

Quick and cheap aluminum melting furnace setup

by [robtoberfest](#) on March 18, 2009

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Intro: Quick and cheap aluminum melting furnace setup

This Instructable shows a quick and cheap setup to melt a few batches of aluminum for casting before the thin metal equipment starts to break down. Actually the 5-gallon bucket furnace will last quite a long time, over a dozen uses easily. This uses BBQ charcoal as the fuel and a hair dryer as the blower, it'll melt a small batch of aluminum in about 10 minutes. Most of the materials to build this can be found in dumpsters; the only cost here is the charcoal fuel, duct tape, and the \$1 yard sale hair dryer. Recycle old lawnmower parts, computer/stereo parts, and beer and soda cans to make awesome new things with them.

For the furnace, two five gallon metal buckets (with lids) were used, a piece of 3-inch stove pipe, hair dryer, and of course, some duct tape.

For a crucible (the little bucket that holds the melted metal), a 16 oz propane bottle was used; the top was cut off and some bolts were added for grabbing the crucible with the tongs.

I made some basic tools with some scrap steel from an old bed box spring. You'll need tongs for the crucible, some kind of shepard's hook to tip the crucible when pouring, and a plain rod with a little bend at the tip for poking things and skimming out the dross (impurities in the aluminum).

Use of this equipment shown is dangerous because of extremely high temperature molten metal, fumes and smoke, etc. HOT! Use caution and be safe by wearing leather gloves, face protection, and other protective clothing. Do this outdoors and use it when it's a little windy so the smoke and fumes quickly dissipate, also use this during dry conditions because dripping molten metal on moist surfaces can cause little hot metal explosions. I'm not liable for any injuries you may occur using the equipment and techniques shown here.

Read, read, read lots of metal casting stuff before starting.

[Casting Aluminum at submarineboat.com](#)

[Home Foundry](#)

[BackyardMetalcasting.com ...Melting and casting metal yourself](#)

Here's a silent movie of the foundry at work.



Image Notes

1. hooked tongs for lifting crucible.
2. Crucible made from a camping size propane bottle.



Image Notes
1. Tape the cold switch.



step 1: The furnace

Using tin snips, cut a hole in the bottom side of one of the buckets to fit the 3 inch diameter stove pipe.

The hair dryer needs to have the "cold" button taped for use as just a blower; tape the hair dryer into the stove pipe, then insert the pipe into the bucket . Air flow is the most important part of this, I first used a little 1.5 inch pipe, but it just wasn't enough air volume to get the charcoal really nice and hot.

The bottom of one metal bucket is cut off about 2 inches from the bottom; a lot of holes are punched in center 6 inches of that piece and it's inserted into the main bucket as a burning base.

Keep the lids, one lid should have a 3 inch vent hole in it for burning and the other lid should be left unchanged for snuffing out the fire.



Image Notes
1. punch holes in the center area only to keep the fire focused there.



Image Notes
1. Vented lid



Image Notes
1. Tape the cold switch.

step 2: Crucible

This crucible might last half a dozen uses, but it's cheap and easy enough to make several of these.

Use a hack saw and cut off the top of a little camping propane tank (make sure its empty first).

Drill holes near the top of the cut tank for inserting some large bolts; these are for picking up the crucible.

Use a hammer and knock a pouring lip into the edge of the crucible.



Image Notes
1. hooked tongs for lifting crucible.
2. Crucible made from a camping size propane bottle.

step 3: Tools

Tools, to make them you'll need a bench vice and some gorilla power bending skills. Just bend until things fit nice. Use something other than aluminum, like steel rod or conduit pipe.

These are the tools needed:

- Hook tongs for lifting the crucible by its bolts.
- A shepard's hook for tipping and pouring the crucible
- A dross stick for skimming out the metal impurities.

Extra tools to have handy are:

- Grill tongs
- Large adjustable pliers

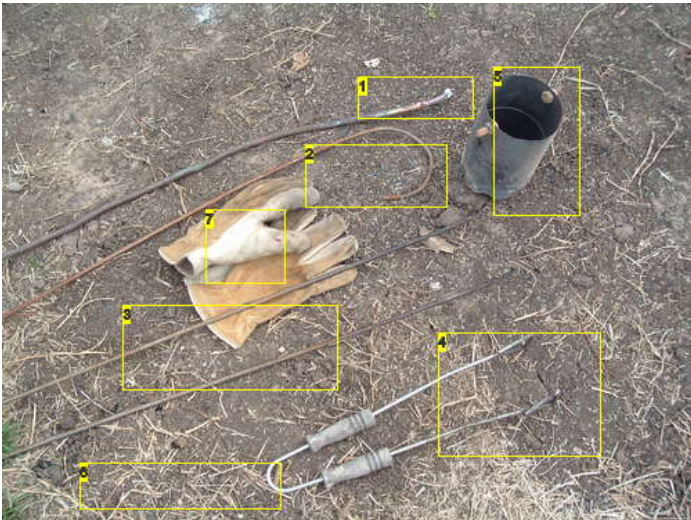


Image Notes

1. piece of old copper pipe for removing dross.
2. Shepard's hook for tipping crucible.
3. Hook tongs for lifting crucible.
4. Grill tongs for lifting hot things in general.
5. crucible
6. Missing from this picture is adjustable pliers for grabbing hot things too.
7. Have leather gloves at all times.

step 4: Safety and use

- Wear leather gloves, long sleeve non-synthetic clothing, preferably leather and thick cotton and leather boots, no flip-flops no matter how fun it sounds to have a hole fried into your foot. Also a hat to keep embers out of your hair.
- Have a garden hose charged and ready for fires.
- Work over dry dirt.
- Have something ready to pour into; a mold in green sand for casting or regular dry sand when foam casting; many backyard casting people use steel muffin molds to make nice little ingots.
- The first use of this is the stinkiest because of all the paint burning off the bucket and crucible, after that it's not so bad. It's best to do this on a slightly windy day.

To operate this, fill the furnace 1/3 full with charcoal and light it like you're going to cook some hot dogs. Wait until the coals start to turn grey on the edges, now fire up the blower and set the crucible in there with chunks of the aluminum. Cover the furnace with the vented lid, then grab a chair, a drink, and wait. When the aluminum is liquid, skim the floaties off the top with the hooked metal rod until the molten aluminum looks like a shiny pool of mercury. Now it's ready to pour.

Have all the safety gear on, turn off the blower, remove the lid and use the tools to grab the crucible and pour.

In the picture below, all my sand got wet just before I wanted to melt some metal, so I used clay kitty litter for a quick lost foam casting test . I don't recommend kitty litter; see all the lumps and pieces still stuck in the cast. Lost foam casting is using a piece of shaped styrofoam stuck in dry sand, then pouring in the molten metal which burns out the foam and takes its place.

Lost foam casting at submarineboat.com

Have fun, I know I love it and will probably make a higher quality setup sometime.



Related Instructables



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



Aluminum Foundry by StaticPhocus



Press Aluminum Cans into Ceiling and Wall Tiles by robbtoberfest



Build Your Own (metalworking) Lathe - Part I by corradini



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The Aluminum Foundry by ClipTheAnarchist


Comments

34 comments [Add Comment](#)


 **walfers1** says: Sep 24, 2009. 7:31 AM [REPLY](#)
does it work for steel =>


 **robbtoberfest** says: Sep 24, 2009. 3:28 PM [REPLY](#)
No, because the bucket is made of steel. You'll need a much better set up for steel and over 1000 degree F more heat. I think 2500 degrees for steel.


 **Panchz** says: Sep 11, 2009. 5:29 PM [REPLY](#)
Very useful guide, personally it worked great, and now im making my own aluminum stuff :)


 **kb3guy** says: Sep 4, 2009. 12:01 PM [REPLY](#)
Hi,
Thanks for posting the tutorial. I've been trying to devise something of this ilk myself.
Just a safety observation --- I noticed you suggested using galvanized pipe for an airfeed. Getting galvanized pipe very hot (very hot being about 1665 degrees F) is very dangerous, because the zinc will vaporize at that temperature. Vaporized zinc can cause some very serious health problems, including death. (see <http://www.anvilfire.com/iForge/tutor/safety3/index.htm>). I think perhaps black iron would be a much better alternative, especially for more high powered furnaces.
If someone wanted to still use galvanized pipe, you can remove the galvanization by a bath in muriatic acid. How to make sure you've successfully etched all the zinc off is beyond what I've researched, however.

 **robbtoberfest** says: Sep 4, 2009. 7:27 PM [REPLY](#)
Thanks for the pointer! Safety with the fumes is essential.

 **t4kitty** says: Jul 30, 2009. 8:46 PM [REPLY](#)
Can u use aluminum cans to meal down whole? also can you use coal


 **trf** says: Aug 27, 2009. 9:25 PM [REPLY](#)
Heres 1 hint for you..If you MUST use alluminum cans, first use something a little thicker first. Once you have a good pool going from the thicker stuff then switch to alluminum. It resists oxidation as it isnt exposed as long as starting with the alluminum can for a tiny pool. Secondly, To further reduce oxidation, crush the cans flat first. Sincerely, TRF!


 **t4kitty** says: Jul 31, 2009. 10:29 AM [REPLY](#)
does the dross stick have to be copper and also how do you light the charcoal

 **t4kitty** says: Jul 31, 2009. 3:01 PM [REPLY](#)
one last questin can i use my half horse blower or is that going to get it to hot

 **robbtoberfest** says: Aug 2, 2009. 6:52 AM [REPLY](#)
That should work, my shop vac has replaced the hair dryer.

 **robbtoberfest** says: Jul 31, 2009. 10:49 AM [REPLY](#)
No, just a hooked metal rod to skim the "fat" off the surface.

 **robbtoberfest** says: Jul 31, 2009. 10:18 AM [REPLY](#)
Yes and yes. The cans will have a lot of dross from oxidizing and when melted from the paint on and inside the can. Its usable, just not ideal like chunks of aluminum from a lawn chair or engine. Coal is better than charcoal because it lasts longer and burns hotter.

 **astrong0** says: Aug 13, 2009. 10:17 AM [REPLY](#)
why cold you not use the wet sand... oh never mind you were probably worried about steam explosions



robbtoberfest says:
yup.

Aug 15, 2009. 3:43 PM [REPLY](#)



skuitarman says:
can I use this as a kiln?

Jul 5, 2009. 9:44 PM [REPLY](#)



robbtoberfest says:
No, I don't think so; the charcoal lasts only up to 25-30 minutes.

Jul 6, 2009. 5:32 AM [REPLY](#)



sharlston says:
once i made a furnace like yours but i used a footpump instead of the hair dryer just so i didnt waist electricity

Jun 14, 2009. 3:42 AM [REPLY](#)



robbtoberfest says:
It's not wasting too badly, just a little inefficient; adding the insulation to this would cut out the waste. I don't think a footpump has enough output on this because the bucket is so inefficient.

Jun 16, 2009. 11:06 AM [REPLY](#)



arirang777 says:
okay, how did you get the mini "propane" camping tank opened up? Obviously it was empty, but still it may be a hazard to use a saw to open it. What's your trick?
Thanks in advance!

Apr 20, 2009. 7:04 PM [REPLY](#)



robbtoberfest says:
I put the tank in a vise and used a hack saw, no sparks or anything. Beware of the residual propane stink.

Apr 21, 2009. 9:42 AM [REPLY](#)



arirang777 says:
Once I needed to have some weights done for scuba diving, so I used lead from old sewage pipes to make them. I used a simplistic sardine can and a torch, but if I had seen your instructable, OMG, it could have been waaaaaaaaaaaaay more fun. I think lead may have bigger negative impact on environment than aluminum. Great description. Thanks!

Apr 20, 2009. 7:14 PM [REPLY](#)



JohnNNJ says:
I've used hair dryer's to dry sneakers and other stuff. The trick is always to make sure the air flow isn't restricted too much to cause the dryer to over heat and shut down. Has that been an issue when using one in this way?

Apr 16, 2009. 8:30 PM [REPLY](#)



robbtoberfest says:
No issues so far. I usually place a bucket lid under the dryer to keep debris from sucking in.

Apr 18, 2009. 10:24 AM [REPLY](#)



Spokehedz says:
Why the cold air? It would seem that hot air would help the combustion of the fuel to get a hotter burn... or maybe that would be too hot, and would melt the furnace?

Apr 16, 2009. 8:22 AM [REPLY](#)



robbtoberfest says:
Cold air is more dense and oxygen loaded, also your not wasting 1500 W for the heating element of electricity just to blow air. This design of the furnace actually stays cool on the bottom from the incoming air and keeps the grate from burning out.

Apr 16, 2009. 8:35 AM [REPLY](#)



Spokehedz says:
Ah. That makes sense.
I have seen these made out of concrete, but a metal bucket is much easier to comeby.
thanks for the info!

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



Adam Casio says:
It looks great and I cant wait to make one. Thanks a ton.

Apr 4, 2009. 8:59 PM [REPLY](#)



daedric says:

Mar 22, 2009. 5:14 PM [REPLY](#)

Great Great! 5/5 I want to comment as a fellow caster than you would be better off with welding gloves instead of leather glove because they travel farther up your arm. The furnace wont be as efficient with out proper isolation, most hobby furnaces ive seen are lined with a high temperature paste to protect the outside. If your only interested in using it a few times then this is simple and easy! If you want to have a hobby I would say buy a better one. I recommend this site here: <http://www.backyardmetalcasting.com>



robbtoberfest says:

Mar 24, 2009. 9:04 PM [REPLY](#)

Thanks, I'll probably upgrade if I get really addicted to this. My problem is I want to do so many different projects, I don't know if I'll make time to build it the better way.



daedric says:

Mar 25, 2009. 5:32 AM [REPLY](#)

yea, ive had time like that to



robbtoberfest says:

Mar 24, 2009. 9:02 PM [REPLY](#)

So far so good on this; I've used the crucible 4 times and it seems to be holding fairly strong. I've used the furnace with a cast iron crucible about 8 times without much damage to the furnace. If I can get a dozen or more uses out of this, I'll be very happy.



cotton says:

Mar 22, 2009. 11:24 AM [REPLY](#)

i havent made one me an my dad might make one these are very useful since i have all those old computer casers an i think it would work better using merly hhos gs as the fuel



rimar2000 says:

Mar 19, 2009. 12:26 PM [REPLY](#)

Good work. ¿What do you do with the aluminum?

In the step 3 photo there are some things similar to gloves, without a reference.



robbtoberfest says:

Mar 19, 2009. 9:09 PM [REPLY](#)

As probably with many beginners, right now I'm making aluminum ingots and half successful casts. I'm trying to cast some dies for a small sheet metal press.
