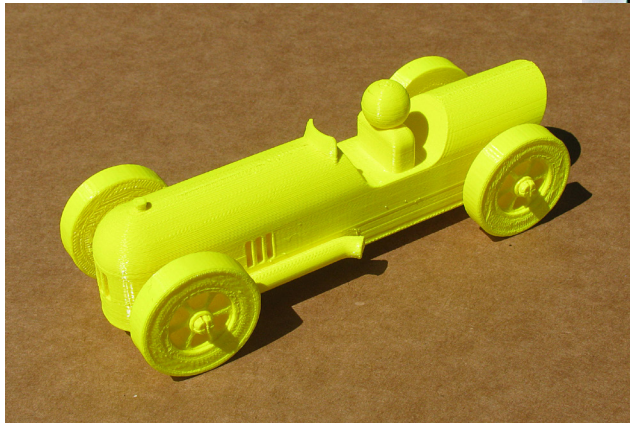
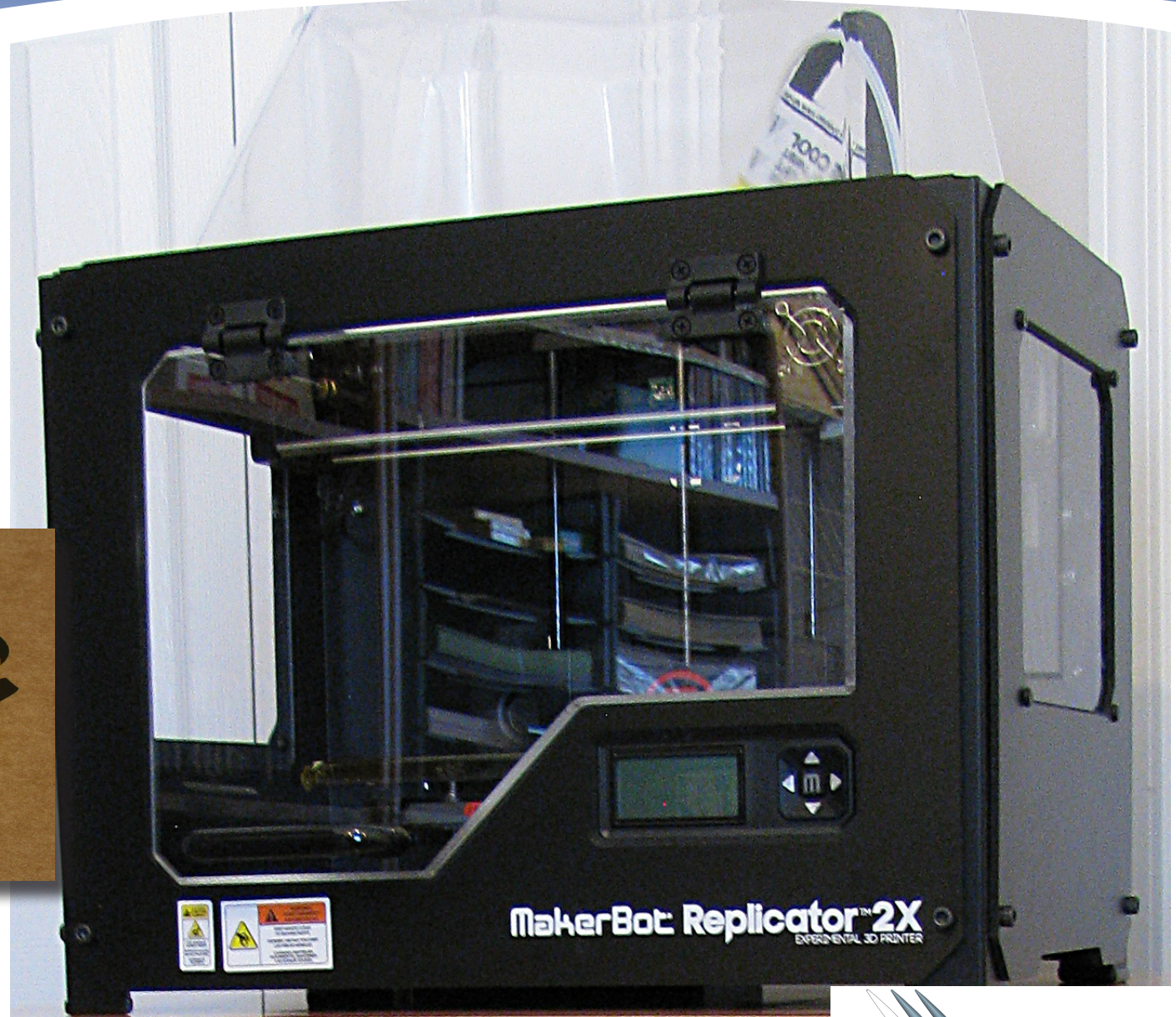


Do you ever wonder what all the 3D printing hubbub is about and wonder if it is really worth the cost?

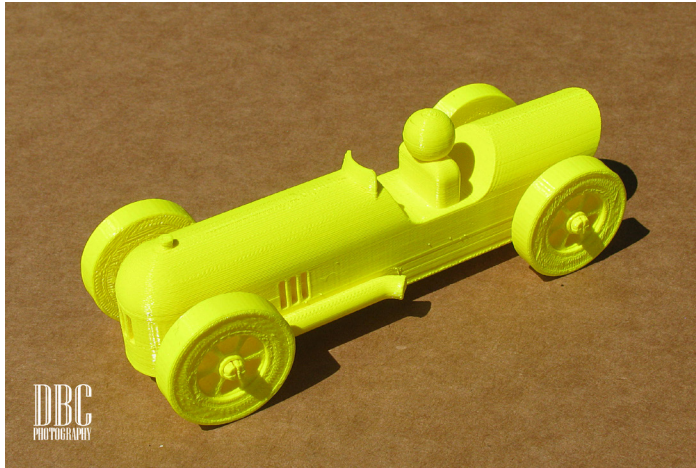
According to Don Cheke the answer is a resounding YES! 3D printing is most definitely worth the cost if one is realistic about the expected results from an affordable home / office 3D printer.



All models in this TurboCAD tip were printed on the MakerBot Replicator 2X pictured on this page.



At its core, 3D printing is really all about early design checking in a timely and cost effective manner. It is about getting a feel for one's designs before taking the next steps to production.

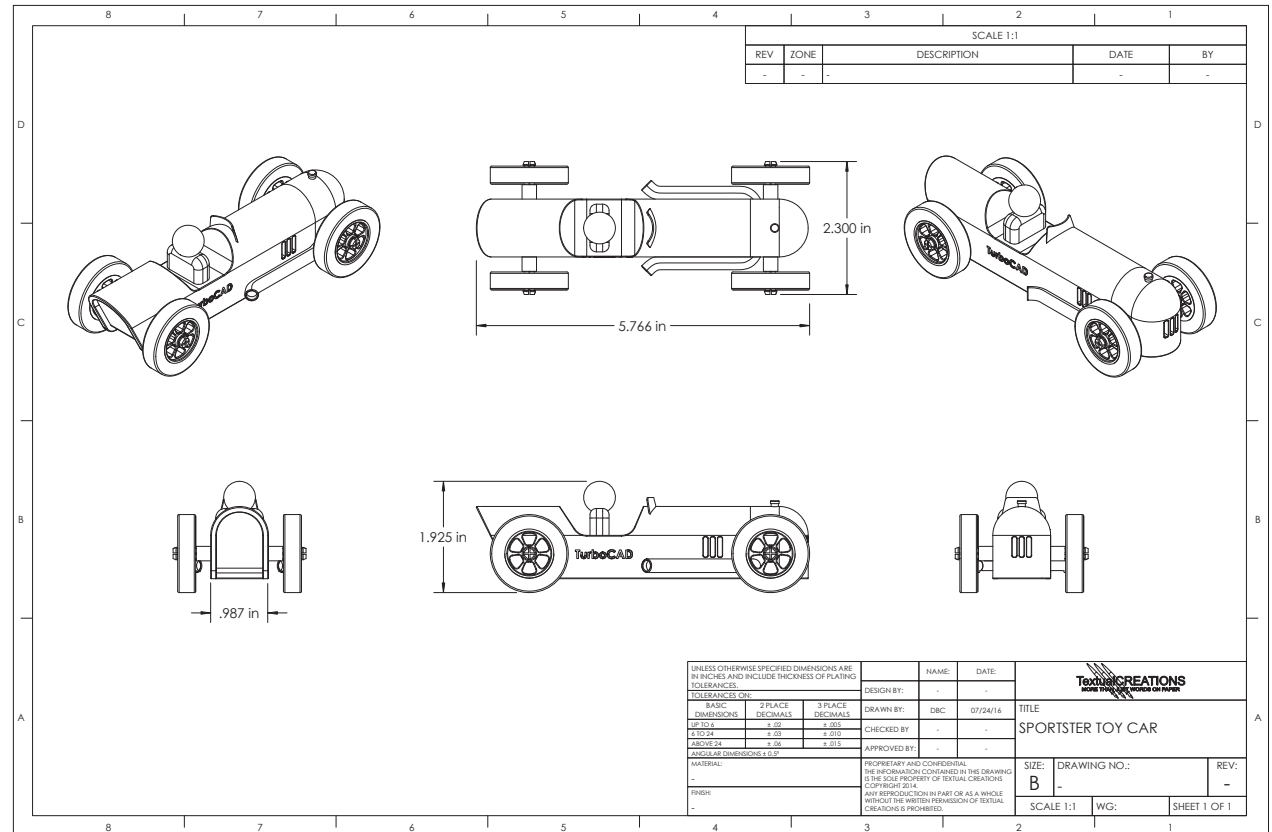


Single color 3D print, snap-on wheels printed separately.



Donald B. Cheke © 2015
www.textualcreations.ca

Rendering done in TurboCAD 2015 Pro using RedSDK render engine.

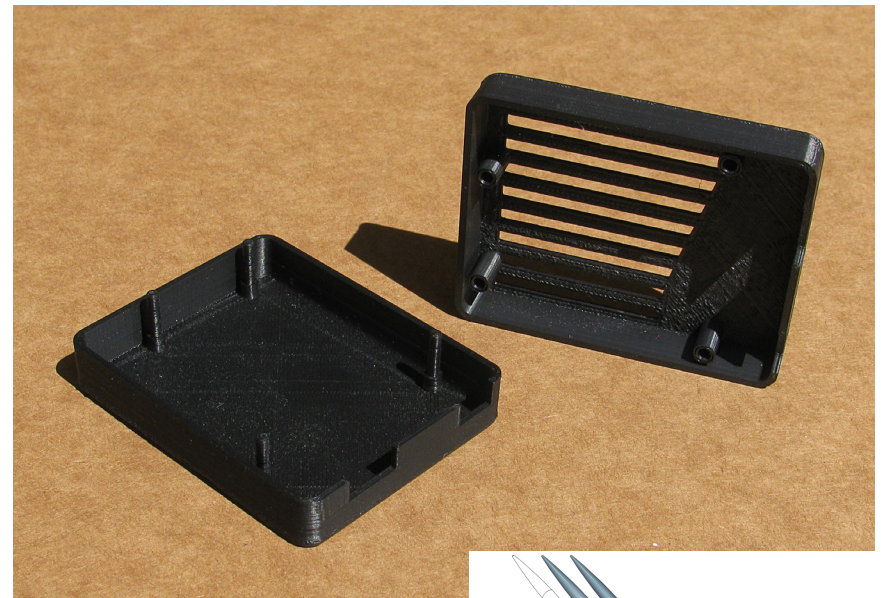


The Sportster Toy Car was modeled in TurboCAD Pro. It was inspired by a similar design by Tomas Sciskala as seen in the Foundry Community CAD gallery.

Arduino Enclosure created in Fusion360, based on tutorial by Taylor Stein. (<https://www.youtube.com/watch?v=E0bhdr84FNU>)

Some of the things that make 3D printing an excellent design tool include:

- The WOW factor. It is simply amazing to model one's design in CAD and be able to create a real-world representation of it right in the comfort of one's own home or office. All this in a relatively short time frame. Very reminiscent of the Star Trek replicator.
- Reality of size. When working with small sizes the CAD screen can be quite deceptive. A small gap may look sufficient, tolerance-wise, in a design on the zoomed-in monitor but a quick test print shows immediately if the gap is too small.
- Is much cheaper to print on the home / office 3D printer than having a print house do it. For better results with tighter tolerances on a final check, using a 3D printing house like Shapeways can prove very beneficial. Don Cheke does this often with work related mechanical designs.

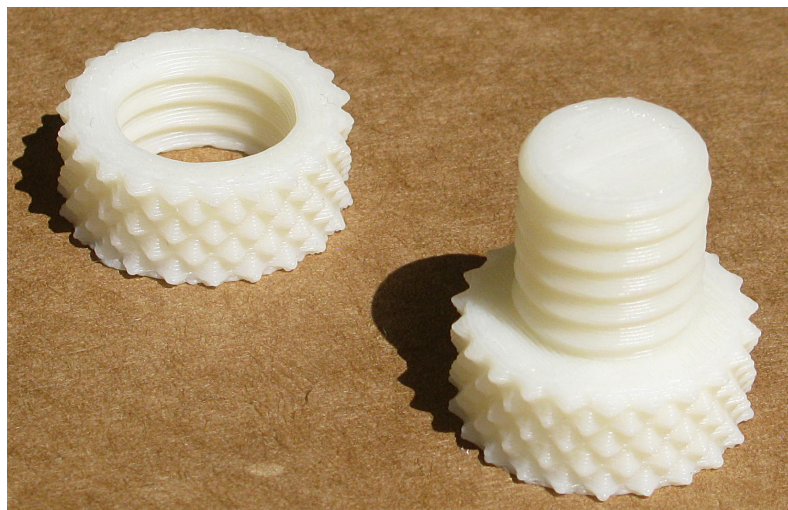


3D printing from an affordable filament extruding printer does have some limitations and it is important to know what these limitations are. They include:

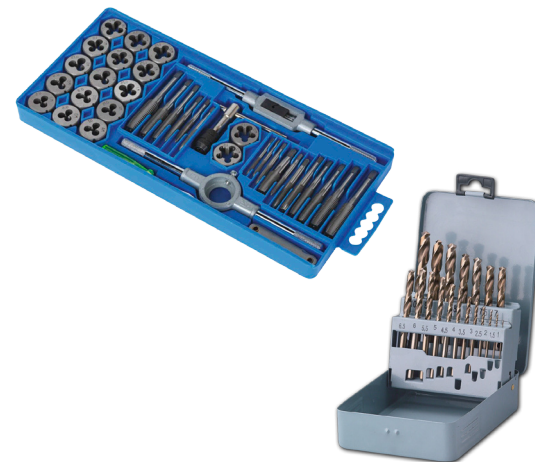
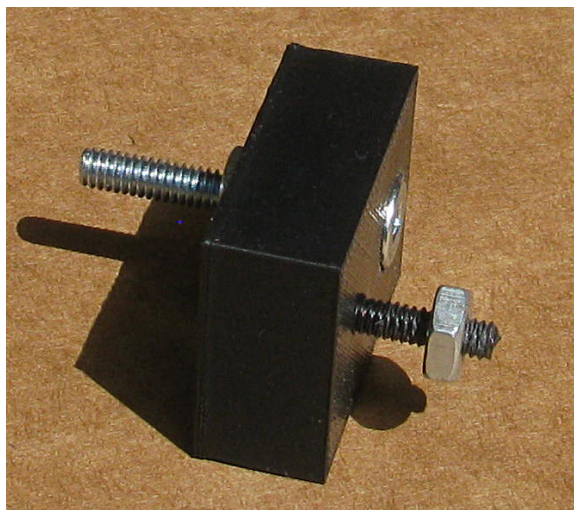
- Poor tolerances on most holes and screw threads. It is best to keep a set of drill bits and a tap and die set on hand as they will come in handy to tweak the final output.
- Exterior finish is a bit rough, even at the finest resolution, so it may not be suitable for additional processes that might include molding.
- Creating a two color print can leave a lot to be desired. More on this further along in the tip.
- Models are not solid which may make after print changes difficult, but fill density can be adjusted if needed.



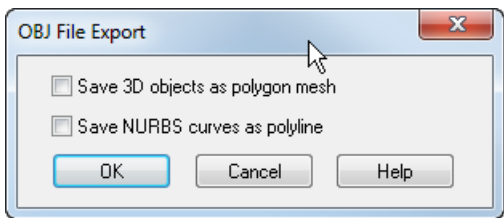
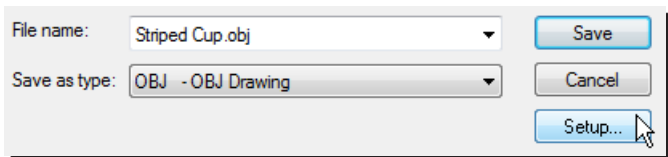
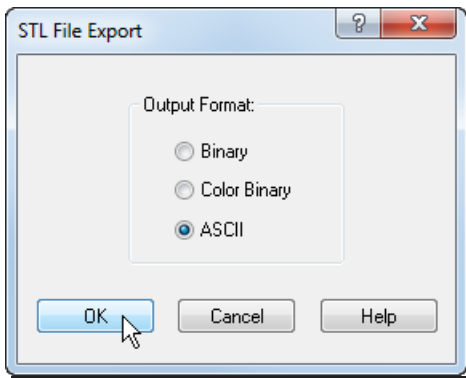
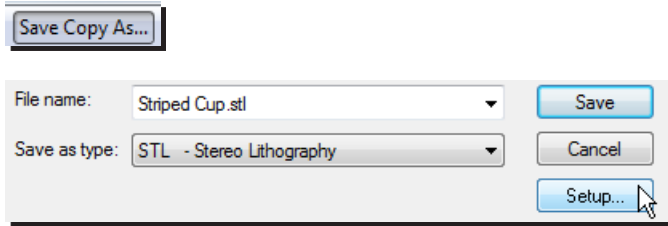
Cone and Nut & Bolt are MakerBot supplied sample files for users to test print.



Countersunk hole & thread test print. Drill & die both required post printing.



So what does this mean for TurboCAD users? Simply put, it means that TurboCAD is well suited to create models and is able to export to a file format that is suitable for 3D printing.



Melted Face file from Thingiverse, printed on MakerBot Replicator 2X



TurboCAD, like most other CAD applications, can export in the two most common formats utilized by 3D printers. These formats are STL and OBJ.

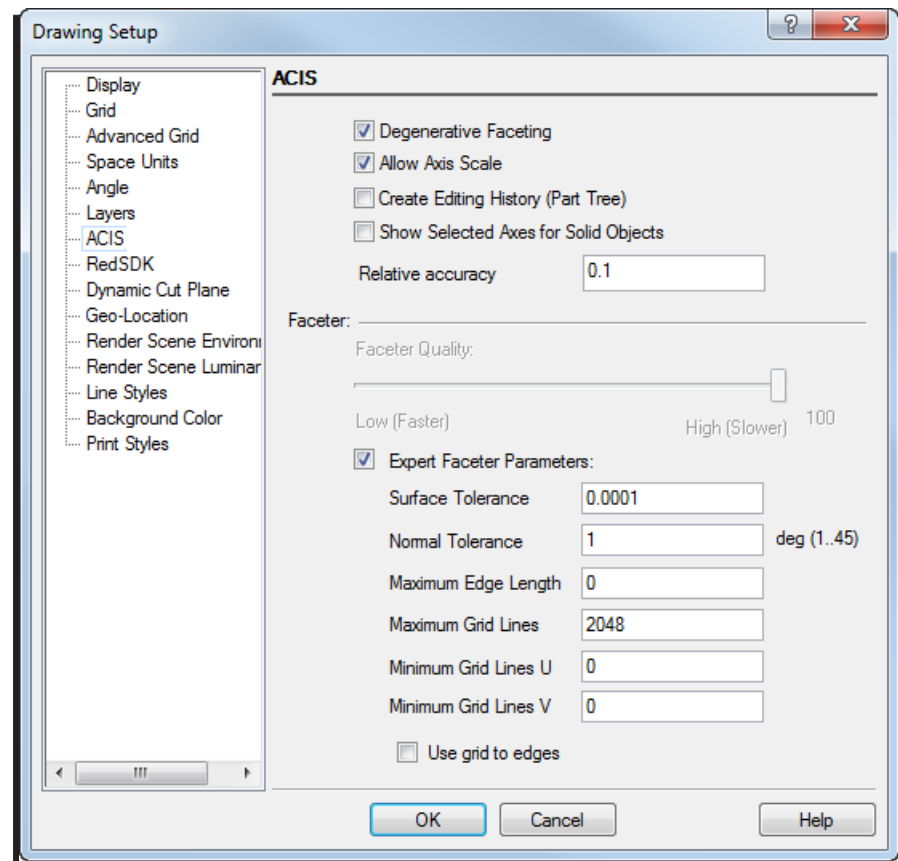
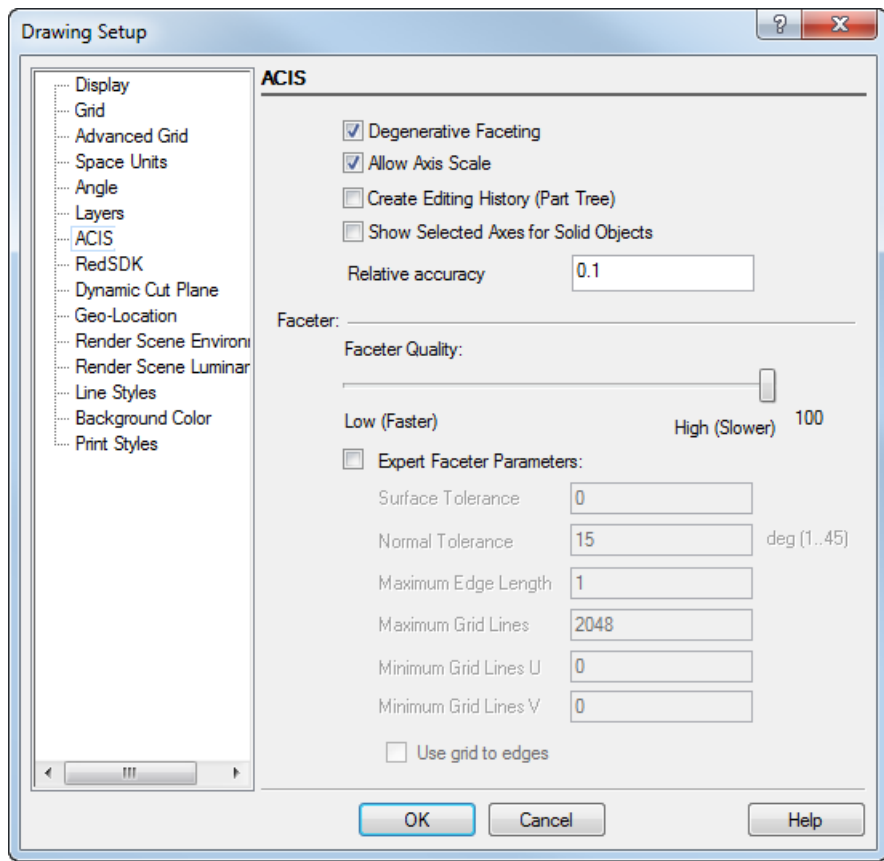
STL seems to be the best option for TurboCAD as OBJ files seem to take a long time for export completion, if they will export at all.

Be sure to select the Setup options best suited to one's printer.

Aside from the ability to get a design out of TurboCAD to a 3D printer, the most important consideration is model quality. Spend some time under the ACIS tab of the Drawing Setup options to ensure high faceter settings are used.

For best 3D printing results be sure to use a High Faceter ACIS (100) setting.

Or use a Custom (Fine) Faceter ACIS setting.



See TurboCAD Tip #15 for an in-depth look at Faceter settings.

In the next several pages the process of getting one's model to the 3D printer and performing the print job will be detailed using the Striped Cup, designed by Don Cheke, as the test subject.



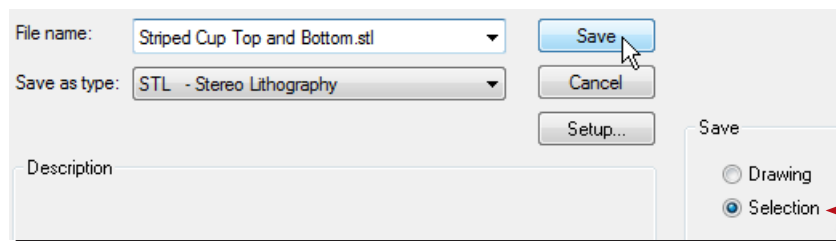
Dual color printing using MakerBot Replicator 2X



Single color printing using MakerBot Replicator 2X

A user experience may vary depending on the type of 3D printer that is being used, but perhaps what is illustrated here will provide some insight into what is required.

1. The first step is to select the components that will be one particular color. In this first step the bottom and the top of the cup is selected.
2. Next the Save Copy As function is selected, STL is selected for format (ASCII for options) and a file name is added. 'Selection' is ticked for save option.
3. Finally, Save is selected.
4. Yes is selected at the warning that appears.

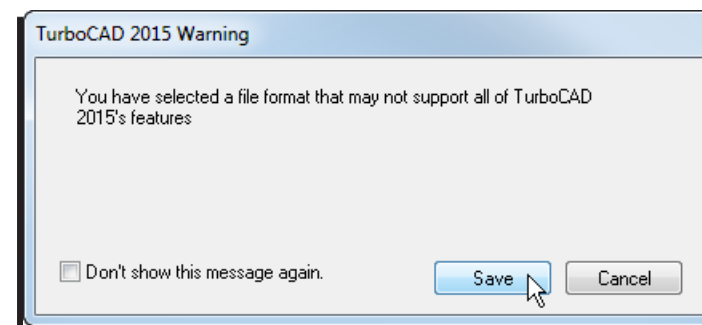
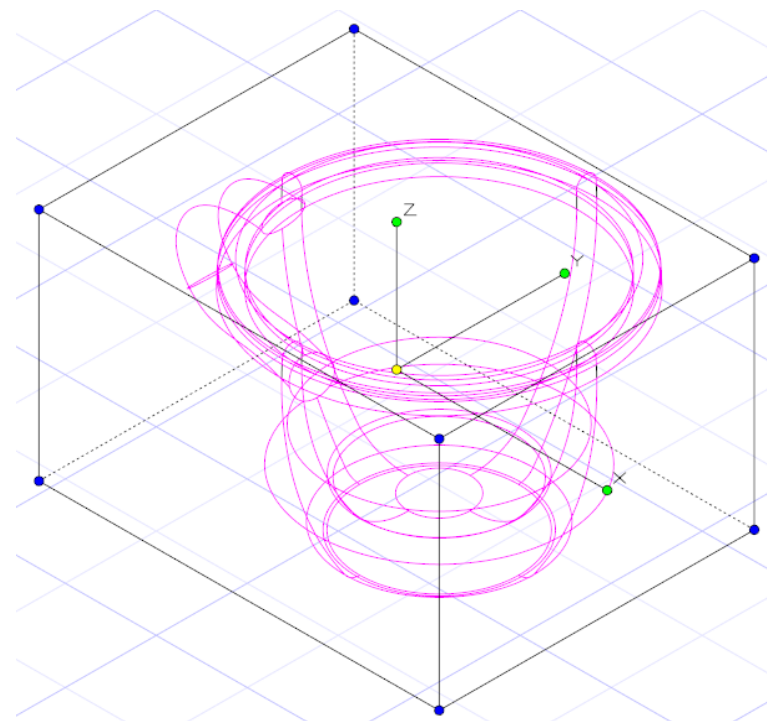


See video, if desired, to see the process:

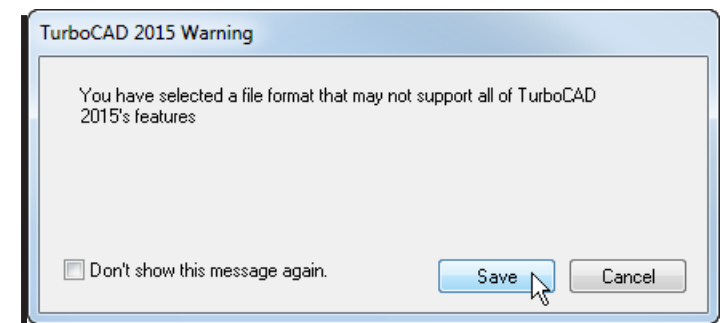
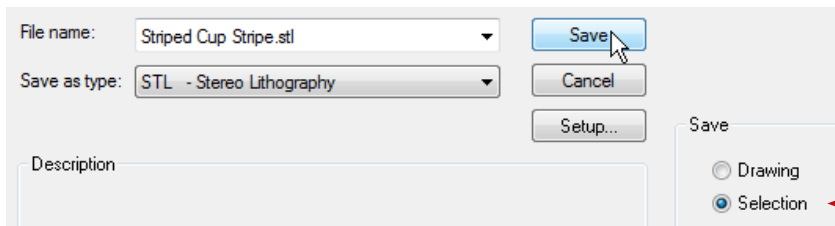
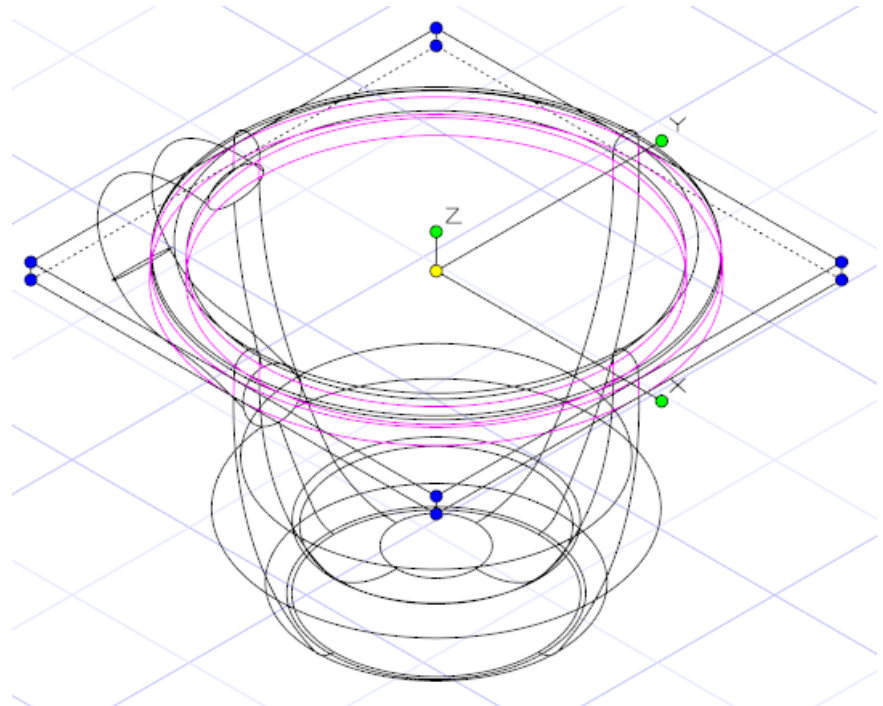
<https://www.youtube.com/watch?v=Wm6Cq6hSSnA>

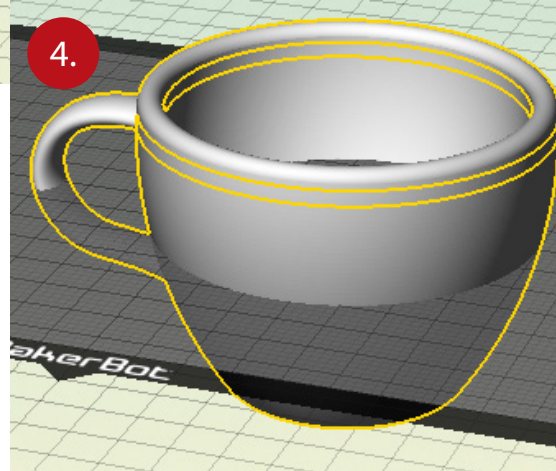
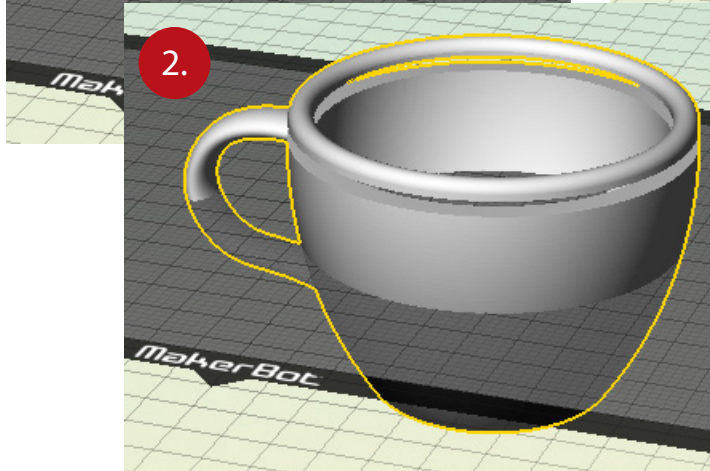
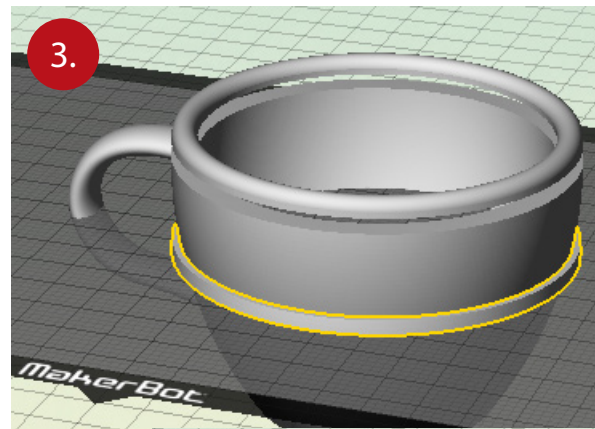
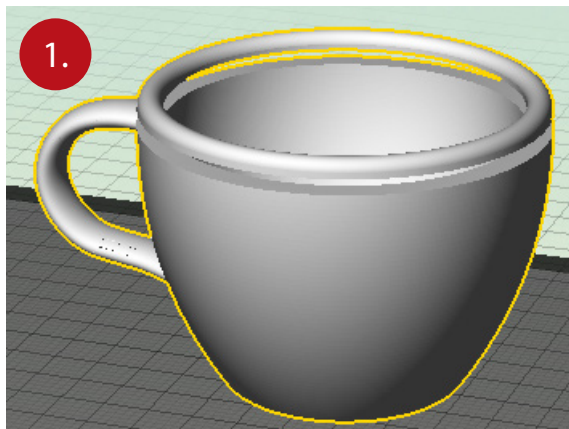
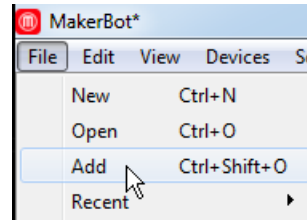
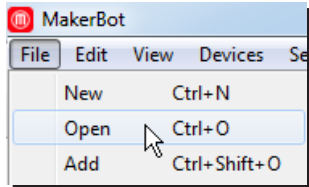
From earlier version trials:

<https://www.youtube.com/watch?v=7UKa09kKsXA>



5. The next step is to select the second color components. In this step the stripe of the cup is selected.
6. Next the Save Copy As function is selected, STL is selected for format (ASCII for options) and a file name is added. 'Selection' is ticked for save option.
7. Finally, Save is selected.
8. Yes is selected at the warning that appears.

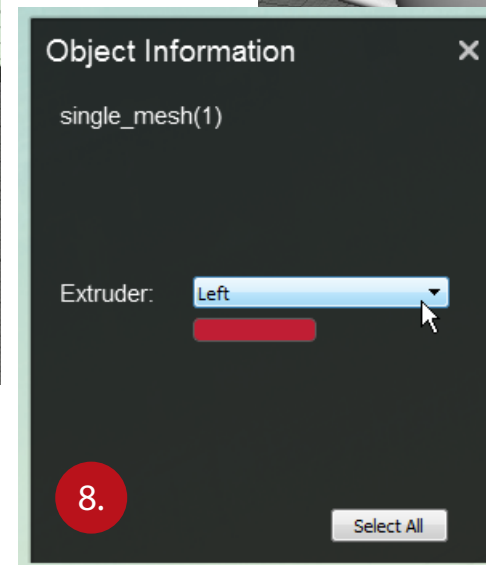
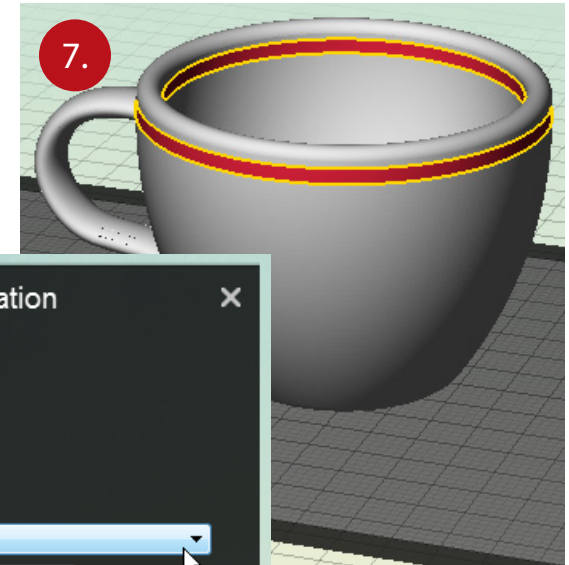
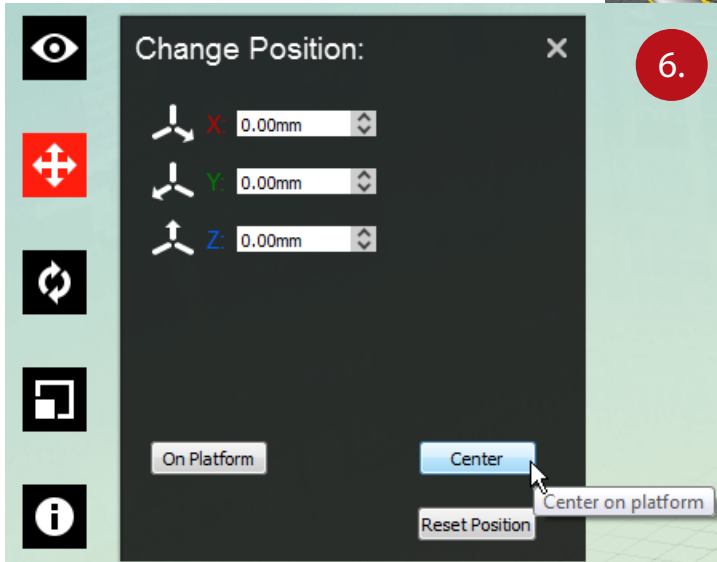
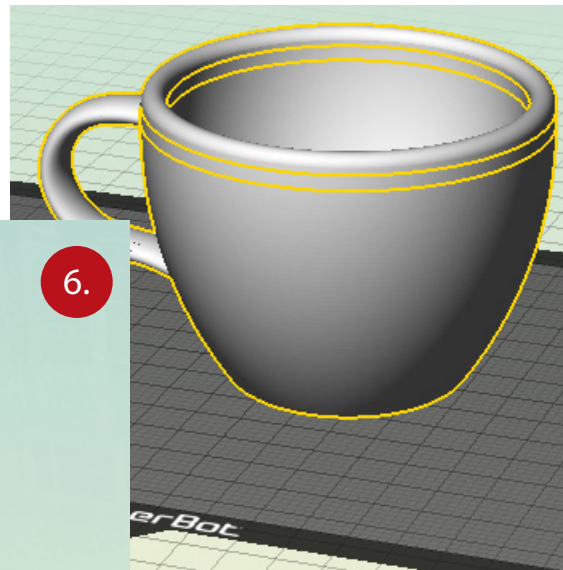
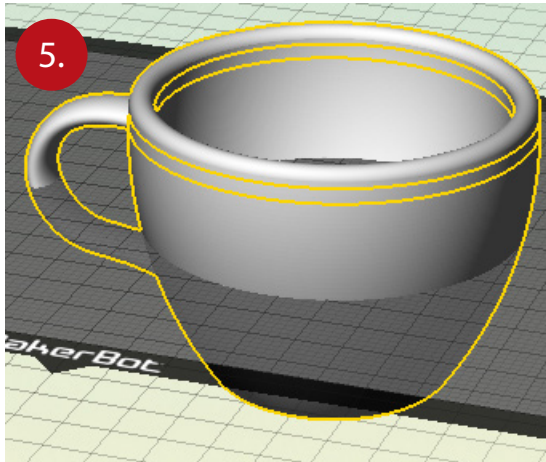




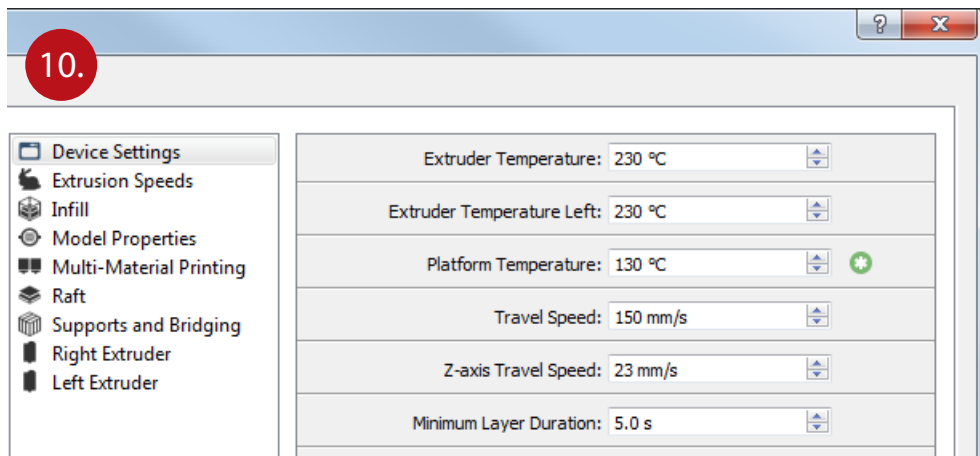
The next steps take place in the MakerBot desktop (software that comes with the printer).

1. Open MakerBot and the Striped Cup Top and Bottom file.
2. Select Ctrl + Z twice to move back two steps from auto positioning (something new, but not so handy to the software).
3. From the File menu select Add. Open the Striped Cup Stripe file.
4. Select Ctrl + Z once to move back one step from auto positioning.

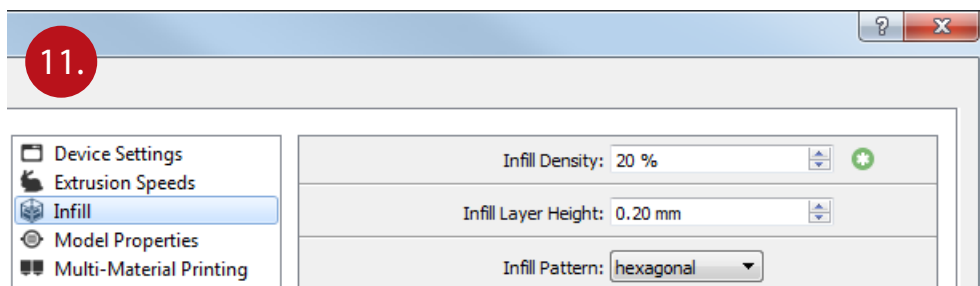
5. Press and hold the Shift key and then select the first object. Release Shift after selection.
6. Open the Move menu and select On Platform and then Center.
7. Press and hold the Shift key and then select the first object to deselect it. Release Shift after selection.
8. Open the Information menu and select the second extruder.
9. Deselect all objects.



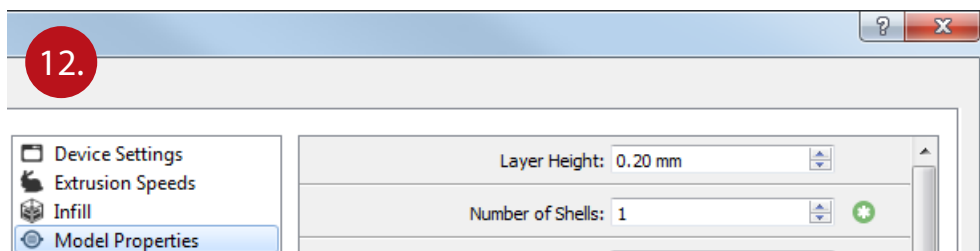
With the model loaded it is time to focus on the settings required for optimal printing. Note that Don Cheke uses default settings for the most part.



10. Platform Temperature set to 130°.



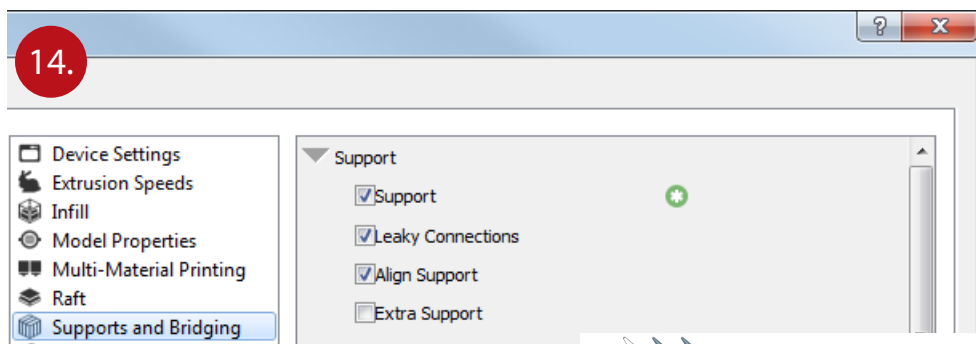
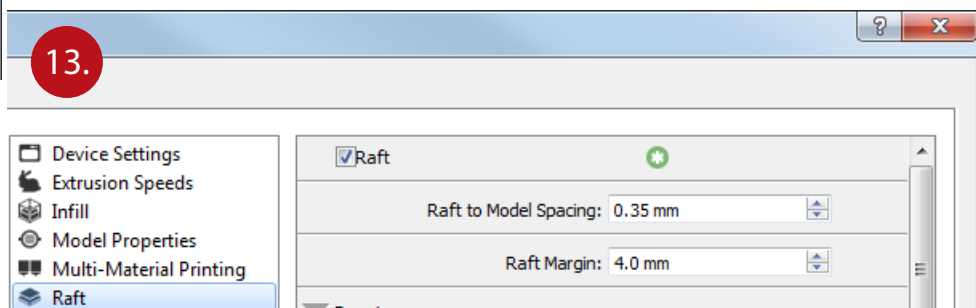
11. Infill Density set 20%.



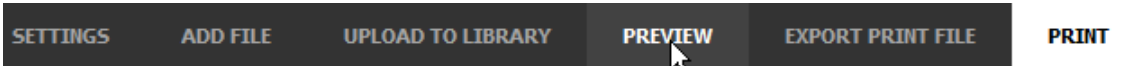
12. Model Properties Number of Shells set to 1.

13. Raft selected.

14. Supports selected.

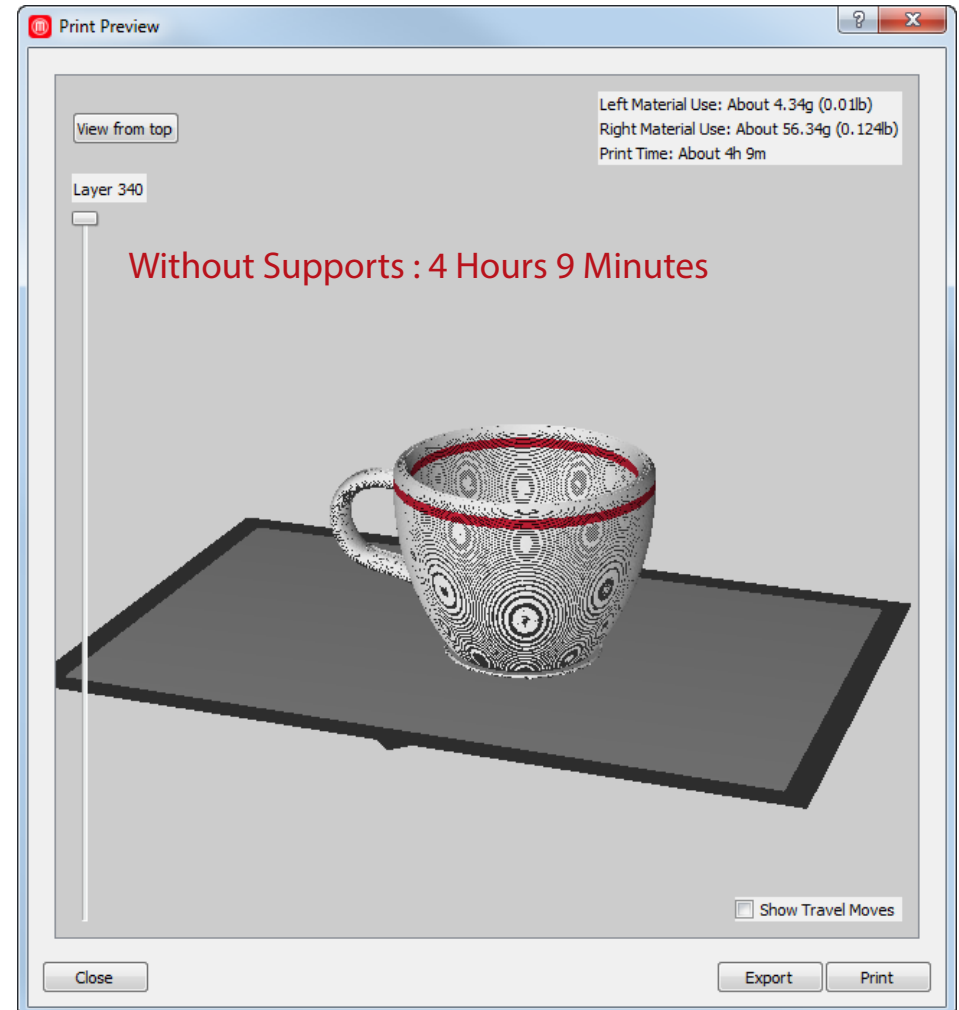
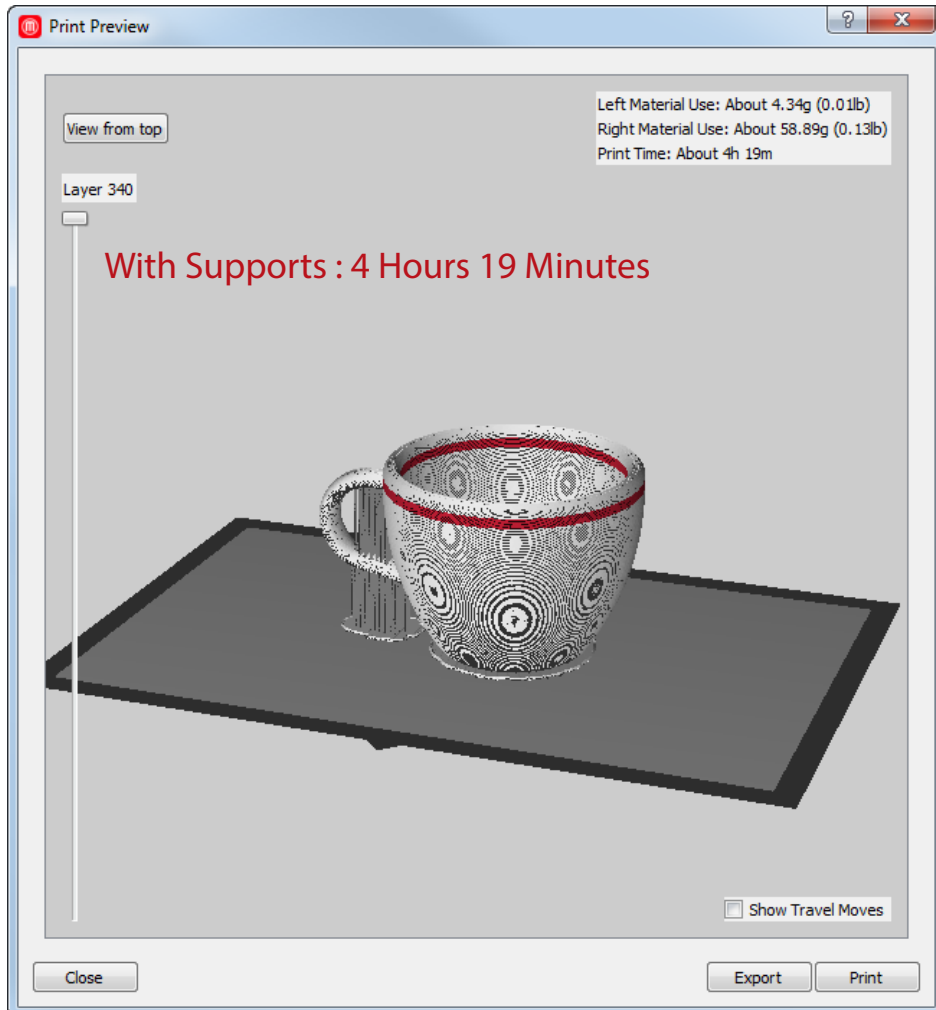


15.



15. Select Preview.

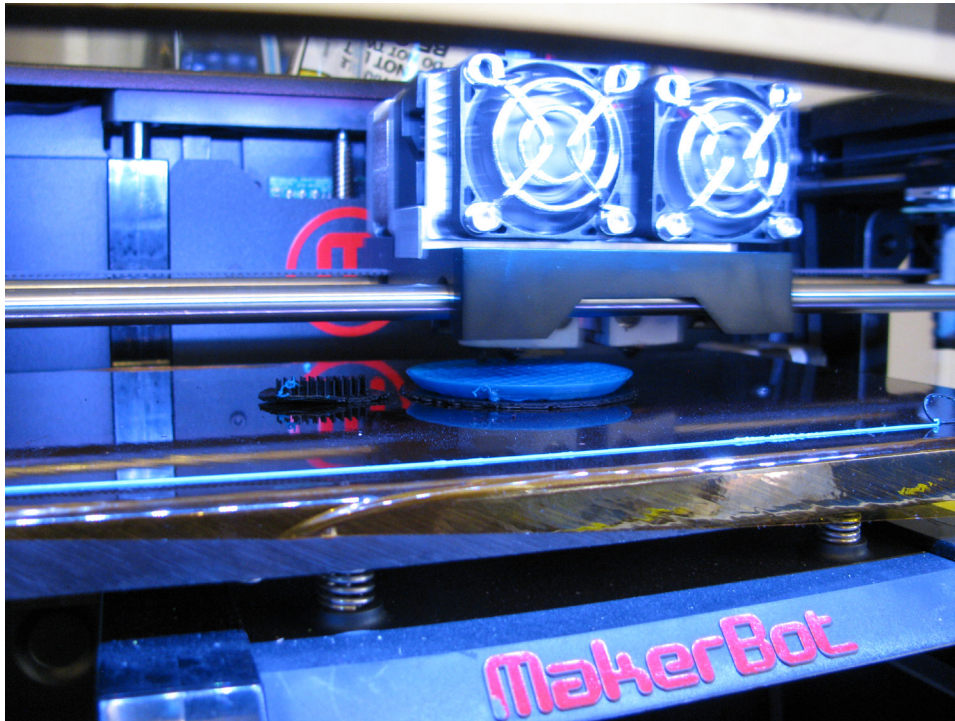
16. Select Print.



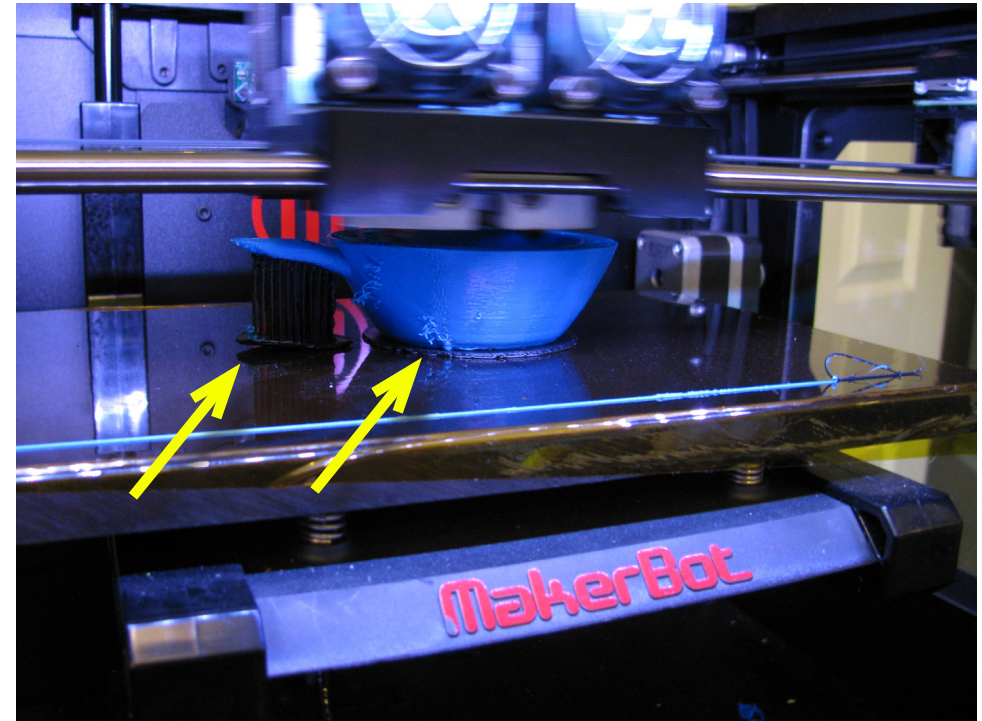
16.



The printing process begins.



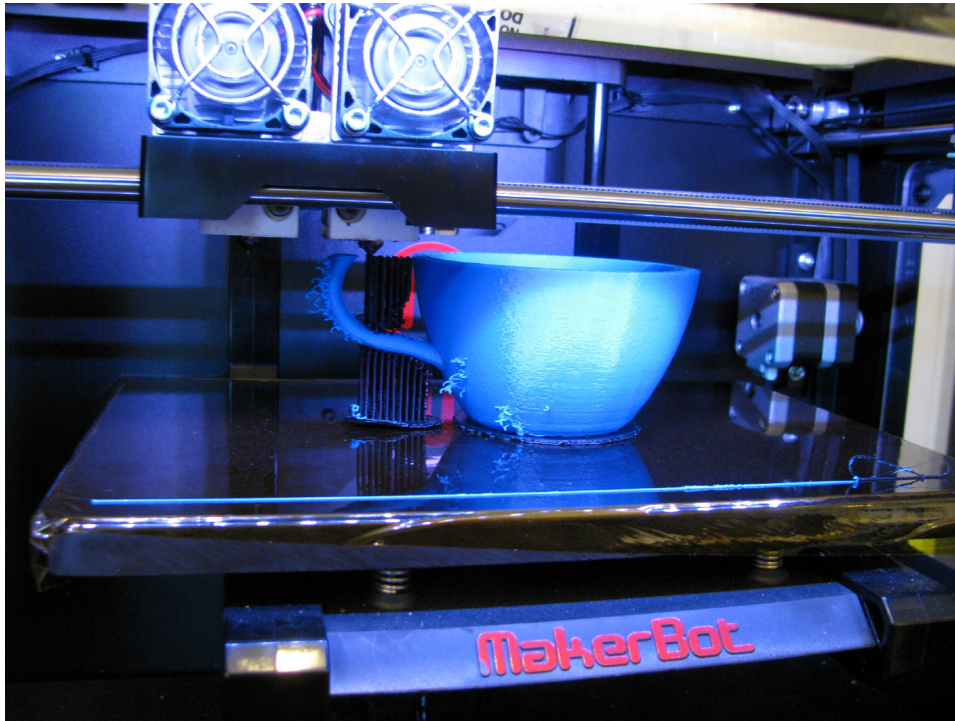
Rafts laid down for cup and supports. Base of cup appears.
8% at 27 Minutes



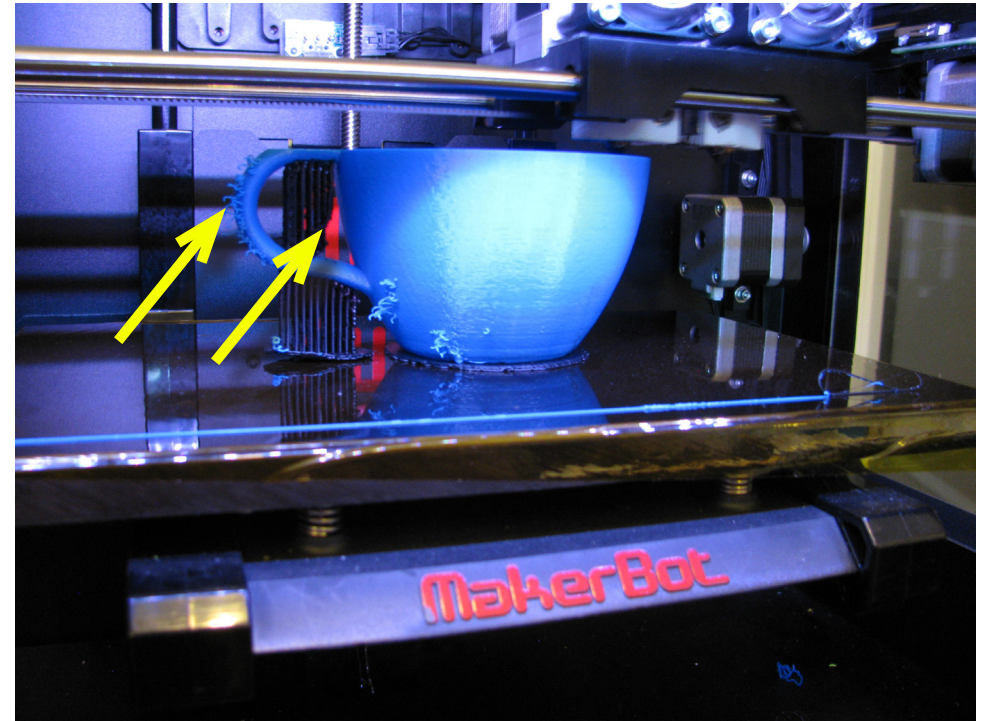
Note the two colors. As MakerBot switches back and forth between colors it leaves hangers on the cup. Note how the small raft of the support has lifted a bit.



The printing process continues.

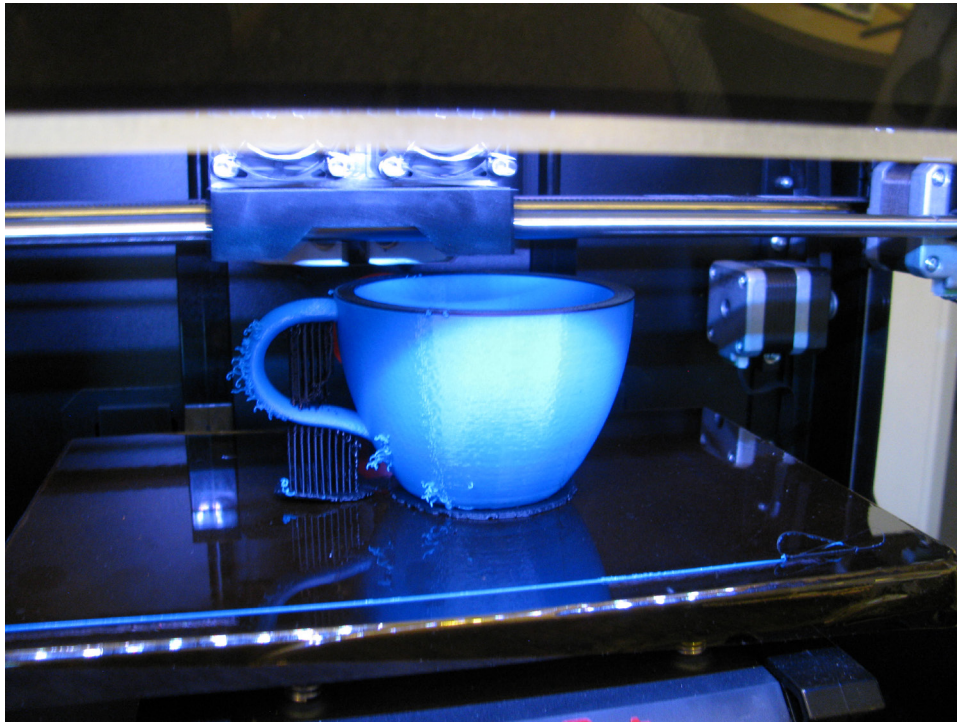


Print continuing.

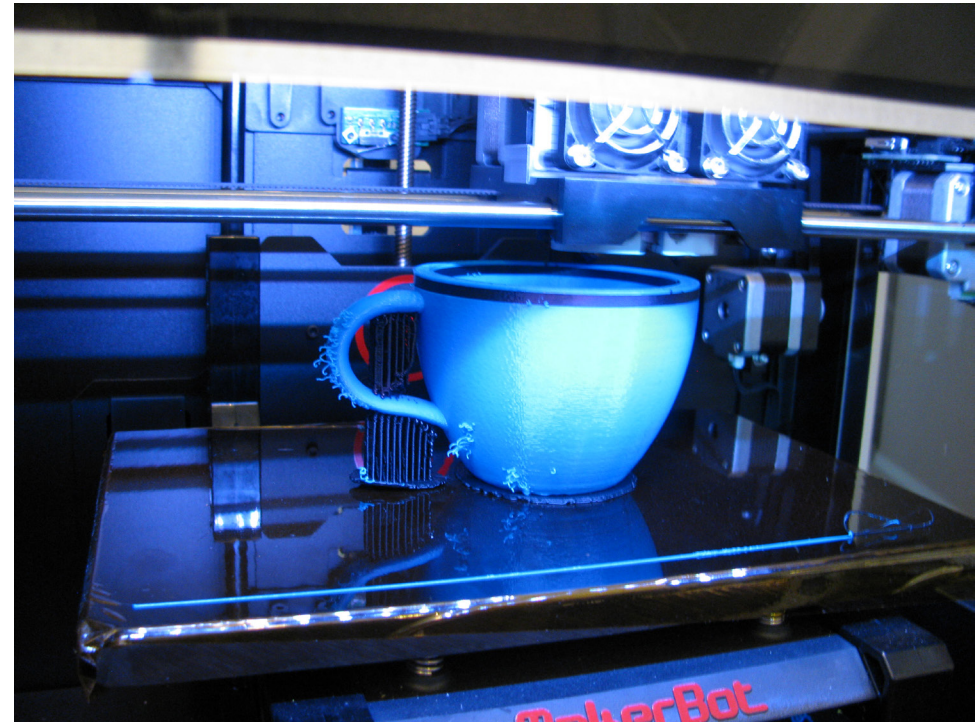


Note the two colors. As MakerBot switches back and forth between colors it leaves hangers on the cup. Note how the supports have failed inside the finger hole a bit. Not a big deal on this project.

The printing process continues.



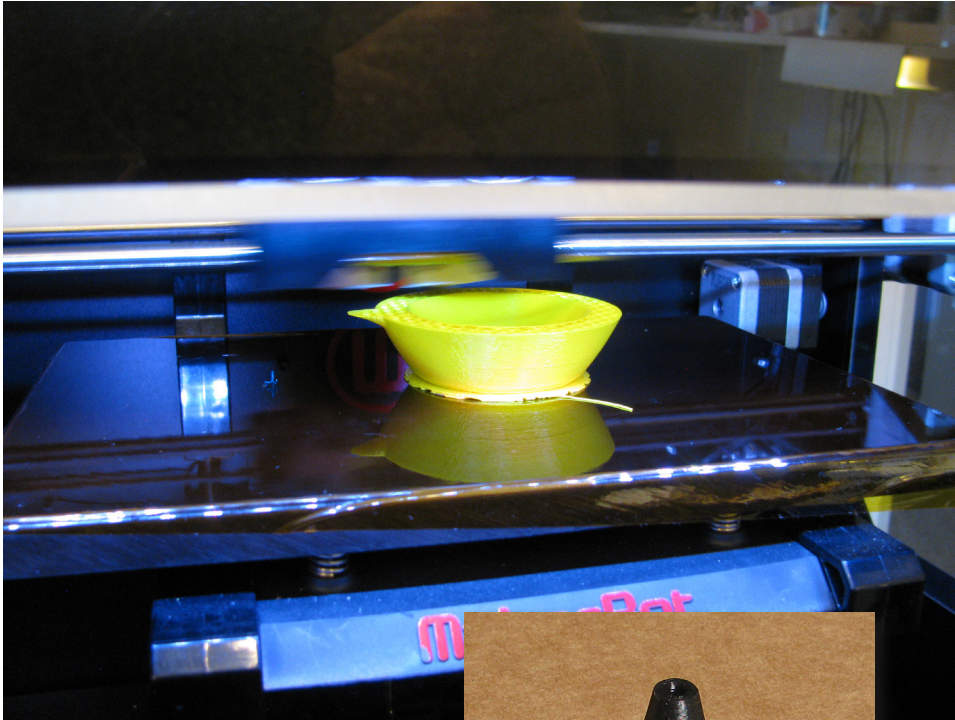
Stripe starts to appear.
89% at 4 Hours 33 Minutes



Almost done.
99% at 5 Hours 0 Minutes



For comparison, the same cup with single color and no supports. Two color print without supports was not tried, but it would have similar results to the traffic cone. That is, pretty good.



No peeling rafts.



Very little hangers, just a bit off the upper inside of the finger hole due to lack of supports.

So why the unappealing results with two color printing with supports?
The mixed bits of color come from one head passing over the previous color while transitioning to the next color. Little bits of hanging filament hit and attach during the pass.

This does not happen when done as a single color.



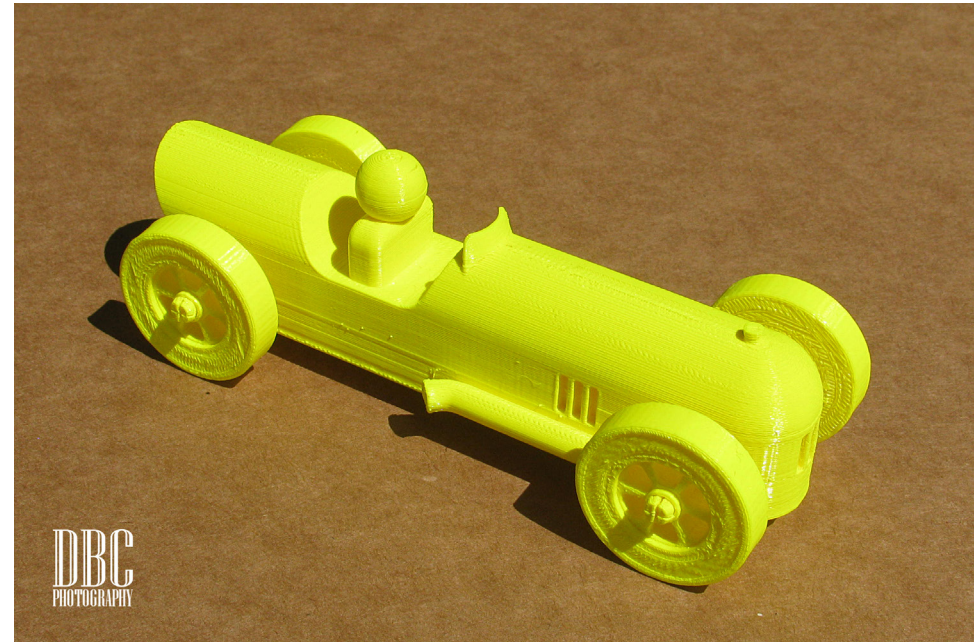
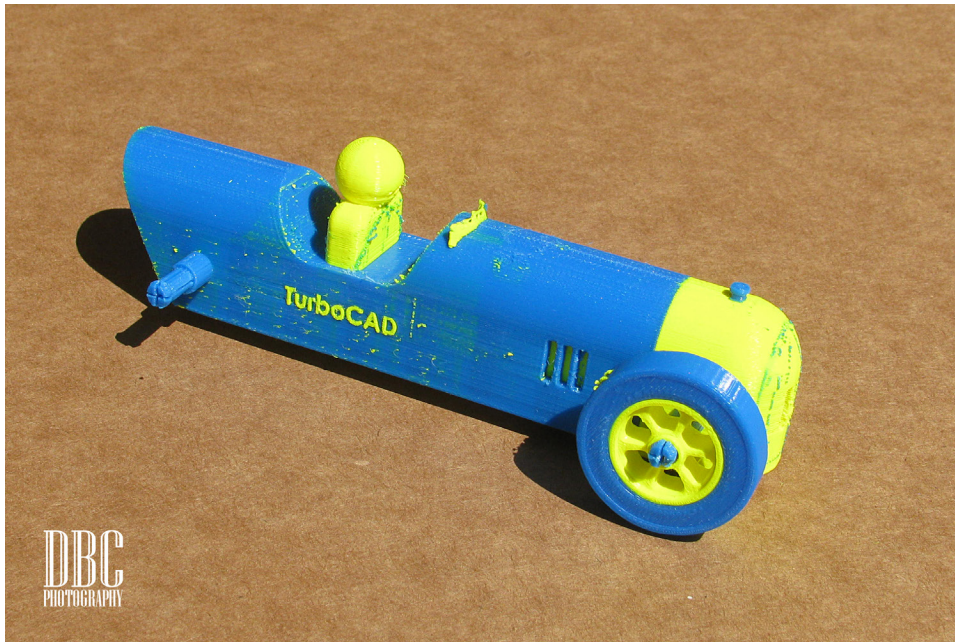
Inside, a similar result.



A second example with the Sportster Toy Car.

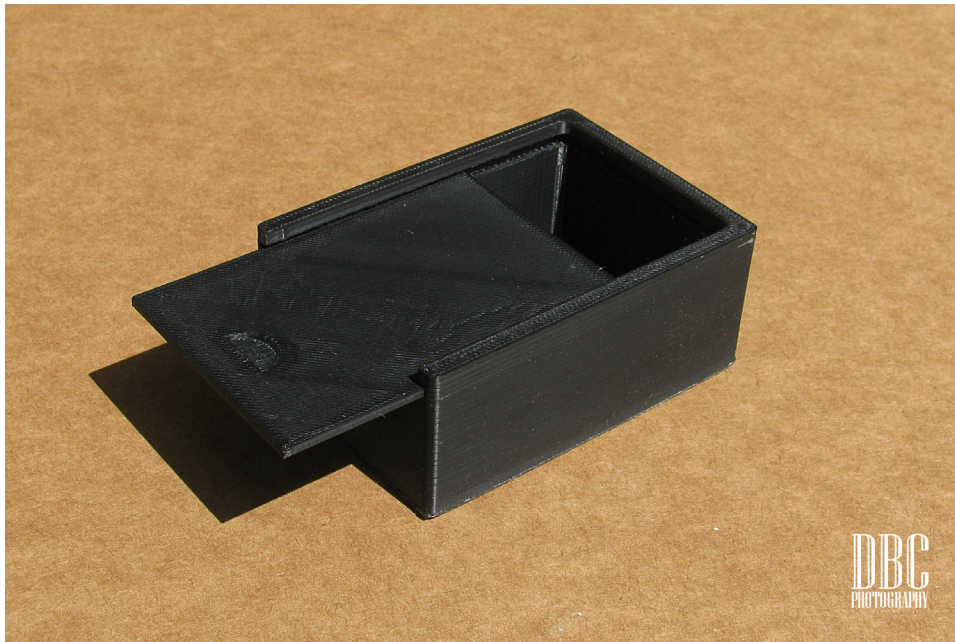
By the time the second extruder does a test pass for the color change the previous part cools a bit too much and parts do not stick as well (i.e. axles, exhaust, etc.)

This does not happen when done as a single color.



A dismal failure on this dual color trial.

Another project that Don Cheke has 3D printed.
This slide top box was modeled and rendered in Fusion 360.



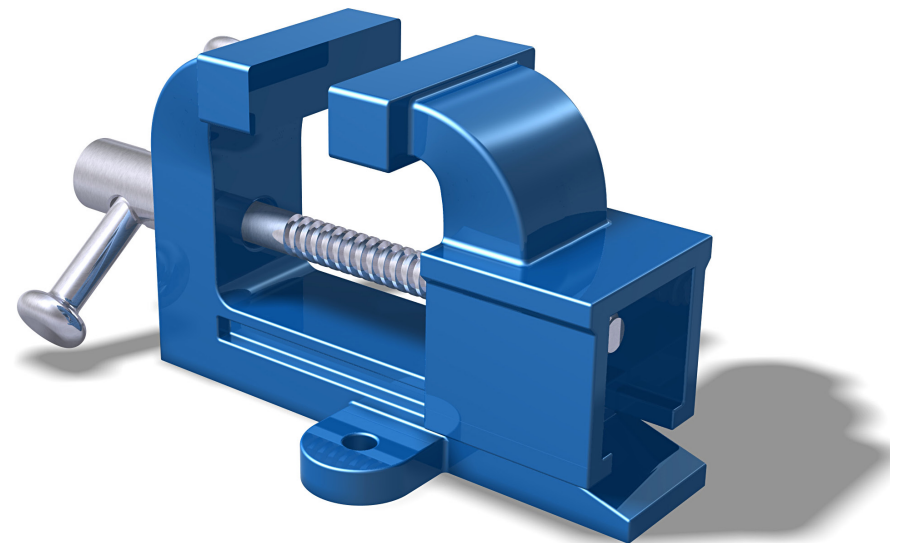
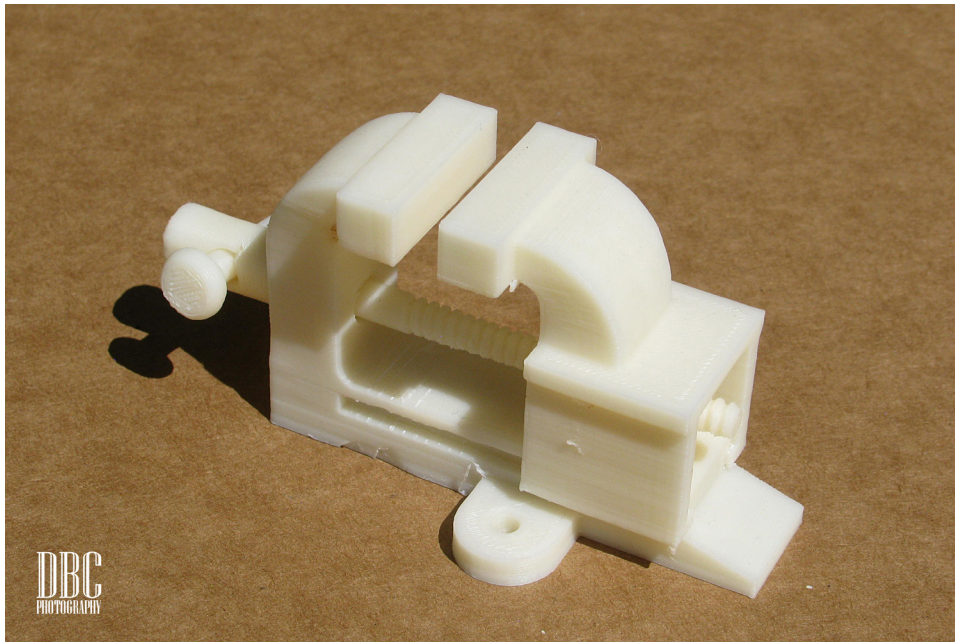
Another project that Don Cheke has 3D printed.
This barrel was modeled and rendered in TurboCAD.



Two more project that Don Cheke has 3D printed.
The key fob was modeled in TurboCAD.
The drawer pull was modeled in SolidWorks.



Another project that Don Cheke has 3D printed.
This mini vise was modeled and rendered in TurboCAD.



Another project that Don Cheke has 3D printed.
This box house was modeled and rendered in TurboCAD.



If you found this TurboCAD tip helpful, please consider purchasing a full Textual Creations TurboCAD project tutorial that will lead you through an entire project, keystroke by keystroke. You won't be disappointed! Visit the [Textual Creations Shopping Page](#)