

# 3D Printer

## **What is it?**

The 3D Printer is a rapid prototyping machine that can create complex three-dimensional models with working parts.

## **How does it work?**

The machine prints micro-thin layers of ABS plastic to build up a three dimensional object. The plastic comes in spools which are melted down and fed directly to the printer head. Depending on the model's geometry, a support material is added to help structure the model during the printing process. This support material is later dissolved away in a special solution.

## **What software can I use?**

You can use almost any modeling program you want as long as you can save or export your file in the .stl format. Beware of student versions as they often limit their saving and exporting options.

## **What materials can I use?**

Our 3D printer only prints with ABS plastic. You can choose between red, white, blue, and black.

## **What do I need to do before I come to the Lab?**

Have your .stl file ready to go.

## **How do I work the machine once I'm at the Fab Lab?**

Have a lab assistant help you. Once your file has started to print, you do not have to remain with the machine. You can come back at a later time to pick up your model.

Please refer to the diagrams on the following pages while going over these directions.

1. Make sure that the 3D Printer is on and that it is loaded with a clean tray. Make sure that the tray is secured in place with the blue clips. Make sure that the door is closed.
2. Open CatalystEX 4.2 on the computer workstation.
3. Go to File > Import .stl. Find your .stl model and open it. You will see your model appear on the screen.
4. There are three tabs you will need to use: General, Orientation, and Pack.
5. In the General Tab, there are a few options that you can choose from.

Layer resolution- This can be set to either .01 or .013. For most applications you will choose .01 as your model will print more quickly without much difference in quality.

Model Interior- You can choose between solid, high density and low density. The low density option uses a loose honeycomb structure to build the model's interior, high density uses a denser honeycomb structure, and solid of course is completely solid. No matter which option you select the model will look exactly the same from the outside. The benefit of these options is that the plastic material can be pricy, and you can save money by using a lower density setting. In our lab we charge \$10.00 per cubic inch of material to cover basic costs.

Support Fill- For most purposes you will select "Smart Fill." This tells the machine to use the least amount of support material in the most efficient way to structure the model.

Number of Copies- Enter the number of copies that you would like to print out.

STL Units- You can change the scaling units from millimeters to inches and vice versa.

STL Scale- You can change the scale factor of the model to make it larger or smaller.

6. Under the Orientation tab, there are several options again. In almost all cases, all you need to do here is hit the "Auto Orient" button. The machine will automatically analyze your model and orient it in the best position for printing. There are some special circumstances where you might want to override this command and manually orient the model in a different position. As you become more experienced with the 3D printer you may eventually have a reason for doing this.
7. Then you will hit the "Add to Pack" button at the bottom of the screen. You can see the machine calculate the layering of your model, and where the support material will be added.
8. At this point the program tells you how much model material and support material will be used, as well as how long your file will take to print.
9. Go to the Pack tab and you will see your model added to the printer pack. You can move the model around here if you want it printed on a specific part of the tray.
10. You can now add more models to the pack.
11. When you have added all of your models to the pack, hit "Print" and your model will be sent to the 3D Printer.
12. On the machine you will see a flashing message that says "Start Model." Hit the button to start the model. You will see a message that tells you that the machine is warming up. In a few minutes you will see your model start to print.
13. When your model has finished printing you can remove the tray from the machine. Be careful- it will most likely be very hot inside. Turn the blue clips to the sides to release the tray and pull it out.
14. Pull your pieces off the tray and put them into the cleaning station to remove the support material.
15. Put a clean tray back into the machine, secure it with the blue clips, and close the door so that the machine is ready to go for the next print.

# 3D Printer Parts

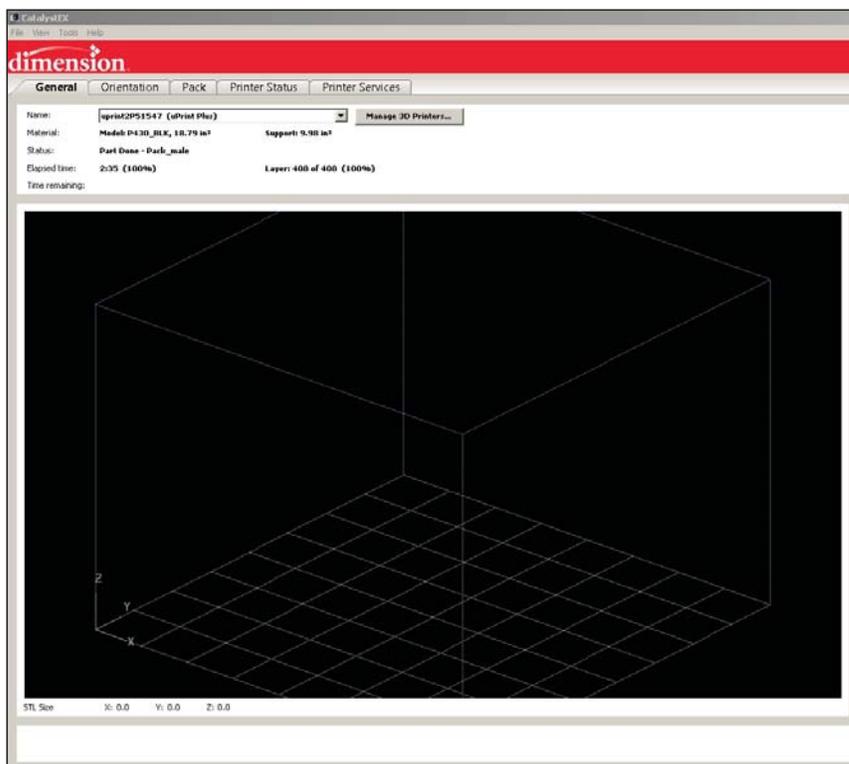


Printer Head

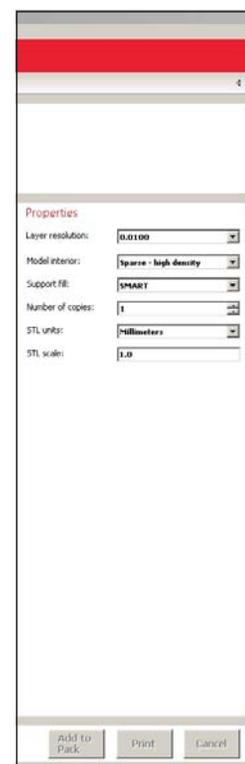
Tray

Clips to secure tray

# 3D Printer Program



## General



## Orientation



## Pack

