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Pack 12

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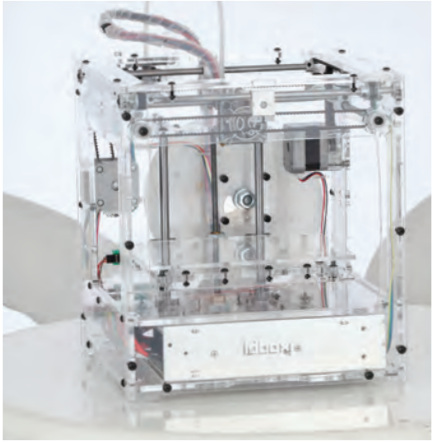

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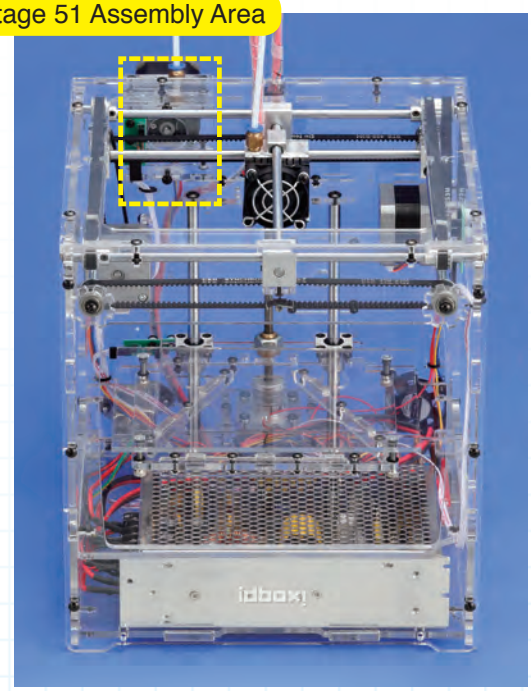
WARNING: Not suitable for children under the age of 14. This product is not a toy and is not designed or intended for use in play. Items may vary from those shown.

DeAGOSTINI MODEL SPACE™
www.model-space.com

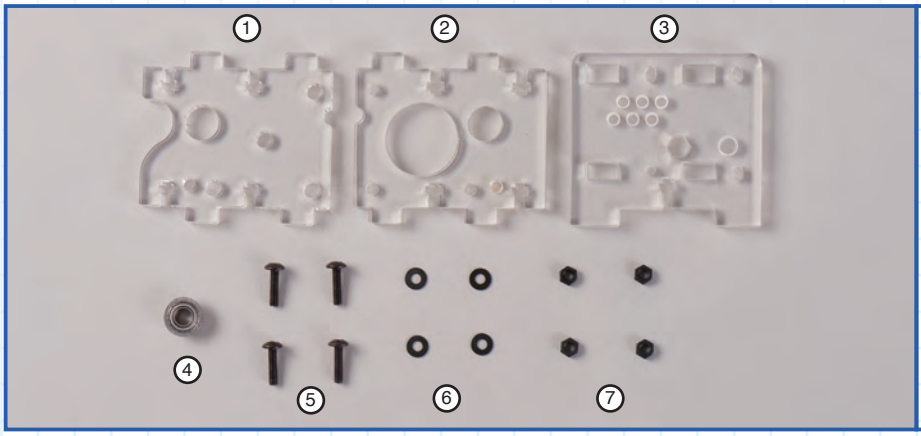
Stage 51: Insert the extruder drive shaft into the U-shaped extruder assembly

Stage 51 Assembly Area



In this stage, you will insert bearings into the sides of the U-shaped extruder assembly while adding the drive shaft with its drive roller and large gear.

First, add a bearing to laser-cut part A, then fit the drive shaft into the bearing with the drive roller. Then, add the second bearing to laser-cut part B and put the other end of the drive shaft through this bearing. Next, fix nuts into the laser-cut parts A and B and secure laser-cut part C to the assembly, using screws that are only finger-tightened for now. Make sure you orientate the laser-cut parts correctly during the assembly process.



Stage 51 Components

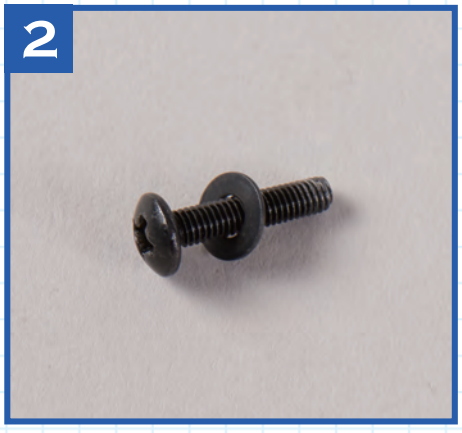
1: Laser-cut part A
2: Laser-cut part B
3: Laser-cut part C
4: Bearing (F685ZZ)
5: M3 truss head screws (12mm) x 4
6: M3 washers x 4
7: M3 nuts x 4

Parts to have ready

1

Get ready the large gear and drive roller that you assembled in Stage 50, and also the bearing and M5 washer supplied with Stage 50.

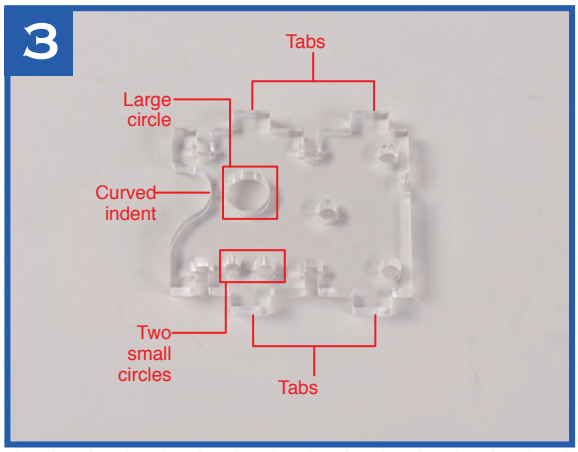
2



Put an M3 washer onto each of the 12mm M3 truss head screws supplied.

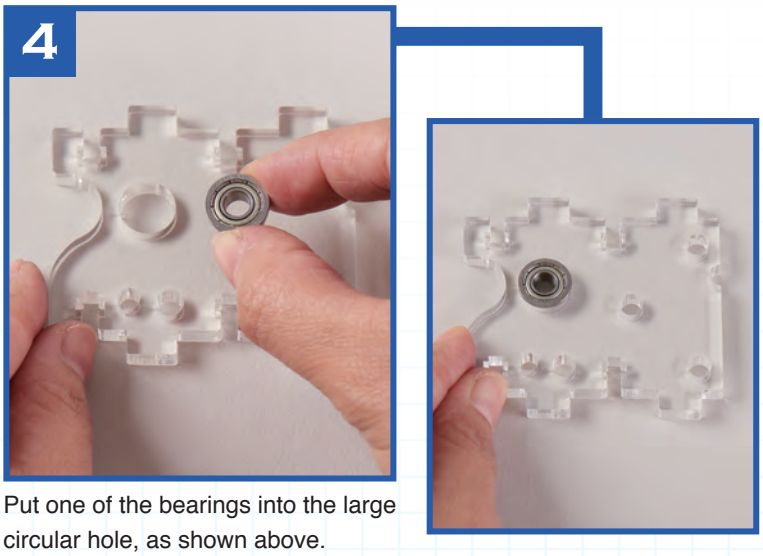
Assemble the large gear into laser-cut parts A and B

3



Position laser-cut part A as shown, with the curved indent on the left, and the large circular hole above the two small circular ones.

4



Put one of the bearings into the large circular hole, as shown above.

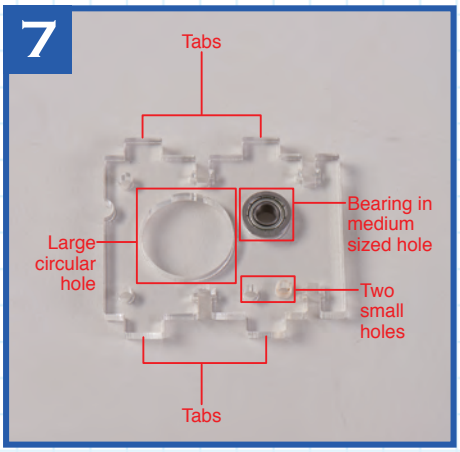
5

Plug the drive shaft, with the large gear and the drive roller mounted on it, into the bearing, so the drive roller is close to the bearing.

6

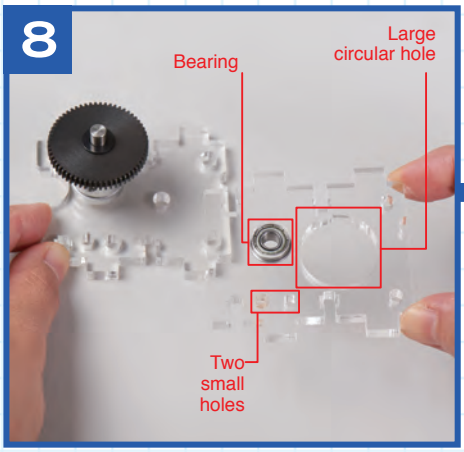
Put an M5 washer on the drive shaft.

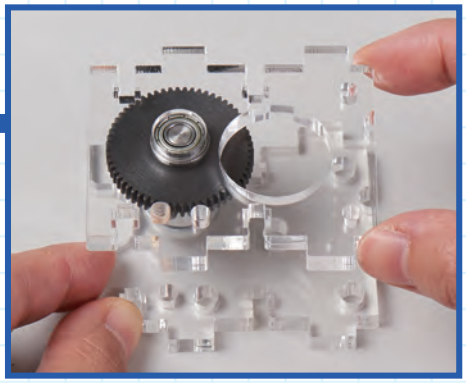
7



Position laser-cut part B as shown, with the large circular hole on the left and the medium-sized circular hole on the right, above the two small holes. Fit the other bearing in the medium-sized circular hole.

8

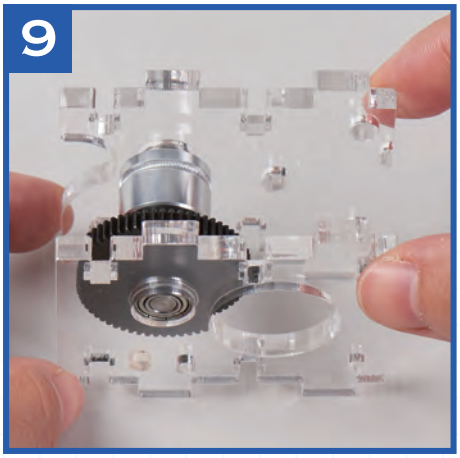




Turn the laser-cut part B over, so that the large circular hole is on the right. Put the drive shaft on part A through the bearing, so that part A is sitting on top of part B.

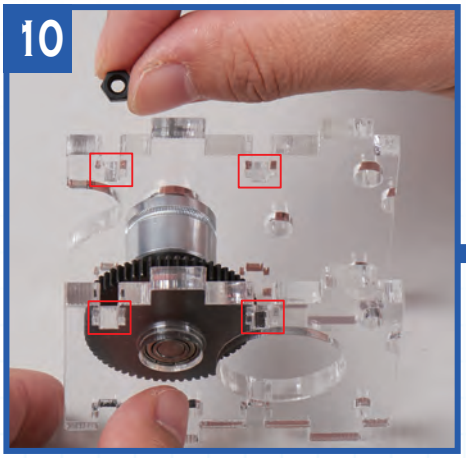
Add laser-cut part C to complete the U-shaped assembly

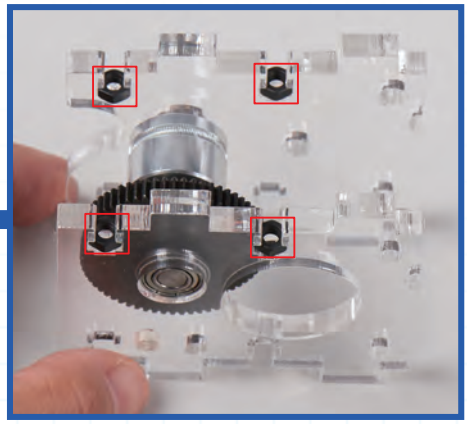
9



Turn the assembly so that the large hole is facing you, on the right.

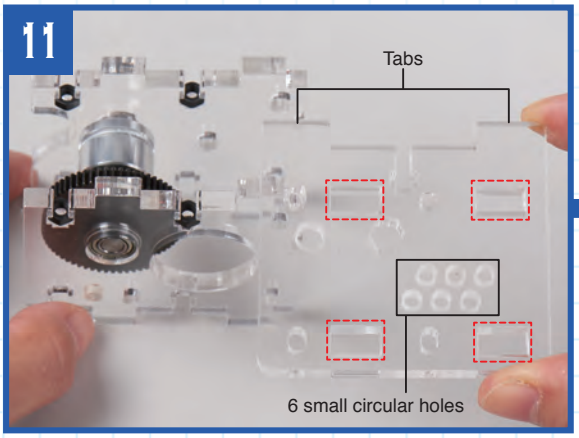
10

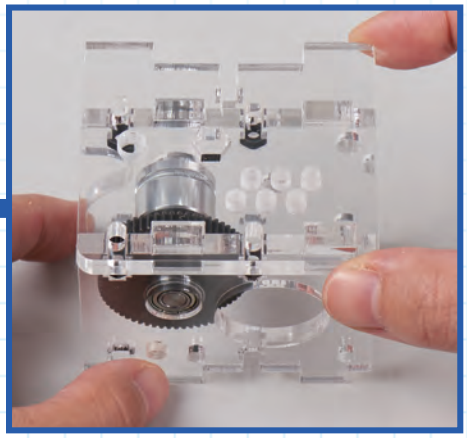




Put an M3 nut into each of the slots shown outlined in red, above.

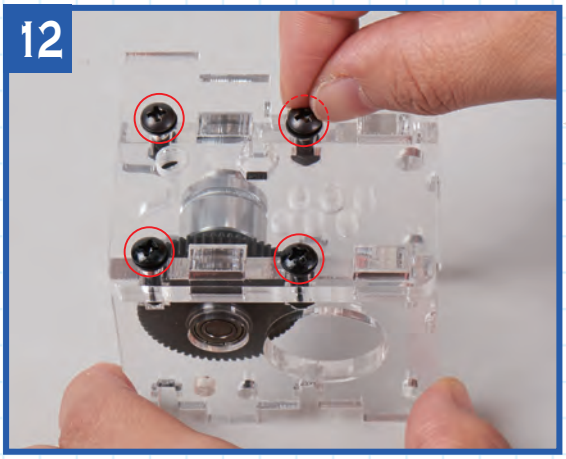
11





Hold laser-cut part C as shown, so that the two tabs are at the top and the six small circular holes are towards the bottom right. Insert the four tabs on laser-cut parts A and B into the slots outlined in red, above left, in laser-cut part C.

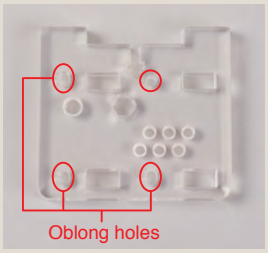
12



Put washers over the shafts of each of the four 12mm M3 truss head screws. Then, insert the screws into the nuts (inserted in Step 10, above) and finger-tighten them.

HINT

To allow for adjustment when the screws are fully tightened, three of the four holes are oblong. One is circular.

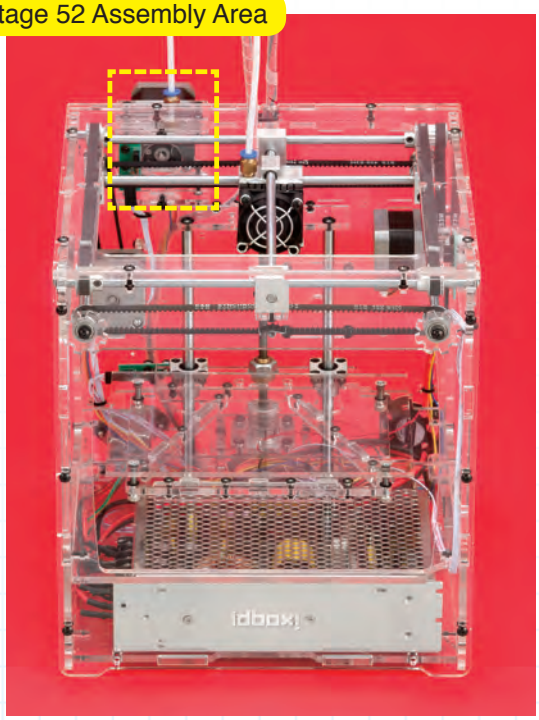


Stage finished

The drive shaft, with its large gear and drive roller, has been assembled into the U-shaped mounting part of the extruder.

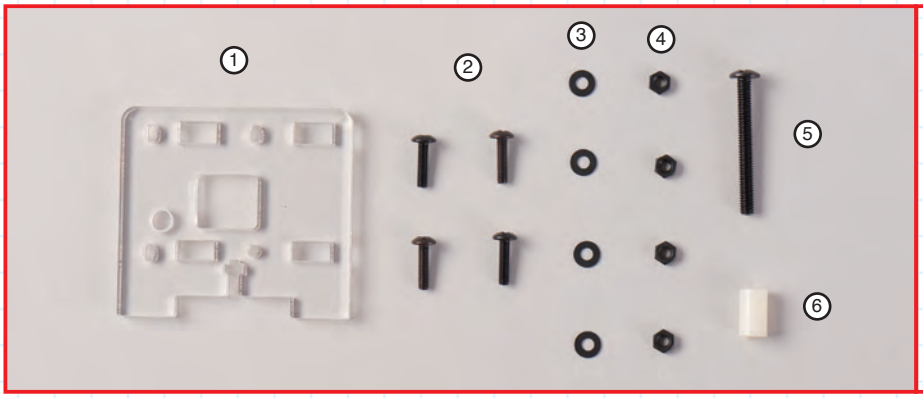
Stage 52: Put together the extruder arm and drive assembly

Stage 52 Assembly Area



In this stage, you will add laser-cut part D, which makes up the fourth side of the drive unit, and attach the extruder arm to the unit using an M4 screw.

After inserting the four M3 nuts into the sides of the U-shaped drive unit, add laser-cut part D to the existing assembly and then finger-tighten the M3 screws into the nuts to hold it in place. Now, add the arm to the drive unit, securing it with a 35mm M4 truss head screw. This passes through a hole in the side of the drive unit, then through a hole in the arm and then through a spacer. Tighten the 35mm M4 screw enough to hold the arm in position but not enough to restrict the arm's movements.



Stage 52 Components

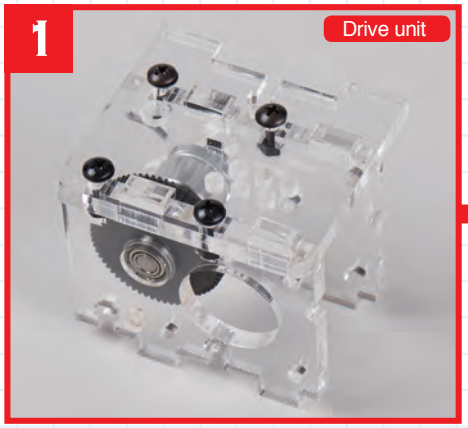
1: Laser-cut part D
2: M3 truss head screws (12mm) x 4
3: M3 washers x 4
4: M3 nuts x 4
5: M4 truss head screw (35mm)
6: M4 spacer (12mm)

Tools you will need

Phillips screwdriver size 1
Tweezers or pliers

Parts to have ready

1

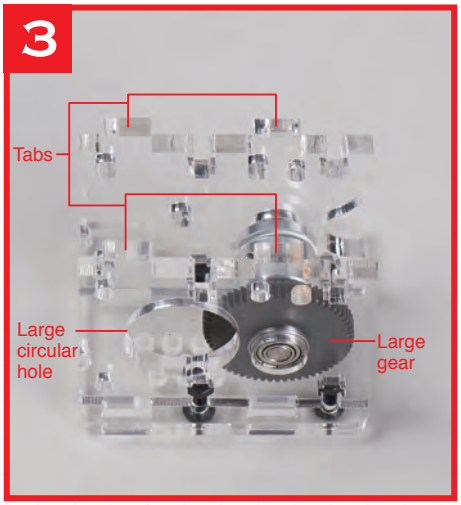


Get ready the drive unit that you assembled in Stage 51 and the extruder arm you put together in Stage 49.

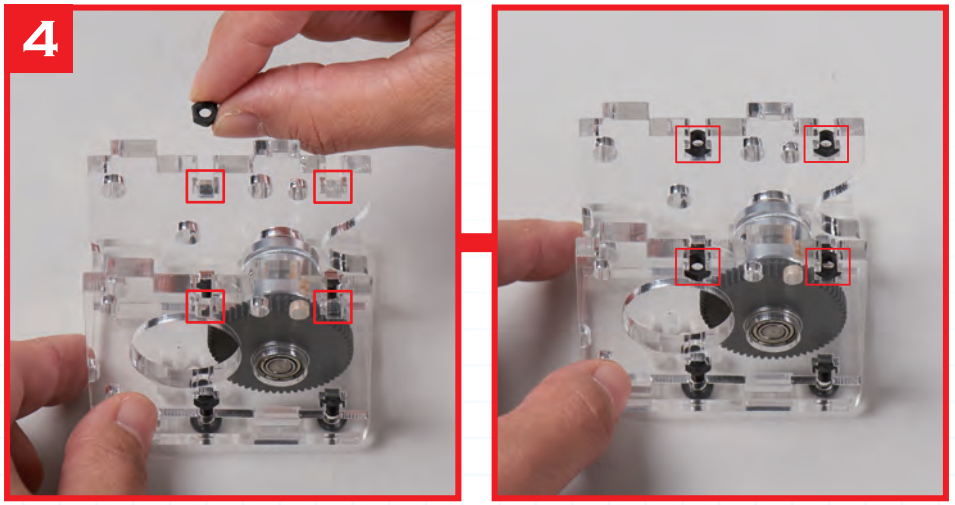
2

Put an M3 washer on each of the four 12mm M3 truss head screws supplied with this stage.

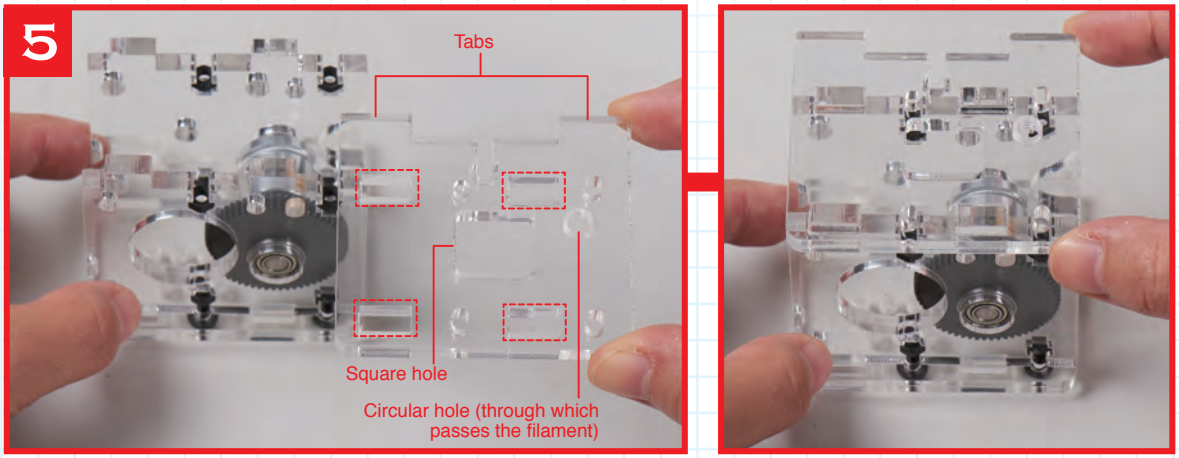
Add laser-cut part D to the drive assembly



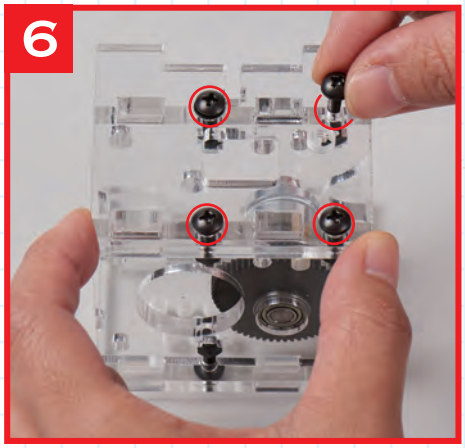
Position the drive assembly so the large circular hole is at the front left and the large gear is at the front right.



Insert an M3 nut into each of the slots shown outlined in red, above.



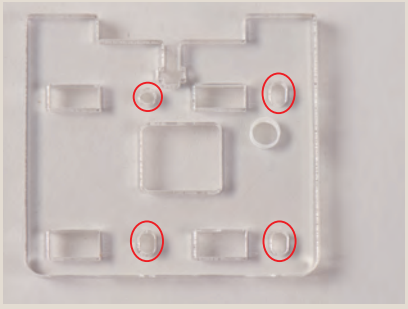
Hold the laser-cut part D as shown, with its tabs at the top. The square hole should be central and the circular hole to the right. Insert the tabs on laser-cut parts A and B into the slots (outlined in red in the image, above left) in laser-cut part D.



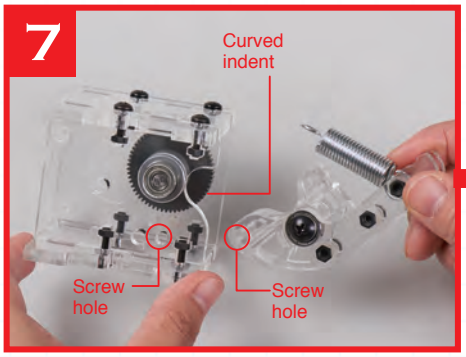
Insert the screws with washers through the screw holes (ringed in red, above). They will fit into the nuts you added in Step 4. Finger-tighten them.

HINT

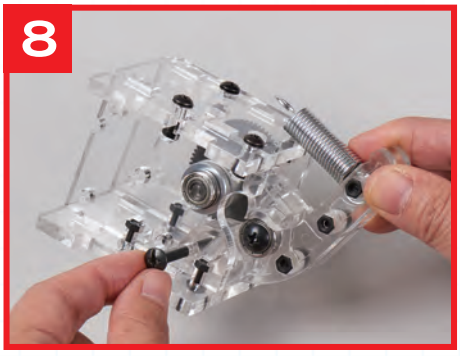
Three of the screw holes in laser-cut part D are oblong, and the one at the top left is circular. This allows you to adjust the position of the part when the screws are fully tightened.



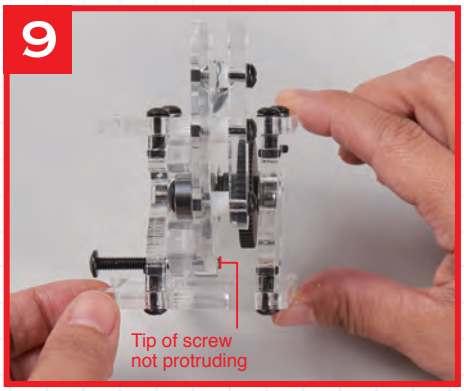
Add the arm to the drive unit



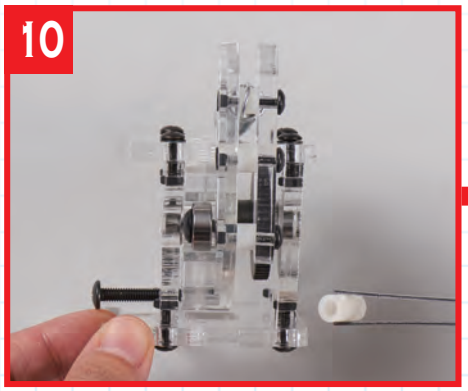
Hold the drive unit, so the curved indent is at the front right. Move the lower end of the extruder arm into the drive unit and align the screw holes (ringed in red, above) in the arm and in the drive unit, as shown.

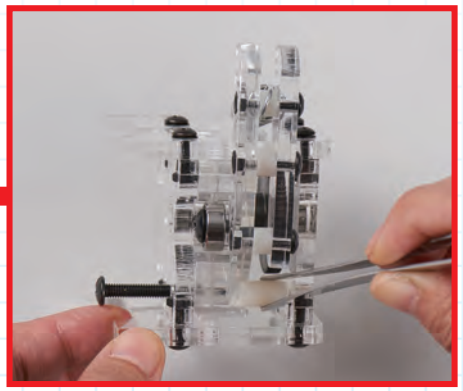


Insert the 35mm M4 truss head screw about halfway into the aligned screw holes.



Turn the drive unit so the arm is facing you and check that the 35mm M4 truss head screw does not poke out of the hole in the arm. If it does, pull it back.





Pick up the 12mm M4 spacer with tweezers and position it as shown above, so that one of its ends aligns with the screw hole in the arm.

Holding the spacer in position, push the 35mm M4 truss head screw in, so it enters the spacer.

Move the assembly so the M4 screw is uppermost, then tighten the screw into the threaded hole in laser-cut part B.

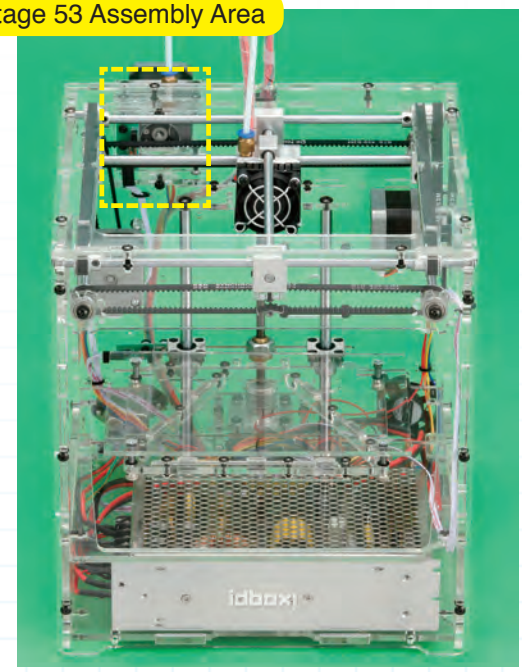
POINT

Do not over-tighten the screw as this might prevent the extruder arm moving freely.

The arm has been added to the drive unit for the extruder.

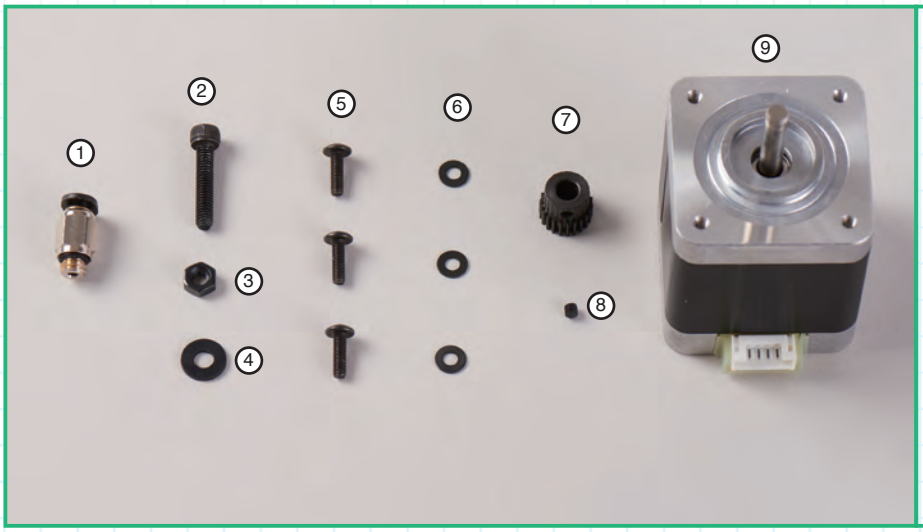
Stage 53: Finishing off the extruder assembly

Stage 53 Assembly Area



In this stage, you add the cap bolt and tube fitting to the drive unit, then add the small gear to the extruder motor's drive shaft. Next, you attach the motor to the drive unit, setting the correct gap between the small and large gears.

The extruder is designed to deliver filament smoothly to the print head. To make this possible, the parts must be accurately set up. Because of this there are a number of adjustments to be made this time. Of particular importance is getting the distance set correctly between the two gears: the small gear, which you add to the shaft of the extruder motor in this stage, and the large gear, which you have already assembled into the drive unit in previous stages.



Stage 53 Components

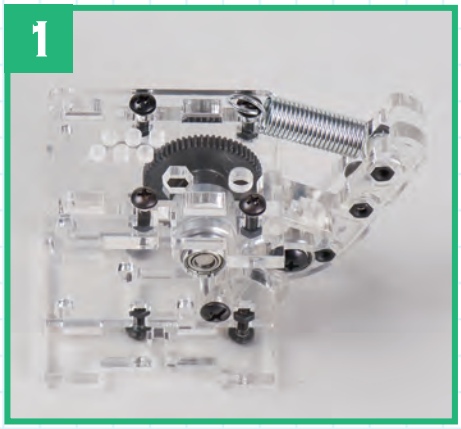
1: Tube fitting
2: M4 cap head bolt (20mm)
3: M4 nut
4: M4 washer
5: M3 truss head screws (10mm) x 3
6: M3 washers x 3
7: Small gear (P0.5-22)
8: M3 set screw (3mm)
9: Extruder motor

Tools you will need

Phillips screwdriver size 1
Allen key (1.5mm) supplied with Stage 30
Tweezers
Thin paper, such as copy paper

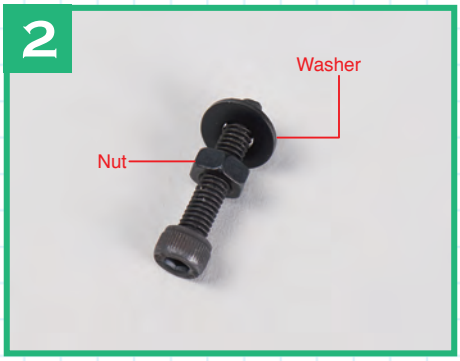
Parts to have ready

1



Get ready the drive unit assembly that you last worked on in Stage 52.

2

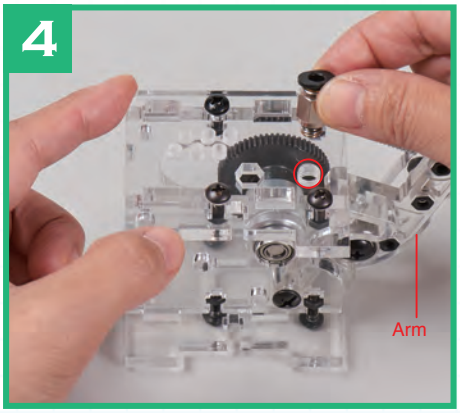


Screw the M4 nut about halfway down the shaft of the M4 cap head bolt and then put the washer on the bolt.

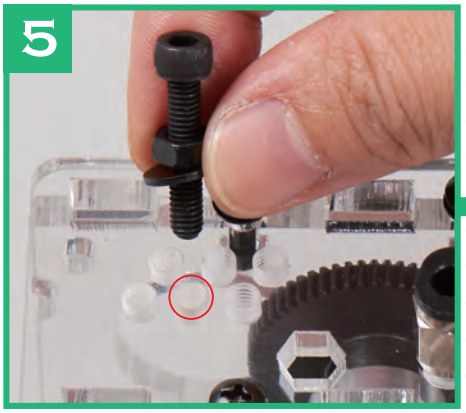
3

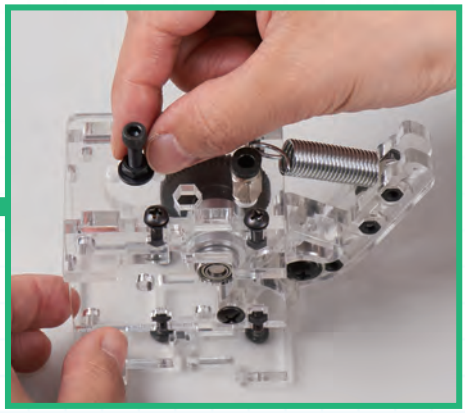
Put an M3 washer on each of the three 10mm M3 truss head screws that are supplied with this stage.

Add the tube fitting and cap bolt to the drive unit

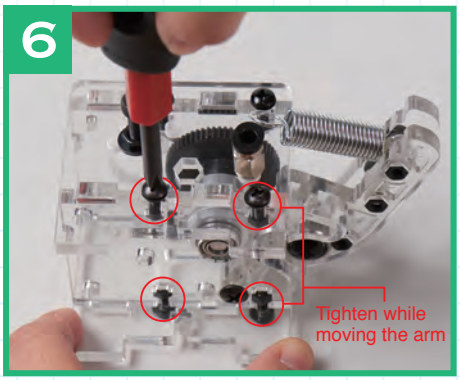


Position the drive unit so the arm is on the right and screw the tube fitting into the threaded hole (ringed in red, above) in the uppermost plate in the drive unit.





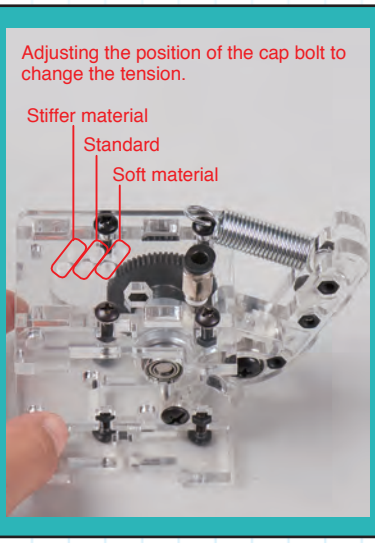
Screw the 20mm M4 cap head bolt into the centre front threaded screw hole (shown ringed in red above) of the six closely spaced screw holes on the top of the upper plate of the drive unit. Turn the screw until the tip of the screw is level with the underneath of the plate and then lock it in position by tightening the nut with your fingers.



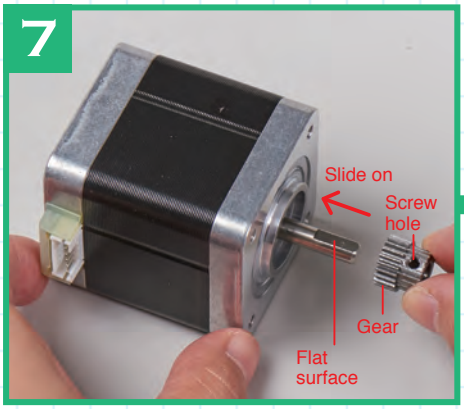
Tighten the truss head screws shown ringed in red above. Tighten the two on the right while moving the arm of the extruder, to be sure that the nuts are clear of the arm and that the arm moves freely.

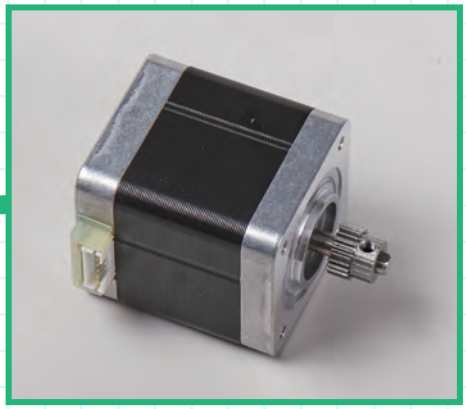
Match the tension and material

To make sure the filament is extruded evenly, the filament is pressed against the drive roller by the arm, which is pulled towards the roller by the tension spring. By changing the position of the cap bolt, to which one end of the spring is attached, you can change the tension in the spring and thus how hard the arm presses the filament onto the drive roller. Softer filament materials, for instance, need less tension (the cap bolt is screwed in closer to the arm) and stiffer materials need more tension (the cap bolt is screwed in further from the arm). The photo right shows the three holes into which the cap bolt can be fitted, depending on the material used.



Add the extruder motor to the drive unit

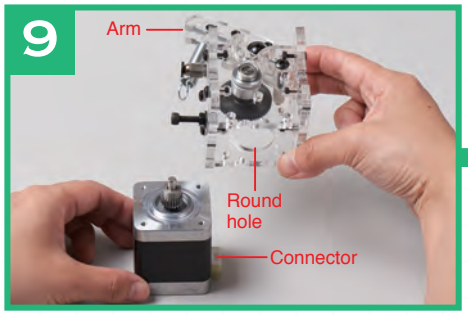


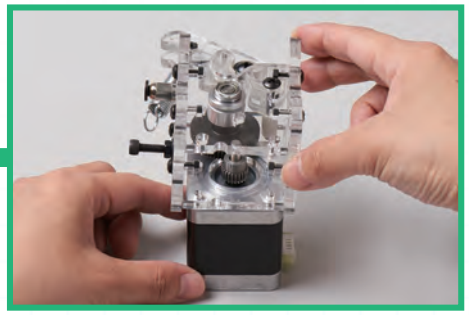


Align the flat surface of the motor's drive shaft with the screw hole in the small gear and slide the gear onto the shaft as shown.

Insert the 3mm set screw into the screw hole in the small gear and tighten it with the 1.5mm Allen key, just enough so that the gear does not fall off the shaft.

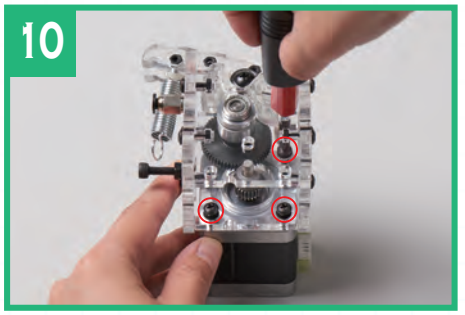
9





Place the motor so its shaft is uppermost and its connector on the right. Hold the drive unit with its arm at the back and cap screw on the left, and lower the large circular hole over the small gear of the motor, fitting it over the ring shape on the motor.

10

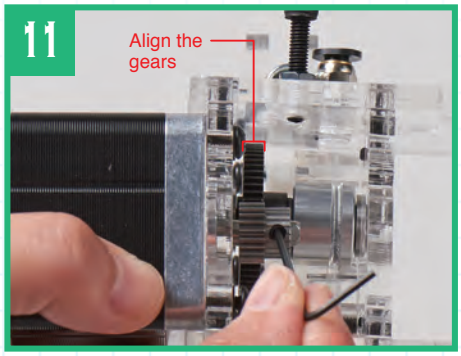


Screw the three 10mm M3 truss head screws (with washers) through the holes in the drive unit (ringed in red, above) and into the screw holes in the motor. Insert the screwdriver through the holes in the upper plate to gain access to the screws.

HINT

Use tweezers to get the screws into the holes in the drive unit before loosely tightening them with the screwdriver, which you can poke through the holes directly above the screw heads.

11

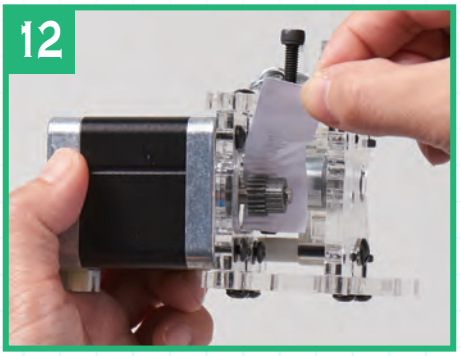


Hold the motor as shown so its connector is at the front and move the small gear along the shaft to align it with the large gear. Tighten the set screw when the gears align.

POINT

Make sure the set screw tightens onto the flat surface of the motor shaft.

12

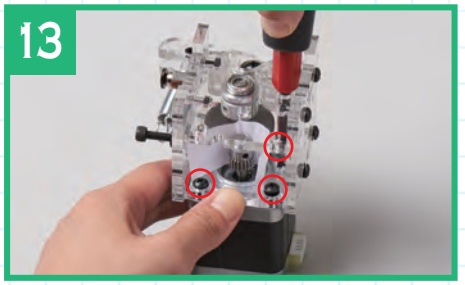


Cut a strip of thin paper to between 1.5 and 2cm in width. Sandwich the paper between the small and large gears by feeding it between the gears and rotating the gears with a finger.

HINT

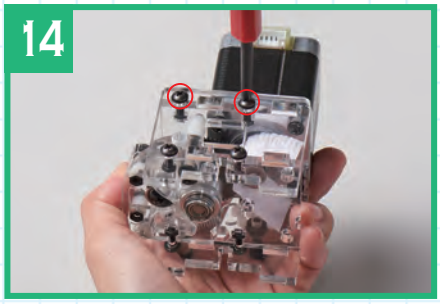
Push on the motor from the back and the drive unit from the front using moderate force while tightening the screws.

13



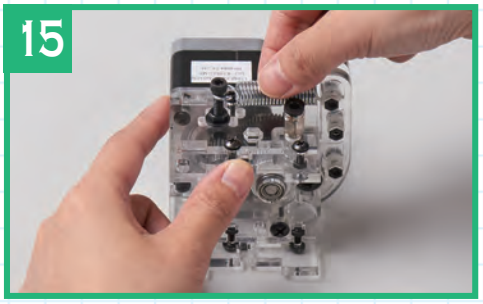
Place the motor on your work surface and, while pushing the gears together, fully tighten the three screws ringed in red.

14



Hold the motor and drive unit as shown above and fully tighten the two screws shown ringed in red, above. When these two screws are fully tightened, pull the paper out from between the gears. The paper is used to set the gap between the teeth of the two gears accurately, so ensuring smooth running.

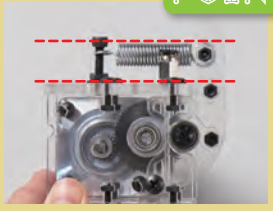
15



Hook the end of the tension spring over the cap bolt. A bit of pressure might be required.

POINT

Align the tension spring so its sides are parallel with the top panel of the drive unit.

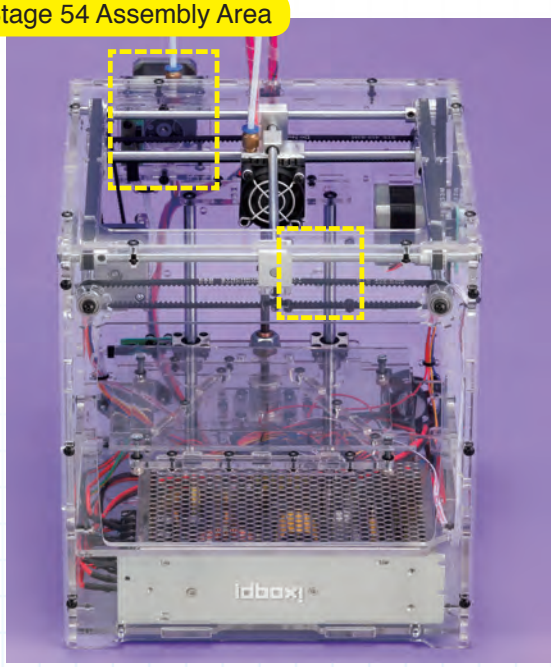


Stage finished

The drive motor has been added to the drive unit and the extruder is now completed.

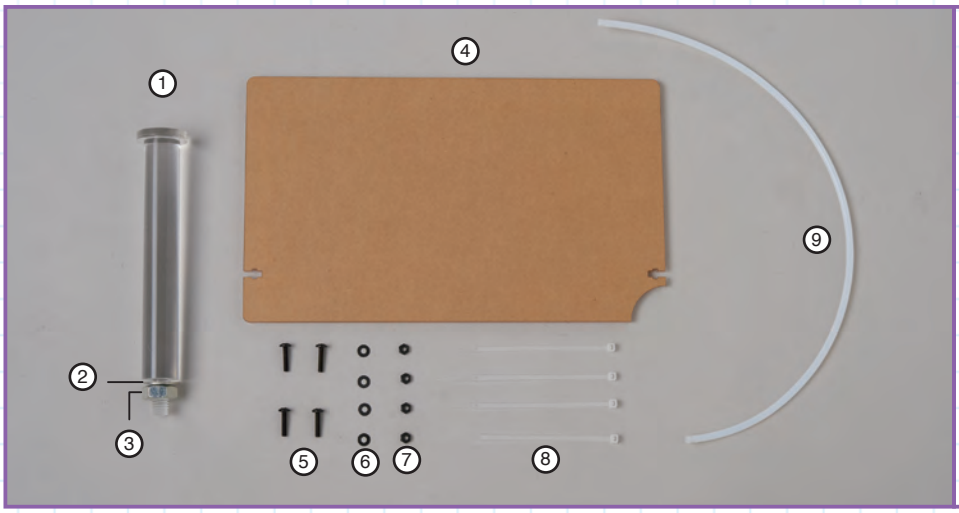
Stage 54: Attach the extruder and the spool holder to the housing

Stage 54 Assembly Area



In this penultimate stage, you attach the extruder assembly (which you finished in Stage 53) and the spool holder to the rear of the housing.

After you have added the extruder assembly, which is secured to the rear panel of the idbox with two screws and nuts, you plug the motor cable into the socket on the extruder motor. You then add the spool holder, which is held in place with a large M10 nut. The spool holder holds the spool of filament that the idbox uses for printing out your models.



Stage 54 Components

1: Spool holder
2: M10 washer
3: M10 nut
4: Bottom cover panel/front
5: M3 truss head screws (14mm) x 4
6: M3 washers x 4
7: M3 nuts x 4
8: Ties x 4
9: Filament guide tube

Tools you will need

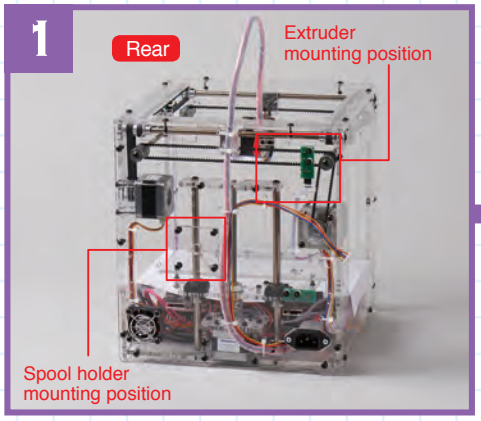
Phillips screwdriver size 1
Spanner supplied with Stage 9
Grease supplied with Stage 47

Useful items

Adhesive tape (or PVA glue) to hold nuts in place

Parts to have ready

1



Get ready the housing and identify the mounting positions for the spool holder and extruder assembly, both of which are on the rear panel. You will also need the extruder assembly that you last worked on in Stage 53.

2

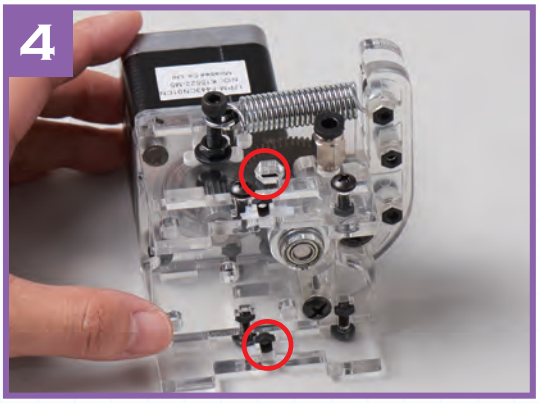
Remove the M10 nut and washer from the end of the spool holder and keep them handy.

3

Put an M3 washer on two of the 14mm M3 truss head screws.

Attach the extruder to the back of the housing

4

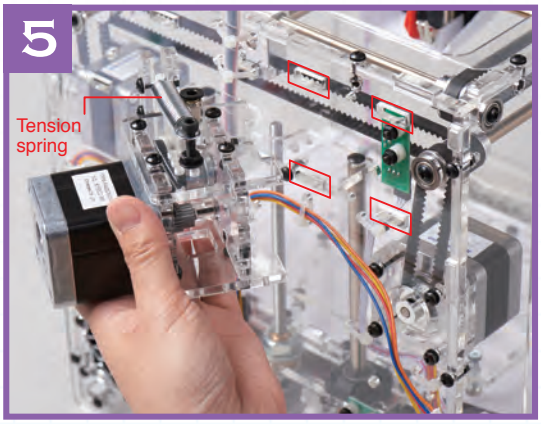


Put an M3 nut into each of the nut slots shown ringed in red, above. The nuts can be temporarily held in position (see HINT, right) to stop them falling out before they are screwed tight.

HINT

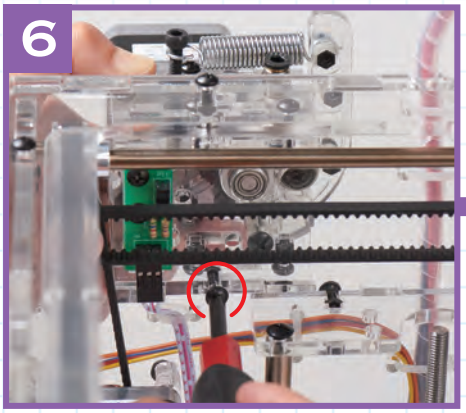
You can use adhesive tape or PVA glue to hold the nuts in position so they do not fall out before being tightened.

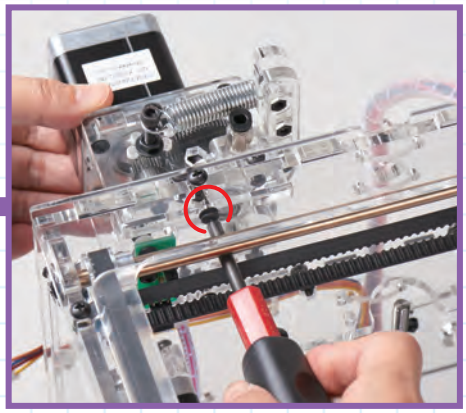
5



With the tension spring at the top of the extruder assembly, insert the tabs or projections on the assembly into the four slots shown outlined in red, above, on the rear of the housing.

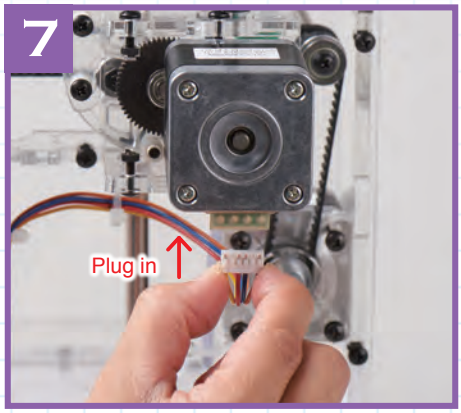
6





Hold the extruder assembly with one hand while you insert the screws through their holes in the rear casing (ringed in red, above), tightening the screws into the nuts. If you have temporarily secured the nuts with tape, remove the tape now.

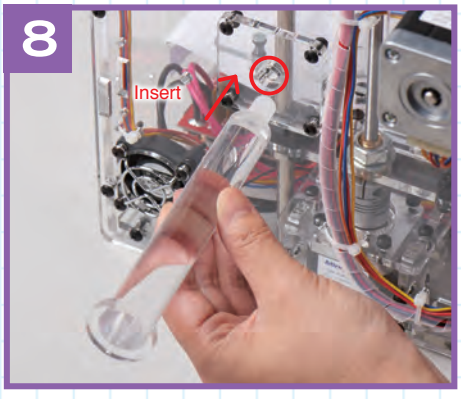
7



Plug the motor cable connector into the extruder motor's socket. Viewed from the rear, the yellow wire should be on the left.

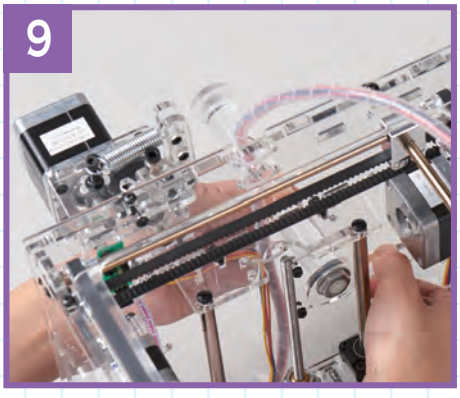
Add the spool holder to the back of the housing

8



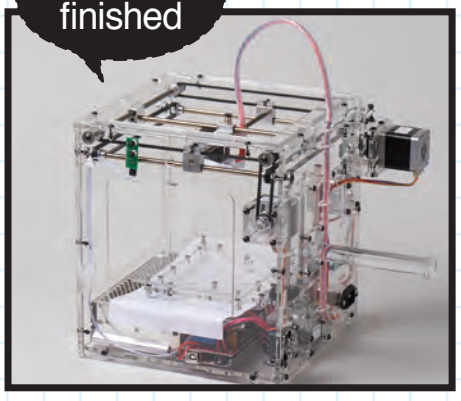
Insert the threaded end of the spool holder through the hole (shown ringed in red, above) in the rear of the housing.

9



Hold the spool holder in position and put the M10 washer, then the M10 nut, on its threaded end. Then, gripping the spool holder tightly, use the acrylic spanner to tighten the M10 nut.

Stage finished

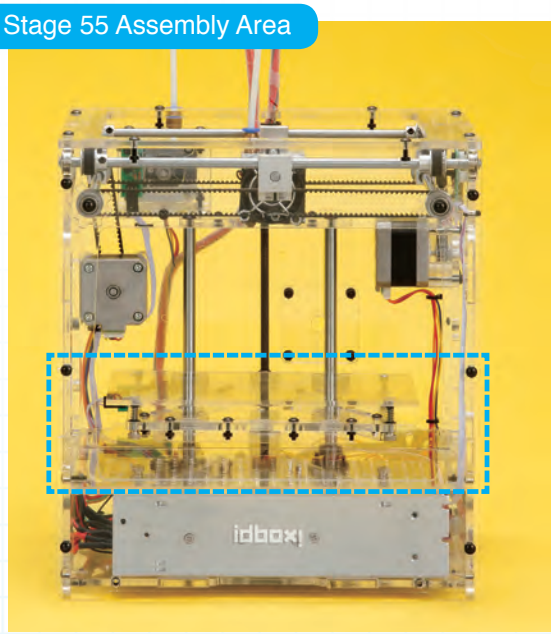


The extruder assembly and the spool holder have been attached to the rear panel of the housing. Keep the parts not used in this stage safe for use later.

Stage 55: Final steps for completion of your idbox

In this last stage, you attach two plates that protect the components in the bottom of the idbox's housing. With these simple additions, you reach the end of the assembly of your 3D printer. It is important, however, to get the order of operations correct (see below) regarding the assembly, setting up and calibration of the idbox.

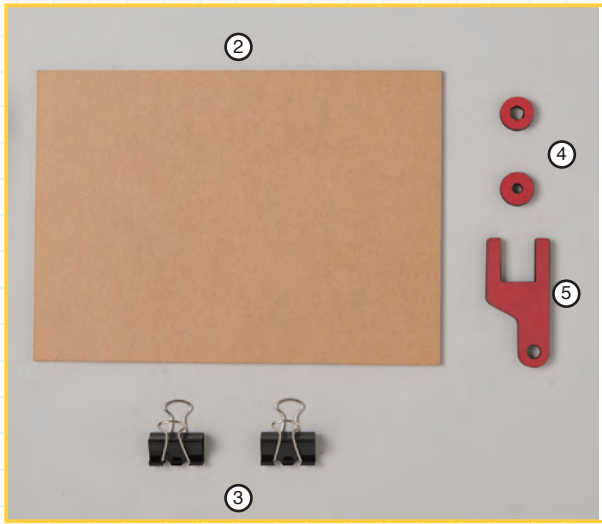
Stage 55 Assembly Area



Order of operations

Before you attempt to use your idbox, make sure you have performed the actions in the order set out here:

1. Follow Steps 1 and 2 on this page.
2. Follow all the instructions on pages 255-256 of User Guide 1 in Pack 10, and all the instructions on pages 283-292 of User Guide 2 in Pack 11. Be sure to read the Corrections on page 321 before you attempt to follow the instructions on pages 290-292 of User Guide 2.
3. Follow Steps 3 to 8 in this Assembly Guide stage.
4. When you are ready to try out the idbox, look at pages 311-315 of User Guide 3 in this pack.



NOTES ON COMPONENTS

The power cable is needed on page 257 of User Guide 1 in Pack 10.

The heater block wrench and nozzle nut tool are needed when you follow the instructions on page 290 of User Guide 2 in Pack 11. See also the Corrections on page 321 of this pack.

The modelling table and clips are needed when you set the height of the modelling surface in relation to the nozzle on pages 291-292 of User Guide 2 in Pack 11. See also the Corrections on page 321 of this pack.

Stage 55 Components

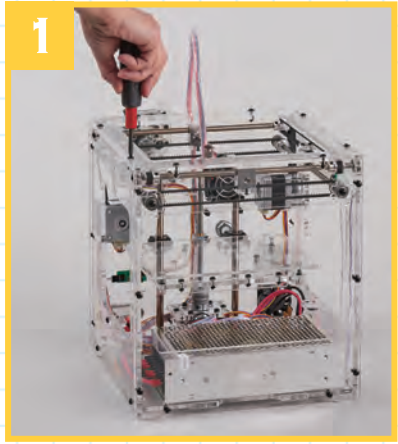
1: Power cable x 1 (not shown)
2: Modelling table x 1
3: Clips x 2
4: Nozzle nut tool (in two parts) x 1
5: Heater block wrench x 1

Tools you will need

Phillips screwdriver size 1
PVA adhesive

Preparations and parts to have ready

1



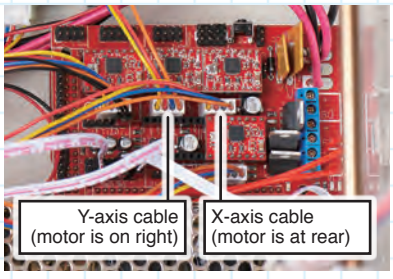
Prepare the housing. Check that all the screws (including the set screws), nuts and bolts are tightened properly. Remove any paper covering the nozzle and the table base.

2

Prepare the nozzle nut tool by sticking the two halves together with PVA adhesive as shown. The hexagonal socket on one side of the tool is used to tighten the printer nozzle. (See page 290 in Pack 11.)

Correction

In a photograph in Stage 43's Assembly Guide, the motor cables of the X- and Y-axes are shown plugged into each other's sockets. **The proper positions for the cables are shown below.** Instructions for fitting the cables correctly are given in Assembly Guide Stage 39.

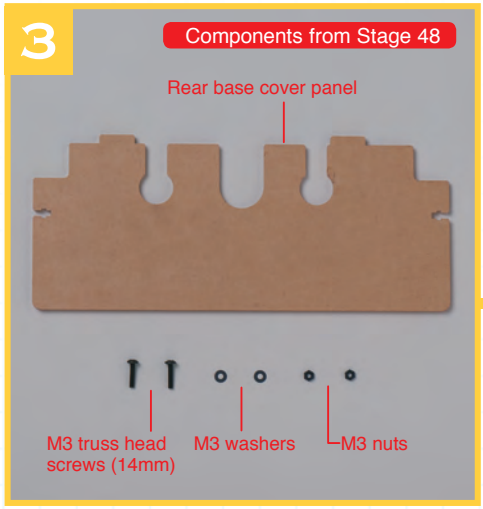


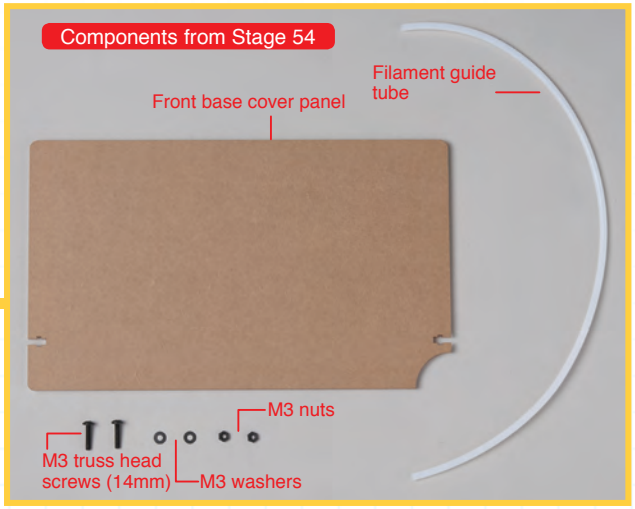
Attach the base covers

CAUTION!

Before you start the remaining steps in this Assembly Guide stage, make sure that you have followed all the Instructions in **User Guide 1** in Pack 10 and **User Guide 2** in Pack 11.

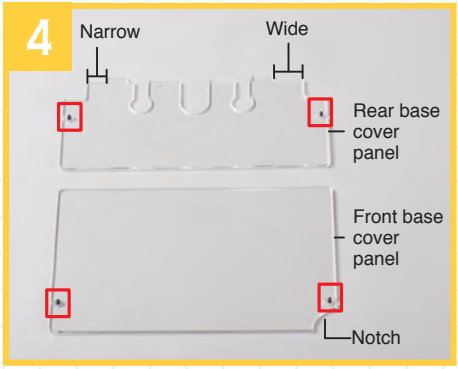
3





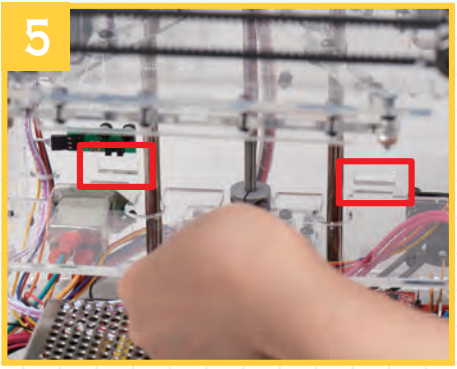
Make sure you have the components shown left, that were supplied with Stages 48 and 54. Peel the protective paper off the acrylic panels and put an M3 washer on each of the four M3 truss head screws. (The filament guide tube, supplied with Stage 54, will be needed when you test the extruder in User Guide 3 of this pack.)

4



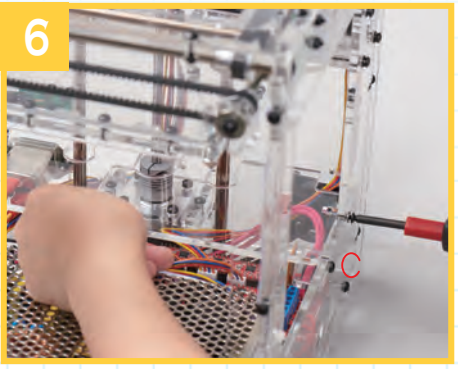
Put an M3 nut into each of the four nut slots, shown above, outlined in red. Secure the nuts in the slots with PVA glue or tape so they don't fall out. Position the rear base cover panel so the narrow section indicated above is on the left and the wider section is on the right.

5



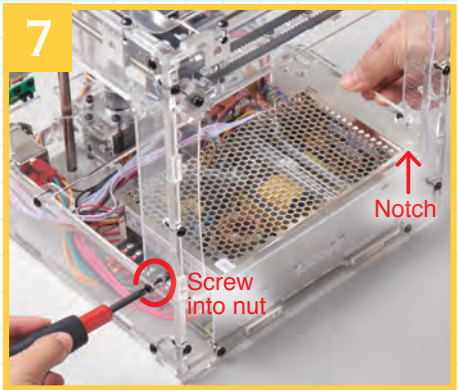
Insert the two tabs on the rear base cover panel into the slots shown outlined in red, above. Try not to touch the Z-axis rods or lead screw with the panel. If a nut falls, retrieve it, taking care not to damage the components in the base of the housing.

6



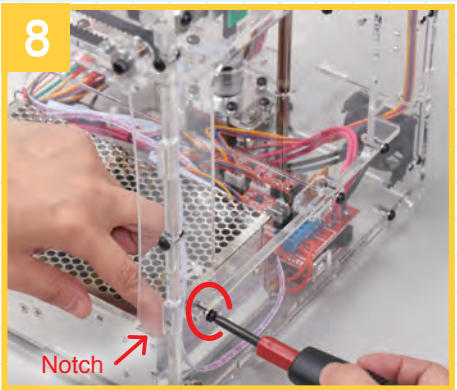
Insert the M3 truss head screws (with washers on) through the screw holes on the left and right of the housing and tighten them into the nuts in the panel with a screwdriver.

7



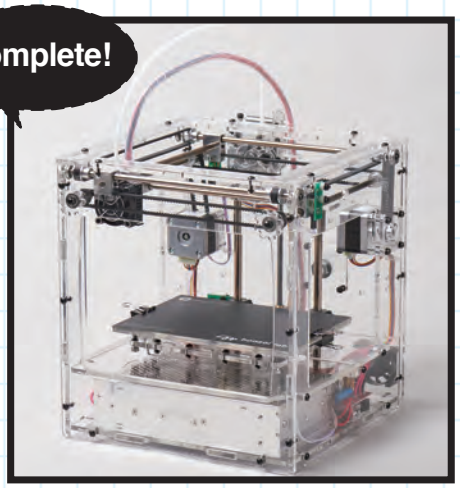
With the front of the idbox facing towards you, position the front base cover panel so the notch is on the right at the front. Insert the M3 truss head screw into the nut on the left (ringed in red) and tighten.

8



Put a finger in the notch and move the panel so that the nut and screw hole on the right (ringed in red, above) align. Then insert the M3 truss head screw and tighten it into the nut in the panel.

Complete!

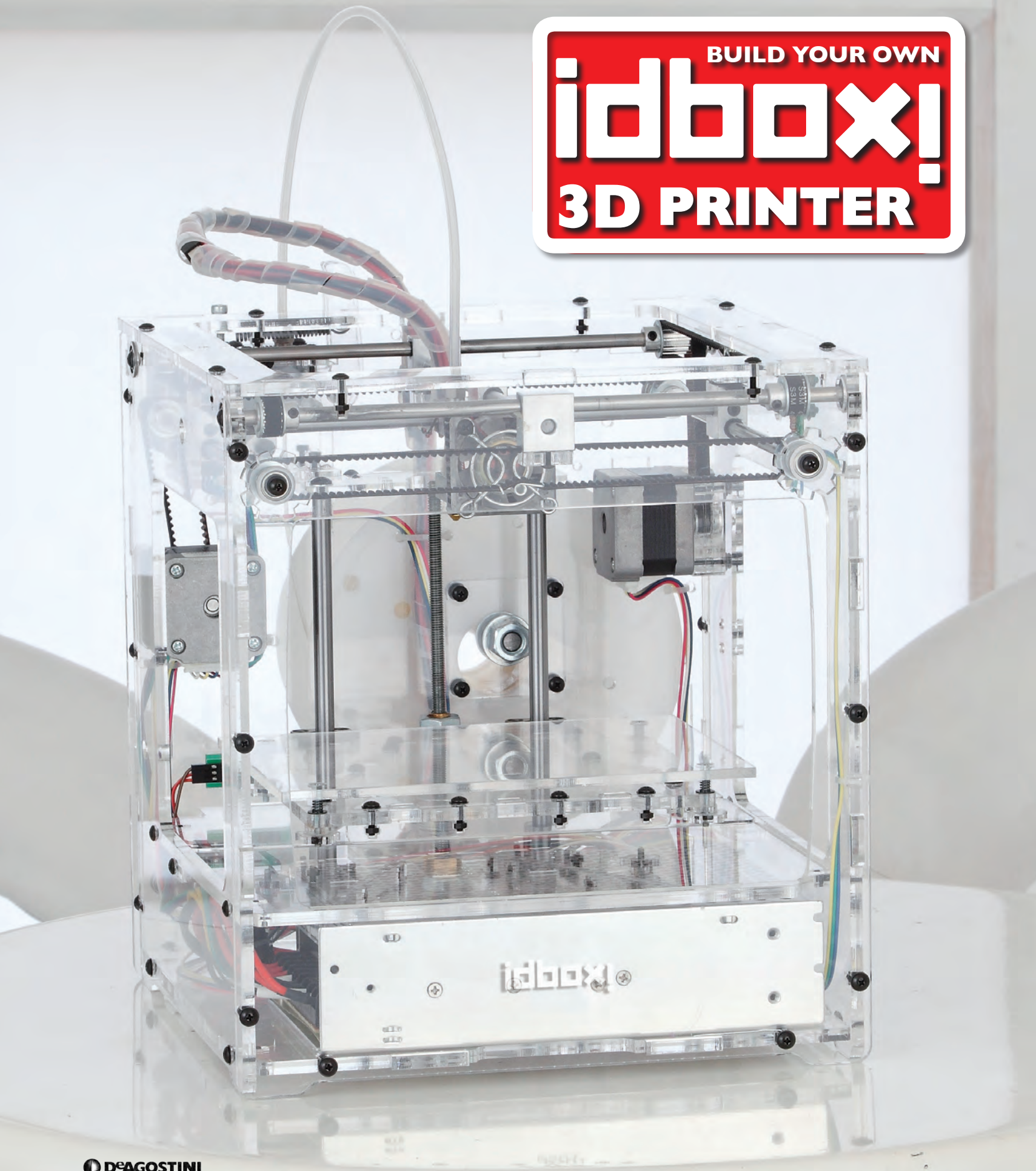


It's done! In the photo above, the filament guide tube and a sheet of BuildTak are shown. These are added when the idbox is being used – see page 313 of the User Guide 3 in this pack.

BUILD YOUR OWN

idbox!

3D PRINTER



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