Dietrich’s Mini Metal Foundry

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Project Area: **Science, Engineering, and Technology**

Class : **10630:Science, Engineering, and Technology**

No. years

In project: **4**

Grade Completed: **7th Grade**

Age: **12**

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My goal is to create a Mini Metal Foundry before the fair in 2020.

Some of the terms in this project are

Foundry: an establishment for producing castings in molten metal. https://www.dictionary.com/browse/foundry?s=t

Refractory: a material having the ability to retain its physical shape and chemical identity when subjected to high temperatures. https://www.dictionary.com/browse/refractory#

Ingots: a mass of metal cast in a convenient form for shaping, remelting, or refining. https://www.dictionary.com/browse/ingot?s=t

Crucible: a container of metal or refractory material employed for heating substances to high temperatures. https://www.dictionary.com/browse/crucible#

The Mini Metal Foundry is a ten quart steel bucket that has makeshift refractory concrete. I decided to build this because I have always wanted to be able to melt aluminum pop cans. I don't know exactly why I want to melt cans but it is fun and satisfying to watch them melt. When I was searching for ways to melt metal on the stove I found the Mini Metal Foundry on youtube by the King of Random. The Mini Metal Foundry is capable of getting hot enough to melt pop cans in seconds. It can also melt plastics, brass, copper, gold, and silver. It can only get hot enough to forge steel though.

The first step of making the Mini Metal Foundry was to make the makeshift refractory concrete. The ingredients for the refractory concrete are 21 cups of plaster of paris, 21 cups of play sand, and 15 cups of water. The next step was to pour all

ingredients together in a 5 gallon bucket and stir till all the lumps are gone. After that I poured the mix into a ten quart galvanized steel bucket and held a 2.5 quart bucket in the center of the steel bucket. When the refractory concrete hardened I pulled the 2.5 quart bucket out of the hardened concrete with a pair of vice grips.

Next it was time to make the hole for the air supply tube. I used a 1” hole cutting saw to cut at a thirty degre angle towards the bottom of the opening made by the 2.5 quart bucket. Once the hole was made I started to build the lid of the Mini Metal Foundry. The first step was to make more refractory concrete using 10 cups of plaster of paris, 10 cups of play sand, and 7 cups of water. Then I poured it into a container of the shape I wanted the lid to be. After stirring I inserted two 4” U bolts and a pop can, the U bolts for handles and the pop can for a pressure vent. After the concrete dried I took out the can and the lid.

The next step was to make the crucible I could have bought a clay graphite crucible but Those are expensive and I could make one for free instead. All I would need was a steel fire extinguisher and a chop saw. What I did was measured about 5” from the bottom and used the chop saw to cut the fire extinguisher, and the crucible was done.

The mini metal foundry was complete so I did a test run and the crucible was just a tad bit too tall but it worked really well, until I dropped the lid and it broke but it still melted metal and made ingots without the lid. The next thing I am planning to use the mini metal foundry for is going to be melting brass bullet shells.

The final step was to remake the lid so the foundry heated up faster with more efficiency. This time I was going to find something bigger to make the lid in, and I also found a bigger bottle so that I didn't need to chop off some of the crucible. I found a metal bucket that was a little smaller than a five gallon bucket, but bigger than the last container I used for making the lid. Then it was basically the same steps as the last lid equal parts sand and plaster of paris and ¾ the amount of water then stir until it's mixed then put the U-bolts and bottle into the mixture. Then I left the lid to dry for a day.

The challenges of this project were washing out the five gallon bucket I used for creating the concrete because everything got very crusted. The other challenge was to find a fire extinguisher that was broken, but facebook marketplace is a very helpful place.

The cost of all the supplies needed to make the foundry is in the list below

Ten quart steel bucket: $16.41 on amazon

Play sand: 23.71 on electricalworld.com

Plaster of paris: $25.64 on amazon