Instructions for Assembling a Pressure/Vacuum Pot For Casting Blanks from Resins as well as to stabilize woods

A Tutorial by:

Steve Swiger
A.K.A "Stevers"

Pressure and Vacuum Pot.

When I set out to build my pressure/vacuum pot, (hereafter referred to as PVPot) I did a lot of research. I studied the set-ups of several different people. I took all of their ideas and put them together to come up with what you see in this tutorial.
Requirements for my PVPot were:

- Monitor the pressure and vacuum (hereafter refereed to as P/V)
- Switch from pressure to vacuum easily
- Keep the gauges isolated

The system I built seals well enough to maintain the pressure or vacuum overnight within a couple of PSI when under pressure and within one inch of vacuum.

Like most others, I used the Harbor Freight (HF) paint pot http://www.harborfreight.com/cpi/ctaf/displayitem.taf?Itemnumber=93119. It can be found on sale quite often worked very well for this application.

I also used the HF vacuum pump, http://www.harborfreight.com/cpi/ctaf/displayitem.taf?Itemnumber=92475 It also can be found on sale often and also works well. I am able to pull 26 ½ inches of vacuum with it.

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Now for the construction of the system. I started by basically stripping down the tank I got from HF. All of the fittings they supplied were cheap metal parts. I removed the fittings from the top of the lid and then turned it over and "cut" off the paint pick up tube. I cut it close enough to the lid that when you set the lid down on the bench, it sets flat and doesn't rock on the cut off tube. I "cut" this off because I had heard several people mention how difficult it was to get it out. Apparently, this tube is glued into place and therefore very difficult to remove.

Once the lid was stripped down, it was time to begin the assembly process. Be sure and have lots of Teflon tape handy. I wrapped each fitting 5 to 7 times to insure each joint was sealed. Do not to get tape inside the ends of the fittings. You don't want it making its way into the pot or your vacuum pump. (Which really isn't a pump, I'll explain this more later)

Below is a list of the parts I used. This is going to vary; depending on what type of stores you have available to you. Stores will tend to vary when it comes to which parts they have in stock. I had to search Home Depot, Lowe's and Ace to find all the parts I needed. I suggest reviewing the pictures below first and get a good understanding of the overall assembly. You may be able to do it with fewer parts and save some money.
Here is a basic parts list to get you started. Like I mentioned above, availability of parts in your area may vary from mine, therefore you may be able to produce the assembly with less parts and for less money. Again, "review the pictures below and plan ahead".

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(PT = Pipe Thread)
4- 1/4” nipples 1” long PT
1- 1/4” nipple 2 1/2” PT
3- 1/4” elbows, male – female PT
1- 1/4” “T” all female PT
4- 1/4” ball valves PT
1- 1/4” female cap PT
2- 1/4” mail PT air compressor adapter fittings
1- 1/4” male to 1/8”male adapter PT
1- 1/4” female to 3/8” male adapter PT
1- 1/8” elbow male – female PT
1- 1/4” female to 1/8” male adapter
1- vacuum gauge. (I had mine from an old vacuum tester in the garage)

It’s a fairly large bill, so be prepared. Like one of our folks said, “good lord, you probably spent more on the brass than the pot”. If you can save any money on fittings, by all means do so.
The pressure gauge comes with the paint pot. Mine came with 1/4” male PT. Along with the pressure regulator, which has 1/4” male PT fittings at all three ports. The lid has one 1/4” PT hole and one 3/8” PT hole (which has the paint pick-up tube on it). The center hole is for the handle and does not go through the lid. The hole on the inside, (that doesn’t have the tube in it) is 1/8” PT.
Because my PVPot is already assembled, I have no pictures of the aforementioned items in their initial stages. My apologies.

Assembly is pretty straight forward. Although some of it has to be done in order. Some parts can’t be turned to thread into place without hitting other pieces. I just started at the tank fitting and worked my way out. And be patient, I too wanted to get started before the tank showed up. But I would have wound up redoing most of it.
It goes as follows:

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We will start at the air inlet of the tank. 1/4”x2 1/2” nipple in tank lids 1/4” opening, 1/4” “T”, 1/4”x1” nipples in both sides of “T”, 1/4” ball valves in both nipples (now both sides should look the same).

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Now the right side, out of the ball valve, 1/4” elbow with female pointing up, 1/4” to 1/8” adapter, to vacuum gauge.

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Now the left side, out of the ball valve, 1/4” elbow with female pointing up, pressure regulator in elbow facing you, 1/4” female cap in right side, 1/4” ball valve in left side, 1/4” air compressor fitting

The gauge is already mounted on the top of the regulator. That takes care of the pressure inlet and vacuum monitoring section.

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Next I modified the vacuum “pump” from HF. I disassembled the housing it came in and removed the vacuum “block”. All you have to do is remove the four screws from the bottom of the casing and take off the bottom plate. Now just disconnect the fittings holding the block in place and remove it from the casing. Be sure and mark the direction of air flow when you remove it.

The vacuum inlet (or outlet as it could be called), is next. Come out of the tank with a 3/8” male to 1/4” female adapter, 1/4” elbow, now pointing sideways, 1/4”x1” nipple, 1/4” ball valve, 1/4”x1” nipple, 1/4” female x 1/8” male adapter into vacuum block, and be careful to install it with the air flowing in the correct direction. Another thing I need to mention is just how soft the vacuum block is. It appears to be made of aluminum and will crack quite easily if the fittings are cross threaded into it. So please be very careful when threading the necessary fittings into the vacuum block.

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Come out of the vacuum block with your 1/4” air compressor fitting. The fittings that came mounted on the block work well for this. I tried to find a better method to attach the air compressor fitting, but the brass fitting that threads into that end of the block has a unique design which incorporates an “O” ring. The method I used was the best “I” could do with what I had available.

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The last thing is inside the lid. I got the idea from Gary Nichols. Thread the 1/8” elbow into the opening where the air enters the tank. This diverts the air sideways as it enters the tank. This is done to prevent the air from blowing down on to your freshly poured PR and causing it to ripple or even blow out of the mold.

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That’s the extent of the assembly. Next you will want to do a pressure check. The first series of tests I ran where to simply fill the tank with air and let it sit. On the first test, I lost about 3 or 4 pounds of pressure in 24 hours. I did the soapy water test and found only one leak. It was at the cap on the side of the regulator.

This was easily fixed with by re-taping the fitting and threading it back on. Now I have no noticeable leaks in the system.

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Now we will talk about how to use the tank. It's very important the valves are in the correct positions when using pressure as compared to using vacuum. The whole idea behind my system is that I wanted to be able to fully isolate and monitor any part of the procedure at any time throughout the process. With this system, I can be in the pressure mode and turn off and on the regulator at any time I want. I can also be in the vacuum mode and turn off or on the vacuum gauge at any time I choose. One draw back I found with the HF vacuum "pump", is that you can't leave the air supply connected all the time you are under vacuum. Because of the way this device operates, your compressor would run the entire time it was hooked up. The vacuum device works by blowing air by a set of ports in the block causing, what I can only describe as, a reverse air flow affect, which in turn creates vacuum. If you left the air supply on the entire time, the block would allow the air to run at full volume the entire time. It's much easier to understand once you see it work.
Next is a series of photos showing the different "modes" in which the tank may be operated.
First we will look at the pressure side of the system. Note that both valves on the vacuum side are closed. If you leave the inside vacuum valve open, you will pressurize the vacuum gauge and possibly damage it.

Air line connected and filling the tank with pressure,

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Tank full of pressure and air line shut off,

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Tank full of pressure and line removed,

Pressure and Vacuum Pot.

Tank full of pressure, air line off and gauge off,

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Now the vacuum side, note that both valves on the pressure side are closed. If you leave the inside pressure valve open, you will pull a vacuum on your pressure gauge and possibly damage it.

Air line connected to the vacuum block and pulling vacuum on tank,

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Vacuum full and air line off, gauge on,

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This is with the air line off and the gauge off and isolated.

That’s about it. Thank you for taking the time to read my tutorial on building and using the PVPot. This tutorial is meant as a guide to constructing and using this PVPot. The proper use of the materials used/cast/stabilized in this PVPot are up to you. There are lots of great tutorials out there that deal with casting and stabilizing materials. If you have any questions about the construction of this unit please feel free to post a topic on IAP and ask. If you don’t get the answers you need you can also contact me by personal message.