

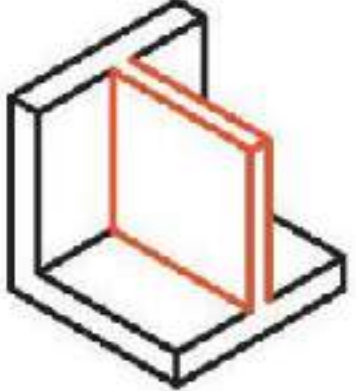
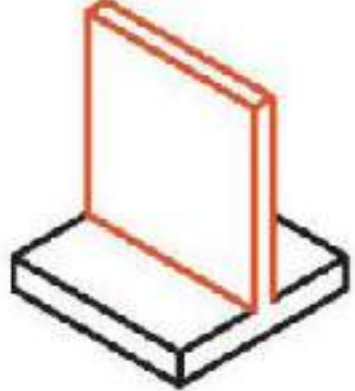
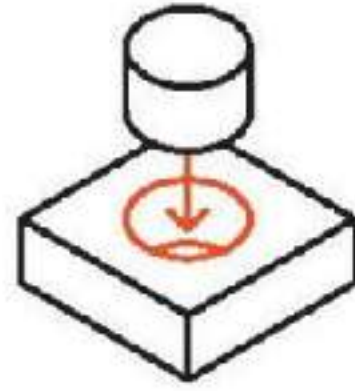

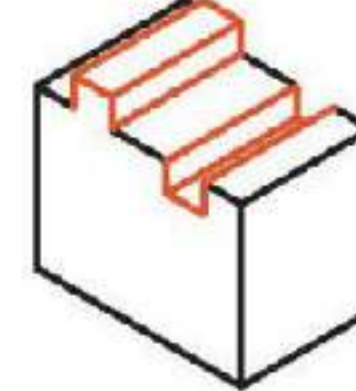
# 3D Modeling best practices for 3D printing

# How do 3D Printers work

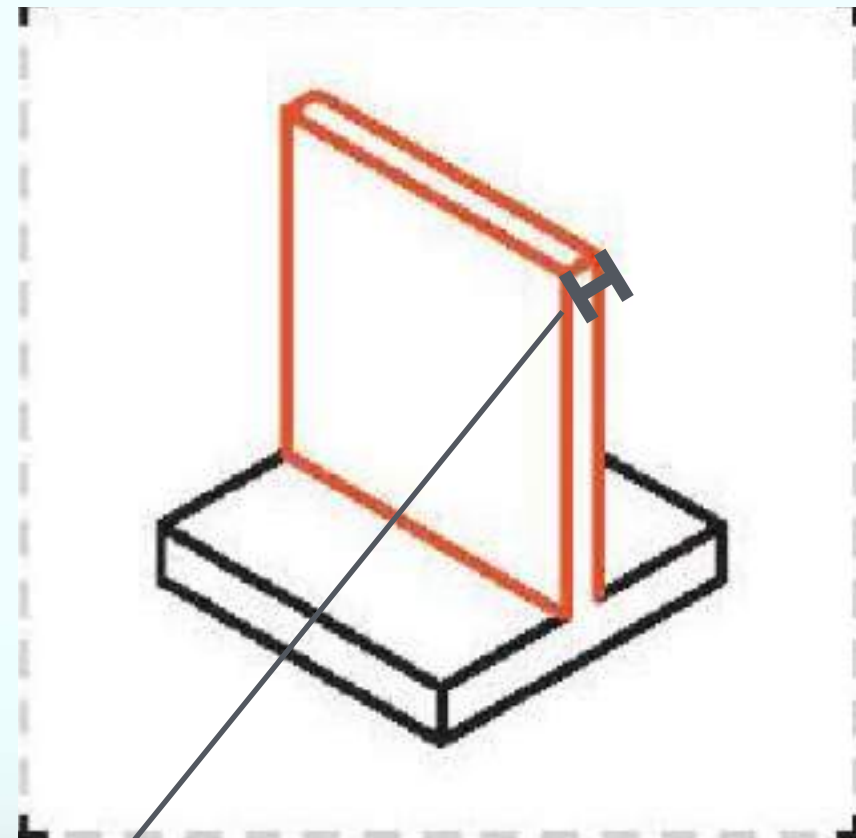
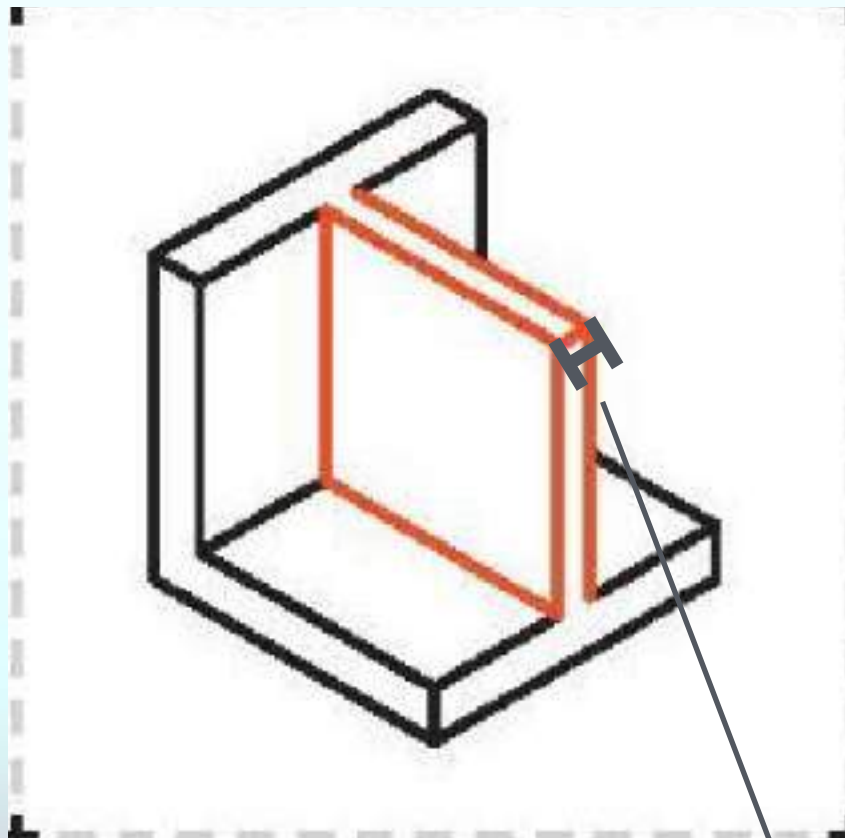
# 3D Printing Timelapse



# Design rules

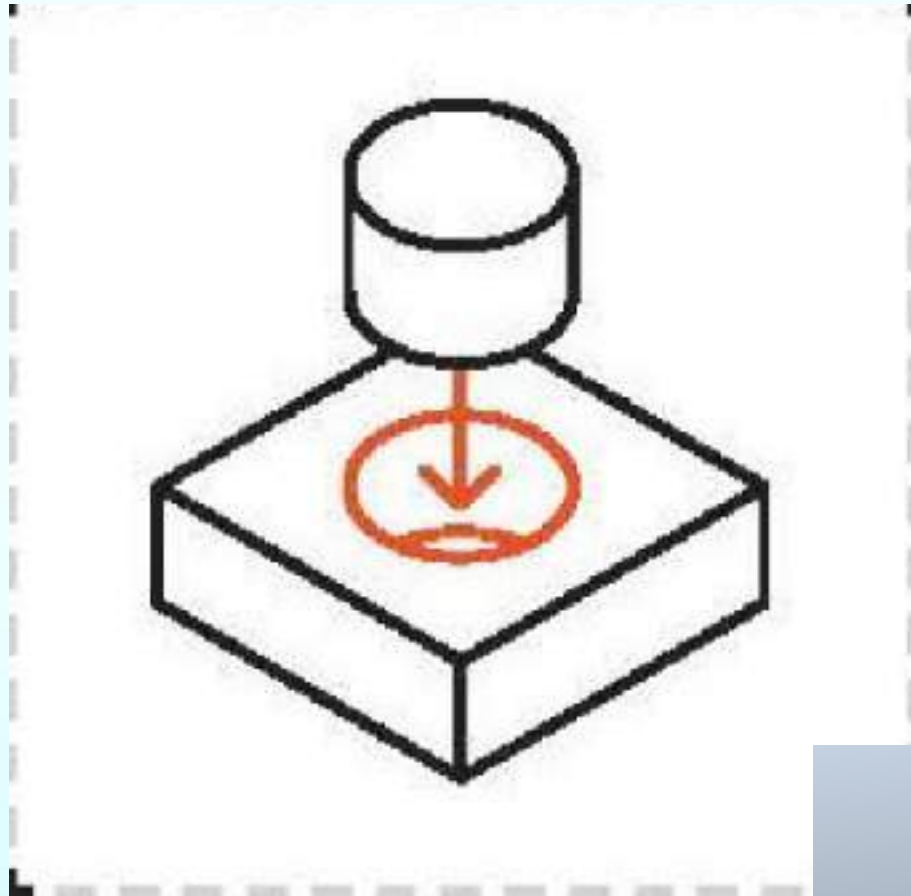
Supported Walls	Unsupported Walls	Connecting /Moving Parts	Minimum Features	Embossed & Engraved Details
Walls that are connected to the rest of the print on at least two sides.	Unsupported walls are connected to the rest of the print on less than two sides.	The recommended clearance between two moving or connecting parts.	The recommended minimum size of a feature to ensure it will not fail to print.	Features on the model that are raised or recessed below the model surface.
				

# Supported & Unsupported walls

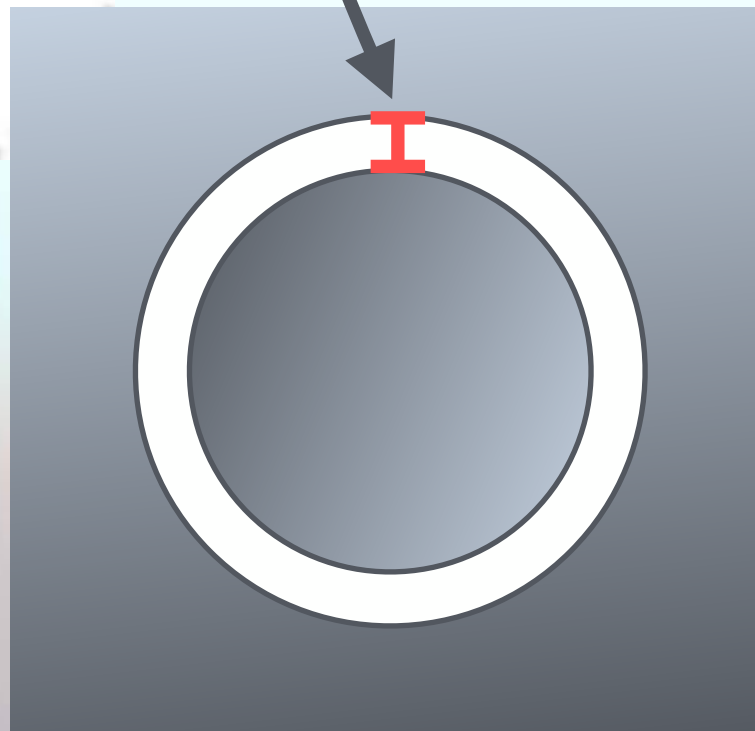


Minimum: 1mm

# Connecting/moving parts

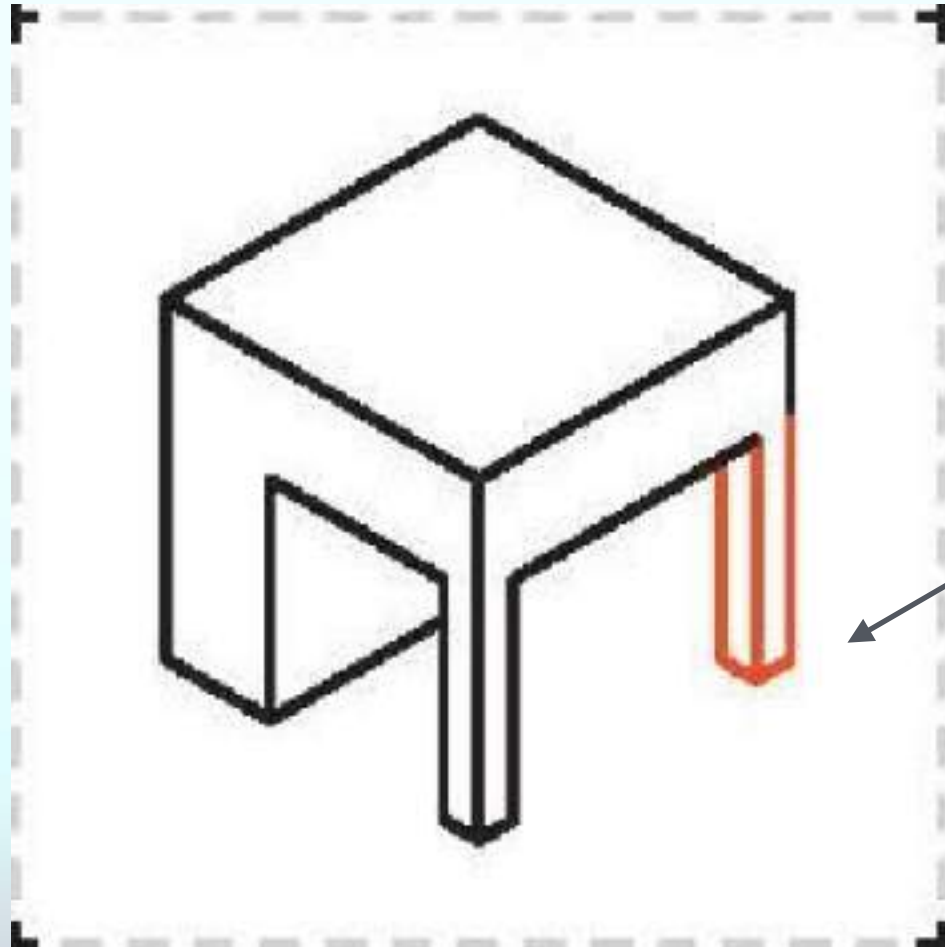


- Snug fit: 0.15mm
- Moving joint: 0.2mm
- Loose joint: 0.3mm



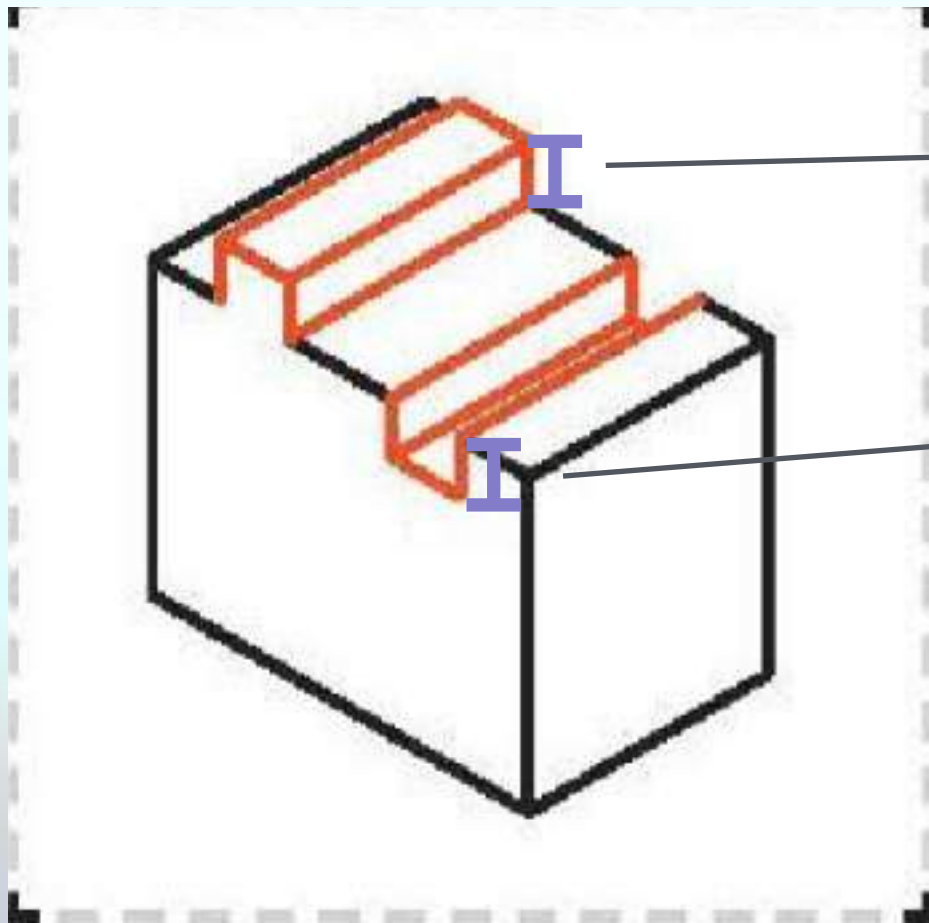


# Minimum Features



Min: 1mm x 1mm

# Embossed & Engraved Details



- Absolute min:  $\pm 0.2\text{mm}$
- Visible: Greater than  $\pm 0.5\text{mm}$

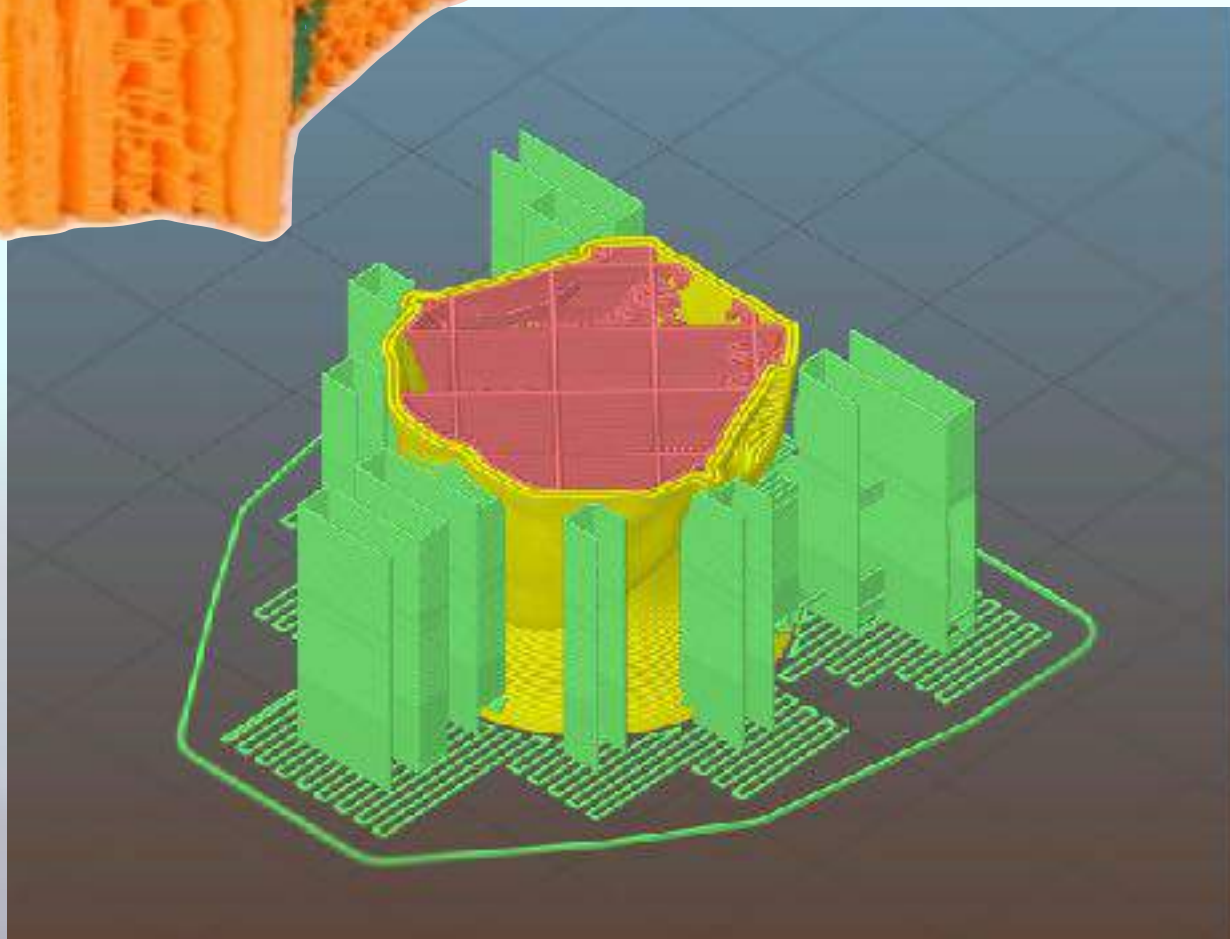


# Supports



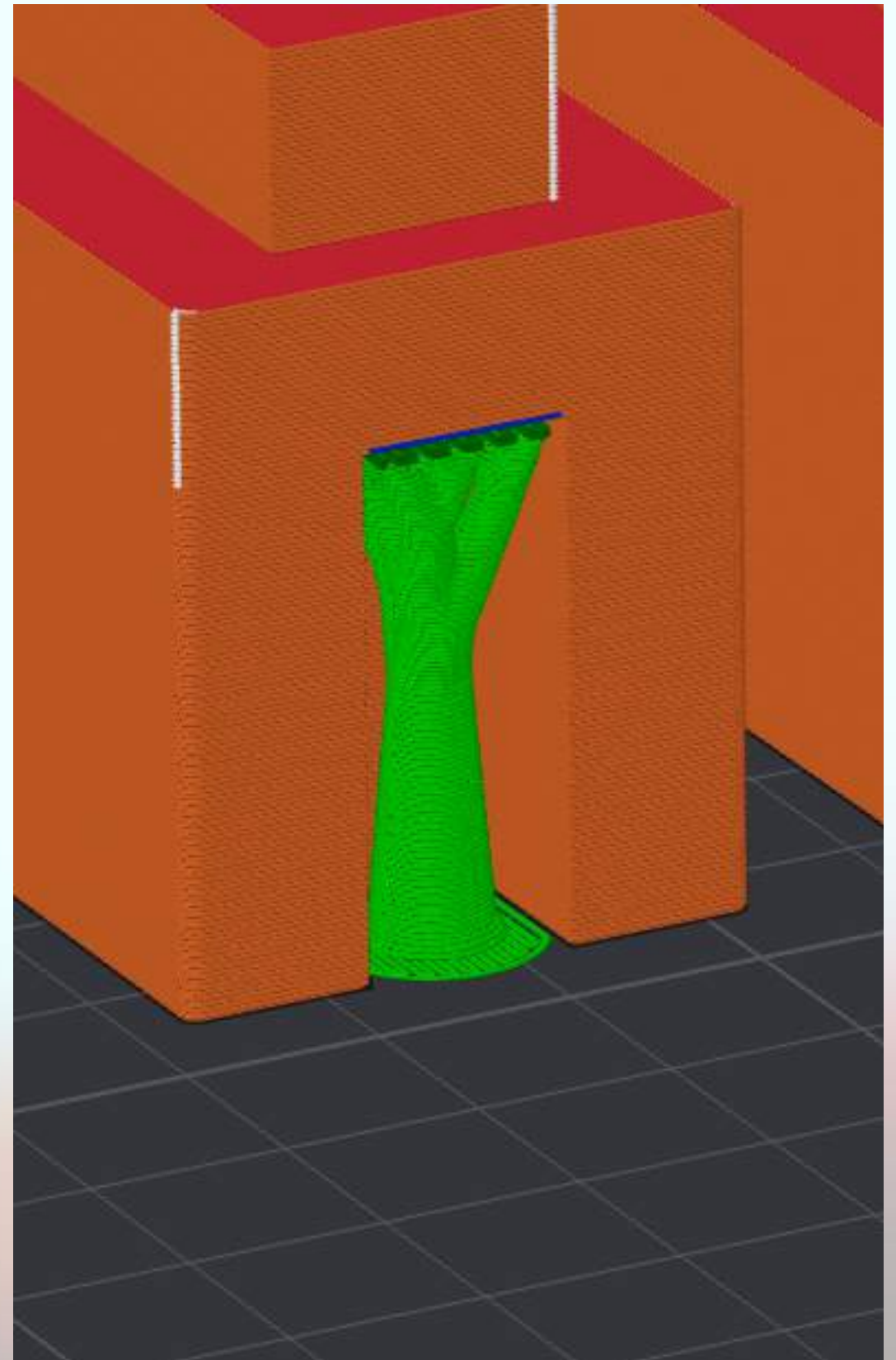
[https://www.ucreatestudio.is.ed.ac.uk/support\\_docs/fdm\\_supports](https://www.ucreatestudio.is.ed.ac.uk/support_docs/fdm_supports)

[https://blog.prusa3d.com/how-to-create-custom-overhang-supports-in-meshmixer\\_8188/](https://blog.prusa3d.com/how-to-create-custom-overhang-supports-in-meshmixer_8188/)



# Supports

- Sometimes supports are unavoidable
- Best to design parts that require the least amount of supports for best quality
- Support interface causes faces to be rough, more time in post processing



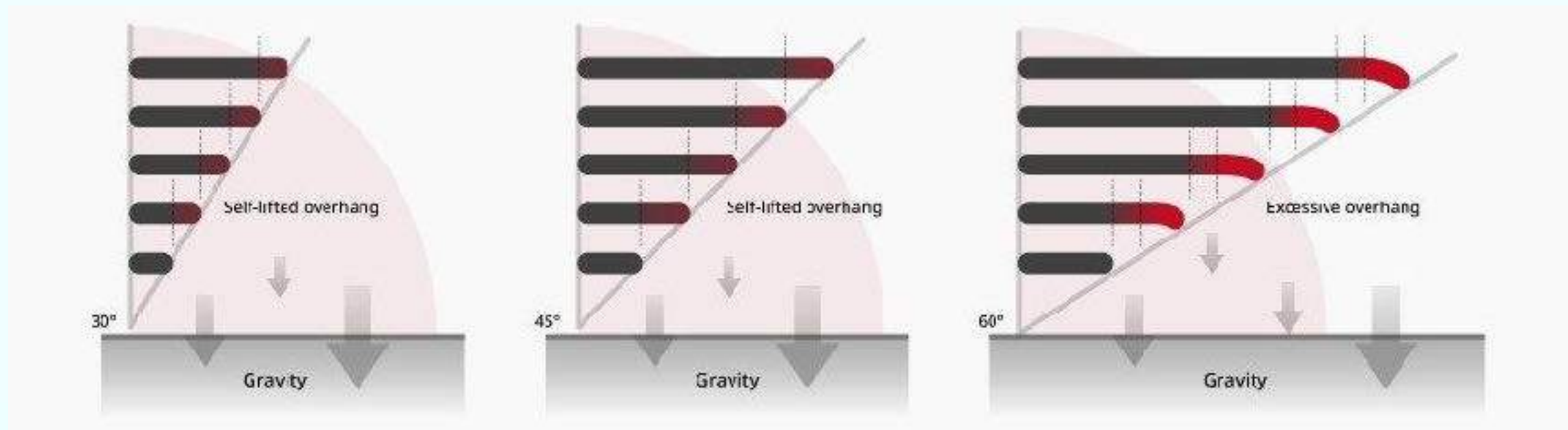
# Supports

- How to reduce supports needed?
- Keep overhangs less than 45 degrees

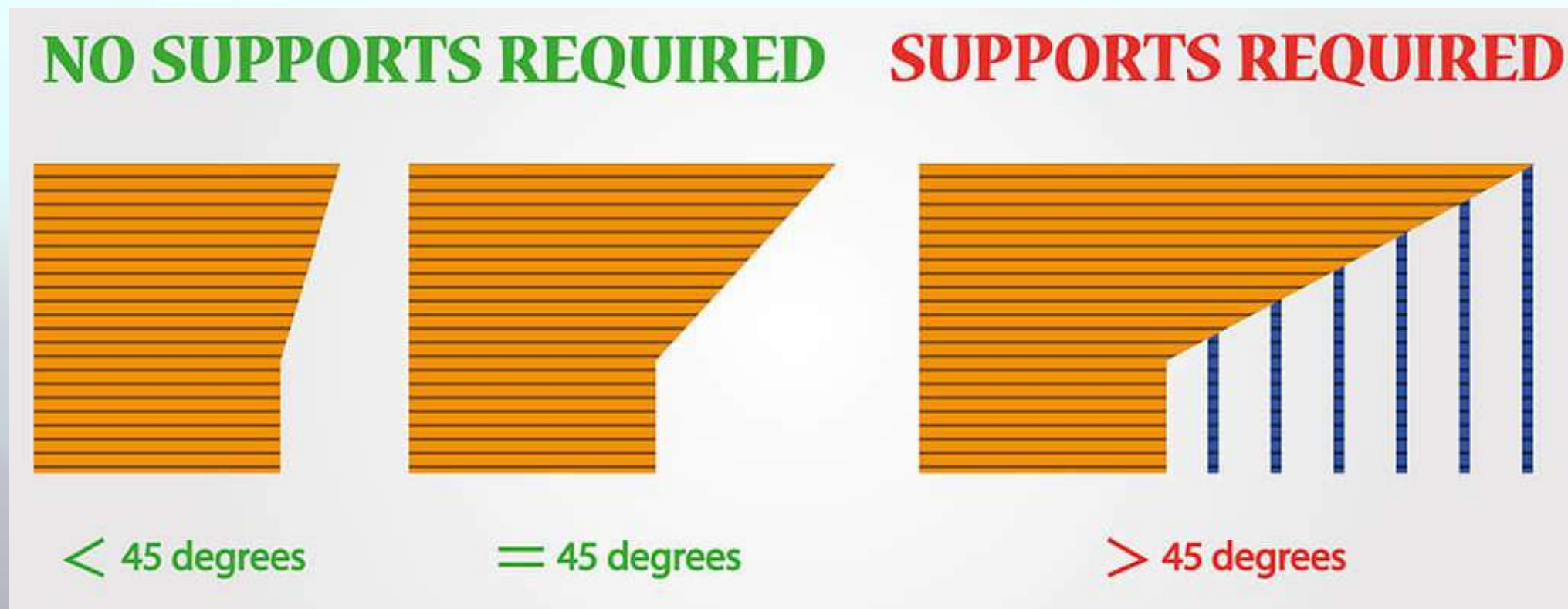




# Supports



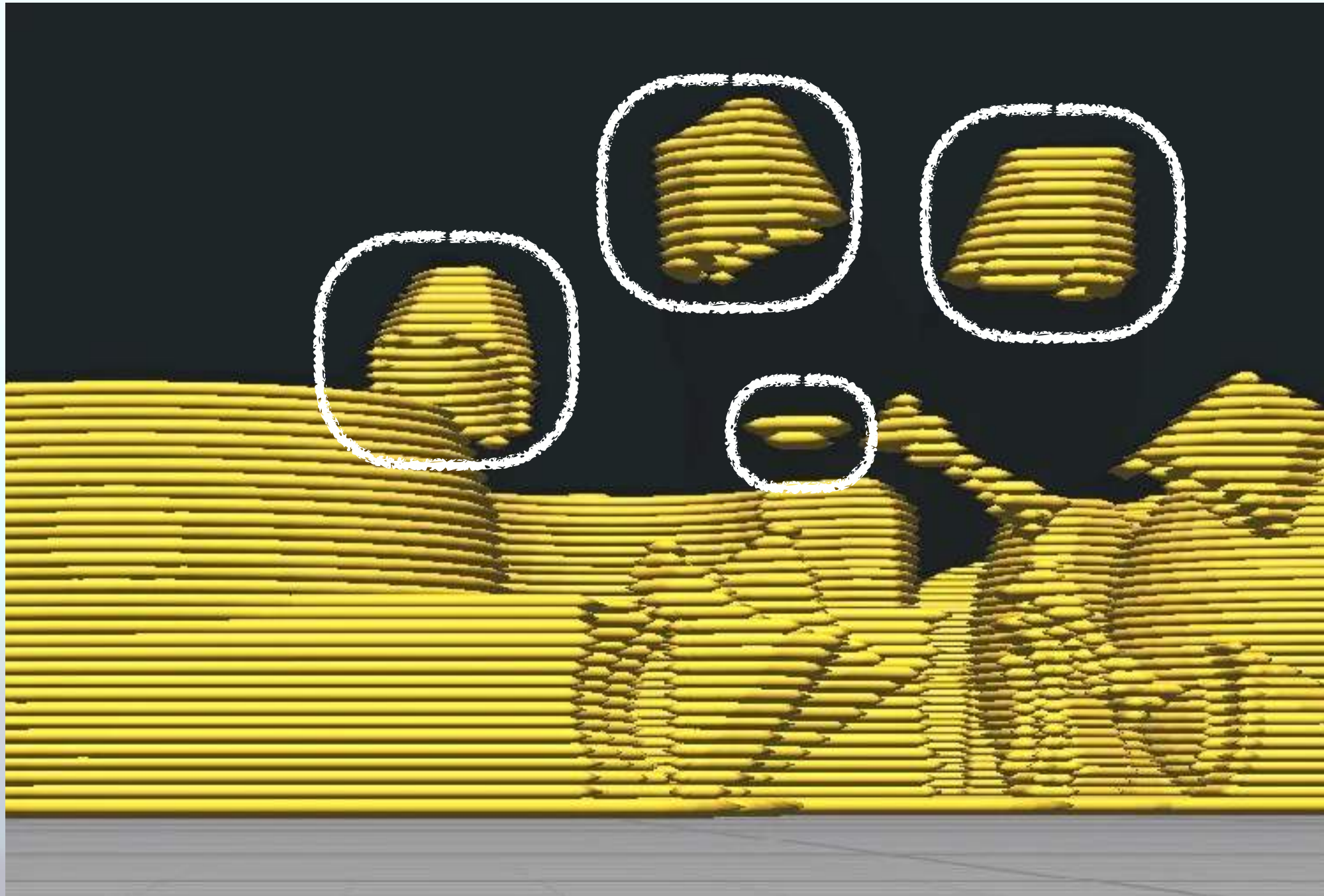
<https://www.raise3d.com/academy/when-and-how-to-use-3d-printed-support-structures/>



<https://www.gambody.com/blog/best-tips-on-how-to-3d-print-without-supports/>

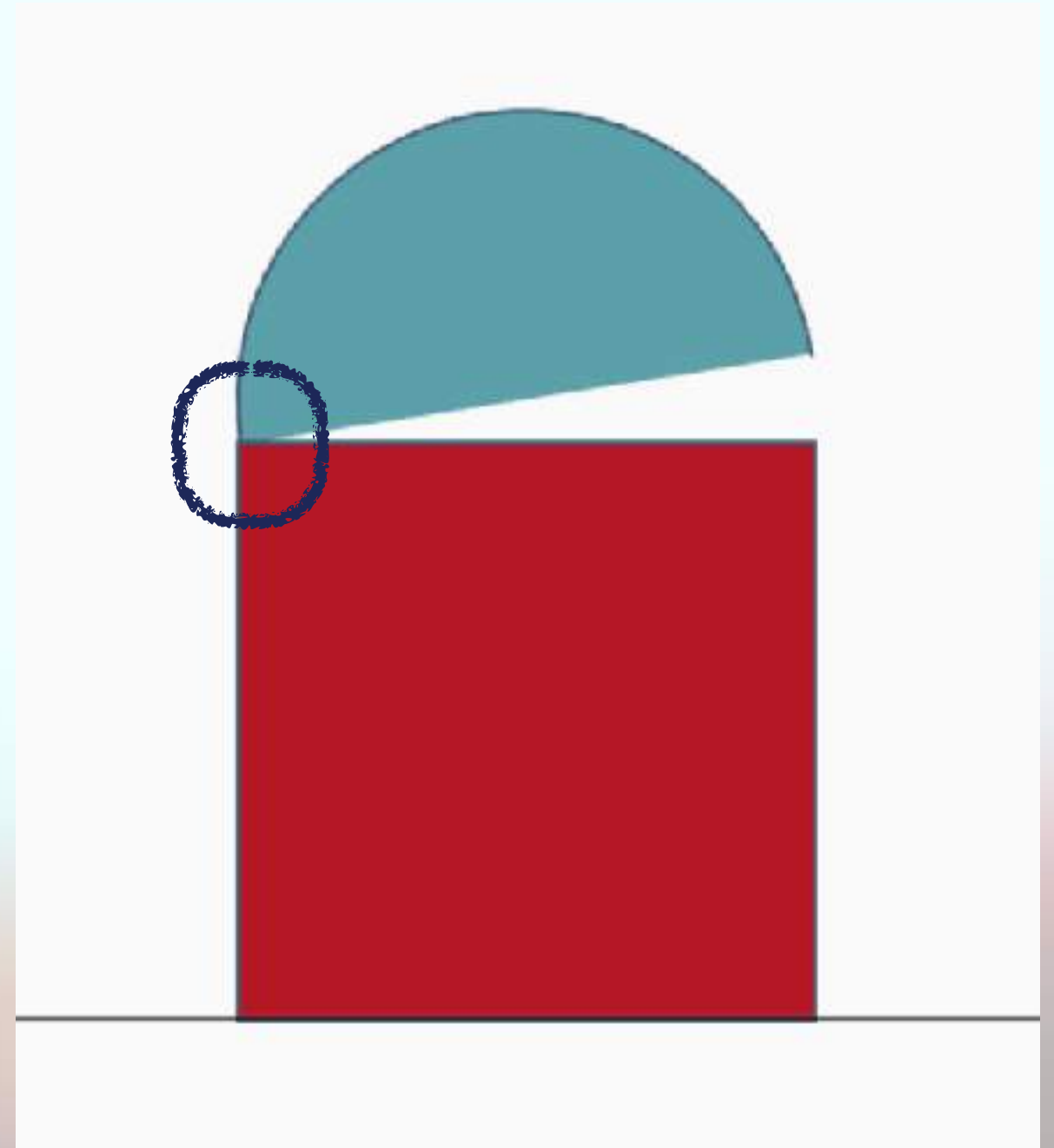
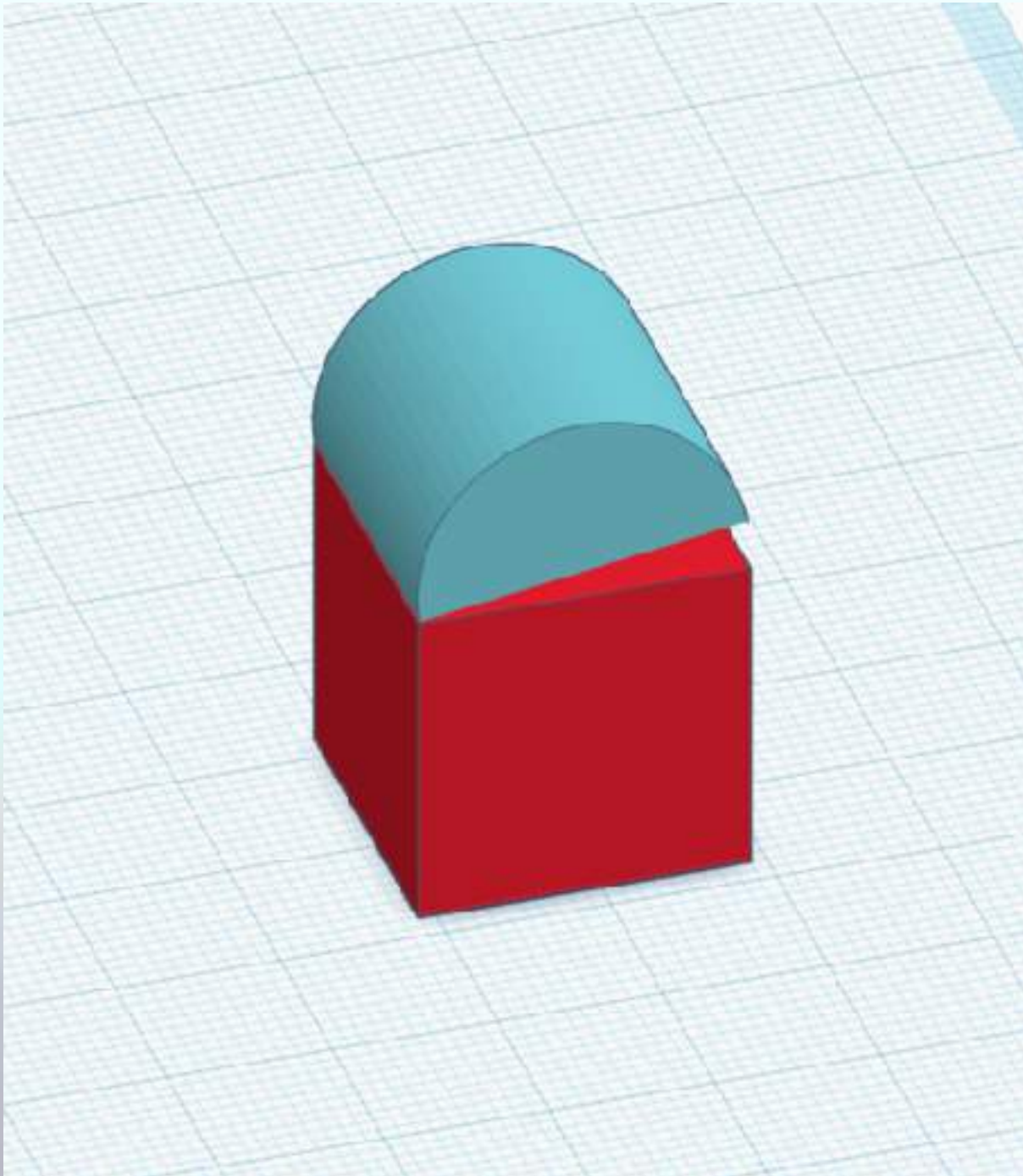
# General tips

# No floating objects

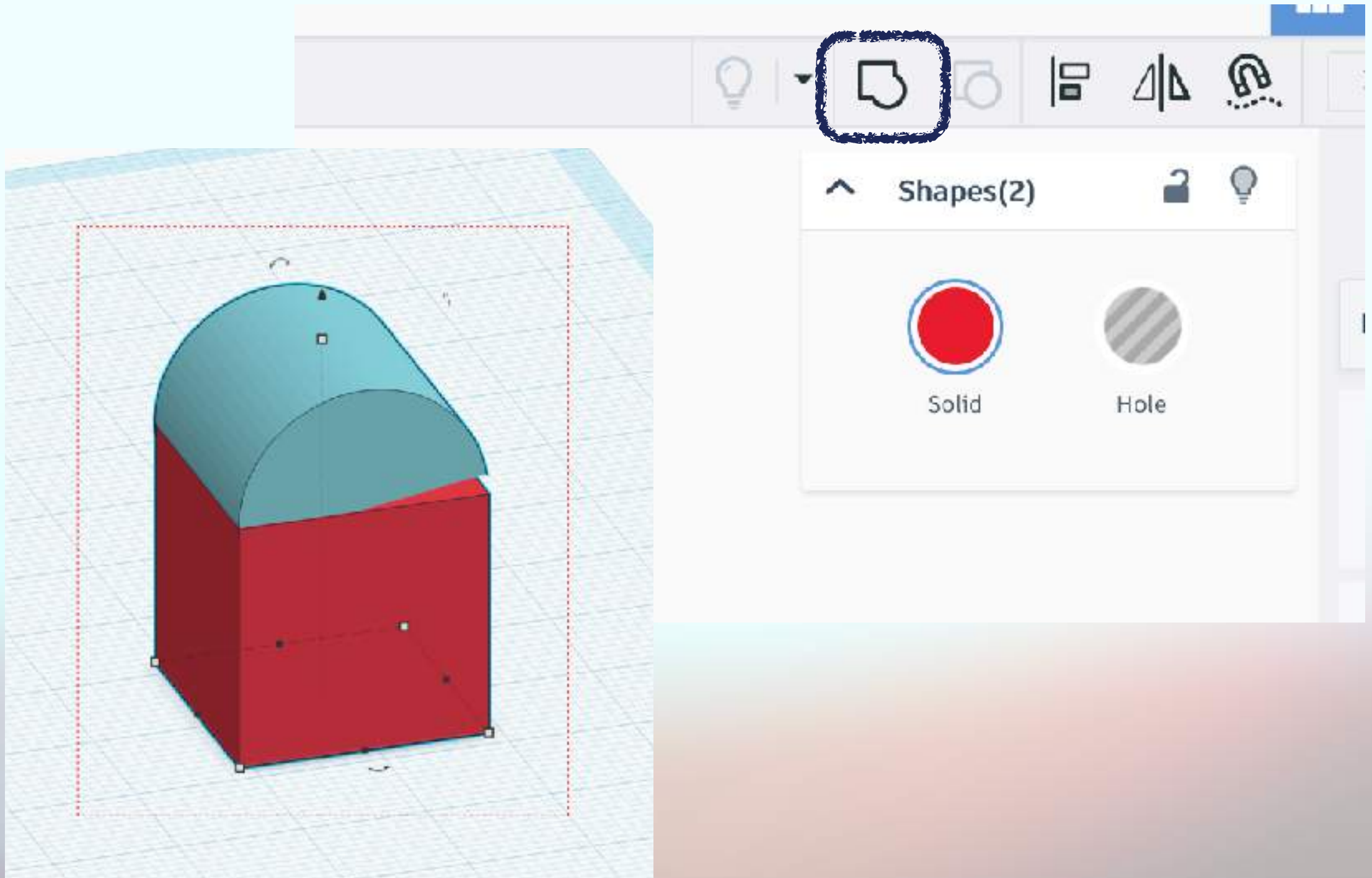




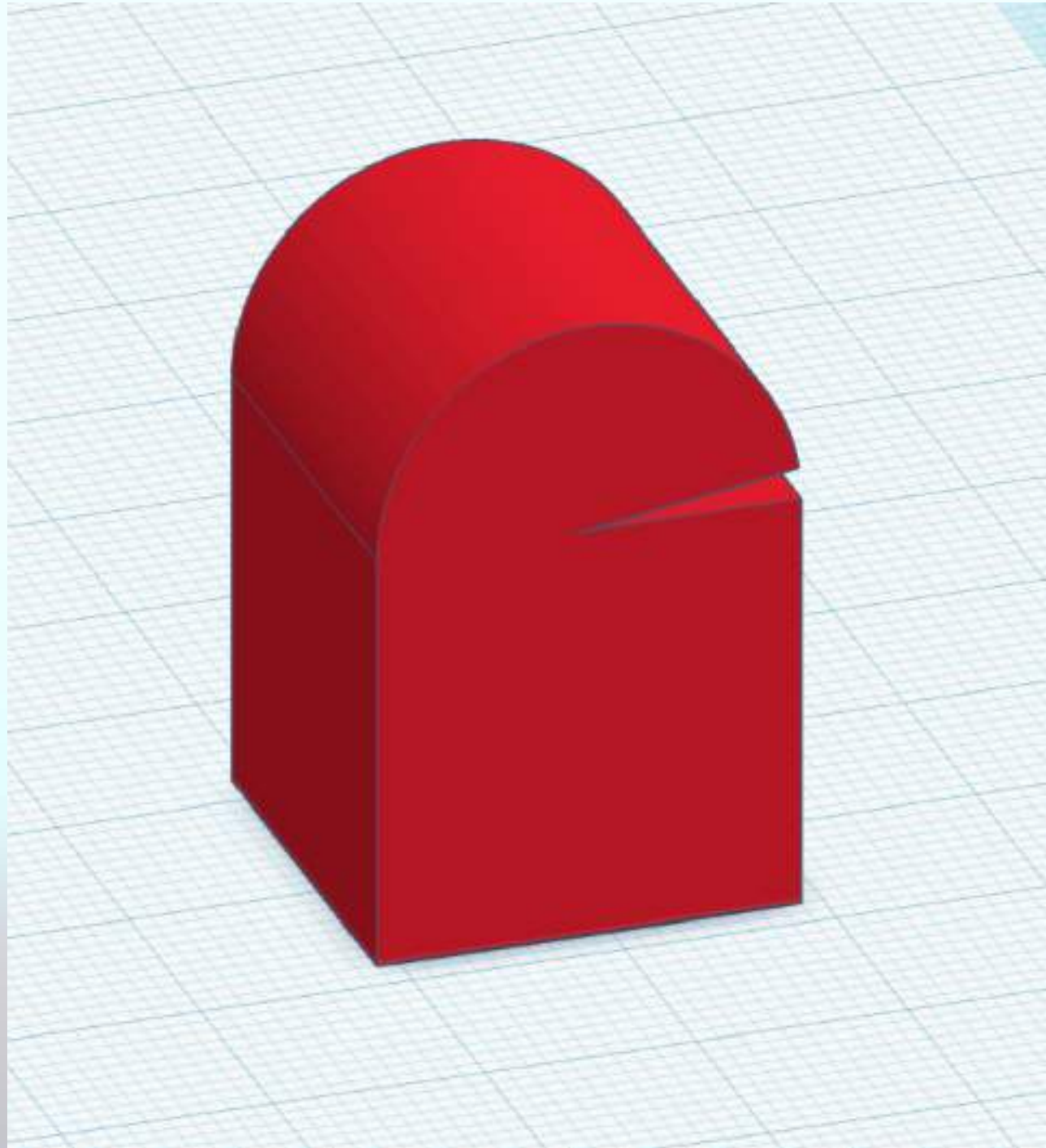
# Combining your shapes



# Combining your shapes



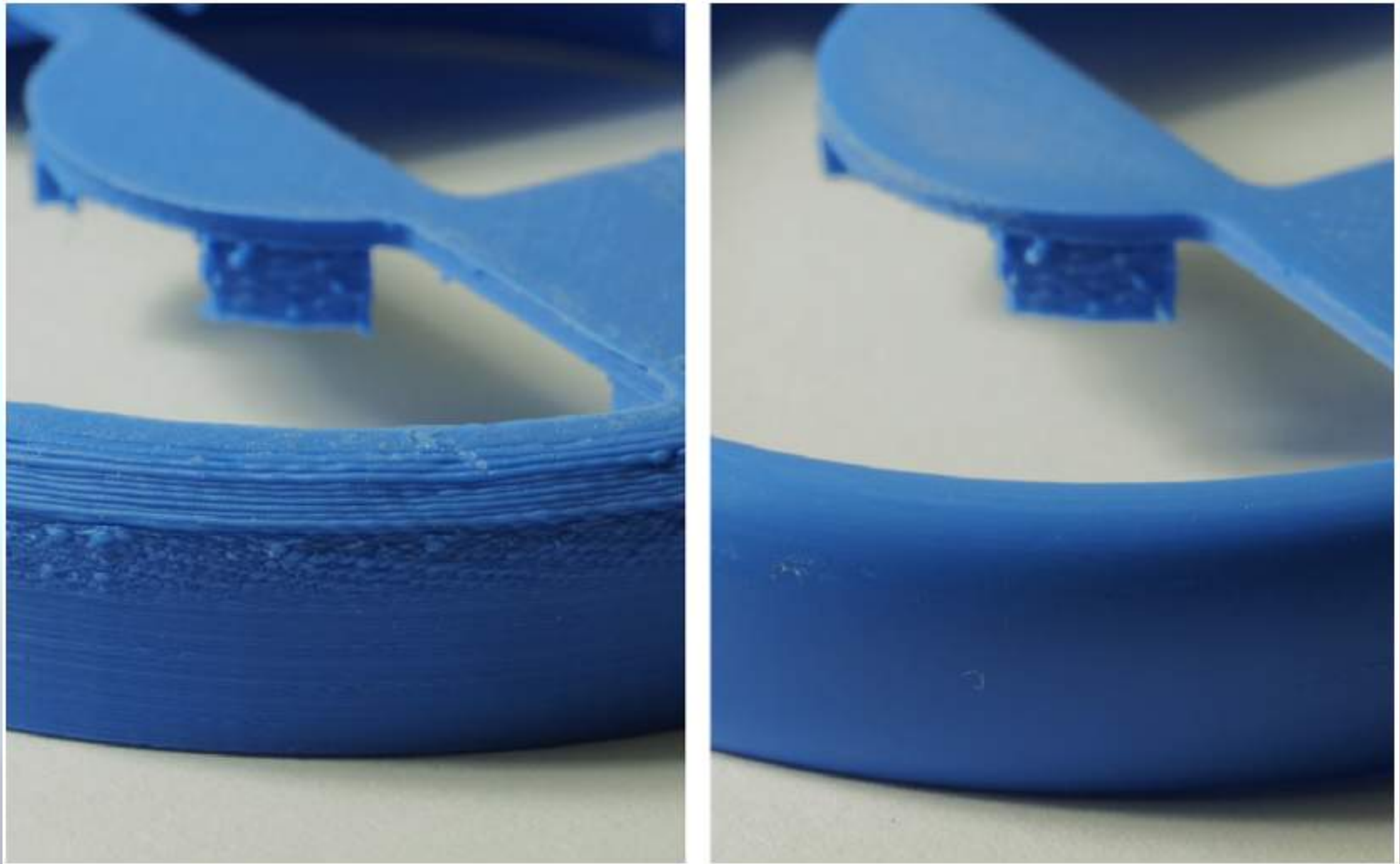
# Combining your shapes



# Post processing methods

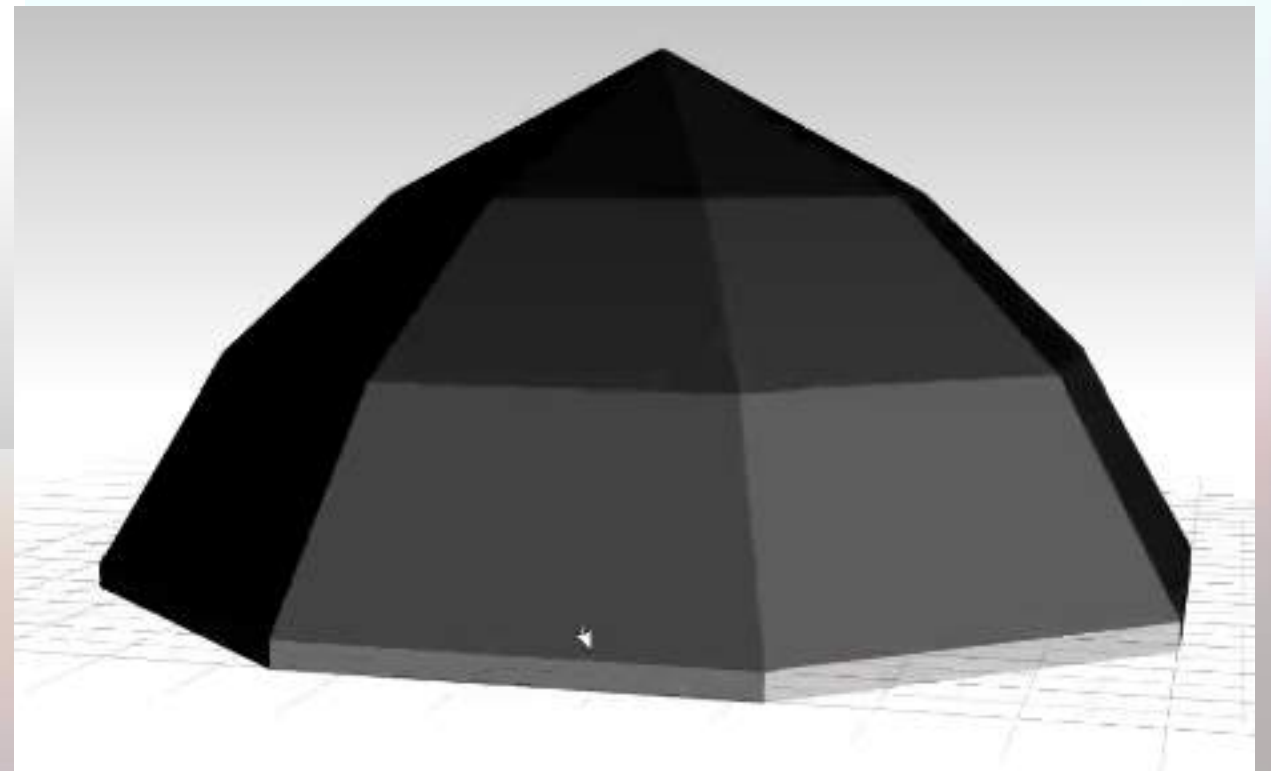
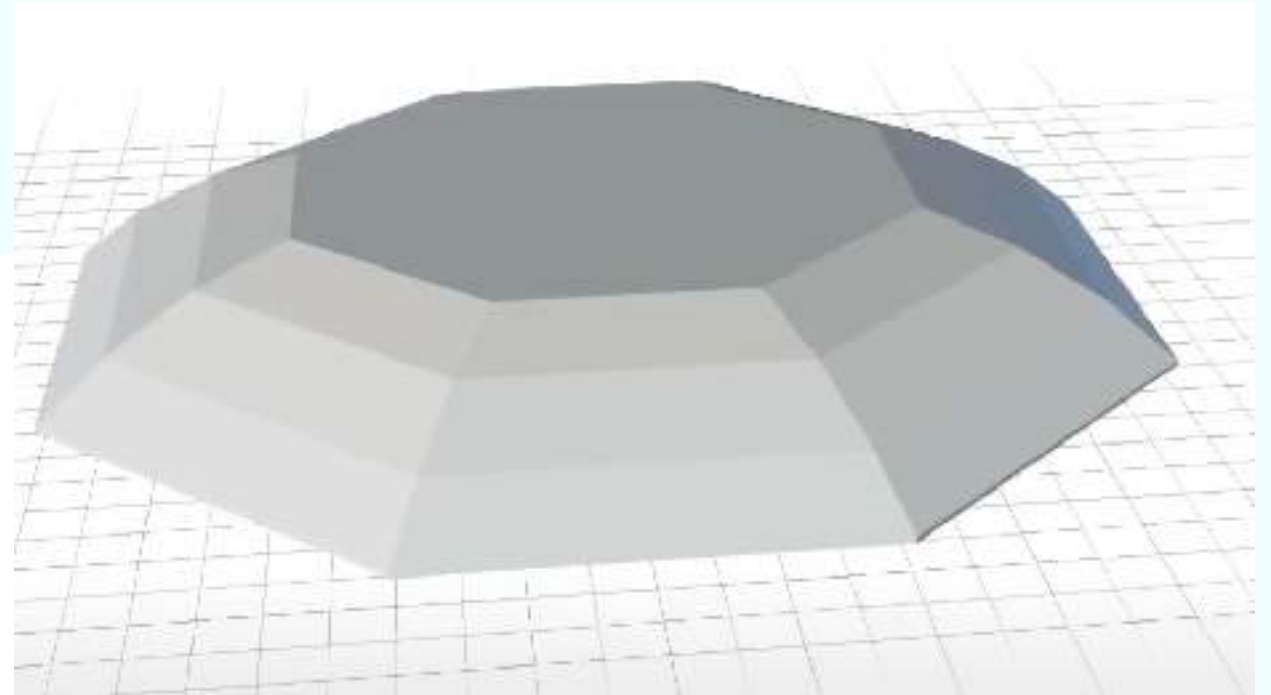
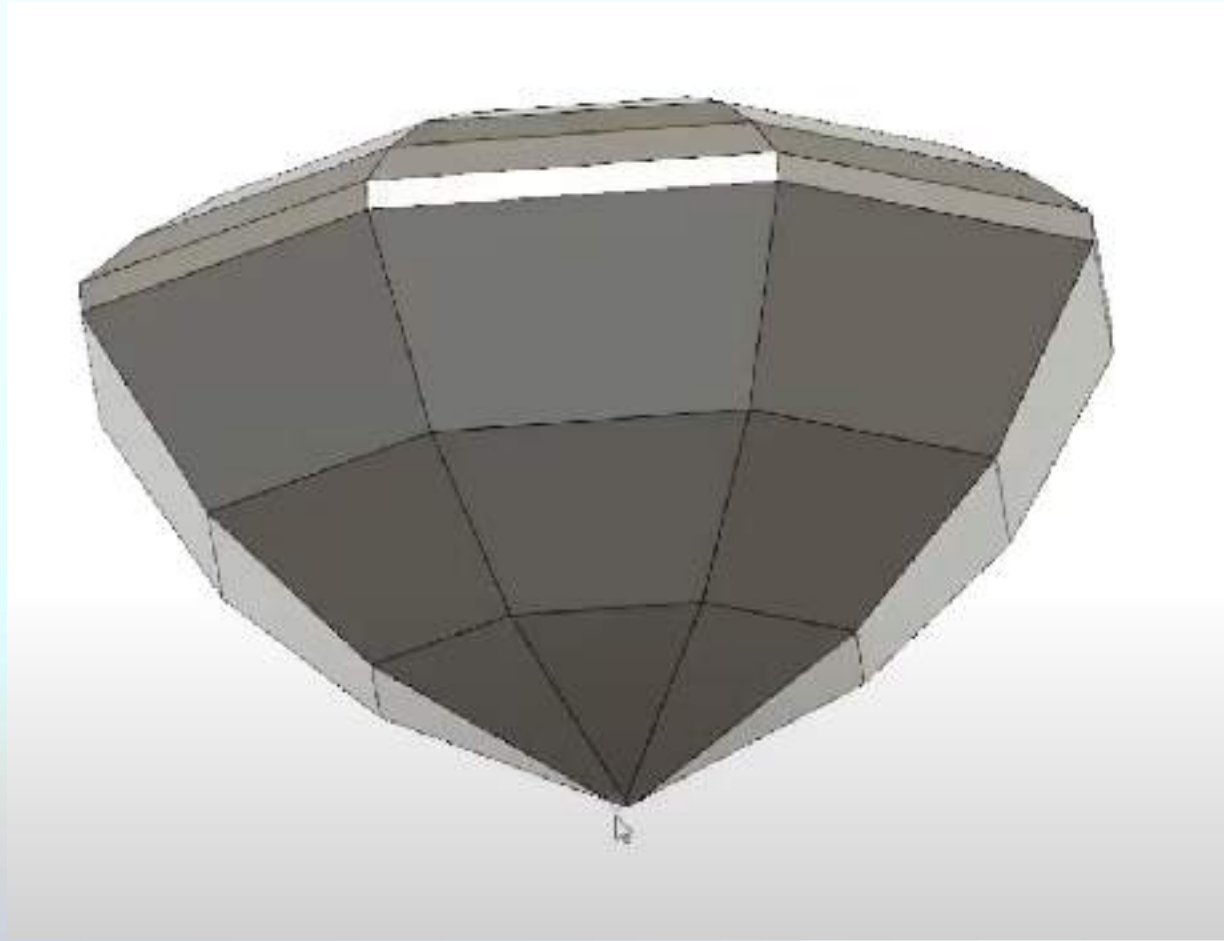


# Using sand paper



<https://3dprint.com/113714/sandpaper-3d-printed-parts/>

# Separating shapes to reduce supports





# Using hot air gun



[https://www.youtube.com/watch?app=desktop&v=3L3vOS\\_5xQ8](https://www.youtube.com/watch?app=desktop&v=3L3vOS_5xQ8)