety equipment and common sense, it's quite safe. Just read the warnings, do this in a 100% non-flammable area (I do this in a large sand area) and wear leather gloves at all times. Safety glasses aren't a bad idea either but I never use them. The lighter fluid will not explode; this is the same as lighting your charcoal grill and the same as using a grill, just much much hotter. Lighter fluid simply does not have the power to explode or blow anything up here for our uses, even if you allow it to vaporize and then light it, you'll just get a big poof.

May 25, 2008. 9:48 PM [REPLY](#)



lasermaster3531 says:
don't use zippo fuel! I have made a tennis ball mortar that can hurl a tennis ball 300 ft in the air. 1/2 teaspoon ronsonol lighter fuel.

Aug 10, 2008. 7:34 PM [REPLY](#)



2k4u says:
Zippo's lighter fluid would work just fine, except I'd rather use it in my zippo...And it's not meant to light charcoal. It's just much more refined lighter fluid (naphthalene) so it burns cleaner.

Aug 15, 2008. 4:06 PM [REPLY](#)



nodrog19 says:
Naphthalene is a solid.

Apr 17, 2009. 5:42 PM [REPLY](#)



hsvenforcer says:
Correct. Zippo fluid is Naphtha.

Jun 12, 2009. 12:01 AM [REPLY](#)



lasermaster3531 says:
also correct: do **NOT!** use zippo fuel!!!! it will explode! I have used this stuff and it is as bad as gasoline in a semi-enclosed space like a furnace. think about the air pockets between the charcoal pieces. also, zippo fuel is a much more volatile form or maybe an entirely different molecule than charcoal lighter fluid.

Jun 15, 2009. 6:32 PM [REPLY](#)



Crazy Pyro says:
Hello, I was wondering if the soap can composition messed up anything. The inner lining is usually plated with tin. Would the tin contaminate anything. (If so, is there a way to get it out short of electrolysis) Also, did you have to specially prepare the muffin tins so that the aluminum didn't stick to it? Thanks

Nov 4, 2008. 4:09 PM [REPLY](#)



hsvenforcer says:

Aluminium is lighter at melting point. Tin is 6.99 g-cm³ and aluminium is 2.375 g-cm³. So worst case the tin would sink. Just burn it off first, much easier

Jun 12, 2009. 12:10 AM [REPLY](#)



2k4u says:

I had those same questions when I started. Tin melts at a very low temperature, and it burns off before you put the aluminum in. It does not contaminate anything. But again, if you really start melting stuff, get a "real" crucible :) And as for the muffin tin, don't get an aluminum one, or they'll obviously melt when you pour your ingots. Most come with a non stick coating for your muffins, not aluminum Therefore when you pour the first time, it burns off and leaves a nasty colored residue on your ingots. Just re-melt and pour next time. By now the coating is gone, leaving bare metal (usually steel I think?) which will rust. It doesn't hinder the process.

Nov 4, 2008. 6:01 PM [REPLY](#)



Crazy Pyro says:

Ok, thanks...one last question, if you heat the muffin tins to red hot, the coating will burn off right?

Nov 4, 2008. 6:37 PM [REPLY](#)



2k4u says:

Definitely, yes. If you want to get nice ingots the first time, I guess that's an option. Red hot is a little too hot though, and I would be afraid it would slightly weaken it. Eventually I think muffin tins would break, but I have to keep using them since the only other option is to weld together eighth or quarter inch steel together in a pattern to make molds. Muffin tins breaking = LONG term, not after a few uses. So you can pretty much disregard those last few sentences, it's just informational.

Nov 5, 2008. 1:54 PM [REPLY](#)



Crazy Pyro says:

Ok, thanks again.

Nov 5, 2008. 3:42 PM [REPLY](#)



evanwehrer says:

How do you get the slag out, and would this work instead of a blower, and can use use nichrome wire to light the lighter fluid?

Nov 6, 2008. 6:40 AM [REPLY](#)



hsvenforcer says:

I use a cheap tin ladle to get the crud from my lead.

Jun 12, 2009. 12:04 AM [REPLY](#)



bwpatton1 says:

Cool Website! Pretty much all the cool websites I get are from Instructables. United Nuclear Etc.....

Jan 13, 2009. 1:47 PM [REPLY](#)



evanwehrer says:

Would this work? here

Nov 6, 2008. 6:59 AM [REPLY](#)



cowscankill says:

If it's as strong or stronger, than It will work.

Nov 12, 2008. 1:23 PM [REPLY](#)



iPodGuy says:

Would I be able to use this to make lead ingots?

Mar 3, 2009. 11:00 AM [REPLY](#)



hsvenforcer says:

My dad uses a cut down bbq gas cylinder as the melting pot. Just make sure you purge the gas before cutting the bottle.

Jun 12, 2009. 12:02 AM [REPLY](#)

[view all 108 comments](#)