99-353 SolidWorks and Laser Cutting

Kerf and Joinery

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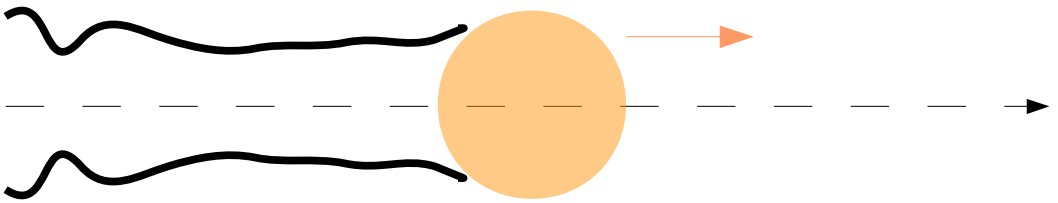
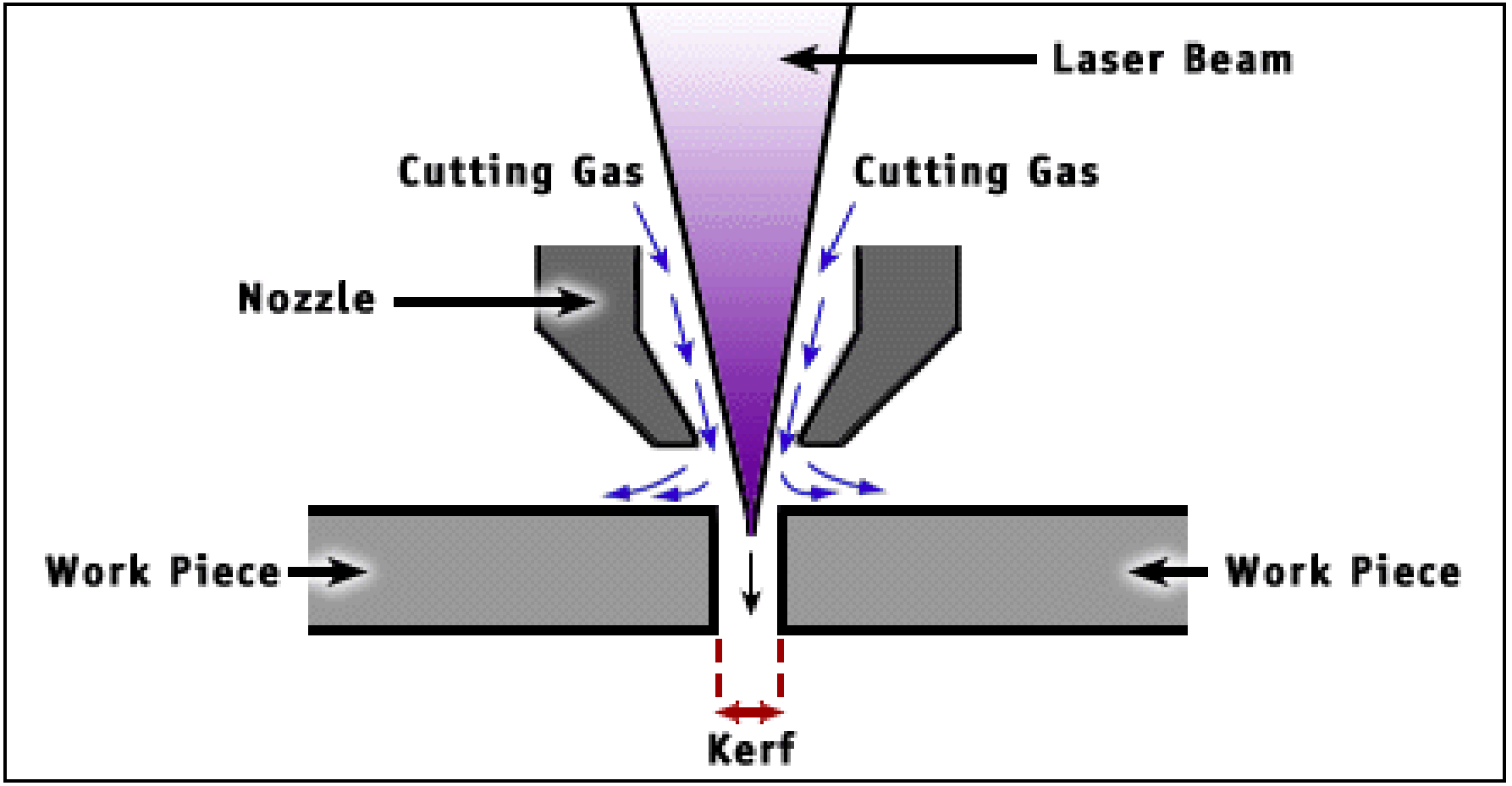
Beam Width

- The beam cuts by burning and melting.
- The width of the beam is non-negligible.



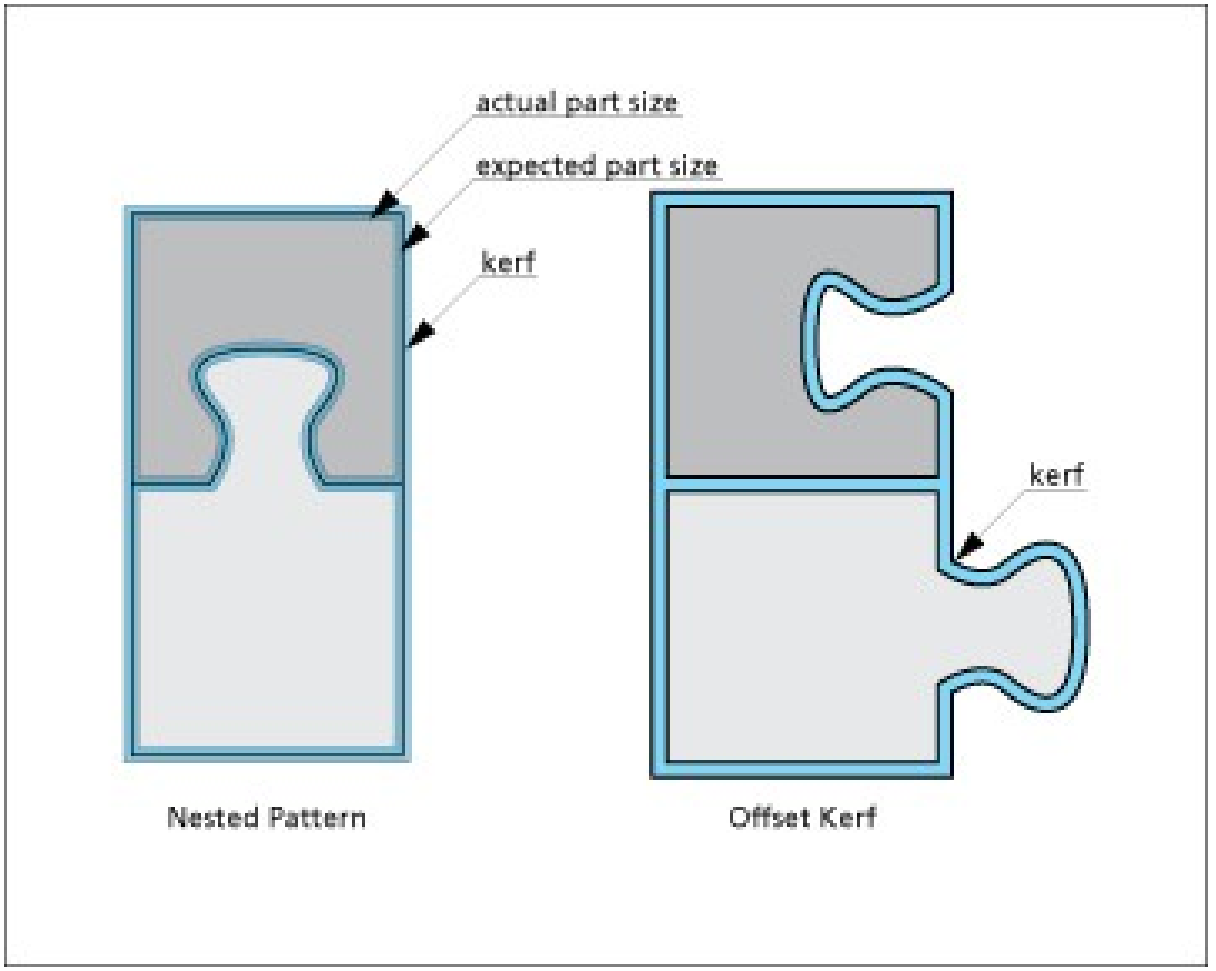
Kerf


Laser Beam
Cutting Gas
Cutting Gas
Nozzle
Work Piece
Work Piece
Kerf

Kerf

- Typically 0.08 to 0.45 mm (3 to 18 thousands of an inch), depending on:
  - Laser optics and focusing
  - Type of material
  - Thickness of material
- Consequences:
  - Parts will be undersize
  - Holes will be oversize
- Example: 0.1 inch diameter holes in acrylic:
  - Measured diameter 0.106 inches (kerf 0.006”)

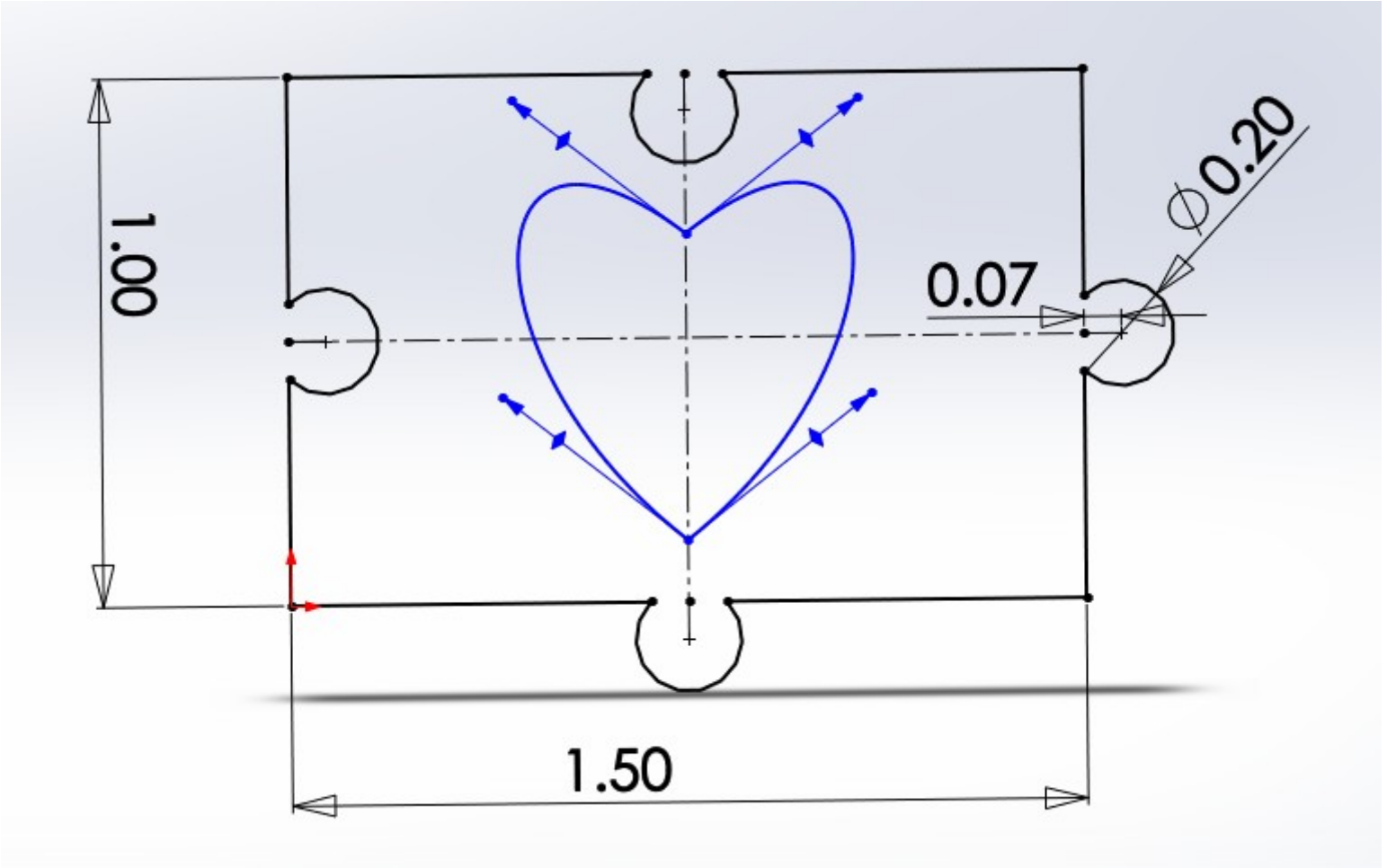
Offset Kerf



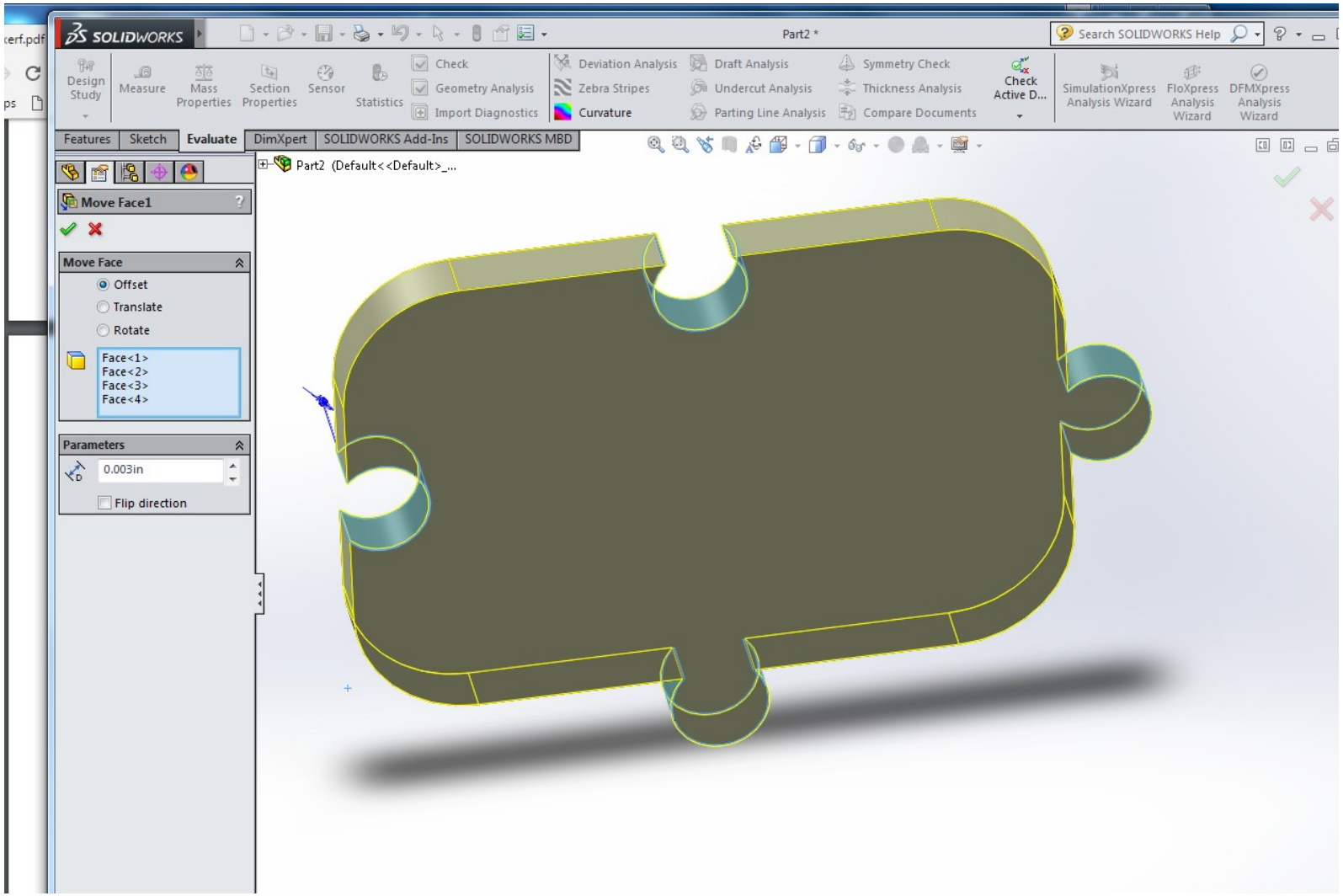
Can do this in SolidWorks with Insert > Faces > Move.

Kerf and Puzzle Pieces

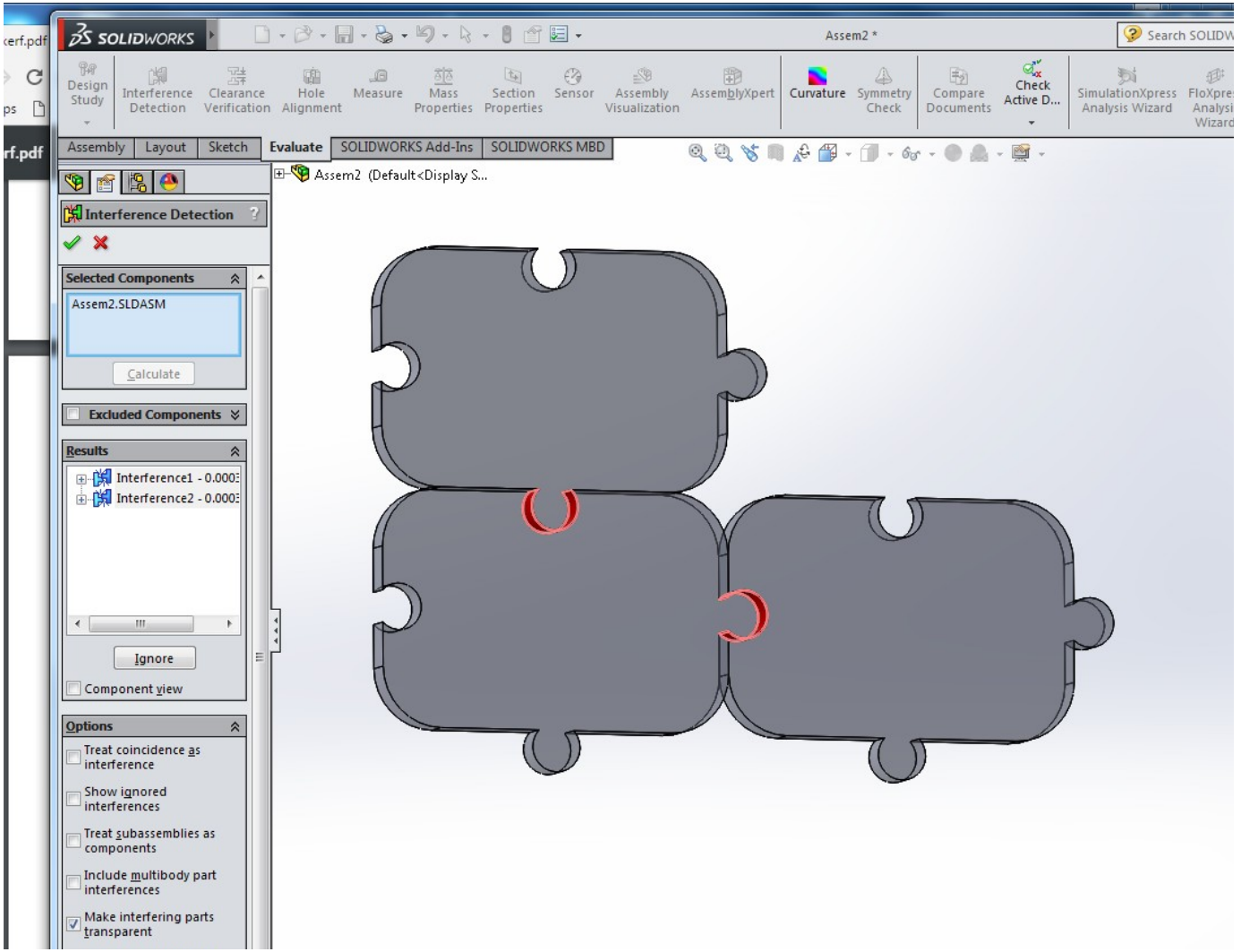
No correction:



Faces > Insert > Move : Offset



Intererence Shows the Offset

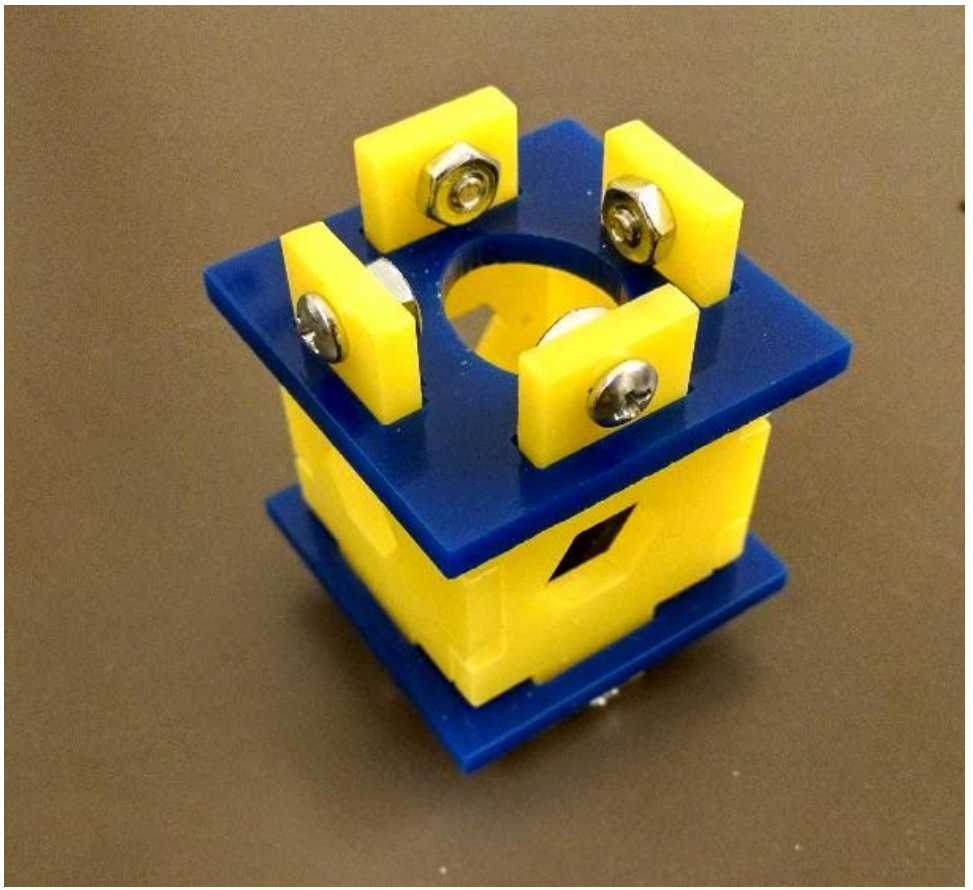


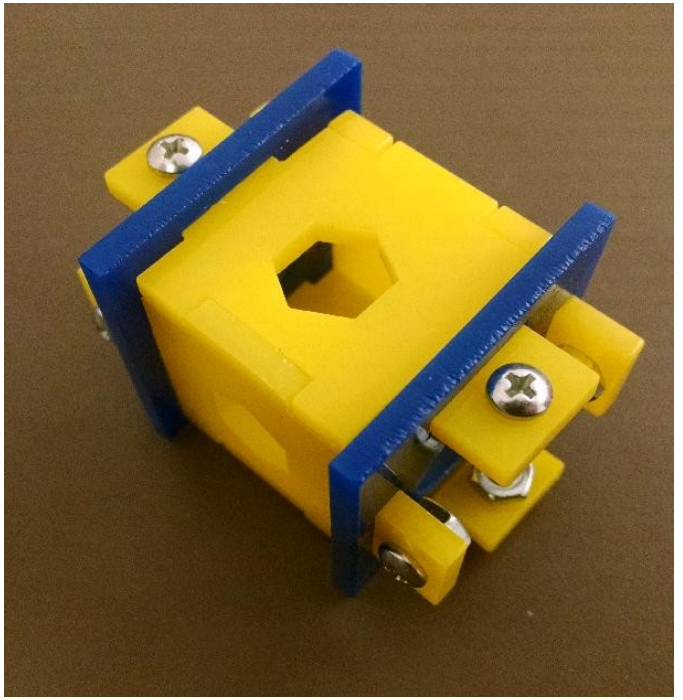
Working With Paper

- You can laser cut paper, card stock, etc.
- Yupo synthetic paper (polyproplylene): waterproof, tear-resistant, recyclable.
- Make your Pocket Transmission pinwheel from Yupo paper for durability.
- Cutting parameters: 50 mm/sec, 50% power

Making a Box

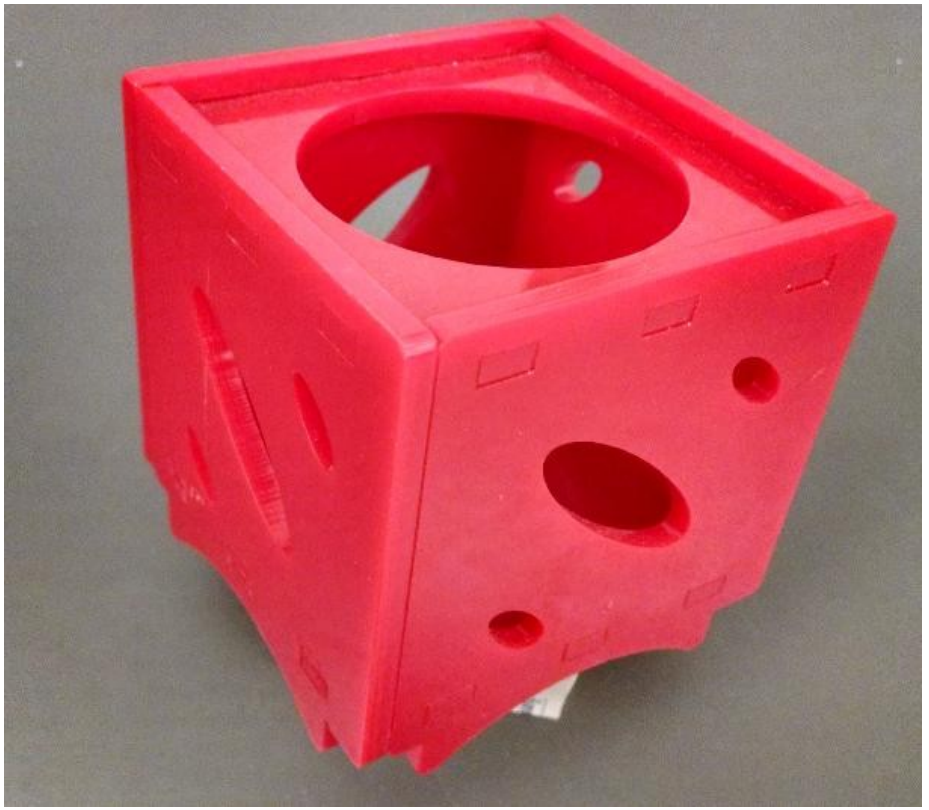
- Tab and slot construction
- Fasteners through the tabs





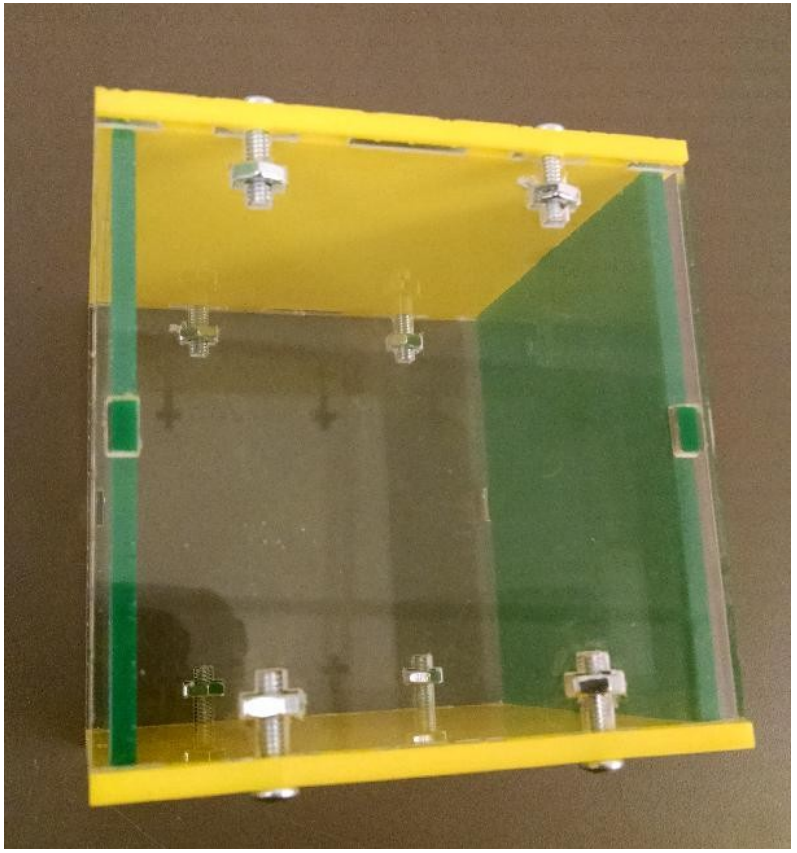
Making a Flush Box

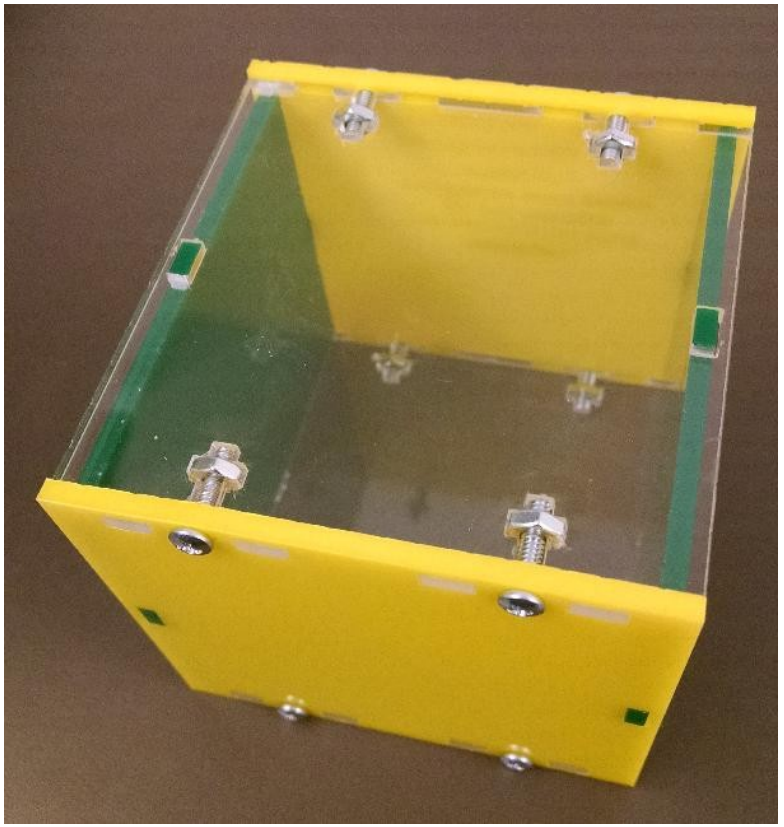
- Tabs are flush with the slots
- Fastened with acrylic cement



T-Slot Joints

- Nut embedded in the panel
- Panels held under tension





T-Slot Pattern

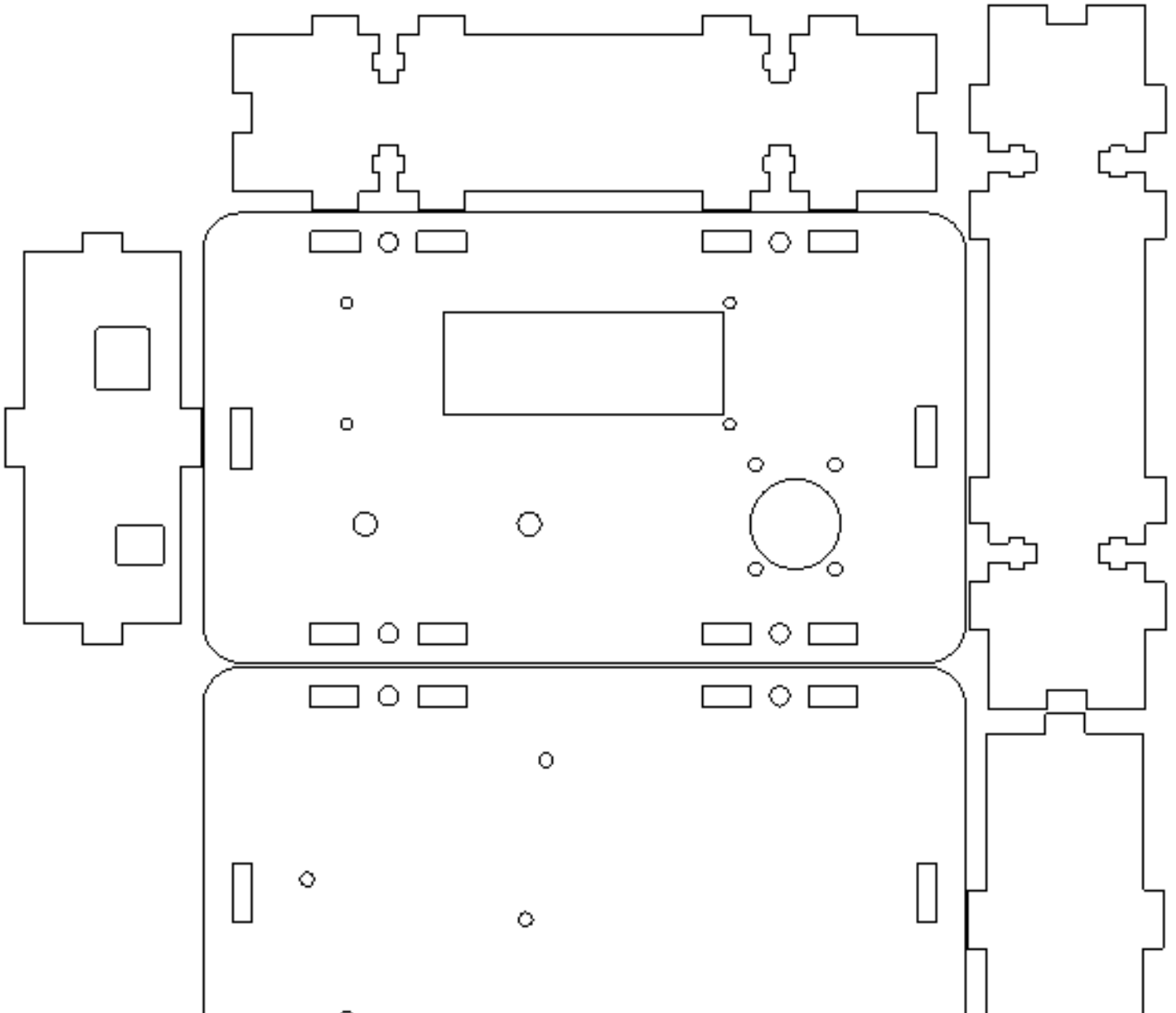


Image from Xiaoyang Kao
xy-kao.com

T-Slot in Wood

Image from Xiaoyang Kao
xy-kao.com

Flash Forge T-Slots

Dragon's Claw Joints

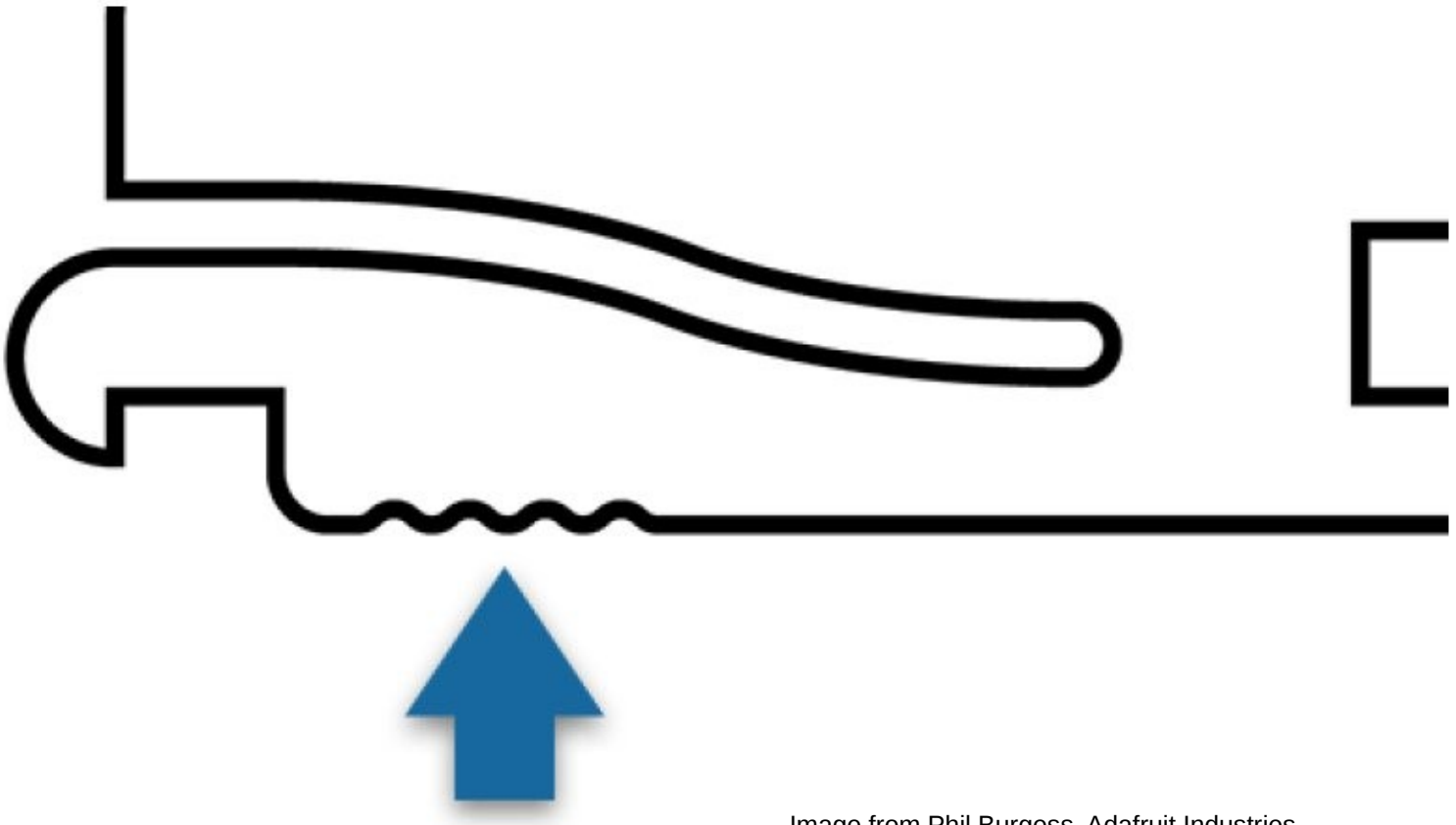


Image from Phil Burgess, Adafruit Industries.

Dragon's Claw

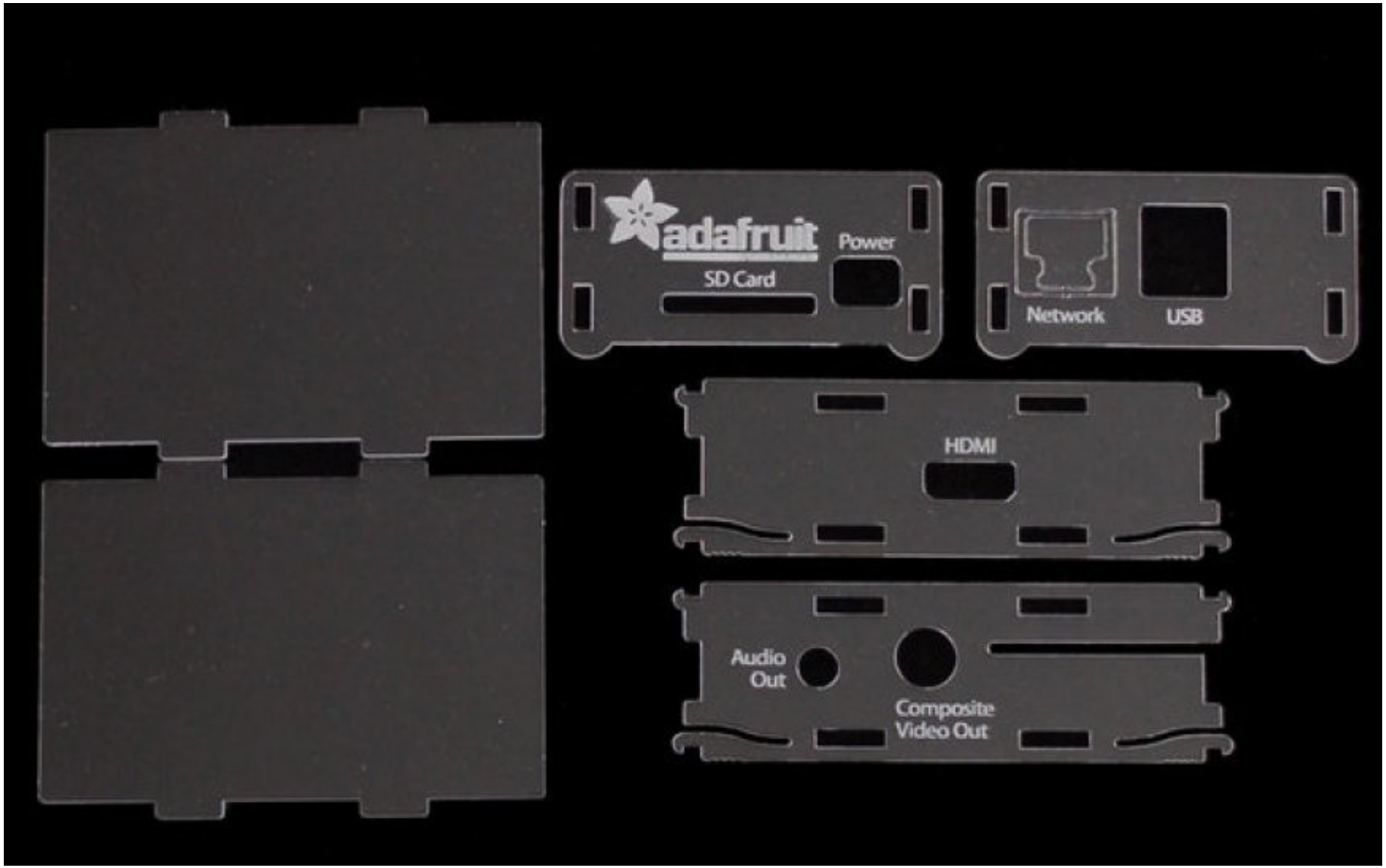


Image from Phil Burgess, Adafruit Industries.

Dragon's Claw

Image from Phil Burgess, Adafruit Industries.

Mirror Matching Parts Instead of Copying Them

Compensates for laser cutter asymmetries: beveled edges due to depth of cut. Otherwise you get a skewed parallelogram instead of a box.

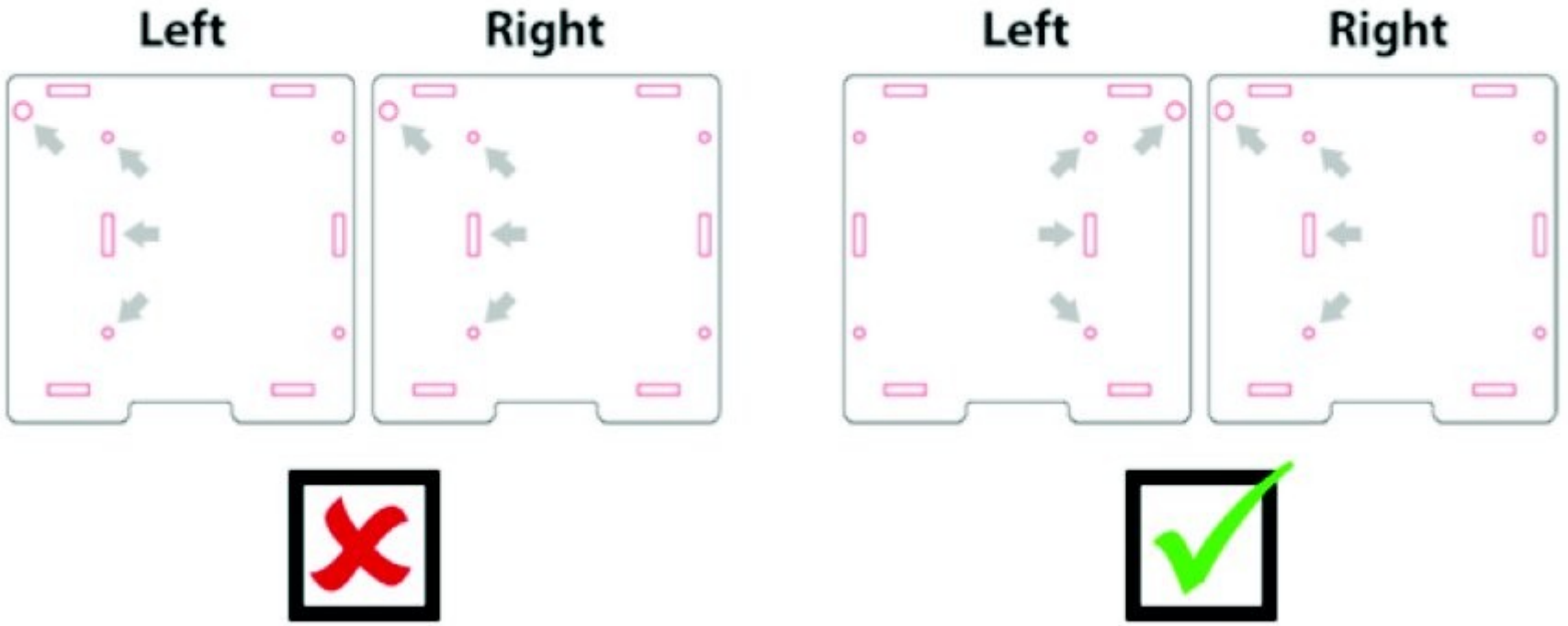
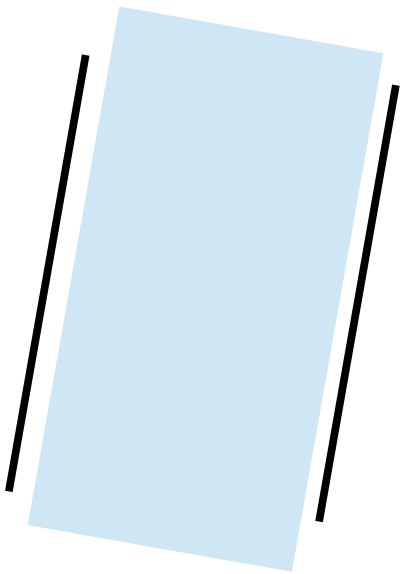
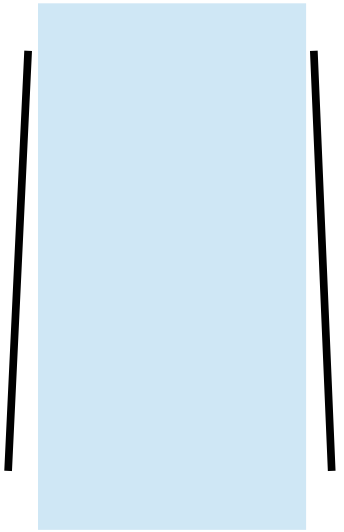


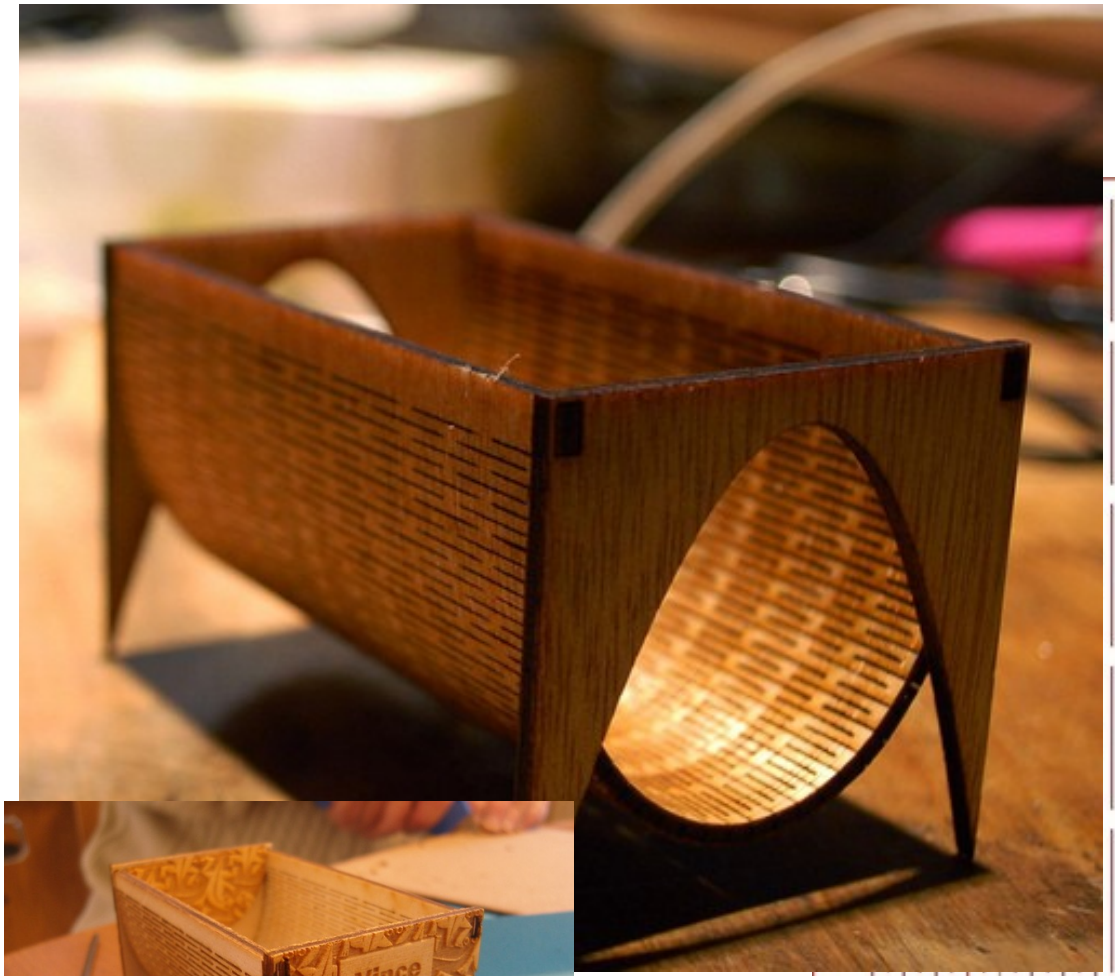
Image from Phil Burgess, Adafruit Industries.

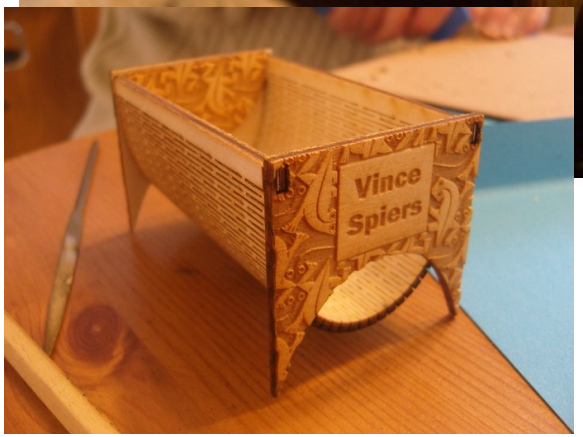
Mirror to Counteract Skew





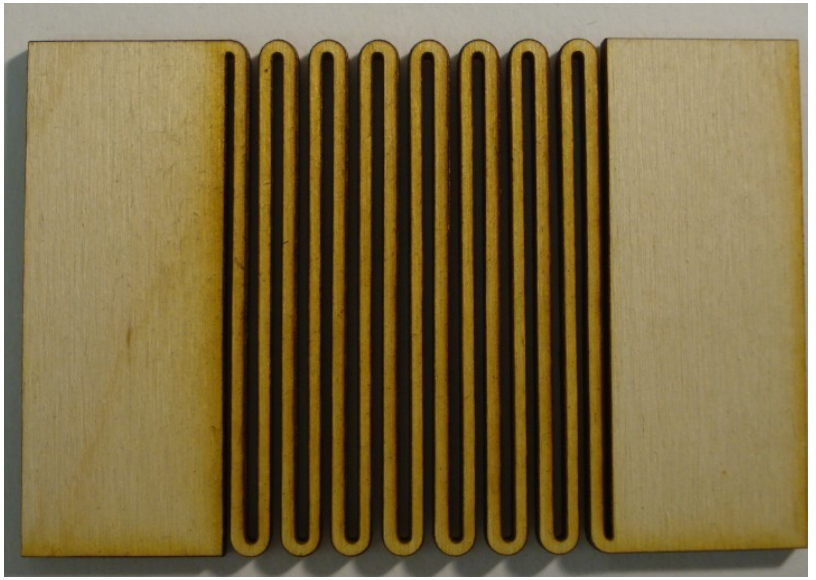
“Living Hinge” in Wood

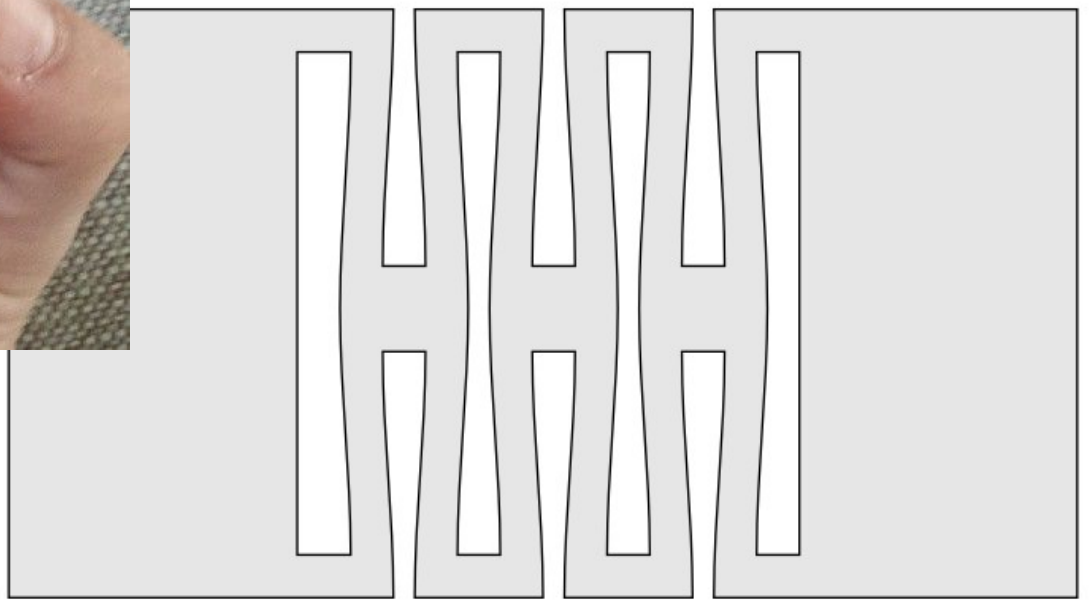




http://www.thingiverse.com/thing:15845

Living Hinges





Engraving

- Engraving uses raster scan to fill in an enclosed countour.
- Select “Engrave” instead of “Cut” in the laser client program.
- To engrave acrylic, use these settings:
  speed 325 mm/sec, power 15%.
- Higher power will cut deeper but can leave artifacts.

Engraving Acrylic