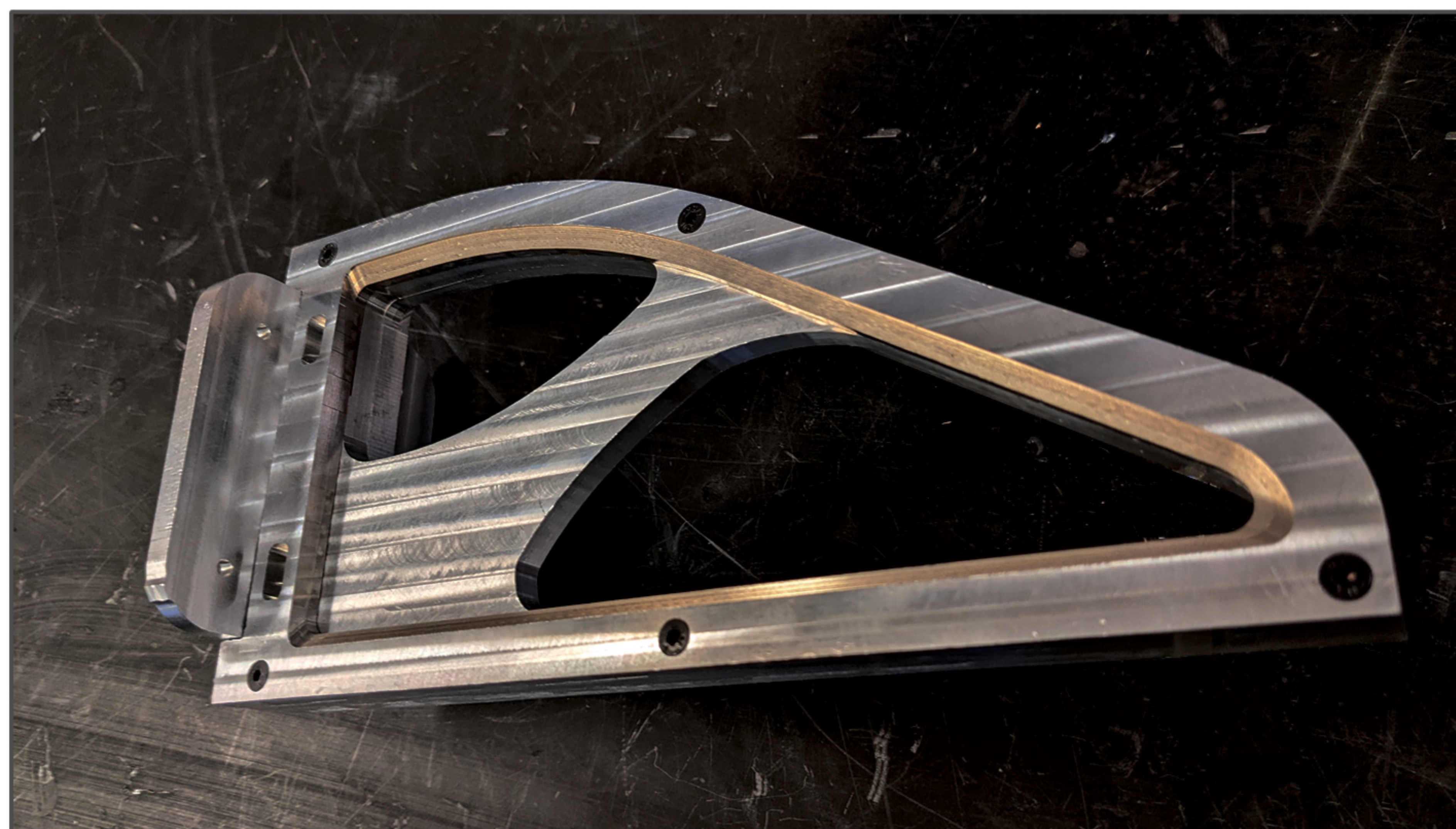
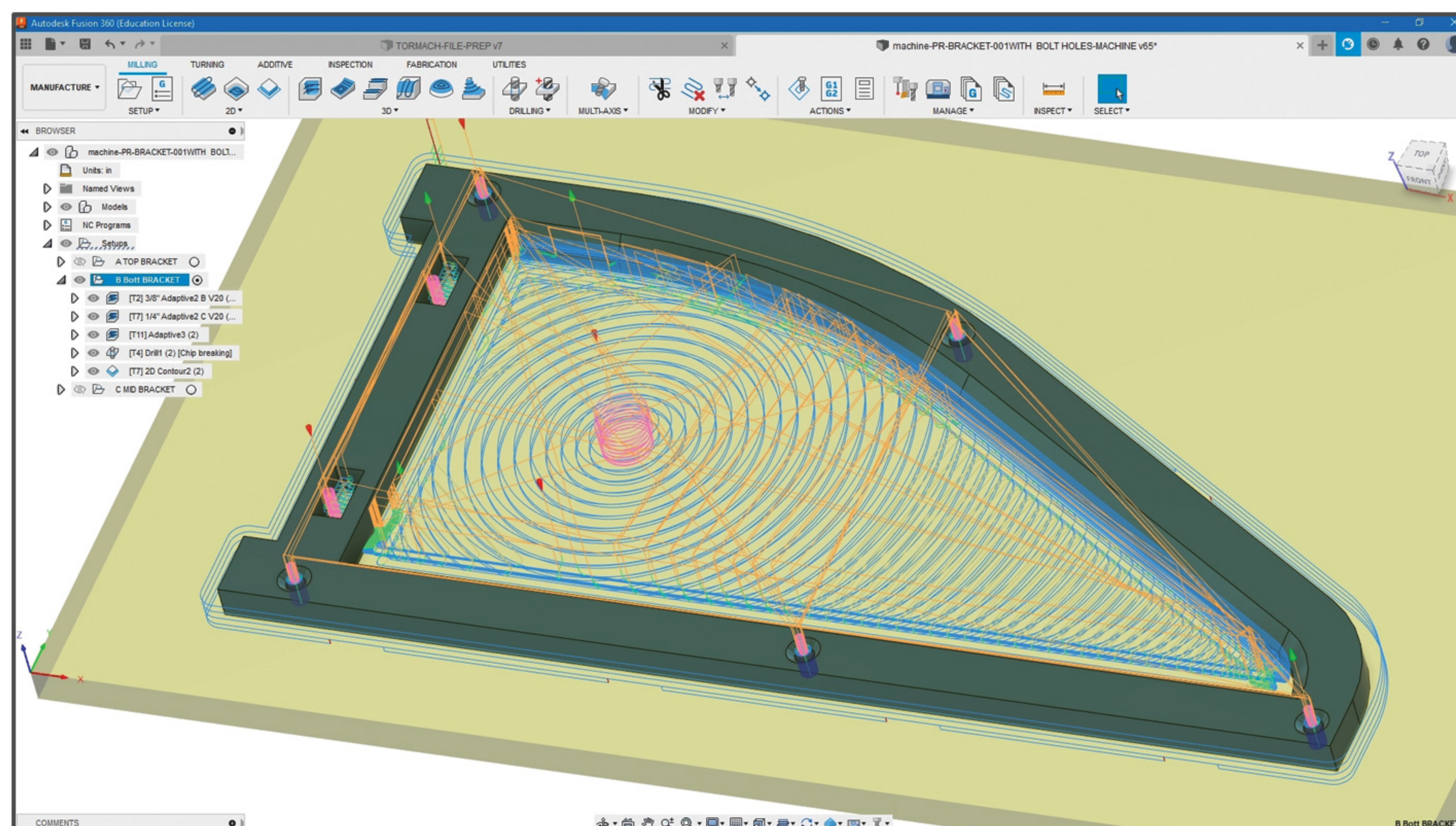
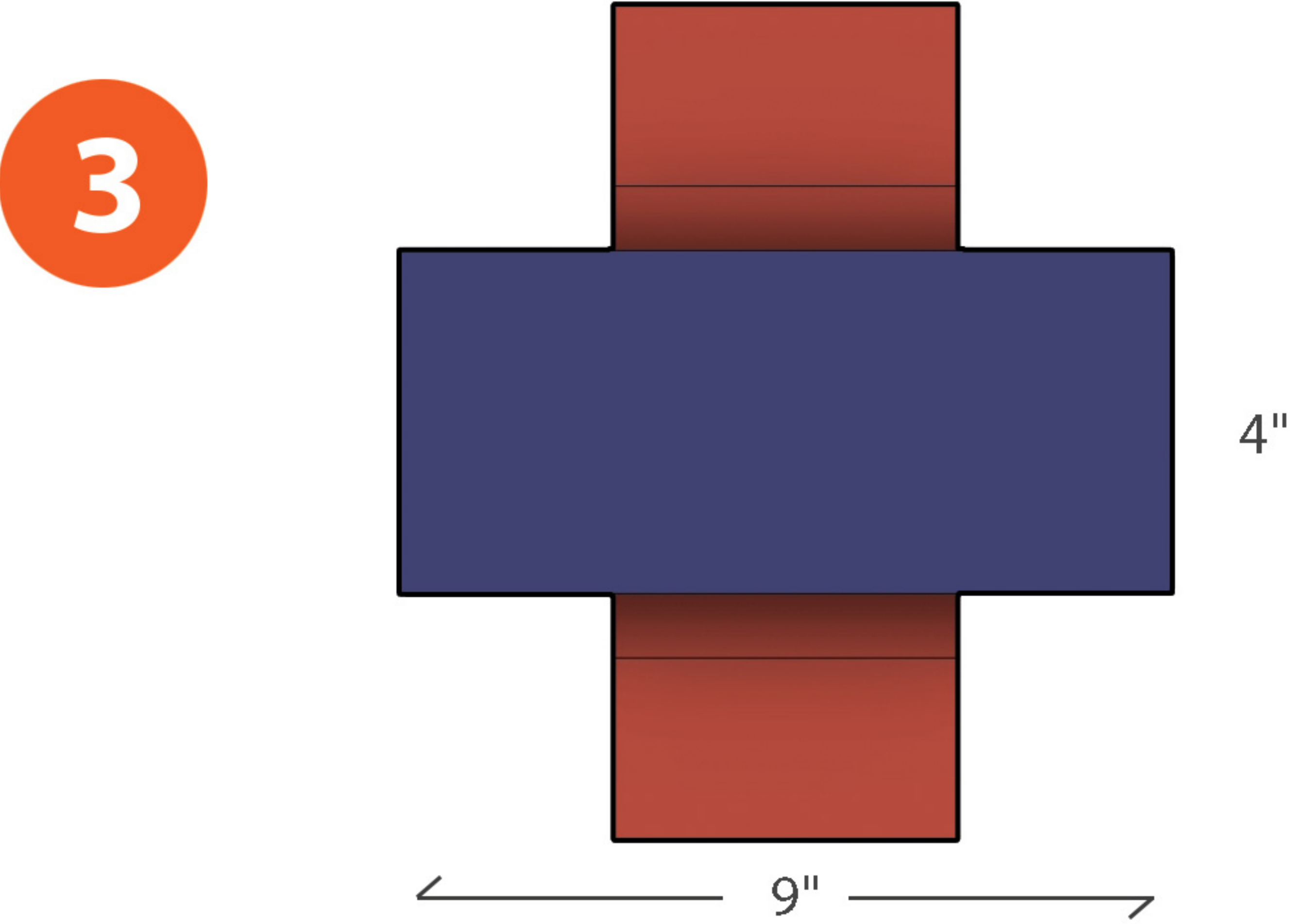
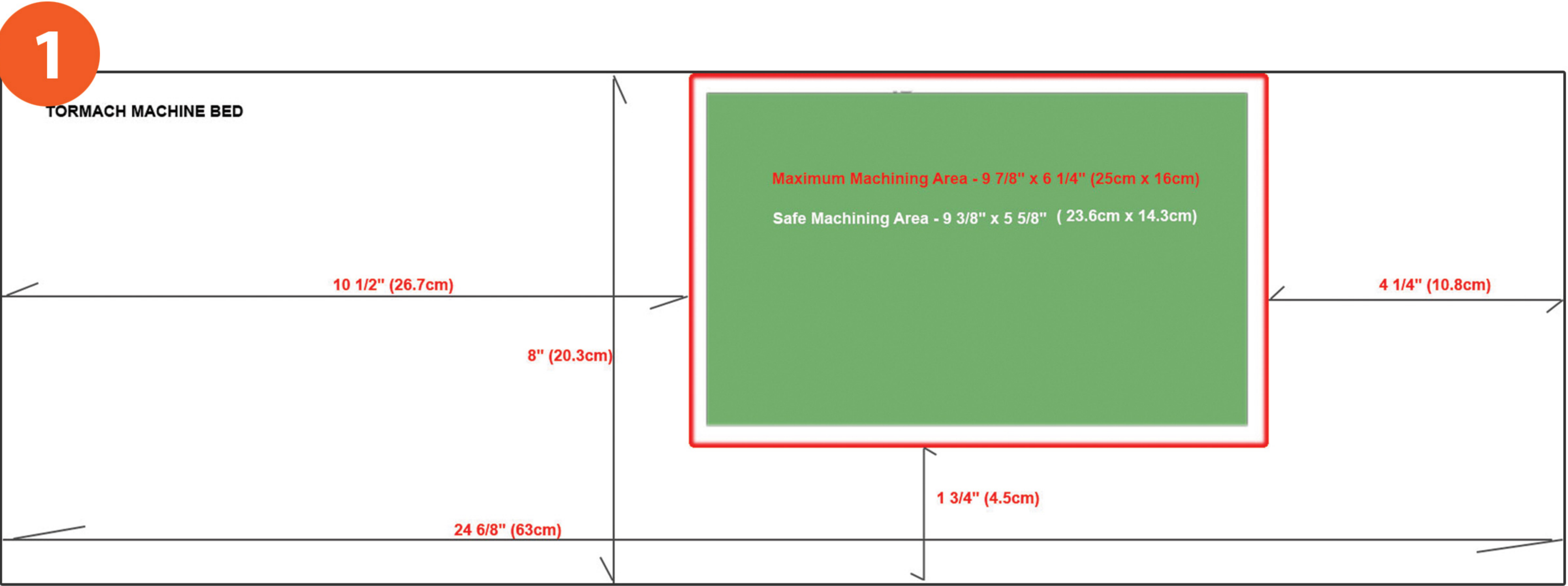


HOW TO PREPARE & DELIVER YOUR TORMACH MACHINING FILE TO MAKERSPACE

Version V2

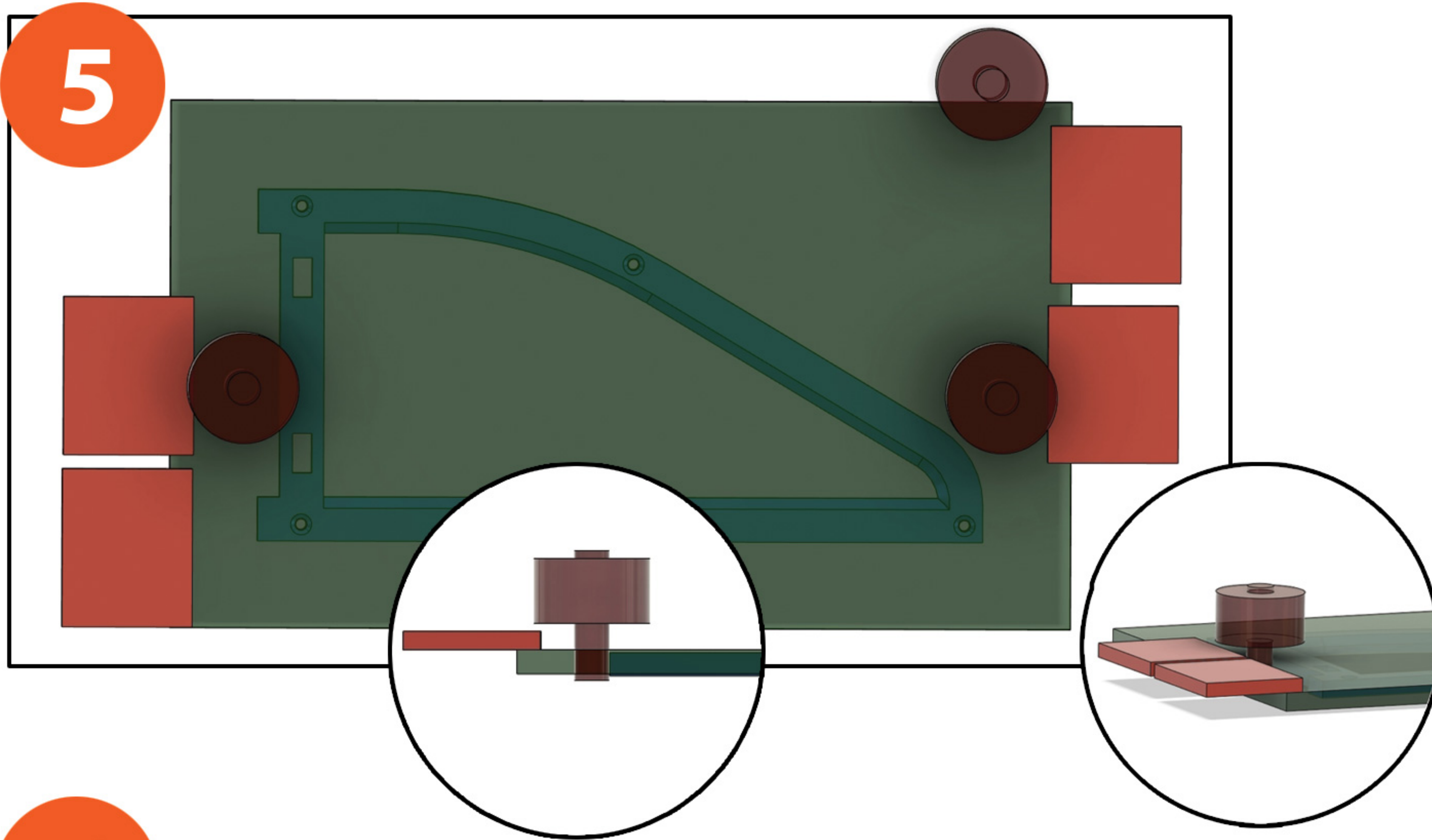




- 1. TORMACH BED**
- The Tormach bed illustrated with the actual machining area shown in green.
- 2. FLAT CLAMP**
- The Top view of the maximum stock size for flat stock with the nessasary clamping area. The depth of the actual stock can be up to 8".
 - The green area represents the machining area.
 - The red area represents the 1" clamping area that is required.
- Flat Stock Maximum machining size =**
9 3/8"w x 5 5/8"d x 6"h* (23.8cm x14.2cm x 15.2cm)
- Flat Stock Maximum size =**
9 3/8"w x 8"d x 6"h* (23.8cm x 20.4cm x 15.2cm)
- 3. VISE**
- Top view of the maximum stock size for the Vise.
 - The blue area represents the stock.
 - The red area represents the vise.
 - The stock must be clamped into the vise a minimum of .5".
- Maximum Vise Stock Size = 9"w x 4"d x 3"h***

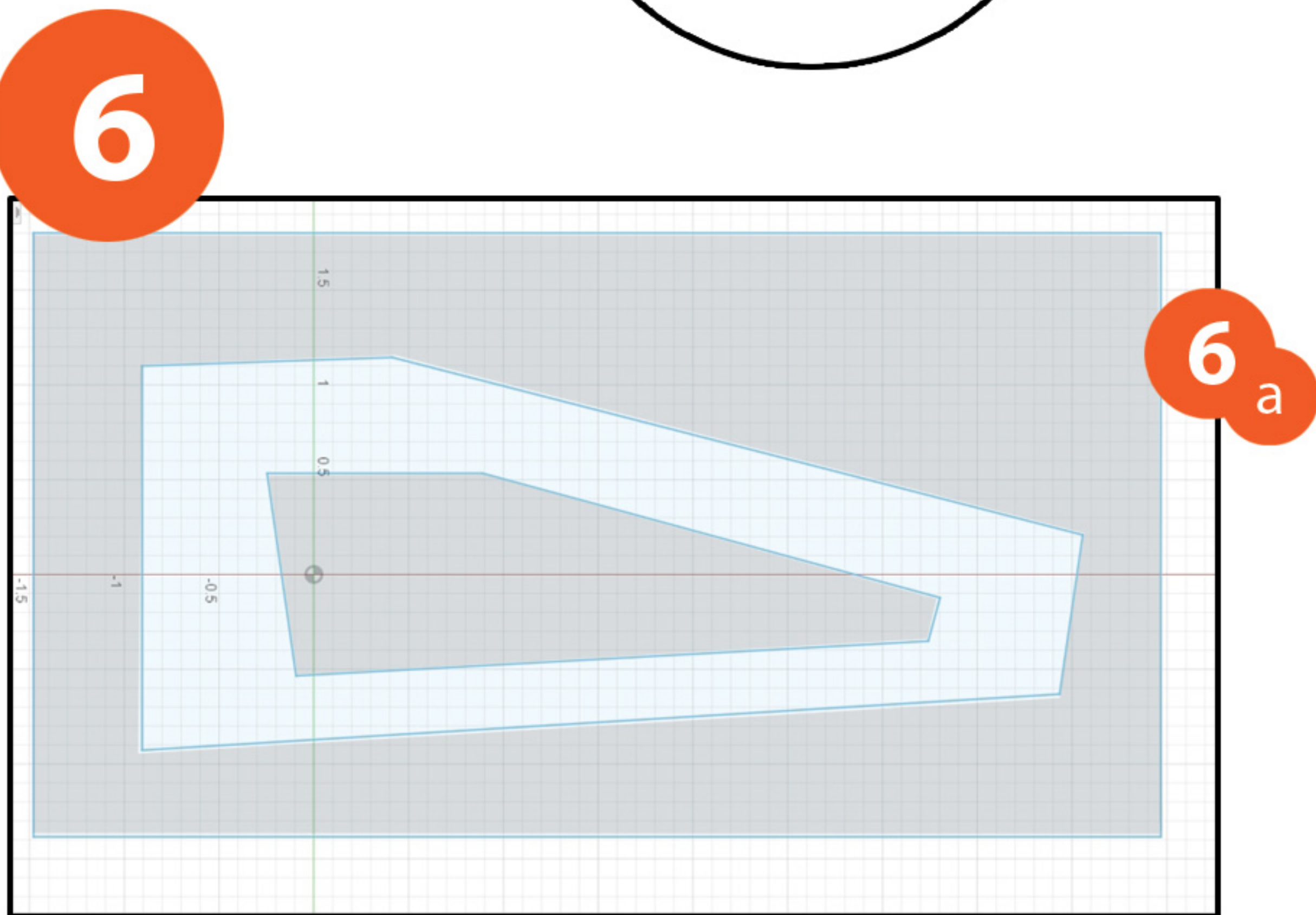
- 4. MACHINING DEPTHS**
- *Each surface of the stock can only be machined to the depth of the length of the flutes on each bit. The chart & image shows the flute sizes for each bit.

| Tool | Diameter | | Type | Tormach Tool offset | Stickout | Flute Machining Area |
|------------|----------|-------|------|---------------------|----------|----------------------|
| #11 | 1/8" | .125" | FEM | 2.6" | 0.8" | .45" |
| #7 | 1/4" | .25" | FEM | 2.59" | .80" | .5" |
| #2 | 3/8" | .375" | FEM | 2.58" | .8" | .5" |
| TTS Collet | 1-1/4" | 1.25" | TTS | | | |



5. TORMACH TTS HOLDER & BIT CLEARANCE

- Any machining must take the clamps and bit/holder clearance into consideration.
- The machining area may need to be smaller, or there may need to be multiple operations and reclamping.
- The TTS holder is 1.25" in diameter.
- The clamps are various heights, with the minimal clearance height being .2" (5mm).

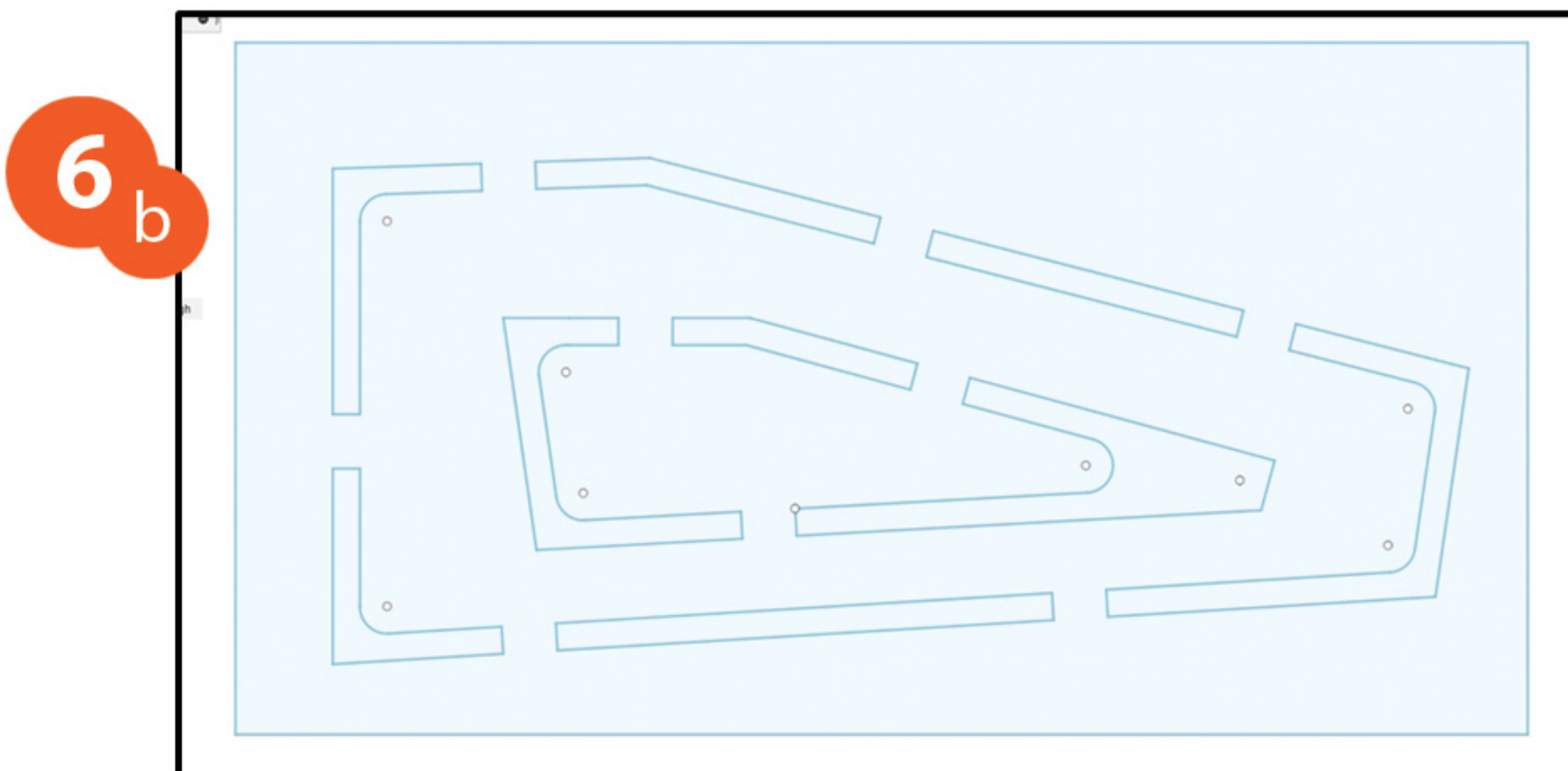


6. CUTTING OUT POCKETS & PROFILES

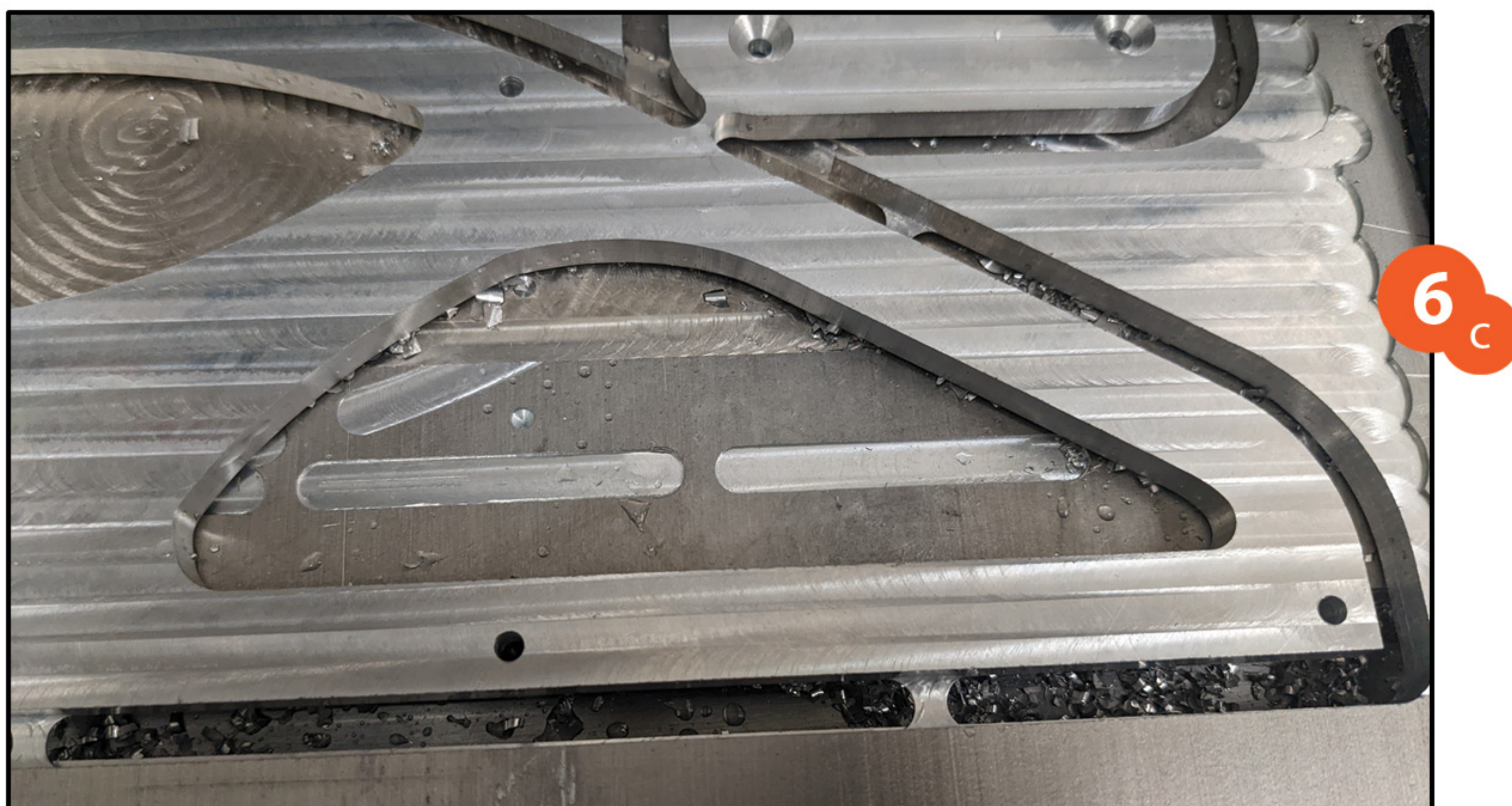
- Profiles & Pockets must either have tabs, or be machined in sections so as to clamp and keep parts stationary.

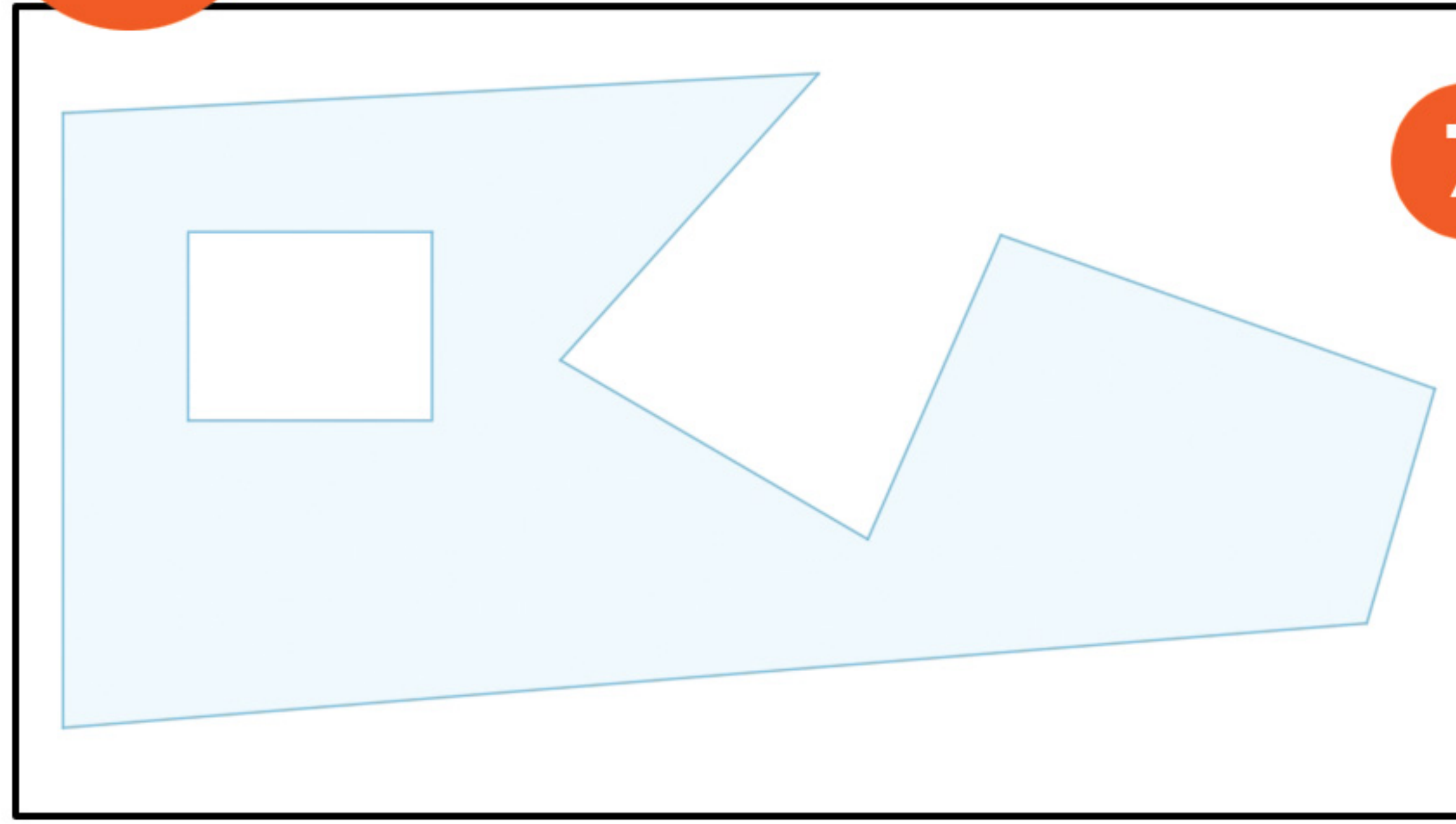
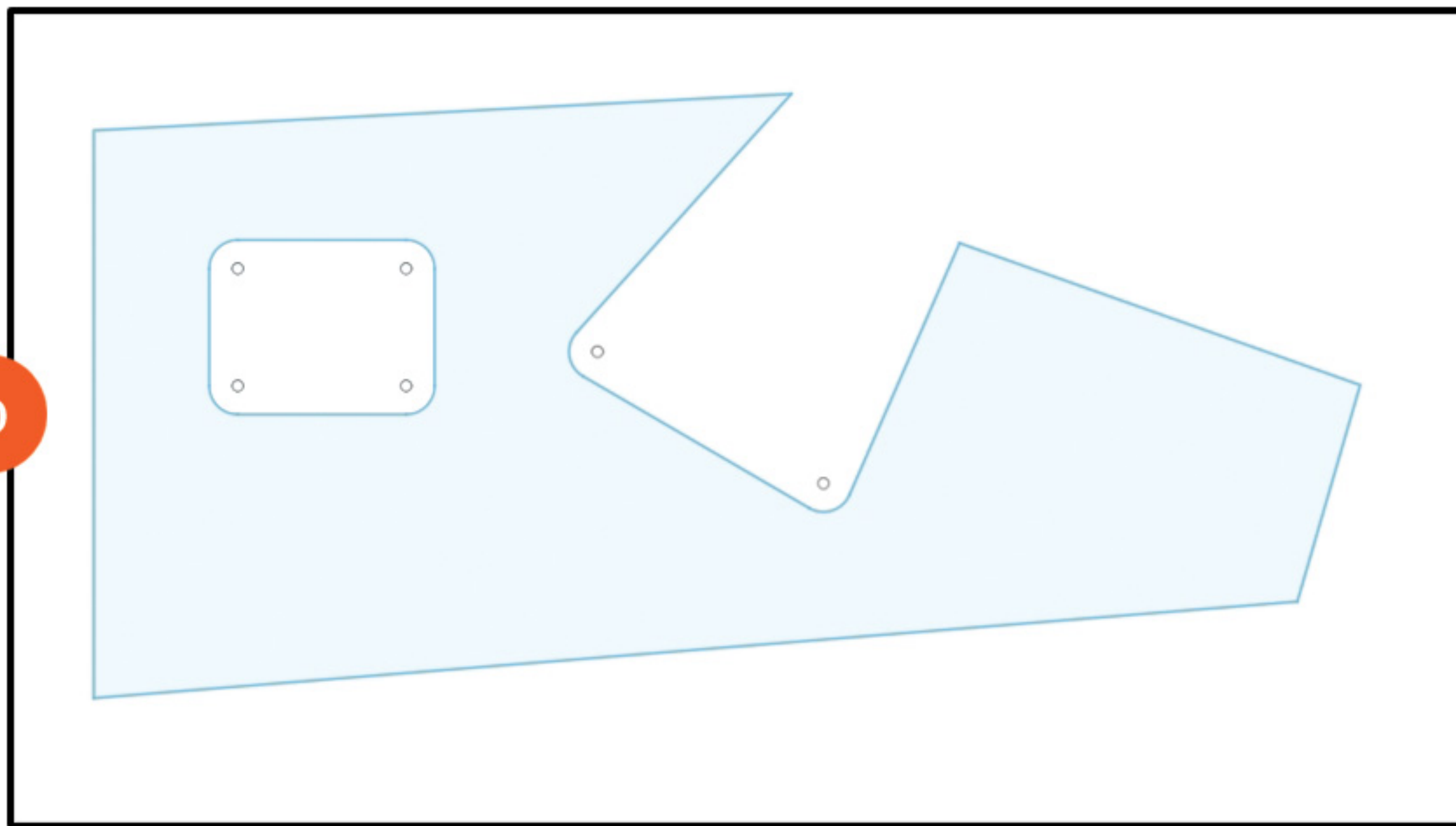
6a - The part design.

6b - The pocket and profile with tabs. This is done by Makerspace at the machining stage... DO NOT put tabs in your drawing!



6c - View of machined tabs. They are thin and narrow, so are easy to cut off after the machining is complete.



7

7
a

7
b

7. POCKET CORNERS & INSIDE CORNERS

- You cannot have 90 degree corners in pockets, they will be the radius of the final bit used.
- You cannot have 90 degree corners on inside corners, they will be the radius of the final bit used.

7a - A design example with sharp corners.

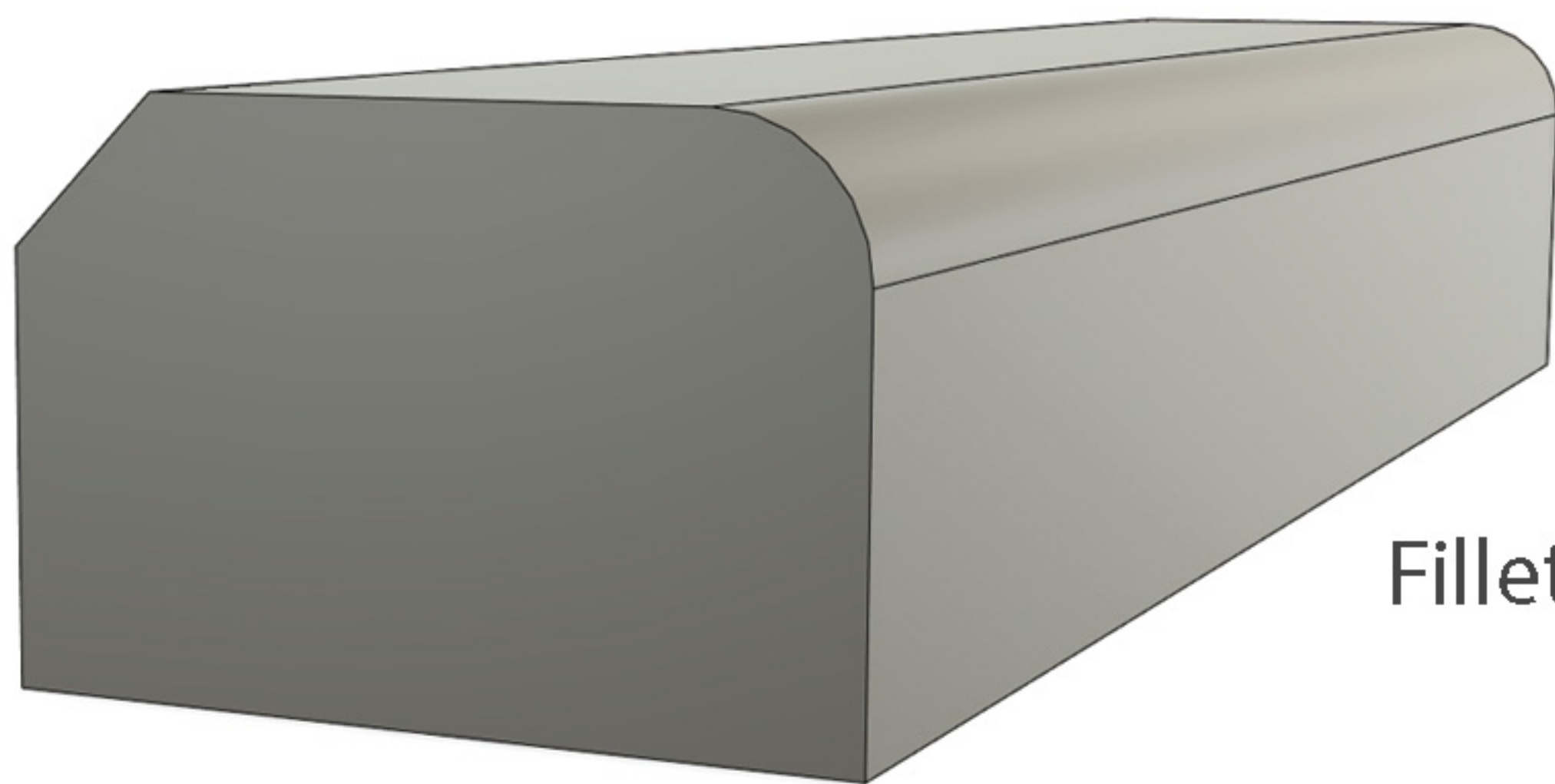
7b - What the design would machine like using a 1/8" diameter FEM bit.

This is a 3 axis mill, so only 1 face/surface at a time can be machined.

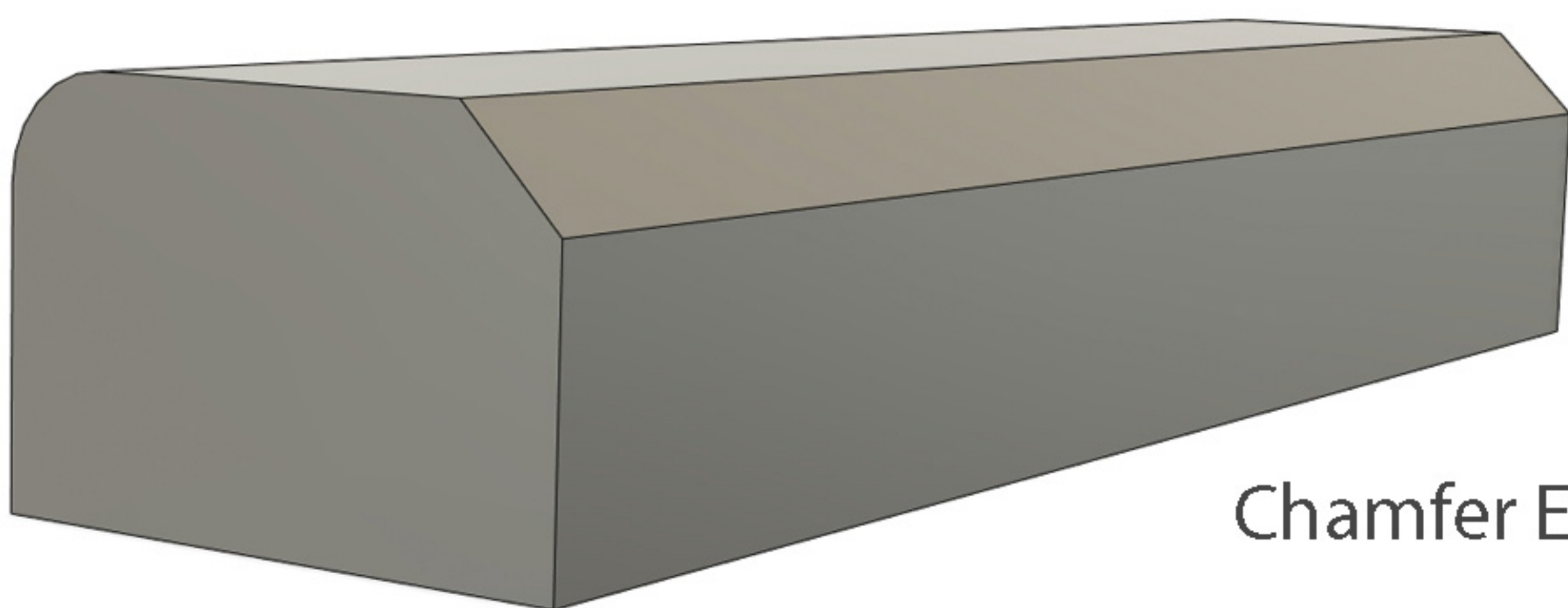
8

Fillet Edge

Chamfer Edge


8
a


Fillet Edge

8
b


Chamfer Edge

8
c

8. SPECIAL EDGE TREATMENTS

- If you are supplying a 2d drawing file and you want some edges with a certain treatment, here are the following options.

8a - Illustration of a Fillet & Chamfer edges.

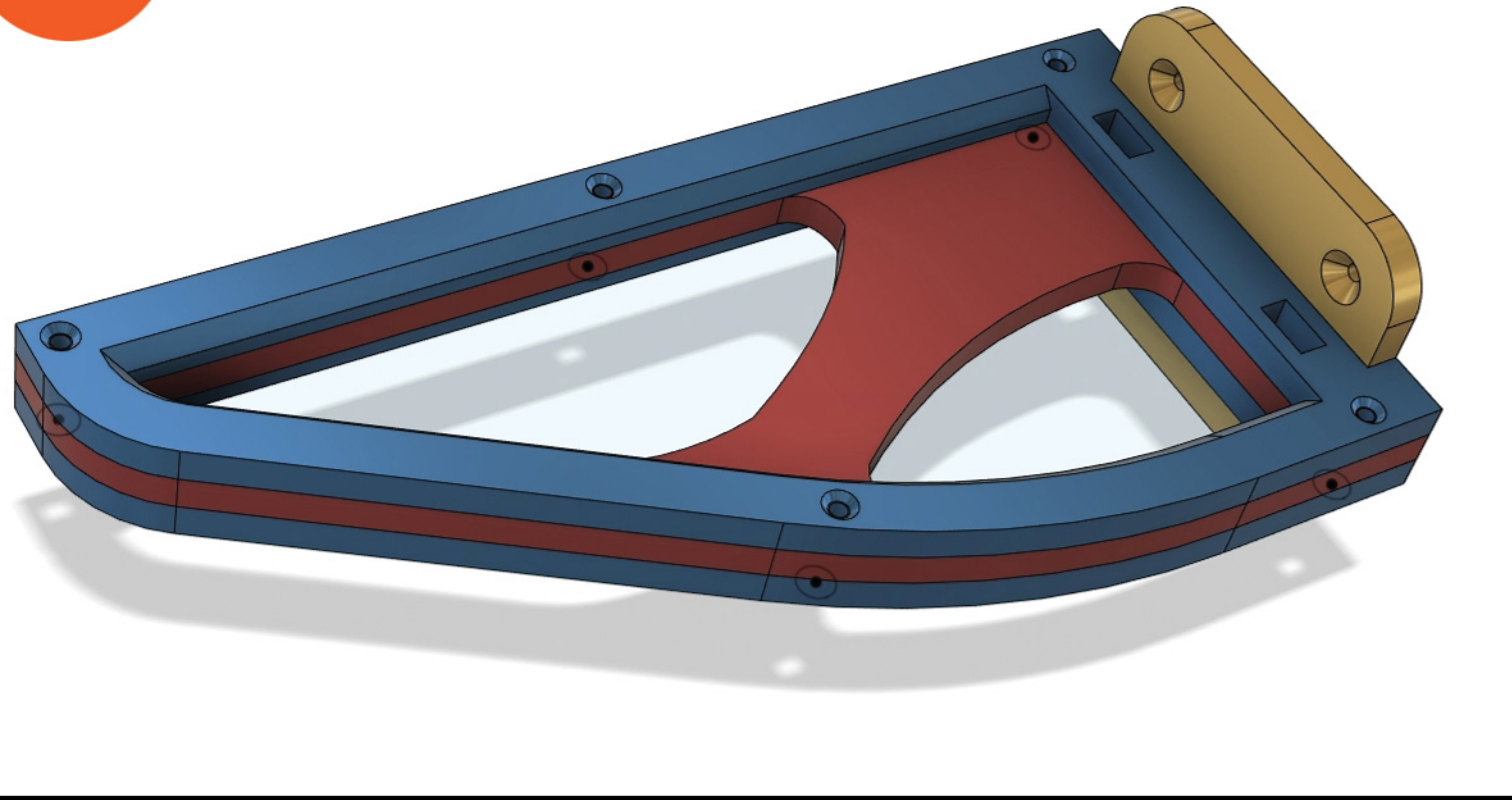
8b - A Fillet edge or a Rounded edge.

8c - A Chamfer edge or a Beveled edge.

To specify an edge, print out your drawing and yellow highlight the edges you want a special treatment on. Also specify the amount/dimension of edge treatment.

Note, the edges cannot be treated on the bottom side of your stock, unless special arrangements are made with Makerspace. The object would have to be flipped upside down, this requires very accurate positioning.

9



There are 2 options for delivering your part to Makerspace for Tormach Machining. Option 1 is to supply a 3d drawing from a 3D program (see #9). Option 2 is to supply a 2D drawing of your part (see #10).

9. 3D FILE CREATION & FILE EXPORT FORMATS

A. Fusion 360: File/Export/ as a Autodesk Fusion 360 Archive File (.F3D).

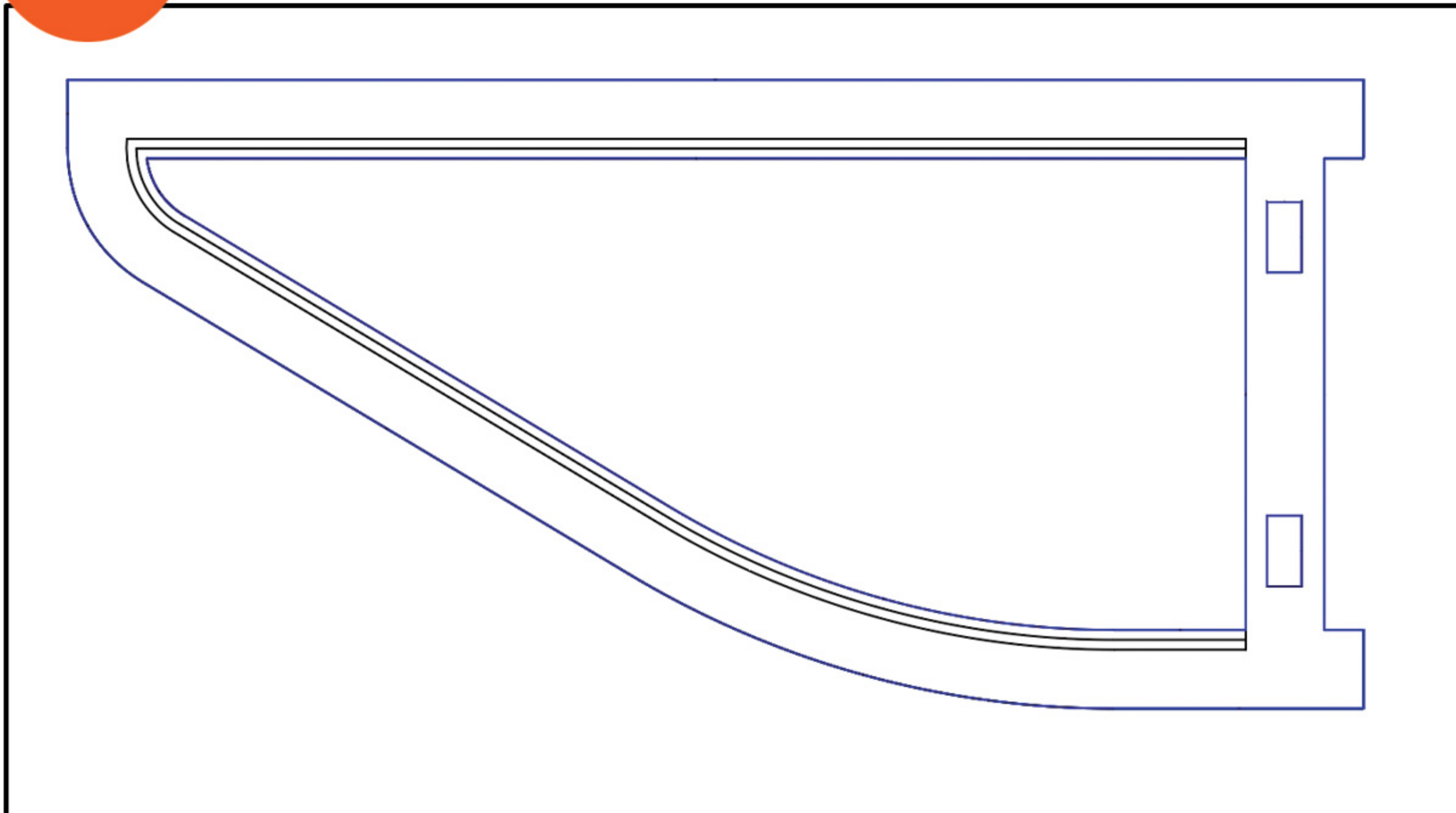
B. Rhino 3D - Save as a Rhino 3D model (.3DM).
- You may also be required to supply DXF exports of certain views.

C. Solid Works - Save as a SW 3D model (.PRT).
- You may also be required to supply DXF exports of certain views.

D. Sketch UP - Save as a Sketch Up Model (.SKP)
- You may also be required to supply DXF exports of certain views.

E. Other 3D programs you can export DXF files. These files may work depending on the program and the object.

10



10. 2D DRAWING CREATION & EXPORT FORMATS

A. For a 2d profile drawing of your part, you can use any drawing program such as Adobe Illustrator. Once you create the top (plan) view of your object, export it as an EPS or a DXF

B. Include a word doc with the file with notes on:

- Object thickness
- Stock size
- Stock material type (please be specific ie Aluminum Wrought #6061-T651)
- Info for special edge treatments
- Print out the drawing & yellow highlight any special edge treatments on it.

11

11_a11_b11_c**11. BIT & DRILL TYPES & USES**

11a - Flat End Mill bit.

Used to: clear out pockets, shape, cut out profiles, finish edges. Comes in various sizes. MS has 1/8", 1/4" & 3/8".

11b - Round End Mill bit.

Used to: clear out pockets, shape, cut out profiles and finish edges. Comes in various sizes.

11c - Hog Shear

Used to face surfaces. If facing a surface, your stock must be thicker than your final object.

11_d11_e11_f

11d - Spotdrill

Used to spot mark for pre drilling or marking.

11e - Drill Bit

Used to drill out holes. Comes in many different sizes.

11f - Engraver Bit

Used to engrave text & shapes. Comes in 60 degree & 90 degree.

11_g

11g - Engraving text into a surface. It will come out with angled sides. The engraving cannot go very deep, usually .003" into the stock.

11_h

11h - Engraving patterns into aluminum. this can be used for fine detail, but cannot go very deep, usually .003" into the stock.