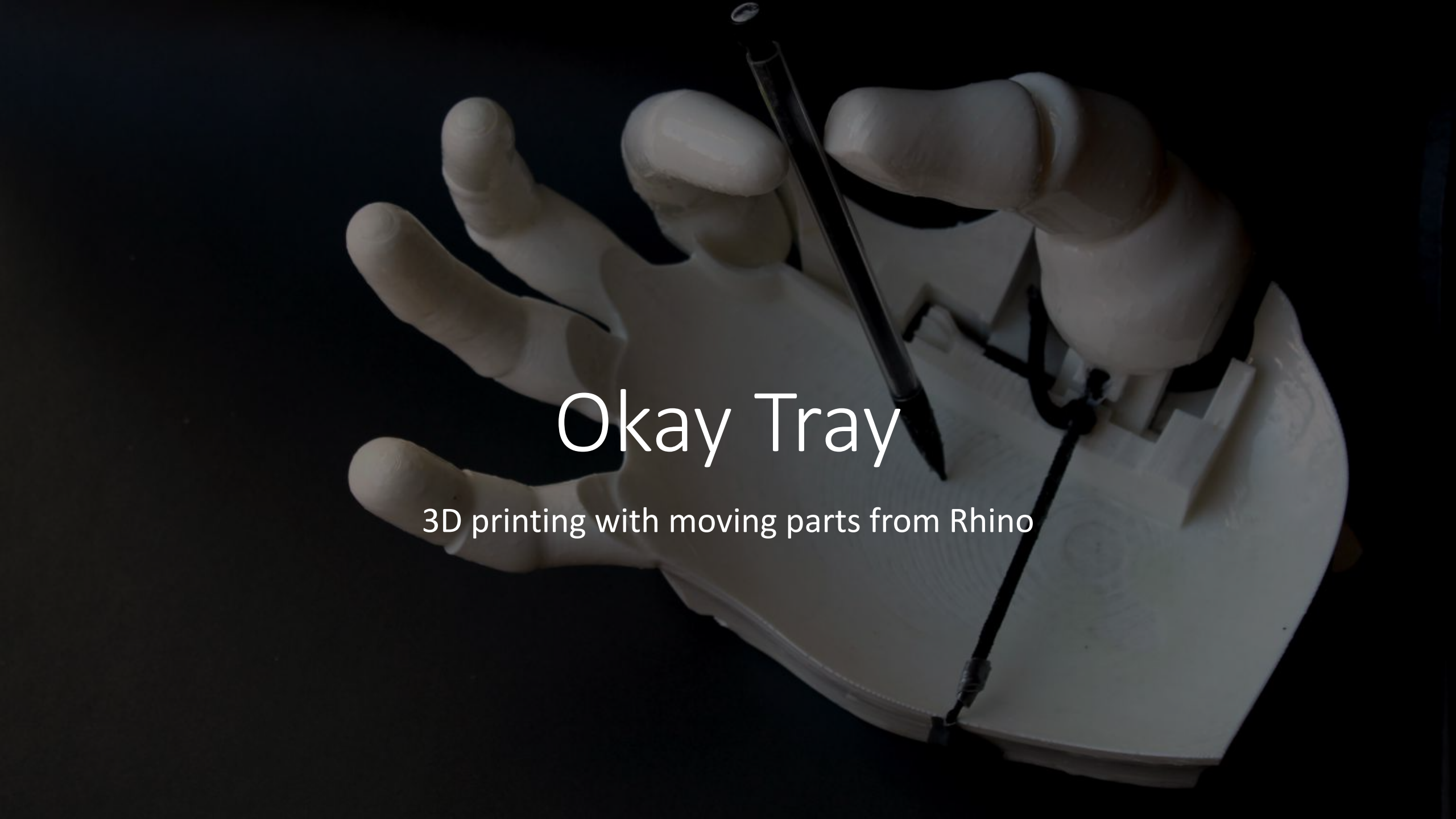
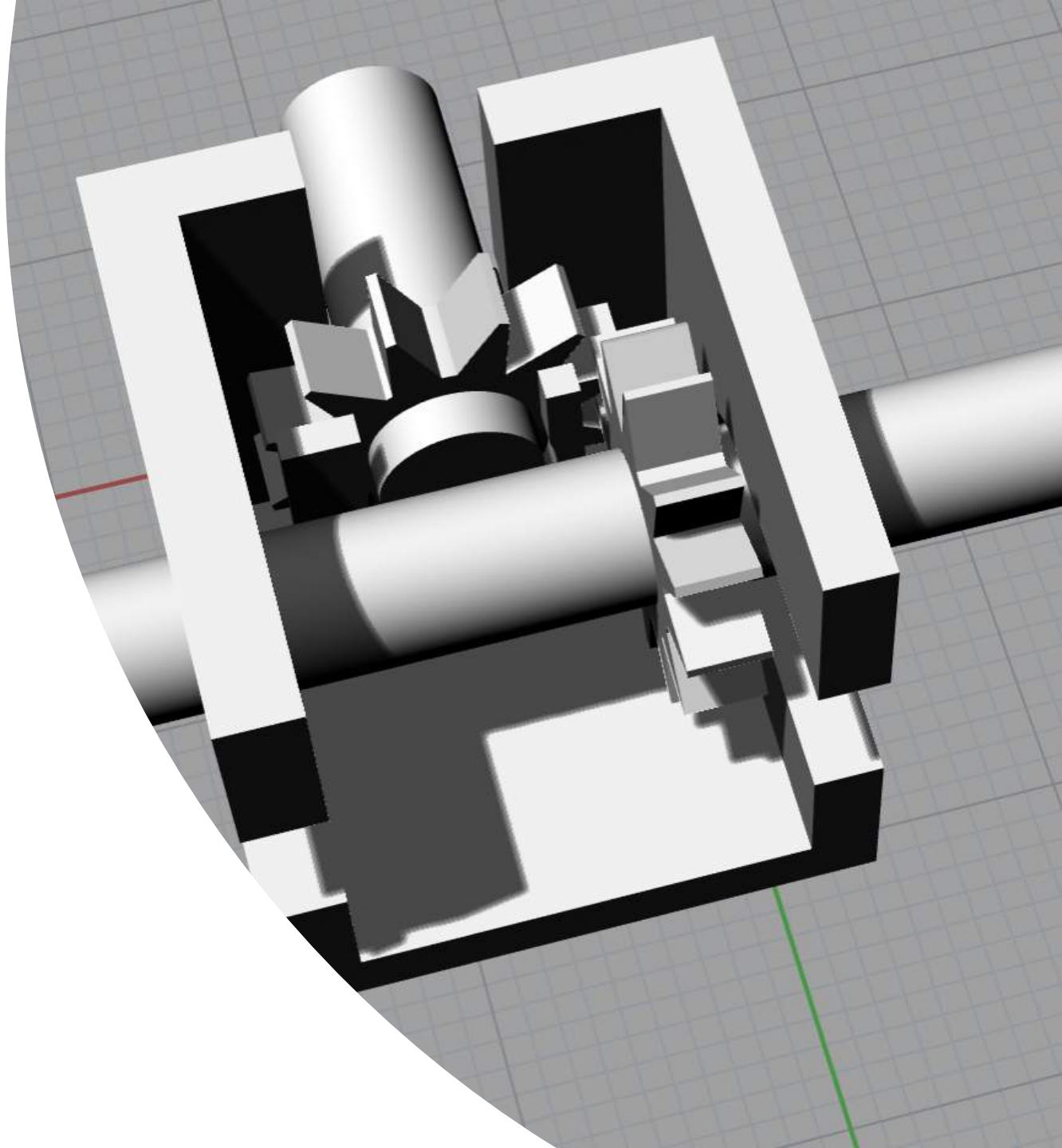


Okay Tray

3D printing with moving parts from Rhino

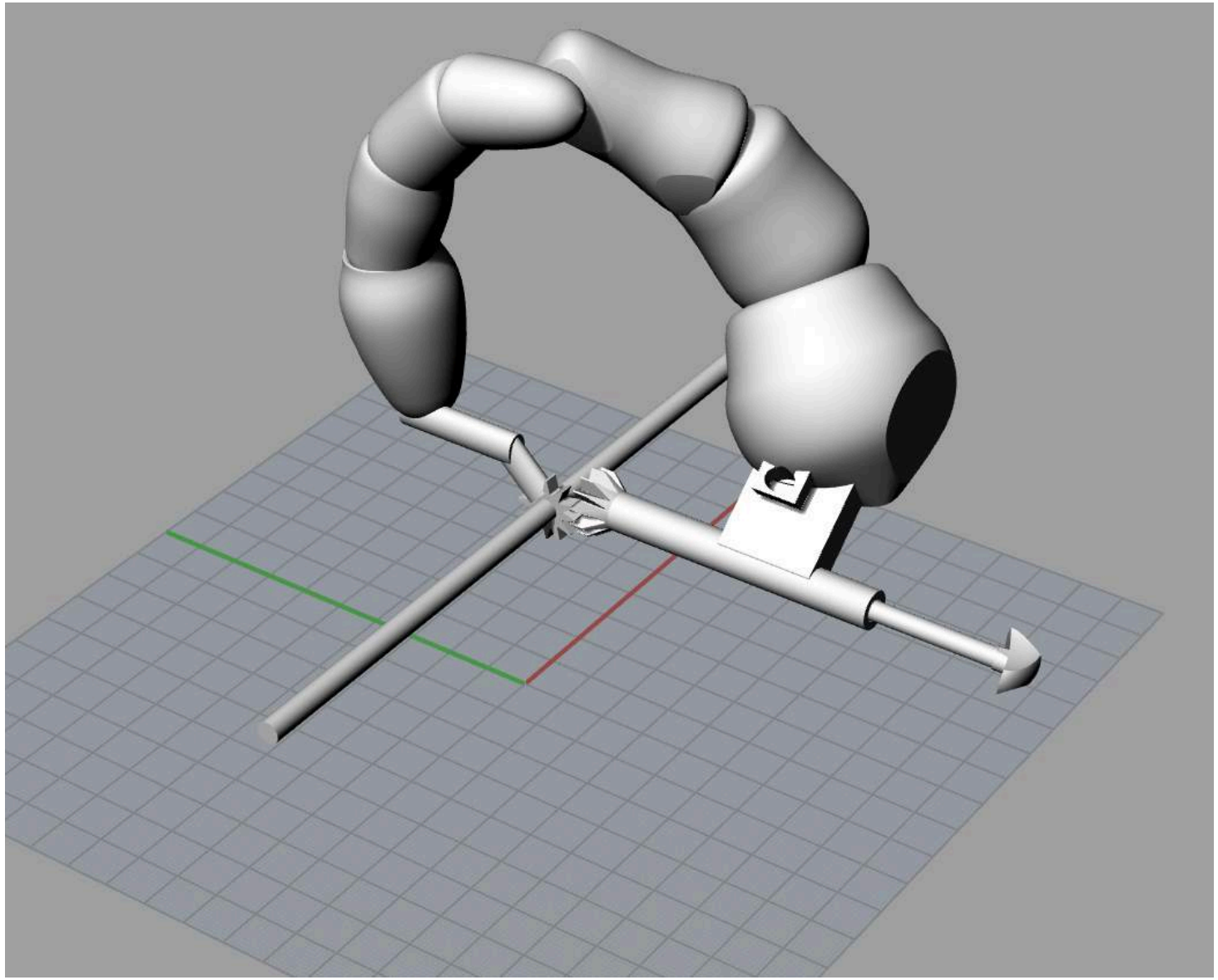
Test Print

- 3 piece print
- Gears made without add-ons
- Attempted to test ability to print small moderately detailed pieces
- Gears had to be supported without hindering movement
  - Angle change made this relatively difficult
  - In the end the support detail inside the housing was too thin to print
- Test print at minimum potential gear size worked



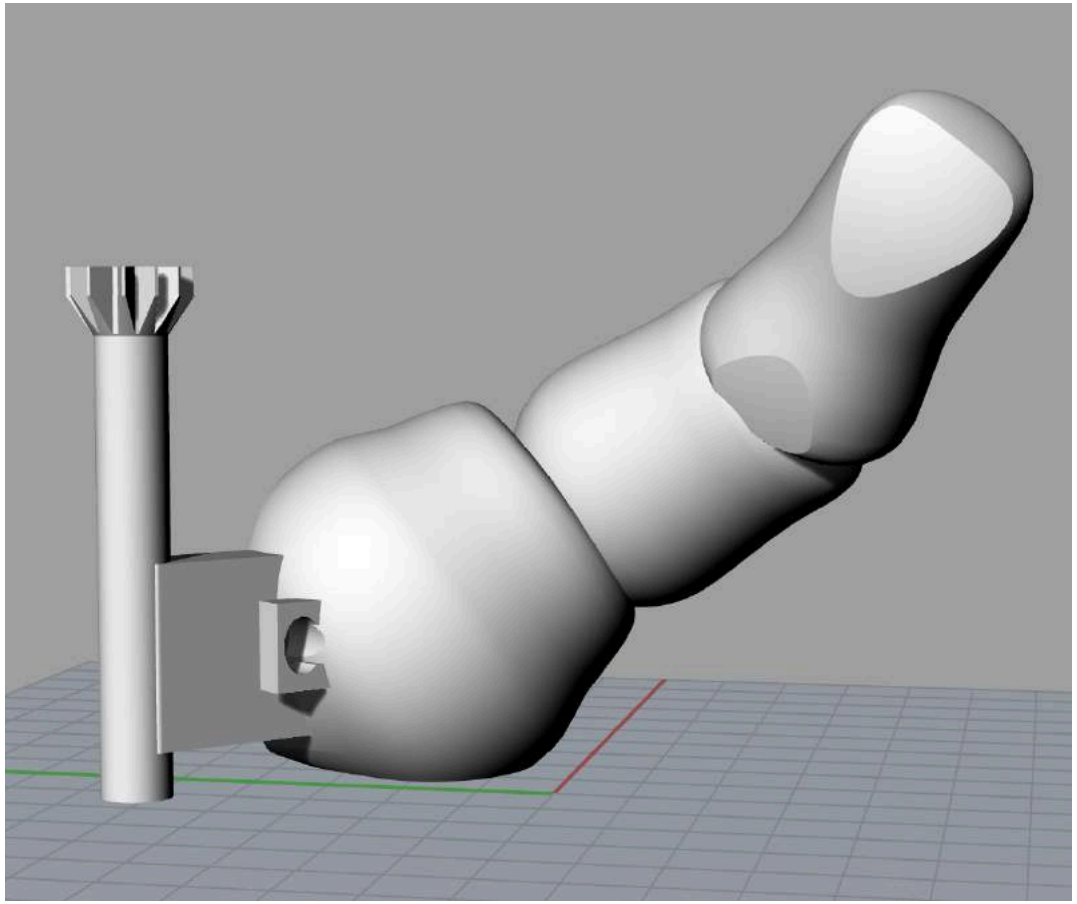
First Draft

- 5 part print
- Gears supported by shafts (not connected)
- Shafts supported entire weight of index and thumb
    - Concerned with how thin shafts had to be
- Had to figure out how to best print piece so supports would not deform integral structures and surfaces like in gear test print



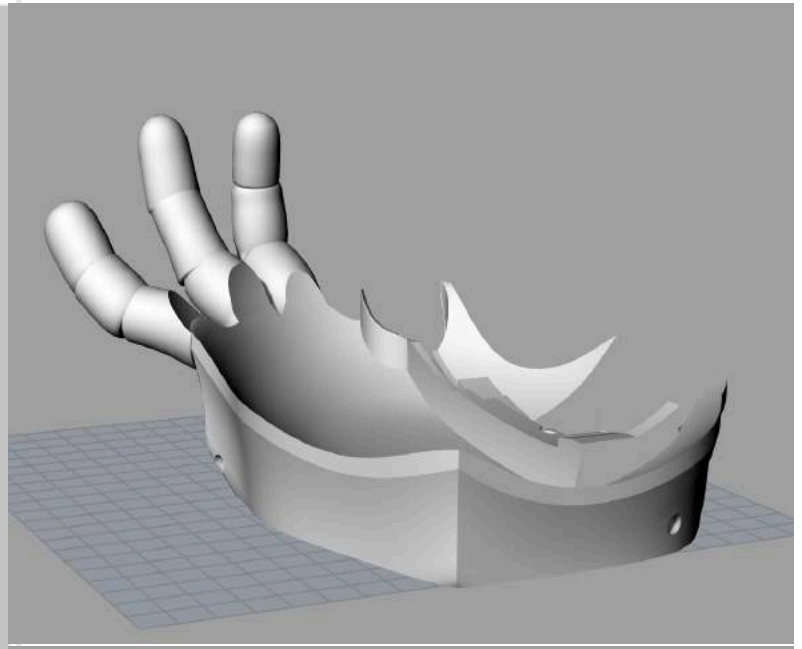
Complications: Thumb

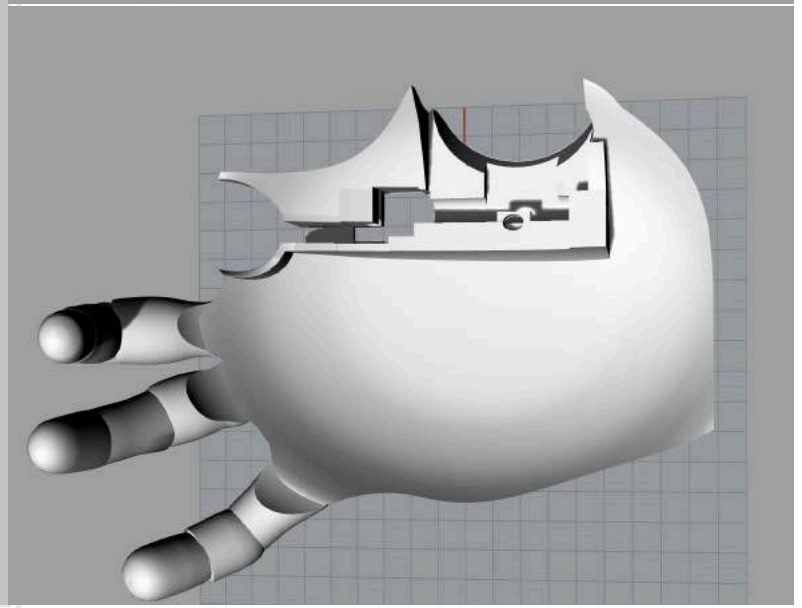
- In order to ensure the success of gear details on thumb I had to print gear shaft straight up ensure its shell walls were thick enough to supports its weight while printing and no supports would be needed for gear head
  - Also changed the body so that instead it now supported thumbs weight and the shaft was just a axis of rotation
  - Created a 45 degree fillet off of gear head by creating a cone and boolean splitting with gear head
    - In printing software mike had us choose anything over 45 degrees off the vertical to need support
  - Increasing thumb gear piece diameter
    - In the first two prints my lack of support caused structural failures mid print



Complications: Body

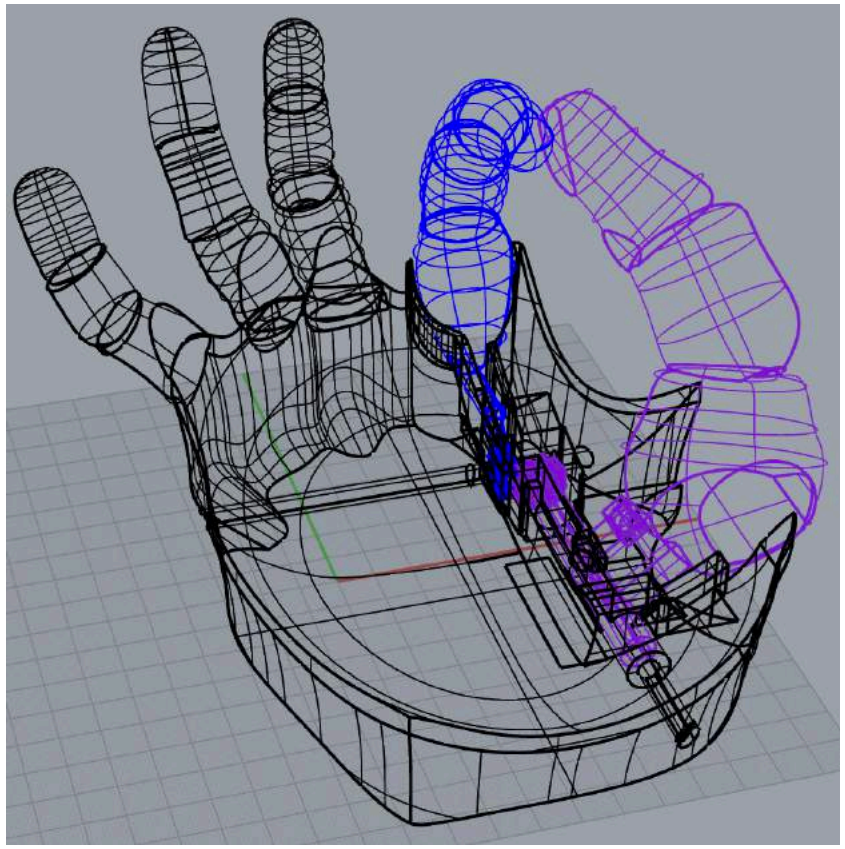
- Shaft holes required supports to be printed in them
  - Support always prints left to right (and back) when looking at the fusion printer
  - Shaft with long supports came out easily
  - Shaft with short supports was impossible to weed with manual tools
    - Used power drill to both pull out supports and ensure shafts were wide enough
      - This does not work on thin walled shafts on draft 1 when I attempted to drill into the thumb shaft it snapped into 4 pieces
        - Gluing with epoxy doesn't’t work because epoxy is a relatively malleable bond
      - Power drill is a very effective tool on the plastic though I am unsure how it looks because I only drilled on interiors

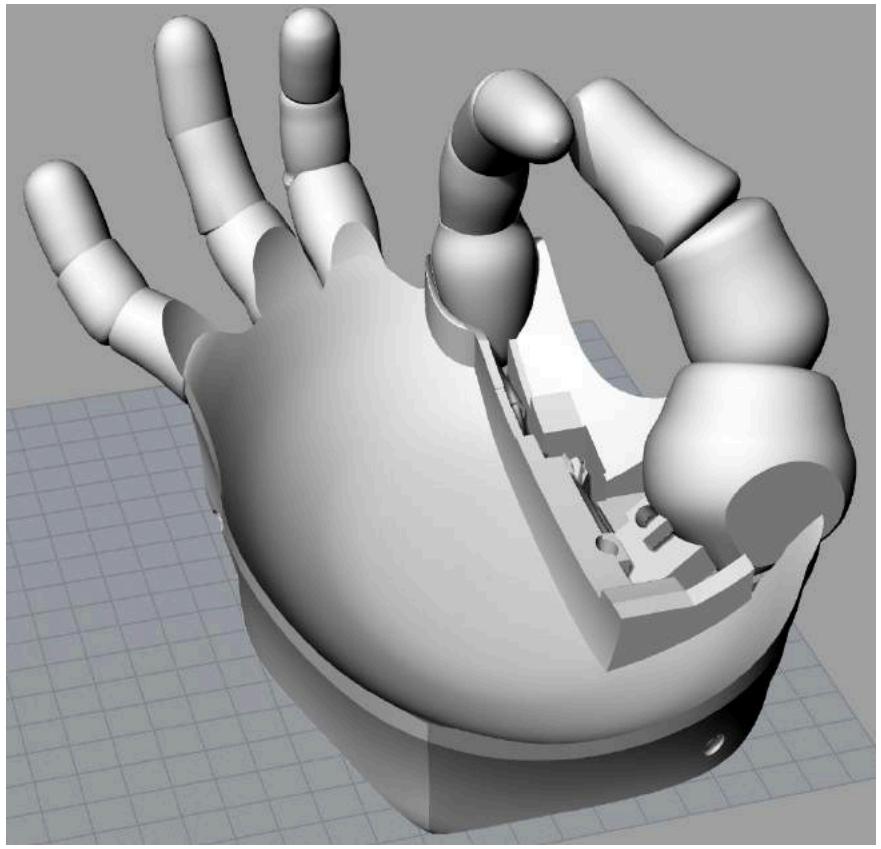




Complications: Index

- The index had no issues printing
- Only issue came in final assembly
  - Gears would match but index gear wouldn't stay in correct place
    - The shaft and gap it sat on was too small relative to diameter of gear hole
    - Had to force gear into place using electrical tape on index shaft
  - In the future I would add a sixth piece that was conical with a end diameter smaller than gear hole and use it as a wedge to hold piece in place





Final Print

always use layers!!