



Design for Additive Manufacturing for 3D Printing on Fabric for Designers

Overview

The full color, multi-material Stratasys® J850™ TechStyle™ and J850™ Prime FabriX™ printers powered by 3DFashion™ technology boast the innovative capability of printing 3D designs directly onto fabric. With Stratasys printing materials, combinations of colors, transparency, and flexibility are possible all in one print on different types of textiles and flexible substrates.

The following sections describe tips, guidelines, and online resources for designers to get started with 3D printing using Stratasys technologies and materials. With this wealth of information and your own experimentation, you will gain the knowledge and skills you need to achieve outstanding results.

Guidelines and Tips

- A. Tips for Getting Started
- B. Vector Designs
- C. Distance Between Elements
- D. Element Size
- E. Element Height
- F. Size Recommendations Table
- G. Color Assignment
- H. File Type Support
- I. Stratasys Online Resources

Design for Additive Manufacturing for 3D Printing on Fabric for Designers

GUIDELINES AND TIPS

A. Tips for Getting Started

- **Select geometries that have positive angles**—Use geometries with positive angles, that is, no overhangs, to avoid using support material on the fabric. (Figure 1)

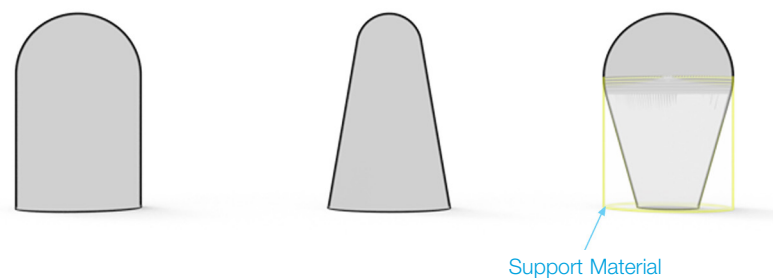


Figure 1: Support material and negative angle

Notes:

- Parts printed with support material have a matte finish wherever the support touches the 3D print and require support removal.
It is possible to print elements that require support material, but the post-print tasks might affect the appearance of the fabric and the surface finish of the print elements.
- In most cases, prints on fabric should be printed with a glossy finish.
- **Separate large and bulky designs into smaller elements**—This enables fabric movement and is more critical when printing with rigid materials, compared to flexible materials.
- **Print samples**—Create sample prints with design variations to determine the ideal height, spacing, colors, and patterns before printing the whole design.
- **Consider the weight of the material**—When using a lot of PolyJet™ material in a design, the fabric is heavier and can potentially impact the wearability and usability of a garment that is made with the fabric.
- **Align all elements to the bottom plane or surface**—All elements of the same 3D print should be aligned to the bottom plane or surface in GrabCAD Print™, so that they are positioned directly on the fabric. This prevents floating elements and ensures that the support material is not printed between the print and the fabric. (Figure 2)

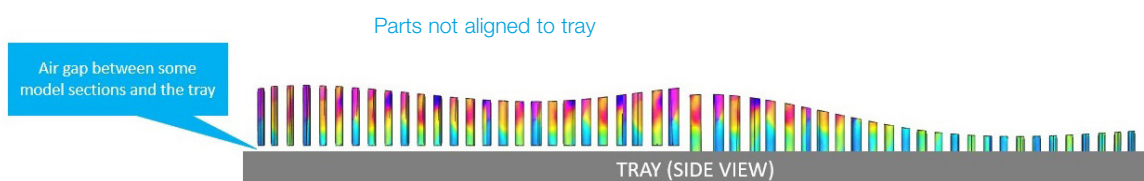


Figure 2: Align all parts to the bottom plane—Left—not aligned to tray; Right—aligned to tray

Design for Additive Manufacturing for 3D Printing on Fabric for Designers

B. Vector Designs

- **Verify curves and elements in the 2D design are closed and do not intersect**—This makes it easier to convert the 2D design to a 3D geometry.
- **Use a 1:1 scale for all design elements**—When working with graphics, start with the 1:1 scale (relative size of design elements). Scaling your design up or down can adversely affect your 3D print.

C. Distance Between Elements

- **Prevent elements from merging during printing**—Make sure that you have at least 0.3 mm between elements. Merged elements can affect fabric movement. (Figures 3-5)

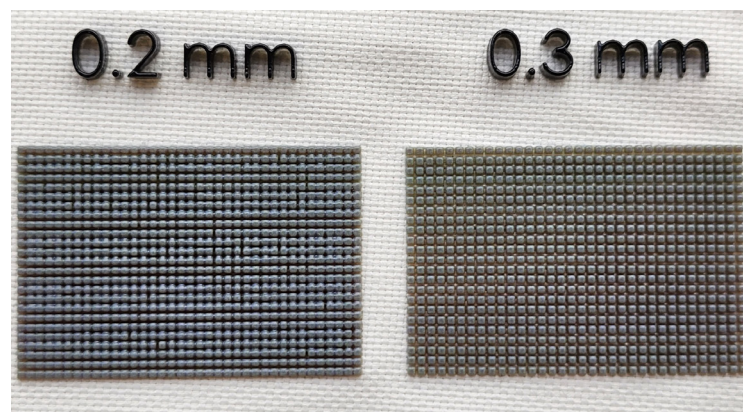


Figure 3: Distance between pins (Rigid)—Left, 0.2 mm not good; Right, 0.3 mm better

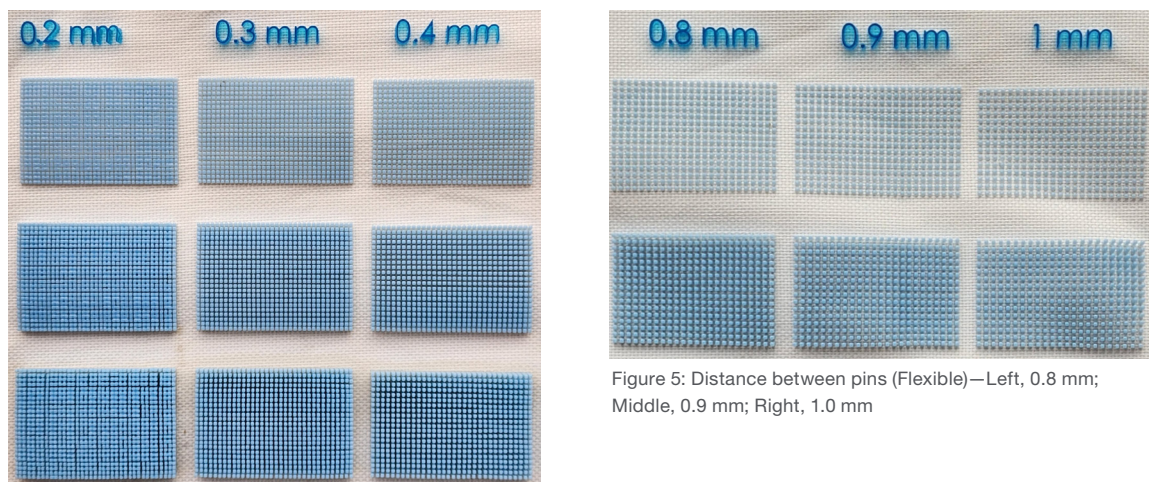


Figure 4: Distance between pins (Flexible)—Left, 0.2 mm; Middle, 0.3 mm; Right, 0.4 mm

Figure 5: Distance between pins (Flexible)—Left, 0.8 mm; Middle, 0.9 mm; Right, 1.0 mm

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D. Element Size

Element Size refers to the wall thickness or width of parts or elements in the X or Y direction.

Wall Thickness

Wall thickness refers to the width of wall elements or pins. (Figure 6)

- **Restrict the minimum wall thickness—** Ensure that the minimum wall thickness of elements is 0.6 mm. A smaller wall thickness might compromise the print quality.

Element Width

Element width refers to the width or length of printed elements. (Figure 7)

- **For Rigid printing materials, restrict the maximum element width (X/Y)—** Ensure that the maximum element width for *non-segmented* elements is in the range of 30–50 mm.
- **For Flexible printing materials, restrict the maximum element width (X/Y)—** Ensure that the maximum element width is as follows:
 - For *non-segmented* elements, the maximum element width needs to be 30–35 mm.
 - For thin continuous lines, there is no limitation for the maximum element width (length of the line). (Figure 8)

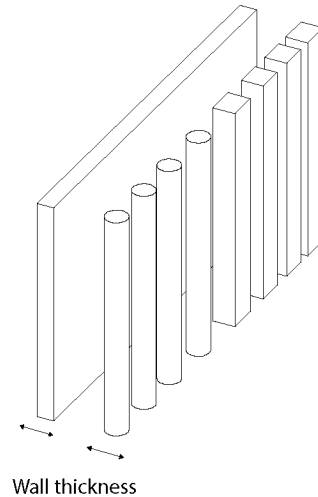


Figure 6: Wall thickness of wall element and pins

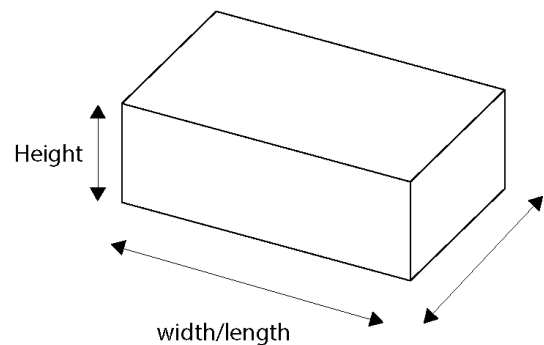


Figure 7: Element width or length of a printed element



Figure 8: Flexible material thin continuous line – example

Design for Additive Manufacturing for 3D Printing on Fabric for Designers

E. Element Height

- **Restrict the maximum element height**—Ensure that the maximum element height is as follows:
 - For bulky parts (*non-segmented* parts that are wider than 2 mm)—Ensure that the maximum element height is 50 mm.
 - For thin parts (*segmented* parts or pins that are narrower than 2 mm)—Ensure that the maximum height of elements printed with: rigid material is 20 mm (Figure 9) and flexible material is 10–15 mm (Figure 10).

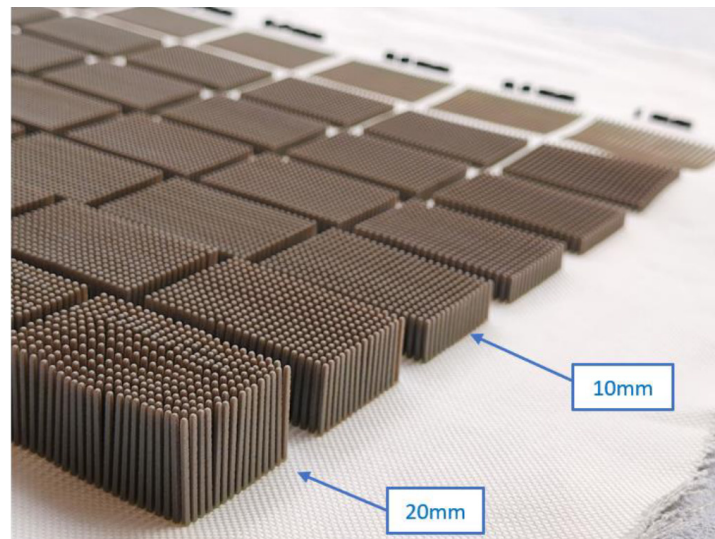


Figure 9: Rigid pins, different heights—Left, 20 mm not good; Right, 10 mm better

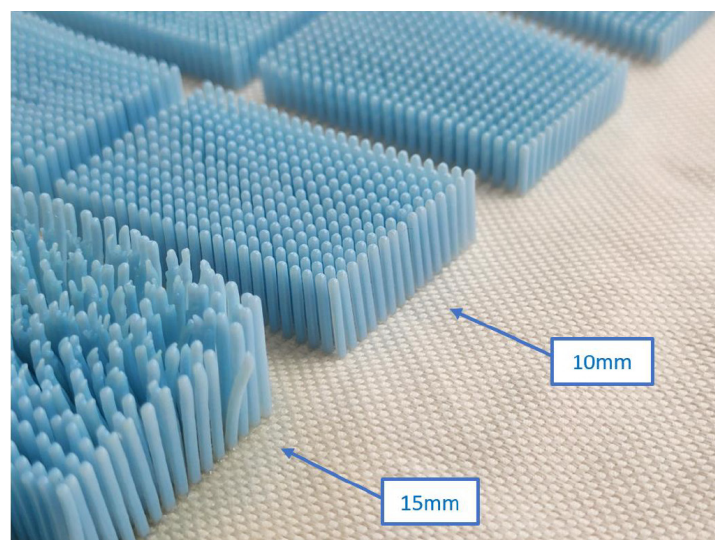


Figure 10: Flexible pins, different heights—Left, 15 mm not good; Right, 10 mm better

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F. Size Recommendations Table

The size recommendations are summarized in the following table:

Part Type	Rigid Material		Flexible Material	
	Min	Max	Min	Max
Distance Between Elements				
All parts	0.3 mm	–	0.3 mm	–
Size of Element				
Parts with different thicknesses/widths (X/Y)	0.6 mm	30–50 mm	0.6 mm	30–35 mm
Height of Elements				
Bulky parts (non-segmented, > 2 mm)	–	50 mm	–	50 mm
Thin parts (segmented, < 2 mm)	–	20 mm	–	10–15 mm

G. Color Assignment

- **Assign colors using the design software or GrabCAD Print**—Color can be assigned to the models in different ways:
 - **CAD software**—Assign the object color, mesh vertex color, or texture map.
 - **GrabCAD Print**—Assign colors using different options such as base material, pre-defined material pallets (digital materials), RGB, Hex, Pantone®, etc.

Note: In GrabCAD Print, color assignment is only per body.
- **Element thickness can have an effect on color appearance**—Consider the following effects:
 - Parts thinner than 2 mm may not achieve the desired color.
 - In certain colors, parts thinner than 1 mm might appear transparent. (Figure 11)

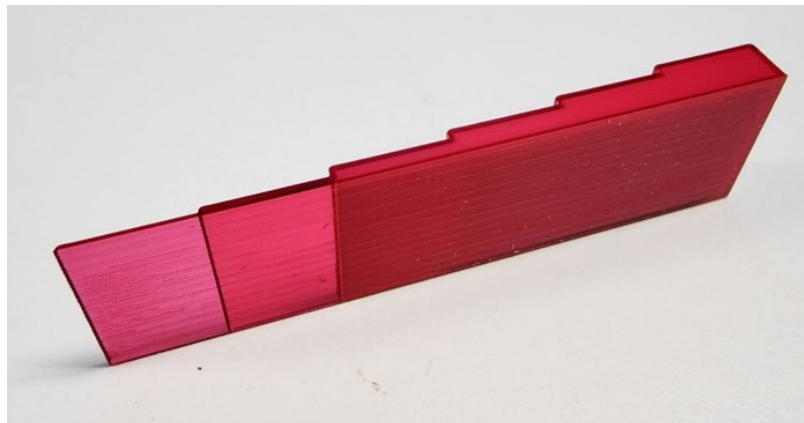


Figure 11: Color of thin walls may appear transparent

Design for Additive Manufacturing for 3D Printing on Fabric for Designers

H. File Type Support

- **Use supported file types in GrabCAD Print**—For information about the supported file types, refer to [GrabCAD Print supported file formats](#).
- **Assign color and transparency in design software**—To assign color and transparency in your design software, save the file type as OBJ or VRML file types. For texture maps, save the texture file in the same folder as the 3D file.
- **Assign single color or limited pantone colors in GrabCAD Print**—Use STL files or native CAD files as a single part or assemblies.

I. Stratasys Online Resources

Stratasys Support Center

- [J850 TechStyle Printer](#)
Learn about the J850 TechStyle 3D printer, powered by 3DFashion technology.
- [Best Practice for Printing on Fabric with J850 TechStyle printers](#)
Learn how to obtain optimum results for 3D printing on textiles and flexible substrates with J850 TechStyle printers.
- [J850 Prime FabriX Printer](#)
Learn about the J850 Prime FabriX 3D printer, powered by 3DFashion technology.
- [Best Practice for Printing on Fabric with J850 Prime FabriX printers](#)
Learn how to obtain optimum results for 3D printing on textiles and flexible substrates with J850 Prime FabriX printers.
- [Troubleshooting for 3DFashion](#)
Find 3DFashion strategies for resolving quality print issues.
- [FAQs](#)
Find answers to Frequently Asked Questions about 3DFashion Technology. Search for 'PolyJet 3DFashion'.
- Design for Additive Manufacturing using PolyJet Technology [PDF](#) | [eLearning](#)
Learn about tools and methods for optimizing design features.
- [File Preparation for 3D Printing with FDM and PolyJet](#)
Learn about creating and optimizing STL files. You can also learn about color and multi-material features.
- [Stratasys PolyJet Materials](#)
Learn about the range of PolyJet material options.

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Stratasys Academy Online

- [Welcome Page](#)
Find learning paths with eLearning, videos, and more training opportunities about additive technologies.
- [3DFashion Technology Overview](#)
Get started with an introduction to 3DFashion printing and Stratasys technologies and materials.

Stratasys YouTube Channel

- [3DFashion Videos](#)
Play videos from the *3D Fashion* playlist, and for more content, search for other playlists, for example, *PolyJet materials* and *GrabCAD Print*.



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USA - Headquarters

7665 Commerce Way
Eden Prairie, MN 55344, USA
+1 952 937 3000

EMEA

Airport Boulevard B 120
77836 Rheinmünster, Germany
+49 7229 7772 0



GET IN TOUCH.

www.stratasys.com/contact-us/locations

ISRAEL - Headquarters

1 Holtzman St., Science Park
PO Box 2496
Rehovot 76124, Israel
+972 74 745 4000

ASIA PACIFIC

7th Floor, C-BONS International Center
108 Wai Yip Street Kwun Tong Kowloon
Hong Kong, China
+ 852 3944 8888

stratasys.com

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