Haley Passov — *Project Manager*
Ahmad Alhashmi — *Manufacturing Engineer*
Isaai Urbina — *Logistics Manager*
Cullen Flynn — *Systems Engineer*
Emmalie Markham — *CAD Engineer*
Nate Gillaspy — *Manufacturing Engineer*
Kelly Sikora — *Test Engineer*
Jose Sandoval — *Financial Manager*

BACKGROUND

Our client, a Navy veteran, lost approximately half of an inch past the center knuckle of his right index finger. We created a prosthetic finger for him that helps him more easily perform tasks, increasing the quality of his life.
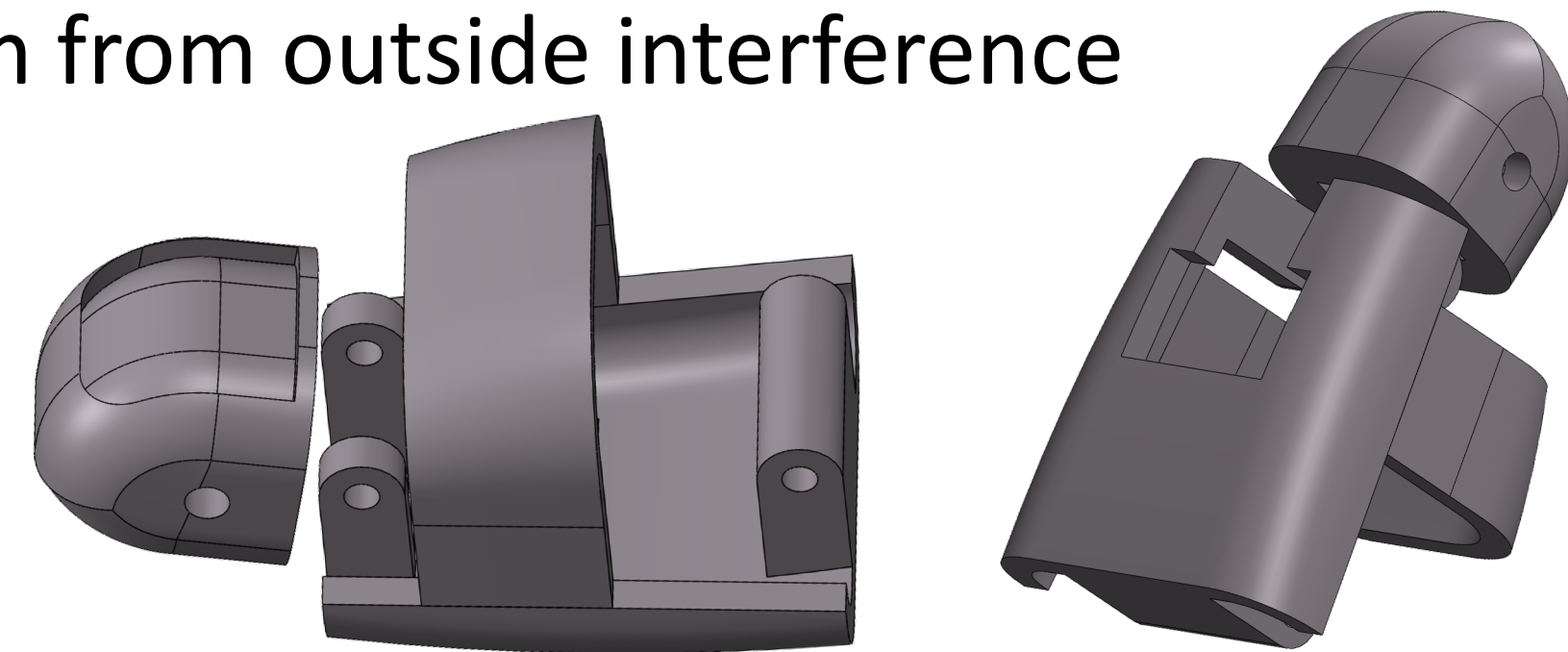
KEY REQUIREMENTS

- ✓ Create a trade-show ready prototype
- ✓ Lifting capacity of 8lbf
- ✓ Range of motion of 145°
- ✓ Ability to wear comfortably for 5 hours
- ✓ Perform and withstand day-to-day activities
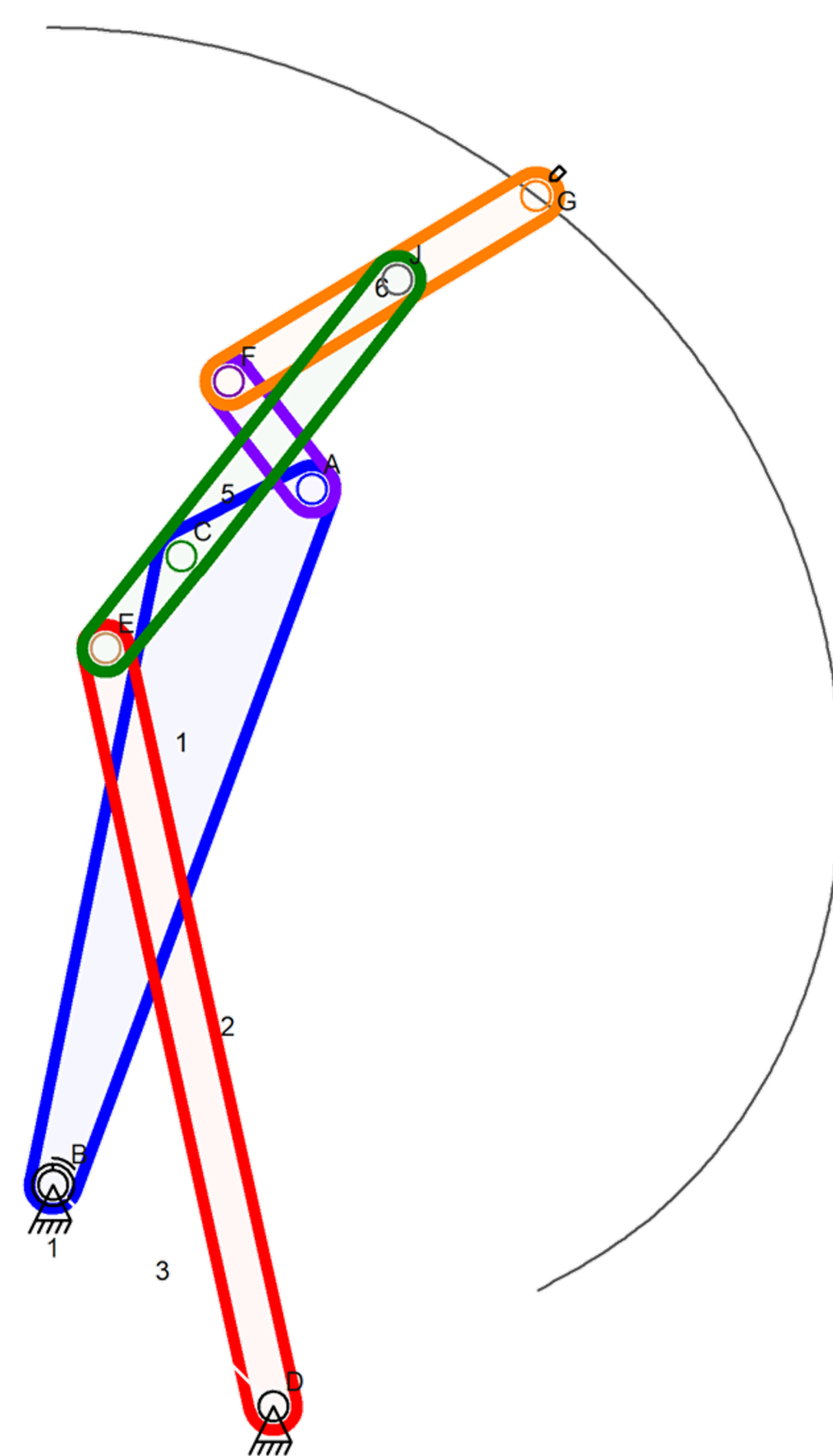- ✓ Actuation initiated by the bending of the base knuckle

HOUSING

- Protects linkage system from outside interference
- Helps prevent binding
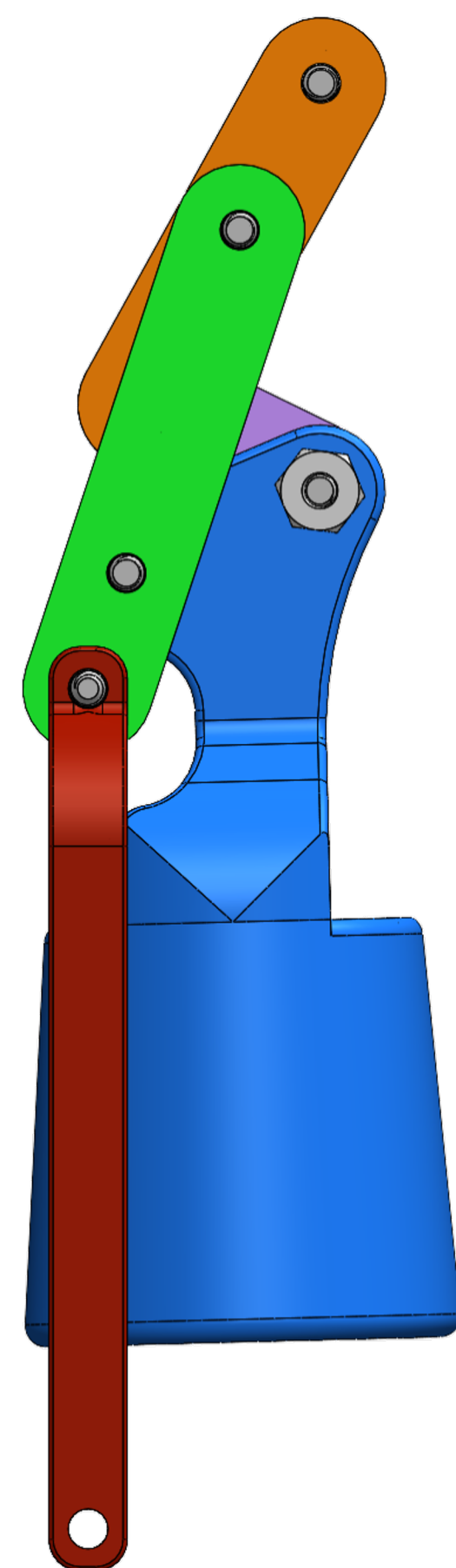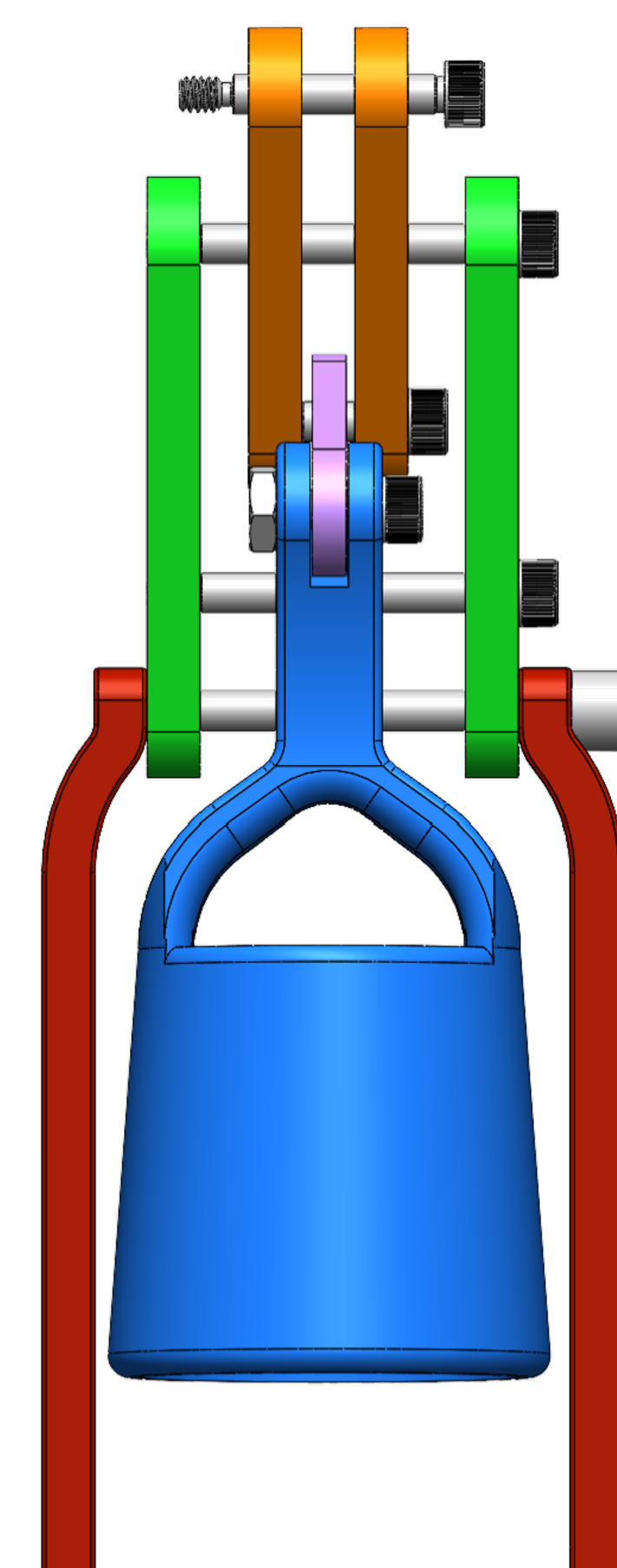- Grip indentation
- 3D printed Onyx™

LINKAGE SYSTEM

- Linkage system of rigid bars and pinned joints
- Seven bar system designed to mimic finger motion
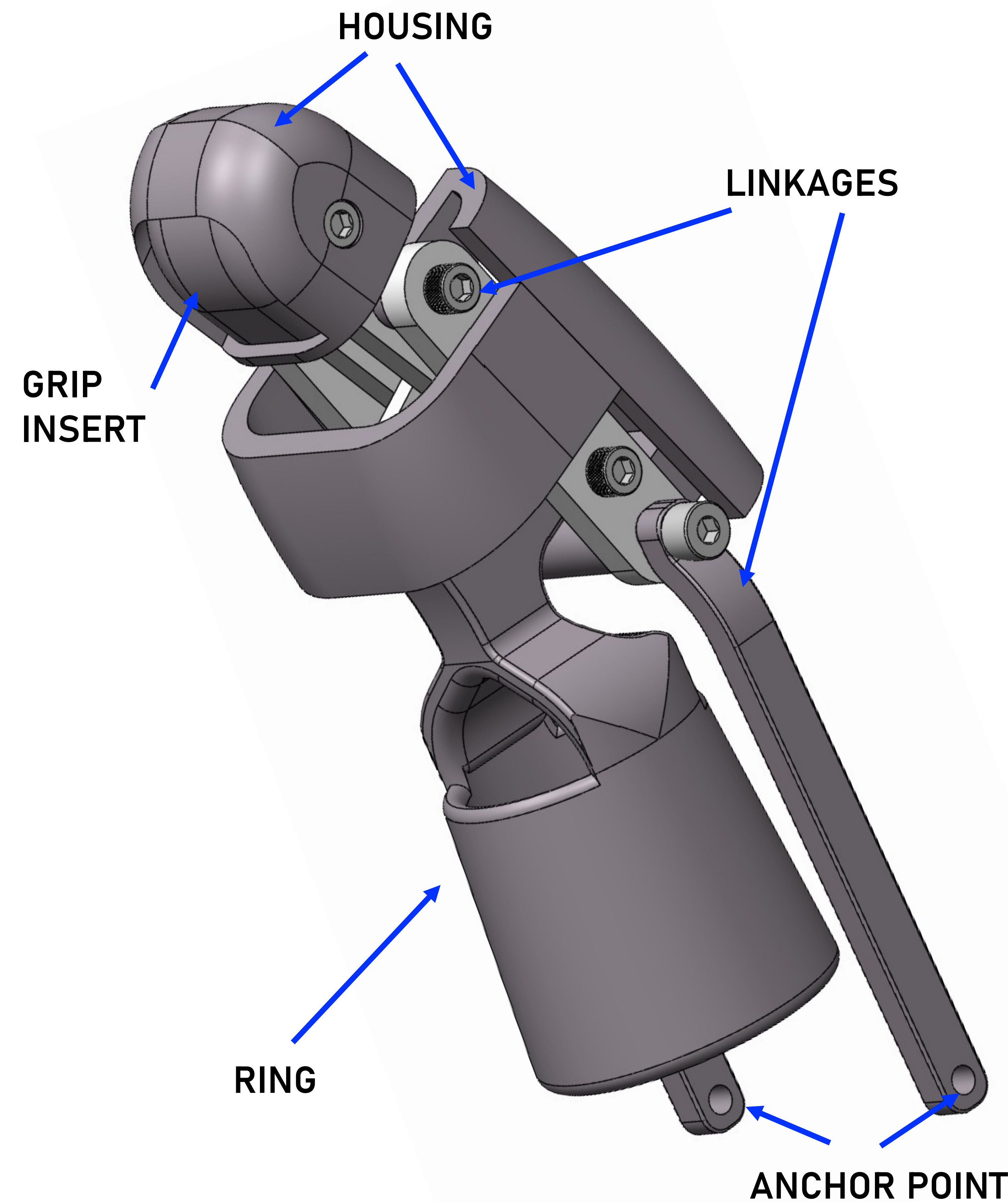- Waterjet out of Aluminum 6061
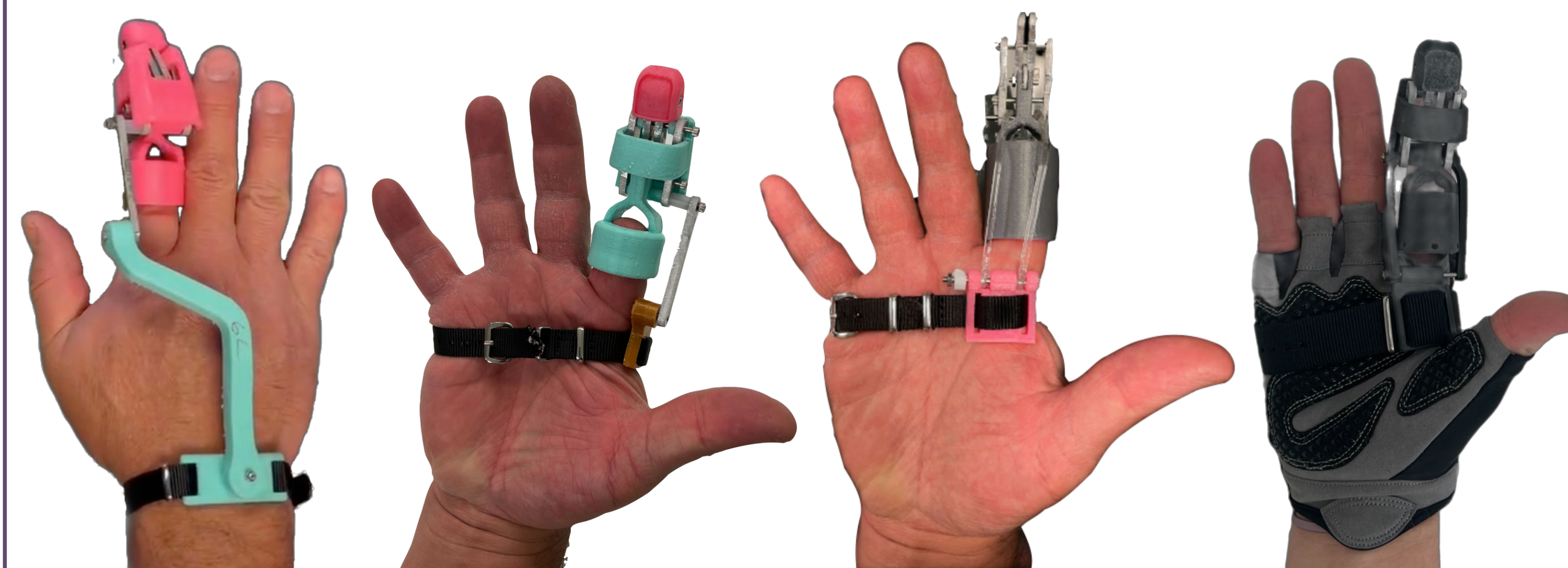
2D schematic *CAD sideview* *Full 3D translation*

"This is the best grip I have had since 1972" - V^2

HOUSING
LINKAGES
GRIP INSERT
RING
ANCHOR POINT

MAIN ITERATIONS

Over a 9-month design cycle we created many iterations resulting in more than 100 prototyped parts, shown here are the 3 versions that show the biggest changes and our final design:
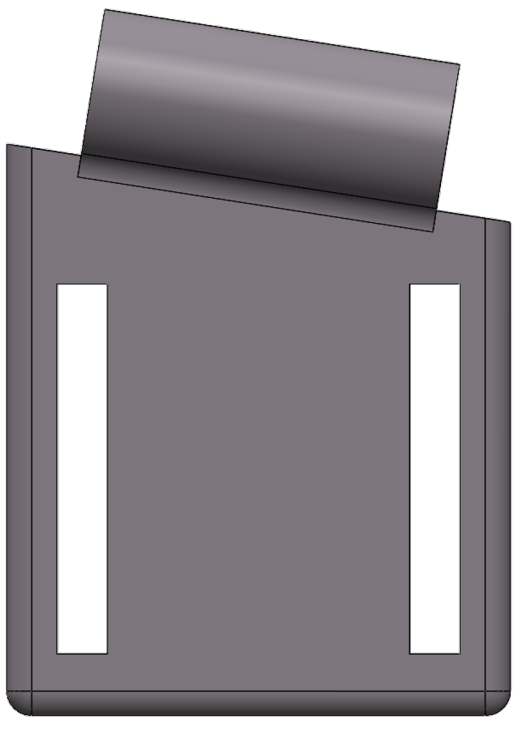
Initial → *Final*

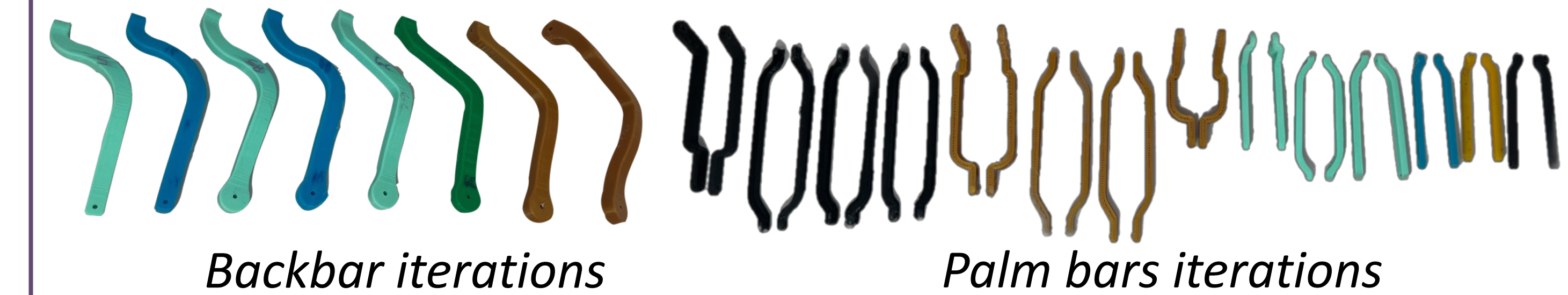## HAND STRAP

- Iterated locations and chose palm location
- Increase symmetry and stability
- Decreases binding
- Glove for securement
- Palm connection: 3D printed Onyx™
- Anchor bars: 3D printed Onyx™-Carbon fiber
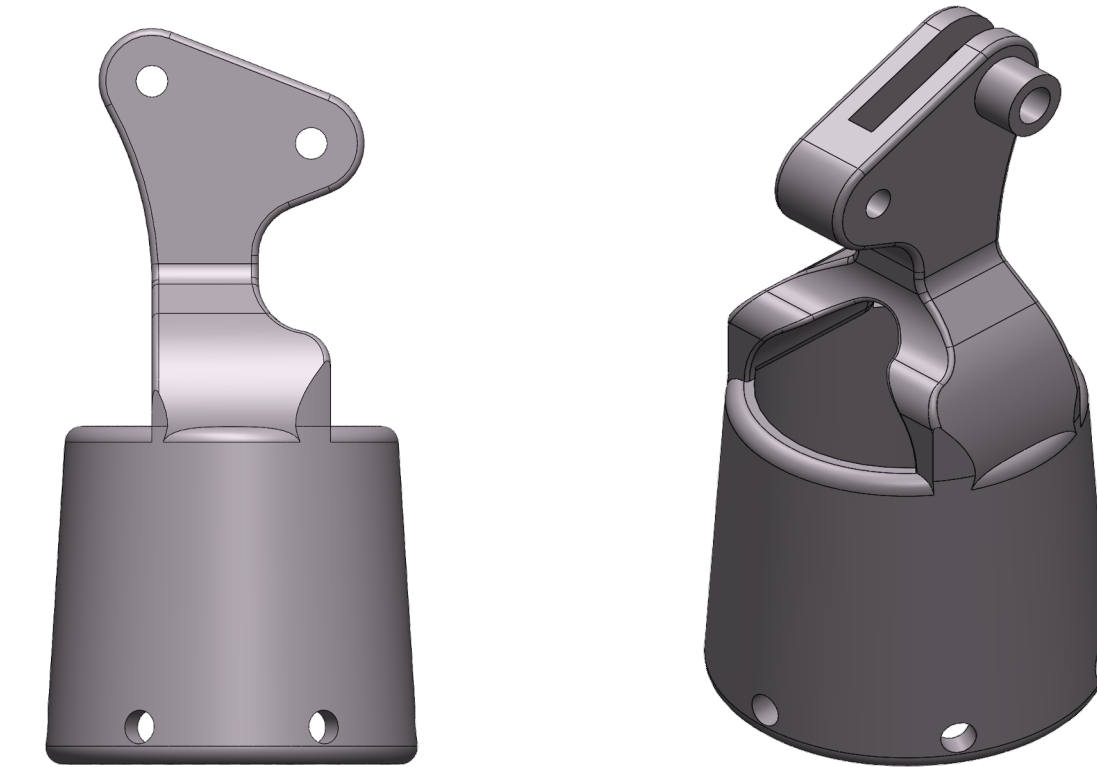
Palm connection

Backbar iterations *Palm bars iterations*

RING

- Silicon insert and receptacle
- Secures prosthetic to finger
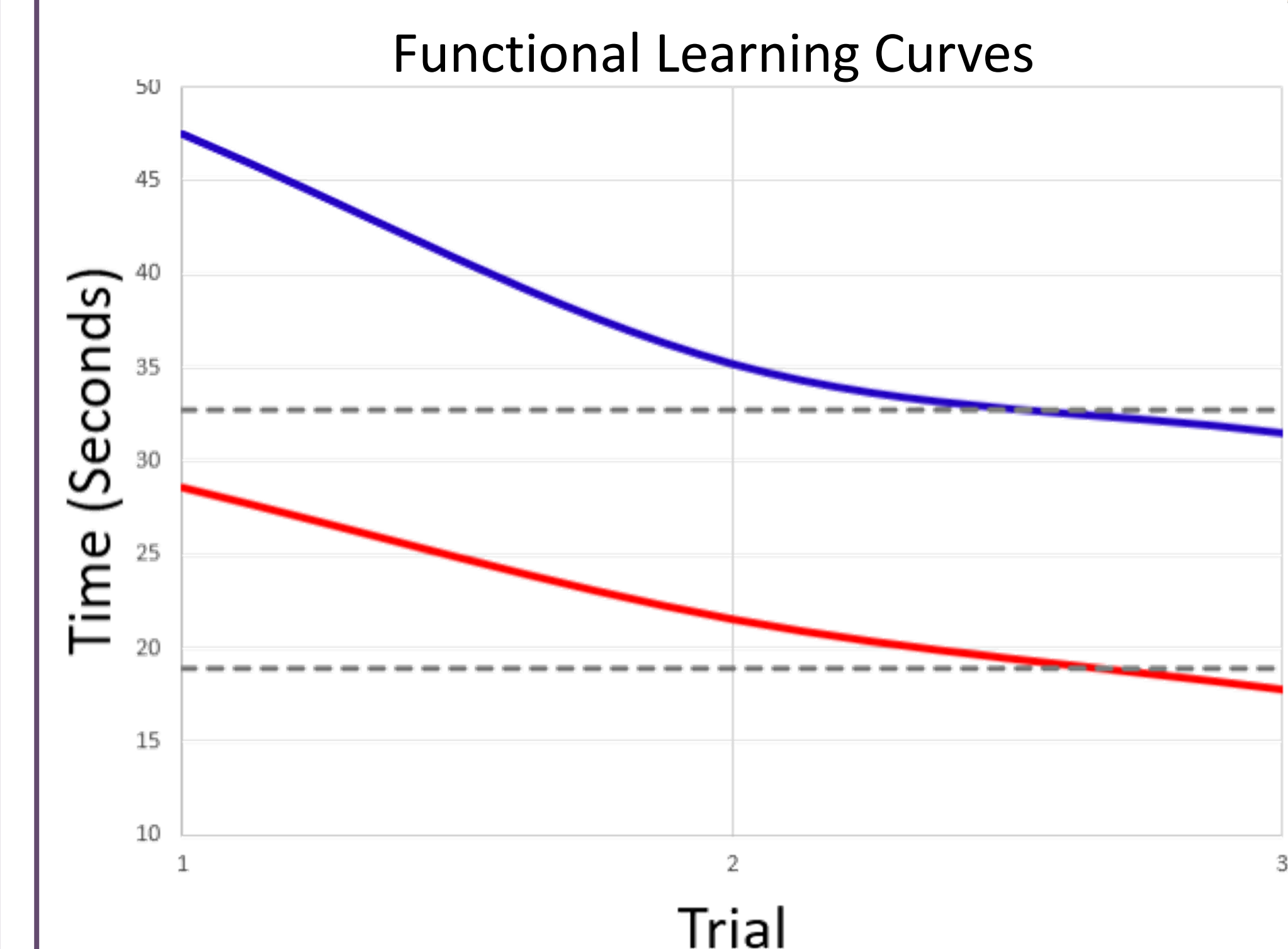- Provides actuation point
- 3D printed Onyx™

Ring iterations *Final render*

USER TESTING

- Box and Blocks
  - (Denham, et. al., 2019, Journal of Prosthetics and Orthotics)
- Everyday Object Handling by Inspection
- Strength Verification
- Fitting

Functional Learning Curves

Time (Seconds) vs Trial

— Box and Blocks
— Object Handling
--- Left Hand

Scott Huyvaert   Vicente Vitela   Rebecca Komarek   Jianliang Xiao   Julie Steinbrenner   Daria Kotys-Schwartz   Pat Maguire   Chase Logsdon