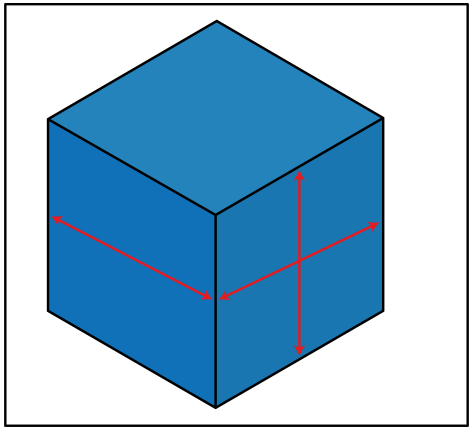
PROTOFORM 3D

FDM PRINTING DESIGN GUIDELINES

File Types Accepted	Our 3D printers accept files in the following formats: • .STL • .OBJ If your model is in a different format, don't worry — we can convert it for you as part of the service.
General Dimensional Tolerance	Like all manufacturing methods, FDM 3D printing has a general tolerance range that applies to all part dimensions. Our printers typically achieve: • Dimensional accuracy: ±0.5% (e.g. a 1.00 mm feature = 0.995–1.005 mm) • Minimum tolerance: ±0.15 mm
Print Size	These are the minimum and maximum single-part dimensions supported by our printers: • Minimum: 2 × 2 × 0.4 mm • Maximum: 245 × 245 × 240 mm If your model exceeds these dimensions, feel free to send it over — we'll review it and advise on possible solutions, such as splitting or resizing the part. 

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Resolution

Layer resolution refers to the height (in mm) of each individual layer in a 3D printed part.
It affects both surface finish and detail — particularly on curved or sloped areas.

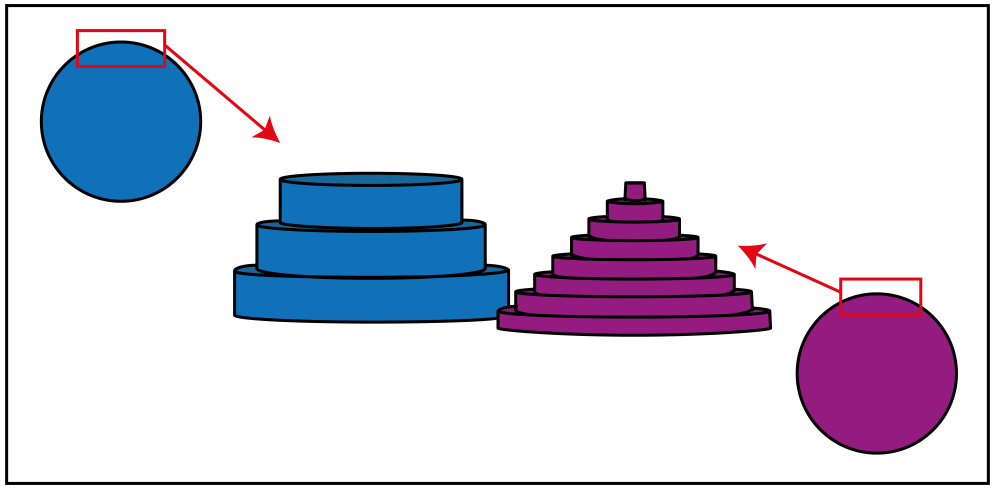
We offer the following resolution options:

- 0.28 mm: draft quality
- 0.20 mm: standard quality (default)
- 0.12 mm: high detail

Finer resolutions produce smoother surfaces and greater detail but also significantly increase print time.

Our 0.20 mm setting is the default, offering an ideal balance of speed, accuracy, and visual quality.

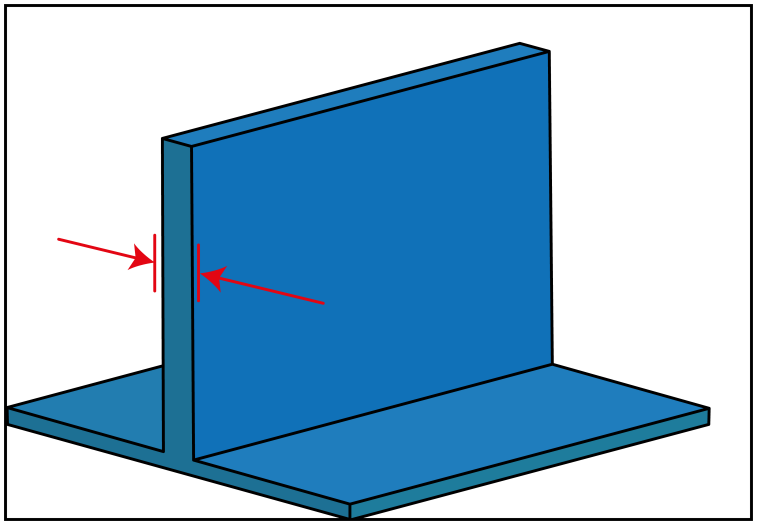
Let us know if your project requires a specific resolution.



Wall Thickness

Wall thickness refers to the distance between one surface of the model and its opposite side.

To ensure both strength and printability, all vertical walls, embossed details, or raised text should have a minimum thickness of 1.2 mm.



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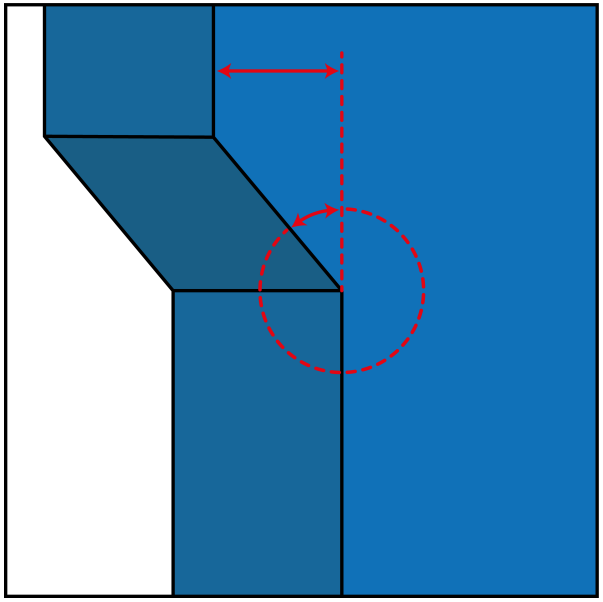
Overhangs

Overhangs are features that extend outward without material directly beneath them.

Our printers can typically handle overhangs up to 45° from vertical without support.

Features exceeding this may require printed supports, which can affect surface finish.

We'll assess your model and add support structures where needed to ensure successful printing.



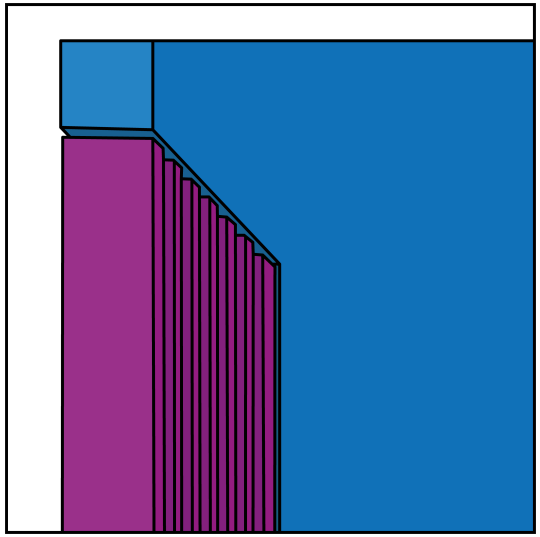
Support Material

If your model requires support structures for a successful print, we will generate and add them during preparation.

These rigid supports may leave visible witness marks on the printed surfaces they contact.

The level of post-processing required to remove or smooth these areas will be discussed during quoting.

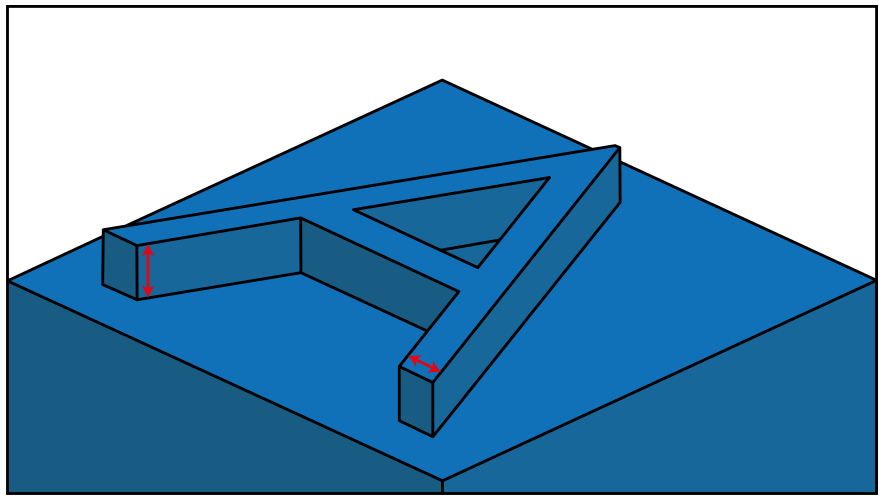
Please refer to our Product Finishing service for guidance on available options.



Embossing

Embossed details are shallow, raised features on your model — such as text, symbols, or logos.

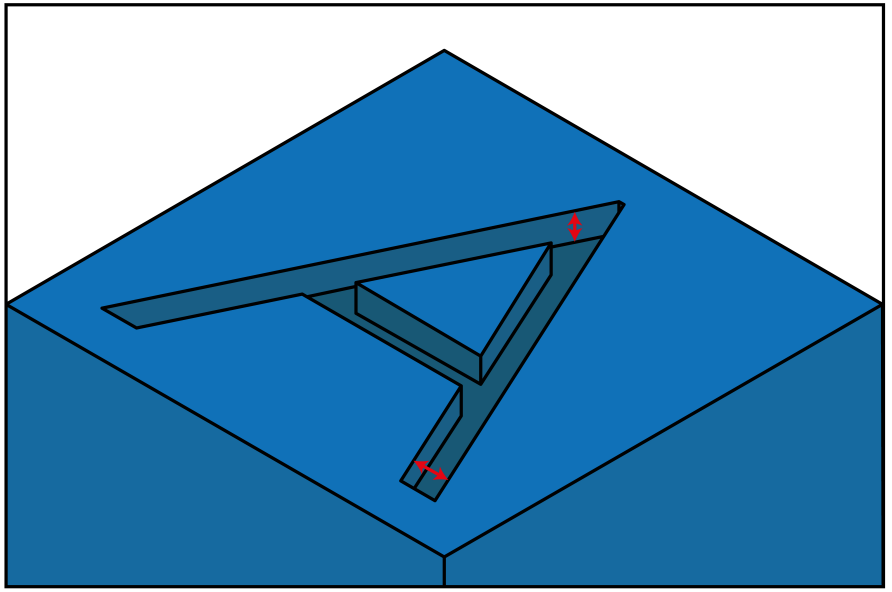
For best visual clarity and reliable printing, embossed elements should have a minimum thickness and line width of 1.2 mm.



Engraving

Engraved details are recessed or imprinted features such as text or logos.

For clear and consistent results, engravings should be at least 0.6 mm deep with a minimum line width of 1.2 mm.



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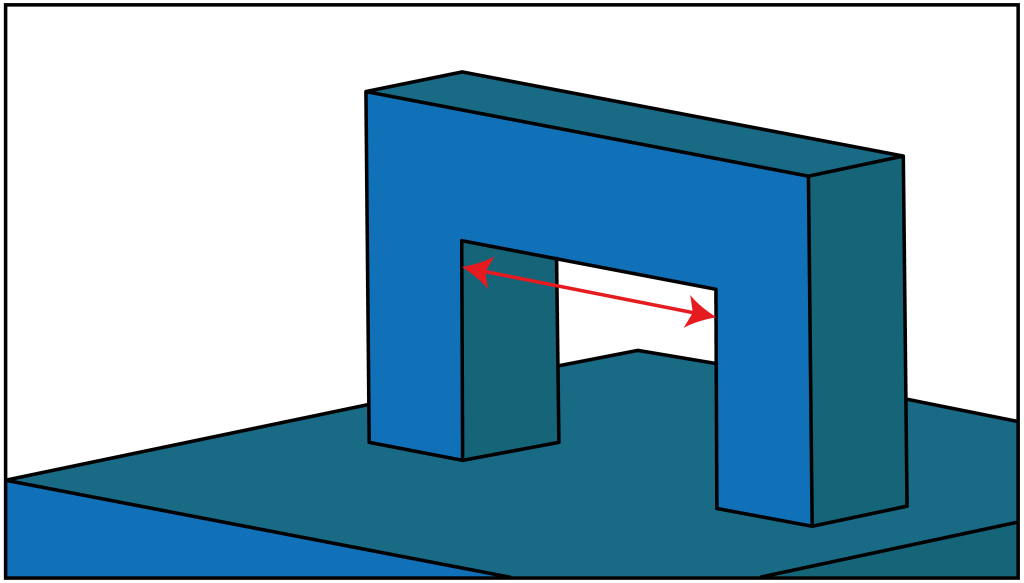
Horizontal Bridges

A bridge is a horizontal section that spans between two points without direct support underneath.

Unsupported bridges longer than 50 mm can sag during printing.

To maintain print quality, we recommend adding support structures beneath any bridges exceeding this length.

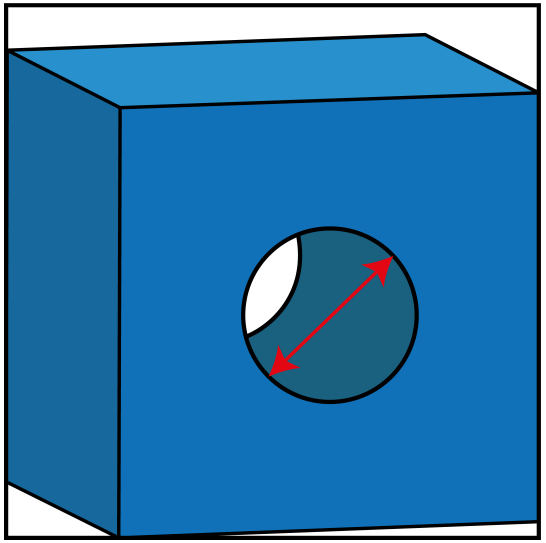
If not already included in your model, we will generate and add support material during print preparation where required.



Holes

Small holes can close or deform slightly during the printing process.

- For reliable results, holes should have a minimum diameter of 1.2 mm.
- Holes under 3 mm may require post-processing (e.g. drilling) for precise fits.
- For self-tapping screws, design the hole diameter to be 90% of the screw's thread diameter.



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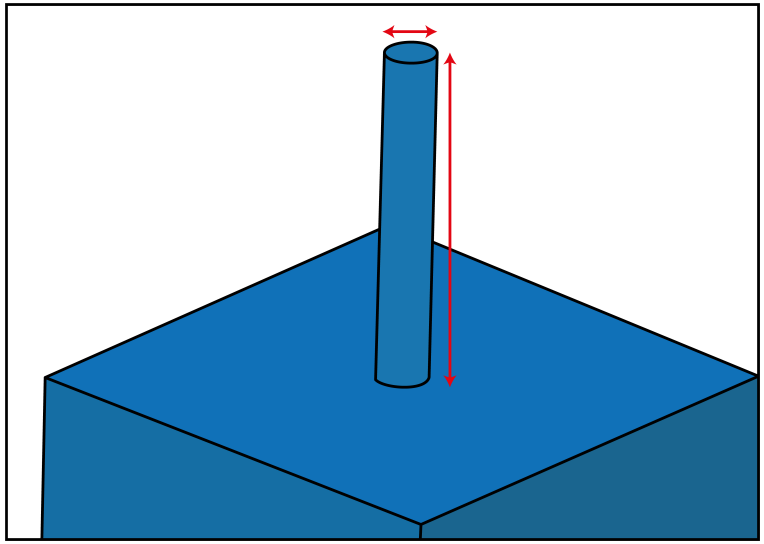
Pin Diameter

Thin pins and small protrusions can fail during printing, especially when tall and unsupported.

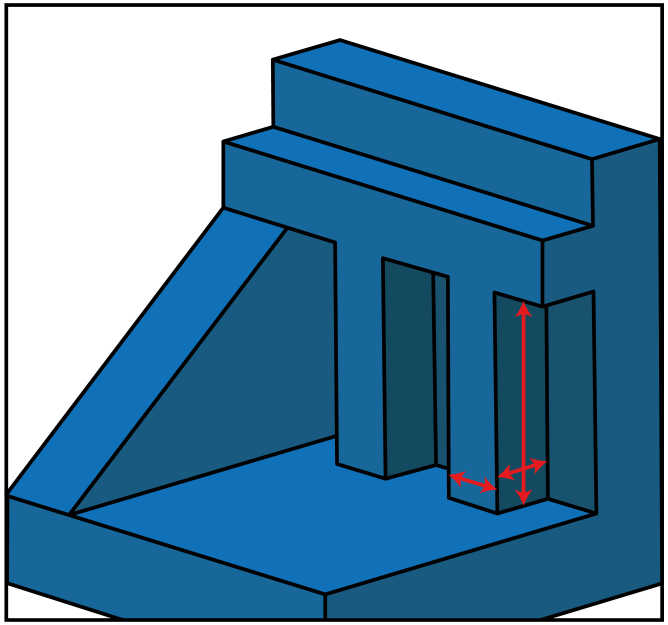
Pins should have a minimum diameter of 2 mm.

If the length exceeds 4 mm, consider increasing the diameter to improve strength and stability.



Minimum Feature Size

Any single feature (e.g. small protrusions, gaps, or isolated details) should be at least 2 mm in total size to print reliably and avoid breakage or deformation.



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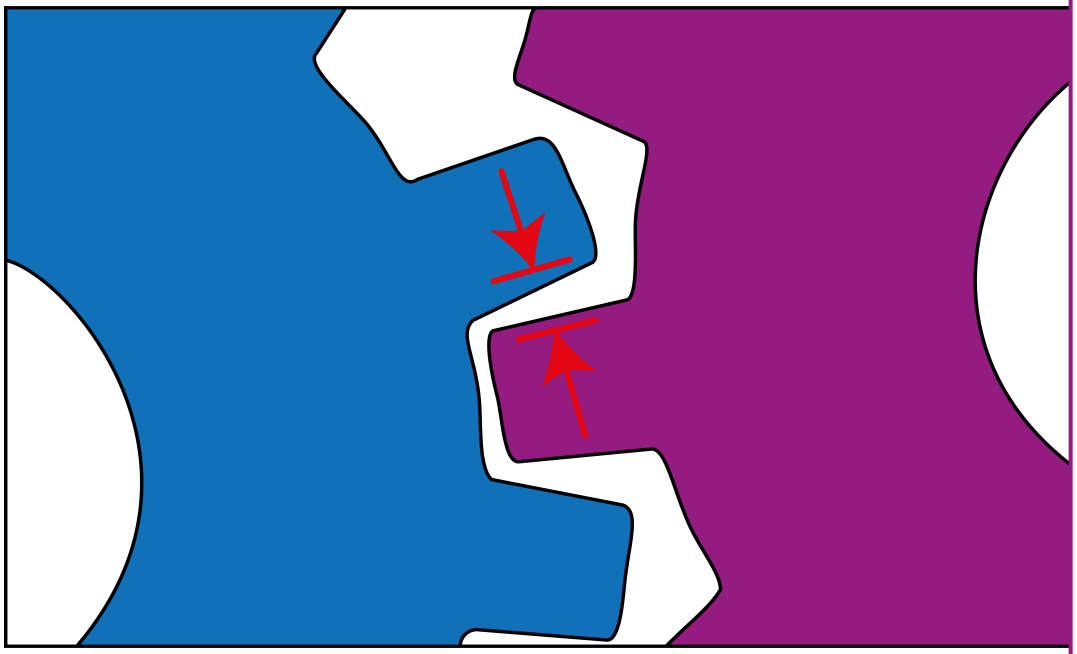
Moving Part Clearance

When designing moving or interlocking parts, it's essential to include clearance space between components.

A minimum clearance of 0.2 mm is recommended to prevent fusing during printing.
Smaller gaps may result in parts bonding together.



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FAQS

Can I use Protoform 3D for both scanning and printing, or just one service at a time?	Absolutely — you're free to use as many or as few of our services as your project requires. Some clients come to us with a physical object they need digitised through 3D scanning, while others already have a model and simply need printing. Many projects benefit from the full 3D scanning, design, and printing workflow, but we're happy to support just the parts you need. Our goal is to make the process as seamless and flexible as possible for you.
What if my 3D model file does not meet the requirements listed?	If your model does not meet all of the criteria listed in the Printing Design Guidelines for the selected 3D printing technology, your parts could take longer to print or be more likely to fail during the printing process. Before we print any of your parts, we inspect and analyse your files to identify any issues and pre-emptively detect potential failures. It's not a perfect system, and we're not able to guarantee on-time delivery for parts that don't meet the above criteria. If the model falls short of these guidelines, we are unable to take responsibility for defects in the final print — so please follow them carefully.
Which of the Printing Design Guidelines criteria are most important?	Some of these guidelines are critical — for example, we cannot print single parts that exceed the maximum size listed. Others, such as moving part clearances, may not apply to every design. These criteria only affect features actually present in your model, so it's essential to consider each one carefully during the design phase to ensure successful results.
If my part does not meet the guidelines, will Protoform 3D still print it?	We inspect all parts for major defects that might affect our printing process. However, not every guideline can be automatically checked. If we detect potential issues, we'll get in touch before printing — but we can't guarantee we'll catch everything. If your parts fail to meet the design guidelines, we will not be able to take responsibility for any defects.
What happens if my part is below the minimum wall thickness?	Thin areas of your model that fall below our minimum thickness are much more likely to print incorrectly. Walls that are too thin may disappear or cause missing sections in the final print due to printer limitations.
Can Protoform 3D edit my model to make it fit the guidelines?	Yes — you can use our CAD/3D modelling services to alter and optimise your design for 3D printing. We'll help you prepare your model so it meets the technical requirements. Get in touch through the Contact Us page and let us know what you need. Don't forget to attach your files!

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