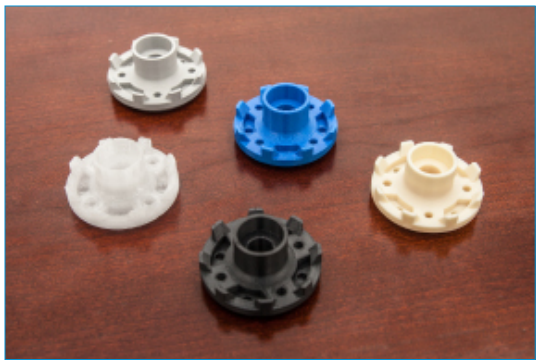
Xometry

Design Guide: Preparing a File for 3D Printing

Xometry

Table of Contents

Preferred File Settings



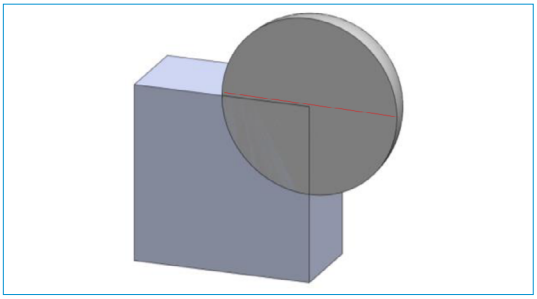
STEP and IGES are our preferred CAD file formats. Working with these parametric formats allows our team to be more inventive creating support structures. However, we will work with just about any CAD format, including native SolidWorks, AutoCAD and PTC Creo (Pro/ENGINEER.)

STL is the standard file type for our 3D printing software. A mesh resolution of 0.01-0.03mm and a ≤0.016mm chord length produce an optimal STL file. To change your mesh resolution, while saving your file to STL, click on options and choose the resolution to coarse or fine. Customize the .stl output with manual changes to deviation & angle to fine tune the resolution for your part.

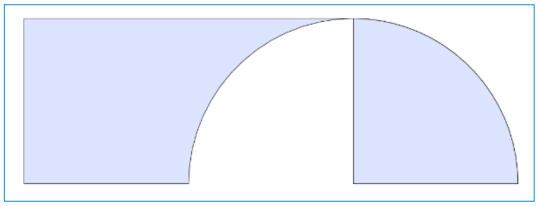
Note:

Keep in mind that higher resolution creates larger files, and recommended settings are given for a good mix of quality and file size.

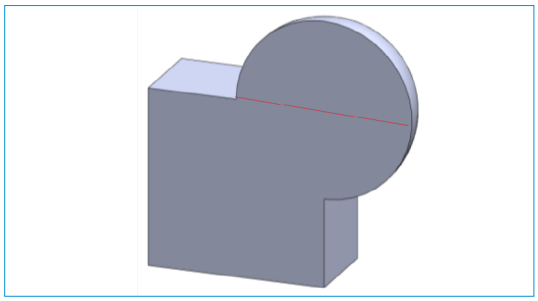
Overlapping Geometry



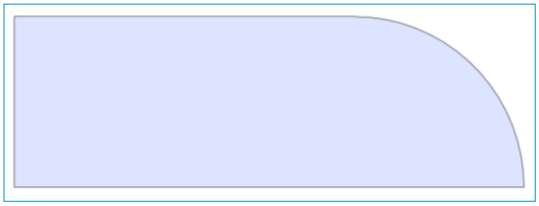
Overlapping geometry



Slice image demonstrates how overlapping geometry may create missing data



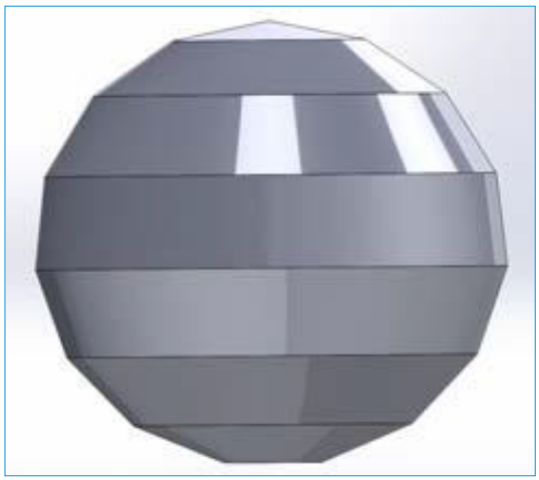
Unified/merged geometry



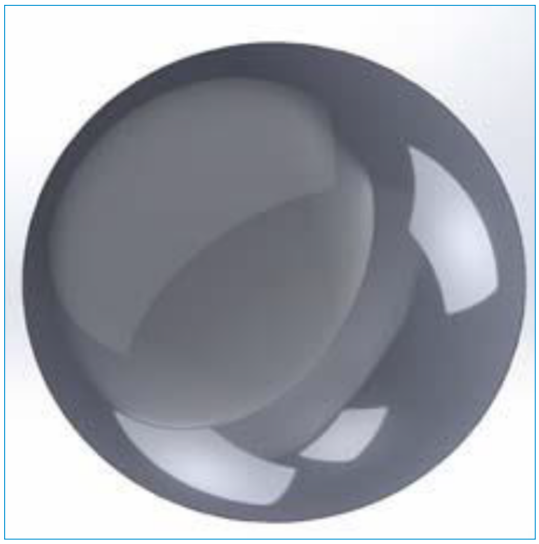
Slice image of unified/merged geometry

Overlapping geometry will sometimes cause problems, being misinterpreted by printer software when being converted into 2D layers. To ensure proper interpretation, multiple bodies are always unified, merged or booleaned together.

STL File Resolution



Low resolution



High resolution

A mesh resolution of **0.01 to 0.03 mm** generally produces a good-quality STL file. Reducing mesh resolution below this range does not necessarily mean that model accuracy is improved. As a rule of thumb, designs that have many contours or curved surfaces need a higher resolution than flat, geometric surfaces.

To change mesh resolution while saving your file to STL, click on options to set the resolution to be coarse or fine. The STL file can also be customized with manual changes to the deviation and angle. Keep in mind that higher-resolutions create larger files.

Minimum Thickness

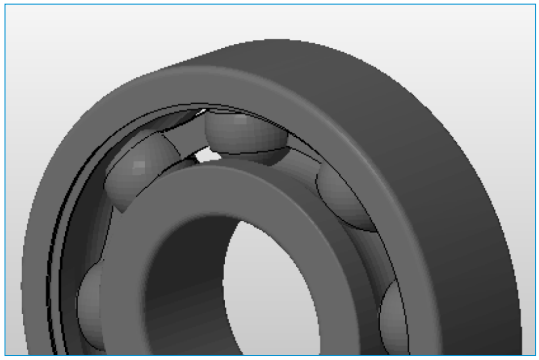
Example of a model design with thin features

It is recommended that the features of a design have a minimum thickness of 0.6 mm [.024 in].

Note:

Xometry recommends >1 mm [.039 in] for load bearing features.

Clearance Between Moving Parts

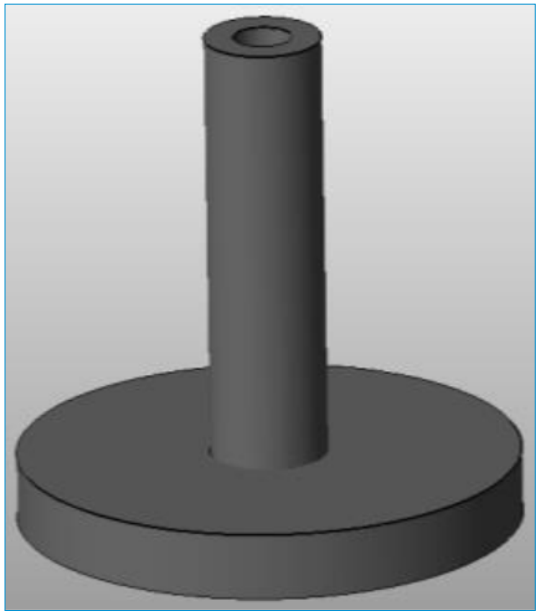


Example model design of an all-in-one assembly with moving parts

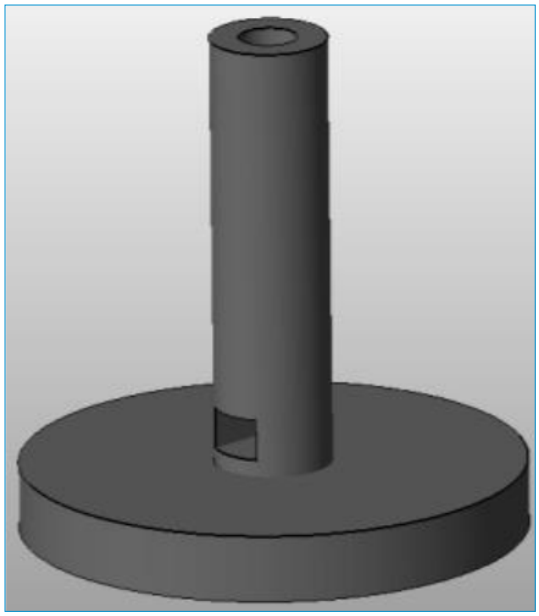
A great feature of SLS and PolyJet 3D printing is the ability to print all-in-one assemblies that feature moving parts.

For assemblies including moving parts, e.g. fine- detail separation, Xometry recommends a clearance of >0.5 mm [.02 in].

Confined Hollows



Original model



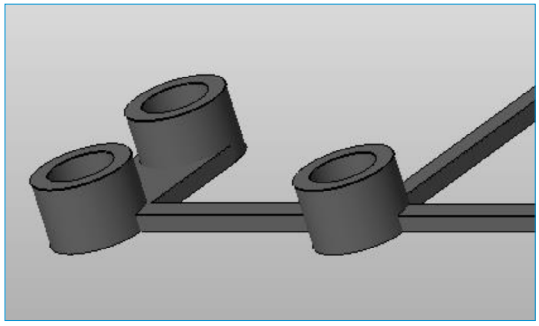
Model with holes for removing support material

If a model design contains confined hollows, there is no way to remove the support material. Xometry recommends designing a model so that support material can be removed. This is especially important when printing moveable parts and parts made from clear material.

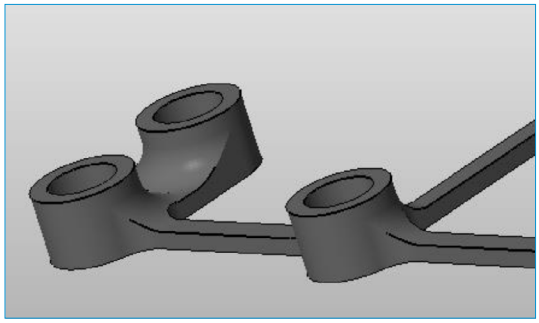
Limiting cavities that are confined to one opening will reduce cleaning time for support material, thus lowering the price of the build.

Additionally, cavities having a depth of over 50.8 mm [2 in] with only one access point are not recommended.

Fillets



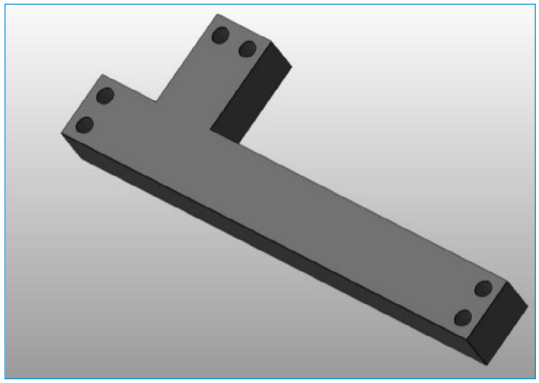
Original model



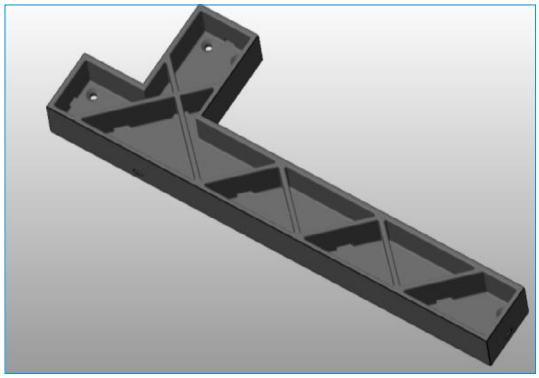
Model with fillets

Adding fillets (rounded edges) to a design will strengthen unsupported surfaces and make parts more robust by distributing stress over a broader area. While Xometry's PolyJet, SLS, and DMLS printers are capable of printing 90° corners, fillets are recommended to add strength to any part. "Lollipop head" features, where a large mass connects to a much smaller mass, are especially prone to breaking, making them ideal candidates for fillets as well.

Lightweighting



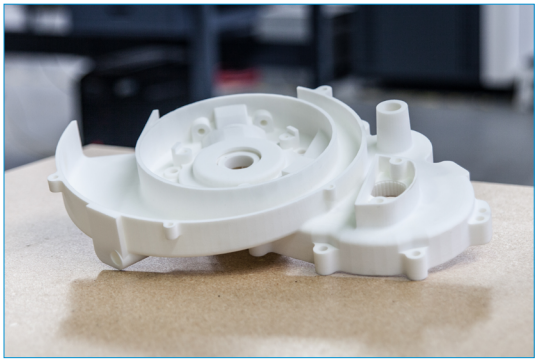
Original model



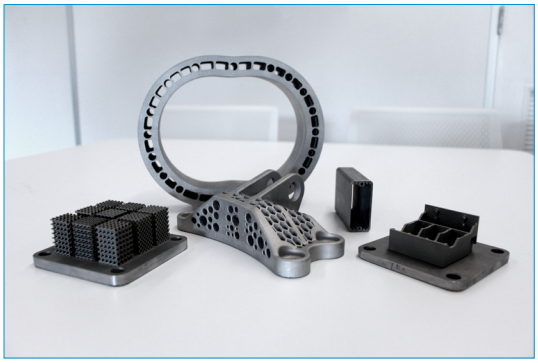
Model with lightweighting

Creating pockets in designs will reduce print material and making it more cost-effective to build. When creating a pocket, be sure to create an exit hole for un-sintered (SLS and DMLS) or support (PolyJet) material removal.

Build Volume



Part built with SLS



DMLS parts of various sizes

FDM parts in progress

The maximum build volume of a part depends on the 3D printing technology used:

- SLS: 13” x 13” x 22”
- FDM: 36” x 24” x 36”
- PolyJet 3D: 19” x 15” x 7”
- DMLS (Aluminum): 6” x 6” x 6”
- DMLS (Stainless Steel): 9” x 6” x 6”"
- Metal Binder Jetting (420SS/Bronze): 29” x 15” x 14.25”

Resources at Xometry

Instant Quoting

Upload your 3D CAD file to our instant quoting page at **get.xometry.com/quote** to get started.

Support Team

Contact our support team to speak directly with Xometry's engineers:

Email: **support@xometry.com**
Phone: (240) 252-1138

Live Engineering Support

Click the Help button anywhere on **xometry.com** for FAQs and other helpful articles, or to chat live with our engineers.