Quickparts

5 DESIGN PITFALLS TO AVOID WITH YOUR

3D PRINTED PART

Discover how to address five of the most common design challenges for 3D printed parts and get the most out of your additive manufacturing project.

What to Look Out for When Designing for 3D Printing

Additive manufacturing has quickly become the go-to technology for producing on-demand prototypes and end-use parts at scale. However, without a deep understanding of what goes into an optimized 3D printing design, businesses can often run into hurdles trying to get accurate parts produced in time.

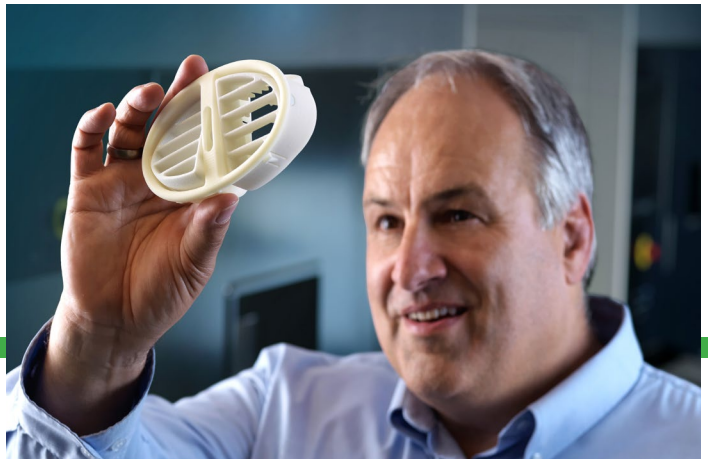
To minimize the chance of time-to-market delays, keep in mind these five common mistakes in 3D printing part designs and learn how to avoid them so that your parts always meet and exceed your project requirements.

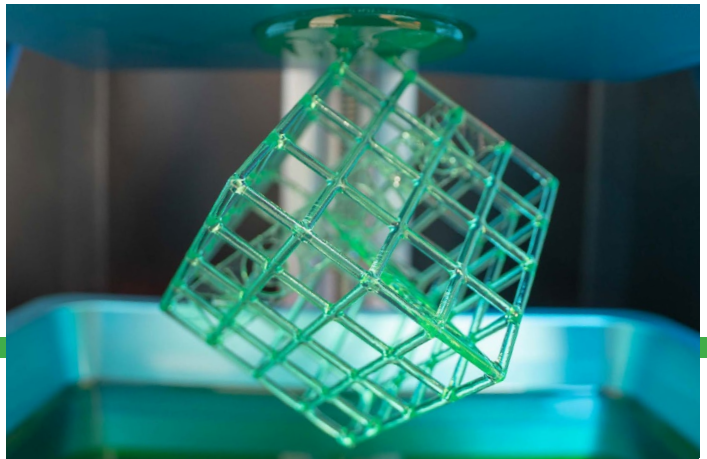
1 Don't Design Walls and Features Too Small

One of the most common issues in 3D printing part design is excessively thin walls or small features. This oversight can lead to various defects and compromise the overall structural integrity of your part.

To avoid this problem, observe industry standards for feature size and wall thickness, which can differ depending on your chosen 3D printing process type. Consider also how those guidelines can be affected by other factors such as build orientation, part dimensions, and materials. In most cases though, we recommend the following minimum thickness for your part features and walls.

3D Printing Process	Minimum Thickness for Features and Walls
Stereolithography (SLA)	High Resolution 0.015", Standard Resolution 0.025"
Selective Laser Sintering (SLS)	0.030"
Digital Light Processing (DLP)	0.010
Fused Deposition Modeling (FDM)	0.060"
Direct Metal Printing (DMP)	0.010"





2 Avoid Warpage and Differential Shrinkage

Part warpage mostly occurs when parts are either too thin or thick. To avoid this, maintain an ideal part thickness of around 0.125".

Likewise, differential shrinkage happens when certain areas of your part cool faster than others due to non-uniform thickness. To mitigate this issue, hollow out thicker features to balance the overall thickness of your part, which can help ensure your entire part cools down at an even rate.

Part warpage and differential shrinkage are major concerns for SLS and FDM projects due to the heating and cooling cycles in both manufacturing processes.

Pro Tip

Maintain an ideal part thickness of around 0.125".

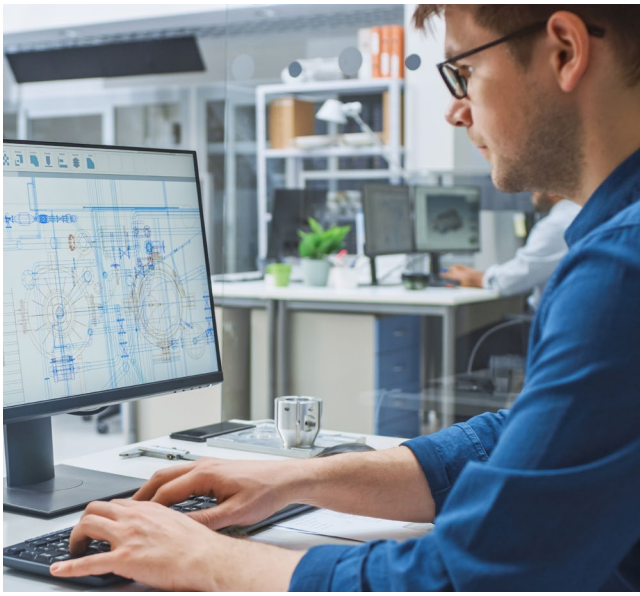
Alternatively, consider selecting a nylon material with a glass or fiber filler to help prevent part warpage.

3 Original CAD data has numerous unstitched surfaces, resulting in errors when converting to .STL format.

When converting CAD data to .STL format, it is crucial to ensure that all surfaces are properly stitched or closed to avoid errors. Unstitched surfaces can lead to issues such as gaps, missing geometry, or non-manifold edges, which can cause problems during the conversion process.

To address this issue, you need to identify and close the unstitched surfaces in your CAD model. Here are a few steps you can take to resolve the problem:.

- **.STL files can be inspected to ensure that the dimensions, part volume, and surface area all appear to be correct**
- **Close gaps and openings: If there are gaps or openings in the model, you need to fill them. CAD software usually offers features like "fill hole" or "close surface" that automatically create new surfaces to close the gaps. Alternatively, you can manually create new surfaces or extend existing surfaces to cover the openings.**
- **Check for non-manifold geometry: Non-manifold geometry, such as overlapping surfaces or edges, can cause conversion errors. Make sure to eliminate any non-manifold geometry by merging or deleting redundant surfaces or edges.**



4 Choosing the Right Material

3D printing offers a wide spectrum of materials, including thermoplastic-like materials, elastomers, and metals that each offer their own unique strengths and trade-offs. Depending on the material you choose you can enhance your part's temperature resistance, strength, durability, stiffness, flexibility, and translucency so make sure to pick one that closely matches your part requirements.

While 3D printing materials are often an excellent choice for prototypes that need to look and feel like the final part, they often are not as strong and durable as traditionally manufactured parts. The plastics used in processes such as SLA are also vulnerable to damage from long-term UV rays and moisture exposure, making them unfit for outdoor environments.

5 Beware of Using Low-Resolution Models

When printing your part, the key to a smooth and clean finish is having a high-resolution file. Liquid-based processes such as SLA and DLP will benefit the most from high-resolution files.

While low-resolution models can be printed, the course side wall quality will result in parts with a faceted rough surface feel. This means that your part may require significant post-processing to achieve your desired look and feel, increasing production time and cost.

To avoid this issue when designing your part, make sure to export your file in a high resolution and consider loosening your design tolerances. Nonetheless, keep your file size under 100MB in size so that it is easy to upload and modify.

Need a review of your 3D printing design?
Contact our experts at contact@quickparts.com or **+1 931 766 7290**. If you would like to request a quote, please submit your project here.

About Quickparts

Quickparts offers a complete range of on-demand manufacturing services, from 3D printing to traditional manufacturing processes.

Quickparts empowers its customers with the tools to reduce production times, speed up design iterations, and shorten product development lifecycles with high-quality 3D printed and machined parts from one of our seven global design and production centers. Quickparts' U.S. facilities are ISO 9001:2015 certified and ITAR registered, with expert teams that have been producing parts for more than 20 years.

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