Building a Keg Still (Bokakob Design, Reflux Still)

by **n1cod3mus** on January 26, 2013

Table of Contents

Author:n1cod3mus Chris Fry Design
I'm a web developer, IT engineer, Graphic Designer. I have a creative nature and an over reactive imagination which is perfect for instructables.

Intro: Building a Keg Still (Bokakob Design, Reflux Still)

Building a Keg based reflux still using the bokakob design, with some modifications courtesy of the distilling community.

Before you start check the laws in your local area, some places you cant even own a still let alone use it to make a drinkable product, check it out first. I know in New Zealand you can make your own booze and in the UK you can have a still that makes up to 5L if you have a permit.

I wanted to have a go at making my own spirits, Rum, spiced rum, vodka, schnapps whatever took my fancy really and to do this I knew I needed a still, now there is very cheap and easy to make stills out there, you can connect a copper coil to a stockpot and put the coil in water and off you go, this is known as a Pot Still, a very crude one but it will work, just not very efficiently.

I wanted to get the best out of my still, plus I like the challenge or building something new and something that looks cool, and it's nice to say "I own a still"

the following instructable comes from weeks of research in to making stills, running them and making actual drink able products.

I have attached an image of the original Bokakob still design, but in summary it's a large copper pipe with 2 plates near the top at a 30 degree angle with a copper condenser coil at the top which water runs through to cool the valorised alcohol which then drips down hits the plates and then it can be collected.

for those that don't know what a reflux still does, basically it allows the alcohol to be re circulated around the column each time it drips back down the center it picks up more alcohol from the vapour which means you get a much purer product that from a pot still. having said that sometimes you need a pot still to keep the flavour of what you produce, the Bokakob design allows you to run it both as a reflux still and a pot still.

during my research I found this animation of the bokakob design working, check it out.

http://www.screencast.com/t/ODMxYThm

also there is a ton of information out there on this still design, but you have to take it all with a pinch of salt and work out what is good or not.

with this still we should be able to produce around 90% pure alcohol if not more, about 3 litres from a 20L fermented mix, also known as WASH or MASH, the wash should be around 14% alcohol by the time its finished fermenting, more if you use turbo yeast, it really depends on the recipe.

you can get so much information from the home distillers website, they have some great recipes and information on their site and on their forum.

http://homedistiller.org

if you need more information on the bokakob still design check this wiki out

http://wiki.homedistiller.org/Boka_Reflux_Still_-_How_To_Build

Step 1: Tools and Materials

OK so here is your list of materials, I will be following what most of the guys in the distilling community recommend which is a 2 inch column, here in the UK that is 54mm, and its expensive to buy so I didn't want to make too big a column.

you should use as much copper as possible, as the copper removes a lot of the impurity's from the alcohol as its produced.

Tools

Hack Saw

drill

6mm drill bit

Blow torch

heat mat for soldering copper

a metal file

spanners and grips

Gloves (very important)

hammer

tape measure / ruler

6mm pipe bending spring

15mm copper/steel pipe to wind condenser coil around.

32mm PVC pipe for winding the coil around.

Materials for the still

Lead free Solder

Flux for pipe work

54mm (2 inch) length of copper pipe, I bought might at a small local independent plumbing store, 1 meter long cost me about £24

54mm copper end cap, got at the same place I got the pipe from, cost about £12

6mm copper pipe, 7.5 meters from eBay cost me £18.99, plumbing shops doing tend to stock this, but you might be able to get it from car part suppliers as they use it for brake linings.

6mm needle valve, got this on eBay too for £11.99 which i thought was expensive

a few small pieces of scrap copper pipe to make plates out of

hose tap connector

food thermometer

copper scourers, make sure they are copper and not copper plated otherwise they will rust inside the still, check them with a magnet if you have to. you can use stainless steel scourers in a pinch, but the more copper you use the better. I got mine at a pound store, the local supermarkets didn't stock them.

a stainless steel keg 50L, you must buy this legally

a 2 inch tri-clamp also known as a tri clover clamp

Equipment For Making the Spirits and Fermenting

Fermentation Vessel, I'm using a 25L tub bought from a local store

Hydrometer

Test flask

Alcoholmeter, make sure it's one for sprits

Wine Siphon

18 inch plastic spoon

Airlock valve and rubber bungs

materials for cleaning the still

5kg sugar

Baker's yeast

water

yeast nutrient

sterilising compound

vinegar

dish soap

Image Notes
1. 54mm (2 inch) copper Pipe
2. 54mm copper end cap

Image Notes
1. gloves
2. safety glasses
3. mitre saw, Dont use this

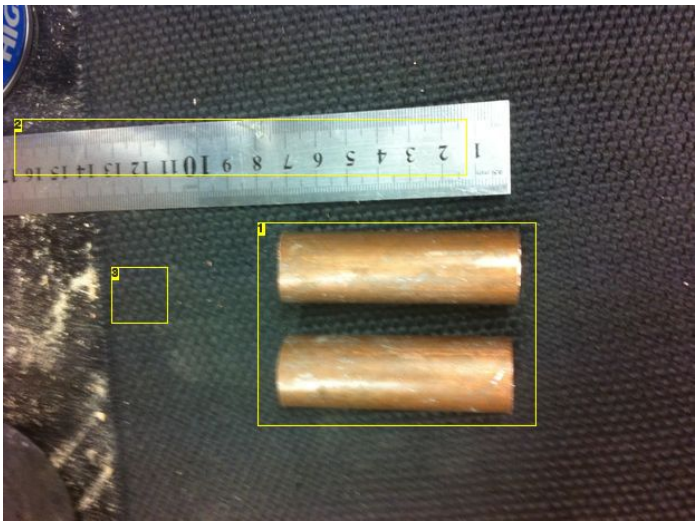


Image Notes
1. spare copper pipe to turn into plates
2. ruler
3. this black thing is a heat mat

Image Notes
1. hammer

Image Notes
1. flux
2. lead free solder

Image Notes
1. 6mm copper pipe, 7.5 meter coil

Image Notes
1. 6mm drill bit
2. drill

Image Notes
1. test flask
2. hydrometer

Image Notes
1. copper scourers

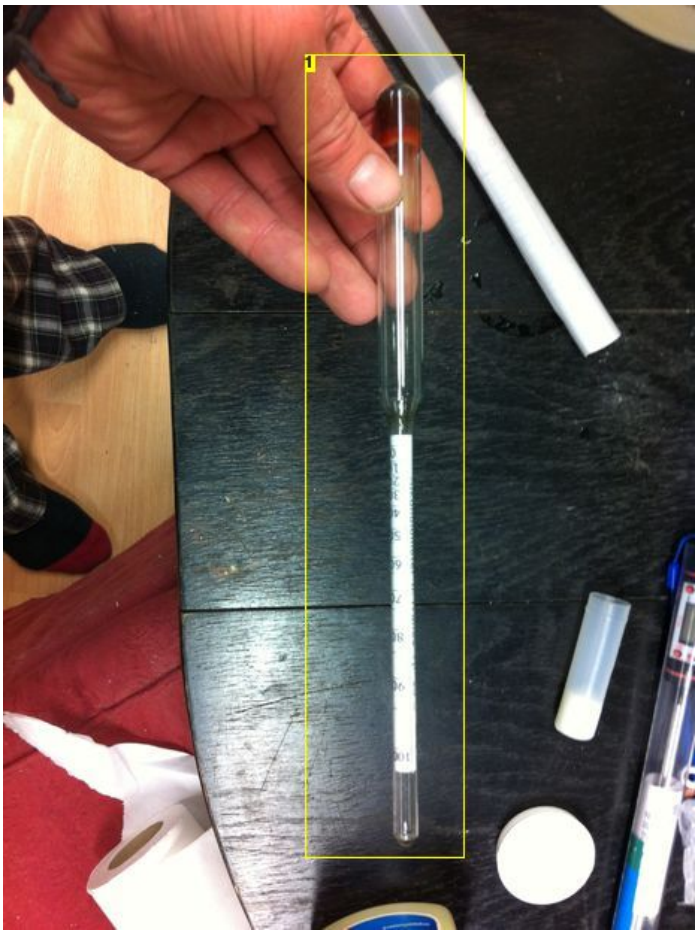


Image Notes
1. alcohol meter, make sure its one for sprits

Image Notes
1. bread yeast
2. sterilising compound
3. airlock and bung
4. yeast nuturiant, 50g pot
5. 18 inch plastic spoon
6. 5kg sugar

Image Notes
1. 25L fermentation tank

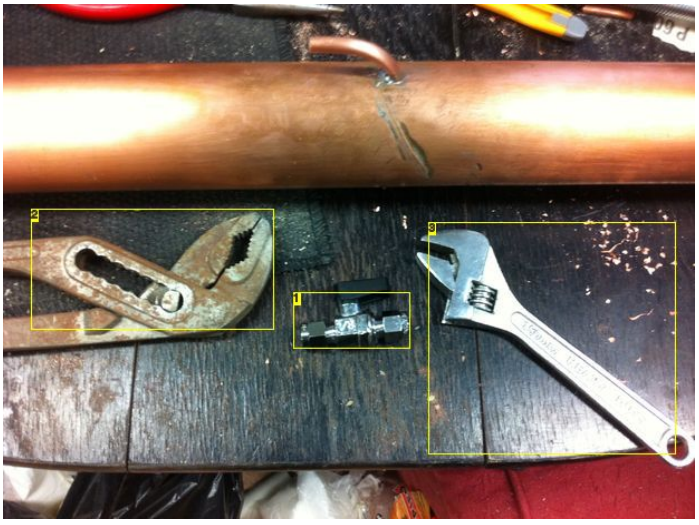


Image Notes
1. 6mm needle valve
2. pipe grips
3. sdjustable spanner

Step 2: Terminology

ok just going to run over some terminology I have learned from the various distiller forums and community's.

Wash or Mash : the mix of sugar / fruit / vegetables / grain, yeast water and nutrients which is fermented to produce your starting alcohol. in beer making its called wort.

SG : Specific gravity, this is measured using a hydrometer using this you can calculator your starting ABV from that you can work out how much you will finally get.

ABV : alcohol by volume, measured using a alcohol meter, it can be calculated using the SG click here for a calculator

The Column : this is the 54mm (2 inch) copper pipe we will be using, you can use other sizes but I will be using this.

The Head : this is the top part of the column which holds the plates and condenser coil, this could be made separately from the main part of the column but for mine I am making them all part of the same piece.

Boka : this is just a short term for Bokakob Still, which comes from the original designer of this method.

Step 3: Making the plates and fitting them

we need to make our plates and fit them, according to the designs they should be at a 30 degree angle and cover just over half the width of the still.

One plate on each side of the still and they are 1 inch apart, one of these plates needs to have a tab which will be bent downwards, this will mean that the alcohol that overflows the plate will be directed down the center of the still and not just run down the sides. we want it to run down the center so it picks up more alcohol from the vapour going up the column.

check out this handy diagram

when you get your 54mm pipe it might not be a straight cut so trim a little of each end to make sure its level.

to know where to cut your 30 degree cuts you need to know what size condenser coil you are going to make, for this one I am making an 8 inch coil so I measure down 8 inches on my 54mm pipe form one end, your top plate should be about 1 inch down from the end of the coil. Measure down 1 inch from your 8 inch line and this is where the first cut should be made.

the second plate should be at least 1 inch apart from the top plate, someone on homedistiller made a template for the 54mm still and you can download it here. the original page is here and has a lot of information on the boka design.

Ok when you cut your slate holes, DO NOT USE A MITRE SAW, I did and though it gave me the right angle I needed the cut was too wide and I had to use 3 plates in each cut to plug the gap, the blade from the mitre saw also bent my 54mm pipe a little on the cut, which was annoying and it can't bend it back and make it look good :-(, most distillers use a Dremmel or a hacksaw and file to make it wide enough for the plates.

you will also have to drill 2 holes one on each side that will accommodate the 6mm copper pipe, one below the top plate at the back so you can insert your thermometer. And one above the bottom plate which will be used to output your alcohol. drill these holes before fitting the plates.

once you have your cuts you will need copper plates to go in to them, if you used the template before then there is templates on there for the plates as well.

to get a copper sheet get couple of pieces of copper pipe and cut along the length and wearing gloves bend them out and hammer them flat.

I then pushed this sheet in the cut in the 54mm pipe and then using a pencil drew around the pipe on to the sheet, then I roughly cut the sheet, pushed it in to the cut and filed it flat to the pipe, if all has gone well this should be a tight fit.

when you cut the bottom plate make sure you cut a longer bit in the middle for the tab so the liquid can drip down, you will see what I mean in my pictures. I used tin snips to roughly cut mine.

now all you have to do is put some flux on and solder the plate in place using lead free solder and a blow torch, you will have to excuse my soldering this is the first time I have ever done it so I was learning as I went.

you want to make sure there is no leaks in your joints, they should be air/water tight. it also pays to clean the plates before fitting them, look at the pictures to see the state of the pipe I had on the inside.

clean up the joints with a file and some sandpaper.

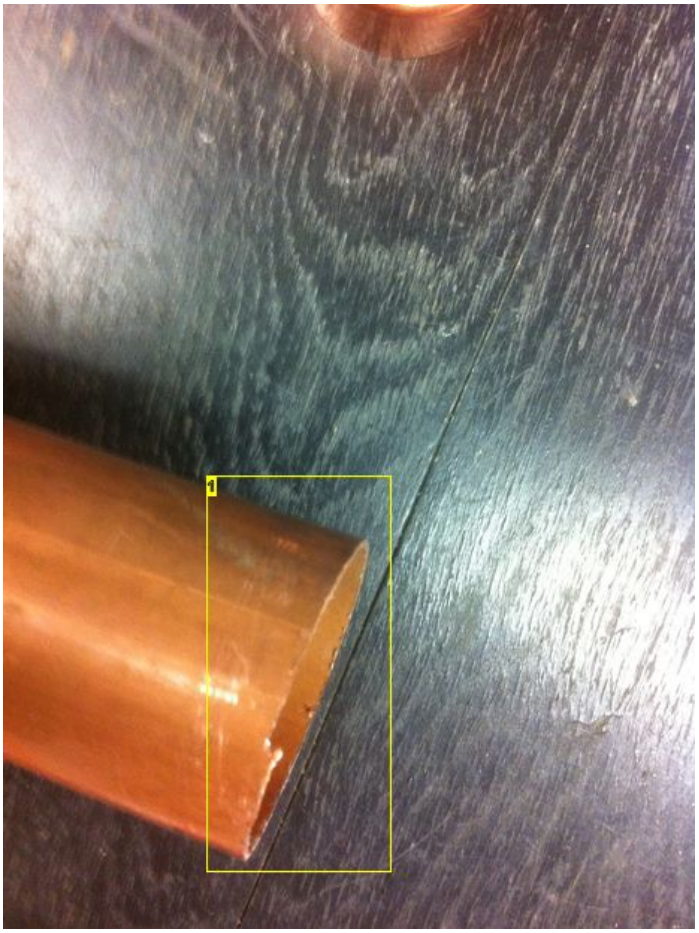


Image Notes
1. this is how the dude in the plumbing store cut my pipe at both ends so it needed trimming up

Image Notes
1. this is what you should use to cut the 30 degree cuts

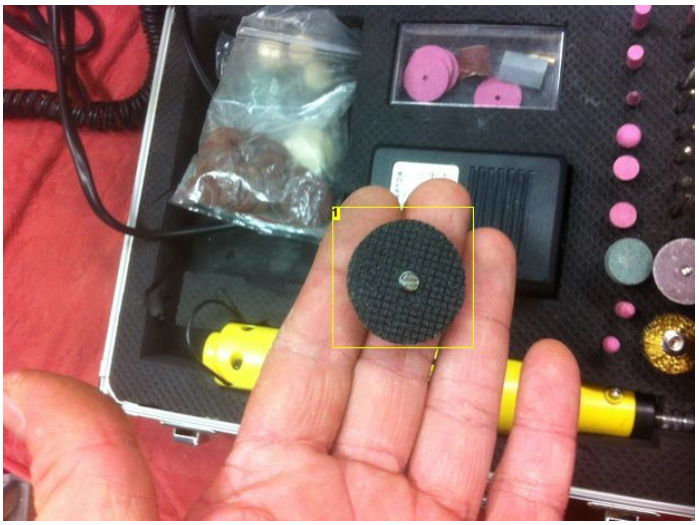


Image Notes
1. and this is the bit you need to cut them with.

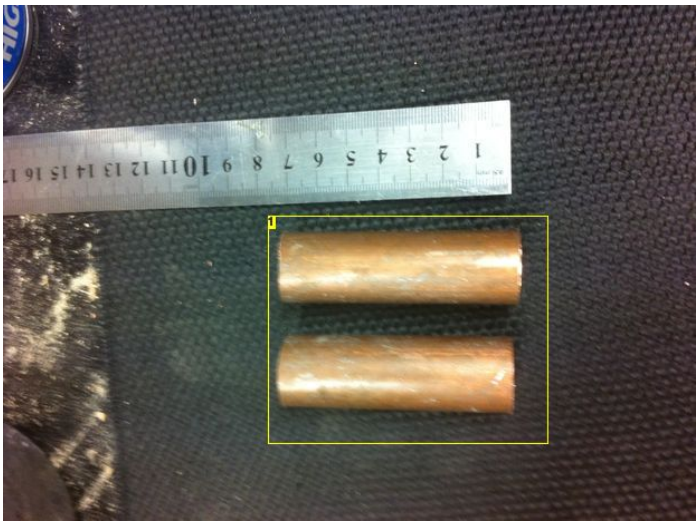


Image Notes
1. these bits of pipe will form my plates

Image Notes
1. scrap pipe cut down the center

Image Notes
1. this is not the right hammer for the job really but i'm going to use it anyway as i'm to lazy to go find the right one.

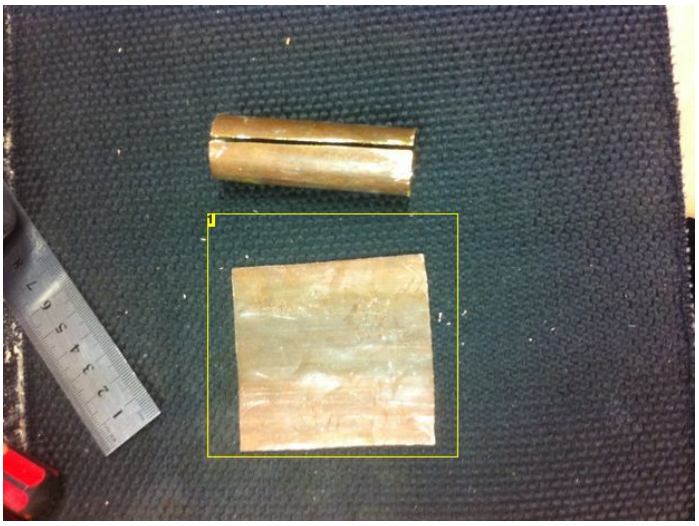


Image Notes
1. flattened pipe

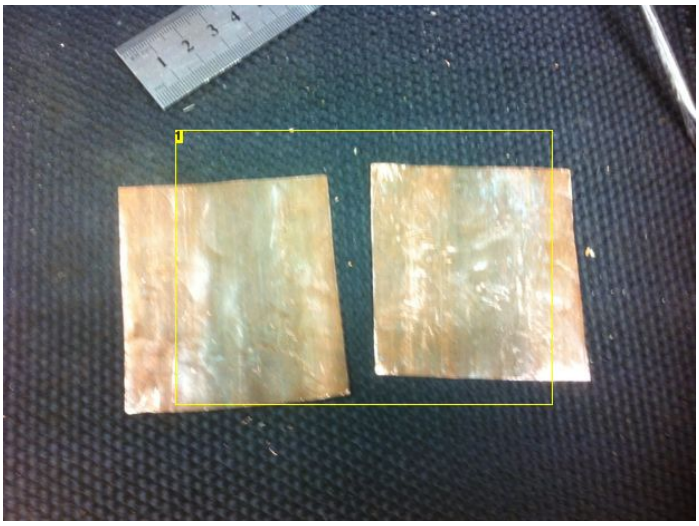


Image Notes
1. 2 plates done

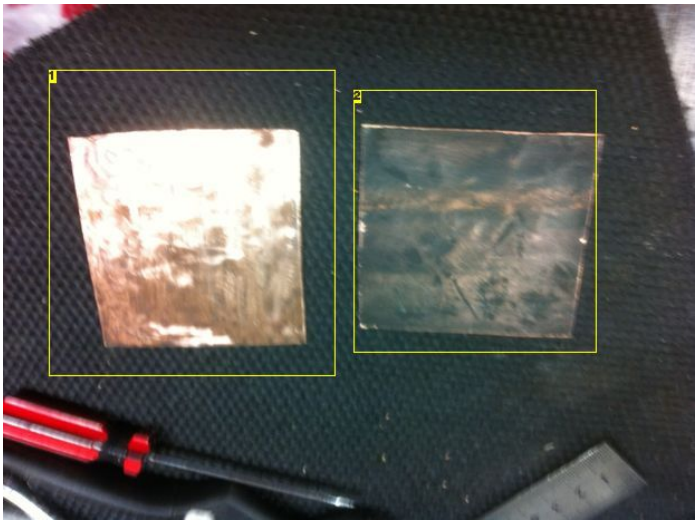


Image Notes
1. cleaned the plate up
2. this is what the inside of the pipe looked like before I cleaned it

Image Notes
1. this is the bottom plate
2. this is the tab that will be used to channel the liquid down the center of the still, do not bend this yet.

Image Notes
1. pipe all marked up ready to cut, my mitre saw can cut steel not all mitre saws can so dont ruin your saw.

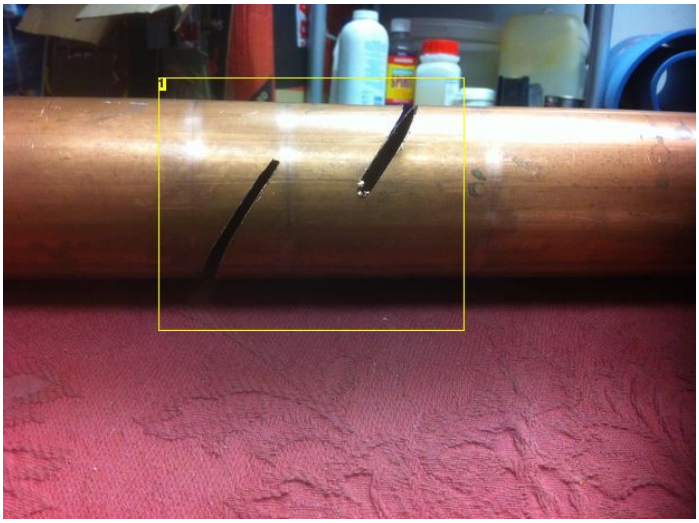


Image Notes
1. look at the size of these cuts, thats why you dont use a mitre saw

Image Notes
1. fluxed up ready to solder

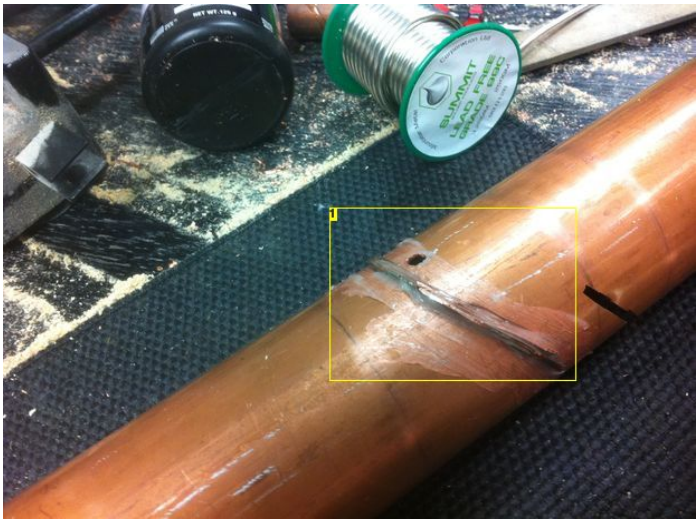
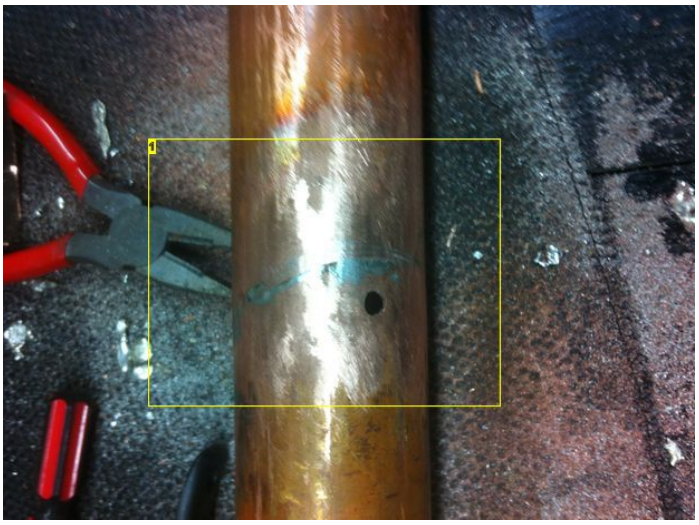


Image Notes
1. joint flused up ready to solder

2. flux
3. lead free solder, make sure its lead free you dont want to poison your self or anyone else!



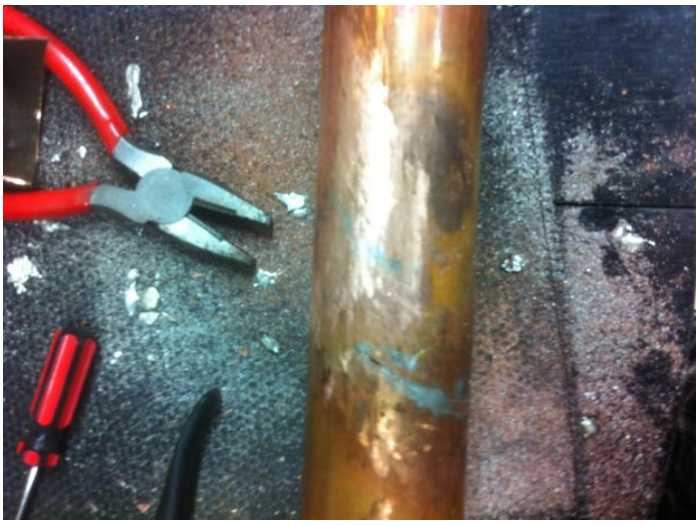


Image Notes
1. this is the second joint soldered and filed down flat

Image Notes
1. joint doesnt look too bad after cleaning it up, this was the second joint and looks way better than the first

Image Notes
1. you cant even see the joints
2. i cleaned up the pipe as well with some sandpaper

Step 4: Winding the condenser coil

ok, so we need to make a condenser coil, now the original Boka still was a single coil, since then other distillers have found a double coil to be more effective.

a double coil is a smaller coil inside a larger coil.

ok so I had to work out how I would make the coil so that it would fit, i knew the diameter of the pipe I was using to make the coil, 6mm, and the internal diameter of the column, 50mm. the coil should be made in such a way that it fits inside the column but without touching the sides. I planned to wrap the outer coil around a pipe of 32mm copper pipe that and 6mm copper pipe x 2 = 42mm perfect.

the inner coil would then have to fit inside the PVC pipe with room to spare, the inner diameter of the PVC pipe is 30mm, so a piece of 15mm copper pipe fitted the bill, 15mm plus 6mm x 2 for the copper pipe = 27mm also perfect.

we start off by making the smaller coil, the inner coil, to do this we have to wrap the 6mm copper tube around a form, e.g. a 15mm copper pipe in my case. be careful when starting it off you need to leave enough to go out the top about 5 inches long. also when starting off take it slow, you don't want to kink the pipe, I did a little but it hasn't restricted the flow too much, if I find later it has I will have to make a new coil. when winding your coil make sure you leave a gap between turns, we want to allow the vapour to get between so it can cool on the coil.

Coil length, 8 inches in my case which is what everyone seems to say is best for this type of still, you can make it to 5 inches if you're making a smaller column but if you can make it 8 inches or more.

once the inner coil is to the length you want slide your PVC pipe over and start winding the outer coil around it when you get to the end leave 5 inch's and cut it, bend it so both ends of the coil are facing upwards using a bending spring you don't want to put a kink in it now.

you should be able to slide the copper tube out easily, the PVC pipe you may have to pull out with pliers.

check out this forum post on winding the perfect coil, click here

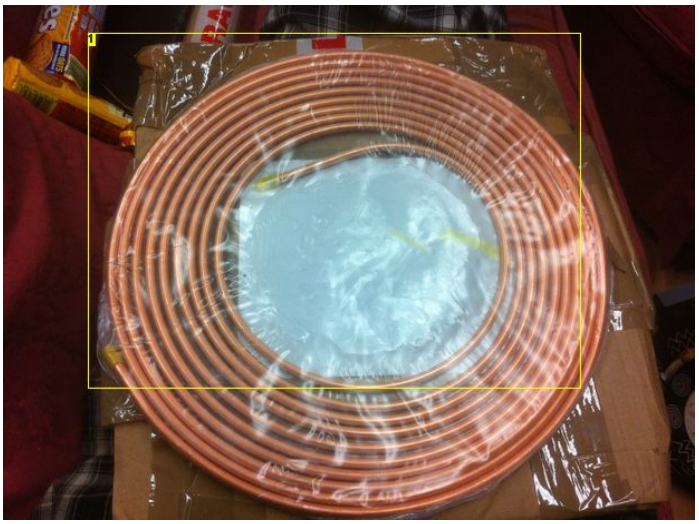


Image Notes
1. 6mm copper pipe

Image Notes
1. this is what i'm using for my inner form

Image Notes
1. the coil is going well, doing this by hand is hard work, you need a little muscle

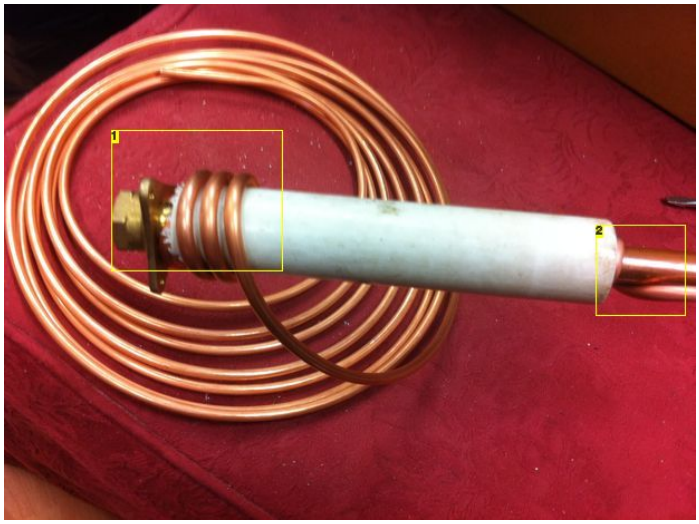


Image Notes
1. start of the outer coil
2. you can just see the inner coil poking out here

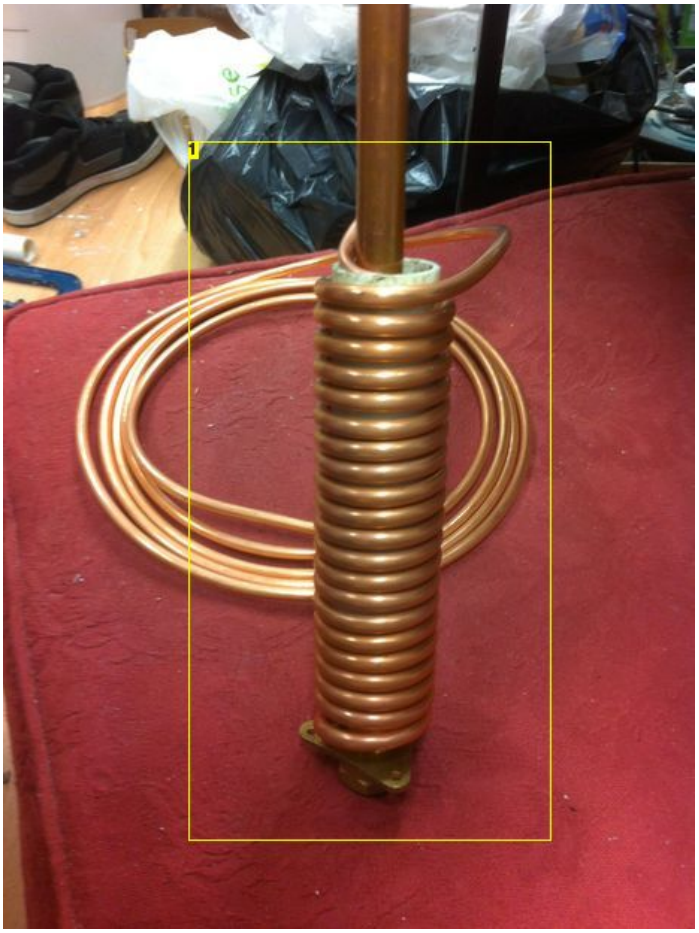


Image Notes
1. thats it, the outer coil done.

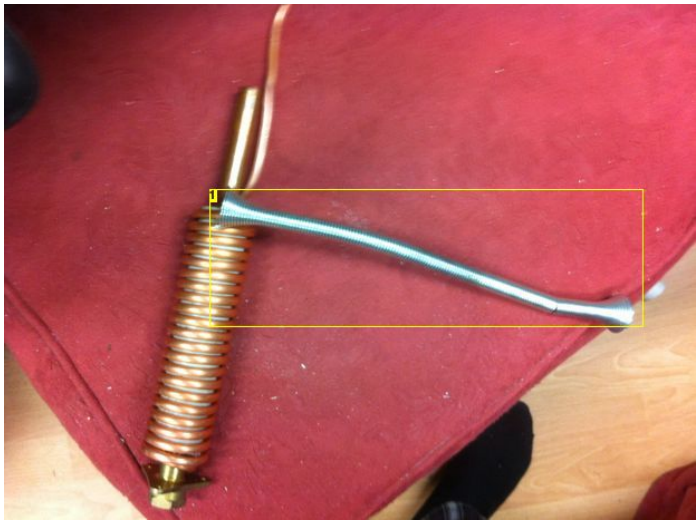


Image Notes
1. using a bending spring to bend the ends upwards

Image Notes
1. a lovely gap between the coils

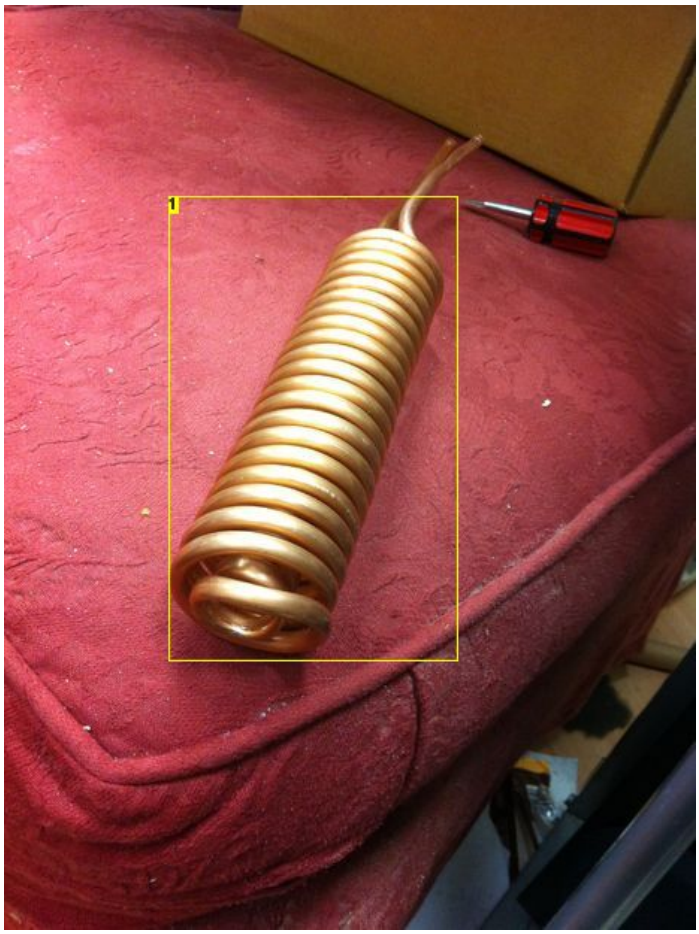


Image Notes
1. finished coil

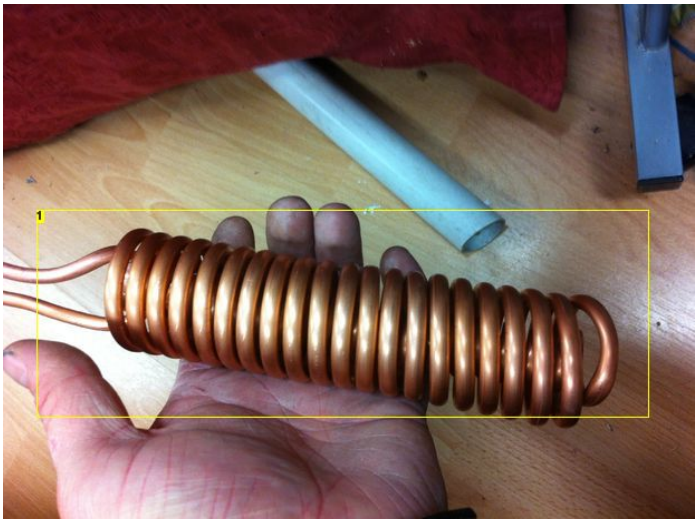


Image Notes
1. finished coil, its a beauty

Step 5: Preparing the end cap and attaching the coil

ok you need to attach your coil but before you can do that you need to drill some 6mm holes, 2 for your coil and 3 for vents, that's right vents, this will allow pressure to escape from the column, you don't want it to build pressure as it could explode.

once your holes are cut, push the ends of the coil through the end cap and solder them in place, you need to do this so that the coil is as level as possible, so you might want to rest the coil on something that will not burn, I used my tin snips. don't forget to use plenty of flux.

once its soldered, file it to clean it up and sand it to look good.

while you have the blow torch out you may want to attach a short piece about 1cm long of 6mm pipe in to the hole below the top plate and also a piece about 5cm long bent in to a curve for harvesting the alcohol which will be attached above the bottom plate facing down towards the bottom of the column.

once the coil was attached to the cap and cleaned up I bent over the coil ends so they faced downwards, this is so that when we attach the water hoses to the coil they won't be bent over and kink and restrict the water flow.

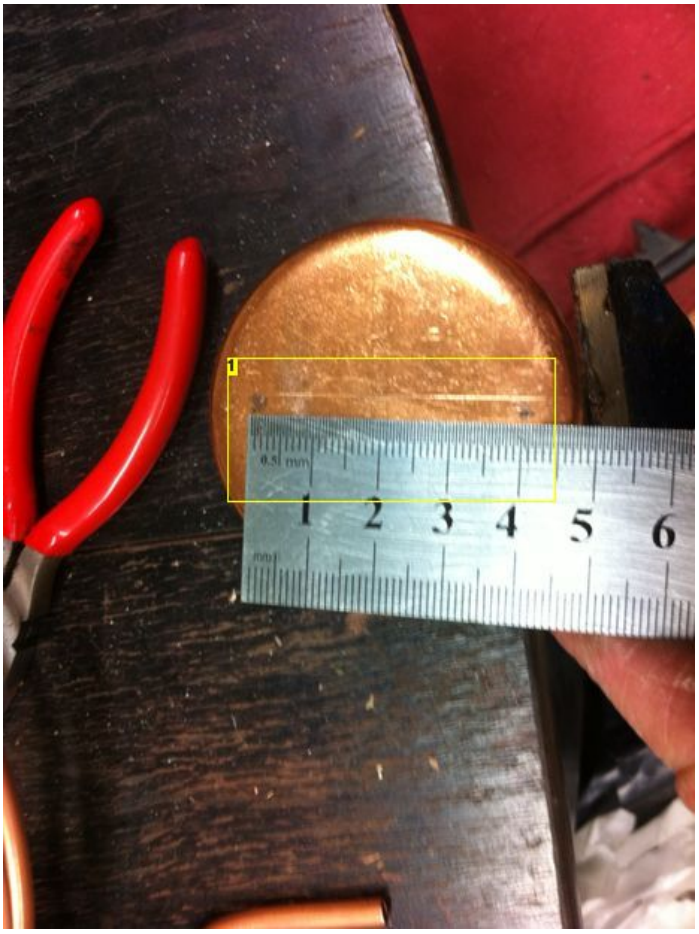


Image Notes
1. measurements for the coil holes

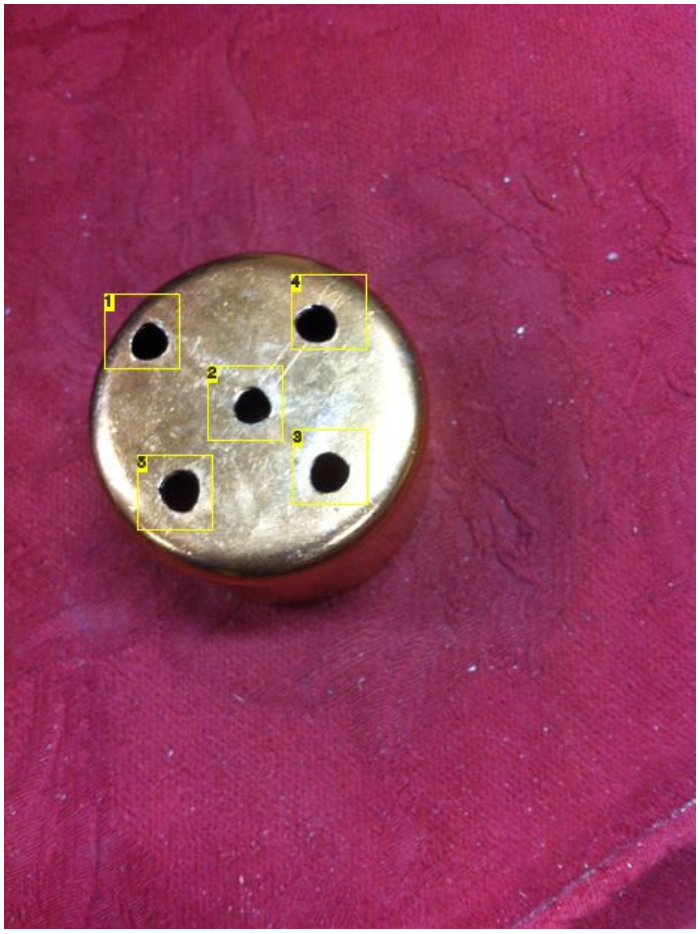


Image Notes
1. vent hole
2. vent hole
3. vent hole
4. coil hole
5. coil hole

Image Notes
1. soldered

Image Notes
1. cleaned up

Image Notes
1. pefect spacing between the cap and coil should give me a couple of mm between the coil and the column

Image Notes
1. mmmm biscuits

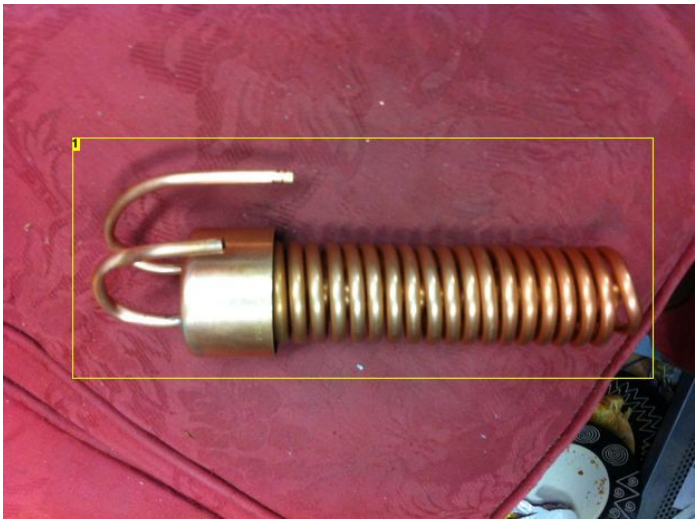


Image Notes
1. finished coil, I am very pleased with how it turned out.

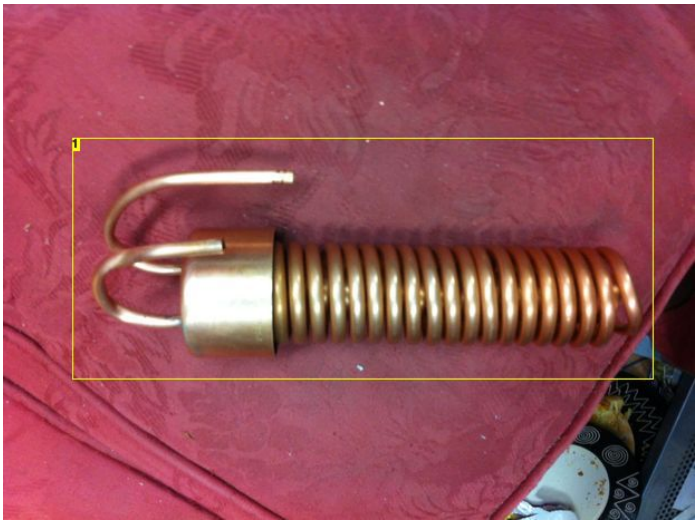


Image Notes
1. we are soldering the thermonitor tube here
2. this tiny bit of pipe will be for the thermonitor

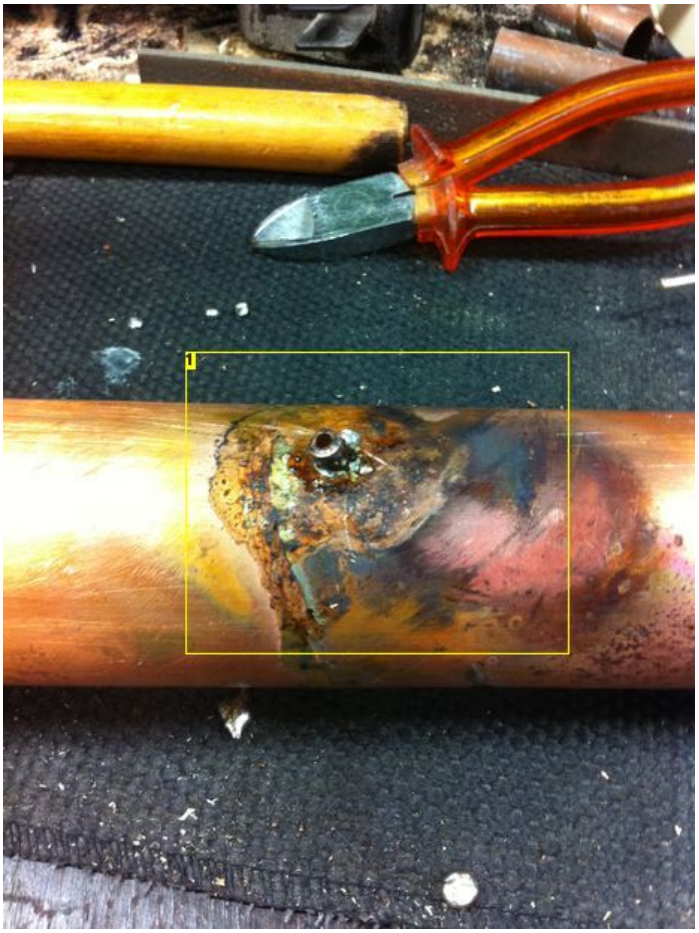


Image Notes
1. soldering done

Image Notes
1. and heres the output pipe

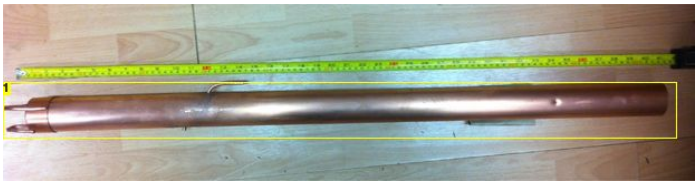


Image Notes
1. here it is with he coil in place and cleaned up

Step 6: Fitting the valve and thermonitor

the valve I'm going to be fitting used a compression fitting on both ends, for those who don't know how these work, there is a nut and inside that is a brass olive, when the nut is done up with the pipe inside the olive is compressed on to the pipe making a water tight seal.

so its simple, slide the copper pipe in to the fitting on one end then holding the body of the valve with the plumbers grips just tighten the nut up using the adjustable spanner until its tight enough that you can't pull the valve off.

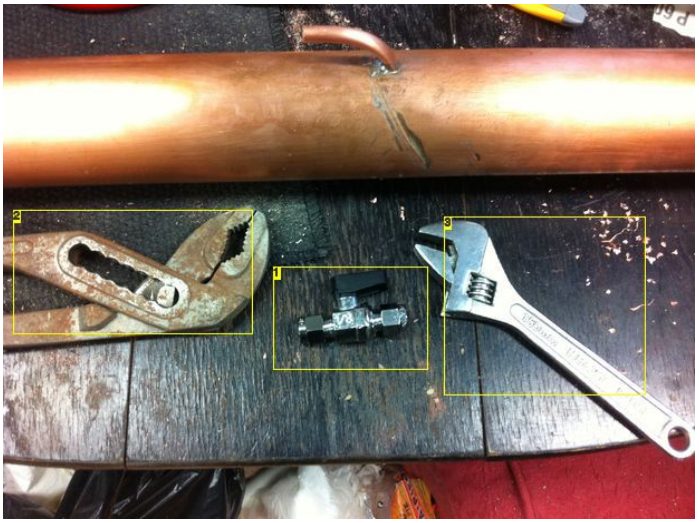


Image Notes
1. needle valve with compression fittings
2. plumbing grips
3. adjustable spanner

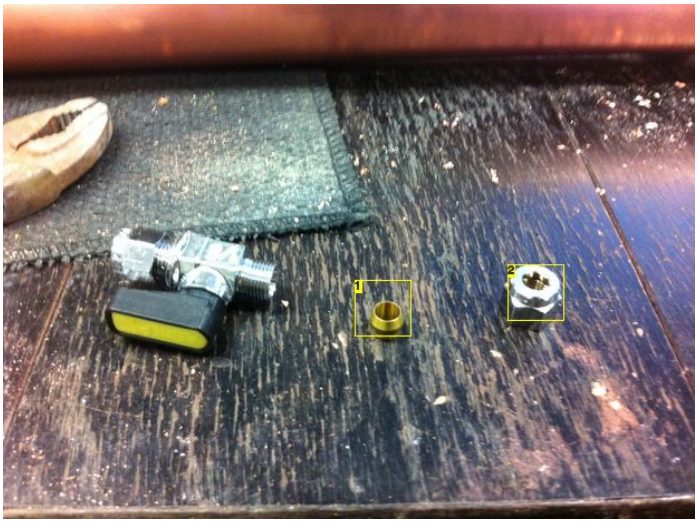
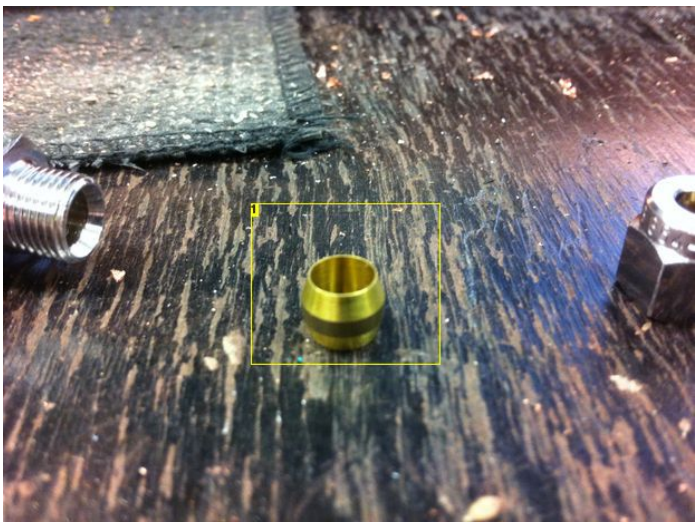


Image Notes
1. olive
2. nut



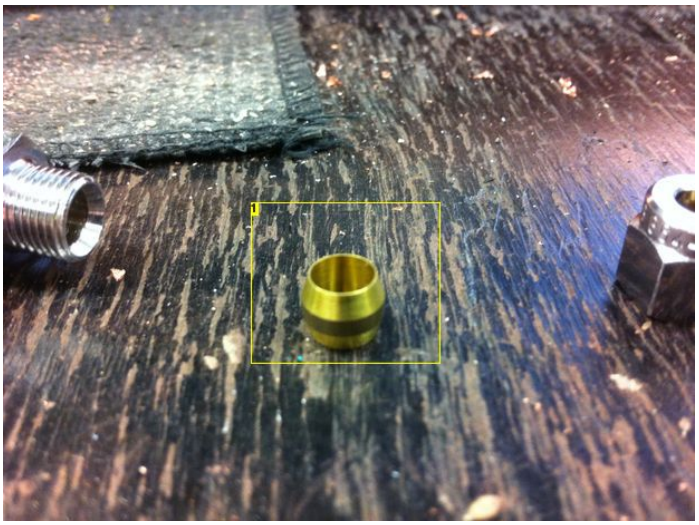


Image Notes
1. olive

Image Notes
1. fitted valve

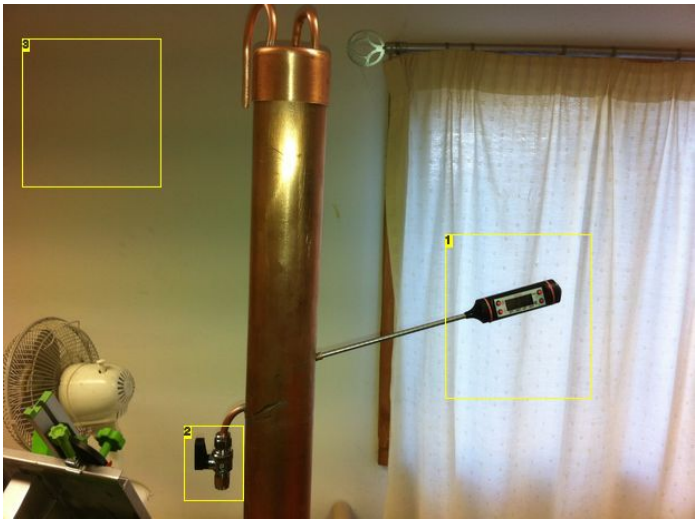


Image Notes
1. digital food thermonitor
2. needle valve
3. i'm really pleased with how this is coming along.

Step 7: Making The Flange (Easy Flange)

you need to create a flange so you can fit the column to the keg, for this you will need a hammer and an anvil or something to hit the copper against. this is called an "easy flange"

we need to bend over the edges of the pipe by about 6mm so they are at a 45 degree angle to the pipe but you can't do this all in one go it has to be done gradually.

you want to start off tapping it with the hammer while turning the pipe we are aiming for a small angle all the way around.

all you have to do is keep turning and tapping until you have the 45 degree angle, just do it slowly and take your time.

once you have your 45 degree angle you need to build up a slope around the edge, this is so that when you do up the tri clamp it will push the column down on to the gasket we will create later on creating a seal between the keg and the column so no vapour escapes.

to do this you need to build up a level of solder, make sure you flux the area before you start, dont hold the blow torch directly on the solder otherwise it will just pool up and roll off you want to heat it until the solder melts then pull the torch away and wait a second and do it again with fresh solder. use a cake time or baking tray to put the column on to protect your work surface.

once you have the right amount of solder built up let it cool and file it so you have the correct angle for the slope, you will also need to file the edges so that its nice and round and level with the flange on the keg.

you also need to file the bottom of the flange as this will have hammer dents in it, you need this to be smooth to create the best seal on the gasket between the keg and column.

Image Notes
1. starting to take shape

Image Notes
1. this is the final angle I wanted

Image Notes
1. these hammer marks will have to be smoothed out using a file.

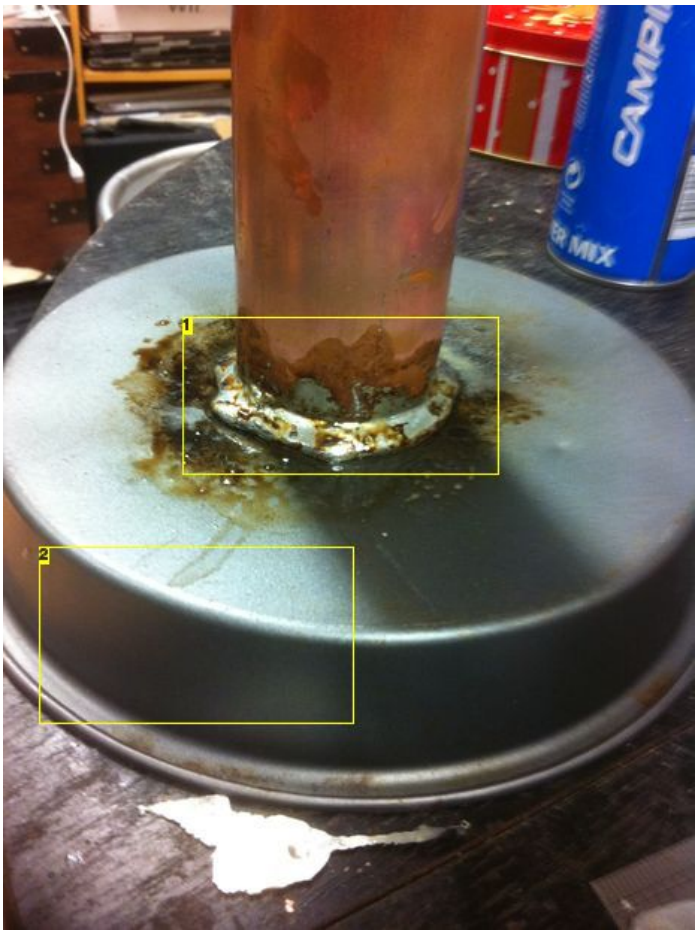


Image Notes
1. built up the solder
2. placed on a cake tin to protect the surface your working on.

Image Notes
1. this is close to what we need, but this is the raw solder so it will have to be filed and the excess removed.

Image Notes
1. this is the perfect angle.

Image Notes
1. I used a trainer to keep the pipe from slipping on the floor while I worked

Step 8: Preparing The Keg

I got my keg form Crusader Kegs and Casks here in the UK I got a brand new one for £72 including delivery.

you should buy your keg, DO NOT go to a pub and ask them for one, buying one from a pub is not legal as the kegs belong to the brewery and not to the pub. A brewery is unlikely to sell you one you will have to find a company they reconditions kegs or makes them.

At this point if you have decided to heat your keg using propane, your done, I would however advise caution if you're using propane or natural gas to heat your keg, not only is it hard to control the temp using gas but it's dangerous. Most still accidents happen when using propane or natural gas because the alcohol vapour is heavier than air and if you have a leak the vapour builds up and ignites on the open flame and BOOM!

the safer option is to use an electric heating element inside the keg for this you will have to drill the keg and then weld on a flange or socket for your element, having said that there are bolt on flanges/sockets but you would have to use a natural cork gasket made form a cork sheet.

You will need to drill a hole in the keg, in the UK the hole size for the flange would be 64mm this size would fit an immersion heater element, in the US I think the elements are smaller so you may need to install more than one. Drilling for the US ones use a conical drill bit. for the UK use a 64mm hole cutter drill bit, make sure it's one for use on metal as pictured. the flange nut is a 2.25 BSP flange nut which is the correct size for a UK immersion heater element.

before you drill anything you need to measure up and mark out where you want to drill your hole, it needs to be as low as possible in the keg, and between the 2 handles on the keg so you don't knock it about when moving it.

using a straight edge, ideally a square, measure down from the handle and make a pencil mark, then roll the keg and make another mark down from the other handle, both should be at the bottom of the keg.

using some masking tape and some string, tape the string to the first marker then pull the string tight to the second mark and cut it, fold it in half and pull it tight against the keg with it still taped in place, and mark where the middle of the string is, this is the middle mark between the handles.

measure up and mark out the width of your flange/socket, also mark the middle marker. I drew around my flange and just marked out the middle.

to get the seal on the flange, as I am using a larger flange than the US, I needed the area to be as flat as possible so I placed a wooden block on the area I wanted to flange to go and gave it a few whacks with a club hammer to flatten the area out.

OK we need to drill the hole before you do this place a center punch on the middle marker and give it a hard whack with a hammer, this dent will keep your drill bit from slipping.

Image Notes
1. Brand new keg!

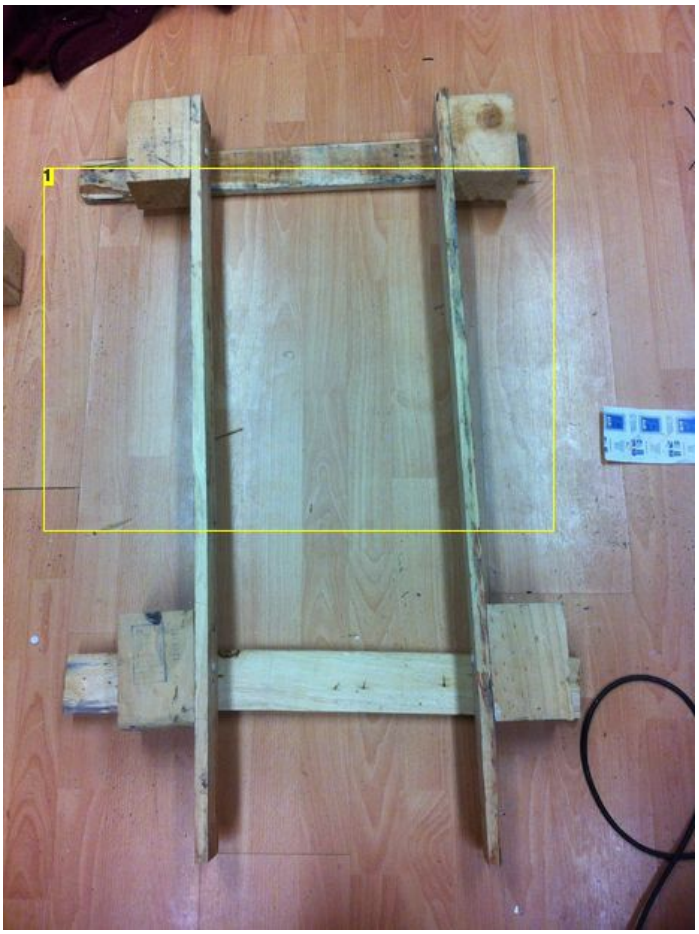


Image Notes
1. I made this frame to stop the keg rolling around while I cut it.

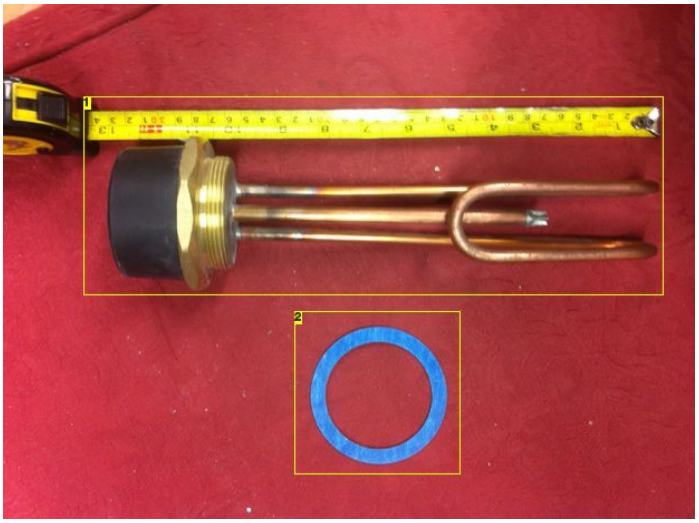


Image Notes
1. 11 inch immersion heater element
2. heater element gasket

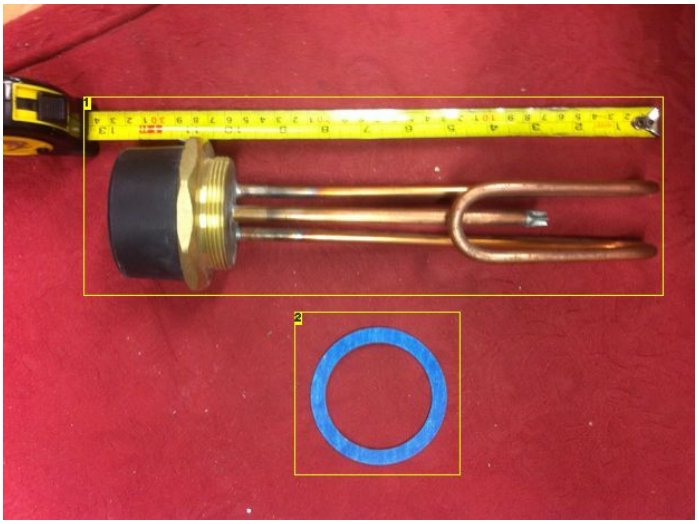


Image Notes

Image Notes

1. a flange nut, 2.25 BSP

Image Notes
1. second mark down from the second handle

1. first marker down from the handle

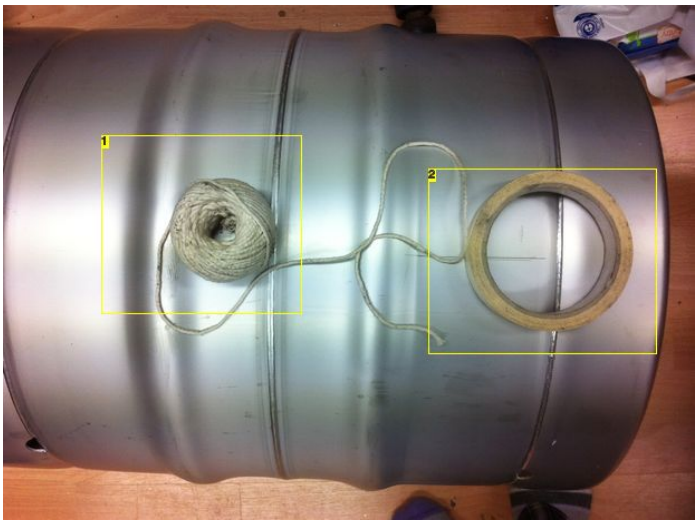


Image Notes
1. String
2. masking tape

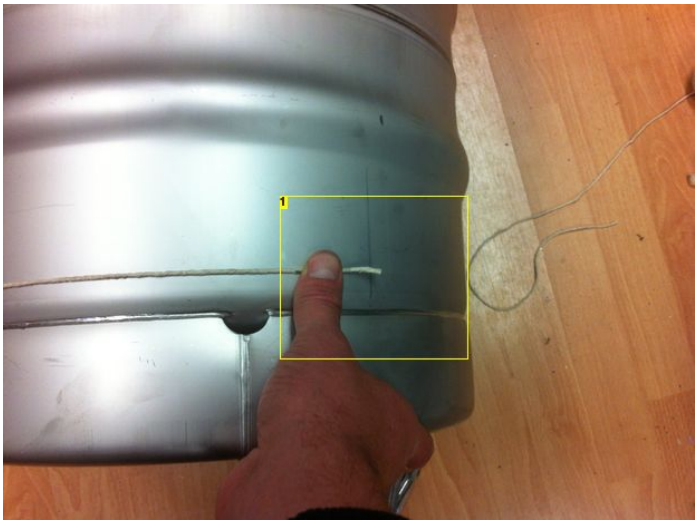
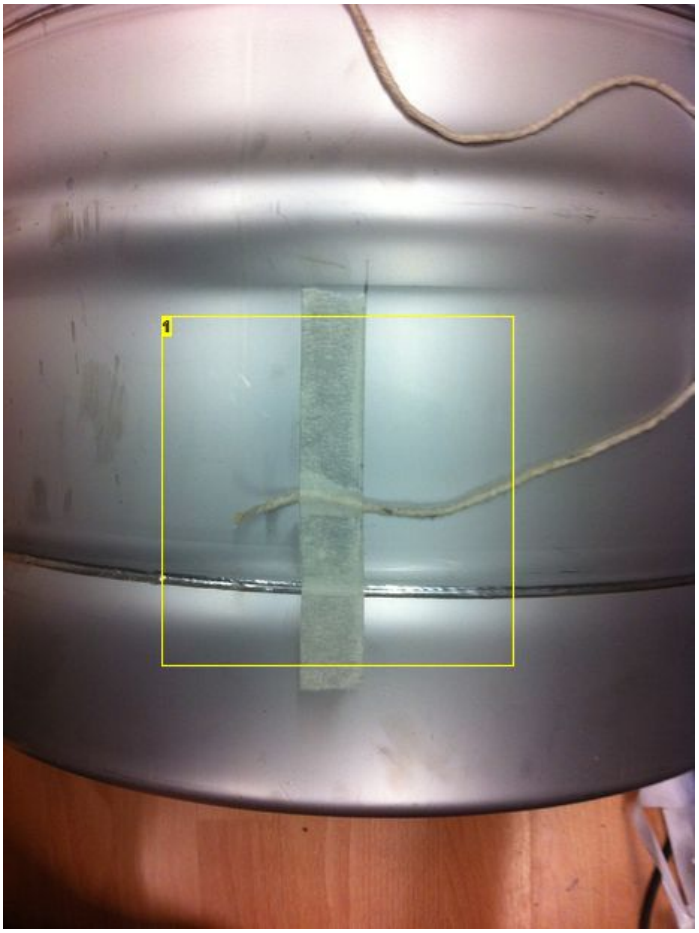


Image Notes
1. cut string at the second line



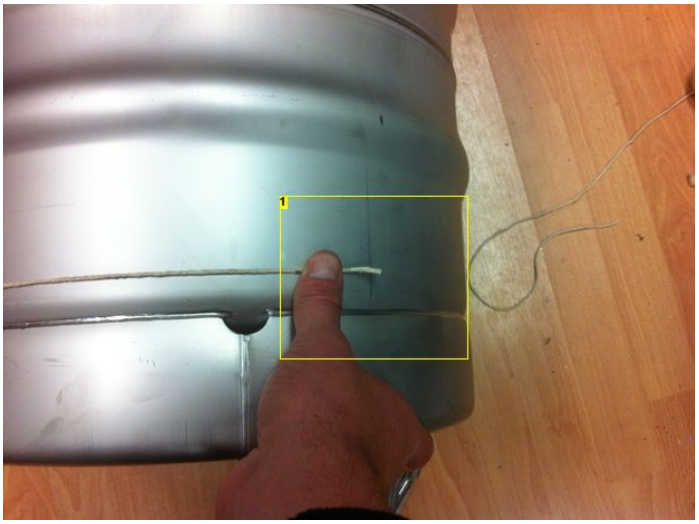


Image Notes
1. string taped at the first marker

Image Notes
1. fold the string in half and mark the half way marker.

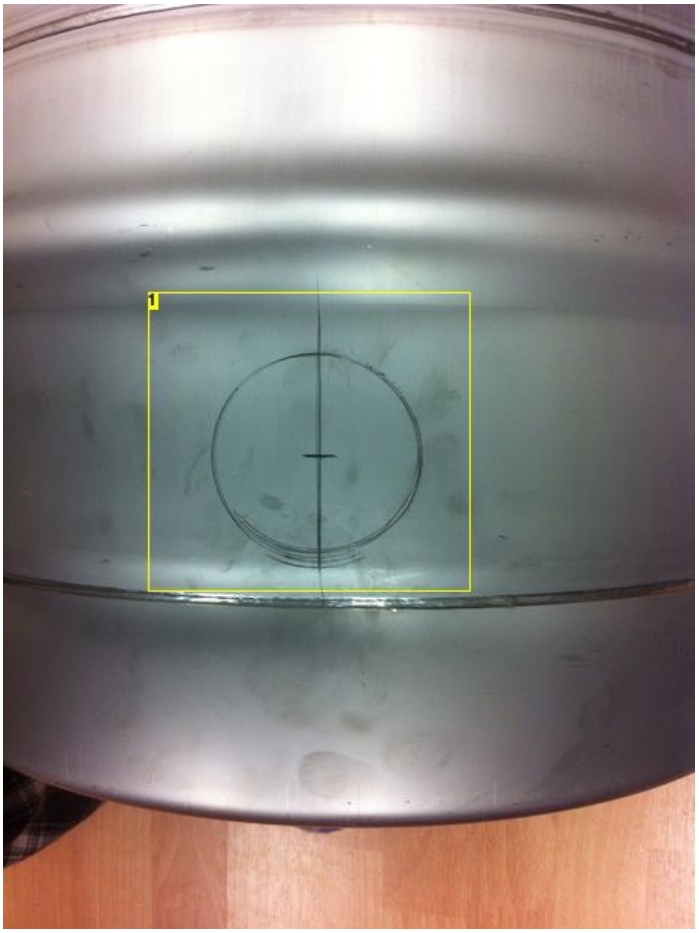


Image Notes
1. marked out the center point for the hole.

Image Notes
1. block of wood and club hammer to flatten the area where we will drill

Image Notes
1. this says it all

Image Notes
1. used 3 in 1 oil as a cutting fluid

Image Notes
1. makes a bit of a mess but its getting there.

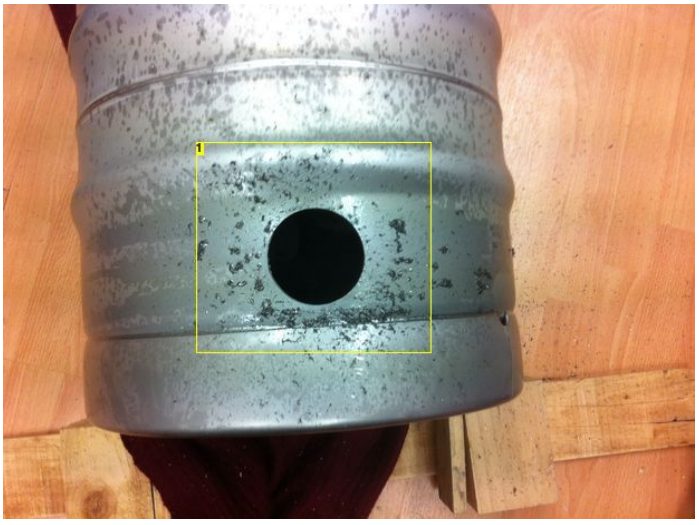
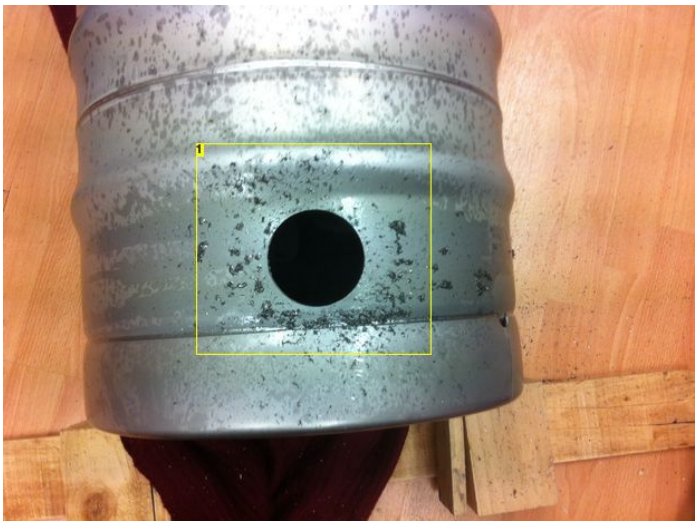


Image Notes
1. hole cut ready for clean up



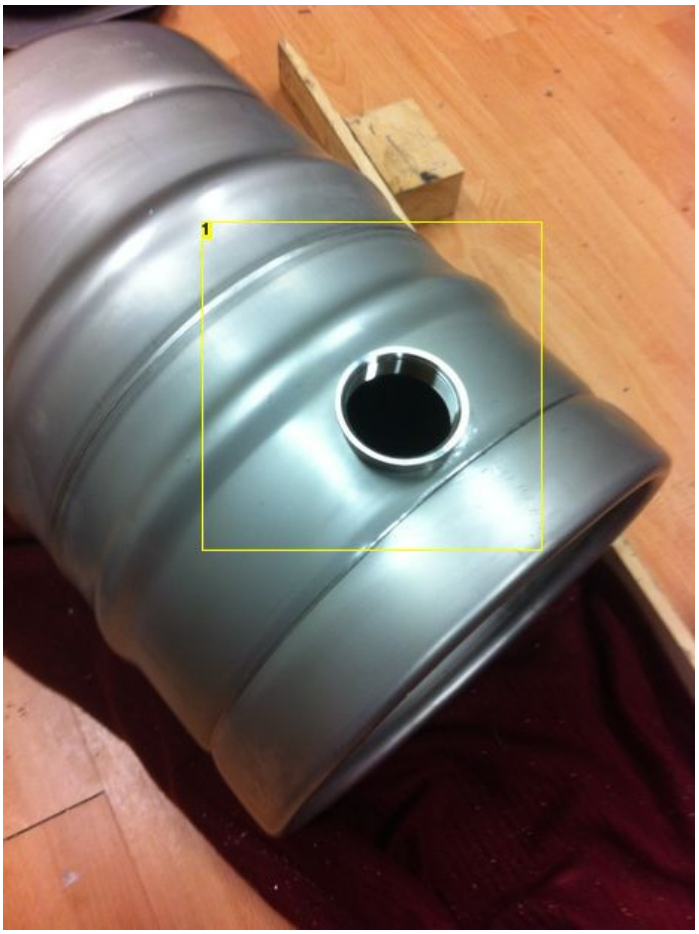
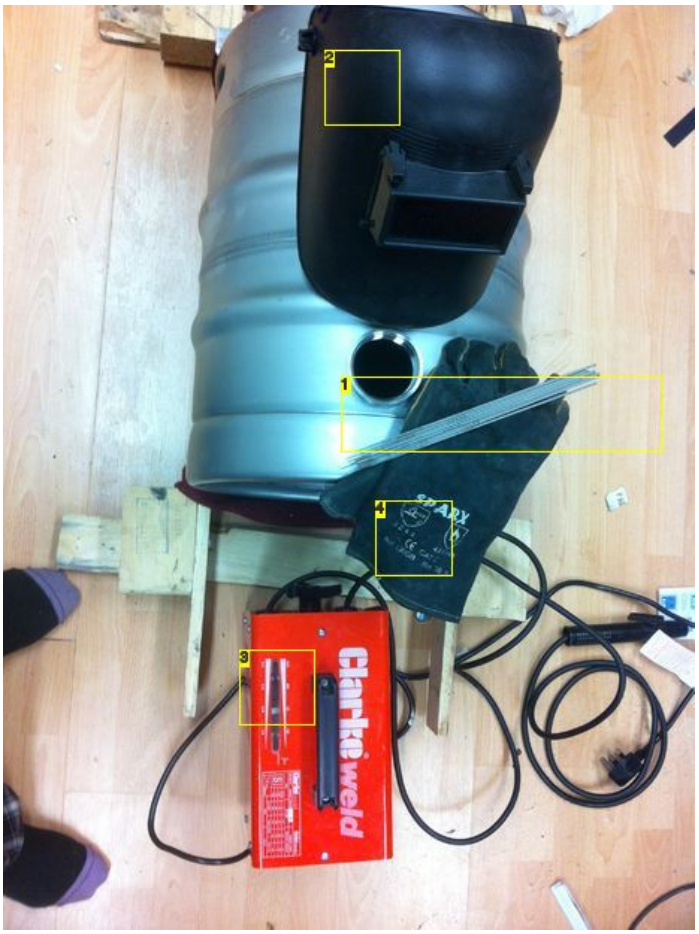


Image Notes
1. flange in place ready to weld



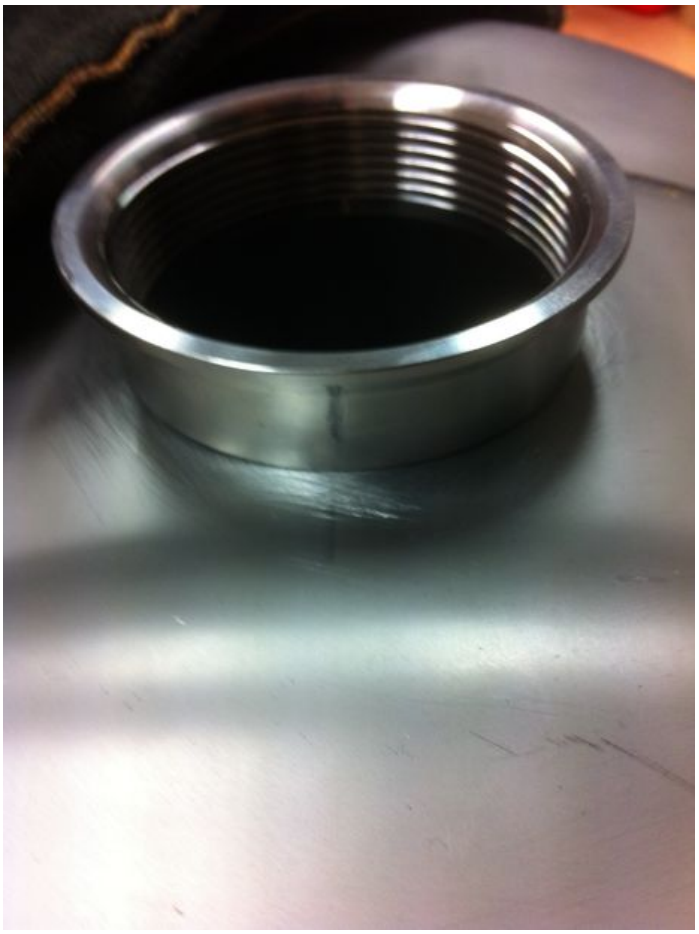
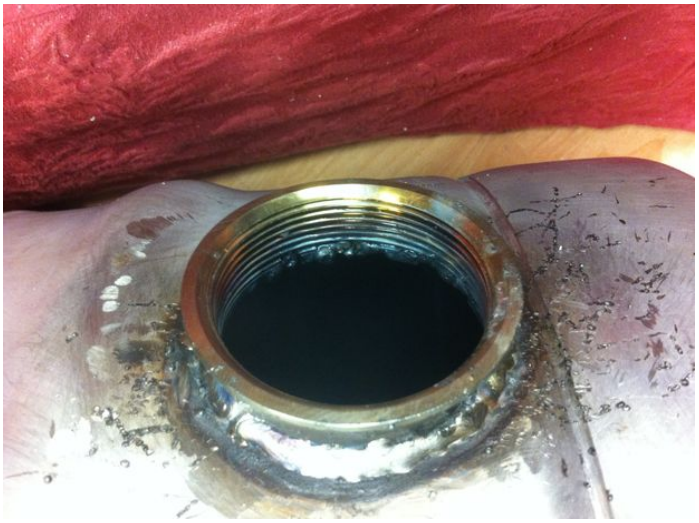
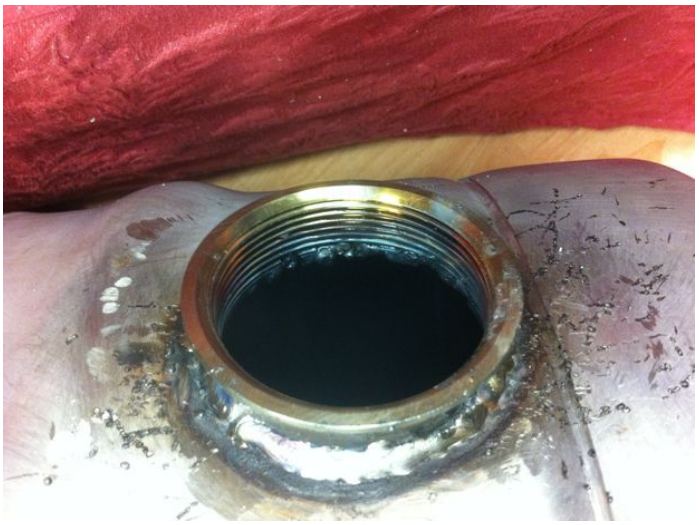


Image Notes
1. stainless steel welding rods
2. welding mask
3. welder which didnt have low enough amps
4. welding gloves very important





Step 9: Wiring/Controlling the element

you can't just use the element from an immersion heater as it is, it's designed to cut off before boiling point which is not what we want, we want to be able to control it using a dial or a knob. to do this you need to disable the thermal probe and wire in a Phase Angle controller.

Disabling the thermal probe and removing it is easy enough just unhook the wires and pull out the probe.

Get yourself a phase angle controller with a Triac, I go mine from china for about £5 inc shipping, it took a couple of weeks to turn up but it was way cheaper than buying one here in the UK, just make sure your controller can handle the watts your element can draw, my element is 2800W and the controller I got can handle 3800W. follow the instructions you get with your controller on how to wire it up. if you can get one that has its own casing then that's great, I'm still looking for one for mine, may have to get a project box form maplin.co.uk

make sure you use cable that can support the number of amps your heater will be drawing, in the UK 16A is what you need to be able to handle, I went to a plumbing shop and got some cable rated for immersion heaters.

Image Notes
1. this is the thermal probe.

Image Notes
1. just pull it out.

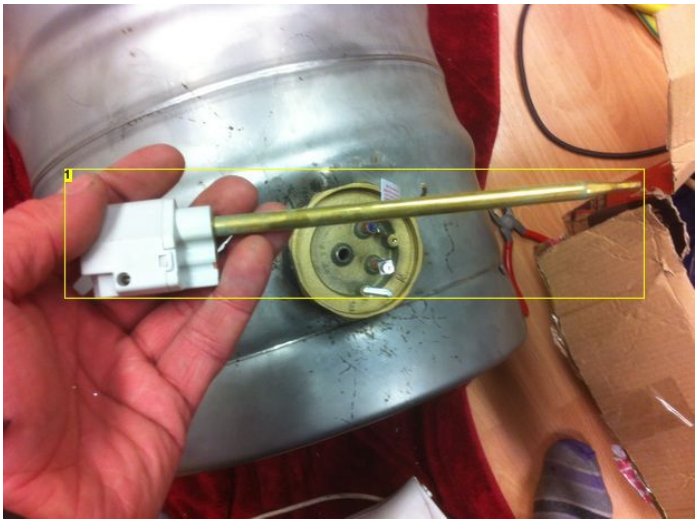
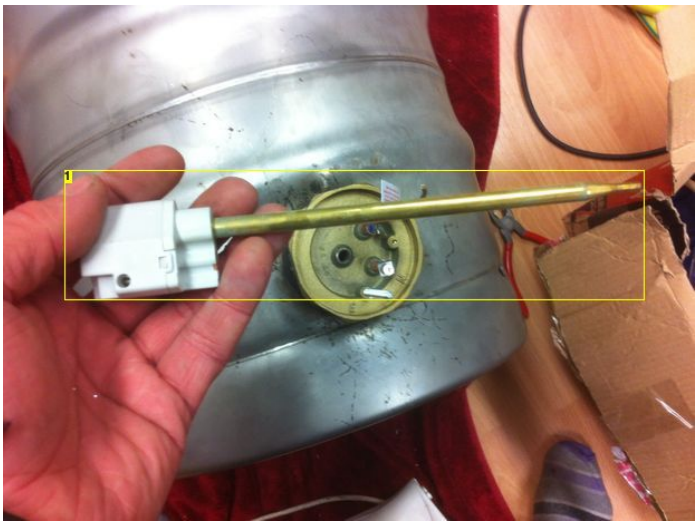
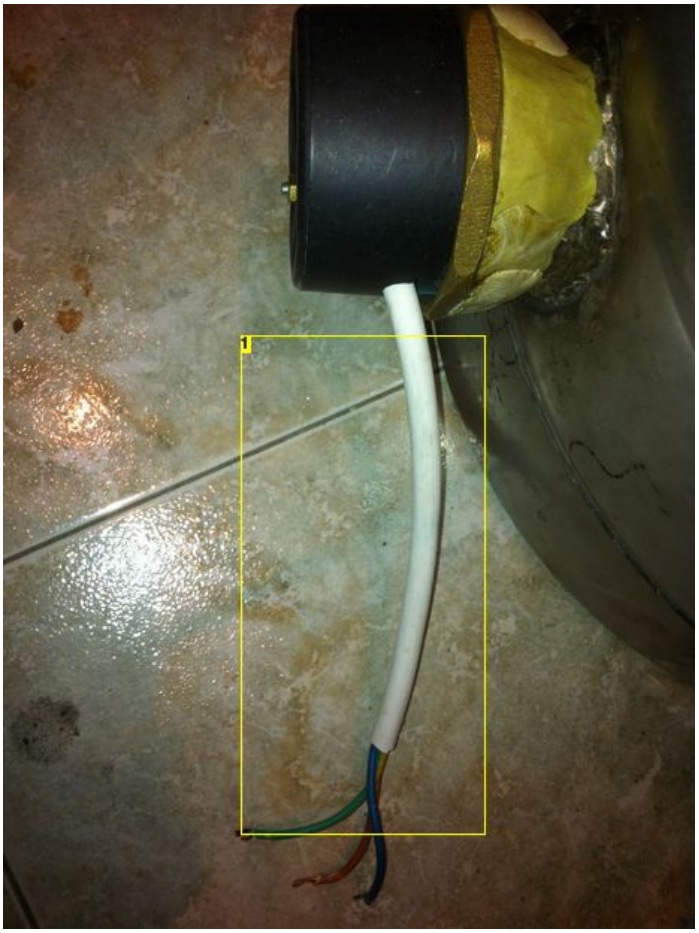


Image Notes
1. the thermal probe removed





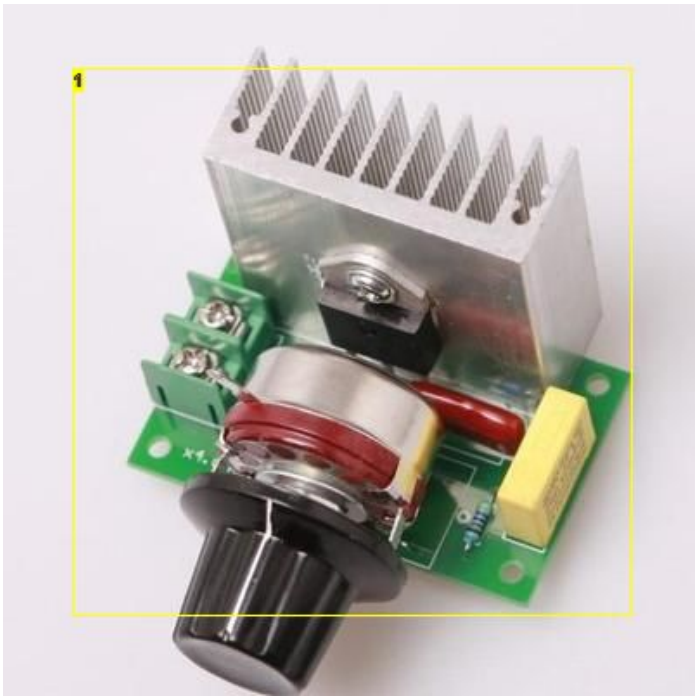


Image Notes
1. this is y chinese phase angle controller

Image Notes

1. this short length of cable goes to the phase angle controller.

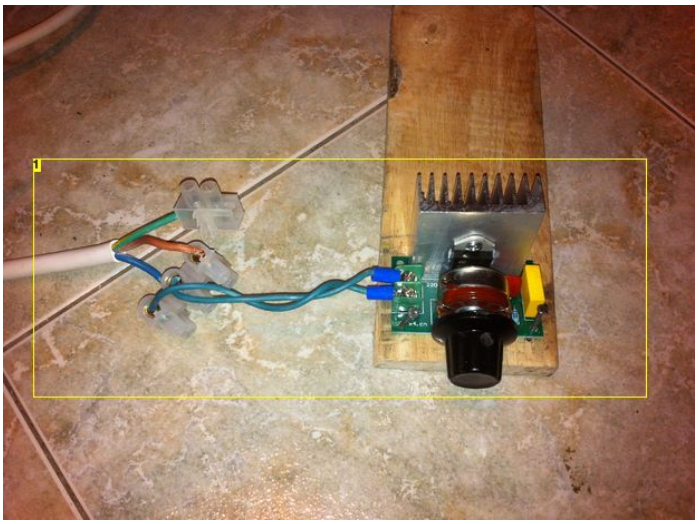


Image Notes
1. phase angle controller wired in.

Step 10: Optional output cooling

this part is optional it's called a Liebig and it cools the output from the still this makes it easier to measure the alcohol level coming out of the still without having to compensate for the temp the liquid is.

if you don't want to do this bit just use a length of 6mm copper pipe to channel the output.

to make the Liebig you need a 50cm length of pipe, I'm using 22mm, and a couple of end caps, and some 15mm pipe.

drill a 6mm hole in the center of each end cap and drill 2 holes in the side of the 22mm copper pipe about 1.5 inches down from the each end.

solder the end caps on and 2 x 15mm pieces over the holes in the side.

cut a 75cm length of 6mm pipe and push it through the end caps so you have about 10cm sticking out one end and solder it in place, you need to make sure your joints are water tight as we will be running water through the Liebig to cool the 6mm pipe which in turn will cool the liquid that goes through it, this is surprisingly effective.

now take a 10 cm length of 15mm pipe and older it to the side of the Liebig at a 45 degree angle to the water inputs and outputs.

bend the 10cm piece of 6mm pipe sticking out the Liebig so it fits in to the needle valve and solder the 15mm pipe (10 cm long one) to the column, this will keep the Liebig at a steady slope down from the column.

bend the remaining 6mm pipe out the other end of the lie big so its shaped to catch the output and go out over the keg.

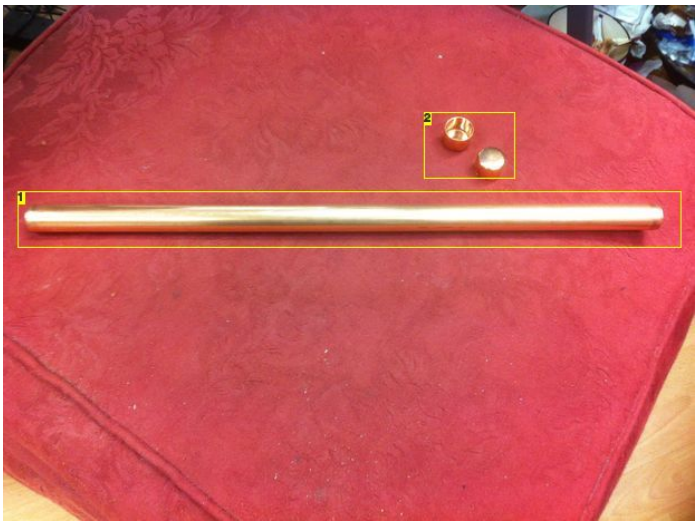


Image Notes
1. 22mm pipe 50cm
2. end caps

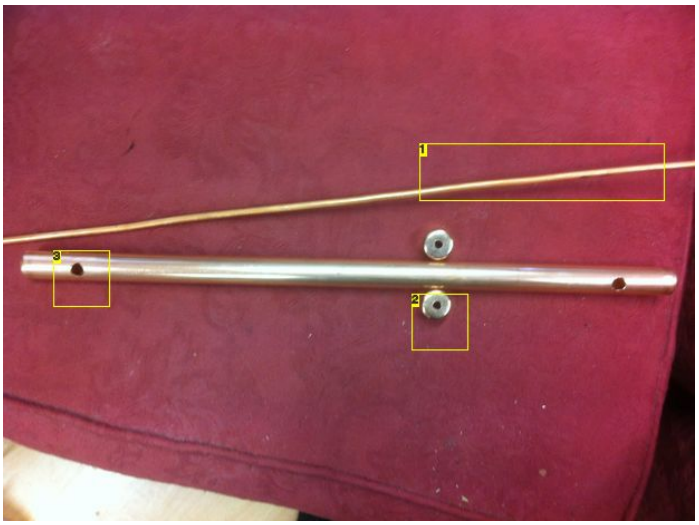


Image Notes
1. 75cm x 6mm pipe
2. holes drilled in end caps
3. hole drilled for the 15mm pipe to go on

Image Notes
1. end cap soldered on

Image Notes
1. both end caps soldered on

Image Notes
1. 15mm pipe soldered on

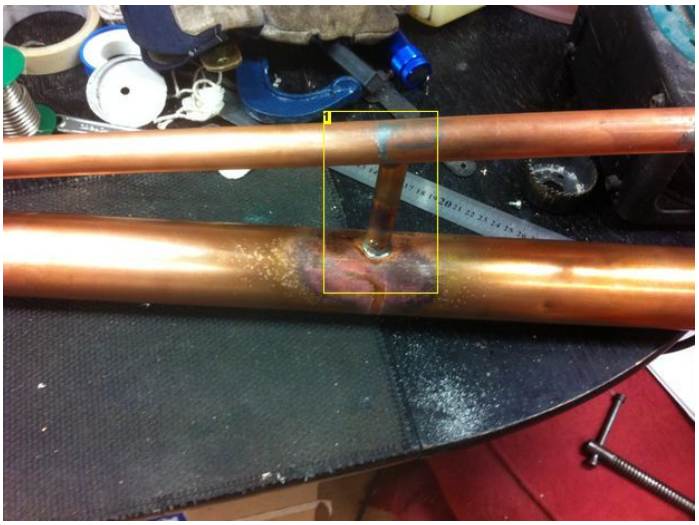


Image Notes
1. attached to the column

Image Notes
1. water in
2. water out, to the condenser coil input

Step 11: Attaching the column to the keg

As I have said in previous steps you will need a 2 inch tri clamp to connect your column to the keg, this is also known as a tri clover clamp.

you will also need a gasket to go between the column and the keg to make an air tight seal so no vapours can escape, you can buy PTFE gaskets but they are designed for the proper 2 inch ferrules that have a special dent in them for the gasket and as such you will have to remove the ridge from the gasket for it to work with your column.

I bought one of these gaskets and removed the ridge using a hobby knife very carefully so I didn't remove wanted fingers.

I then wrapped it in PTFE tape so it would create a better seal, you don't have to have the gasket to do this you could use a ring cut out of card and then cake it in PTFE tape to make the gasket.

once you have your gasket all you need to do is put the gasket on the top of the keg flange and hold your column on top while you put on the tri clamp, not easy on your own but I do it so it can be done.

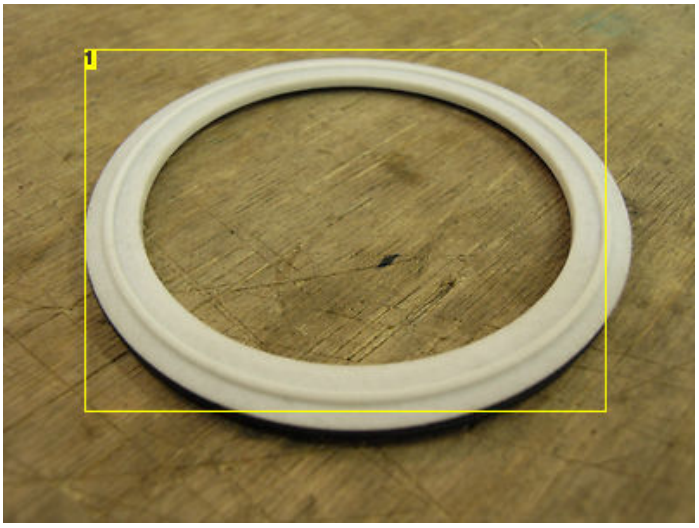


Image Notes
1. this is a standard PFTE gasket notice the rideg, no good for what we need so this gets shaved off on both sides.

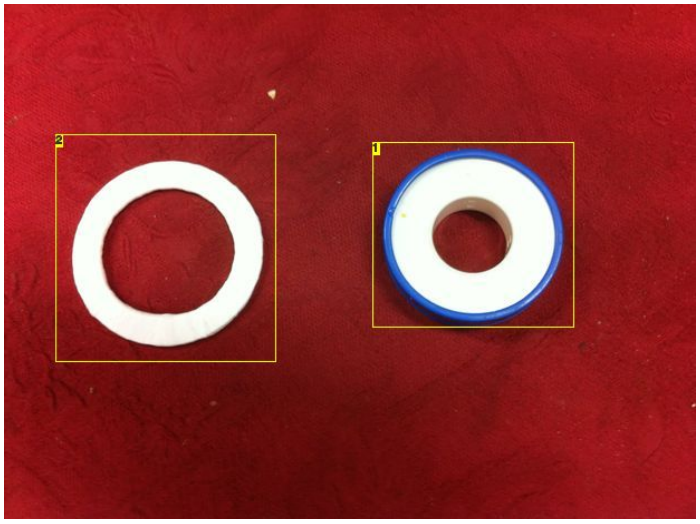
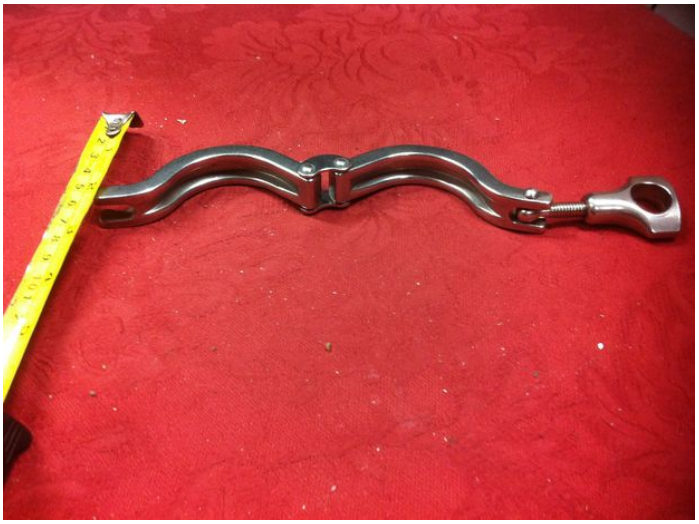


Image Notes
1. PTFE tape
2. Gasket covered in PTFE tape

Image Notes
1. tri clamp, or tri clover clamp



Step 12: Plumbing it in

you need to add your pipes, I used garden hose and some clear PVC pipe I had.

Attach a hose that goes to your water supply to the bottom of the Liebig.

Attach a hose from the top of the Liebig to the inlet on the condenser coil.

then finally attach a hose to the outlet of the condenser coil and put the other end where the water can drain off.

Don't forget to use hose clips for keeping the hoses on.

Image Notes
1. condenser coil inlet

Image Notes
1. water in

Image Notes
1. water out of the condenser coil

Step 13: Cleaning mixes for the still

we need to make sure the still is clean so we dont get funny tastes of flux and other stuff still in the column.

I'm following the recommendations I found on this forum post , it makse the most sense.

1) clean with soapy water

2) rinse with plain water

3) use vinegar and water mix in the still and boil it to produce an acidic vapour

4) alcohol cleaning run, twice, this involves making a cheap wash that will produce alcohol, we will not be able to drink this so basically they suggest making up something that is cheap, I used a basic mix which I will detail below.

You could buy some cheap wine and use that to clean the still or you can make the following wash.

cheap cleaning wash, you can use this as a practice run for your recipes

5kg cheap sugar
2 packets of dry baker's yeast
50g of yeast nutrient
boiled water, to kill any bugs in the water so the wash doesn't go mouldy

ok start off with cleaning everything using steriliser, fermentation vassal, spoon, airlock, hydrometer

boil up some water, I filled the kettle and 2 saucepans, put the boiled water in your fermentation vassal and start to pour in your sugar, you need to dissolve all the sugar, and keep adding boiled water until you reach the 20L mark on your vessel.

let the wash cool down to about 23 degrees C, the reason for this is if it's too high it will just kill the yeast, yeast will die at 40 degrees, and if you're using it above 26 degrees C you will stress the yeast out and it will produce more ester, methanol (bad alcohol, you can't drink it, in fact it's dangerous to humans) and what they call fuser oils.

To produce the good alcohol, most yeasts have to be below 26 degrees and for them to replicate they need to be around 23 - 26 degrees. however if you're using a brewing yeast read the packet as there are some yeasts that can operate at higher temperatures.

so what is fermentation? well basically it's when the yeast breaks down the sugars and turns them in to other substances like CO2 and Alcohol, now these sugars can be pure sugar like we are using in the cleaning wash, or they can be provided by fruits, vegetables or even grains.

whiskey and bourbon are made using grain, so is moonshine (normally horse grain), schnapps is made with fruits like apples / pears / peaches, and vodka can be made out of near enough anything as it's a neutral spirit e.g. a tasteless spirit, well in the US it is, in the UK and Europe it has a tiny bit of flavour.

ok so while you are waiting for your wash to cool down add the yeast nutrient and mix it, take some of the wash and put it in a glass and put the glass in a bucket of cold water to cool it quicker until its 23 degrees C or less, then take it out of the water and add 2 packets of baker's yeast (or brews yeast if you like) mix it up.

This is called a yeast starter, sometimes these are prepared a few days before you want to start your main wash, the key is to make your start wash the same as the main wash as the yeast learns to feed on different sugars, it takes 7 generations for it to learn properly which is why it's important to make your starter exactly the same as your main wash. the purpose of this is to give the yeast a head start.

once your main wash is at 23 degrees C you can add your yeast starter, I'm not too bothered that I haven't waited a few days before adding it as this is just a cleaning mix. give it a good stir, you want to distribute that yeast throughout the mix.

at this point the SG should be about 1.100 and this mix is spot on using the hydrometer to measure it.

pop the lid on and seal it, you should fit an airlock to the lid so the gases can escape but the air can't get in, I put some Vaseline around the edge of the bung to make sure it was air tight.

here is a video of me checking the SG of the wash, now I say in the video the SG at the end should be 90 which is 1.090 on the hydrometer in the blue area, I realised after recording this I was wrong it should be below 1.000 so between 1.000 and 0.900 which is near the top in the yellow section, which means that all the sugar has been converted to alcohol.

I also did a test with just water which you can see here, just so you can see the difference.

during the fermentation process you need to make sure the temperature stays around 23 degrees C, if you find its getting warmer than that put it in a container of water, if it's still getting to warm try putting a little ice in the water.

if you find it getting to cold then you can do the same put in an aquarium heater in the container and set the temp on it to 23 degrees C or whatever your yeast needs to be.

Image Notes
1. yeast nutriant
2. yeast nutriant
3. bakers yeast
4. bakers yeast
5. sterliser
6. 5kg white sugar
7. airlock
8. airlock
9. 18 inch plastic spoon

Image Notes
1. fermentation vessal

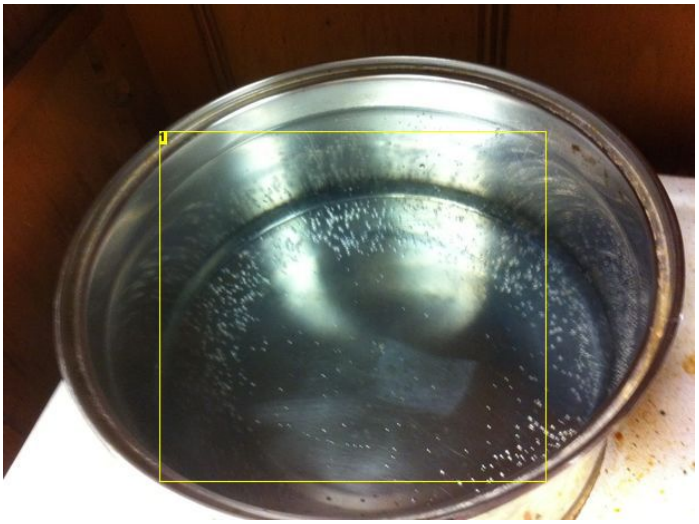


Image Notes
1. boil the water first kill all the bugs

Image Notes
1. follow the instructions on the steriliser

Image Notes
1. add the sugar

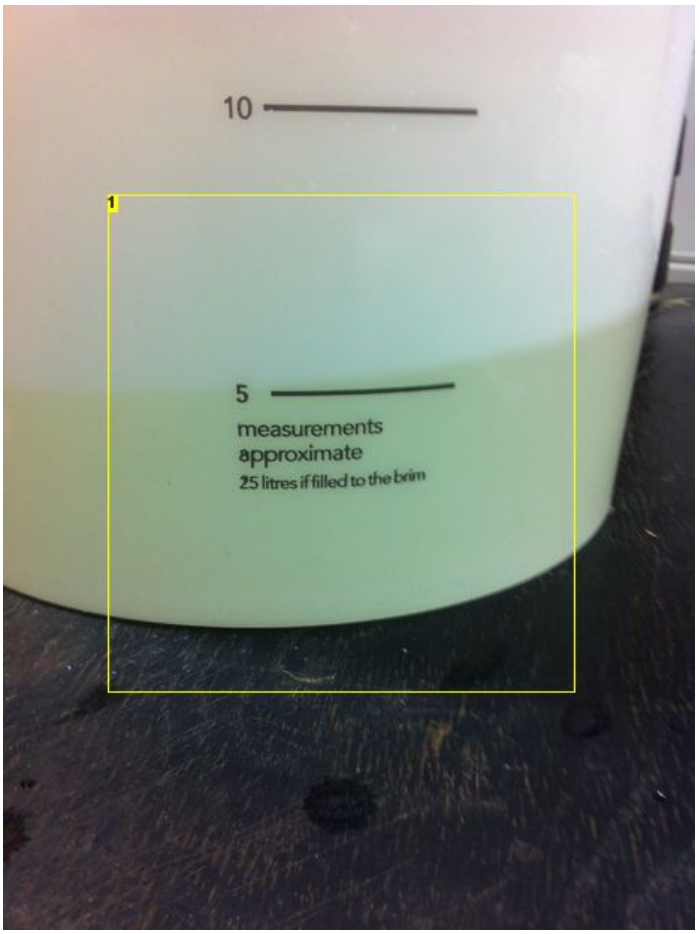


Image Notes
1. 2 saucepans and 1 kettle of water plus 1kg of sugar

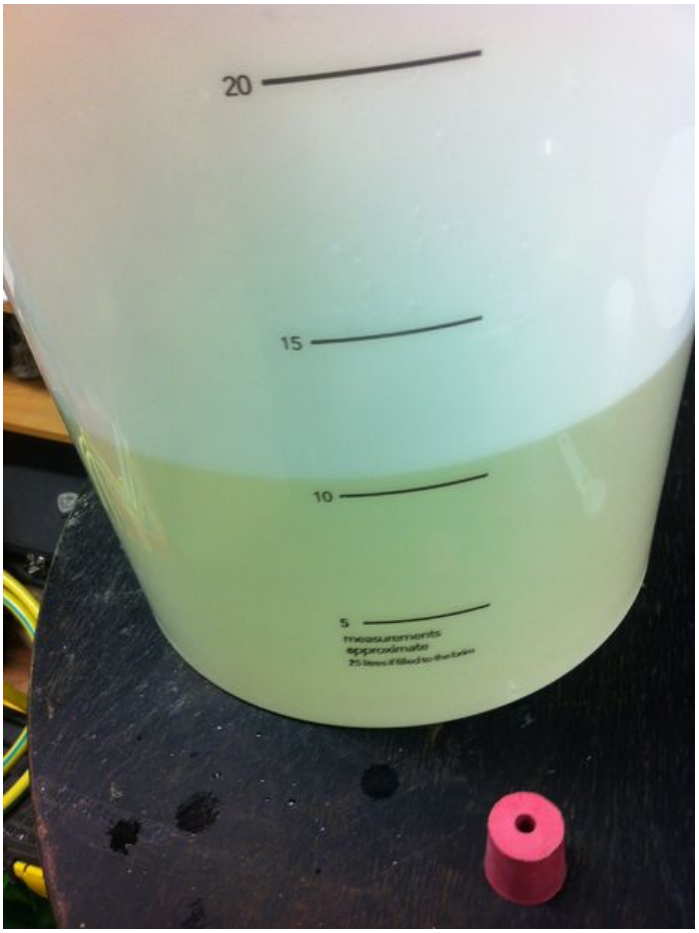


Image Notes
1. disolved sugar
2. disolved sugar

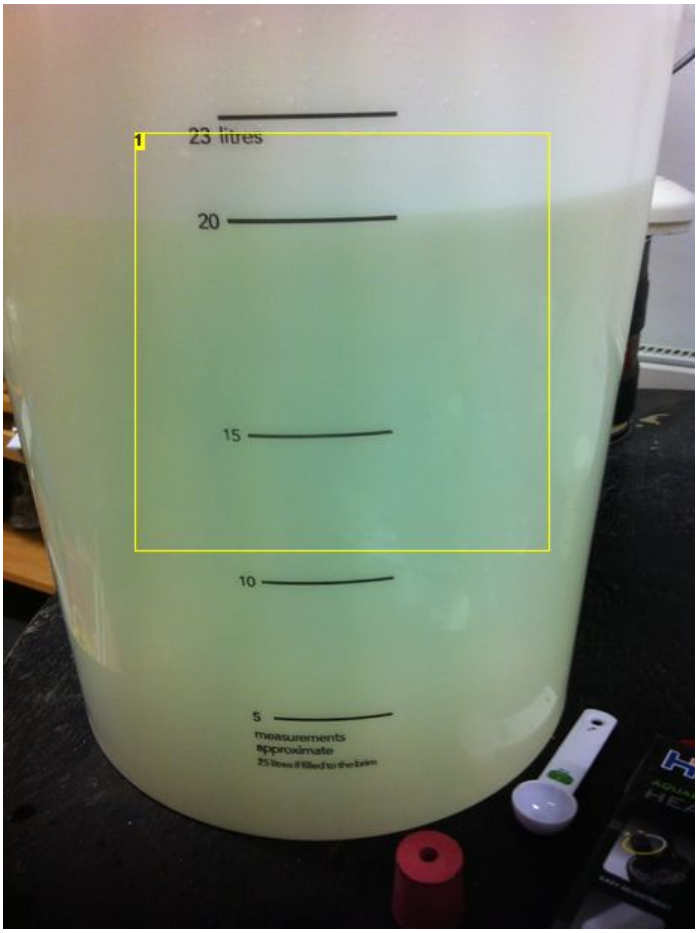


Image Notes
1. thats as full as i want to make it, I want to allow a fair bit of space

Image Notes
1. with the yeast nutriant
2. with the yeast nutriant

Image Notes
1. cooling down a glass of the wash
2. cooling down a glass of the wash

Image Notes
1. its under 23 degrees which is good enough

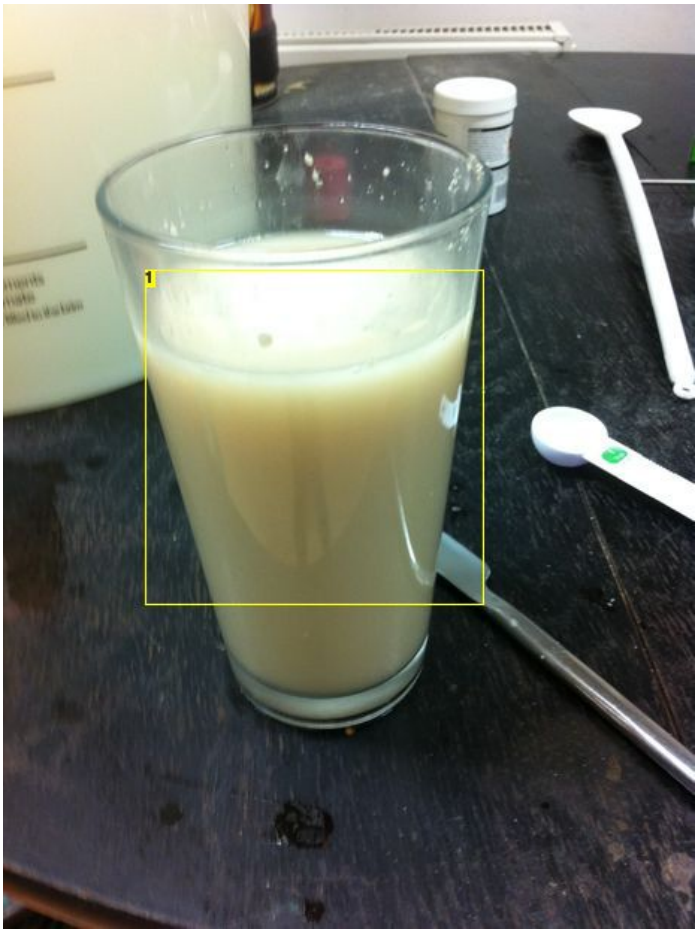


Image Notes
1. yeast added, looks a bit like milk shake, dont think i want to drink it

Image Notes
1. sealed airlock

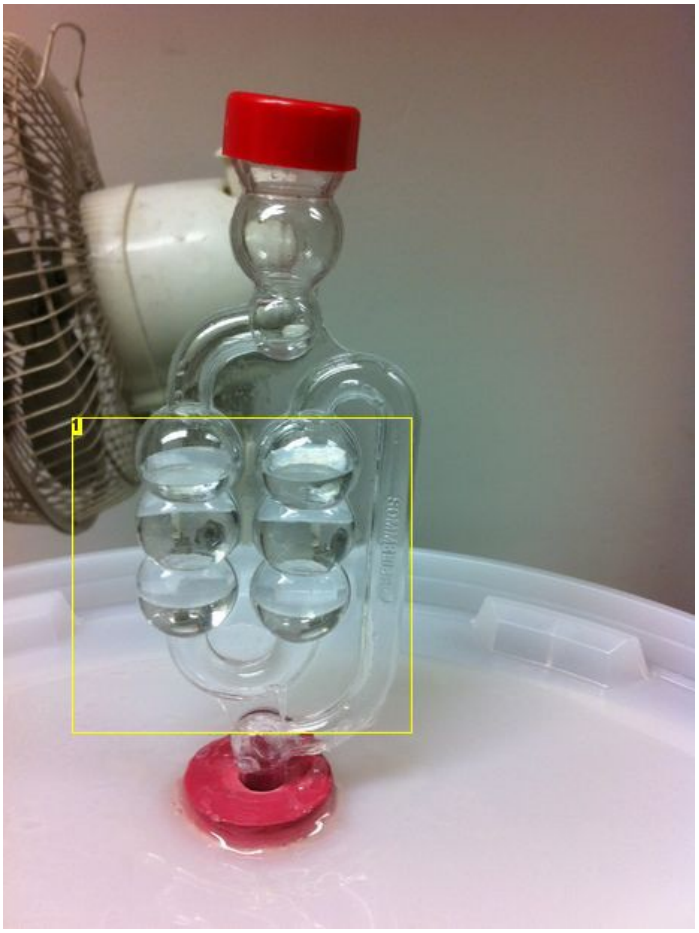


Image Notes
1. airlock has to have a little water in it

Image Notes
1. hydrometer

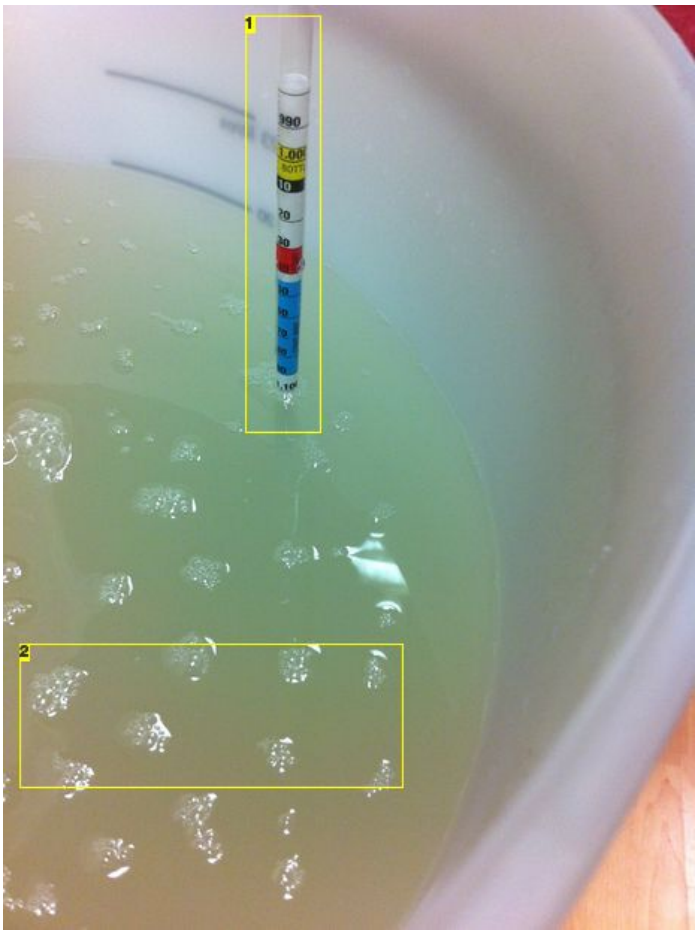


Image Notes
1. 1.100 SG perfect
2. CO2 bubbles from the yeast

Step 14: Running the cleaning mixes through the still

first off run your vinegar mix, make sure you have enough to cover the element and then a few more inches above it, you need to run your boiler at full power until the column temp reaches 40 degrees C then reduce it to half power and turn the water on to your condenser coil, make sure the needle valve on the out let is open and a bucket is under the take off pipe.

once the column reach's about 91.3 degrees you will start to see water coming out of the still, run it like this for a couple of hours.

let it cool and empty out the boiler.

put in your alcohol for the cleaning run, run at half power to start with until the column is at 40 degrees C then reduce it to a quarter and turn on the water to the condenser coil.

when the column gets to 78 degrees C you will start to see alcohol come out, DO NOT DRINK THIS it will have all the oils and fluxes in it from when it was built.

That's it your done, its ready to use normally, for whatever purposes you choose.

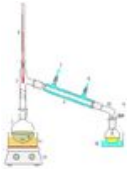
Related Instructables

Understanding: Drinking Alcohol by)-(angman

Building a Whiskey still by densad

Recycle Scrap Wood for the Enhancement of Spirits. by strmrnnr

Moonshine Filter by HuggyBear



How to make Hard Liqour, Wine and Biofuel (E85). by sk187

Alcohol Filter - A Giant Brita for Whiskey, Vodka, Gin, Rum, or Other Cheap Liquors! by letsapocalypso