

Creating STL Files for Objet (3-D) Printing

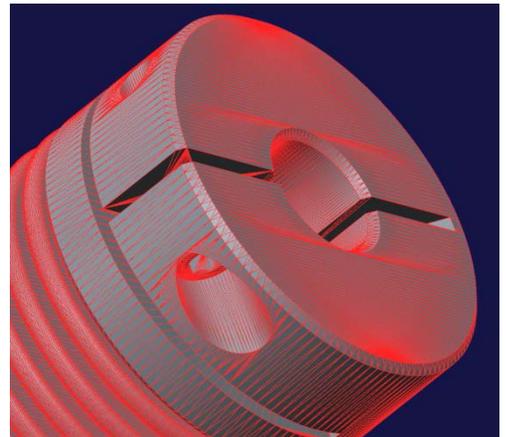
We now have an Alaris 30 Objet and a Connex 350 Printer for printing prototypes. These machines use liquid plastics sprayed down on the tray in a layer. Each layer is then UV-cured to solidify the layer. The model is built layer-by-layer, bottom to top. Holes and inside features are achieved by spraying down support material into the voids. By reorienting the model a certain way, the holes may be printed without support material. After the print is completed, this support material is then rinsed away in a high-pressure wash.

Things to remember:

- The Alaris 30 printer has a model envelope of 10.75 x 7.75 x 5.75" and the Connex 350 printer has a model envelope of 13.54 x 13.54 x 7.89. We can always scale your parts if they do not fit, but be aware that your model will scale accordingly. In other words, if you have a spool piece that we had to print at ¼ scale, that tube's .035" wall thickness will end up about .009" in physical thickness. That may prove too flimsy to survive the washing process.
- The type of output file needed by the machine is a stereolithography file (extension stl). CREO can do this. The procedure for this may be found at :
H:/D-D Group/Procedurals/Creating_STL-Objet_Files.pdf.
- Please do not expect us to print incredibly thin or incredibly small things. Though the printer may be able to handle the detail, we take the parts to a high-pressure washer, and we have lost things down the drain or broken them in the act of washing away the support material. If the prototype is for show, adjust your models to support possibly thin areas, or partially fill in inside voids.
- We have three individual colors to choose from, models may printed in many combinations using the Connex 350 (the Alaris 30 is single material only). The choices are black, white, and clear (like a Lexan clear). These choices are really the same in their physical properties, but clear prints in finer layers so you can get a slightly better detail. We also have a flexible material in clear that may be mixed with the more rigid materials to adjust the durometer (Connex 350 only).
- You may request a range of color/material combinations with the Connex 350 and given normal circumstances, you will get the requested color and durometer. We may ask if you can accept a certain color combo depending on the stocked material. The Alaris 30 prints with clear only.
- Surface finishes are matte and glossy. Glossy cannot be achieved on ALL surfaces, but any surface that faces up when the model is printed can remain glossy.

Procedure:

1. Save your model in CREO. You should ***not*** save it with the following changes.
2. ***File - Prepare - Model Properties***. The setting you're looking for is ***Accuracy***
 - a. Hit the ***Change*** link on the far right side
 - b. Why? Because the better the accuracy, the more triangles you get. The more triangles you get, the smoother your model will print. If your accuracy is sloppy, you get models with curves that come out faceted.
 - c. If your file is relatively simple (no troublesome rounds, no tricky inside corners, etc.), up the accuracy by reducing the default of .0012 (for inch-parts) to something like .0004 or .0002 if you think it is straightforward.
3. ***File - Save As - Save a Copy***
 - a. Change the ***Type*** from "***Part (*.prt)***" to "***Stereolithography (*.stl)***"
 - b. CREO will default to saving this new file in your workspace, ***DO NOT ALLOW THIS***. Place the .stl file on your desktop.
4. This brings up the ***Export STL*** window. In the ***Chord Height***: text widget, enter 0 (as in zero...) replacing the long number that is there.
 - a. When you enter zero, usually a different number than that appears in the box. This is okay, as it fills in with the smallest number possible for your part. Occasionally, CREO will send an error message, but ***read your message line***. Just enter something slightly bigger than the minimum number shown.
5. In the ***Angle Control***: text widget box, enter 0 (as in zero...)
 - a. The "a." note above applies here as well, but it will likely just accept the zero.
6. Click ***OK***. Your part may be overrun with blue lines (blue by default, red in this picture). The more, the better. Down in your message line, it will tell you how many triangles were written to your STL file.
7. ***Exit the file and Erase from CREO memory!*** You do not want to save your file with an exaggerated accuracy.
8. Follow this link to enter your request into the D&D Prototype Request Center.



http://www.aps.anl.gov/APS_Engineering_Support_Division/Online_AES_Support/support_dd.html

Be sure to include such things as file name, scale, quantity, specific material (if necessary), or any building concerns. For instance, if a particular area is the functional portion and you would prefer that glossy, let us know.

Note: If you are making an STL of what amounts to a part but is an assembly (like a modified flange where the cuts are made on the assembly level), then the aforementioned procedure is still valid. The *Export STL* window may look a little longer, but it will not affect the file.

Other Note: If you require an STL of an assembly, to be printed as one model, then follow the aforementioned procedure. Again, the *Export STL* window will look bigger than for a single part, but by default, it will try to export every single component in the assembly. If you wanted to only include some of the components, there is a way to choose at the top of the window.

Keep in mind that the clearance you gave your assembled components will be treated like a void and fill with support material that, depending on the scaling and location in the model, may be washed away. Even if it does not, support material is like packing your joints with used pencil eraser bits. The stuff flakes away. Your model will not hold together very long that way. In this case, it is actually preferable to create interferences in your file before you make the STL file. Interferences will not cause problems in the print, and it strengthens the 3-D model.

