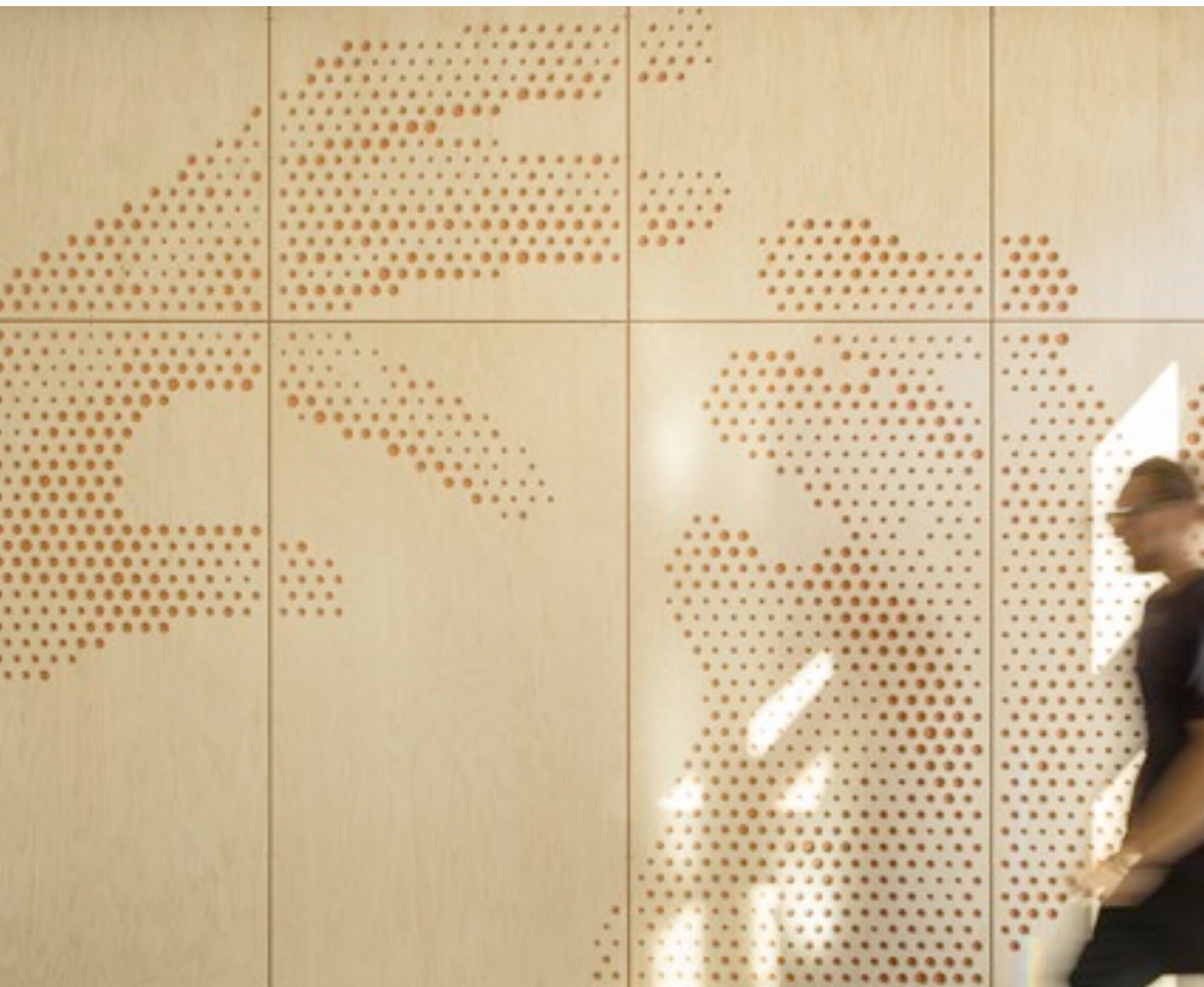


CS181DT Class 5: Digital fabrication



CNC milled wood wall boards showing hands,
UC Berkeley Jacobs Hall



Compostable Lamp from 3D printed
orange peels by Krill Design



Laser-cut puzzle from Nervous System

Class 5 agenda

- PM2: Sensory Cardboard crit
- Mini lecture: CAD-CAM process
- Break
- PM3 details; more on laser cutting
- Vector graphics studio

Announcements

- Most assignments will be graded by the end of the weekend
- Please don't use ChatGPT to generate any of your write ups
- The best way to get a check plus is to turn in a “polished” assignment
 - Very thoughtful reflection, clear you spent a lot of time and effort and care, above and beyond
 - If you wanted a check plus on everything, the assignments would take way longer than I want you to spend on them: focus on your learning, not your grades
- CS181DT will probably be offered again next semester: tell your friends!! Be a TA!

PM2 Crit

PM2 art walk

Squishy • Revolting • Animated

- (2 min) **Phase I:** Place your cardboard on the table. Optional: write anything you'd like others to know (your vision, how to interact, etc.) on the post-its by your piece(s). Don't write your name.
- (15 min) **Phase II:** Walk around the room looking at your classmates' pieces. Give out at least **8** index cards of anonymous feedback. Each cardboard piece should at least have 2 index cards of feedback! Mention (1) how you think this piece is capturing the prompt (2) one thing you like and any other comments or questions.
- (5 min) **Phase III:** Take time to read your feedback. If you'd like to respond to any comments to the whole class, now's your chance.

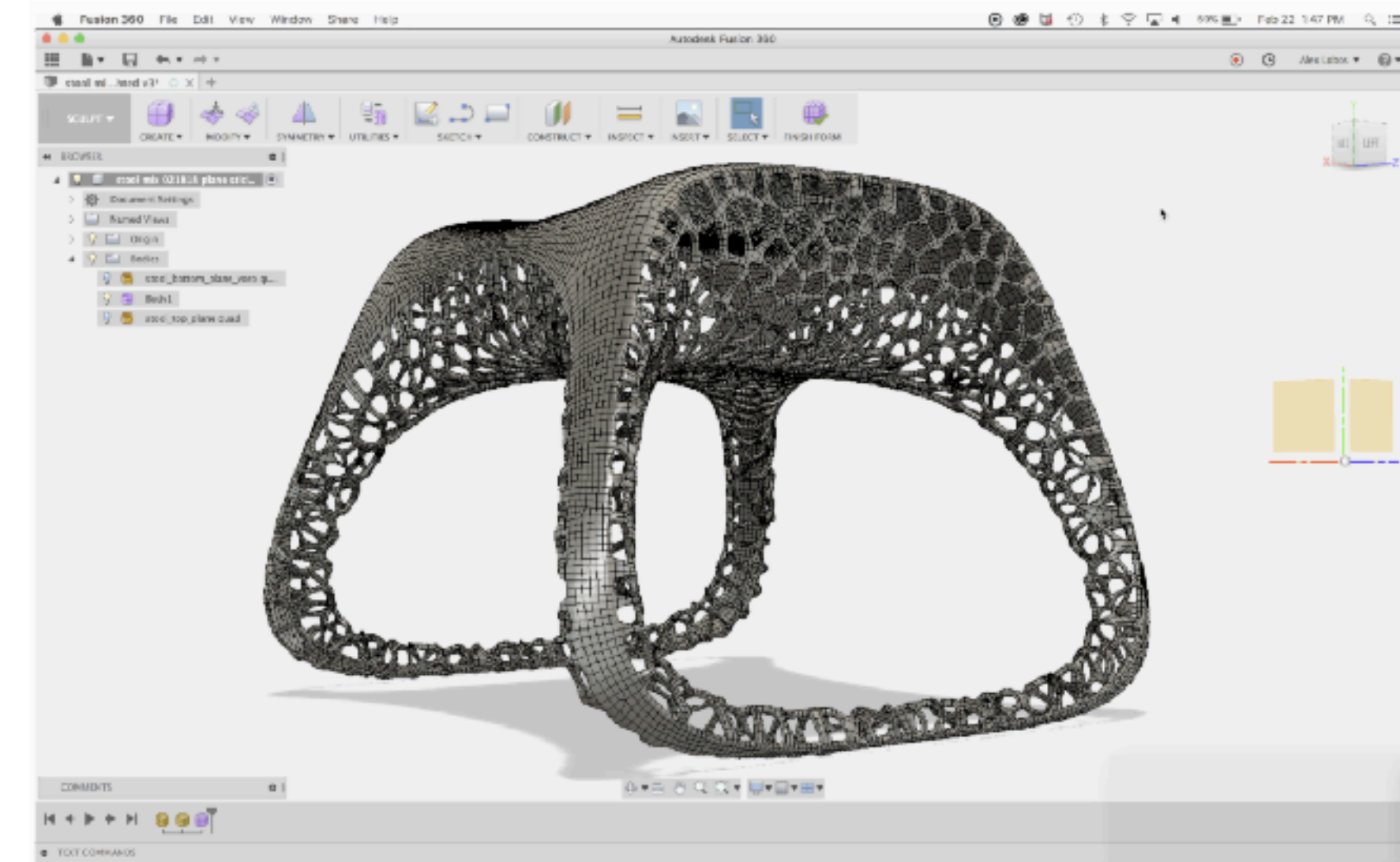
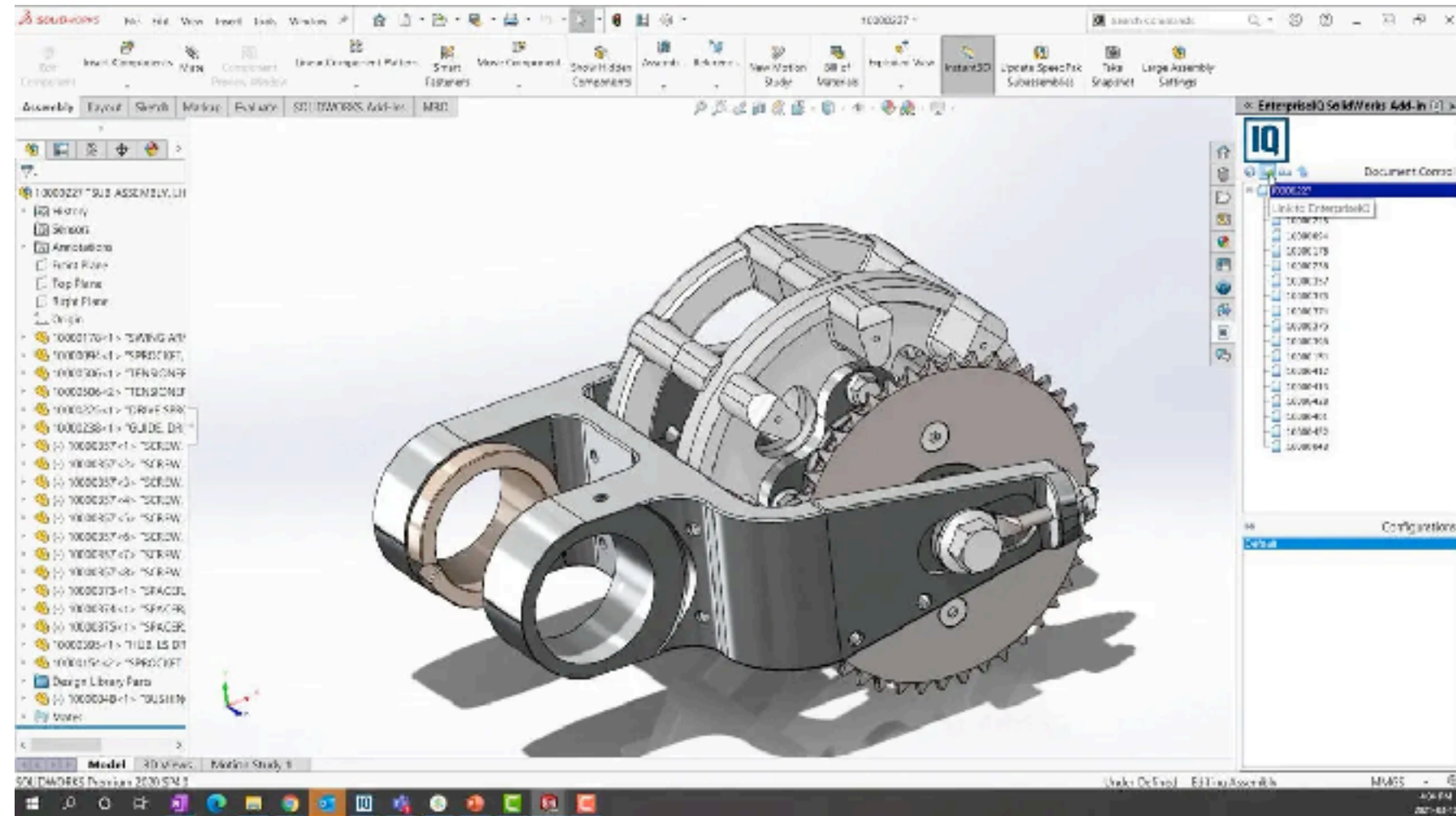
Digital Fabrication

Most things around you are digitally fabricated

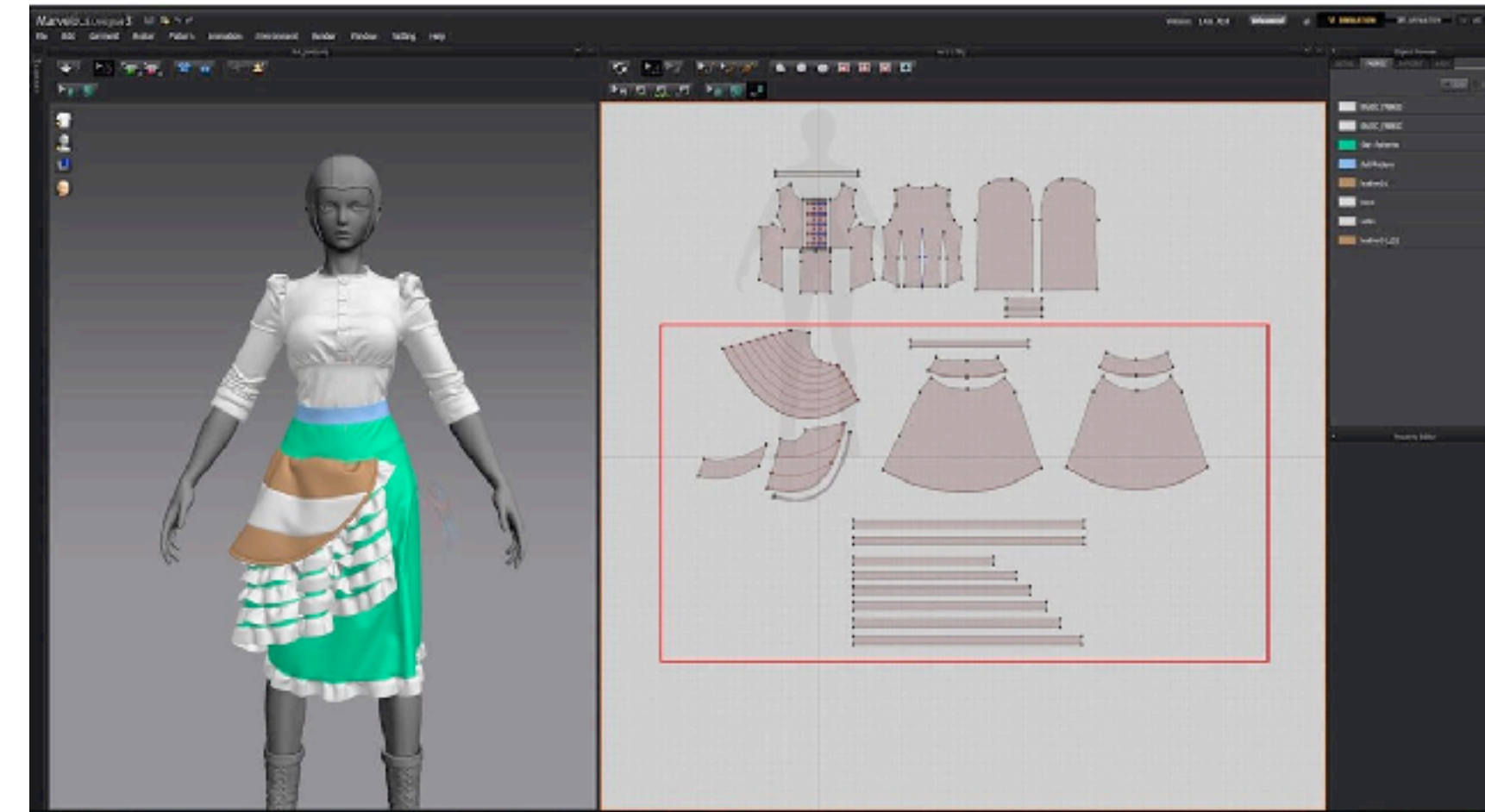


- But designed by humans, usually on computer software: computer-aided design (CAD)

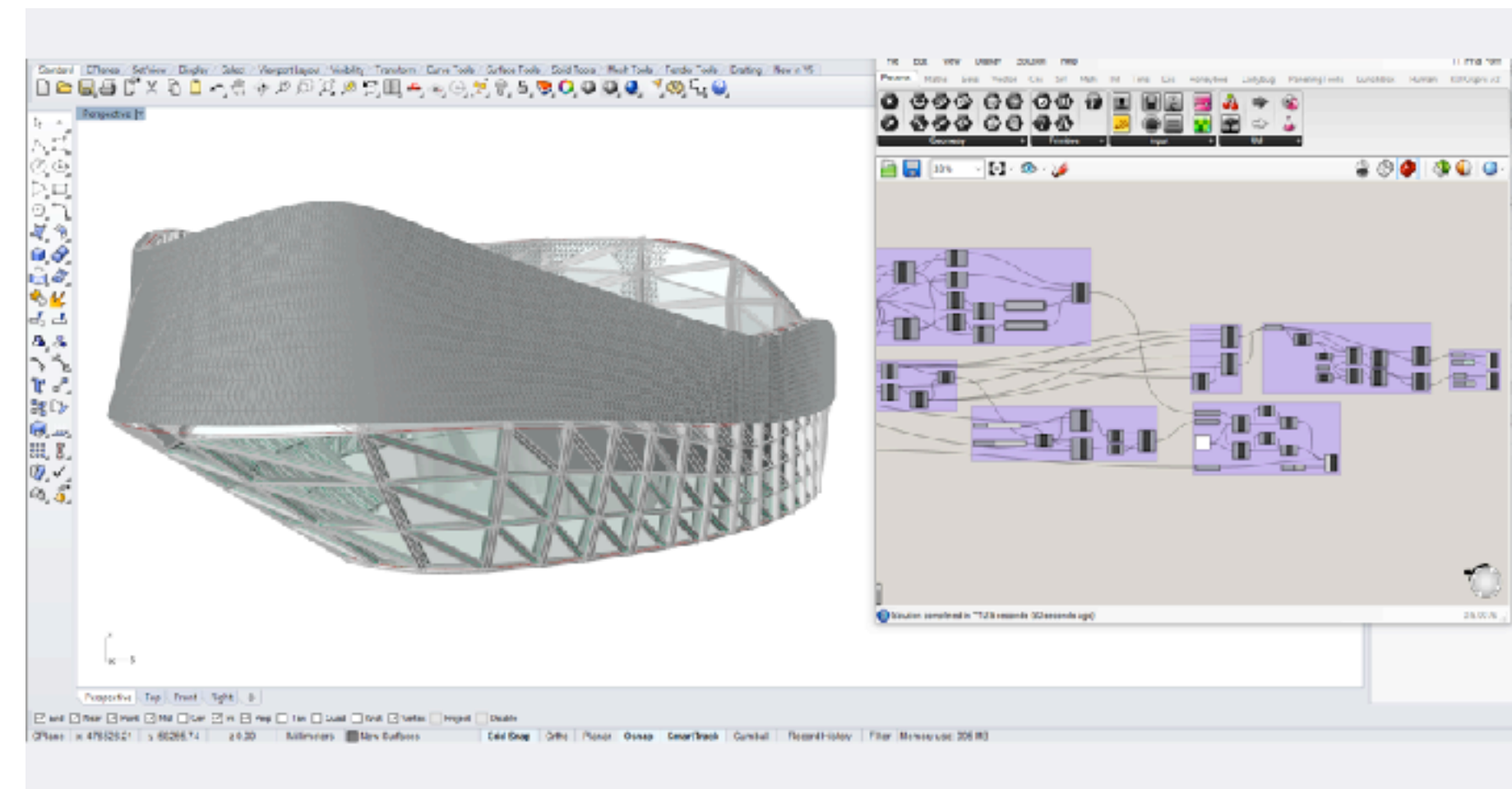
CAD abstracts design from manufacturing



Solidworks, Fusion360 (3D models)

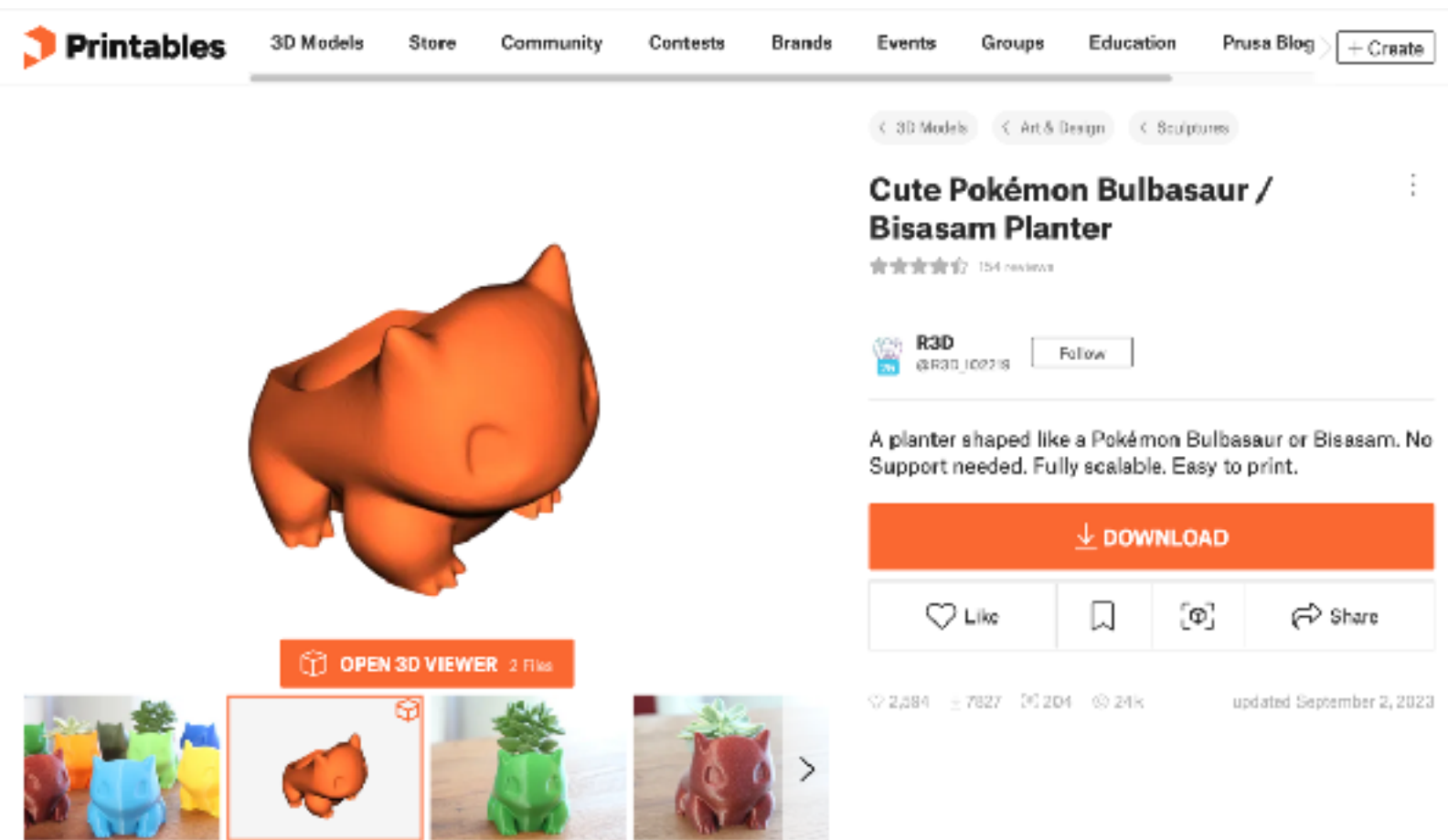


Marvelous Designer (fashion)



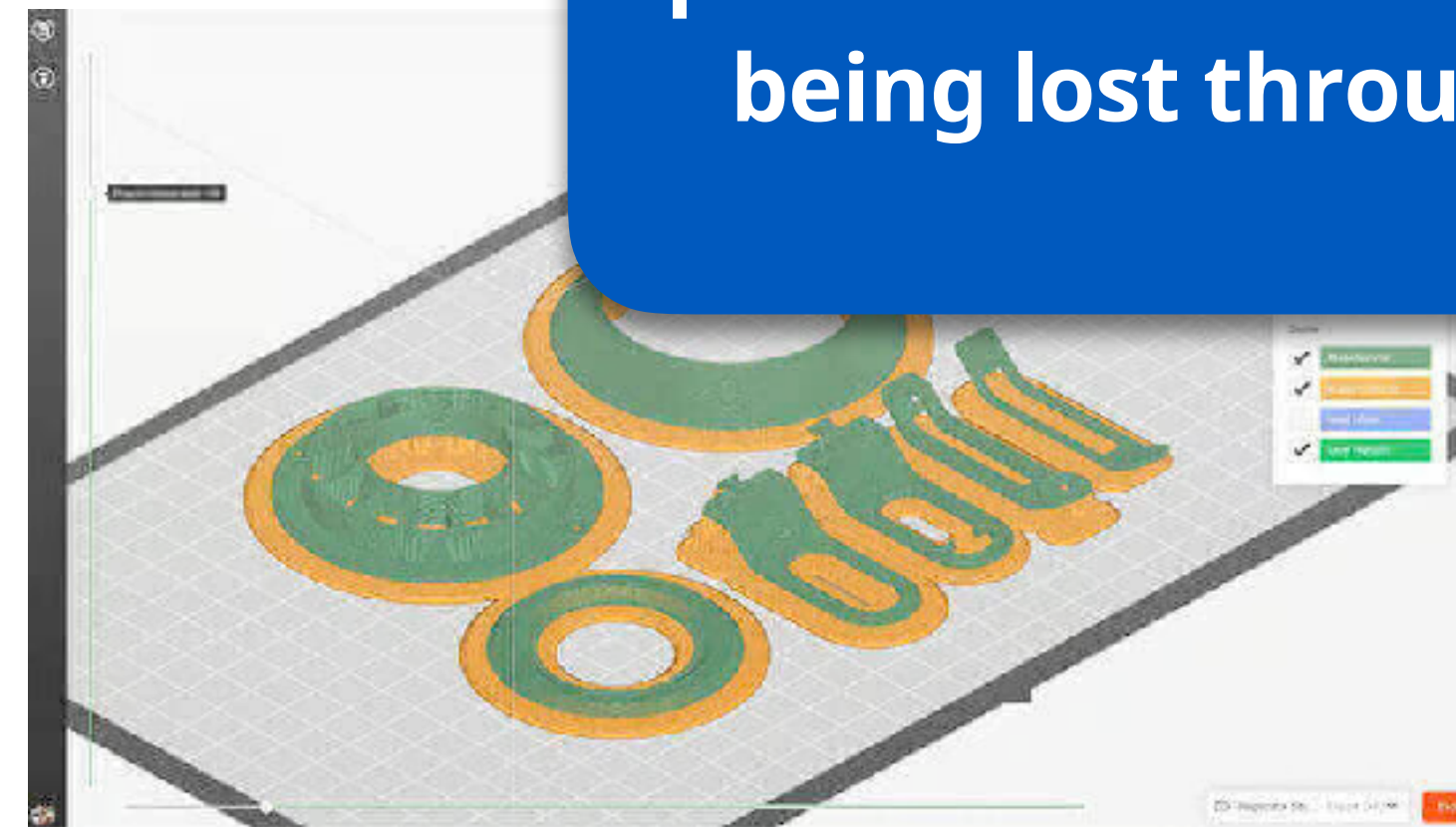
Grasshopper (architecture, generative art)

CAD → CAM cycle



Design a software representation of what we want to make

Computer-aided design (CAD)



Turn our software representation into machine paths

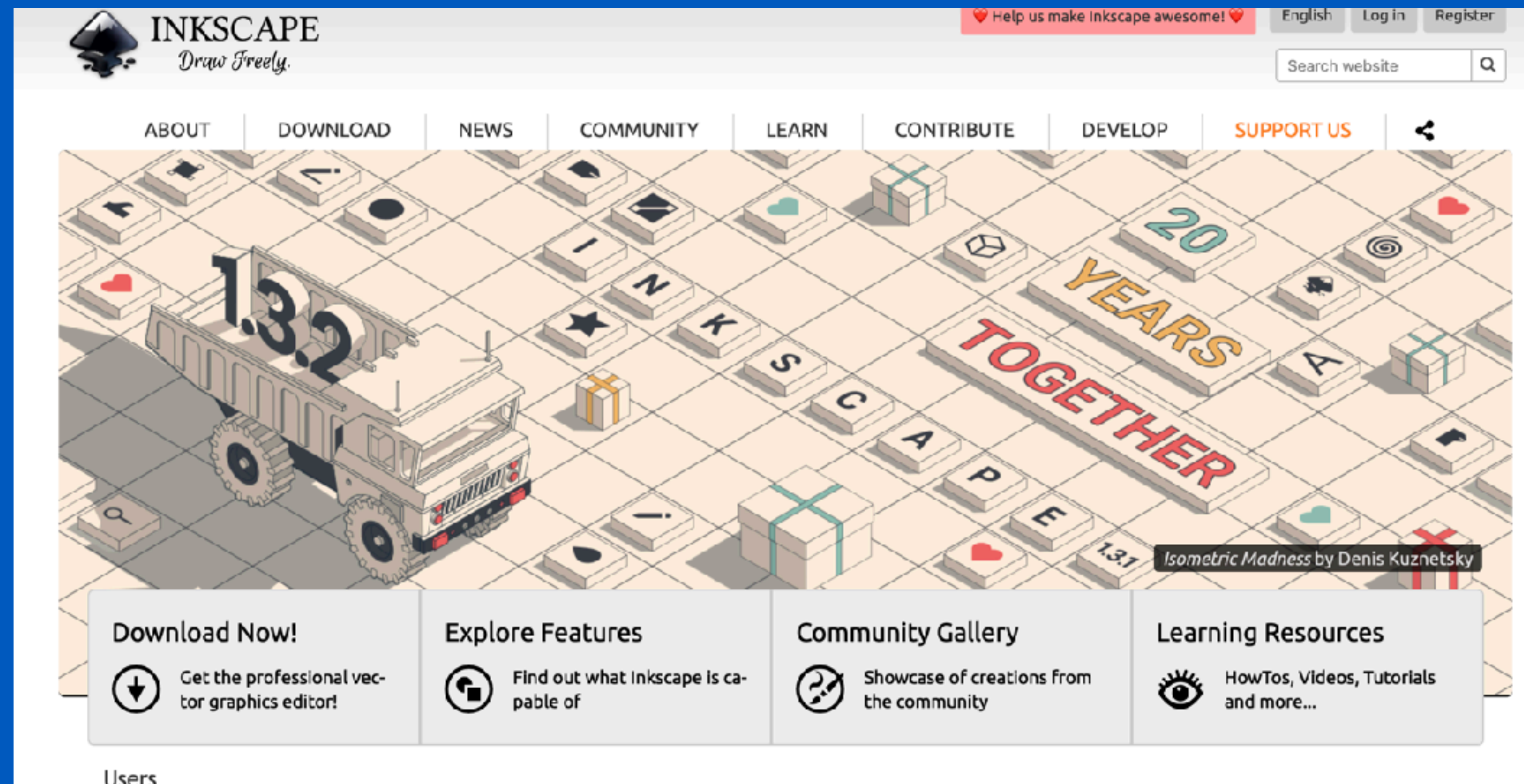
Computer-aided manufacturing (CAM)



The machine will do the actual "making", humans do the "design"

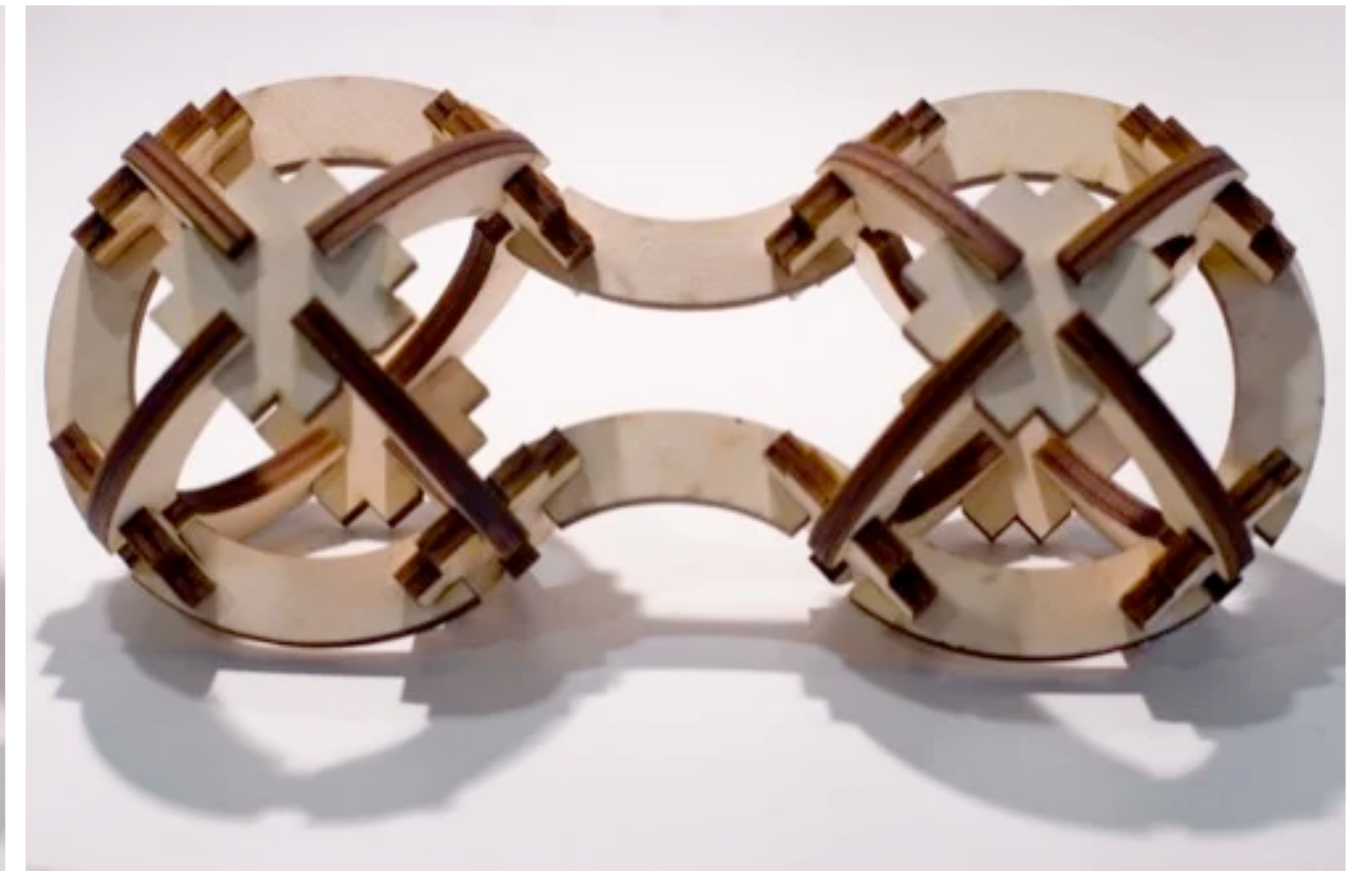
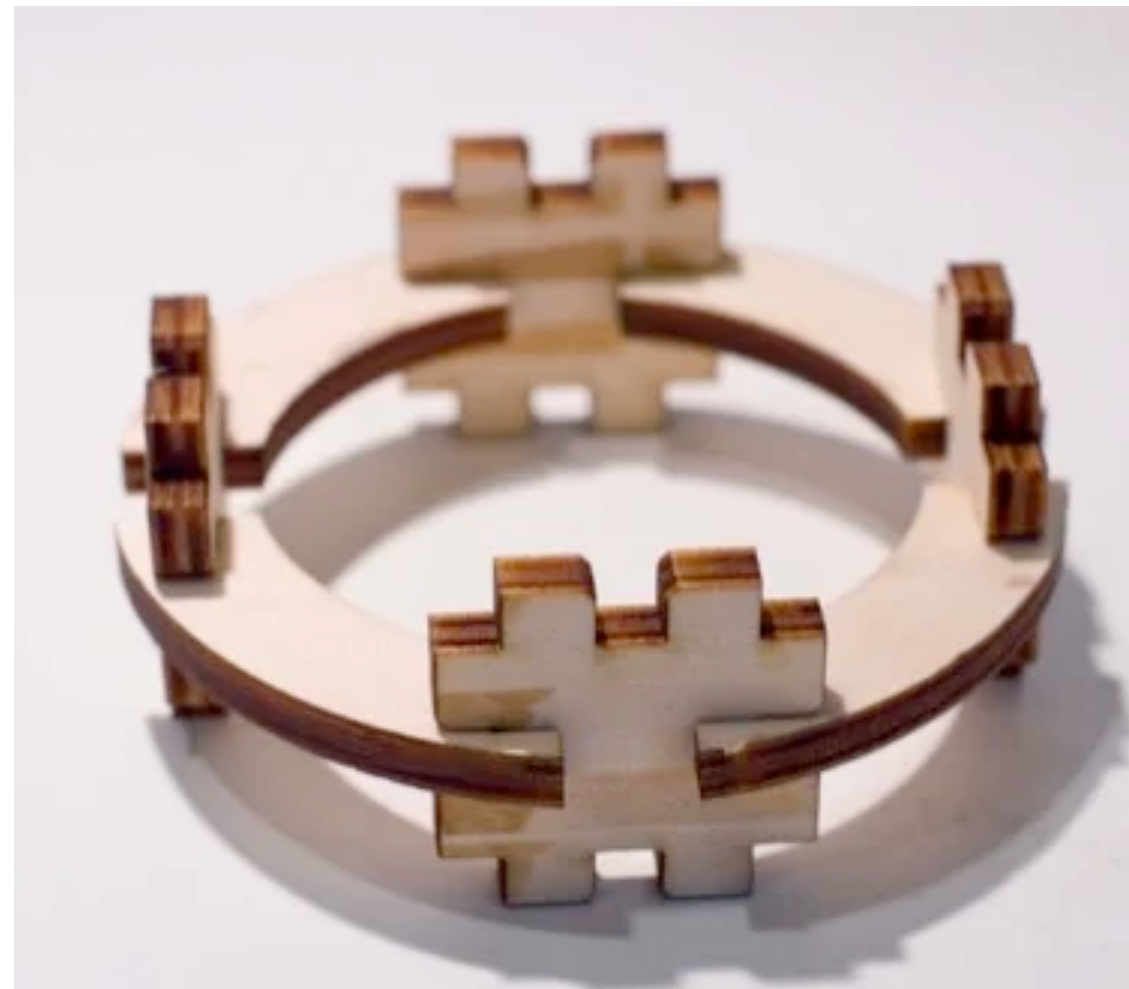
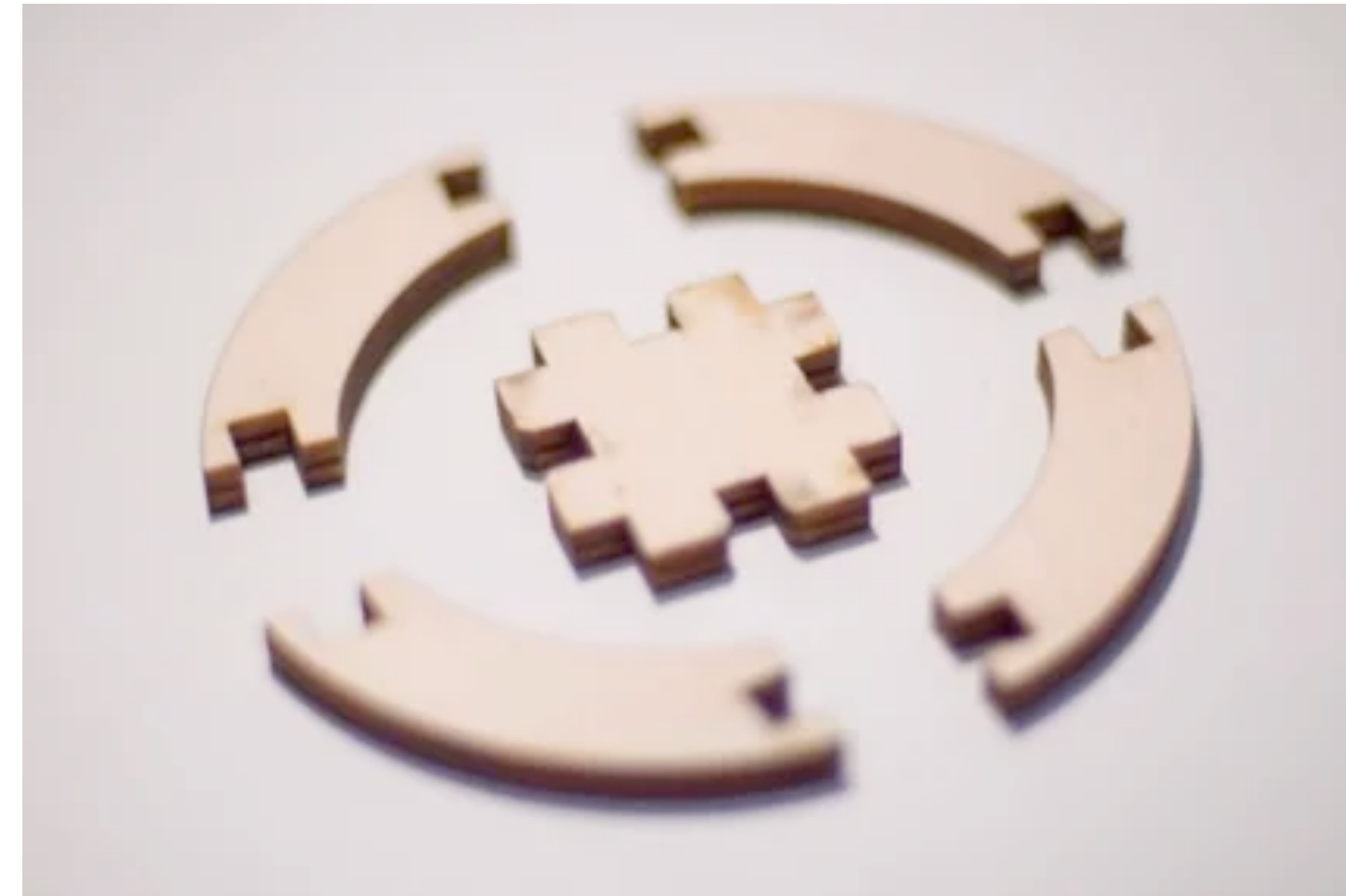
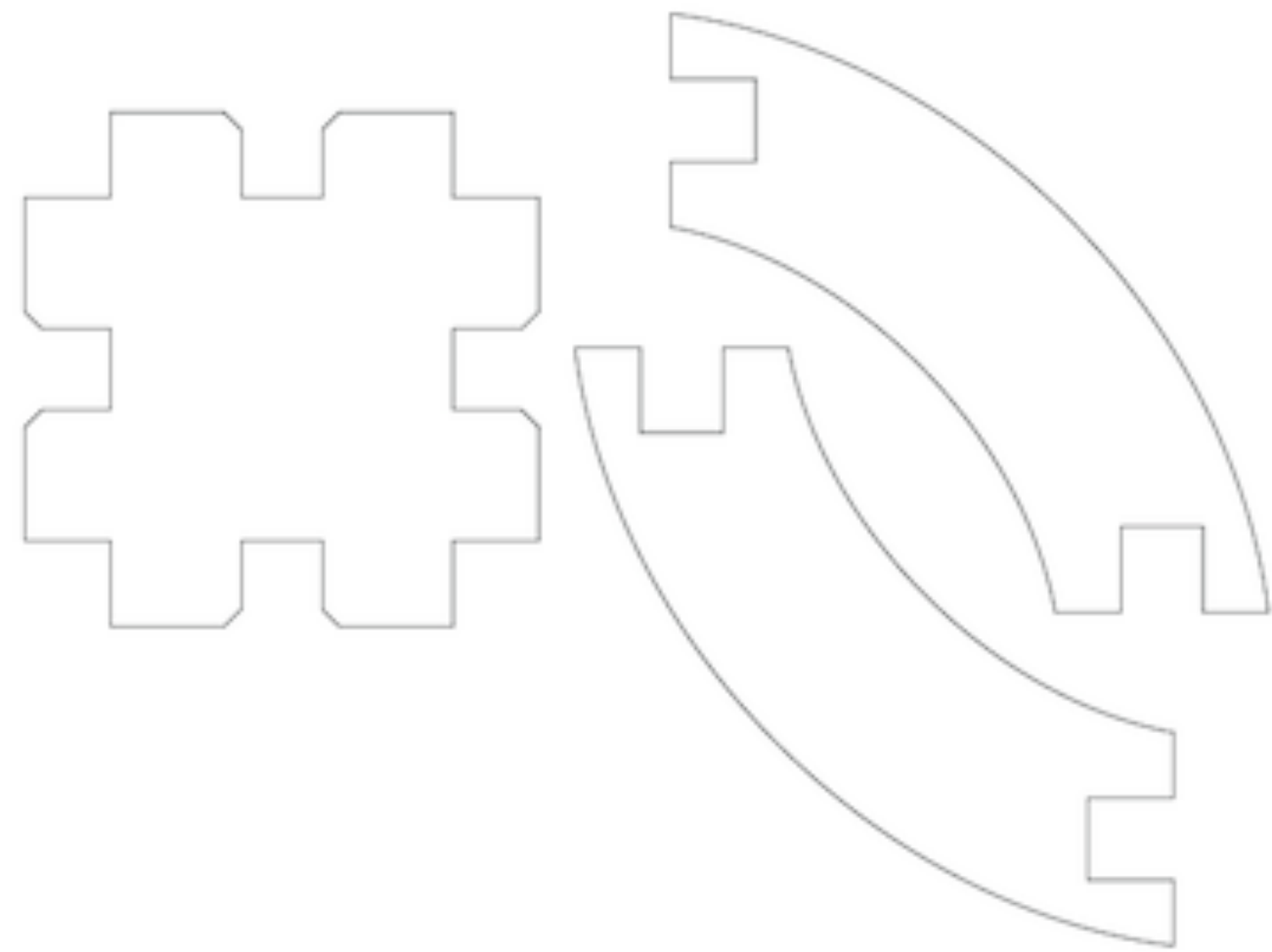
Making no longer requires physical skill (the machine will do it), but just design skill

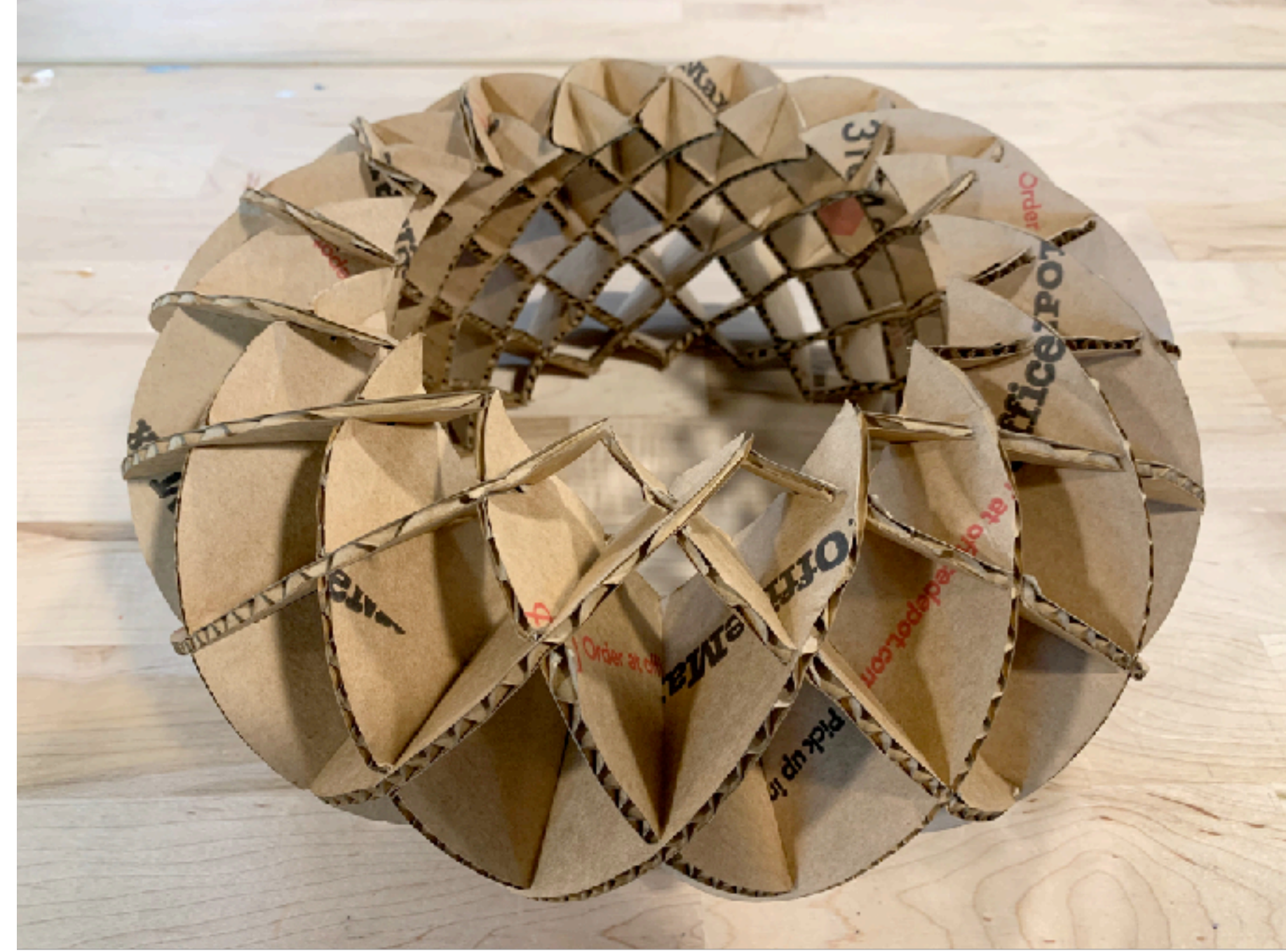
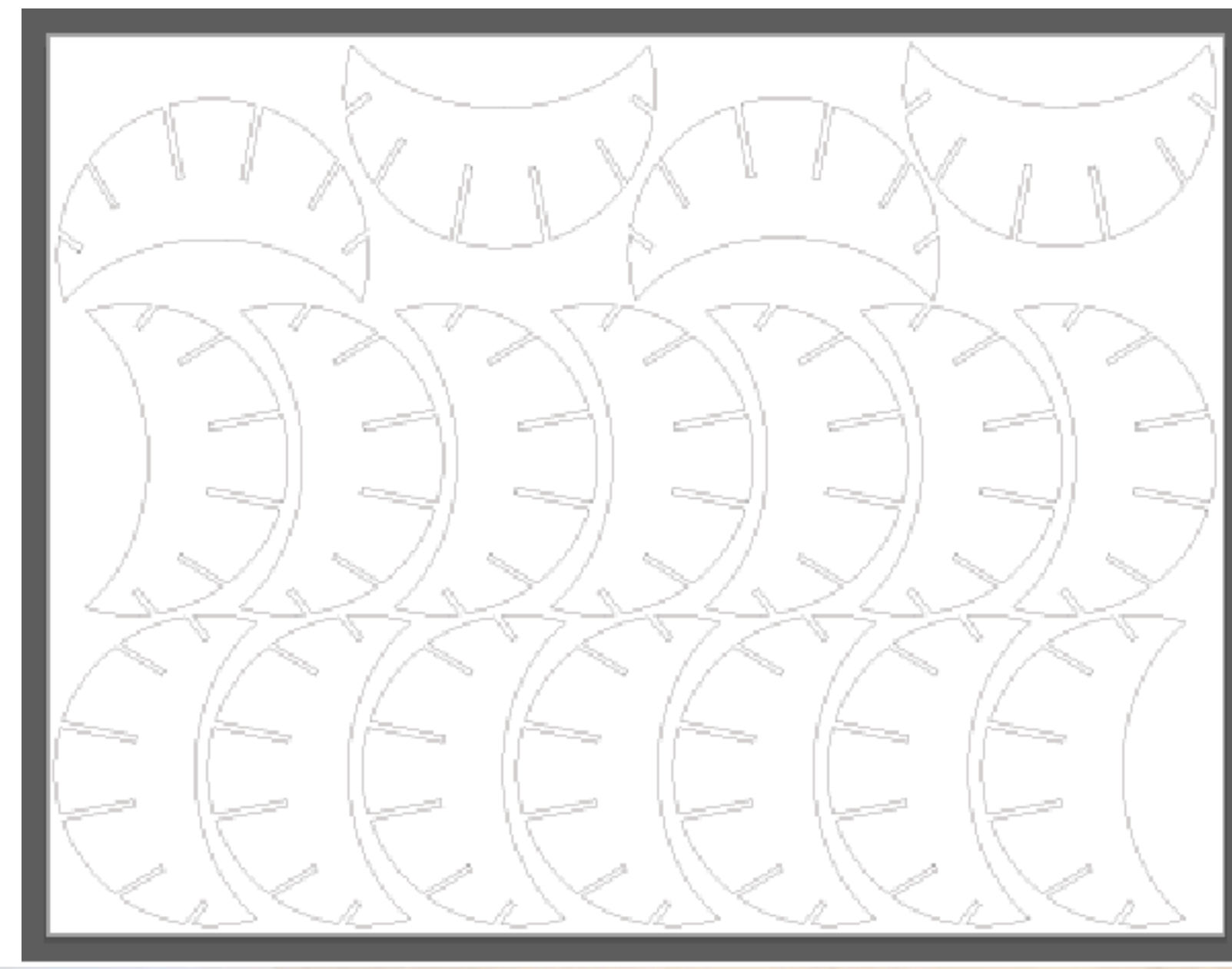
Break



But also, download **Inkscape** or another vector art program

PM3: Press Fit Kit



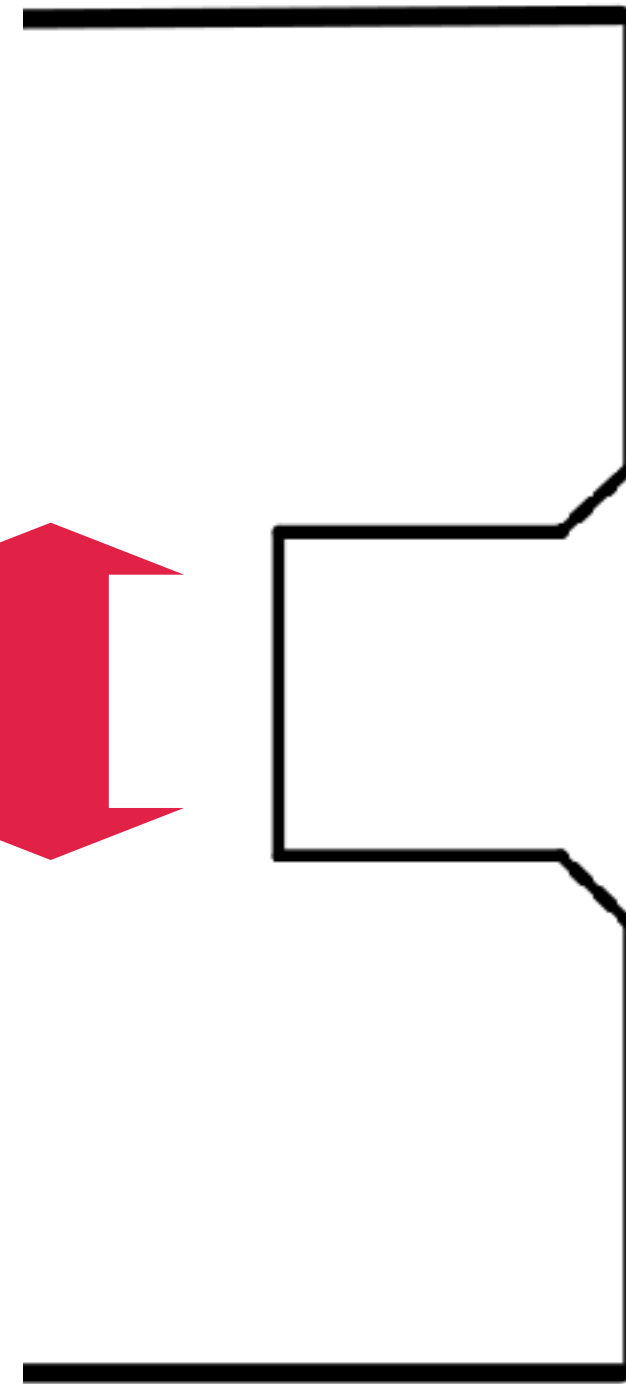
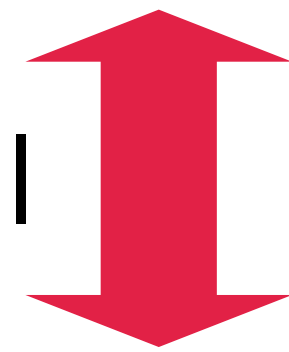


By Hannah Nursalim, <https://hcnursalim.github.io/assignment1.html>

By Kellie Dunn, <https://kelliead.github.io/assignment1.html>

Designing accurate press fits: measure twice

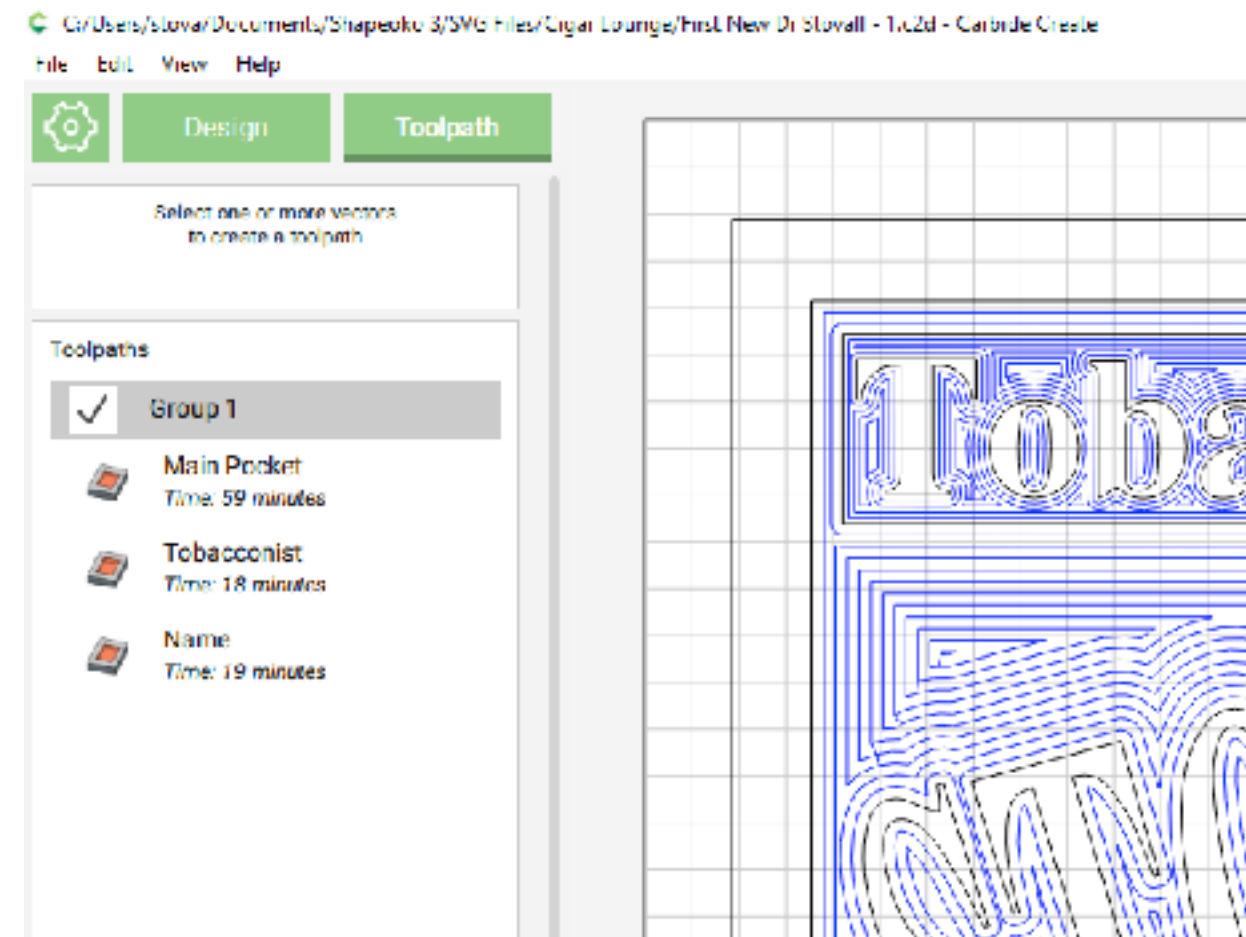
Thickness of material



45° notches (chamfer) to help guide the material in

Cutting from 12 x 17.5 birch plywood: make sure your design fits in less space than that!

Studio: More on Laser Cutting



Use a vector program
(Inkscape, Illustrator) to
draw shapes we want cut

**Computer-aided design
(CAD)**

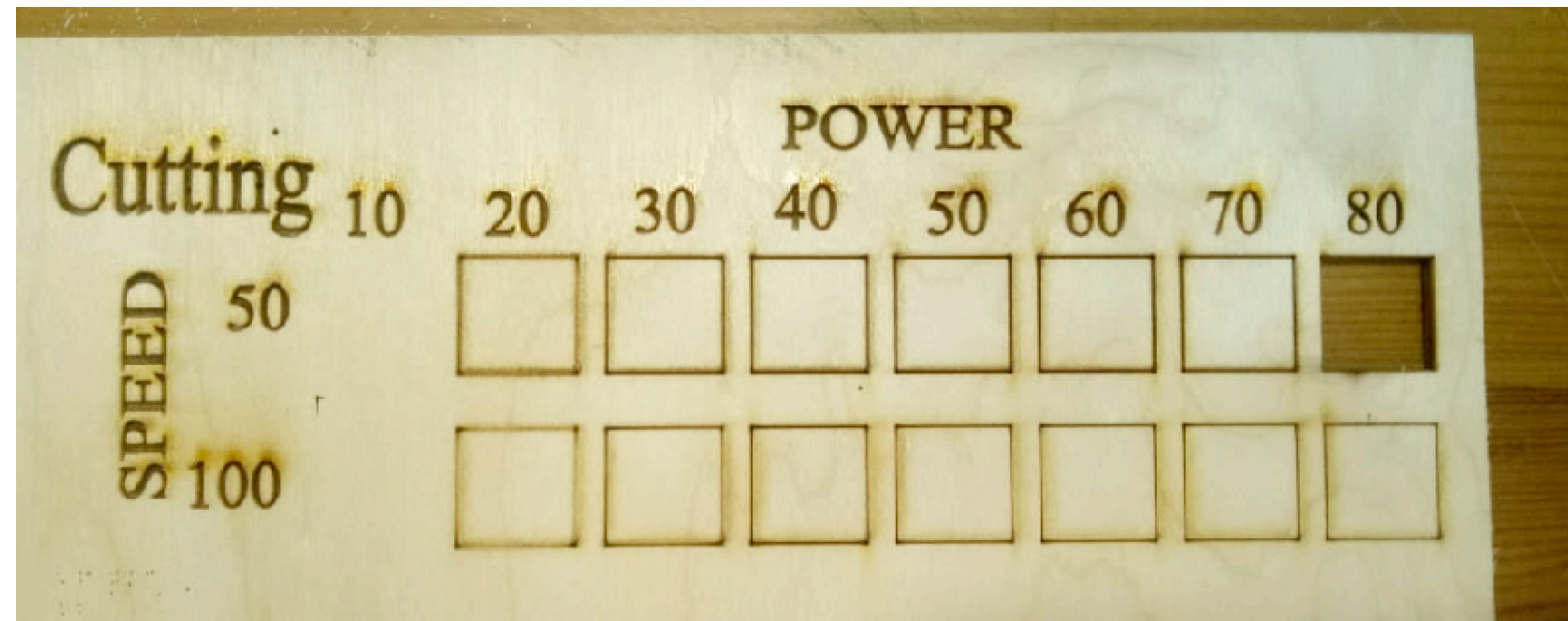
Convert design to
toolpaths on the laser
cutter, which converts it
to motor movements.
Also specify cut settings

**Computer-aided
manufacturing (CAM)**

Cut the piece &
don't start a fire

Laser Cutting terminology/settings

Cutting vs engraving/scoring



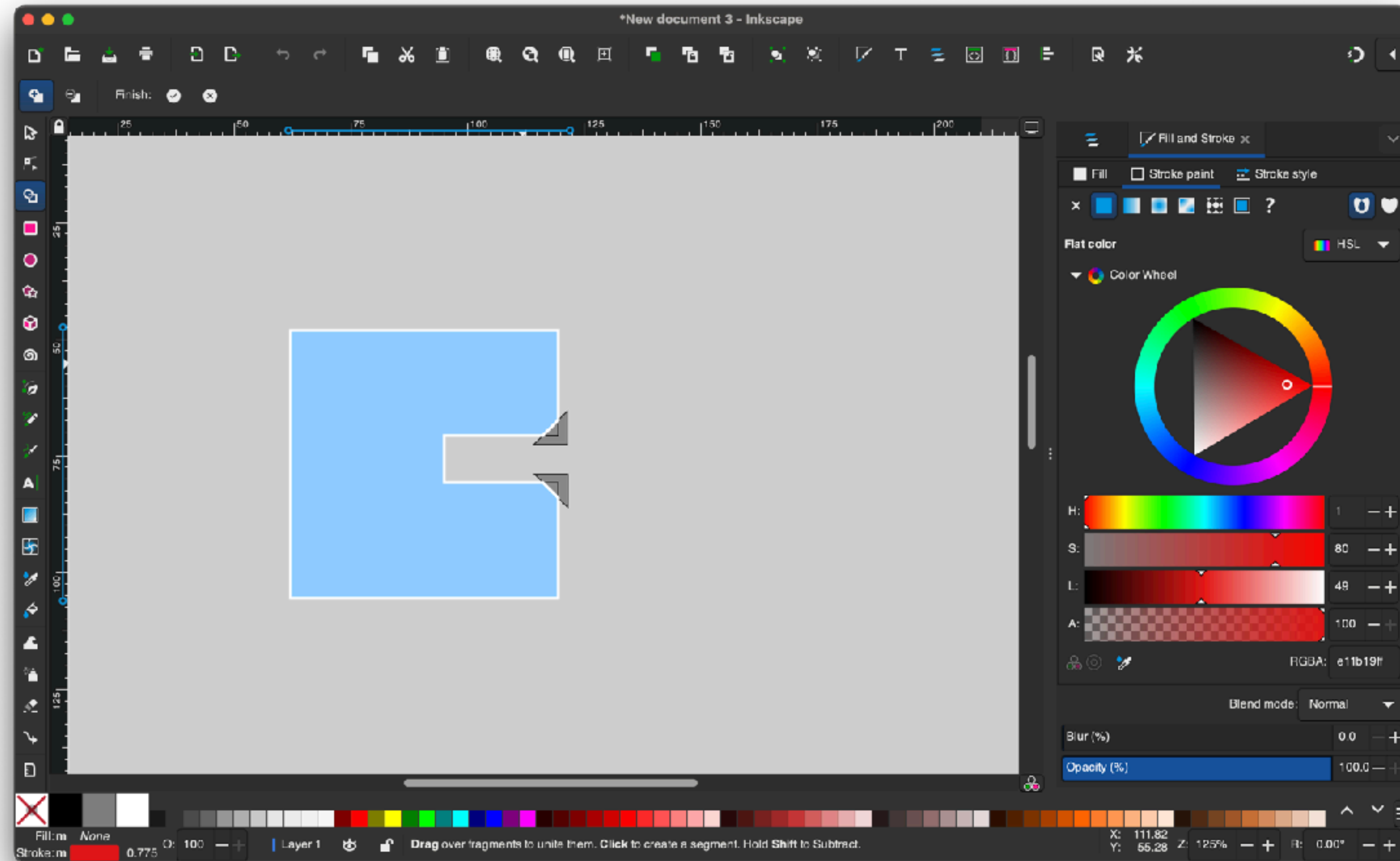
Power & speed



Kerf

How much material is actually removed by the cut

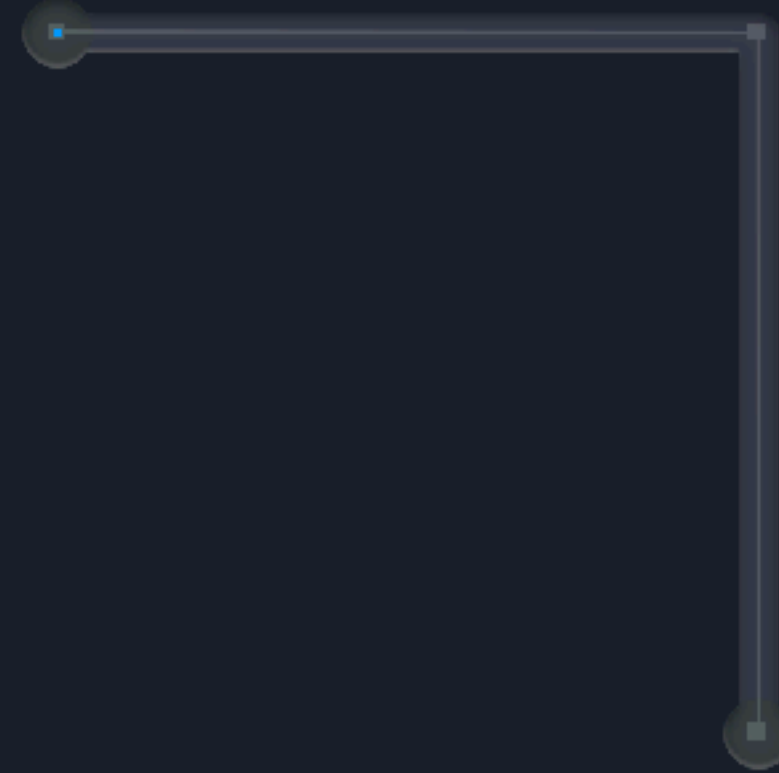
Vector graphics tutorial (in Inkscape)



⌘Z Undo ⌘⇧Z Redo ⌘X Clear Stage ⌘⇧ Snap to Angle ⇧ Unlink Control Handles

The Bézier Game

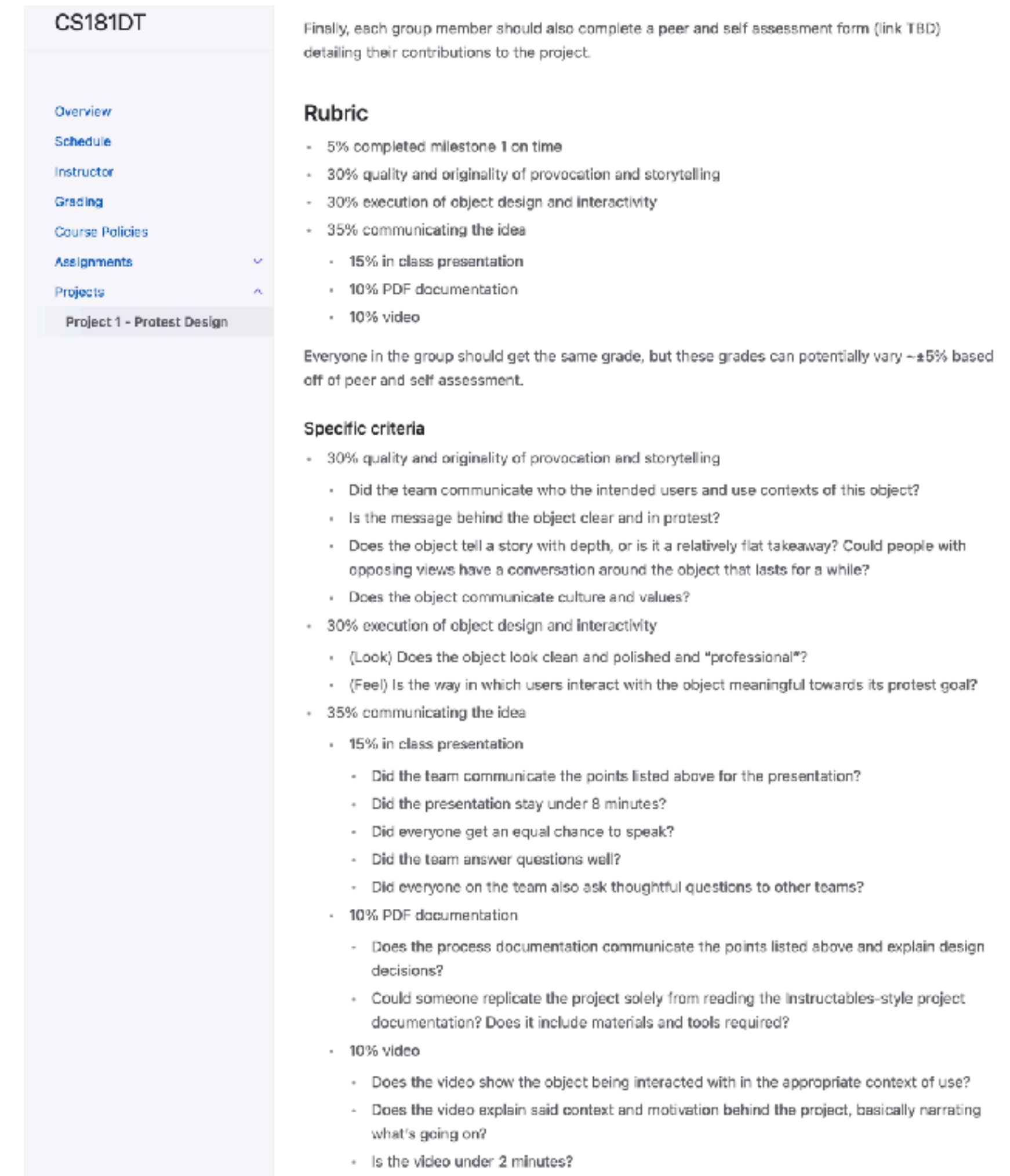
A game to help you master the  pen tool



<https://bezier.method.ac/>

Class 5 recap

- TODOs:
 - By **Thursday's** class:
 - P1 milestone: storyboards
 - Zipcrit from Cassidy
 - Do the HMC Makerspace general and 3D printing/laser cutter training (make.hmc.edu) -> we'll be touring the space and seeing a laser cutter demo for most of class
 - PM3 is due in 2.5 weeks (after Project 1), but that's to give everyone ample time to use the laser cutter - *get started early!*



CS181DT

- Overview
- Schedule
- Instructor
- Grading
- Course Policies
- Assignments
- Projects
- Project 1 - Protest Design

Finally, each group member should also complete a peer and self assessment form (link TBD) detailing their contributions to the project.

Rubric

- 5% completed milestone 1 on time
- 30% quality and originality of provocation and storytelling
- 30% execution of object design and interactivity
- 35% communicating the idea
 - 15% in class presentation
 - 10% PDF documentation
 - 10% video

Everyone in the group should get the same grade, but these grades can potentially vary $\pm 5\%$ based off of peer and self assessment.

Specific criteria

- 30% quality and originality of provocation and storytelling
 - Did the team communicate who the intended users and use contexts of this object?
 - Is the message behind the object clear and in protest?
 - Does the object tell a story with depth, or is it a relatively flat takeaway? Could people with opposing views have a conversation around the object that lasts for a while?
 - Does the object communicate culture and values?
- 30% execution of object design and interactivity
 - (Look) Does the object look clean and polished and "professional"?
 - (Feel) Is the way in which users interact with the object meaningful towards its protest goal?
- 35% communicating the idea
 - 15% in class presentation
 - Did the team communicate the points listed above for the presentation?
 - Did the presentation stay under 8 minutes?
 - Did everyone get an equal chance to speak?
 - Did the team answer questions well?
 - Did everyone on the team also ask thoughtful questions to other teams?
 - 10% PDF documentation
 - Does the process documentation communicate the points listed above and explain design decisions?
 - Could someone replicate the project solely from reading the instructables-style project documentation? Does it include materials and tools required?
 - 10% video
 - Does the video show the object being interacted with in the appropriate context of use?
 - Does the video explain said context and motivation behind the project, basically narrating what's going on?
 - Is the video under 2 minutes?