

THE FUTURE OF 3D PRINTING DESIGNING FOR ADDITIVE MANUFACTURING

BUILDING TOWARD A REVOLUTION

Some have hailed additive manufacturing as a game changer that will transform the manufacturing process. It promises so much: designs inspired by nature, driven by finite element analysis and capable of building impossibly complex components or even complete assemblies. How many applications can benefit from these promises efficiently and at scale? Additive manufacturing generated \$12 billion in revenue in 2020, and is forecast to reach \$78 billion by 2028.¹ The technology is here to stay. How can manufacturers best leverage 3D printing going forward to outpace the competition?

THE TIME FOR CHANGE

Many modern CAD systems include simulation tools to conduct topology studies, which provide the minimum material requirements based on loading conditions. SOLIDWORKS® is no exception. But not every industry is able to produce topology-optimized biomimicry designs to use additive manufacturing efficiently.

However, most can benefit from 3D printing using it as a production method for tooling, fixtures and other manufacturing aids. These are typically customized, low-volume tools that include complex geometry, plus they are needed at short lead times in order to begin volume production of the products they sell. Historically CNC-machined and assembled along with standard components, highly complex tooling and fixtures can be 3D printed as one piece, eliminating the costs and time of assembly.

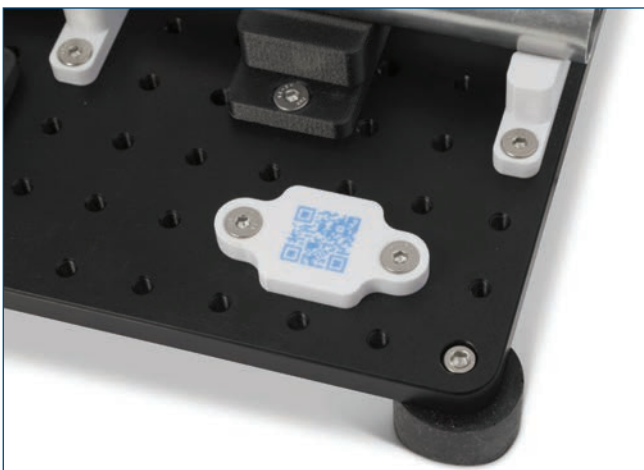
It could be expected that problems with design for manufacturability have largely disappeared because design complexity is no longer an insurmountable barrier; however, the rules have changed, but not disappeared completely. With the right tools and checks in place, you have the freedom to produce multiple test parts to validate designs without extending lead times, while keeping costs under control.

The potential time and cost savings additive manufacturing technologies bring to the factory floor are too big to ignore. Lower production costs, shorter and more responsive supply chains—the benefits are numerous. Certain fundamentals crucial to the development process still apply. Though the method of creating products with additive manufacturing is vastly different, good design is still key.

HIGH COSTS OF POOR DESIGNS

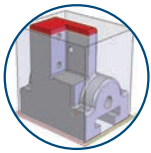
In most cases, design rules for traditional manufacturing techniques are consistent. However, design for additive manufacturing requires a new approach to achieve optimized parts ready for 3D printing. Mistakes in the design process can quickly put an end to any 3D-printed part. Some builds can take hours or even days for large parts to be printed, so you want to make sure that time is not wasted.

There are several ways to validate a design to ensure it can be 3D printed efficiently. First, look for unprintable or inaccessible features that are too small for the printer's resolution, or features that are unsuitable for the process, such as support structures that may need to be machined off. When working with large planar faces, remember that these are more prone to warping and distortion. These and other additive manufacturing design strategies abound. You should also consider tools to make the production process faster and less prone to error.



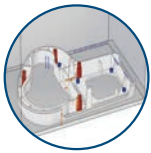
3D PRINTING REQUIRES THE RIGHT 3D TOOLS

Optimizing part designs for 3D printing production relies heavily on using the right tools. SOLIDWORKS has taken the initiative to create a 3D design software environment that is intuitive and aids manufacturers in designing 3D printed parts. You can avoid additive manufacturing problems by leveraging SOLIDWORKS 3D design software tools, such as the Print3D feature, to easily manage, identify and correct issues before going to print. Here are just a few ways you can save time and money:



IS YOUR DESIGN TOO BIG?

Partnering with Wohlers Associates, SOLIDWORKS provides a library of thousands of 3D printers with the corresponding build chamber dimensions. If your model is too big, red highlights show where it is outside the build envelope. Print3D also enables you to scale your model up or down to fit inside the chosen printer and even orient it to fit so you can maximize the size of the model without upgrading your printer.



DETECT PRINTING ISSUES EARLY

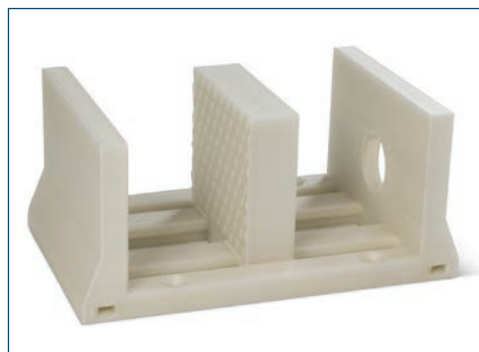
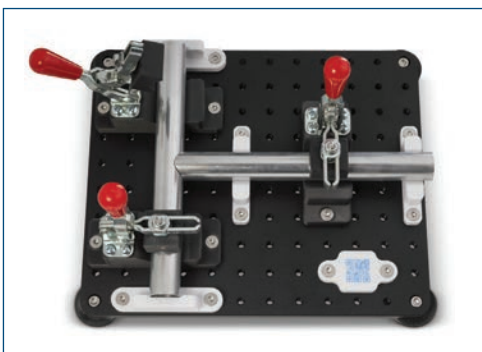
Small gaps and thin walls may cause a design to print thicker than expected, not print properly or not print at all. SOLIDWORKS Print3D automatically helps you spot and avoid such issues before you send the job to print. You can also visualize the layers to see any potential “stair-stepping” that can occur with shallow gradients.



SUPPORT STRUCTURES

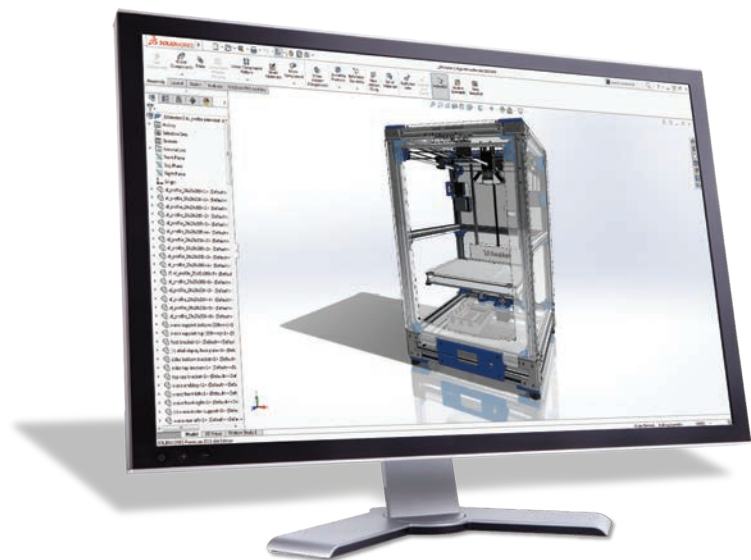
Support structures can harm the aesthetics or function of the areas they are connected to while adding material costs and slowing the build. The Print3D feature indicates which faces of a design may require support structures, thereby providing you the flexibility to tweak the design as needed to reduce them.

Once your design is perfected for 3D printing, instead of exporting outdated STL files, now you can use a better format for 3D printing called 3MF. This full-fidelity file format supports geometry, colors, materials and much more. 3MF can handle anything your printer can print. The file sizes are much smaller than corresponding STL files, and files never need “fixing” on the back end. Plus, you can even see a preview thumbnail in Microsoft® Windows.



FREEDOM AND FLEXIBILITY

SOLIDWORKS brings significant user-driven enhancements to every release, including improvements to optimizing the software for 3D printing. By connecting your SOLIDWORKS data to the **3DEXPERIENCE®** platform, you gain easy, secure access to advanced design, data management and manufacturing tools that allow you to implement new product strategies and workflows. Your connection to the cloud-based platform also means you can collaborate with more people more easily—colleagues, vendors and customers—whether in the office, on the road or working from home.



TO LEARN MORE ABOUT SOLIDWORKS AND HOW YOU CAN OPTIMIZE DESIGNS FOR 3D PRINTING, **CONTACT YOUR LOCAL RESELLER.**

Sources:

1. Source: "Global Additive Manufacturing Market Generated \$12 Billion Revenue in 2020, and Is Forecast to Reach \$78 Billion by 2028 - ResearchAndMarkets.com." Businesswire.com, September 14, 2020. <https://www.businesswire.com/news/home/20200914005395/en/Global-Additive-Manufacturing-Market-Generated-12-Billion-Revenue-in-2020-and-is-Forecast-to-Rreach-78-Billion-by-2028>—ResearchAndMarkets.com.

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.



DASSAULT SYSTEMES | The **3DEXPERIENCE®** Company

Americas
Dassault Systèmes
175 Wyman Street
Waltham, Massachusetts
02451-1223
USA

Europe/Middle East/Africa
Dassault Systèmes
10, rue Marcel Dassault
CS 40501
78946 Vélizy-Villacoublay Cedex
France

Asia-Pacific
Dassault Systèmes K.K.
ThinkPark Tower
2-1-1 Osaki, Shinagawa-ku,
Tokyo 141-6020
Japan

©2021 Dassault Systèmes. All rights reserved. 3D, 3DEXPERIENCE, the 3D icon, the 3D logo, CATIA, SOLIDWORKS, ENOVIA, DELIA, SIMULIA, GEVIA, EXALEAD, 3DVIA, BIOVIA, NETVIBES, IPWE and 3DEXCITE are commercial trademarks or registered trademarks of Dassault Systèmes, a French "société européenne" (Versailles Commercial Register # B 322 306 440), or its subsidiaries in the United States and/or other countries. All other trademarks are owned by their respective owners. Use of any Dassault Systèmes or its subsidiaries trademarks is subject to their express written approval.