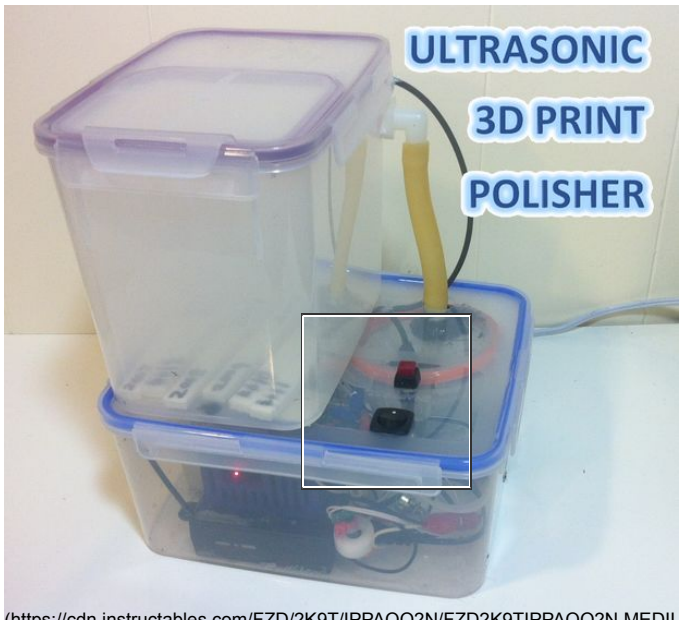
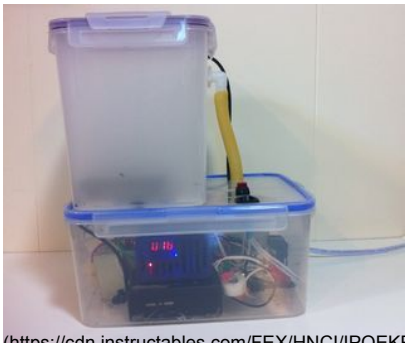
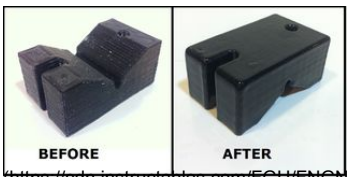
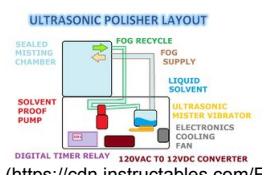
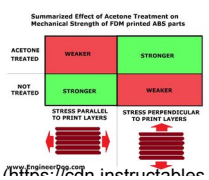










Show All 8 Items

It's been over a year since I published a popular Instructable about ultrasonic misting ABS 3D printed parts with acetone vapor. A couple months ago I was inspired to revisit this project by the professional 3D printing "Polysher" machine on Kickstarter (https://www.kickstarter.com/projects/polymaker/polysmooth-and-polysher-3d-prints-without-layers).

In this instructable I've redeveloped my original ultrasonic polisher proof of concept into a more polished and professional tool with key functional improvements.

Additionally, after perfecting the machine I performed experiments involving mechanical testing of acetone polished ABS specimens in various orientations; and **I observed some very interesting results**! (See final step)

In case you didn't see the original project (https://www.instructables.com/id/Ultrasonic-Misting-3D-Printing-Vapor-Polisher/), my goal has always been to build *"...a machine that lets me quickly drop parts into a transparent container and be able to press 'go' and have the machine produce a predictable finish on its own. I do not want to have to put together a really involved setup that may be a fire hazard, fume hazard, or something that produces unpredictable surface finishes. Essentially I want something as convenient as a microwave*."

The original project involved repurposing the electronics from an ultrasonic water humidifier so that they could be used for acetone instead. The acetone mist/fog was then blown through an open system and filtered through a water

bowl before venting into the room.

The result of that project was a functioning polisher that I could operate inside the house, but not without a bit more effort than I had wanted. In practice the water in the filter would readily absorb the acetone, but the water needed to be changed after every use and the process was wasteful with the acetone. Additionally, the form factor of the entire machine was not visually pleasing or fun to lug around.

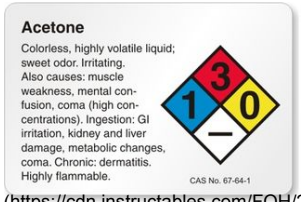
So after a couple design iterations I've improved the old design into something even more awesome!

The user interface is now simply an ON/OFF switch and a single momentary button for 'go'. The new design now uses a closed pumping system and has been optimized for maximum fog production; So it is completely sealed allowing for indoor use, it takes less time, consumes less acetone to do the job, and no water ever needs changing!

And finally the entire machine is built into one single transparent assembly, so it looks good and is easy to transport to Makerfaires! (See you at PDX-mini this fall!)

Step 1: Polishing Chemicals, Safety First!

(https://cdn.instructables.com/FCG/3YZD/IPRAOOYU/FCG3YZDIPRAOOYU.MEDIUM.jpg)



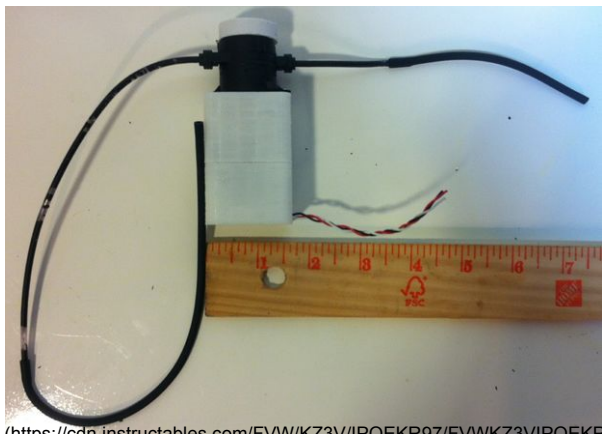
The first thing that must be said here is that the solvents used by this machine are **flammable** and irritating to your eyes, skin, and respiratory system. *Always* read the MSDS sheets for chemicals before using them, *always* wear appropriate personal protective equipment when handling chemicals, and *always* keep solvents away from open flames, sparks, and other possible ignition sources!

Personally, when pouring chemicals I just wear safety glasses and make sure to have adequate ventilation. If you have super sensitive skin then use latex or viton gloves are resisn(not nitrile or PVC).

Despite what is commonly repeated, acetone (and isoproptyl alcohol for that matter) is actually a fairly safe chemical as far as human exposure is concerned. Though it doesn't smell good, you would have to be exposed to a lot to actually be harmed. It is just an irritant in low concentrations, all the bad stuff happens at high concentration levels. Acetone is not regarded as a carcinogen, a mutagenic chemical, nor a concern for chronic neurotoxicity effects.

The device in this instructable uses materials which enable the safe indoor use of acetone for polishing ABS or isopropyl alcohol for polishing 'PolySmooth' material. Specifically, the tubes are EPDM rubber and latex rubber. All clear containers used are polypropylene. Please do not mix chemicals or use different chemicals than I've recommended without doing appropriate research first!

Step 2: Gather Tools & Bill of Materials



Show All 10 Items

Tools: Electronics soldering equipment & wire strippers, drill & drill bit set, light duty hand tool set.

Materials:

None of these parts are optional nor are many easy to substitute for. Fortunately they are all readily available online at the links below. If you are upgrading from having built the original device then you'll need all new parts except for the humidifier itself.

(1) Crane Adorable Ultrasonic Cool Mist Humidifier (http://amzn.to/28ODbg2) - Frog/cow/pig/owl/duck/etc :)

(1) Solvent-Proof 12V Pump Assembly (https://engineerdog.com/store/pump-2/) (This critical part can only be found through this link. I know because I searched forever for a solvent proof pump, until I ended up sourcing all the parts and building it myself! This little baby turned out great though! It can run continuously pumping liquid, gas, and anything in between.

(1) RTV Silicone Glue (http://amzn.to/28Kg99V) (Silicone is very resistant to chemicals)

(1) 12V Digital Timer Delay Relay Module (http://amzn.to/28JfeUv) (The 3D printed case files are provided in step 5)

(1) 17 Cup Clear Air-Tight Polypropylene Tupperware Bin with Flip Lid (http://amzn.to/28O0ode)

(1) 18.5-Cup Clear Air-Tight Polypropylene Tupperware Bin (http://amzn.to/28WjsrA)

(1) 1.2-Cup Clear Air-Tight Polypropylene Round Bin (http://amzn.to/28RGnpV)

(1) 120VAC to 12VDC Power Adapter (~2 A+) (http://amzn.to/28Oz6sa)

(1) Computer Case Fan (http://amzn.to/28O2l9J) (I used 40mm^2 x 20mm deep) (A fan is NOT optional, the piezo-electric shaker from the humidifier creates heat that must be removed from the system.)

(4) Adhesive Mounting Strips or a roll of Double Sided Foam Tape (http://amzn.to/28QQj3K) (For attaching bins together. Most glue wont work for this because polypropylene is so chemical resistant!)

(1) Electronic switch - SPST toggle (http://amzn.to/28OyUaX)

(1) Electronic switch - Momentary (http://amzn.to/28O7fU5)

Recommended Tube Fittings (Likely available at your local hardware store. Mcmaster Carr Linked.)

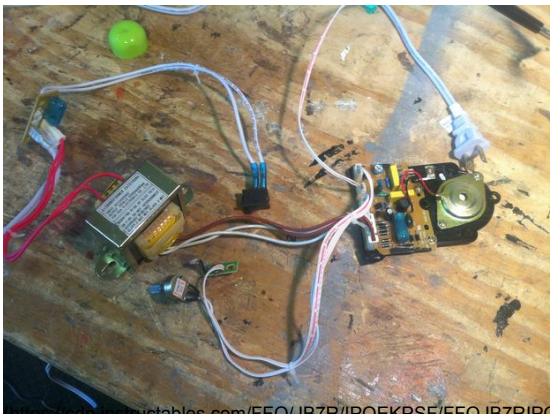
(2) Nylon or Acetal Barbed Tube Fitting (http://www.mcmaster.com/#5047K115), Straight for 3/32" Tube ID x 1/4"-28 Male Pipe

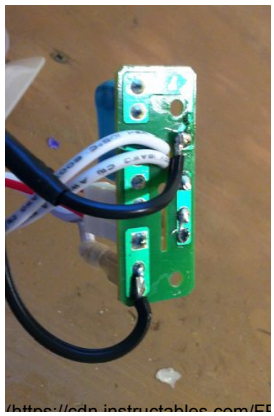
(1 ft) Super-Soft Latex Rubber Tubing Semi-Clea (http://www.mcmaster.com/nav/enter.asp?partnum=5234K261)r, 1/2" ID, 5/8" OD (or this latex free alternative (https://www.mcmaster.com/#9776T17))

(1) Nylon or Acetal Barbed Tube Fitting (http://www.mcmaster.com/nav/enter.asp?partnum=5047K19)*Straight* 1/2" Tube ID x 3/8 Male Pipe Size

(1) Nylon or Acetal Barbed Tube Fitting (http://www.mcmaster.com/#5047K39)*Elbow* 1/2" Tube ID x 3/8 Male Pipe Size

Step 3: Take Apart & Prepare the Humidifier





Show All 11 Items

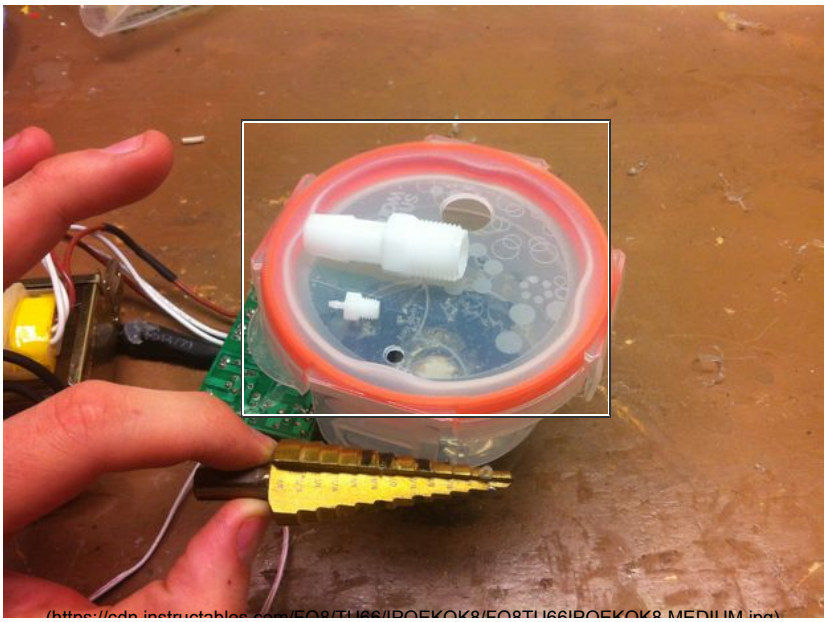
Dissect the frog (humidifier)! The humidifier comes with a power cord, power switch, potentiometer, float switch, and on/off lled. We will use everything so there is no need to cut out any electronics. All you need to do is take apart the humidifier with your screwdriver!

The potentiometer controls the fog intensity. In this version i decided to max it out and just leave that control inside the box. Better to make more fog and adjust the timer for less time!

When it is all apart all you have to do is cheat the float sensor into thinking it is ON all the time by zip-tieing the float in what was the up position. **Note: Do not to operate the humidifier dry!** Im sure there's a reason they installed this float switch.

On that note, the humidifier circuit has been pretty durable in practice. I've only ever bought one and it got heavily handled while I iterated designs to get to this point.

Step 4: Prepare the Liquid Solvent Reservoir



Show All 8 Items

In this step you drill the holes in the bottom of the plastic 1.2 cup tupperware so you can mount the vibrator. Measure and drill 4 mounting holes and one big center hole for the vibrator itself. The big hole will be leak proof because of the rubber seal but the tiny holes are trickier. Solvents will dissolve most any glue you use here so drill your mounting holes as small as possible.

Fasteners shown are 2" long #8 pan head machine screws. But you can use anything you want.

Ive determined from research and lots of trial and error that silicone glue is the only way to go. Use it liberally on both sides of hole seals. When you drill the holes in the lid for the tube fittings make sure to size them as small as possible. You want the fitting to thread itself in and seal the hole mechanically as much as possible.

Maximizing Fog Production: During the new build experimentation process I noticed that sometimes the fog production would be inconsistent for seemly no reason. After some experimenting I determined that the amount of fog production was controlled by 3 critical variables in order:

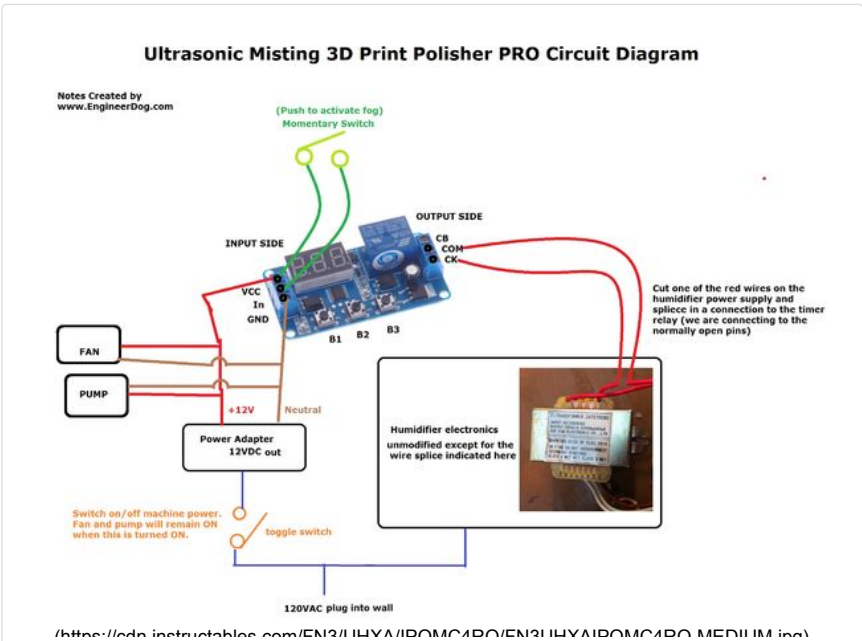
1. Everything needs to be completely air tight. I even used silicone to glue the misting container shut to make 100% sure it was sealed.

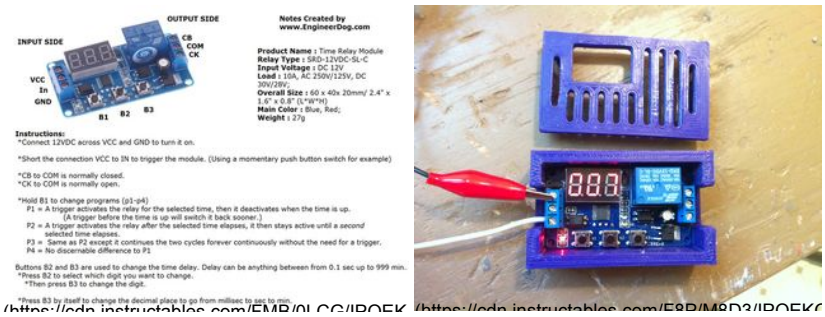
2.Depth of the acetone in the misting chamber (shallow = more fog)

3. Diameter of the fog delivery tube (wide tube = more fog)

4. Length of the fog delivery tube. (short tube = more fog)

Step 5: Wire Up the Digital Timer & Solvent Pump





This design is a case for a digital programmable timer relay, which turned out to be a handy little tool. You can use it to turn electrical devices (AC or DC) on and off at programmable intervals, or when activated by a switch. For detailed wiring, see diagram.

You can program the time from 0.1 sec up to 999 minutes. It can also switch AC OR DC loads. Anyway I sat down and created some instructions as well as the 3D printable case model attached to this step.

*The Pump and cooling fan get 12VDC power directly. They are ON as soon as the main power switch is turned on.

*Fogger circuit is the only thing controlled by the timer relay. The momentary button is wired to trigger this timer relay to turn ON the fogger and begin a countdown. When the countdown is done the timer relay switchs OFF the fogger. (If you press the momentary button while a fogging is in progress then the timer starts over

Timer control box bott...

Download (https://cdn.instructables.com/ORIG/FX9/PBBM/IPPAOZUE/FX9PBBMIPPAOZUE.stl)

View in 3D

(https://cdn.instructables.com/ORIG/FX9/PBBM/IPPAOZUE/FX9PBBMIPPAOZUE.stl)

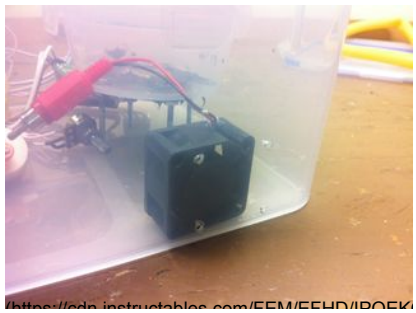
Timer_Lid_with_Wind...

Download (https://cdn.instructables.com/ORIG/FJ8/9FEY/IPPAOZUK/FJ89FEYIPPAOZUK.stl)

View in 3D

(https://cdn.instructables.com/ORIG/FJ8/9FEY/IPPAOZUK/FJ89FEYIPPAOZUK.stl)

Step 6: Prepare the Big Tupperware



Show All 8 Items

Drill 4 tiny holes and 1 big hole to mount the fan so that it can suck in fresh air. Drilling accuracy is not important but you do want to make sure you locate the fan so that it blows onto the bottom of the solvent reservoir.

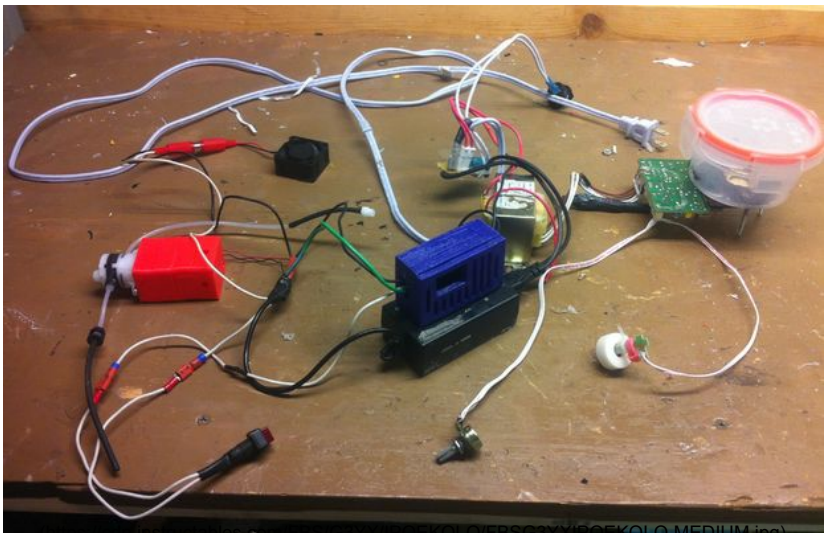
Drill a couple dozen small holes on the opposite side so that the ventilation air flows all the way across the box.

Drill two holes for the fittings and use the fittings themselves to thread their own holes. **Make sure to position the big fitting (fog inlet) below the small fitting (air re-circulation), otherwise you will suck out fresh fog**!

Drill

Use the double sided tape to attach the two bins together. I recommend this rather than glue because glue doesnt stick very well to polypropylene because it is so chemical resistant.

Step 7: Drop Everything in the Tupperware

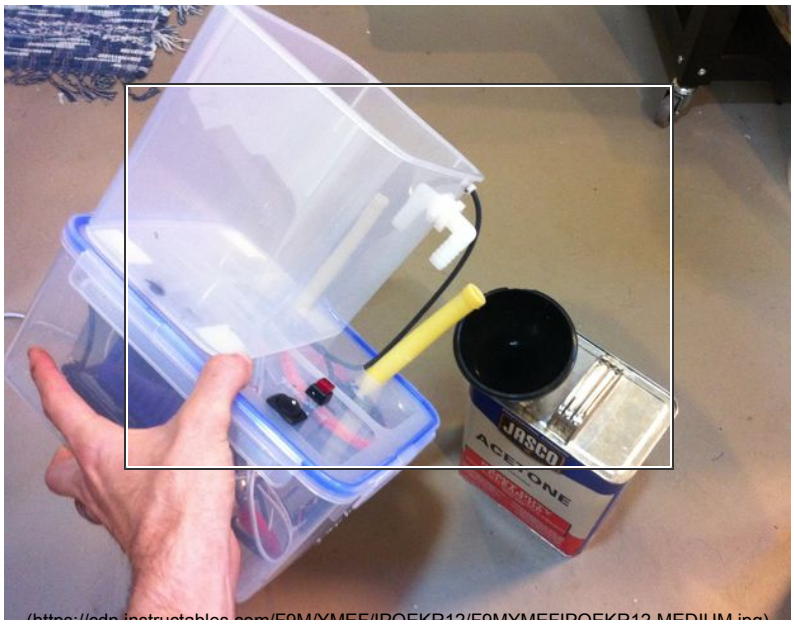


Show All 7 Items

At this point you should have a big ball of functioning electronics and all you need to do is jam them in the box. Use the double side tape to hold the electronics where you want them so they dont shake around.

The pump will function sideways and upside down, but not if the tubes are connected backwards. The shorter tube is the pump output. This gets connected to the solvent reservoir as shown in the diagram in the introduction.

Step 8: FILL 'ER UP, PLUG, AND PLAY!

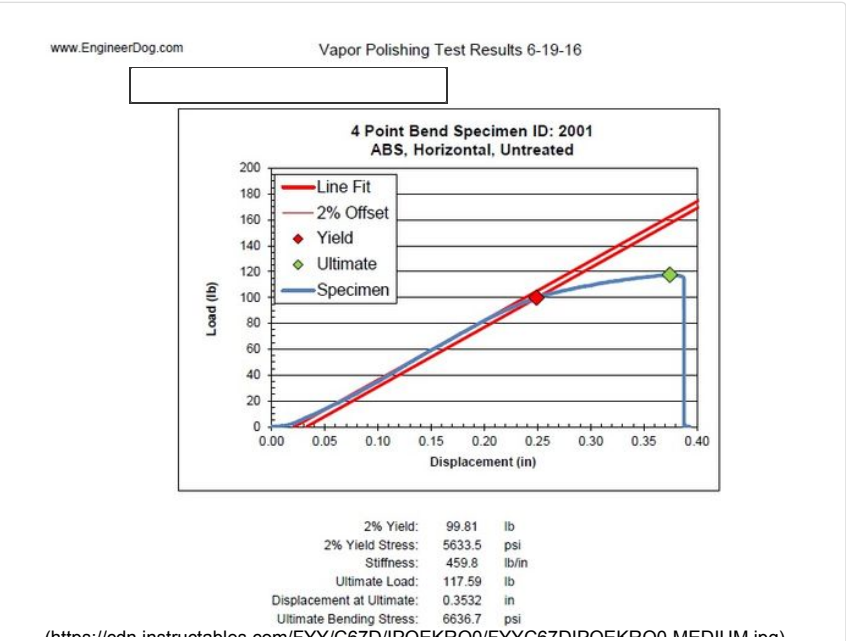


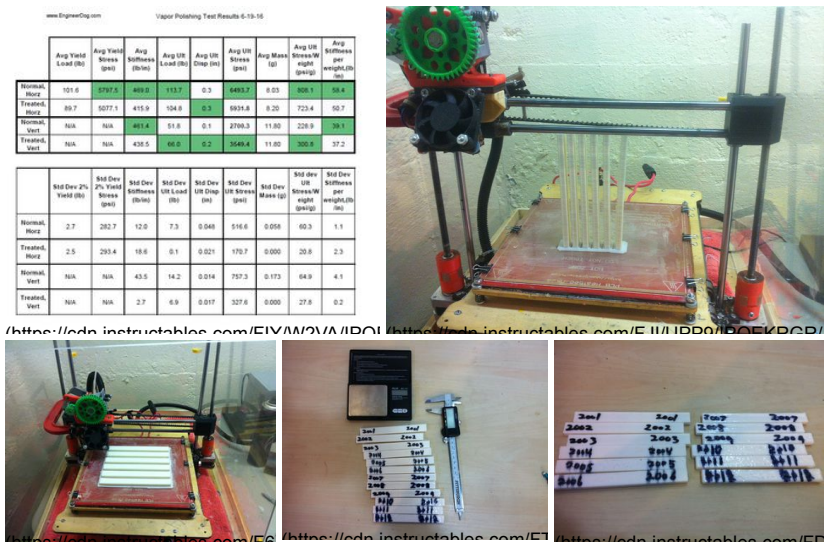
I got a funnel from the dollar store to aid filling. Only fill it halfway, less fluid = more fog but too little fluid may hurt the misting hardware. Don't run it empty! On that note I have noticed that this design is much more conservative with the solvent because it is being recycled within the system. That giant can of acetone will last a lonnng time.

EDIT: Since I forgot to say this anywhere else, I should note that **it doesn't necessarily take 24 hours to smooth a print** like I showed in my video. The actual exposure time is limited to the programmed time (360 seconds here) that the ultrasonic is ON, and for a little longer for the residual fog to clear out. The longest step is waiting for it to dry.

Acetone leaves the plastic surface too squishy & sticky to touch for a while. You can open the lid to let it dry sooner, but I just let it sit for a day all sealed up. **Being able to do that right there is one of the biggest benefits of this contraption, that it only applies a dosed amount of acetone**. If you forget to take your part out you won't come back to find a puddle of goo.

Step 9: Mechanical Testing of Acetone Polished ABS Parts





Show All 11 Items

Curious about the mechanical effects of exposing ABS plastic to acetone, I used a previous Instructables project to perform some experiments. Last year I built a small universal load testing machine (the Testrbot) (https://www.instructables.com/id/TestrBot-The-300-Universal-Test-Machine/) that can measure force and displacement to high degree of precision.

So over the last week I 3D printed ABS specimens in two different orientations, treated half of them with acetone, and broke them on the Testrbot to see how the orientation and acetone affected the printed parts.

The results were very interesting! (complete report attached.)

My testing shows that acetone treatment has two measurable opposing effects on ABS FDM 3D printed parts:

1) A chemical weakening of the material structure

2) A mechanical strengthening of layer bonds via the reduction of surface stress concentrations. (This effect was anticipated but up until now it was never tested for.)

This testing has shown that effect #1 outweighs effect #2 to decrease the part strength by 9% in all stress conditions **other than Z-axis loads**, in which effect #2 outweighs effect #1 to increase the part strength by 31%.

Regarding effect #1, these new results agree with previous testing done (by me in 2015) in effect but not in magnitude. My hypothesis is that the additional drying time that I gave the new specimens helped remove all traces of acetone which may have contributed to additional softening of the specimens in the

previous testing. (Well, that and because I put all the parts into a DIY plastic dehydrator (https://www.instructables.com/id/DIY-3D-Printing-Filament-Dryer/) for 3 hours to aid drying!).

The overall effect of Acetone vapor polishing on ABS effectively makes parts somewhat more isotropic. That is, they react more uniformly to applied loads from various directions. In this case, polishing sacrifices strength in their strong axis to increase strength in their weak axis.

Well that's all I've got today. That was a few months of work there so I hope you enjoyed it and that you take a second to vote for this project in the contests!

ABS & Acetone O

Download (https://cdn.instructables.com/ORIG/FET/J7RZ/IPOEKPNI/FETJ7RZIPOEKPNI.pdf)

(https://cdn.instructables.com/ORIG/FET/J7RZ/IPOEKPNI/FETJ7RZIPOEKPNI.pdf)

Comments

We have a be nice comment policy.
Please be positive and constructive.

I Made it! Add Images Post Comment

Baeumleflo (/member/Baeumleflo/) 2017-07-12 Reply

No offence but if you deal with solvents you should use grounded metal containers to avoid getting static charges when handling and operating the device.

jorgemarmo (/member/jorgemarmo/) 2017-02-13 Reply

ok, here I go....

1) somebody already mentioned before, but was too late for me, the small black fogger is indeed acetone soluble....

2) however today I got this model, https://fr.aliexpress.com/item/DC-24V-19W-Ultrason... (https://fr.aliexpress.com/item/DC-24V-19W-Ultrasonic-Mist-Maker-Air-Humidifier-Waterscape-Atomization-Atomizer/32725166052.html?spm=2114.13010608.0.0.0P8w02)

I immerged it for a couple of hours in acetone and is still working. I'm leaving it overnight, but I'm optimistic.

3) there is also this model with the piezo and the driver... https://fr.aliexpress.com/item/38V-Humidifiers-acc... (https://fr.aliexpress.com/item/38V-Humidifiers-accessories-General-Control-panel-circuit-board-sprayer-plate-pulverizer/32610450535.html?spm=2114.13010608.0.0.0P8w02)

Which I beleive is almost the same as mr. Frog gutts....

4) I'm planning to use a first reservoir that will pour the acetone in a second one (using some capilarity effect) containing the fogger in order to always keep the level to its "optimum"...

5) about the pump.... What about a simple aquarium diaphragm pump? The diaphragm is made out of rubber so it might work, right?

Type 1 https://www.amazon.com/Generic-Diaphragm-Pump-wate... (https://www.amazon.com/Generic-Diaphragm-Pump-water-Aquarium/dp/B00MP4BKL2)

Type 2 (the old noisy pump) https://www.amazon.com/VicTsing-Aquarium-Oxygen-st... (https://www.amazon.com/VicTsing-Aquarium-Oxygen-stones-Silicone/dp/B00L17IPEO/ref=lp_2975471011_1_1?s=pet-supplies&ie=UTF8&qid=1487019788&sr=1-1)

Type 3 (just found it... Apparently a piston pump... Safety concerns on my mind) https://www.amazon.com/gp/product/B00BVLBNB2/ref=s... (https://www.amazon.com/gp/product/B00BVLBNB2/ref=s9_acsd_zwish_hd_bw_b3FMlvv_c_x_w?pf_rd_m=ATVPDKIKX0DER&pf_rd_s=merchandised-search-9&pf_rd_r=AJ8FHSV8TF725TSG8BW7&pf_rd_t=101&pf_rd_p=37f6288c-7bd2-5d3e-a2d9-4bb6ddf022ab&pf_rd_i=2975471011)

GarrettH31 (/member/GarrettH31/) ▸ jorgemarmo (/member/jorgemarmo/) Reply

2017-03-28

"I immerged it for a couple of hours in acetone and is still working. I'm leaving it overnight, but I'm optimistic."

So how did this turn out? Did it dissolve the wire insulation?

jorgemarmo (/member/jorgemarmo/) ▸ GarrettH31 (/member/GarrettH31/) Reply

2017-05-01

The device itself hold up quite well... but the cable started to get "softer" after a week... it slightly shrunk and now it seems as a silicone cable...

GarrettH31 (/member/GarrettH31/) ▸ jorgemarmo (/member/jorgemarmo/) Reply

2017-05-21

Thanks! This is valuable information. I have thought about buying some solvent-resistant epoxy to coat the wire insulation, but it is hard to obtain in a small sized quantity.

米周 **(/member/%E7%B1%B3%E5%91%A8/)** ▸ GarrettH31 (/member/GarrettH31/)

2017-06-04 Reply

Polytetrafluoroethylene

jorgemarmo (/member/jorgemarmo/) ▸ jorgemarmo (/member/jorgemarmo/)

2017-02-13 Reply

btw, I'm not that cheap and I beleive your pump is worth every penny but I'm in france and shipping + eventual custom fees will easily double the price...

TekMason (/member/TekMason/) ▸ jorgemarmo (/member/jorgemarmo/) Reply

2017-02-16

I'm in Canada so shipping, taxes and brokerage fees are killer.

MichaelForer (/member/MichaelForer/) 2017-04-27 Reply

For anyone experiencing this same issue, I found a replacement part here at

www.steminc.com/PZT/en/mist-generation-transducer-25-mhz-20mm-rs112 (http://www.steminc.com/PZT/en/mist-generation-transducer-25-mhz-20mm-rs112)

$15 + shipping for 2

I will update with results from replacing the failed component.

MichaelForer (/member/MichaelForer/) 2017-04-26 Reply

Well, I made it. It worked in test, held water. And it worked with acetone in it...for all of about 165 seconds. Bench test reveals that the circuit is sending signal, so it must be the little ultrasonic transducer.

Anyone know where I can buy a replacement without having to buy a whole new frog?

RobertB7 (/member/RobertB7/) made it! 2017-04-09 Reply

Thank you for posting this instructable! I had to make a few improvisations along the way, as others have pointed out that the new design of the humidifier is different. But it works great! Currently waiting for this Bulbasaur I printed with my Kodama Trinus 3D printer to cure, but it works fantastic!

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(https://cdn.instructables.com/F1D/II1U/J16PHCMY/F1DII1UJ16PHCMY.LARGE.jpg)

MechEngineerMike (/member/MechEngineerMike/) ▸ RobertB7 (/member/RobertB7/) 2017-04-11 Reply

Nice!! Thanks for sharing your experience!

DylanE17 (/member/DylanE17/) 2017-01-24 Reply

My take on this project is that its not really worth it and a big old money pit.

The biggest problem with this project is gluing polypropylene. It is what's called a 'low surface energy' plastic (very little can stick to it). Silicone will just about stick to it but it doesn't create a secure bond, this means Acetone is highly likely to leak out of the bottom of the container you put it in.

After discovering this I tried mounting the transducer inside a new pot with no hole in the bottom and it melted clean through the new pot in seconds.

I then tried another new pot and suspended the transducer half way up in the pot, but this still malted a spot directly below the transducer. The acetone didn't boil, so I am guessing the ultrasonic vibrations simply passed through the acetone into the plastic and melted it.

My only suggestion if you really want to commit to this project is to buy a 500ml or so empty paint pot from ebay and use this as the container, you can use silicone to your hearts content on tin and it will create a solid seal.

Mmmmatt (/member/Mmmmatt+/) 2016-11-21 Reply

do you think i could use metal fittings instead of nylon? I'm having a tough time finding them for a reasonable price (I'm not in the US).

MechEngineerMike (/member/MechEngineerMike/) ▸ Mmmmatt (/member/Mmmmatt+/) 2016-11-22 Reply

Absolutely you could.

DylanE17 (/member/DylanE17/) 2016-11-14 Reply

Righto, found the source of my acetone leak, and now I am at a loss as to how the original project has no leaks.

Silicone sticks to most things with a vengeance, it does not however stick to polypropylene. This isn't just me, search google for example and you will quickly find a link like this:http://www.stealth316.com/2-dp8005.htm (http://www.stealth316.com/2-dp8005.htm)

Which says this:"Despite their widespread usefulness, "low energy" plastics have a quality that can make them hard to work with - they are difficult to seal or bond using commonly available sealant adhesives. Cyanoacrylate, epoxy, polyurethane, silicone (RTV for example), and most acrylic adhesives do not stick to polypropylene and polyethylene."

I think the original project must have got very lucky not to have had leaks with Silicone.

The above link however handily leads you to a 3M adhesive: DP-8005, which is resistant to acetone and and sticks to PP.

DylanE17 (/member/DylanE17/) ▸ DylanE17 (/member/DylanE17/) Reply 2016-11-14

After deciding I didn't want to spend £23 on glue I bought a new container for the acetone. This time I am going to feed the transducer in through the top side of the acetone container so there are no holes in the bottom and then cover the transducer wire completely in silicone to protect it. Although from reading it seems the heat shrink covering the wires is probably polyolefin which is fine in acetone anyway. In addition Acetone is barely conductive so I think it should be ok even if it does get to the wires.

DylanE17 (/member/DylanE17/) 2016-11-12 Reply

Ok, so I have just finished building and it seems to work ok with the new internals of the humidifier. However I have a few notes for anyone else going in to this.

The UK version of this humidifier comes with a plug transformer, so the transformer coil inside the unit is not there (this is a good thing as you are never dealing with mains voltage)

However buying an expensive humidifier isn't really necessary.

You can buy the actual component for a couple of quid: https://www.aliexpress.com/item/20mm-transducer-fi... (https://www.aliexpress.com/item/20mm-transducer-film-atomization-ultrasonic-nebulizer-chip-oscillator-piezoelectric-ceramic-humidifier-with-I6B2/32693221060.html)

So you would just need to figure out how to drive it. The silicone surround is important to stop the Acetone leaking, you could probably just buy this: https://www.aliexpress.com/item/High-Quality-Ultra... (https://www.aliexpress.com/item/High-Quality-Ultrasonic-Mist-Maker-24v-Nebulizer-Atomizer-Head-without-Lights-for-Humidifier/32636337409.html)

take it apart and hope it had the silicone membrane.

Then all you would need is a small piece of metal and drill your own holes in it to mount it to the acetone container.

You would save yourself a good wad of cash and this project becomes more tempting to do.

In addition to the above the bottom project box is basically not needed, and only really serves the purpose of making the pump sound very noisy. It would be much neater to create a mount for the motor, buttons and circuitry on your 3d printer. Having it out in the open would also mean much less chance of Acetone ever gathering near the electronics with the potential for a spark and explosion.

Also I cannot understand the placement of extraction placement for the pump. Acetone vapour created by the mister is clearly heavier than air and I would have thought a better circulation would have been created by placing the extraction neat the bottom of the container.

Finally I think if the return from the pump to the acetone container had a pipe that went in from the top and ended under the level of the acetone this would help it return to its liquid state much quicker as it would bubble through the acetone.

There is a lot of potential to this project, but I feel it is very much deserved of a 'mk3' with some revisions that would improve the whole thing and make it look slightly less 'hacky'.

DylanE17 (/member/DylanE17/) ▸ DylanE17 (/member/DylanE17/) Reply

2016-11-12

In addition to the above I have just realised the Acetone is escaping from the bottom of the container when idle. I had thoroughly covered the bottom of the ultrasonic transducer with the silicone gasket maker as well as putting it on the inside of the silicone surround the transducer is in, but obviously didn't get a proper seal.

If you are doing this with the new design you will need to really smother the bottom of the transducer in gasket maker, make sure there is no way for the acetone to escape.

DylanE17 (/member/DylanE17/) ▸ DylanE17 (/member/DylanE17/) Reply

2016-11-12

"Also I cannot understand the placement of extraction placement for the pump."

Should read

"Also I cannot understand the placement of the extraction pipe for the pump."

And near not neat... and edit button would be nice on these comments!

DylanE17 (/member/DylanE17/) 2016-11-10 Reply

Also... reed switch... why are you holding it in the up position with a cable tie?

It's a switch with two wires, which means its normally open or normally closed, so the connection needs either cutting or shorting. (It's shorting in this case, I'm just wondering why you chose the odd method of manually rigging the switch)

MechEngineerMike (/member/MechEngineerMike/) ▸ DylanE17 (/member/DylanE17/) 2016-11-11 Reply

I guess I was high from all the fumes. I might have had intentions of re-adding in the float switch at some point because running dry on acetone has the potential to hurt the machine (by shaking without a load and also by overheating).

DylanE17 (/member/DylanE17/) 2016-11-09 Reply

Also... why do you have a fan on your purchase list when the Humidifier comes with one?

MechEngineerMike (/member/MechEngineerMike/) ▸ DylanE17 (/member/DylanE17/) 2016-11-11 Reply

It makes sence to do this in retrospect. This project is a rebuild, a version 2 that followed a version 1 where I threw out that fan and forgot about it!

DylanE17 (/member/DylanE17/) 2016-11-09 Reply

Images of the 'new' atomiser

(https://cdn.instructables.com/FD8/RSFP/IVA4HP7U/FD8RSFPIVA4HP7U.LARGE.jpg)

(https://cdn.instructables.com/F92/8ZSX/IVA4HP7Z/F928ZSXIVA4HP7Z.LARGE.jpg)

(https://cdn.instructables.com/FYJ/1CXO/IVA4HP8C/FYJ1CXOIVA4HP8C.LARGE.jpg)

MechEngineerMike (/member/MechEngineerMike/) ▸ DylanE17 (/member/DylanE17/) 2016-11-11 Reply

I think I like the looks of this one more than mine. Mine has electronics right underneath the acetone container, so if the seal is bad then acetone drips onto the board. On this new one if you were to cut the metal right down the middle you could put the electronics farther away and still use the 4 hole pattern to press against the vibrator seal

DylanE17 (/member/DylanE17/) ▸ DylanE17 (/member/DylanE17/) Reply 2016-11-09

In addition to the above the transformer has gone and it now has a 24v power pack. this may be an advantage one I figure it out as less power in the box is a good thing.

Stuffy_ (/member/Stuffy_/) 2016-11-11 Reply

The internals were changed at some point. It appears to have happened to all of the models regardless of the animal model. Here are the two models side by side.

(https://cdn.instructables.com/F9Q/1L78/IVA4UPU2/F9Q1L78IVA4UPU2.LARGE.jpg)

(https://cdn.instructables.com/FSX/3MXE/IVA4UPVK/FSX3MXEIVA4UPVK.LARGE.jpg)

DylanE17 (/member/DylanE17/) 2016-11-09 Reply

Just took the humidifier I bought apart and the design of the atomiser mount is completely different. real bummer as it doesn't lend itself nearly as well to mounting and I will have to make sure it is watertight so there are no leaks.

Worth warning that these humidifiers are not all the same. I bought the duck but I imagine its an actual change in design rather than a difference between animals.

Stuffy_ (/member/Stuffy_/) 2016-11-03 Reply

I just purchased the Crane humidifier (frog one) from the link. Apparently they made a new version that has different internals than yours. The ultrasonic bit is completely different.

MechEngineerMike (/member/MechEngineerMike/) ▸ Stuffy_ (/member/Stuffy_/) 2016-11-04 Reply

Woah thanks for posting this, would you mind sharing a picture of the internals too?

DylanE17 (/member/DylanE17/) 2016-10-30 Reply

Do you just pop your parts on the bottom of the container, do you find they stick to the bottom at all?

MechEngineerMike (/member/MechEngineerMike/) ▸ DylanE17 (/member/DylanE17/) 2016-10-31 Reply

The sticking I've seen is superficial, you can always get the part out with a little knock. easier than popping a printed part off a build plate.

Philph (/member/Philph/) 2016-09-11 Reply

Did you check what the output of the transformer in the Frog was? Looks like a dual output - 28v & 13.5v (cant tell if rectified to DC), so if it were using the 13.5V and were rectified you could probably run the whole system off the one transformer i.e. timer, pump as well.

MechEngineerMike (/member/MechEngineerMike/) ▸ Philph (/member/Philph/) 2016-09-12 Reply

I remember that the 28v & ~13v were both AC. I realize now that I wasn't thinking and I just connected it to a single diode and noted that the result was unusable for operating the timer. I should have

ran it through a full wave rectifier and that would likely have been able to run the whole system.

oangelo (/member/oangelo/) 2016-08-18 Reply

Congrats, nice project. I am trying to do the same, however, I tried first with a very cheap mist maker from ebay, as others have suggested here. However, it will not work because the external case is made of abs and will dissolve inside the acetone. I think you should mention this, to warn people that your designe is the only way to go.

Another thing, I also made a return circuit, so the vapor can better circulate from one box to another.

power000 (/member/power000/) 2016-08-02 Reply

Hi great instructable , i will definettly make it, but i have a few quenstion. What is used for the pump? Is it for economy acetone? after for example 360 seconds, this pump starts andtake the atomized acetone and return it back to the tank of acetone?

If it so, if you don't use pump ,what is around the amount of the acetone is spended for 360 second? 10ml or less? I read your artivle but i didn't realize when it get place

abougakov (/member/abougakov/) 2016-07-19 Reply

Very, very complicated solution for a simple problem. You could have done it way easier.

Acetone BOILS at 56 degrees Celsius (133 F) and produces VAPOR. You take dirt cheap ceramic resistor, for example, 6.8Kohm rated at 20W. When plugged in into wall socket with 220V they dissipate 10W of energy. Connect cheap KSD7000 thermal relay rated at 60 degrees Celsius in series for safety and you are done.

Electric current will heat the resistor and acetone will boil. Its vapor will fill the box. Relay will cut the current once the temperature rises to 60C. As it cools down to 45C, it will reset and process will repeat.

Only one important note - you'll have to use silicone-coated wires, others will be dissolved with the risk of short circuit. You can buy them anywhere, just search for "multimeter probe wires".

Even simpler solution - put some acetone in a glass jar, throw something at the bottom and then place your ABS model on top so it won't touch acetone. Close the lid and put the jar into boiling water. Water will ensure that acetone isn't heated above 100C and won't explode. It will just boil nicely.

(https://cdn.instructables.com/FSW/AUI5/IQTTATBH/FSWAUI5IQTTATBH.LARGE.jpg)

DanielK146 (/member/DanielK146/) 2016-07-17 Reply

Please give details on what parts are used to make the pump.

MechEngineerMike (/member/MechEngineerMike/) 2016-07-15 Reply

The current misting chamber (the tupperware bin with the flip top) is 17 cups, which is 1 cup more than 1/2 gallon. So I'm wondering if you're using a 1 gal. Anyway I think it would work just fine as is for a change on that scale, just expect a little longer to get a fully misted chamber. A larger ID fog supply tube wouldn't hurt though. In any case remember to keep the tube attachments high on the container because the mist will sink to the bottom, and try to use as little length of supply tube as you can. And of cource make sure that your tupperware bucket is a solvent resistant material too!

HaydnH (/member/HaydnH/) 2016-07-03 Reply

Great instructable!

Do you think it would be possible to modify this to use THF (Tetrahydrofuran), which is a solvent for PLA?

DAud_Icl (/member/DAud_Icl/) ▸ HaydnH (/member/HaydnH/) 2016-07-10 Reply

You can try pure ethyl acetate or "MEK substitute" (which is mostly ethyl acetate too). It's not as effective as THF though and it also bleaches the material if left in for too long. Still, it's worth a try.

MechEngineerMike (/member/MechEngineerMike/) ▸ HaydnH (/member/HaydnH/) 2016-07-04 Reply

Thanks! Unfortunately, THF would destroy the latex and EPDM hoses & pump components and may even fog over the PP container. I don't have any suggestions for chemicals to use on PLA.

Mechenger (/member/Mechenger/) 2016-07-08 Reply

In my experience, vapor polishing also reduces fatigue load resistance significantly. Parts subjected to repeated loading in the X-Y plane will fail after a significantly smaller number of loading cycles if vapor polished.

SeamusFrederick (/member/SeamusFrederick/) 2016-07-06 Reply

Nice job man! Have you considered modifying your project to be suitable for various solvents?

MechEngineerMike (/member/MechEngineerMike/) ▸ SeamusFrederick (/member/SeamusFrederick/) 2016-07-07 Reply

Thanks! I try to work with commonly available materials and I was happy that this setup is able to handle the two chemicals that will have the most use for polishing. As I understand it, filaments aside from ABS and Polysmooth require substantially more dangerous chemicals to have this effect, if you can even find something that will work!

Jack Daniels (/member/Jack+Daniels/) 2016-07-06 Reply

I promise this question is for you.
I have read your article quite a few times. I have decided to build one but i have a question for you.
Why a whole humidifier? If your goal is to atomize the acetone, wouldn't just buying an atomizer be cheaper and work just as well?
Take this for instance.
http://www.ebay.com/itm/Mist-Maker-Humidifier-AC-1...
(http://www.ebay.com/itm/Mist-Maker-Humidifier-AC-100-240V-To-DC-24V-1A-Adapter-US-Plug-Hot-Pond-Nice-t/172224804515?_trksid=p2141725.c100338.m3726&_trkparms=aid%3D222007%26algo%3DSIC.MBE%26ao%3D1%26asc%3D20150313114020%26me

I can get the whole thing for 6 bucks and rig it up exactly the same way you do without the extra effort. Is there a reason you choose the humidifier or was it just what you had on hand. because i can get behind recycling.

MechEngineerMike (/member/MechEngineerMike/) ▸ Jack Daniels (/member/Jack+Daniels/) 2016-07-06 Reply

I hate excessive waste too, but there a functional reason I used the whole humidifier aside from 'I already had one'. That the system is physically large and has readily adaptable mounting holes for this purpose. Looking at step 4, the speaker-like shaking disc is ~1.5" in diameter and is mounted to a metal plate with 4 holes in it.

On the other hand the tiny ones are cheap enough that you could probably hook up 3 in the same chamber to get more output. Id love to hear about it if you gave one of those a try.

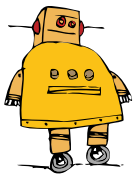
Jack Daniels (/member/Jack+Daniels/) ▸ MechEngineerMike (/member/MechEngineerMike/) 2016-07-06 Reply

soon as i get mine built i will let you know.

KrithikaS3 (/member/KrithikaS3/) 2016-07-05 Reply

Amazing results for a homemade product! Of course you could just send it off to an SLA printing service and call it a day but not everyone has one available around them and I'd imagine the print jobs aren't too cheap either so this is a nice workaround to get that SLA like finish!

More Comments



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