

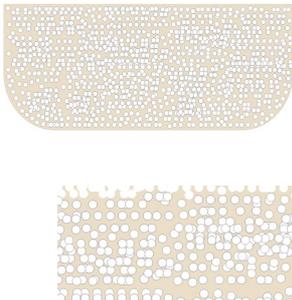
WHAT'S THE HUBBUB, BUB?

Bubbles are bad. In molds they cling to the master part and ruin the finished cavity. In resin they rise to the surface and ruin the part, making it look like a sponge.

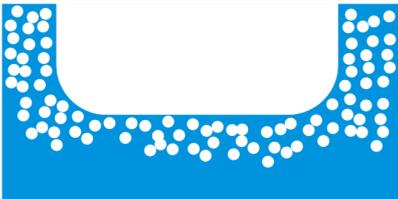
Pressure casting is about two things: killing air bubbles, and making crisp detail.

THEY LURK BELOW

In *Easy Resin Casting - Part 1* we saw how easy it is to make *seemingly* smooth molds and resin casts just by using some simple techniques. But sand or cut that “smooth” resin piece and you expose pinholes! Frothy heating action during curing creates thousands of air bubbles just beneath the surface.



Pressure will crush the bubbles and force thick resin into tiny nooks and crannies, allowing detail never before possible with *ambient* or non pressure casting.



This is a whole new world, and while it may seem scary, it's actually very easy. The catch is that it costs a little money and time to set up. But once set up, it's easy to use.

DANGER!

There's one more catch. BE CAREFUL.

It's not melodrama, but cold hard facts. A Pressure chamber can explode literally like a grenade. That means 252 bazillion fragments of metal (or just one) that INSTANTLY rip through your body like bullets.

No slow-motion ducking like the movies. Rather, you're casually reaching for that thingama—POW! Instant. Totally shredded or dead.

The easy way to avoid this trouble is to use professional pressure-worthy gear or construct your own properly. And to use it safely. Generally, you get hurt AFTER you take off the safety gear, and make “just one little adjustment...”

THE BASICS

Pressure worthy Molds

With ambient casting the resin just sits comfy in the mold cavity. The result is a *surface-smooth* resin part.

Once you add pressure, though, the resin presses tight into the cavity, into tiny air bubble pockets, or breaks through a smooth but thin skin of rubber into air bubbles deeper inside the mold body. The result is a solid resin part but with pimples and warts.

To pressure cast, you *must* make pressure-worthy molds.

When the thick and goopy rubber (RTV) is mixed, air is trapped inside as bubbles. Elephants (the weight of the outside air) sit on top and the bubbles can't escape.

The **pressure** solution is to *add* lots of elephants. The extra weight (pressure) crushes the air bubbles until they are microscopic and not a threat.

This works for casting, too. When you see a clear resin part, it has been cast with pressure. Otherwise the air bubbles show, either as a few bubbles or a cloudy white mass.

Vacuum Solution

The vacuum solution is to *take away* the elephants with "degassing" (or "de-airing"). The mold is put in a vacuum/pressure chamber, and the air is sucked out, letting the bubbles foam up and break free. The foam becomes about three times as big as the original mix, and after a couple minutes the vacuum is released and the rubber settles down to liquid again. This works very well. The only negative: vacuum systems are expensive. Cheap alternatives to a true vacuum pump (venturi pump, brake pump, etc.) do not generate enough vacuum to degas properly. *Since pressure works equally as well, we will not explore vacuum degassing.*

Bass-ackwards

Some casters do things differently. WE DO NOT RECOMMEND THESE ALTERNATIVES AS THEY DEFY LOGIC AND YIELD POOR RESULTS. We mention them only for completeness.

Some few casters swear by Vacuum only. They degas their mix, and then *degas the poured mold* (or just degas the poured mold). The RTV foams out of the mold and makes a big mess. When vacuum is cut the RTV does not always return to every nook and cranny, and undercuts can be left empty or trap *new* air.

Some casters *degas resin*. This is almost an impossible task, as even “slow” resin kicks fast. Some will degas the resin as it cures! But it’s no good having your resin bubble out of your mold.



THE CHAMBER

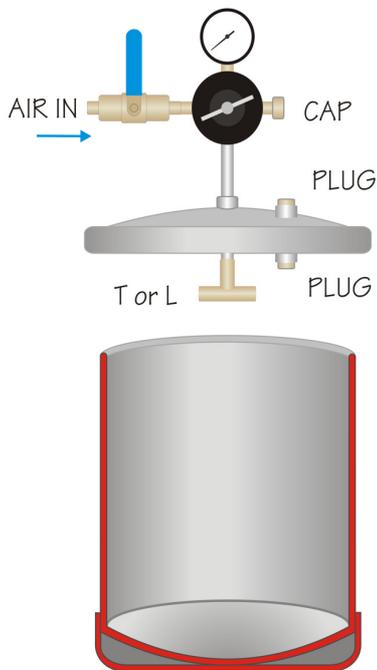
A Paint Pressure Tank (Paint Pot or Paint Tank) used for industrial spray painting is a simple, safe, and fairly inexpensive pressure chamber (and it can be used as a vacuum chamber, too).

Paint Tanks are usually 10 liters (2.5 gallons), rated for about 415kPa (4kg/cm² or 60psi), and have everything you need. They come with a gasket, hinged clamps, a regulator valve, and sometimes hoses. In the USA, Harbor Freight (www.harborfreight.com) sells a few models, one starting at US\$80. Outside the USA you may pay US\$150-250. Sometimes they are available in hardware stores.



Pressure Chamber Lid

The Paint Tank lid requires some minor plumbing modification. Brass fittings are available at hardware, plumbing, and refrigeration/gas stores.



The tank is made for paint, so you must either remove the paint pickup tube and plug the hole, or leave it and just cap the top fitting. It's a long tube that can get in the way, so even though it requires effort, it is best to remove.

The tube may be sealed with Loctite. You'll need to use a torch to heat and break the Loctite. After some muscle you can remove it and the top fitting. Threaded brass plugs, one inside and one outside, will seal the hole safely. Teflon tape in all this plumbing is a must. Additional sealing can be done after with plumbing caulk/silicone sealant.

The regulator may have a 3-way fitting. The third spare fitting has to be capped.

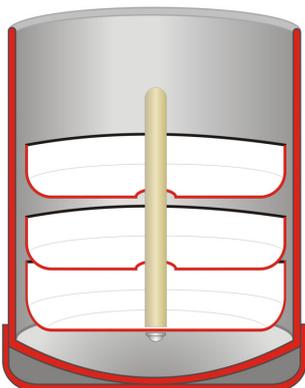
The air enters from the regulator and just blows straight down. This may harm anything directly below (air rushing in with great force). To diffuse you can add a T or L (elbow) at the top, so that the air blows left and right or to one side.

It is handy to add a ball valve shutoff to the regulator. Again, all this plumbing will need various collars, nipples, and up/down adapters. Be prepared to go to several stores to get all the fittings and spend about US\$50.

Bottom and Racks



The Pressure Chamber inside bottom is not flat but rounded concave. Handy for liquid paint, not so good for placing molds that must be level. You can cut a circular piece of craftboard/masonite, or better, use a cheap plastic microwave steamer set.



The steamer set comes in two and three tier versions (three is obviously better). Each tier has holes for flow-through, and the whole thing fits a standard paint tank perfectly, resting quite nicely on the concave bottom (its edges rest on the sloped edges of the tank). There's no need to use the steamer lid.

To quickly and easily place and pull the set out, add a dowel handle to the center. Just cut holes through the center of

the tiers, and screw the dowel straight onto the bottom tray (a round head screw is OK, it will not touch the concave bottom of the chamber).

Now you can fill the steamer rack with lots of little molds (biggest and tallest on the top tier).



Air Compressor

You need to generate about 310kPa (35-45psi) to crush bubbles. Some casters like 50-60psi, but too much pressure is unnecessarily dangerous and may distort molds and parts. Too little is the same as none. 40+psi tests work well in the AMP set up.



An airbrush/hobby compressor, one of the small 1/8th or 1/5th horsepower (hp) units, probably won't be big enough to do the job, but you can experiment before buying a bigger compressor. You need to pressurize the chamber smoothly, in about 10-20 seconds. Too fast might push resin out of molds, and too slow will let the resin kick before reaching full pressure.

If you do need a new compressor, or don't have one at all, you should be able to buy a 2-3hp one from a hardware store for US\$100 to \$175. These usually have an ample tank of 24 to 60 liters (6 to 10 gallon), and can also be used for air brushing. Most come with a regulator. You will **definitely** need to add a moisture trap, water pulled from the compressed air is bad for casting and painting.

PRESSURE RESIN CASTING

Prepare your molds and resin as normal (see Part One). The only difference to normal is that you will be placing the poured molds into the Pressure Chamber. You want to move fast from the last of the pour to pressurizing: you must get pressure to the resin *well before* it kicks.

- 1 CHARGE the air compressor to about 400Pa (60psi)
- 2 Place MOLDS in **separated** steamer racks
- 3 MIX RESIN (you now have the luxury of being fast and sloppy and tornado-like, because any air bubbles will be destroyed by pressure)
- 4 **QUICKLY** POUR the resin into the molds – do not worry about pushing air out as you pour, and **make sure** you leave a slight rounded heap of resin on top, whether on top of a vent in a two-piece mold, or the open face of a one-piece mold. This will ensure there is enough resin to be pushed down into the mold and not skimp on your resin part.
- 5 **QUICKLY** STACK the steamer racks and PLACE in the Pressure Chamber
- 6 **QUICKLY** SEAL chamber with clamps – nice and tight
- 7 **SLOWLY** OPEN air intake on pressure chamber, smoothly flooding it with with high pressure air from compressor. Let it come in smoothly, building to 315kPa (40psi) over about 10-20 seconds (a quick burst could push resin out of the molds and ruin the casting).

WAIT your recommended cure time plus a bit...

- 8 VENT the pressure chamber by releasing the pressure relief valve, remove the lid

Open face casts will have a VERY shiny exposed face and look VERY smooth. If you sacrifice one for testing and cut it in half, the piece will be smooth and solid inside with no pinholes. (Compare to an ambient cast and laugh!)

PRESSURE MOLD MAKING

Pressure moldmaking is the same as pressure resin casting, except that you have much more working time due to RTV's slower kick time.

Also, because of the pressure, you don't have to "paint" a thin coat of RTV onto your master, just dump it over the part, make sure you have ample in the mold, and pressurize.

It's all THAT easy! You'll be making solid and gorgeous parts and molds every time.