Ender 3 S1 Enclosure Kit

Installation Manual 1.0

April 2022

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You Really Do Want to Read the Directions

Hey, we get it. You just got your new enclosure kit and want to start using it as fast as possible. How hard can assembling a few plastic panels possibly be? It's not really that hard, assuming you're following the directions, but try to use brute force and you'll end up working your way through your vocabulary of swear words. While the acrylic pieces in the kit are strong, they are still plastic and will break if bent far enough. The ghosts of the broken panels that have gone before you have become much stronger than you could ever imagine, and are whispering into your ear, "just be a little careful".

Before you Start

Is This Manual for *Your* Kit?

This installation manual covers the enclosure design for the Creality Ender 3 S1 ONLY. The Ender 3 V1, V2, and Max all require different enclosures! If you have a different version of the enclosure please read previous versions of the manual available on the website.

Is your Printer Customized?

If your printer is stock then no customization is needed. If you have customized the printer, you should examine any modifications to make sure they don't block the panels. If part of one of the panels is blocked, you can use a laser or drill to customize one or more panels. **This should be done before removing the plastic or paper covers on the acrylic panels. Cutting acrylic requires great care as the plastic is prone to crack if mishandled.**

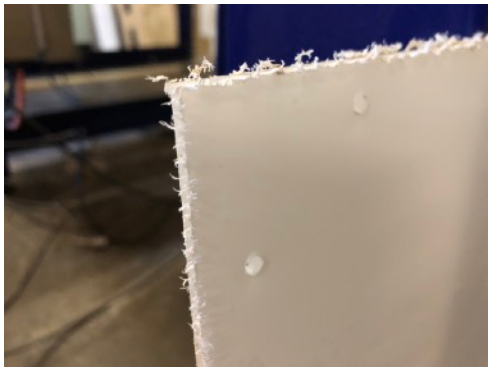
Preparing the Printer

Remove any filament from the hot end (will require heating the hot end) and remove the filament spool from the spool holder.

Turn the printer off and unplug the power cable from the printer's power supply.

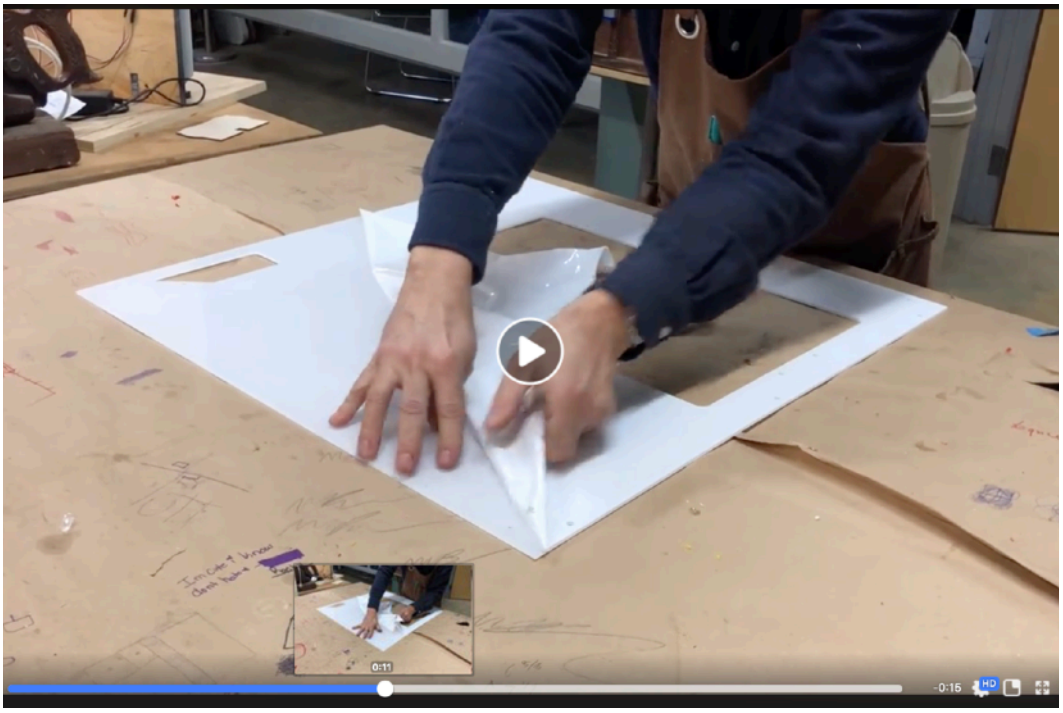
Don’t Panic If You See This!

If you can’t see through the plastic, please don’t panic! What you’re seeing is just the plastic or paper protective covering.



When plastic sheets are manufactured they are covered by either a paper (brown colored) or plastic (white) covering to protect against scratches. Follow the directions below to remove the cover and discover the beautiful plastic underneath.

To remove the covering from an acrylic panel, lay the panel flat on a table. Then peel up a corner of the covering and **CAREFULLY and SLOWLY** pull horizontally to the sheet to reduce the lateral forces that would bend the acrylic. This video shows just what to do.



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Everything You Wanted to Know About Screwing But Were Afraid to Ask

Screw	Tool Needed	Usage	Relative Size
30-50mm Hex Cap Head	3mm Hex Wrench	Attach fan/filter, attach large front latch mounts	 30mm Hex Cap
12mm Hex Cap Head	3mm Hex Wrench	Connectors, hinges	 12mm Hex Cap
16mm Hex Cap Head	3mm Hex Wrench	Knobs, small latch mounts on some models	 16mm Hex Cap
#6 3/4” Wood Screw	Philips Head Screwdriver	Attach magnetic latch to mount	 3/4 #6 Wood Screw

Probably the most confusing thing about assembling this enclosure will be which fastener or screw to use. Luckily it's pretty easy to figure out once you know the system. While the exact screw to use will be detailed in each section of the manual, you probably won't need to refer to it once you know the secrets.

The most common screw is the 12mm hex cap head screws. The 12mm screws are long enough to attach things to the acrylic front, top, sides and back. Each section will describe exactly which screw to use, to read carefully and use the specified screw for the best results.

The actual length of the "long" screws to attach the fan and or filter will vary depending on the depth of the particular shipment of fans we happen to get that month. They won't be hard to spot since they'll be the longest thing in the bags.

Finally, and we can’t stress this enough:

D O N ’ T O V E R T I G H T E N T H E S C R E W S

Leave the screws a little loose until the end adjustment phase. During that process you’ll be hand-tightening until the screws are snug, but you can easily use so much force the plastic pieces or the acrylic crack. Please don’t be *that guy*.

Assemble Panels

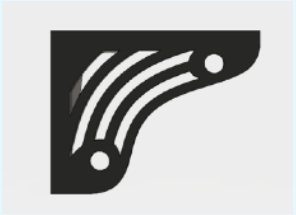
1. The Front Panel

Each of the corners on the enclosure will be held together by the connectors pictured below. There are only two versions L and R, which can be identified by the letters stamped on the inside. The opposite connectors are identical, i.e. Bottom Right is the same as Top Left. In all cases the surface of the connector with the cutout pattern faces front or back.

The front door is designed so that the latches are on the left. Attach the corner connectors on the **back side** of the door frame using the provided cap head 12mm screws. See the photos below. The top of the connector should be flush with the top of the acrylic.

There are also smaller connectors at the top and right side when viewed from the front.

Top Left



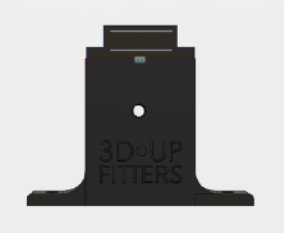
Top Right

Bottom Left

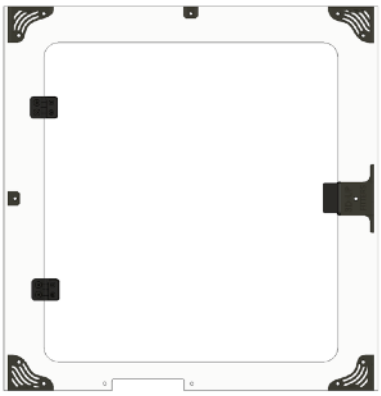
Bottom Right

The front should look like the picture to the right.

Locate the magnetic latches and use the **wood screws** to attach them to the latch mount. Hand tighten and make sure they're secure, but do not over tighten or they may strip. The latch can be later adjusted front-to-back to make sure the door is flush with the door frame.



Each latch mount is attached via three screws. Use the 30mm cap head to secure the latch mount to the door frame. You'll use 2 M4 12mm screws to attach the latch mount to the right-side panel later in the assembly.

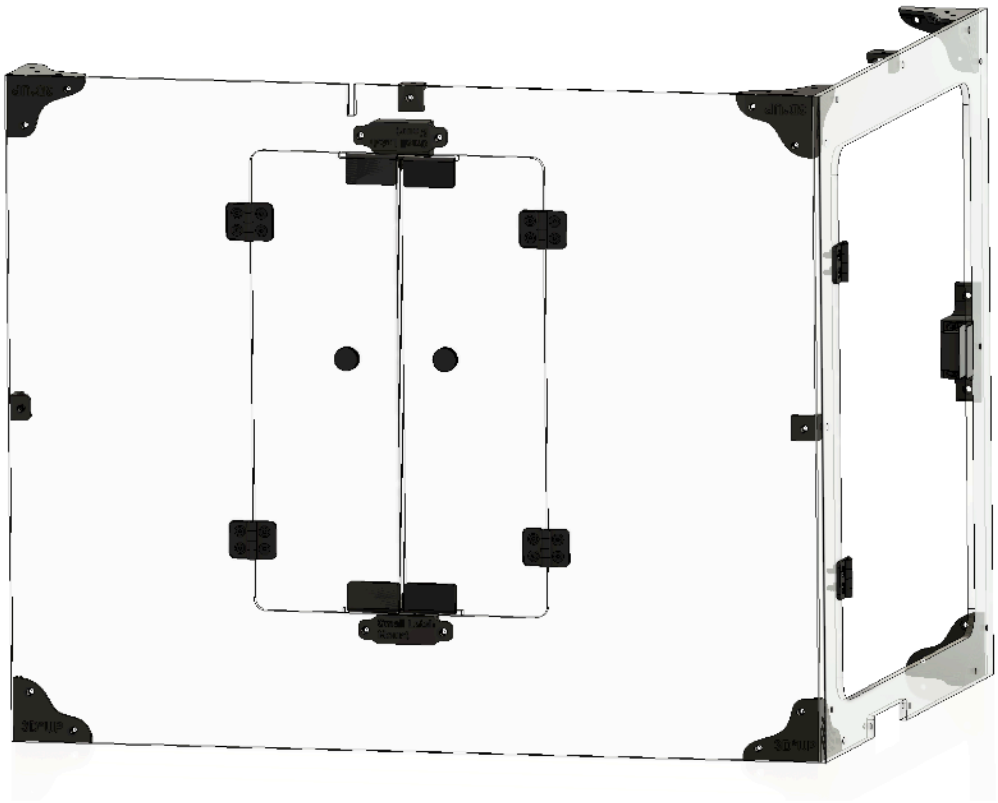


Attach the hinges to the door and door frame using M4 12mm screws and nuts. There will be some play in the hole size so that you can adjust the door to swing freely.

Attach the doorknob by first inserting the square M4 nut into the slot. Use a 16mm cap head screw to attach the door.

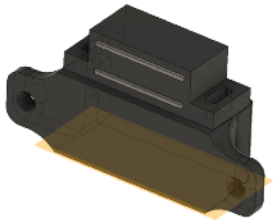
Now that the latches are mounted it is time to connect the strike plates. Each plate comes with a squishy adhesive covering the same size as the plate. Carefully attach the adhesive side to the acrylic at the location of each latch. Then, adjust the width of the metal strike plate so that it is held on by the pressure of the two sides of the plate. The adhesive covering will keep the metal strike plate from scratching the acrylic.

2. Left Side Panel



Attach the left side to the front forming an L-shape that will stand up on its own, then attach one L and one R connector at the back. The Ender 3 S1 design technically doesn't need a door, but it allows for additional access to the extruder. The latch mounts are smaller than the front, although the magnetic latch attaches in the same way with wood screws. The parts for the side door will be in a separate packet.

Attach the door hinges, latch mounts, strike plates, and the knob, and the assembly will look like the illustration to the right. Don't forget the mid-panel connectors at the back left and top.

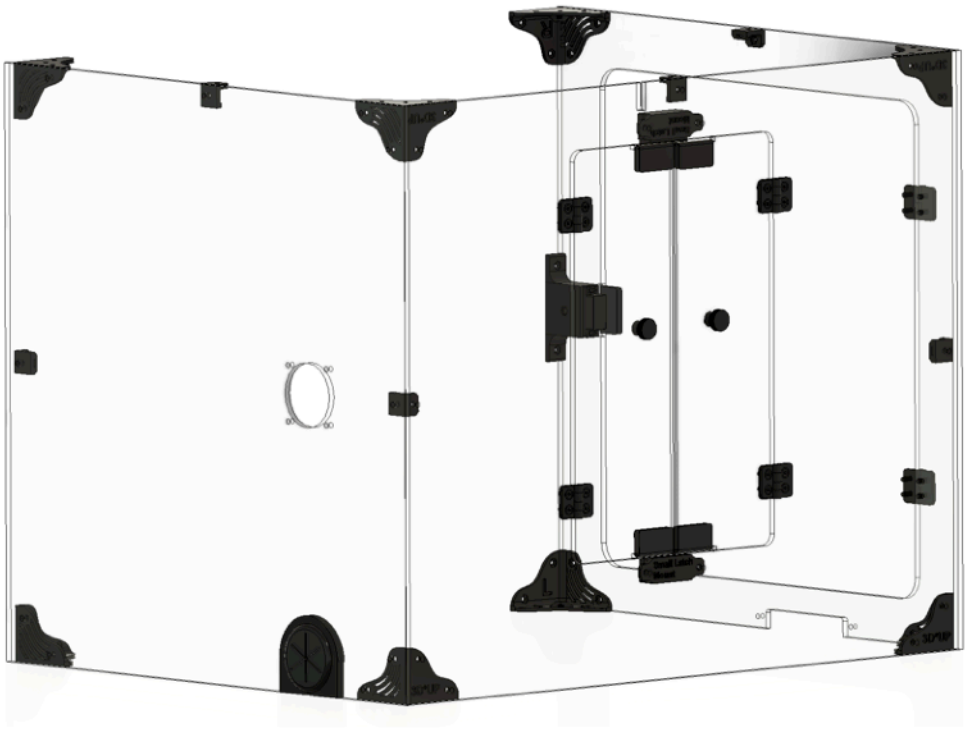


As with the front door, adjust how the door hangs by loosening the hinge screws, using the strike plates to hold the door to the latches, and then tightening the hinge screws.

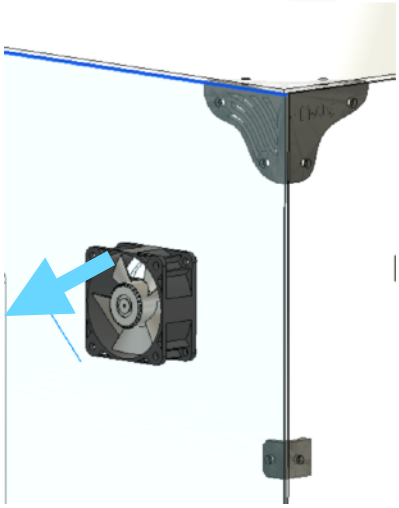
Note that the left side will also be the location of the fresh air intake vent, but that will be installed after the enclosure is placed over the printer.

3. Back Panel

The back of the enclosure is shown below. The four corner connectors are mirror images of the front. The large hole is either for an air filter (purchased separately) or can be covered up by the included plastic disc using M4 12mm screws. On the top and on each side are “mid panel corner connectors”, which are basically simple L-shapes.



Make sure the fan is blowing air out of the enclosure and NOT into it. Confirm the direction of the fan by plugging it into a USB power supply before attaching the filter. The round label should be on the outside



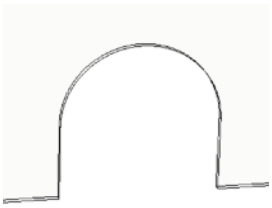
The fan should be attached on the outside of the enclosure.

The fan should be oriented to pull air OUT of the enclosure.

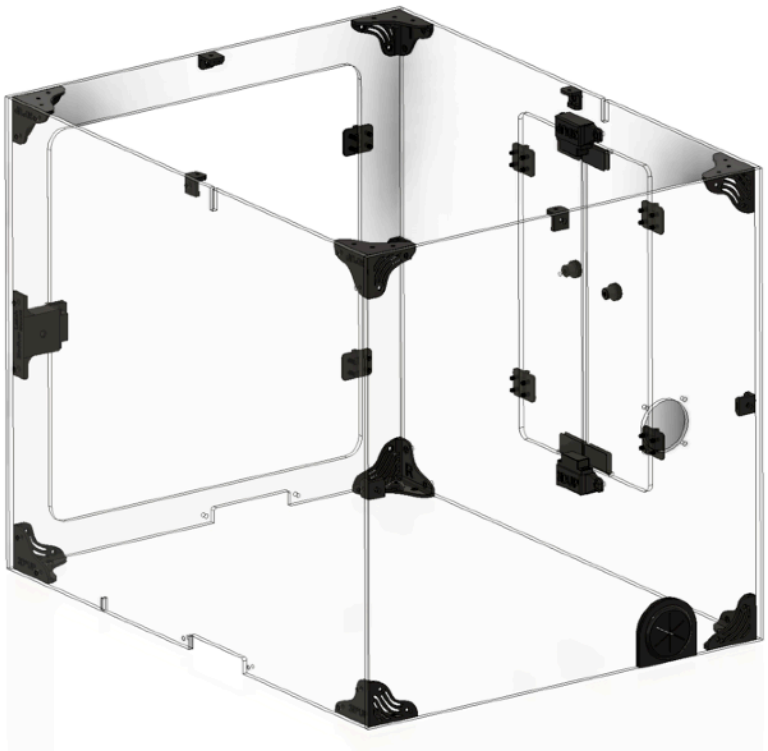
Use the long screws included in the fan packet to attach the fan. The length of the screws may change depending on the depth of this particular shipment of fans.

The back panel also contains the removable grommet cable portal. Locate the grommet and insert it into the grommet holder. This is where you'll insert the power cable, USB cable, and any other wires you want to run in or out of the enclosure.

Insert the grommet holder/grommet combination into the U-shaped hole in the right-side panel. This will enable you to slide the enclosure off and onto the printer without unplugging the cables.

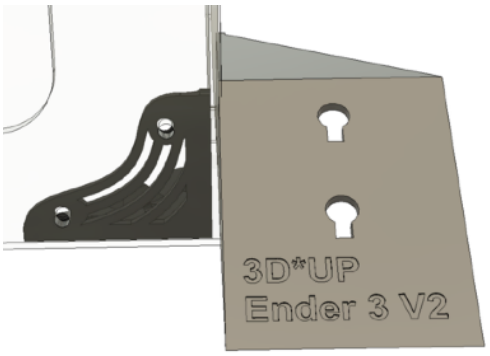


4. Right Panel

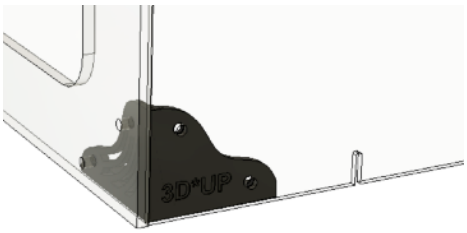


Attach the right panel as shown above at each of the four corners. You can now attach the latch mount on the front using 2 M4 12mm cap head screws.

The new Ender 3 S1 has a different display that inserts into a mounting platform that also attaches via the two corner connector screws on the right panel. Rather than use the 12mm M4 screws as before, you'll use the longer 16mm M4 screws to attach both the corner connector and the display mount.



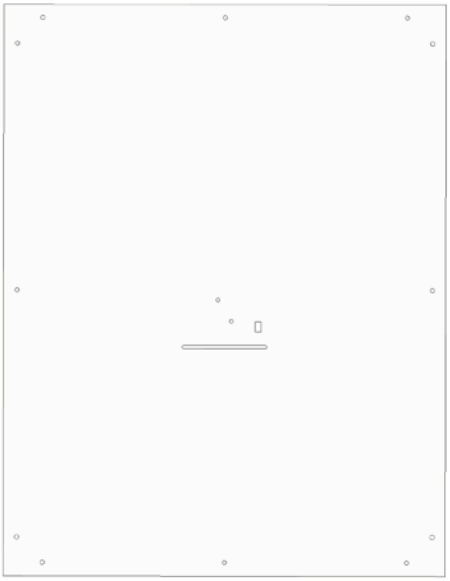
The kit comes with a cable to attach the display on the outside of the enclosure. The cable goes through the enclosure in the slit as shown to the right.



5. Top Panel

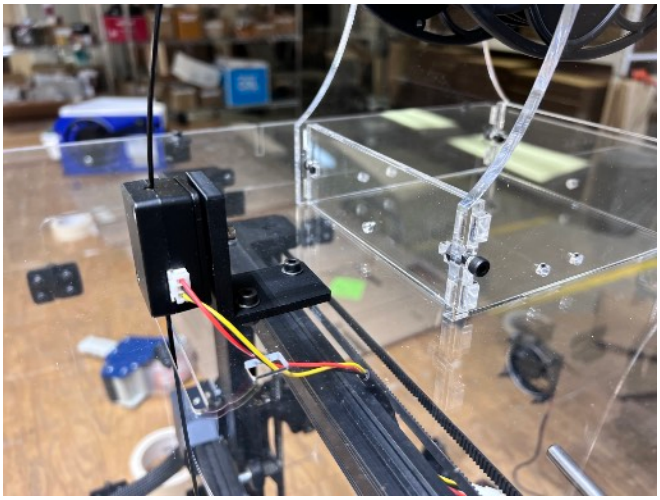
Before attaching the top, now is a good time to insert the support beam. It is a tad wider than the enclosure so that it doesn't fall out when moving the enclosure.

Use access through the doors to attach the top of the enclosure using M4 12mm screws. You'll attach the top on the four corners, and to each of the mid-panel connectors as well. The slit is towards the front, and the small access hole for the filament runout sensor cable should be on the right. The view shown at the right is from above facing the front of the printer.



Attach the filament sensor to the L-bracket as shown using the silver screw that was supplied with the printer to attach the sensor to the Creality spool holder.

Instead, you can use any spool holder on top of the enclosure and run the filament through the filament sensor and directly to the extruder. Note: 3D UPfitters spool holder not included.



6. Install Vents

You should now place the enclosure over the 3D printer.

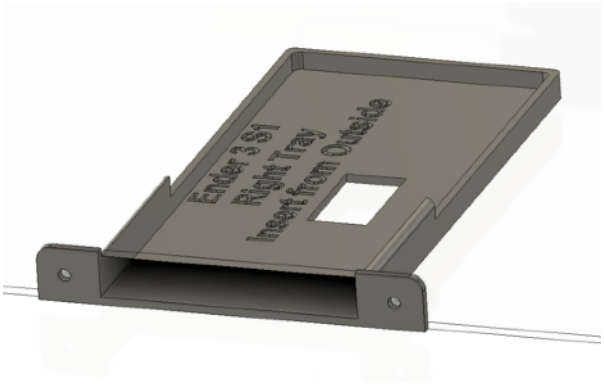
The front fresh air vent is inserted from the outside and attached using M4 12mm screws. This will bring in cold air to the air intake vent of the case, cooling the electronics inside. It's important to keep the fan on the back panel running in order to help draw air through the case's vents and to the outside, especially when printing PLA and PETG.

If you forget to turn on the fan when printing PLA your printer will probably clog.

If that happens use a 3D printer needle (available in many places online) to remove the clog. This technique is easy and works most of the time.

It is acceptable to turn off the fan when printing ABS or ASA in order to bring the temperature into the ideal range, but be sure to turn the fan back on when you're finished, especially if you are venting or filtering the air to remove VOCs.

Note that the lid fits right into the vent slots, helping to form a seal. Slide the 3D printer towards the front up against vent.



The right tray is labeled as such and is inserted from the outside as well. As you insert the tray be sure to lift up the right side of the printer so that the tray slides under the square rubber foot. This foot fits into the square hole in the vent.

7. Tighten Gaps

Once the enclosure is completely put together, it is time to make sure that each of the panels is held tightly to each adjoining panel. The connectors are designed with a small amount of play that allows you to make small adjustments for the perfect fit.

1. Loosen screws on the panel to move.
2. Push that panel into place. You may need a friend to hold it tightly in the right spot.
3. Re-tighten the screws to hold the panel. Only tighten enough to hold the pieces snuggly. **DO NOT OVER-TIGHTEN!** These parts are sturdy, but they're still all made out of plastic.

Repeat the product, going around the enclosure looking to make sure all of the panels are flush to each other.

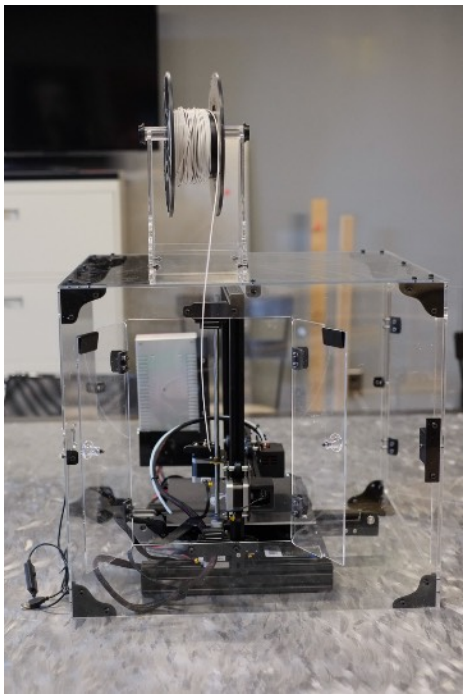
8. Assemble Spool Holder

Instructions to assemble the spool holder are available online in the product description, but it's not too hard to just wing it.

The location that will give the least resistance is placing the spool holder directly to the left of the printer. Many people who are low on space, however, place the spool holder on top, which shouldn't make too much of a different in print quality.

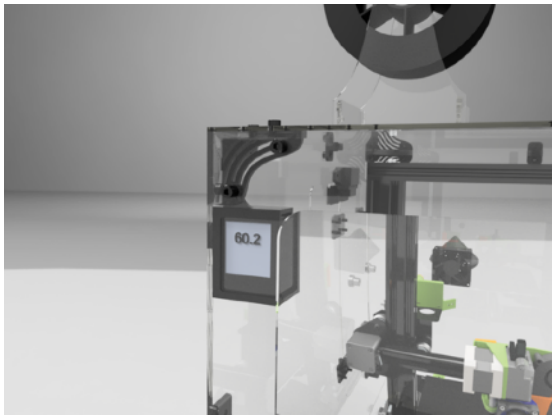
Of course, if you don't like this spool holder you are free to use whatever type of freestanding spool holder you wish; there are hundreds of designs available on Thingiverse.

The filament feeds into the extruder through the gaps in the side doors.



9. Temperature Gauge

The optional thermometer will let you know approximately what temperature it is inside the enclosure. It attaches to the left side of the door piece using the same hole as the top-most corner connector as shown. It comes with a longer screw to fit through everything.



10. Managing Enclosure Temperatures

There's not much to a 3D printer enclosure. Although ours look fancy, functionally they're not much different than putting a card box over the printers since both designs are passively heated by the heated beds.

We generally get two types of customers:

1. Those interested mostly in air quality.
2. Those interested mostly in print quality.

The problem is those two goals use two different techniques in terms of airflow. For the best air quality, as much air as possible needs to come into the enclosure and then be vented or filtered out. All of our enclosures come with fans, and we've chosen the CFM ratings to match the cubic size of the enclosures. This ensures that for filament types like PLA, which don't like the heat there's enough airflow to keep the temperatures in the safe zone.

At the same time, you want the internal temperatures higher for filaments like ABS, which happens naturally because the recommended bed temperatures are much higher than for PLA, typically in the 105-120C range. With the fans turned on we shoot for internal temps between 35C and 40C for 3D printers that use E3D hot ends, because E3D recommends that temp range to avoid clogging. By keeping the temperatures in that range it puts the least stress on the equipment and follows the manufacturer's guidelines.

This works great for people either interested mostly in air quality or those who are risk-averse and don't want to take a chance of clogging their hot ends or decreasing the useful life of their printers.

More experienced 3D printer owners though, those for whom a clogged nozzle is an acceptable risk, might want to run the temperatures higher for less warping of ABS parts or to print nylon. In those cases, you can turn off the fans or even print one of the vent covers and just not vent at all. For our internal print farm, we do the later on a couple of machines where the temperature when printing ABS gets as high as 46C. They've been running like that for years with no clogging and even with no venting of the power supplies, we've never had a power supply fail either. Obviously, your mileage may vary, as it depends on a lot of variables such as filament quality and the quality of the power supply in your printer.

If you're looking for the highest temperature's possible, try turning the bed heater on for an hour before you print.

The other part of the equation is the printer design. Those printers where the hot end is at the top of the enclosure make it easier to achieve higher temperatures because the hot air rises to the top, and the vertical hot end position is fixed. Those printers with the hot ends at the bottom are always going to have more problems managing temperature simply because the temperature is more likely to vary as the hot end goes from the bottom to the top of the enclosure.

If you're looking to achieve a particular temperature with your enclosure, let us know and we'll give some advice on how to manage, but its really not that hard:

Lower Temperature = More Air Flow

Higher Temperature = Less Air Flow