

Biogas System

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BIOGAS SYSTEM

Tools:

Now I will quickly present all the necessary tools for assembling this project.



First we will need an marker, for the hole in the ground that we will create in order to get a negative mold of our hemisphere. that we will use to create a shape



For this we will use a

and a





To prepare the modeling plaster we will need a

and a



to mix the materials.



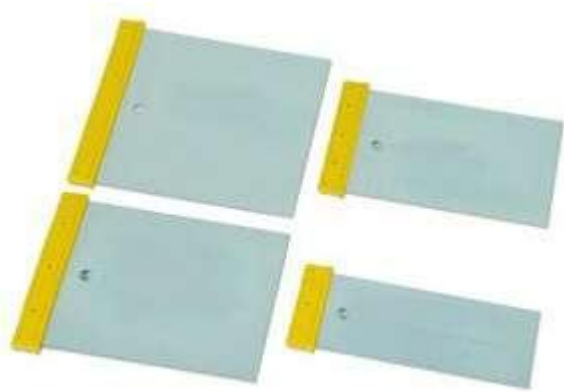
We will also need a
trowel.

to place the plaster layers along with the



The fiberglass.

we will use to cut the excess plaster and



We will use the

to refine the hemisphere surface.



Another tool that we will use is the

along with the



to smooth the surface.



With the

we will apply the floor wax and the resin.



We will use the

to put 10 drops of hardener mixing with the resin.



The

we will use to take off the finished dome from the mold.



A

will also come in handy to take off the excess plaster.



We will also need a
come out.

to insulate so that no air will get in or



The
the gas.

we will use to gather the necessary material (grass) to produce



We will also use the

to weld the pvc pipes, along with



the

that we will be using to cut the pvc pipes.



And of course the

along with



and a

to fasten some pieces.

That's all the tools you will need to get started

Materials:

The materials you will need are:

1 biogas container,

1 Bucket of Sand,

2 or 3 bags of gypsum,

2 veil of fiberglass mesh,

2 packages of fiberglass

Some floor wax,

4 liters of resin,

Some hardener,

2 tubes of silicone,

Some PVC pipes,

Enough grass to fill the container,

1 Aluminum sheet,

1 filter battery,

1 cotton filter,

1 coal filter,

1 inflatable mattress,

About 5 meters of hoes,

1 gas regulator or 1 broken carburetor converted to run on gas,

Some self-screws,

1 power generator.

Step 1: Marking, digging and creating the mold.

I will start by presenting you the container I've bought for this project. It's a 1500 liters visiting chamber for the sewerage.



For the top part we will need to create a hemisphere made of fiber glass.

To do that, I will need to create a hole into the ground in order to get a negative mold of our hemisphere.

I will mark the diameter of the top part with a knife.



Now I am going to start digging in order to get the right shape for our hemisphere.

I am creating a rounded shape towards the bottom using a trowel and the shovel.



The dimension of the hole doesn't matter because you should make the lid to match your needs.

I am adding some sand to smoothen the mold.



To make sure the plaster won't stick to the ground, I am placing some plastic foil inside the hole then I will start adding the plaster.



Now I begin preparing the modeling plaster and mix it with water using a drill.



I begin placing one layer of plaster on the walls then add fiber glass mesh to make sure the mold won't crack when it hardens.



I am placing the fiber glass mesh now then apply another layer of plaster.



Don't worry if you are not getting a nice finish on the interior, the outside part of the mold is what we'll be using to lay the fiber glass on top.

Step 2: Refining and applying the fiberglass on the mold

I've left it dry over the night and take it out from the hole. Now I can work on it to get a fine surface on the exterior.



I begin cutting the excess of plaster using the angle grinder.



Now I will refine the surface to make sure that I will get a nice surface when laying the fiber glass on top.



After the finishing layer hardened, using sand paper, I smoothen the surface.



Before applying the fiberglass on top, I prepare the surface with floor wax so it won't stick to the plaster and it will be easier to get the hemisphere out of the mold.



This is the fiberglass I will be using.



To obtain a strong surface, I need to apply a couple of layers of rosin and fiberglass.

On 400 mill of rosin I add 4-5 drops of hardener.



After the rosin is prepared, I start applying that on the mold.



The fiberglass need to be soaked in rosin to make it stay together, after you apply some fiber glass, you start adding more rosin.



Step 3: Removing the mold from the fiberglass dome and place it on the tube.

This process should be repeated until the entire surface is covered with fiberglass and you get the desired thickness, I've got about 1.5 mm thickness on my hemisphere and it worked great for its purpose.

After the resin hardened I cut the excess of fiberglass leaving just enough to go over the margin of the black tube.



Now I start working on getting the finished dome out of it's mold.

I place the fiberglass dome on the ground and continue the process of getting it out of the plaster mold.



Hammering the fiberglass will release the plaster, making it easy to separate both pieces.



This is the finished version of our fiberglass dome.



It's fitting nicely on the tube which will go on top of our digester.

I begin working on the pipes which will get the gas out of the biogas container safely.

I am drilling a 20mm hole into the fiberglass dome and I am using a PVC fitting piece with a rubber washer to avoid any gas leaks.



On the margin of the black tube I apply silicone before installing the fiberglass dome in place.

I also apply silicone on the inside of fiberglass piece before installing it.



I insert some self-drilling screws to secure the fiberglass dome.



Step 4: Gathering raw material, filling the container and put the tube on top.

After this step is completed, next thing is to collect the biologic material which will create the gas inside the digester.



We need to fill the container with a mix of water and grass

Here you can see that we have the digester filled with grass now. Next step is to add water into the mix then let it produce gas.



In the first 5 days there won't be too much gas produced, after that you will be able to use it.

I am greasing with oil to make the tube slide in easily.



Now I continue the rest of the piping.



Step 5: Preparing the filters and the piping system.

On the margin I am adding silicone to make sure that we are free of any leaks.



I cut a piece of bond to create a support for the filters which will act as a flame arrester and it will also filter out any water residues.



I am using a regular coal and a cotton filter.

This is the assembly for our filters battery.



I am using screws to secure the filters battery to our piece of bond which will be attached to the biogas digester, in order to keep everything together.



Now I am continuing with the pipe coming from the tap to the entry of the filters battery.



All you need to do the pvc piping are a couple of fittings, a pvc welding tool and a tool to cut the pvc pipe.

The dimensions of the piping system are not relevant, you should make your pipes match the design you've built.

This is the cotton filter that will be installed first from the flame traveling direction, the other filter is made of coal and both will ensure that the water from the gas will be filtered out and the sparks or flames won't travel inside the digester.



Another thing that I want to mention is that to have the gas igniting, the level of gas should be around 8% and the rest should be oxygen, inside the digester we have just gas and carbon dioxide.

This is the complete system, I will leave it one week to start generating gas then I will store the gas inside of an inflatable mattress.



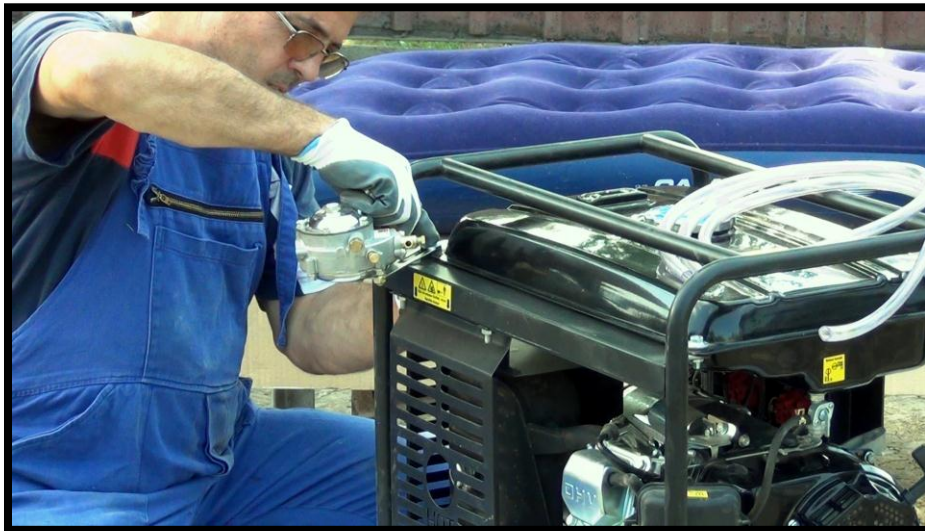
Step 6: filling the mattress with gas and run the generator.

Depending on the type of valve, attach a hose then you can start filling the mattress with gas coming from the digester.

I will open the valve and let the gas fill the mattress.



In order to convert our generator to work on natural gas, I've purchased from e-bay a gas regulator for an electricity generator, that's not the cheaper version of doing this, but it's the safest one.



Another option which will only cost you around \$20, is to buy a broken carburetor and convert it to run on gas.

I am plugging the gas into the air filter, I've took out the hose coming from the engine with the unburned gases and plugged in the gas coming from the mattress, you can use a T connector to connect both, the unburned gases coming from the engine and the natural gas coming from the mattress.



I have to fill the mattress again, I've done a test with the cameras off to see if everything runs well.

What I've found out is that I need to put a bit of weight to make the gas flow to the generator.



We start the generator on gasoline then we shut the gas and you can hear and see it running at 230 V.



I hope that you enjoyed this project, one full mattress of gas is enough to run this generator for like 3 hours and it takes a day to cumulate the gas inside the digester.