

Metal FDM Pictures

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AMLDC Intern Summer 2023

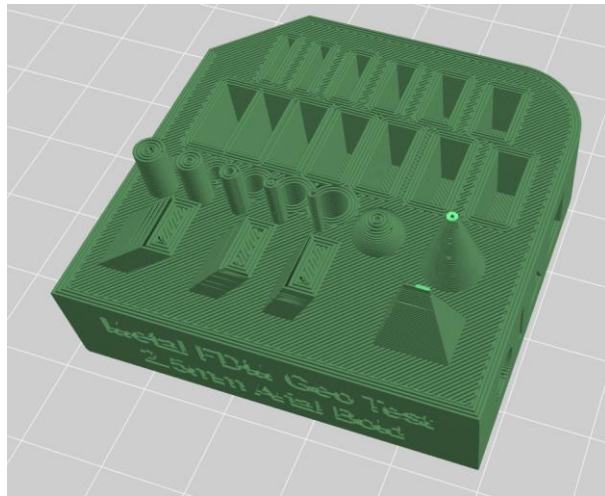


ENGINEERING YOUR SUCCESS.

Printing and Green Parts

Print 1: Geometry Test

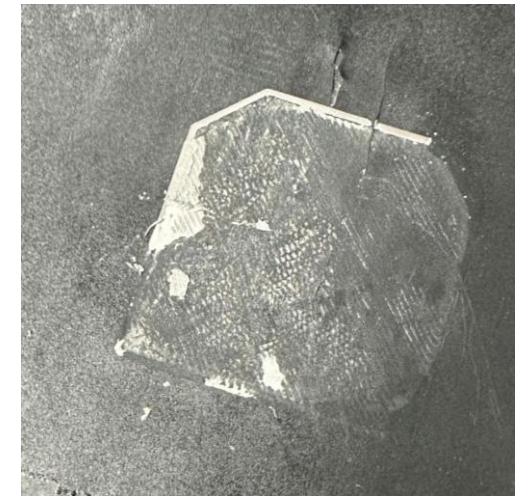
Sliced preview of the print



Near-finished print, notice warping and crumbs

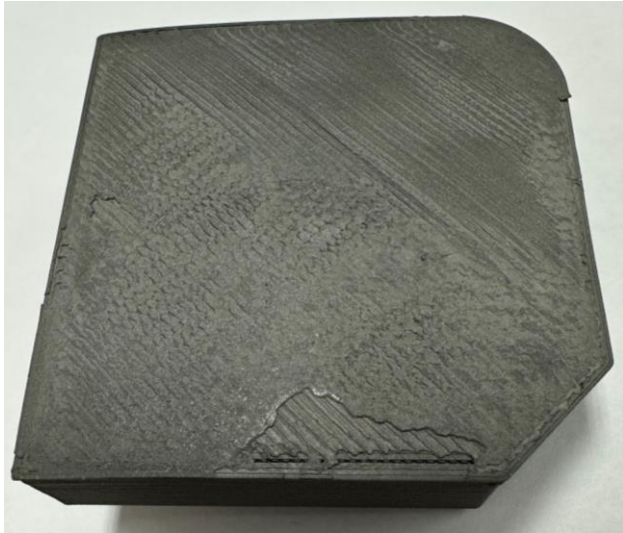


Base layer remnants stuck to build plate

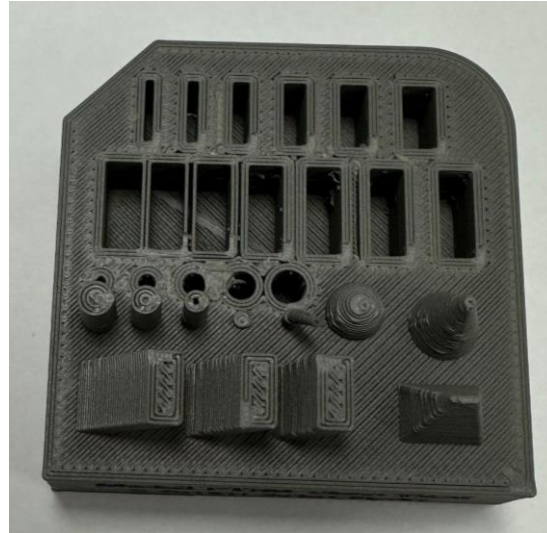


Print 1 cont.

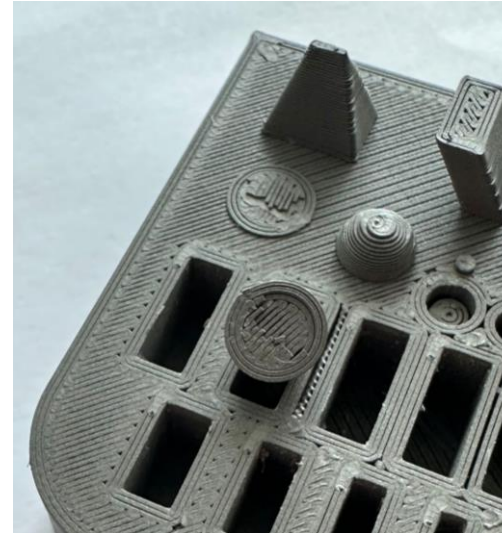
Bottom view showing poor first layer and delamination



Top view showing features with only one pin missing



Multi-layer break from cone

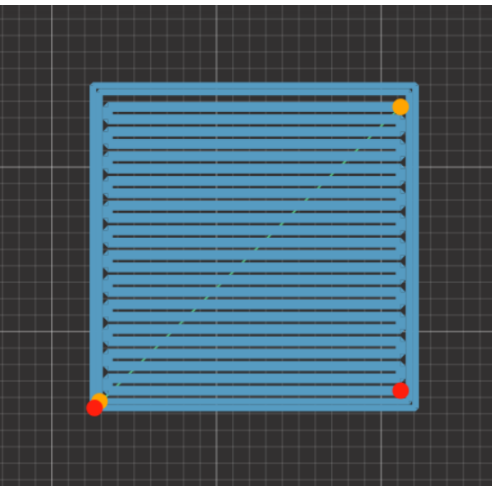


Side views (notice warping)

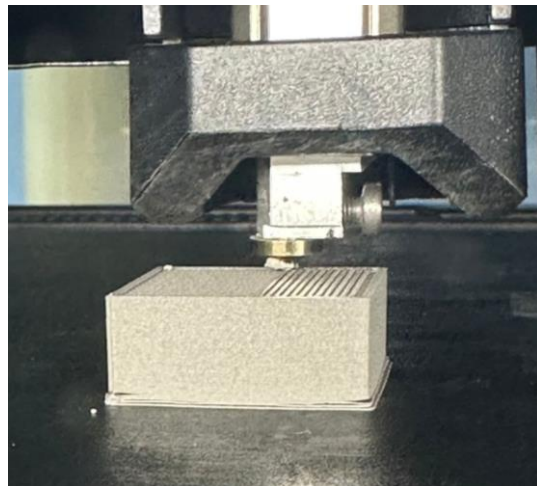


Print 2: CloudPrint Cube

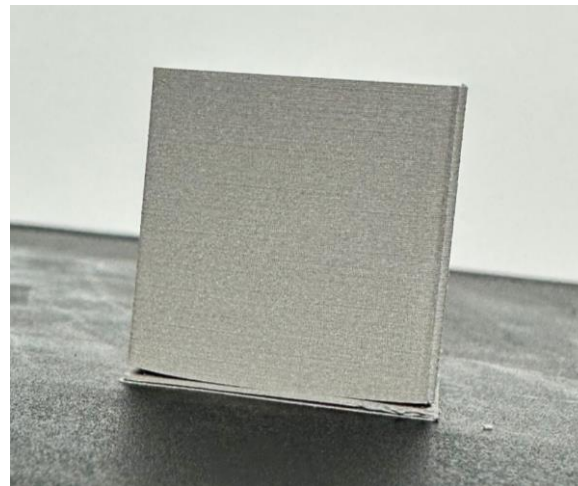
CloudPrint layer preview, notice gaps between lines and at top of part



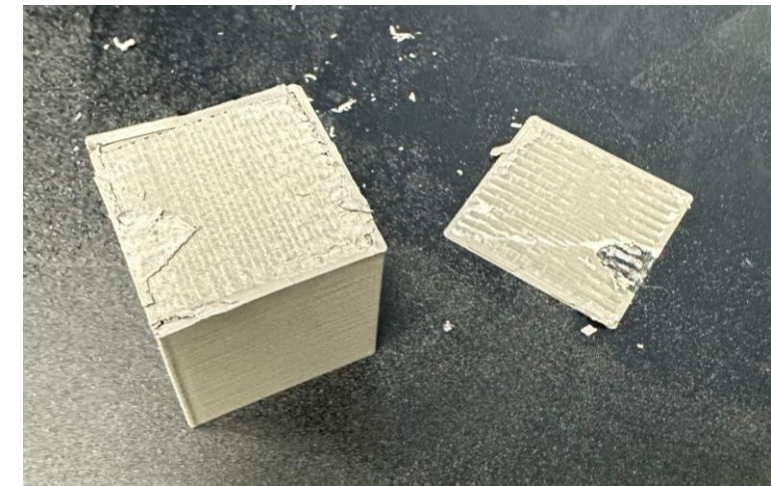
Mid-print progress, notice gap between wall and print on right side



Completed print showing delamination in base

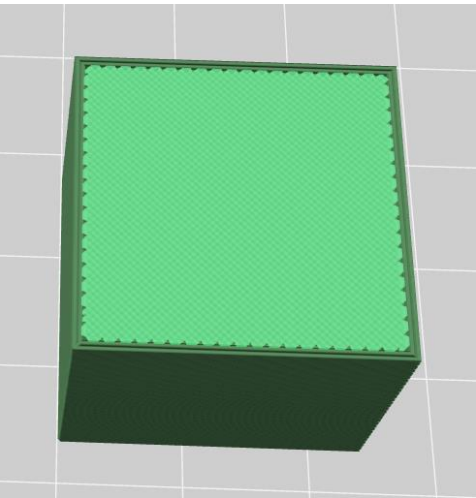


Part with full delamination and base stuck to build plate

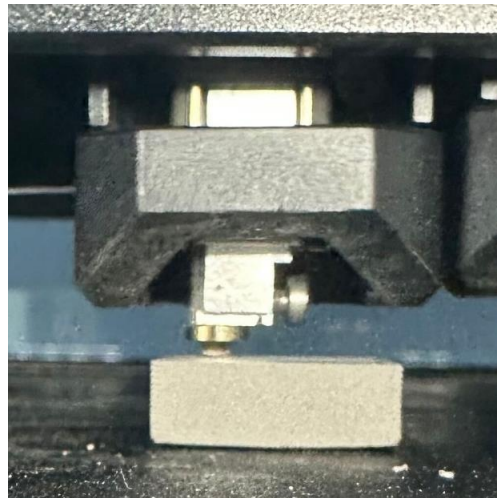


Print 3: MakerBot Print Cube

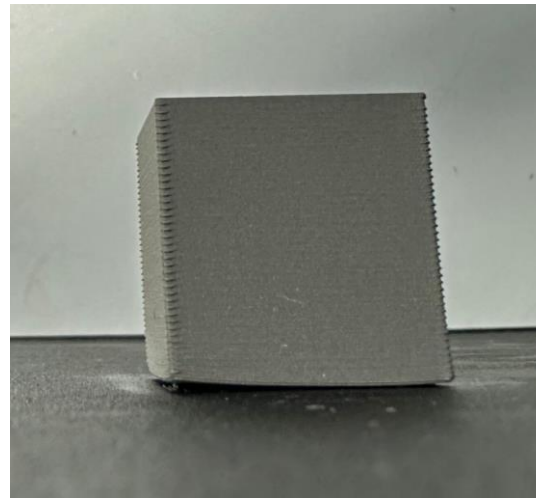
Slicer preview of
infill layer



Mid-print progress



Completed cube,
asymmetric warping
due to placement at
front of build plate



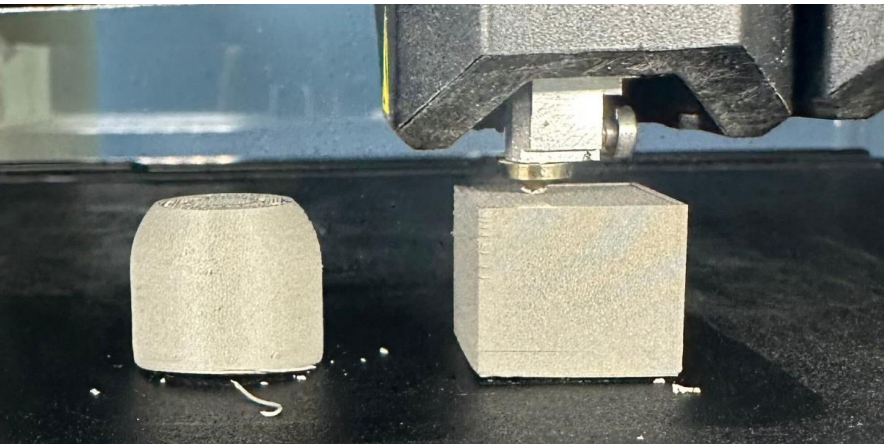
Removed print with stringy
first layer, indicating too far
away from build plate



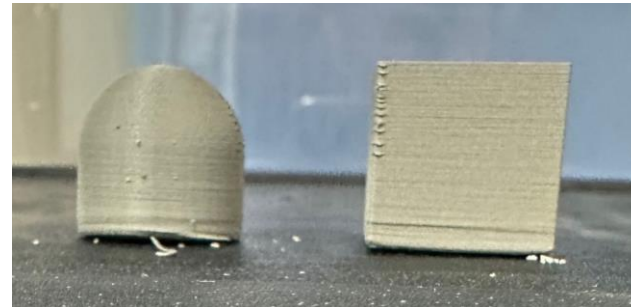
Print 4: Solid Infill Reference

Same issues as Print 3: asymmetric warping and stringy first layer

Near-finished print

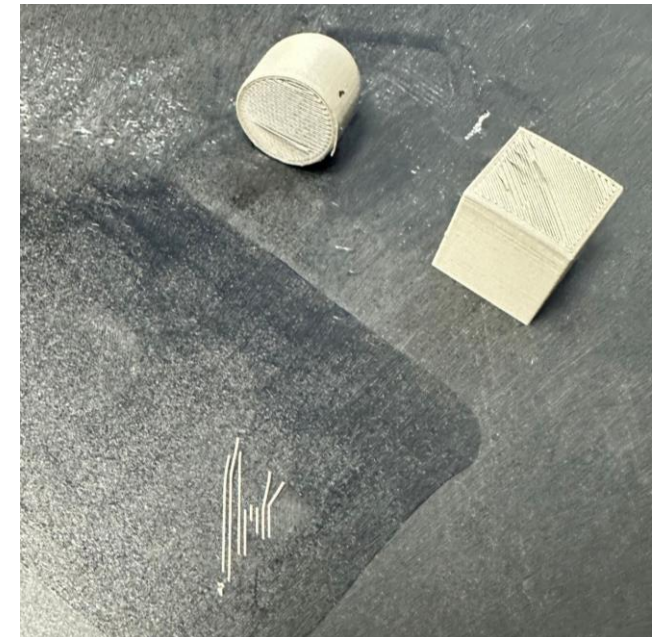
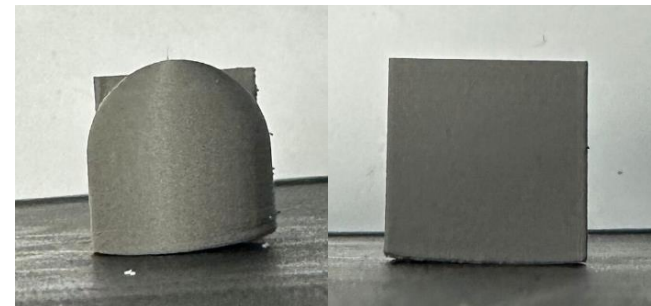


Finished front view



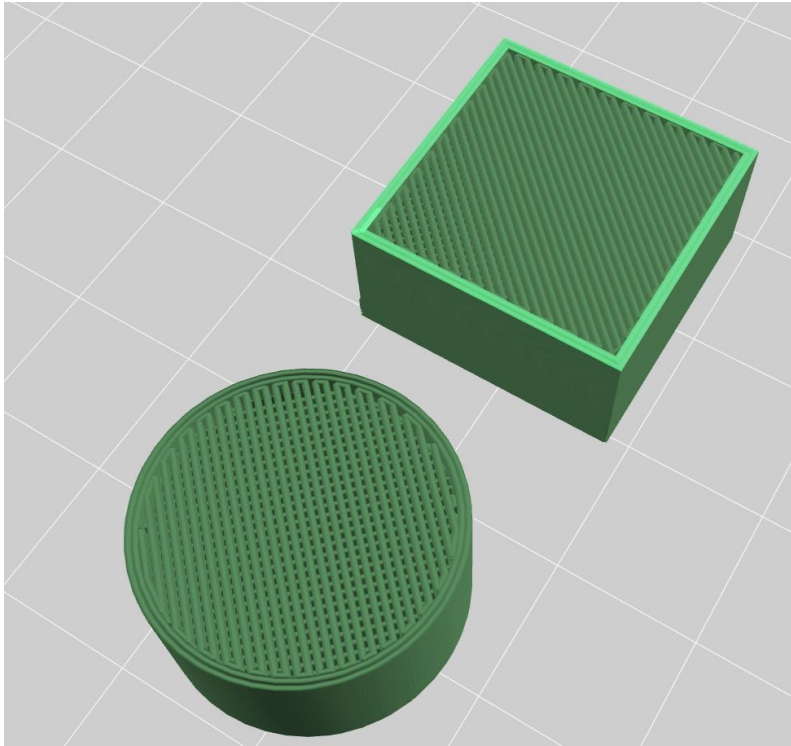
Left

Right

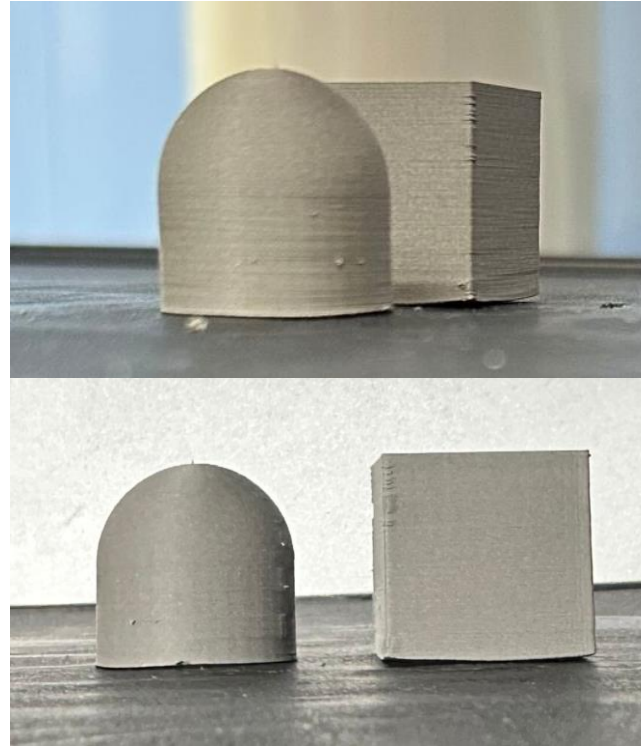


Print 5: 66% Infill Test

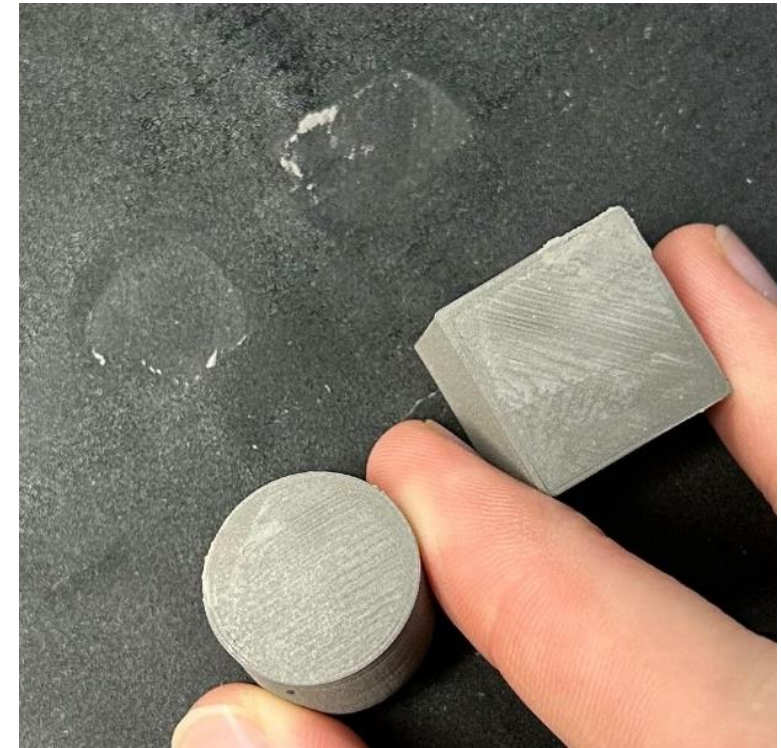
Slicer preview of infill



Finished print with minor warping

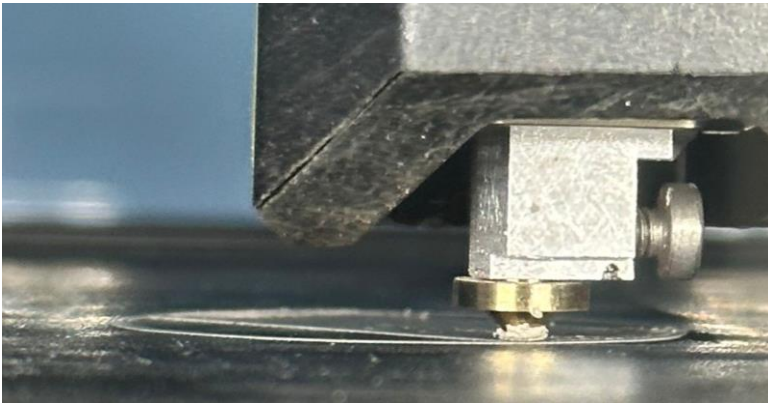


Near-perfect base layers



Print 6: Chess Rook

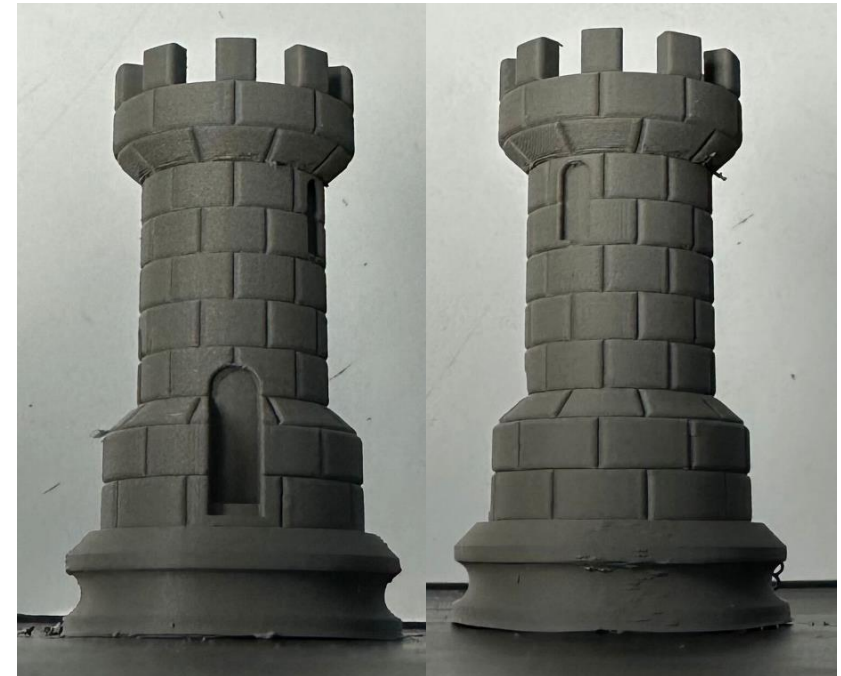
First layer being printed, minor blob forming on nozzle



Part removal residue on build plate



Finished print with clean details and minimal warping



Print 7: 40% Infill Test

Sliced preview of infill

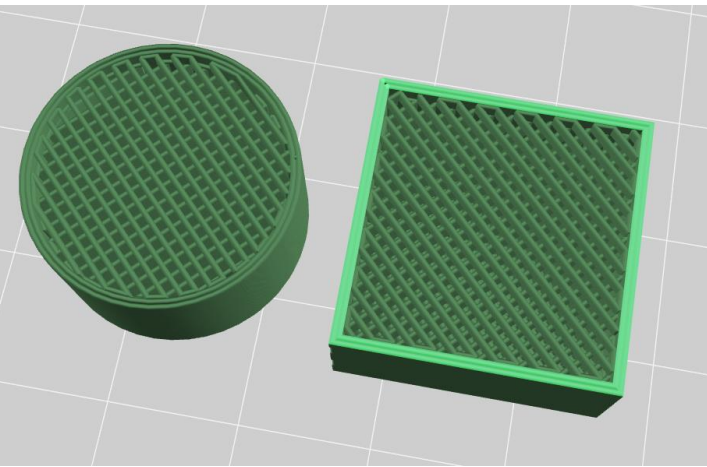
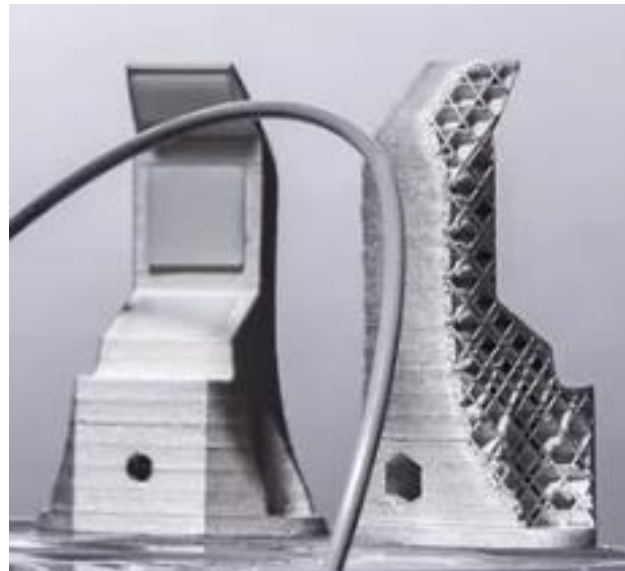
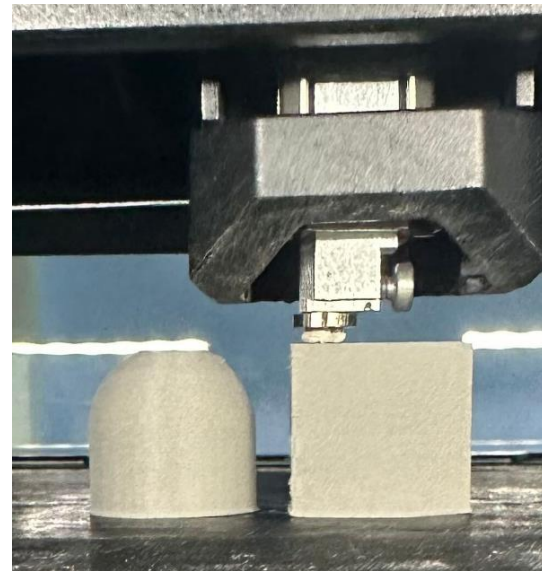


Image of infill from BASF promotional material



Near finished print with no warping

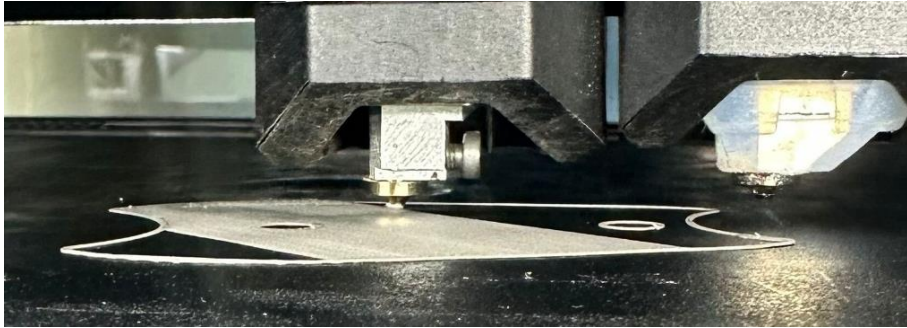


Part removal residue on build plate



Print 8: Spur Gearset and Pyramid

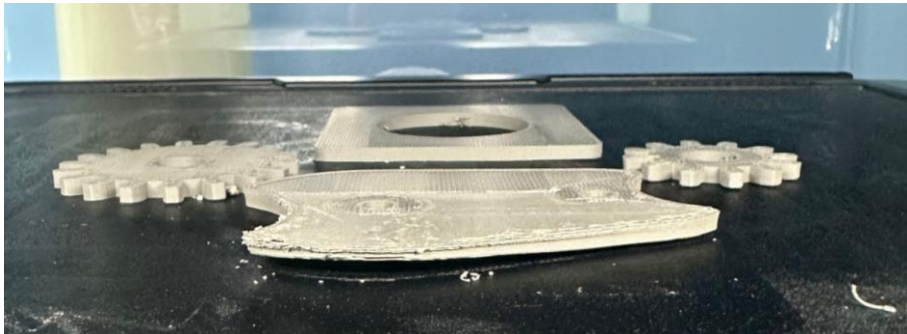
First layer printing



Print when leaving work



Print found paused the next morning



BASF Pyramid
inspiration from video

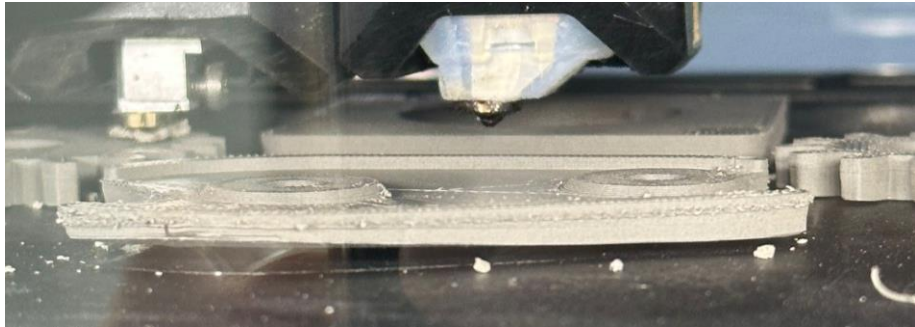


Error message the next morning

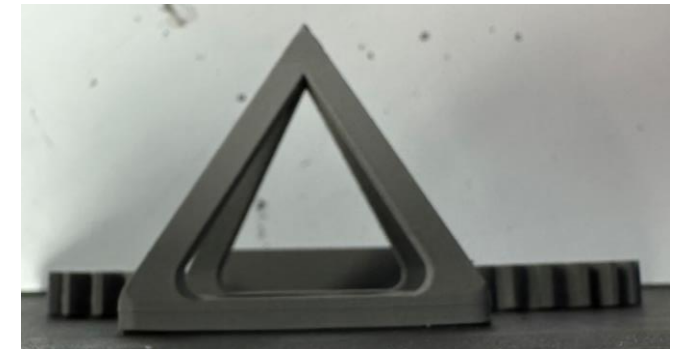
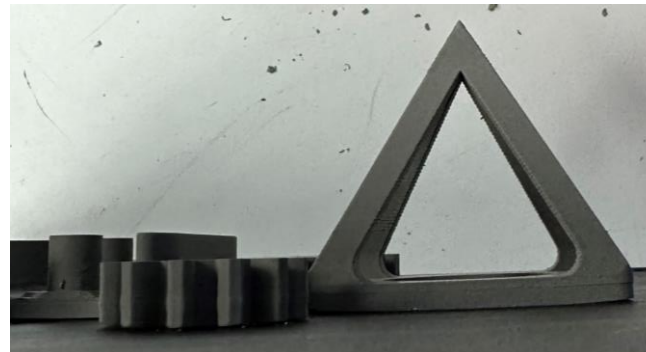
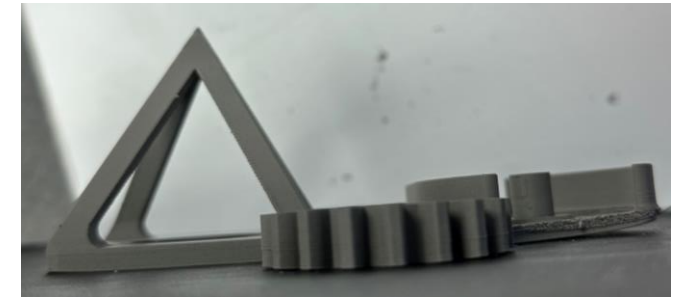
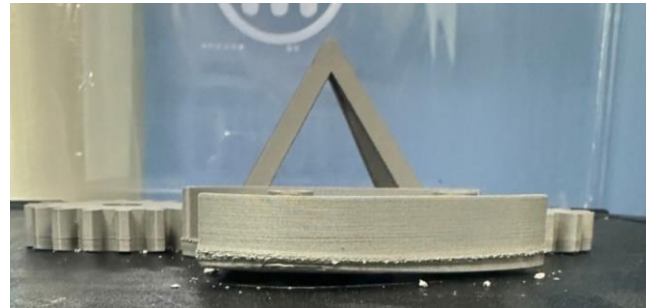


Print 8 cont.

Resumed print progress, notice large blob on the left nozzle

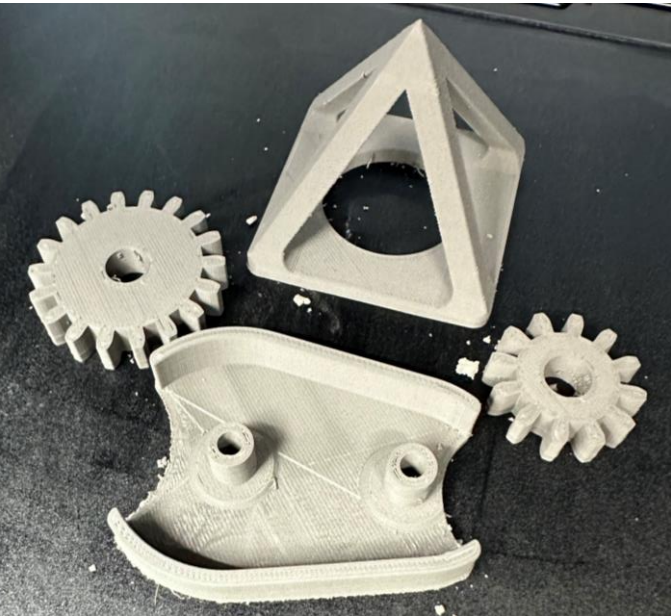


Completed print profile views. Notice warping



Print 8 cont

Completed print



Print residue left on print bed

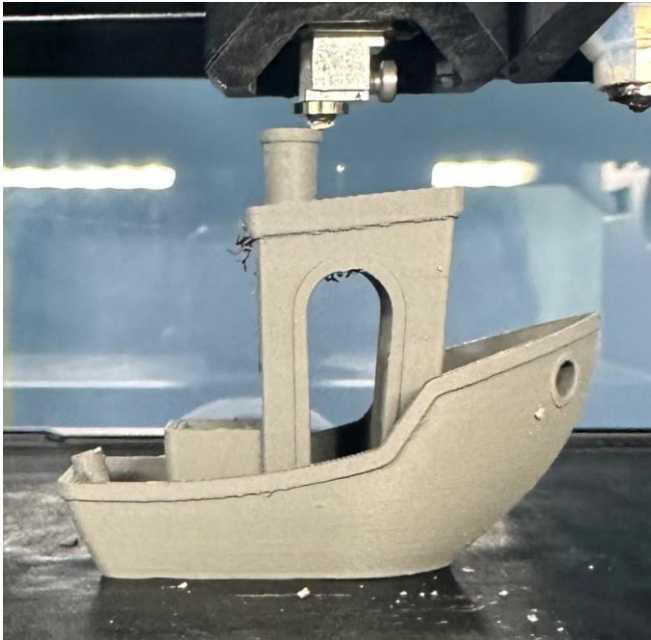


Stringy defects on the inner ring of the pyramid



Print 9: Benchy

Near-finished side view



Finished part on the build plate

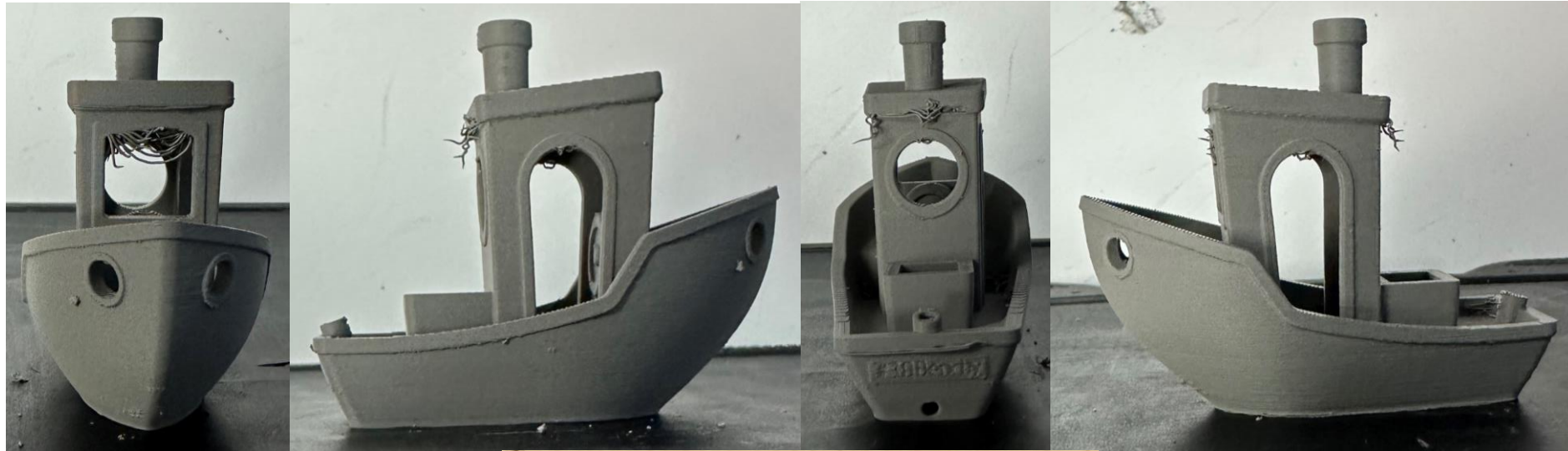


Part residue left on the build plate



Print 9 cont.

As-printed profile views. All drooping was removed with flush cutters and a metal pick.
Bottom layer was sanded flat after this picture



Print 10: Bevel Gears

First layer printed



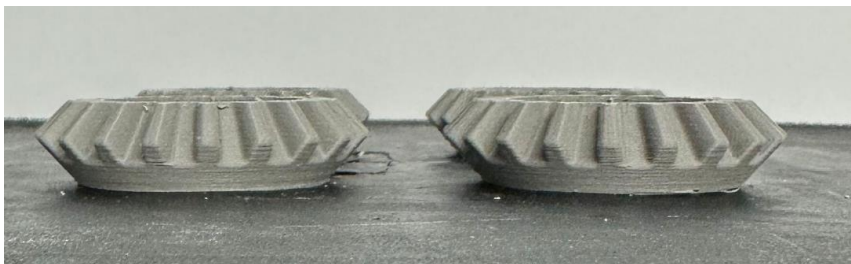
Finished parts with blob artifacts



Print residue left on build plate

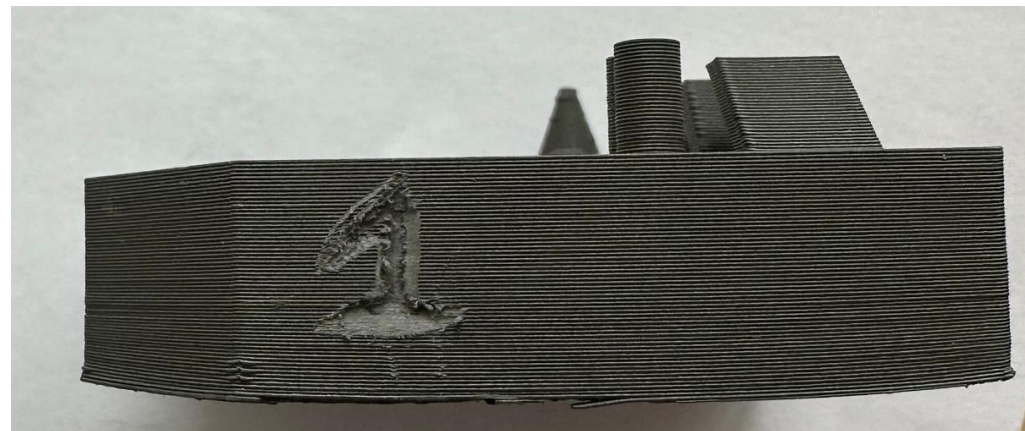
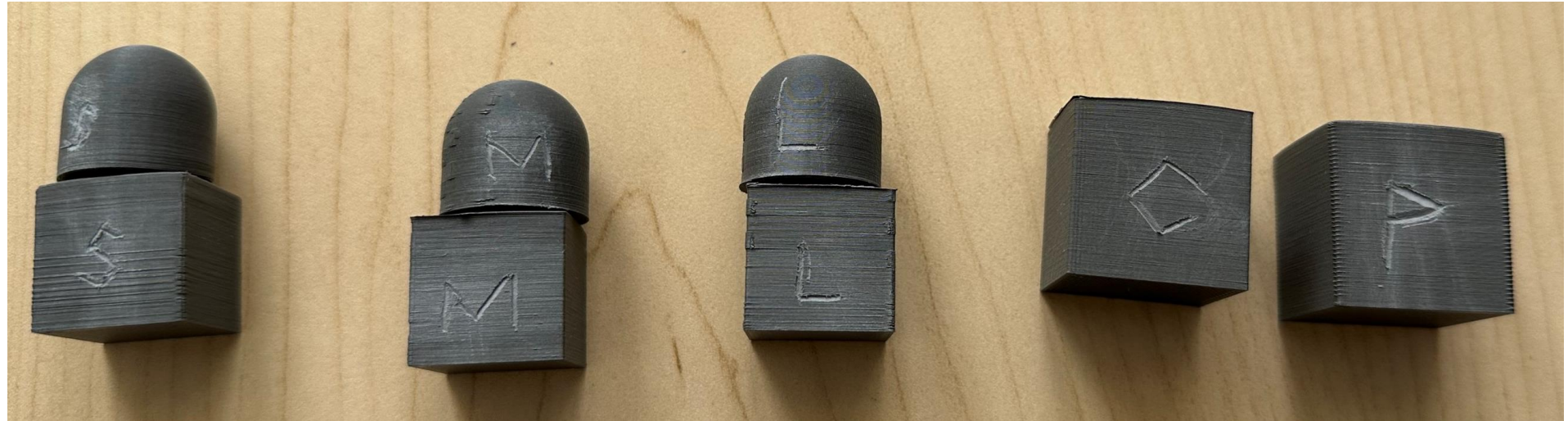


Finished print with no warping



Part Engravings

S = solid infill
M = medium infill (66%)
L = light infill (40%)
C = CloudPrint
P = MakerBot Print



All Parts



Sintered Parts

Slicer Cubes

CloudPrint Cube

Wall delamination



Cracked wall and base



MakerBot Print Cube
Ideal top and
stringy bottom layers



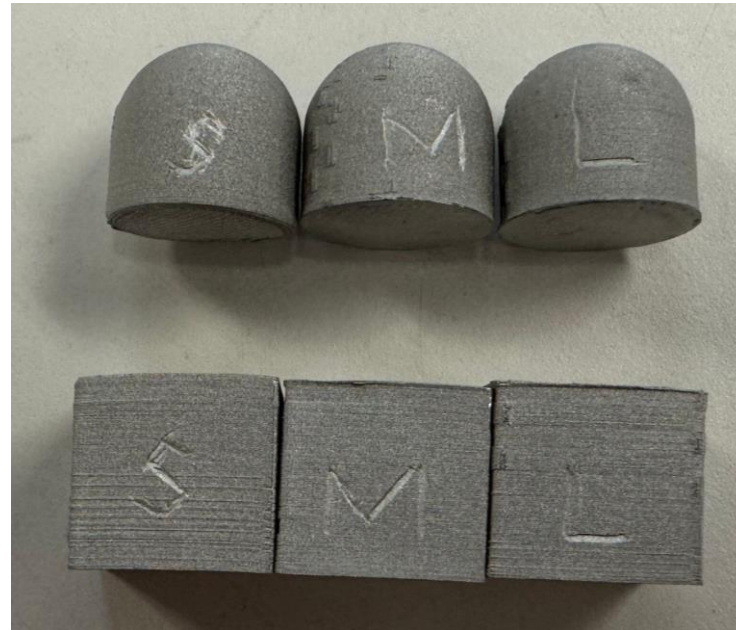
Infill Cubes

Key:
S = 100%
M = 66%
L = 40%

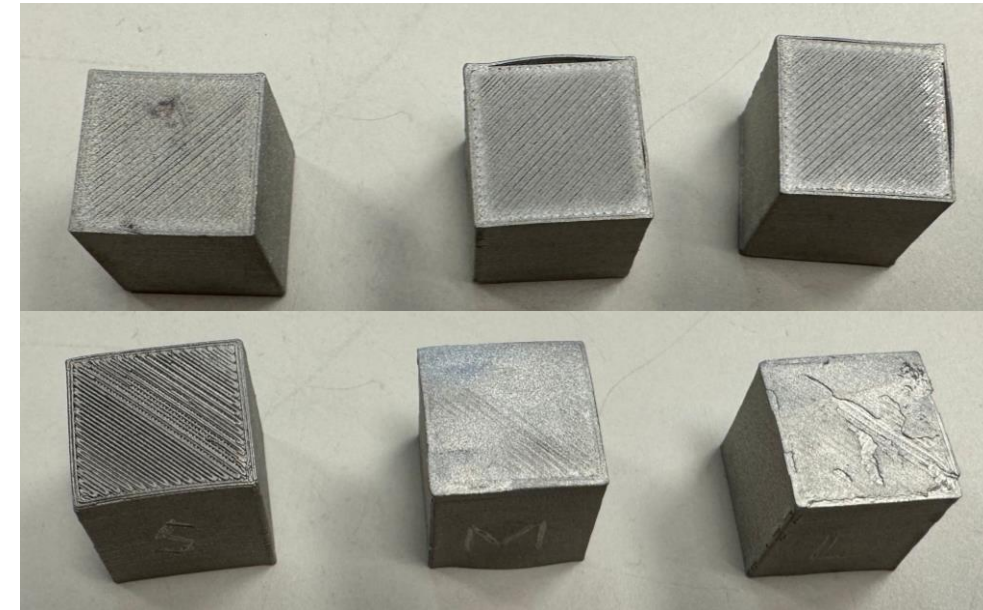
Tops and bottoms of domed cylinders



Etched letters

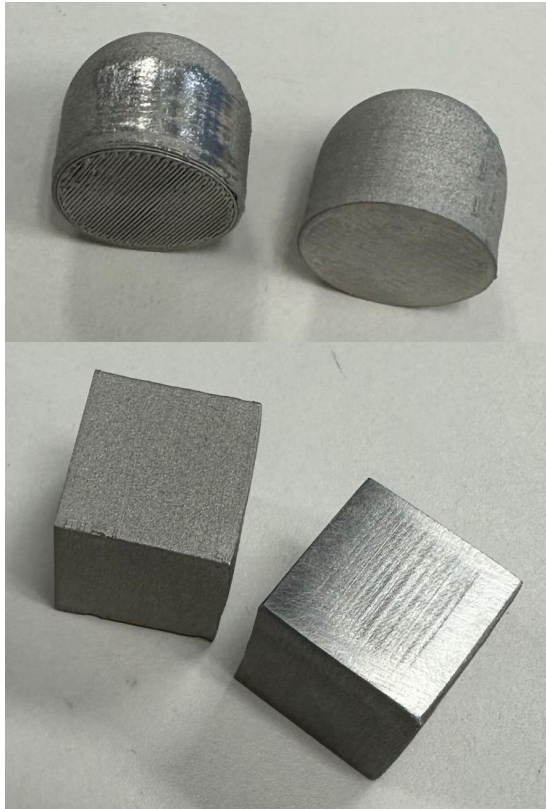


Tops and bottoms of cubes, notice wall delamination

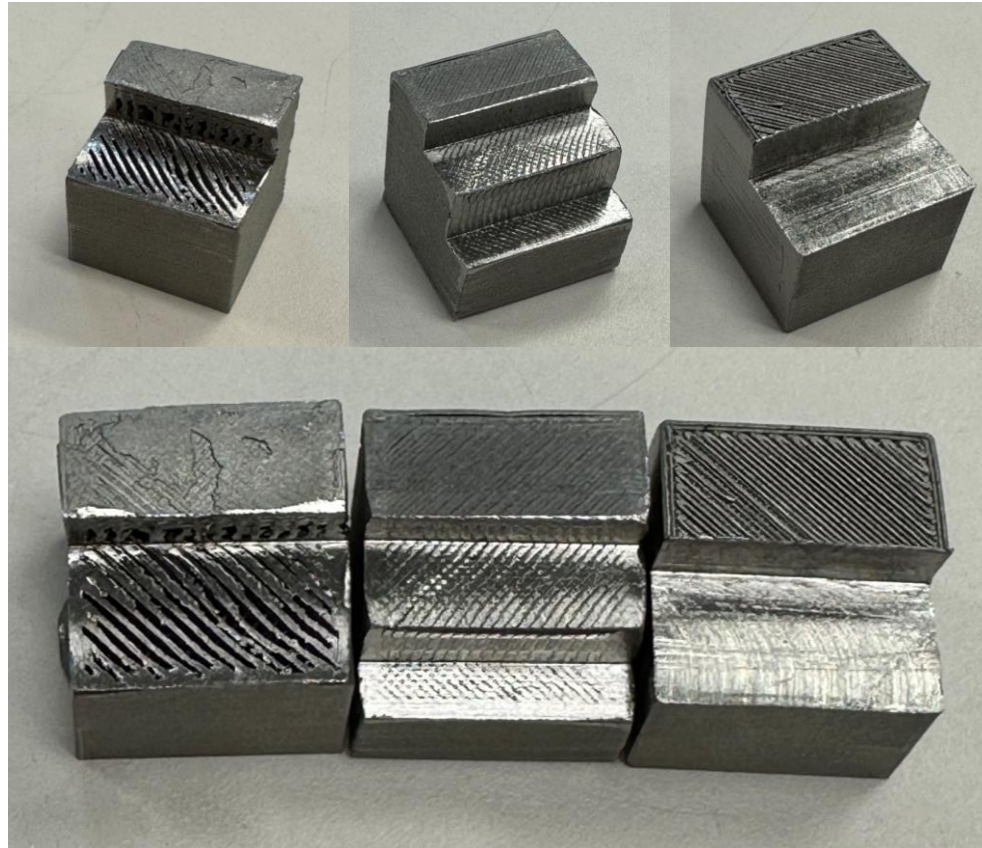


Infill Cubes cont.

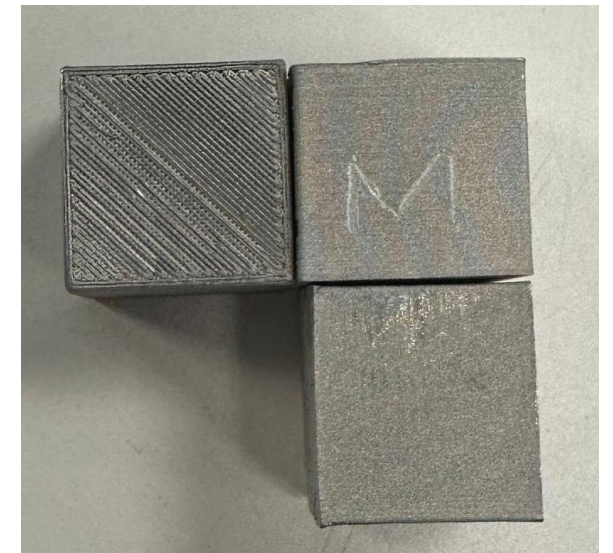
Sanded and filed surfaces



Milled and exposed infill

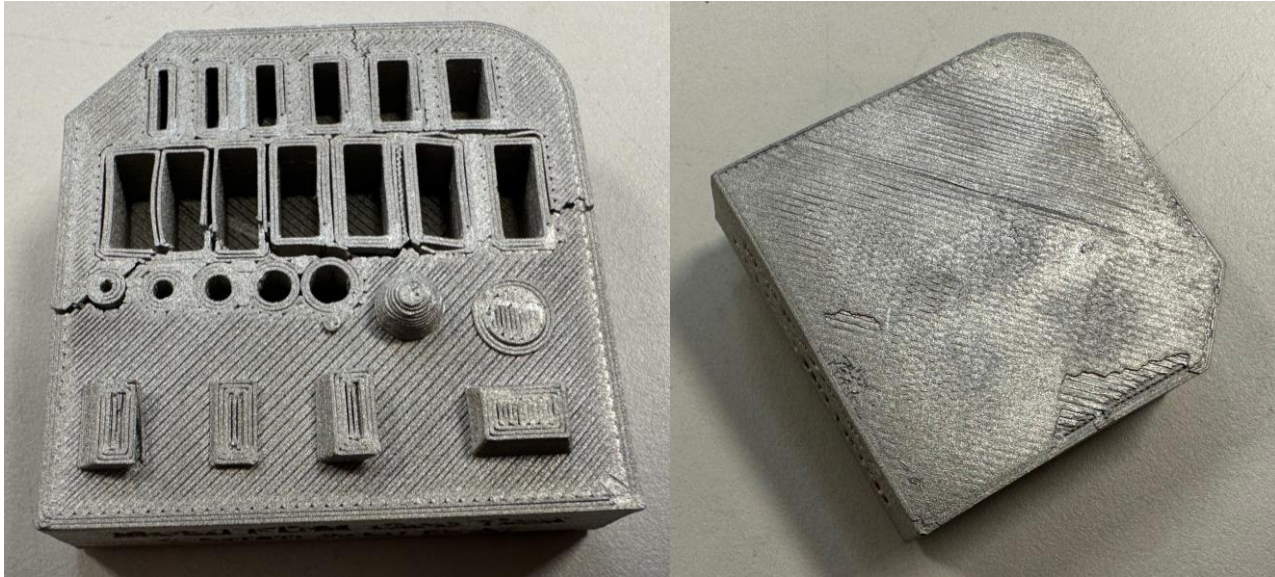


Anisotropic shrinkage reference, notice misaligned corners



Geometry Test

Top view, notice cracking and delamination along wall interfaces



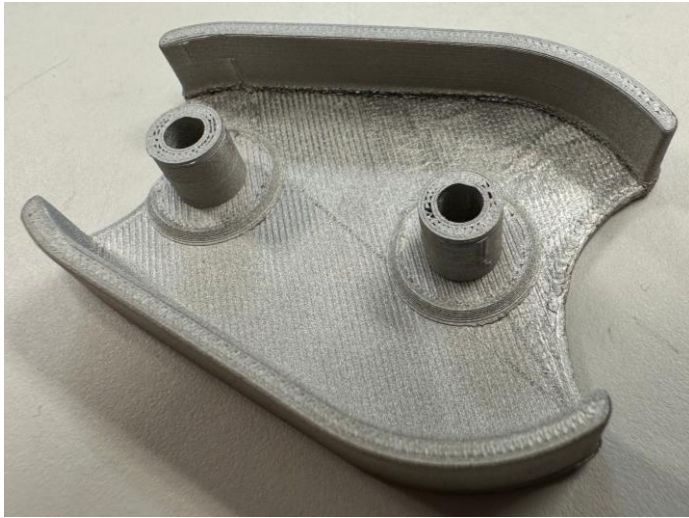
Bottom view

Side views, notice sagging text and cracks

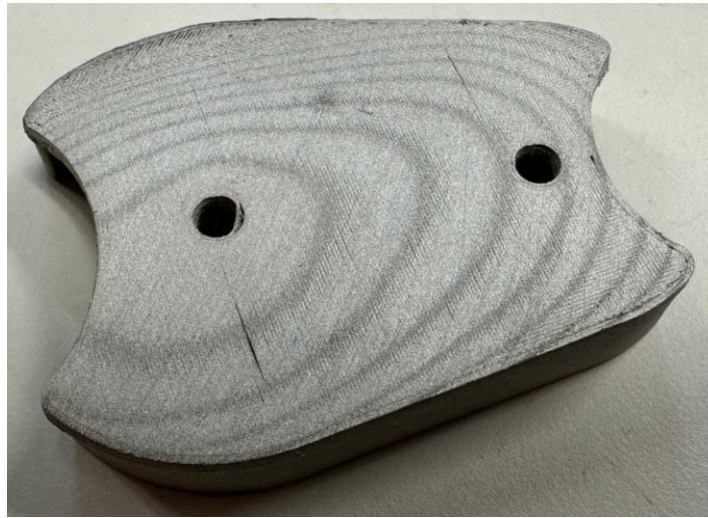


Spur Gearset Holder

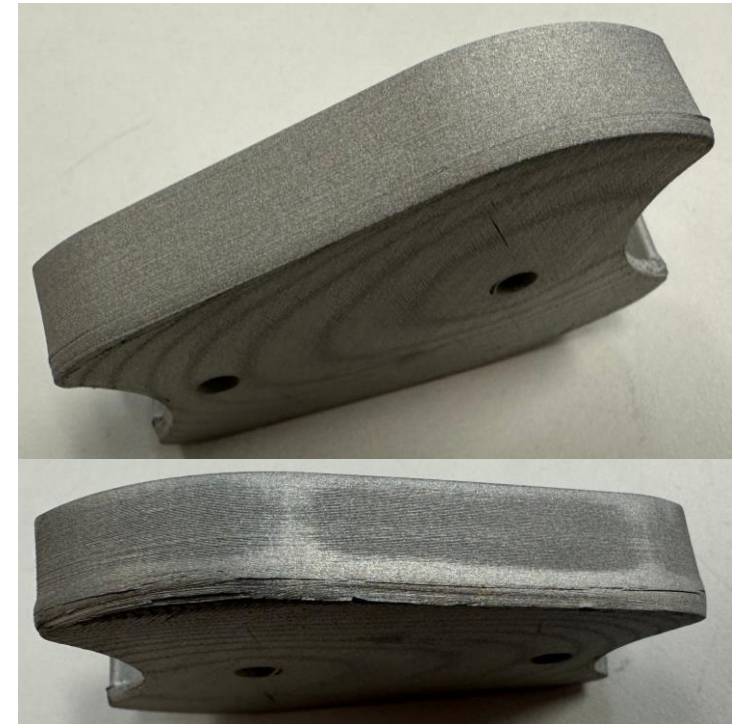
Top view, cracked base along rear edge



Bottom view, pattern is from sanding away extensive warpage



Side views. Notice cracks in lower view. Surface finish difference is from sanding prior to sintering

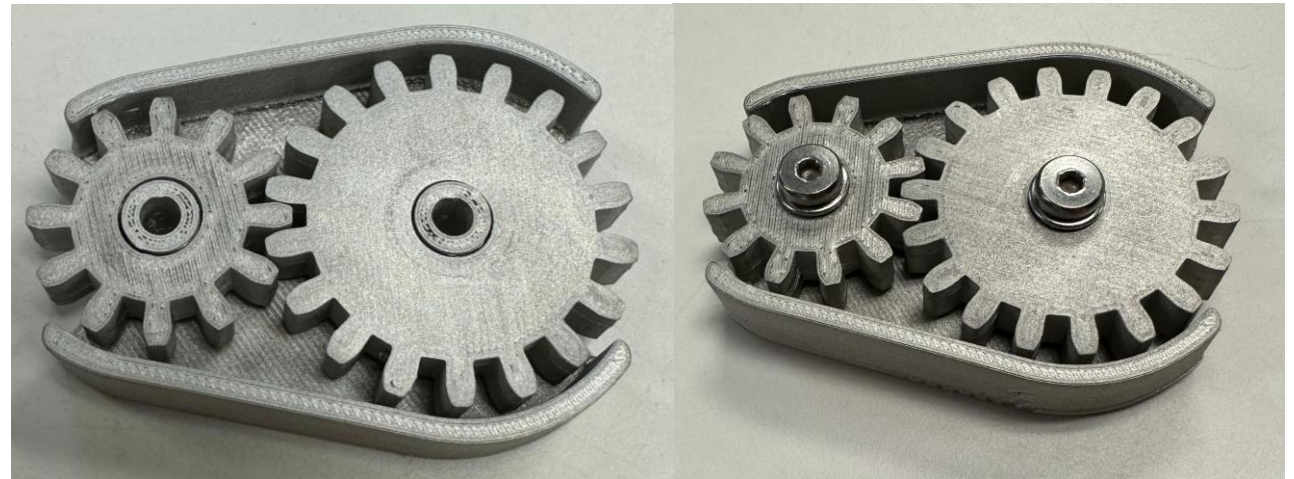


Spur Gears and Assembly

Gears, notice minor lip on middle-right sides

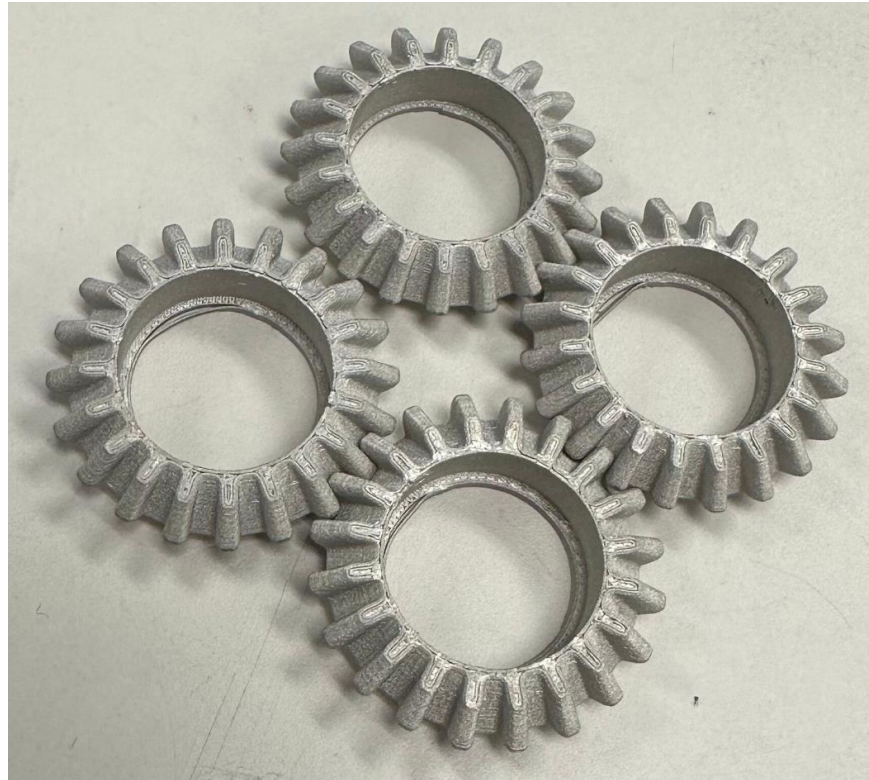


Assembly with and without screws.
Without picture was prior to tapping threads

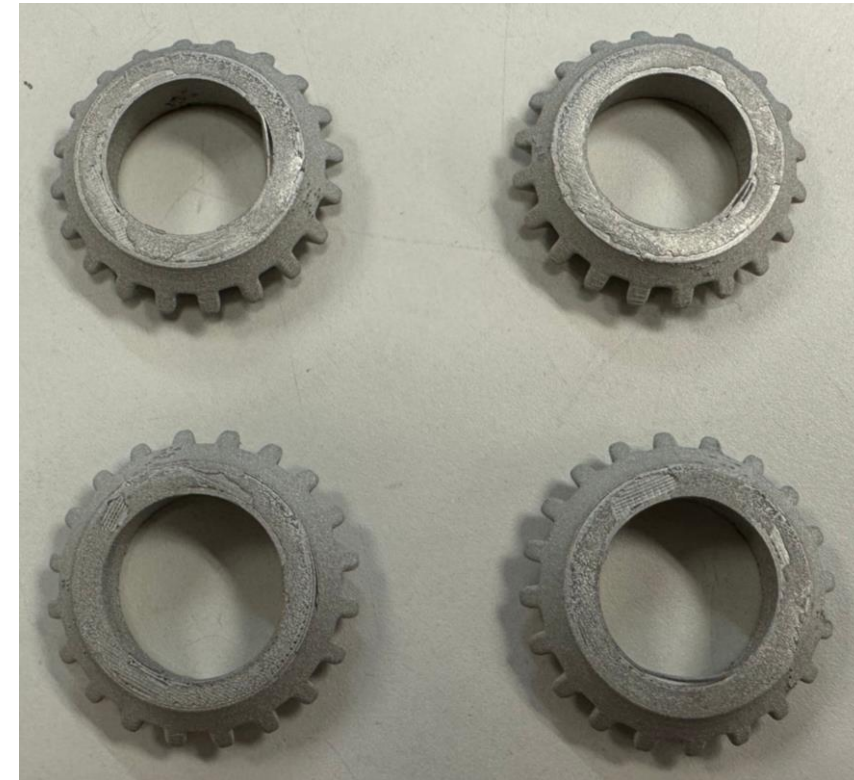


Bevel Gears

Notice wall delamination along bottom ring, oriented in the upper left area



Bottom view with cracked layers



Chess Rook

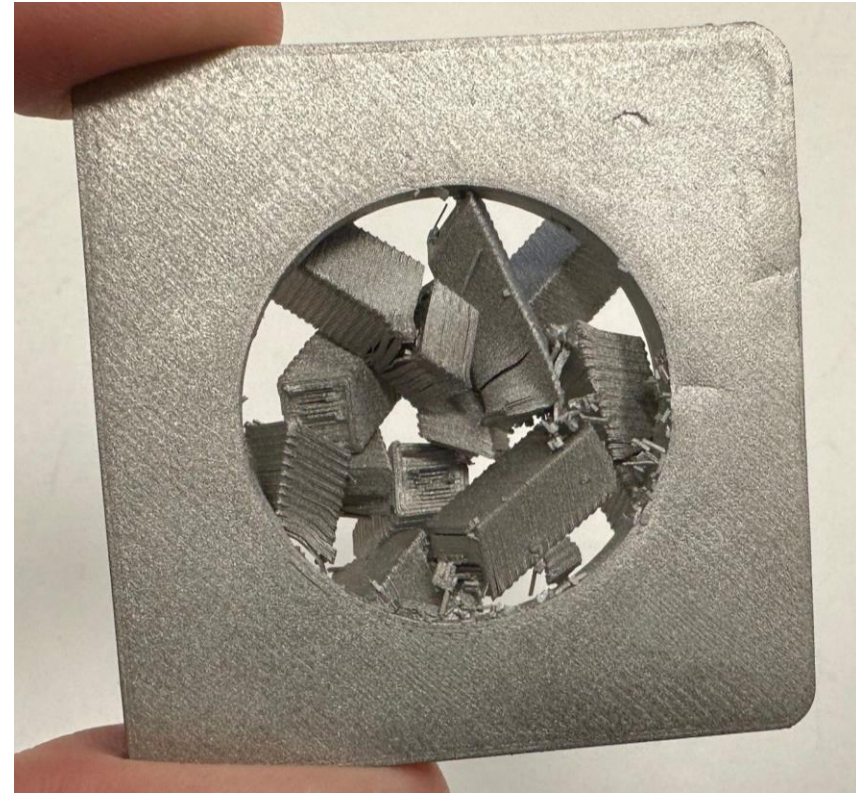
Views of printed part, minor crack in bottom



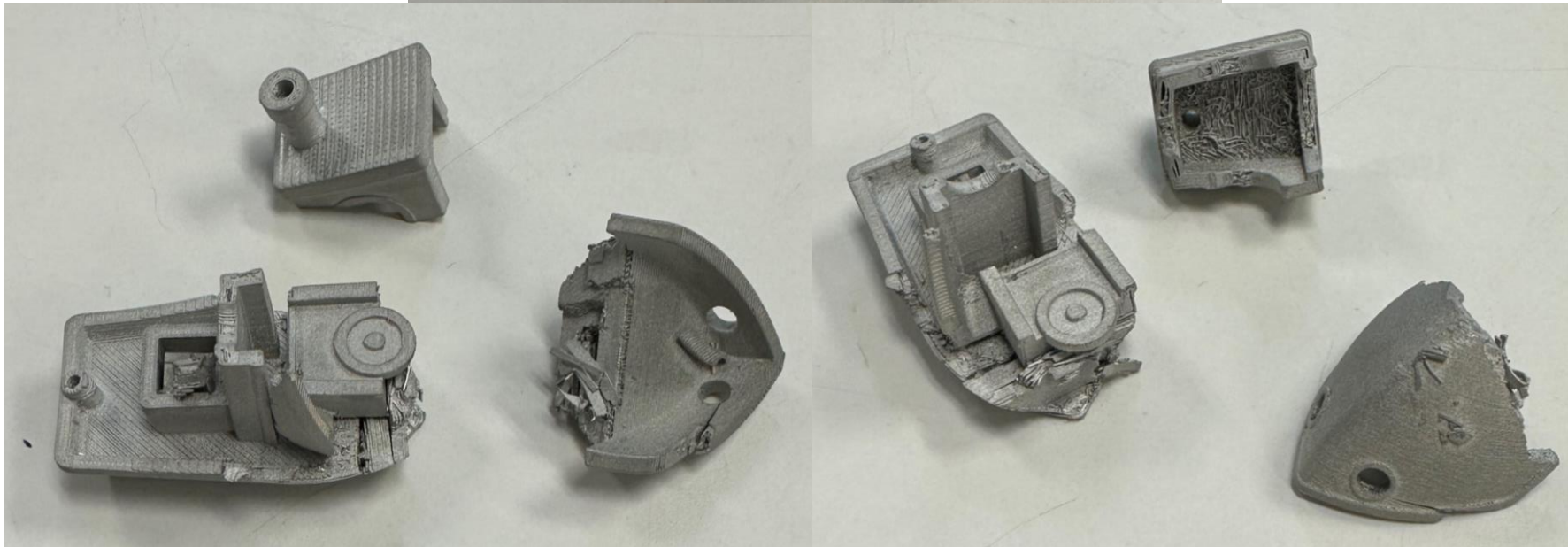
Part alongside PBF printed rooks



Pyramid (Collapsed)



Benchy (Collapsed)



All Parts

