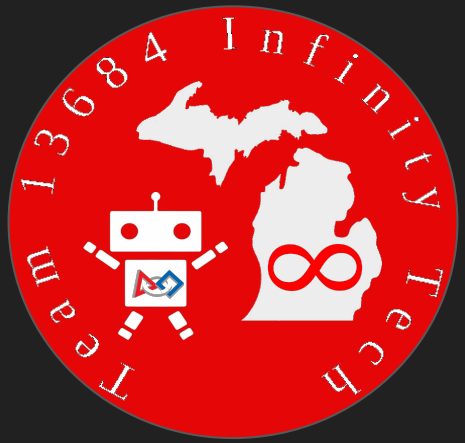


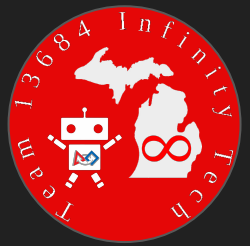
Build Team

3D Printing Tips & Tricks

Overview

We'll review the following:

- 3D Printers Access
- Computer-Aided Design (CAD) to Slicer
- Materials
- Using available STL files
- Common design considerations



3D Printing Access

Where can I get parts 3D printed?

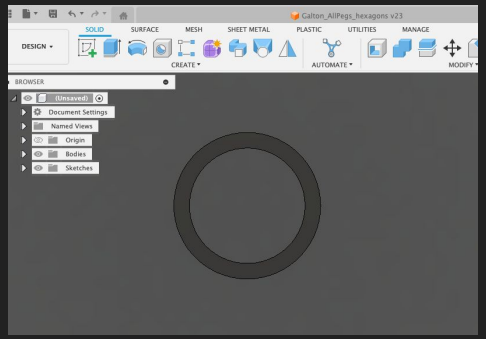
High school supports Plymouth-Canton Community Schools (P-CCS) FIRST Tech Challenge (FTC) Teams

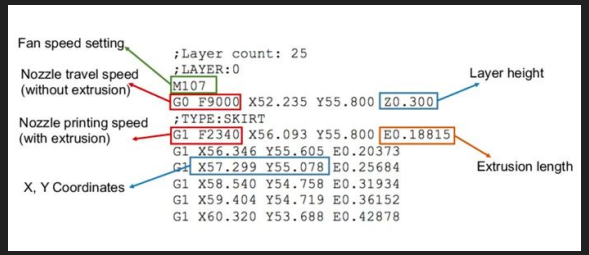
Online Services

Purchase

Computer-aided Design (CAD) to a Slicer

What is a slicer?

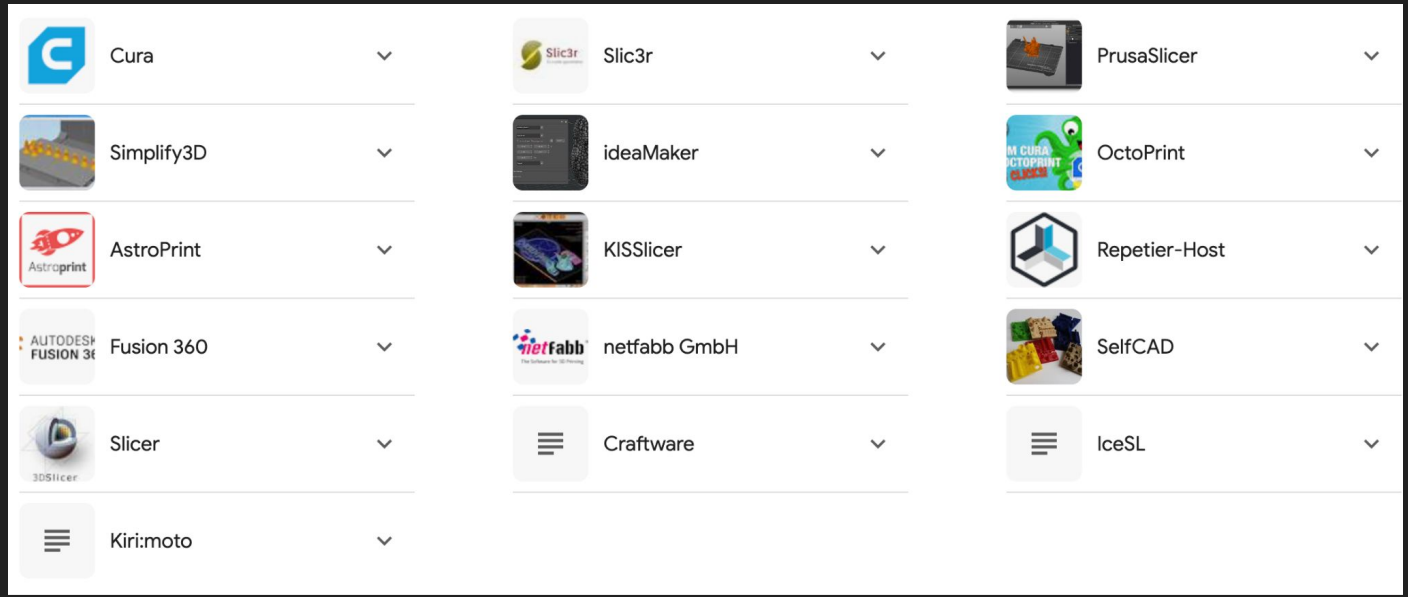




A slicer translates CAD so the 3D printer can lay down the filament

Computer-aided Design (CAD) to a Slicer

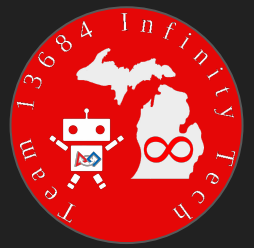
Slicers available to download



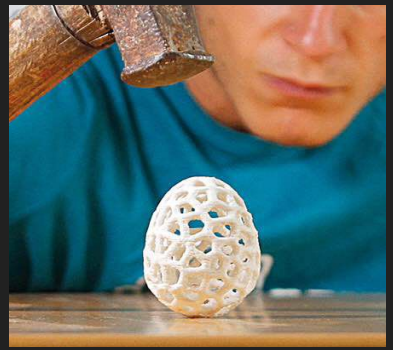
Computer-aided Design (CAD) to a Slicer

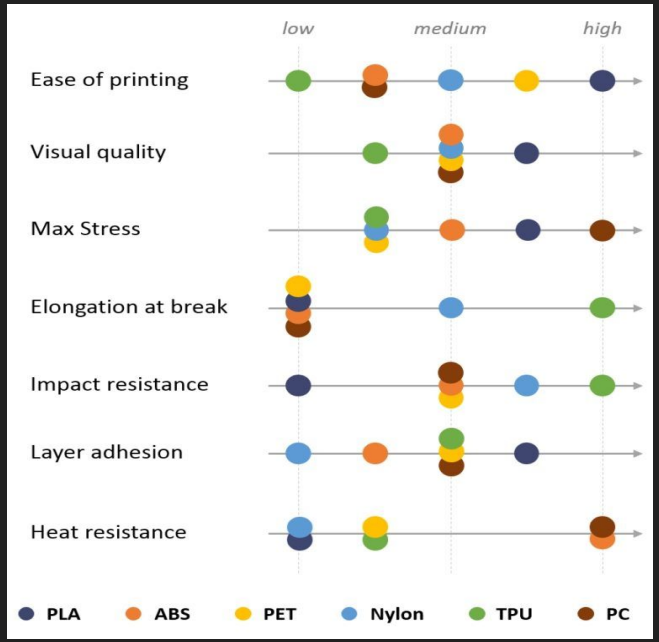
Slicer Settings for Fast, Accurate, and Strong Prints

	Value
Nozzle Opening	0.6 mm
Infill Fill Pattern	Adaptive Cubic
Elephant Foot Compensation	0.4 mm
Perimeters	3
Support Material (Style)	Organic
Bridge Flow Ratio	0.95 (95%)



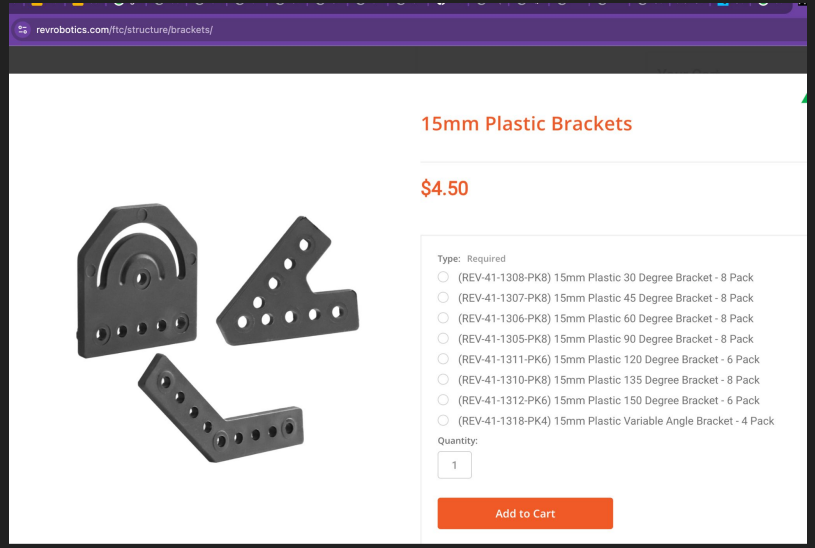
3D Filaments Materials and Properties

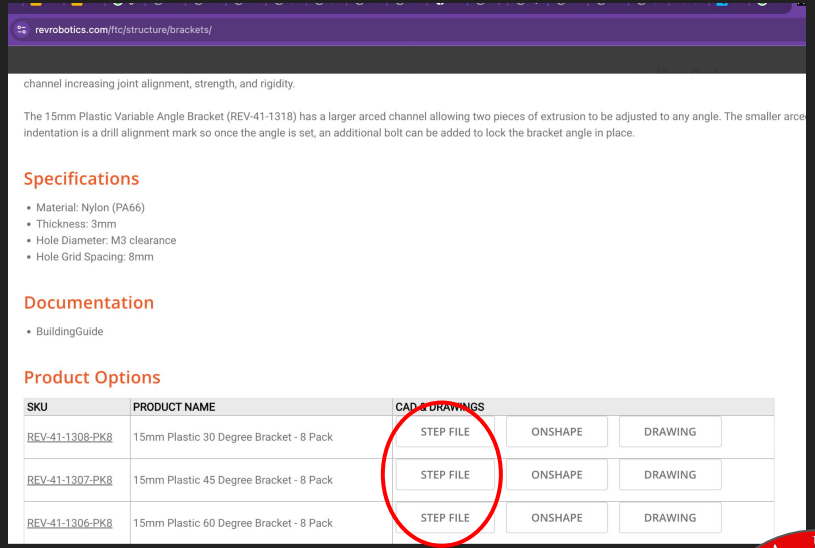




Takeaway: Determine the use then decide what material works best

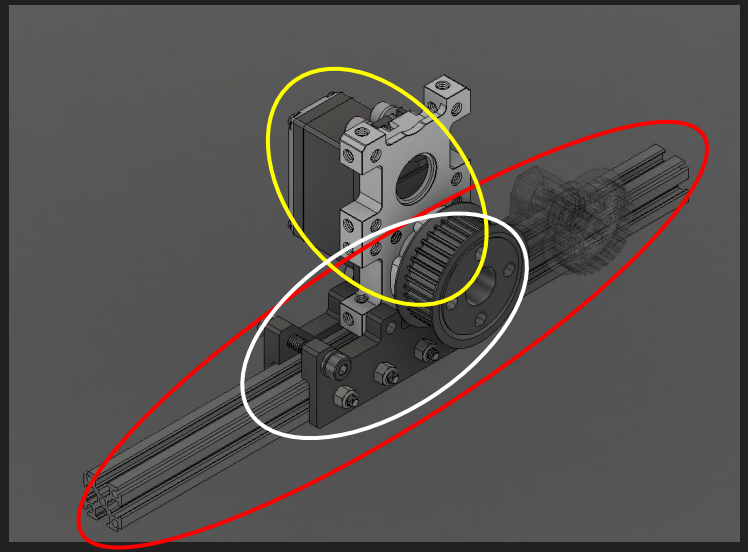
Existing CAD / Step Files





Takeaway: Can directly print parts, via a slicer, for quicker assessments while an order is being delivered

Existing CAD / Step Files

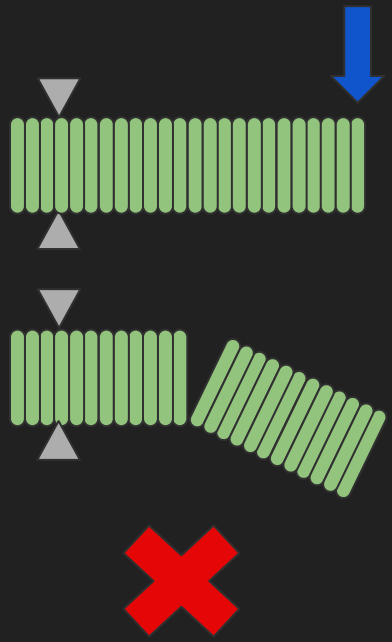


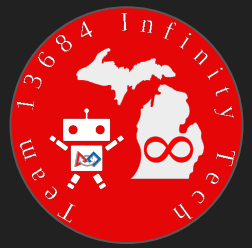
GoBilda
REV
Adapter

Takeaway: Can print nearly any adapter using components from two different companies

Considerations When Designing

What is the direction of the force & how can I print it?





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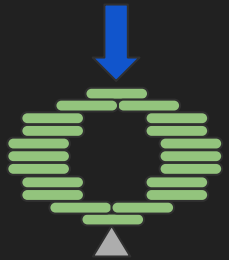
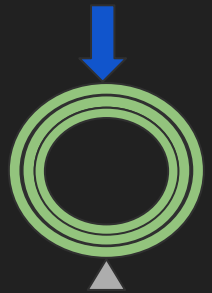
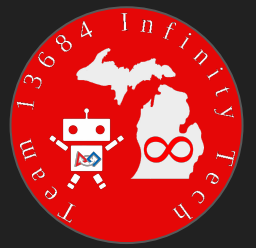
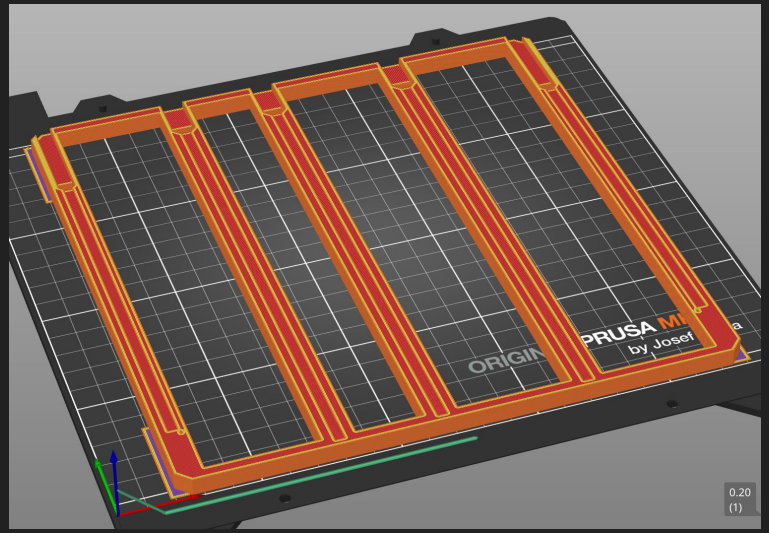
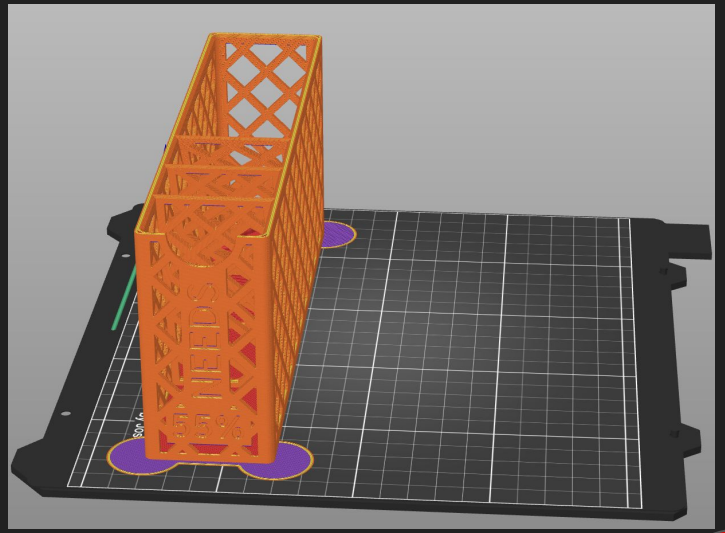






Common Considerations: Print Time

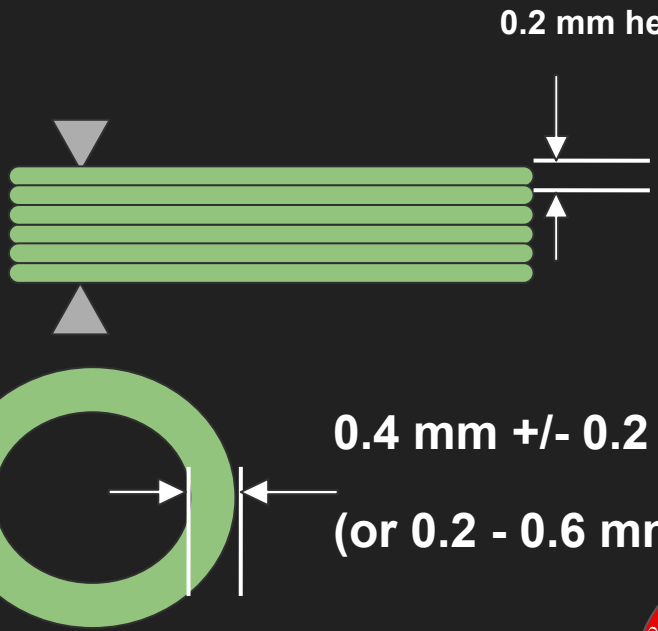




Takeaway: Prints requiring higher z-axis positions take longer to print

Common Considerations: Tolerances & Nozzle Width

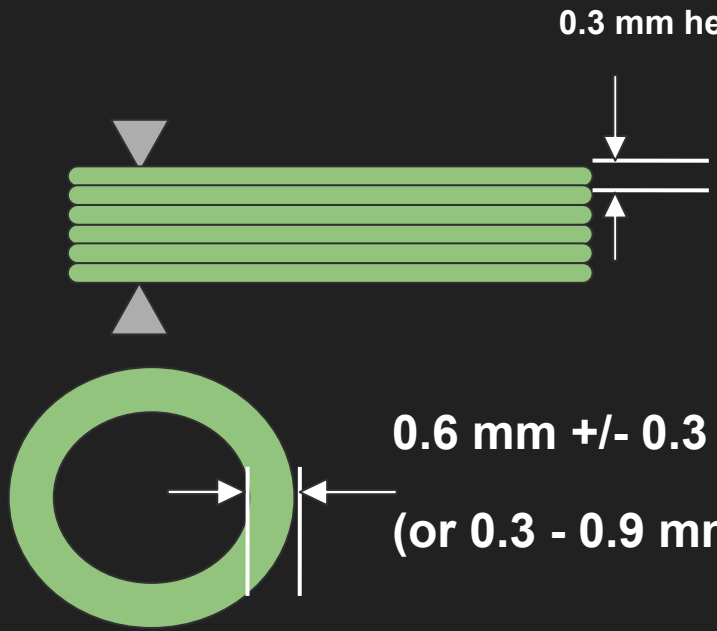
Nozzle width → ← 0.4 mm



Team 13684 Infinity Tech

Common Considerations: Tolerances & Nozzle Width

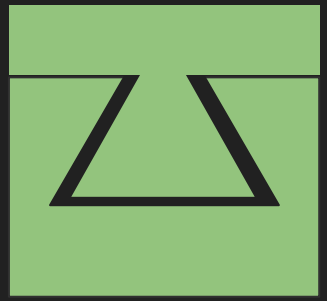
Nozzle width → ← 0.6 mm



Team 13684 Infinity Tech

Common Considerations: Tolerances & Nozzle Width

Examples Gaps for Joints with a 0.6 mm nozzle



Dovetail: 0.5 mm gap

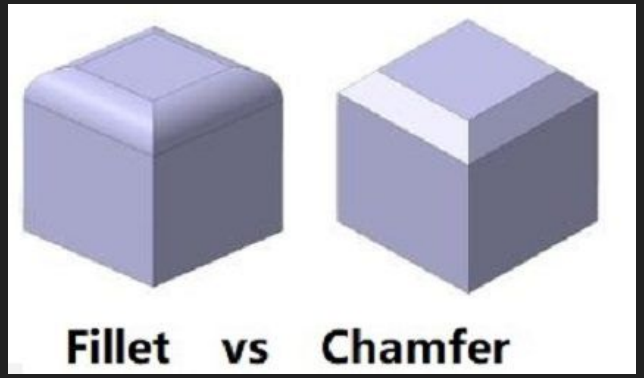
Hole: 0.4 mm gap

Takeaways:

- Tolerance is roughly one half (½) of the nozzle width
- If possible, we recommend a 0.6 mm nozzle as a good balance of print time, strength, & appearance

Common Considerations: Chamfer vs. Fillet

When to fillet and chamfer in 3D printing?



Fillets:

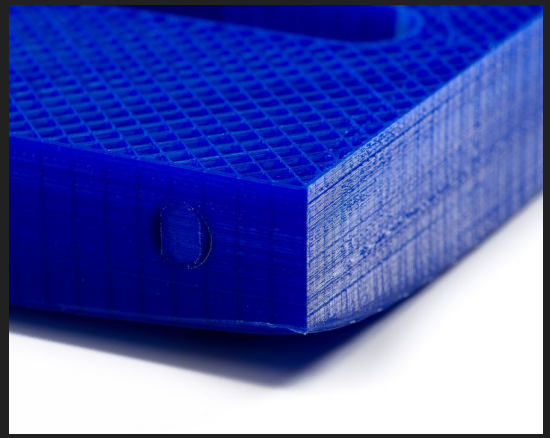
- Pros
  - Soften corners that face the sides
  - Reduces stressors in corners
- Con
  - Prints can be messy and/or misprint

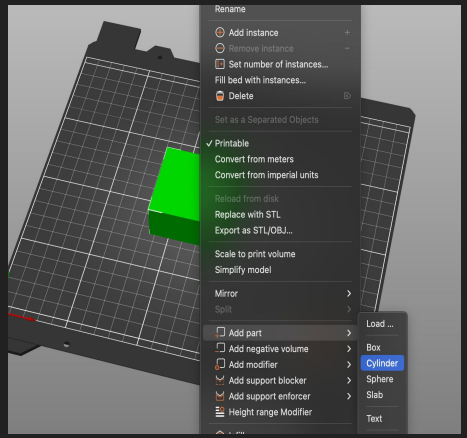
Chamfers:

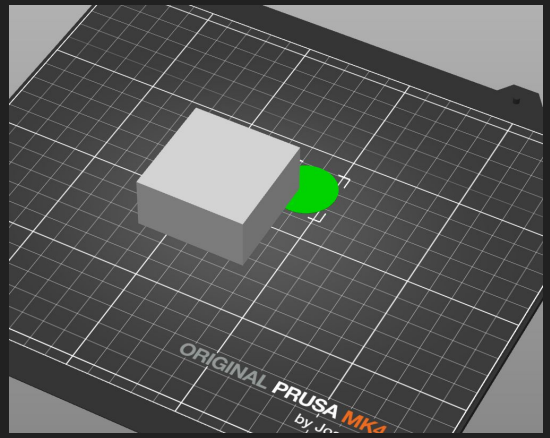
- Pros
  - Ease for assembly
  - Cleaner prints
- Con
  - No stress reduction

Common Considerations: Lifting corners

Ways to address corners lifting off the build plate



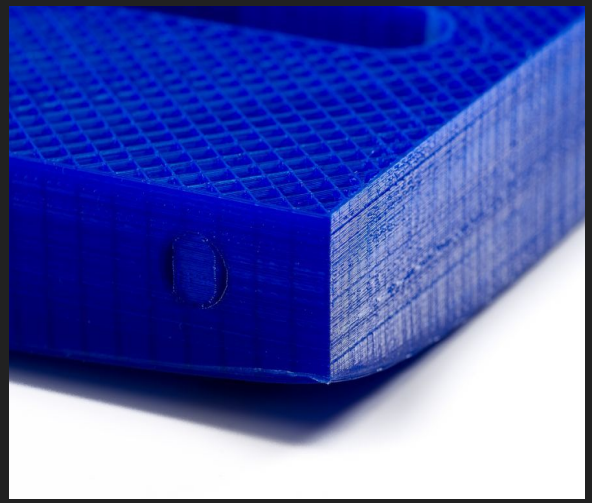


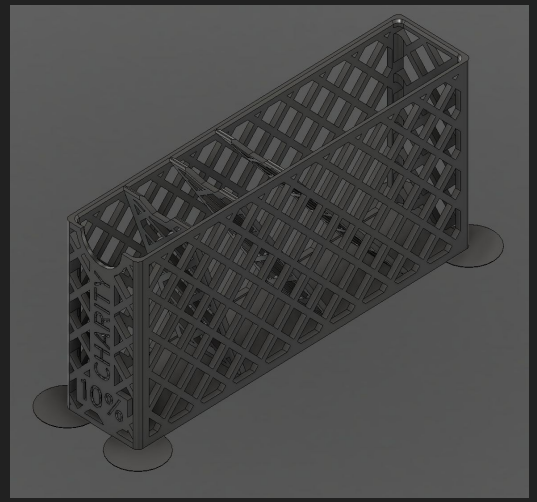


Takeaway: “Mickey ears” is a targeted way to reduce corners lifting

Common Considerations: Lifting corners

Ways to address corners lifting off the build plate

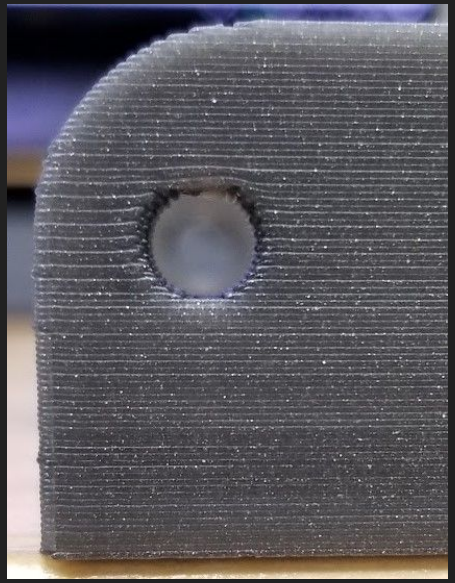


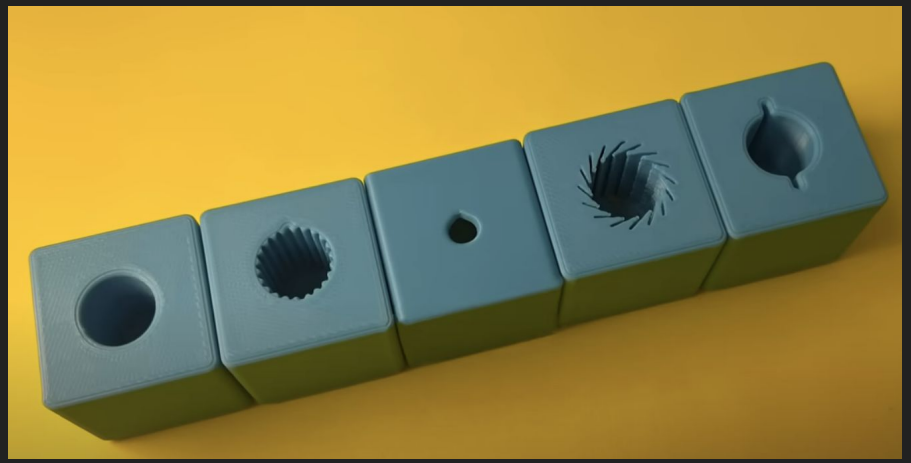


Takeaway: “Mickey ears” is a targeted way to reduce corners lifting

Common Considerations: Printing holes on side of object

Ways to make holes that can accept cylindrical objects

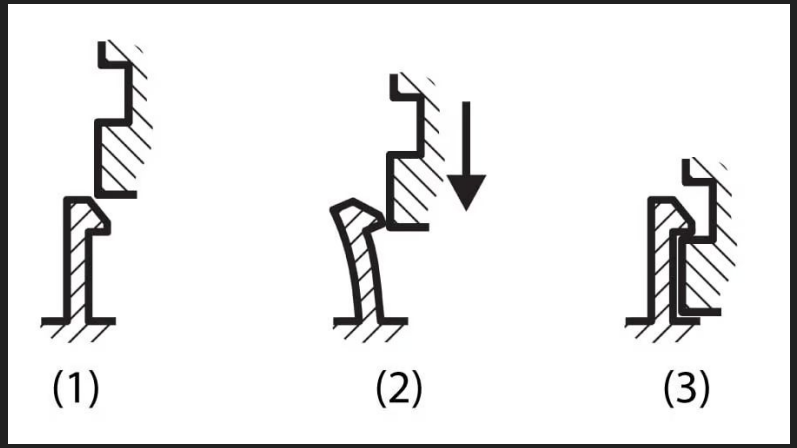




Takeaway: Apply modifications for side holes to keep the hole circular

Common Considerations: Attaching two parts together

Ways to 3D print attach two components together mechanically



Snap fit

Dovetail

Summary

- How to go from CAD to slicer to 3D print
  - Recommended slicer settings
- Uses and materials
- Leveraging available STL files from vendors
- Common design considerations