

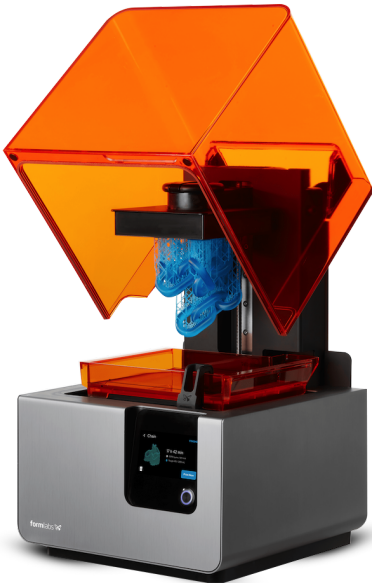
think[box]

3D Printer (Form 2)

SLA 3D Printing Guidelines

Introduction

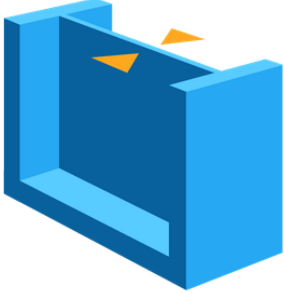
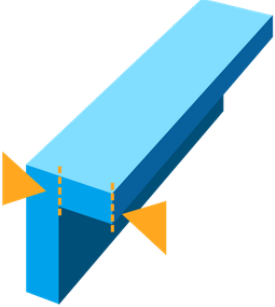
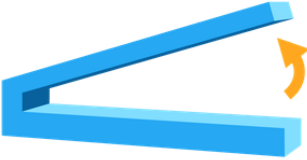
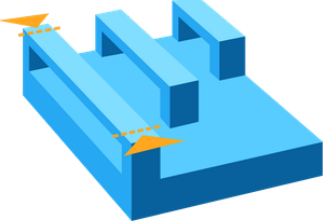
The Form 2 by Formlabs is a SLA desktop resin printer which uses a laser to cure liquid resin in the hardened resin. The Form 2 can print in a number of different resins each of which have their own special properties from flexibility to strength. The Form 2 also possesses the ability to print in great detail.

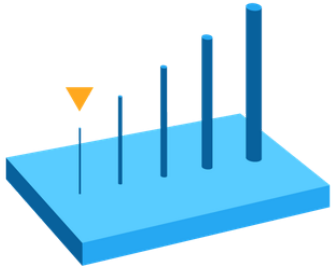
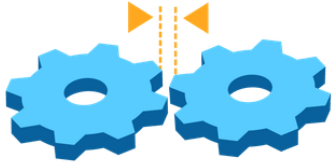
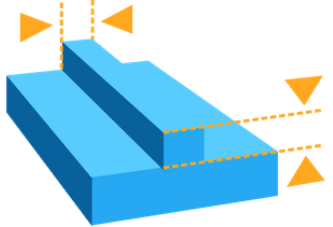
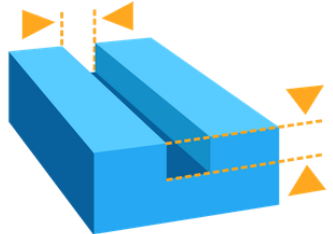
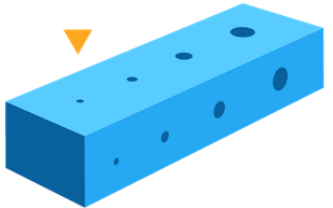
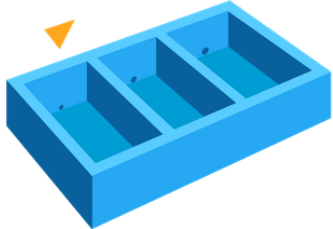


Design For Manufacturability: Clearances and Dimensions

When designing your part, keep these numbers in mind. They are only meant to be a starting place, and you are encouraged to experiment and learn what works for you. If you choose to ignore these minimums, you do so **at your own risk** and will have to pay for the parts even if they do not print properly.

Properties	Form 2	Visualization
Maximum Part Dimensions	5.7 × 5.7 × 6.9 in (145 × 145 × 175 mm)	
Minimum Part Dimensions	10mm x 10mm x 10mm	
Material / Color / Properties	General Purpose Resin: Clear, White, Gray, Black, Draft Engineering Resins: Flexible 80A, Tough 1500, Rigid 4000, High Temp Specialty: Castable Wax 40 Material Data Sheet	
Slice Height	25, 50, 100 microns/0.001, 0.002, 0.004 inches	
XY Dimensional Tolerance	+/-1.0% with a lower limit of +/-0.2mm	

Minimum supported wall thickness [1]	0.6mm (600 microns)	 A 3D perspective view of a blue rectangular block with a central vertical wall. Two orange arrows point towards the wall from the top, indicating the direction of support or force.
Minimum unsupported wall thickness [1]	0.8mm (800 microns)	 A 3D perspective view of a blue rectangular block with a central vertical wall. Two orange arrows point away from the wall from the top, indicating the direction of force or movement.
Maximum unsupported overhang length	0.3mm (300 microns)	 A 3D perspective view of a blue rectangular block with a horizontal overhang. Two orange arrows point towards the overhang from the bottom, indicating the direction of support or force.
Maximum unsupported overhang angle	19° from level	 A 3D perspective view of a blue rectangular block with a horizontal overhang. An orange curved arrow indicates the angle of the overhang relative to the horizontal.
Maximum horizontal support span length	12mm	 A 3D perspective view of a blue rectangular block with a horizontal overhang. Two orange arrows point towards the overhang from the bottom, indicating the direction of support or force.

Minimum vertical wire diameter [1]	For a 7 mm-tall wire: 0.4 mm/400 micron diameter For a 30 mm-tall wire: 1.5 mm/1500 micron diameter	
Minimum clearance between surfaces	0.5mm (500 microns)	
Minimum embossed detail size	0.2mm x 0.2mm	
Minimum engraved detail size	0.8mm x 0.8mm	
Minimum hole diameter	0.4mm	
Minimum drain hole diameter [2]	3.5mm	

[1] Extremely thin objects can be weakened significantly when washing. In addition to that, when cured they may deform under the high temperatures and UV. With this in mind, it's important to try and keep your parts well above the

minimum recommended thickness if possible.

[2] The Form 2 cannot print enclosed volumes. In order to print something that has a fully enclosed cavity, you need to add drainage holes. These will help resin drain from the model so it does not get stuck inside.

All dimensions and pictures can also be found on the [Formlabs SLA Design Guide](#).

Material Options

We stock two main types of resin at think[box]: general-purpose resins and engineering resins. Please note that our general-purpose resins are 0.55\$ per mL while our engineering resins are 0.65\$ per mL. Below we will list out all the resin options at think[box] along with their special properties, material data sheets, and an example part in that resin.

Resin	Properties	Example Part
General Purpose (Black, Gray, White, Clear)	Important note for clear: This resin <i>will</i> yellow after cure. If you would like more optically clear resin, please note that within your part submission. Additionally, here is more information about finishing clear parts . Material Data Sheet Image on the right shows gray resin	
Draft <i>This material is not currently available at think[box]. Please contact us about options for bringing your own resin.</i>	Prints up to 4 times faster than our general purpose resins. Material Data Sheet	
Flexible 80A	This is the only flexible resin we offer on the Form 2 at a shore value of 80A. For more options on flexible resin prints, see our J750 PolyJet . Material Data Sheet	

Tough 1500 <i>This material is not currently available at think[box]. Please contact us about options for bringing your own resin.</i>	For stiff and pliable parts that bend and spring back quickly under cyclic loading. Material Data Sheet	
Rigid 4000 <i>This material is not currently available at think[box]. Please contact us about options for bringing your own resin.</i>	Recommended for load-bearing applications. Material Data Sheet	
High Temp	This resin has a heat deflection temperature of 120C/248F post-cure. Heat deflection temp can be increased with additional thermal cure (see data sheet for more info). We do not do the additional thermal cure at think[box]. Material Data Sheet	
Castable Wax 40 <i>This material is not currently available at think[box]. Please contact us about options for bringing your own resin.</i>	Castable wax can be used for lost wax casting- mainly for smaller items such as jewelry. Below, there is a complete guide for how to cast with castable wax 40. We do not offer any casting at think[box] beyond printing parts in castable wax resin. Casting with Castable Wax 40 Material Data Sheet	

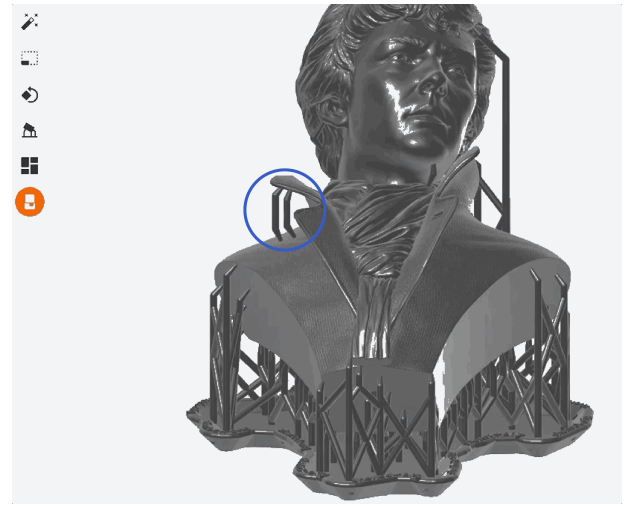
Designing for SLA printing

Supports

Unlike our FDM and Polyjet machines, the supports on the SLA machines are not soluble. These supports will be included in your final part and can be removed with diagonal/flush cutters. **If you are going to sand your final parts, it is very important to wear proper PPE as resin dust should not be inhaled. This dust is cancerous and finishing your SLA parts should be done with care.**

Overhangs

An additional consideration when designing your print for SLA is overhangs. As mentioned before, SLA supports are not soluble and will be printed in the same material as the resin. If you have a part with overhangs as shown to the right, you will get supports that will not start connecting on the build plate.



Thin Walls

Printing SLA parts with thin walls often leads to warping. When finishing a SLA part, we go through two steps: washing and curing. Washing involves cleaning the part of excess resin by putting it in an IPA bath that spins it around. Curing involves a high temperature environment with a UV light. During this process, walls that are too thin often get **warped**.

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