

Rapid Prototyping Service

AMS Service Guide

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The Rapid Prototyping Service uses a Z Corp Spectrum Z510 3D color printer to build high definition physical models from computer generated model files. The Z510 has a build volume that is 10" x 14" x 8" and manufactures models by incrementally laying down a plaster based powder in layers a few thousandths of an inch thick. The powder is then jetted with cyan, magenta, yellow, and clear binders to form a full 24-bit color model layer by layer. Finished models are opaque, either white or colored, and will allow for sanding and finishing to strengthen and smooth the surface. Models show detail down to 1/100", but may not support extended thin features.

Files for 3D printing may be prepared in any 3D modeling program that can export VRML, STL, or PLY file formats. A number of 3D programs are available for use on the Advanced Media Studio's Self Service Workstations, including Maya, Solid Works, Cobalt, SketchUp, Form Z, Rhino, Mathematica, MatLab, and ZPrint. Before files may be submitted as a job order for rapid prototyping, they must be saved as ZBuild files using Z Corp's ZPrint software.

Payment Terms

Method of payment must be confirmed on the RP Service Job Order Form at the time of job submission. Completed jobs will not be released to the client until the job order is paid in full. Grant approval for 3D printing, where applicable, must be obtained prior to job submission. Please refer to the Advanced Media Studio Price Guide for complete payment terms and pricing.

Appointments are required for RP Service job submissions. During your appointment your model file(s) will be reviewed to determine build cost. When your file is approved as "print ready", a price quote will be issued for the job order.

Appointment for File Review + Job Submissions

You must prepare a 'print ready' .zbd ZBuild file to submit for review during your appointment with the AMS Staff. Please send appointment requests by e-mail to its.rp@nyu.edu and include a list of dates and times you are available during the RP Service hours. The AMS staff will confirm an appointment time with you by e-mail. We will answer all project questions and specify any corrections you need to make to ensure your build file is correct or 'print ready.'

ZBuild .zbd files must be prepared using the 3D Workstations in the Self-Service portion of the Studio.

Multiple models may be placed inside the build area of a single .zbd file. However, if tests are required of a portion of your model, submit that portion as a separate .zbd file.

Rapid Prototyping Service Hours

The RP Service operation is restricted to the RP Service hours. These hours are updated every semester, made available to each department account manager, are posted at the Advanced Media Studio, and are available on the AMS website www.nyu.edu/its/ams.

Exporting VRML, STL, and PLY Files.

In most cases VRML, STL, and PLY file formats can be exported natively from the 3D modeling program. In some cases however, a plug-in may need to be activated or acquired.

If your model has color or texture export the model as a VRML (.wrl) file format and when using textures make sure the images are in JPEG file format. If only the geometry is desired export as an STL file format. AMS guides are available detailing STL and VRML export procedures for a few of the 3D modeling programs we offer. The options that are available when exporting these file formats control the tessellation of the model and therefore the amount of detail that will be resolved in the final model.

Generating a ZBuild File for Submission

Use the following steps to import, scale, orient, and correct your VRML, STL, or PLY files. The ZPrint software will allow you to view your model as it will be built by the machine and will indicate and allow you to correct any problems.

1. Open ZPrint software on the AMS 3D PC Station.
2. Go to 'File' > 'Import' and choose your .wrl (VRML), .stl, or .ply file.
 - If your file was scaled before importing to ZPrint choose the units it was scaled with, otherwise choose 'inches.'
3. Hit 'Next'.
 - If Zprint suggests using "fast rendering" choose 'Yes.'
4. If the part requires scaling, go to the menu 'Transform' > 'Scale.'
 - If Zprint warns that the part extends outside of the build area drag the part in the two left hand views until it lies within the boundaries.
5. Check part normals.
 - If there are faces of your object that do not appear or that appear black, they are most likely inverted normals. Refer to the directions below, 'Correcting Inverted Normals in ZEdit,' to attempt to repair the problem.

- Hit the '2D' button on the top tool bar. Starting from layer 0, scroll through all the layers of the build using the "a" and "z" keys on the keyboard, making sure that all components of your part are attached, and that there are no gaps between layers. Solid areas should be black. If they are white, the parts surfaces may not be closed or there may be a normals problem. Refer to the directions below, 'Correcting Inverted Normals in ZEdit,' to attempt to repair the problem.
- Repeat steps 2 – 4 for any additional parts to be submitted in the build file.

6. In the top left hand view move the parts towards the upper left hand corner of the box making sure they don't overlap.

7. Select all parts and go to the menu 'Transform' > 'Justify.' Under 'Left or Right' choose 'No Action.' Under 'Front or Back' choose 'No Action,' under 'Bottom' choose 'Bottom.'

8. Go to 'File' > 'Save As' and save a .zbd file in a folder with your name on the desktop.

- Job submissions must be submitted in the .zbd file format.

Correcting Inverted Normals in ZEdit

Often parts that are imported into ZPrint will need correcting before they can be printed. The most common problem is inverted normals which will show as black surfaces in ZPrint's 3D view. Follow the steps below to correct surfaces that appear to have inverted normals.

1. Select the part to edit in ZPrint and select the red 'E' all the way to the right on the top toolbar. This will open the part in ZEdit.

2. Go to the menu 'Invert Normals' > 'Surface' and left click surfaces that need to be inverted. When finished right click to apply changes.

3. Select the yellow arrow on the right of the top toolbar to return the part to ZPrint.

Job Pick-Up

It is the client's responsibility to provide a box and packaging to sufficiently protect the completed part for transport from the Studio. Please promptly pick-up parts once they have been printed. We are not responsible for parts left over a week or parts damaged after they have left the Studio.

Post Processing Parts

Printed parts are delicate and should be treated through infiltration to increase the strength and durability of the model. Additionally, infiltration will set colors to match the appearance of on screen colors and will improve the surface feel of the models. We recommended infiltrating with cyanoacrylate (Super Glue), Epoxy, or Wax. These products are available at hardware stores and over the internet. Z Corp also provides versions of these products for sale on their website, specifically tailored for their powder. Please see an AMS staff member for Z Corp's website ordering procedures. In the special circumstance where the model is too delicate to leave the Studio with-

out infiltration, arrangements may be made to use the Studio's infiltration workspace.

In addition to infiltration, there are various other post processing steps that can be taken to customize the look and finish of the final product. The colors on the models surface are a few millimeters thick so that the models can be sanded without removing any texture or color. Painting and clear coating are other common post processing steps.