Mountain Bike Grip Prosthetic
Team Grip It
Sponsor: Quality of Life Plus

SDSU | San Diego State University

Project Overview

PROBLEM STATEMENT
Client is a 36 year old Army National Guard Combat Engineer who was injured in 2004 by a suicide bomb. Among many of his injuries, he also has a thumb amputation on his right hand which provides continuous pain and difficulty gripping with his right hand.

NEED
Client rides his mountain bike and needs a device to:
- Be Safe
- Assist with Grip/ Prevent hand from slipping forward
- Allow Quick Movements
- Easily attach & detach from hand & bike
- No interference with any bike controls or motion of hand
- Able to be cleaned

Prototype Process

In order to develop a device that would not only fulfill the requirements needs, but also fit the client best, an iterative design process was used. In order to do this, the team agreed on one basic design and then continually changed little things about the design to best satisfy the client. This was done through 3D-printed models of the device.
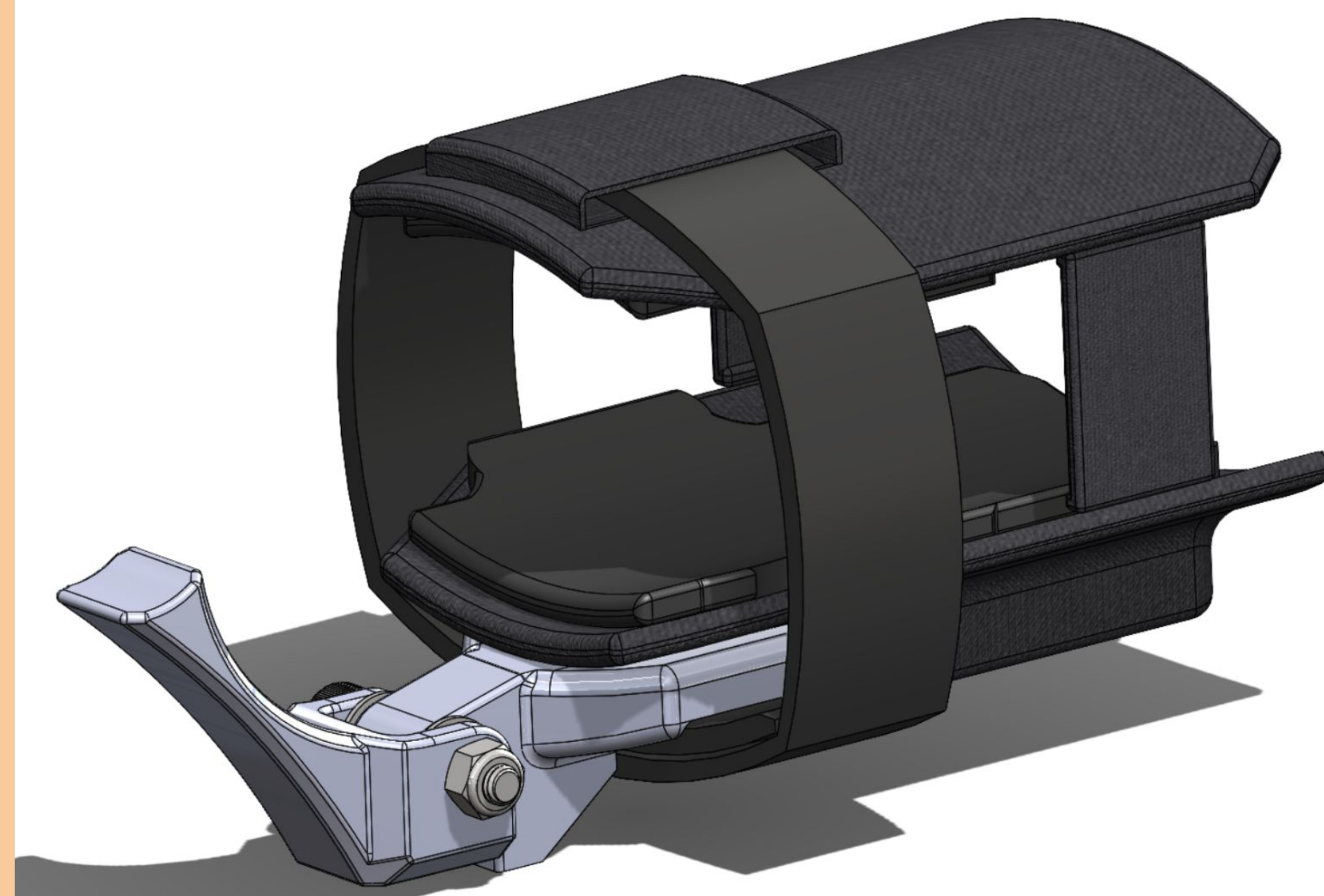
Changes to the design continue to be made, even to the first machined prototype shown to the side. All changes shall be reflected in the second and final machined ASA.
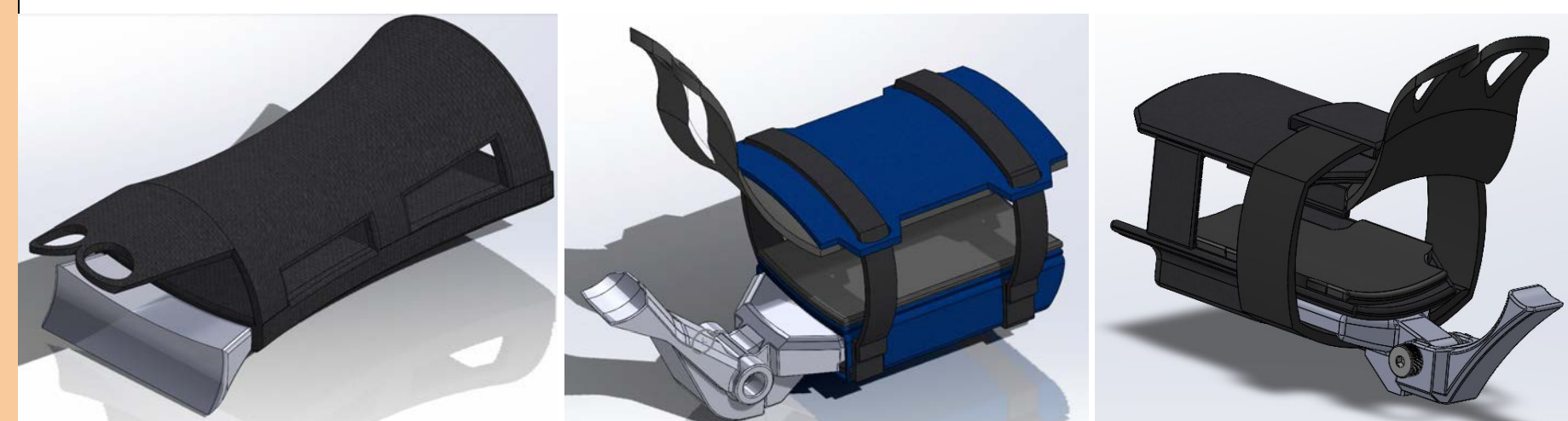
Team Members

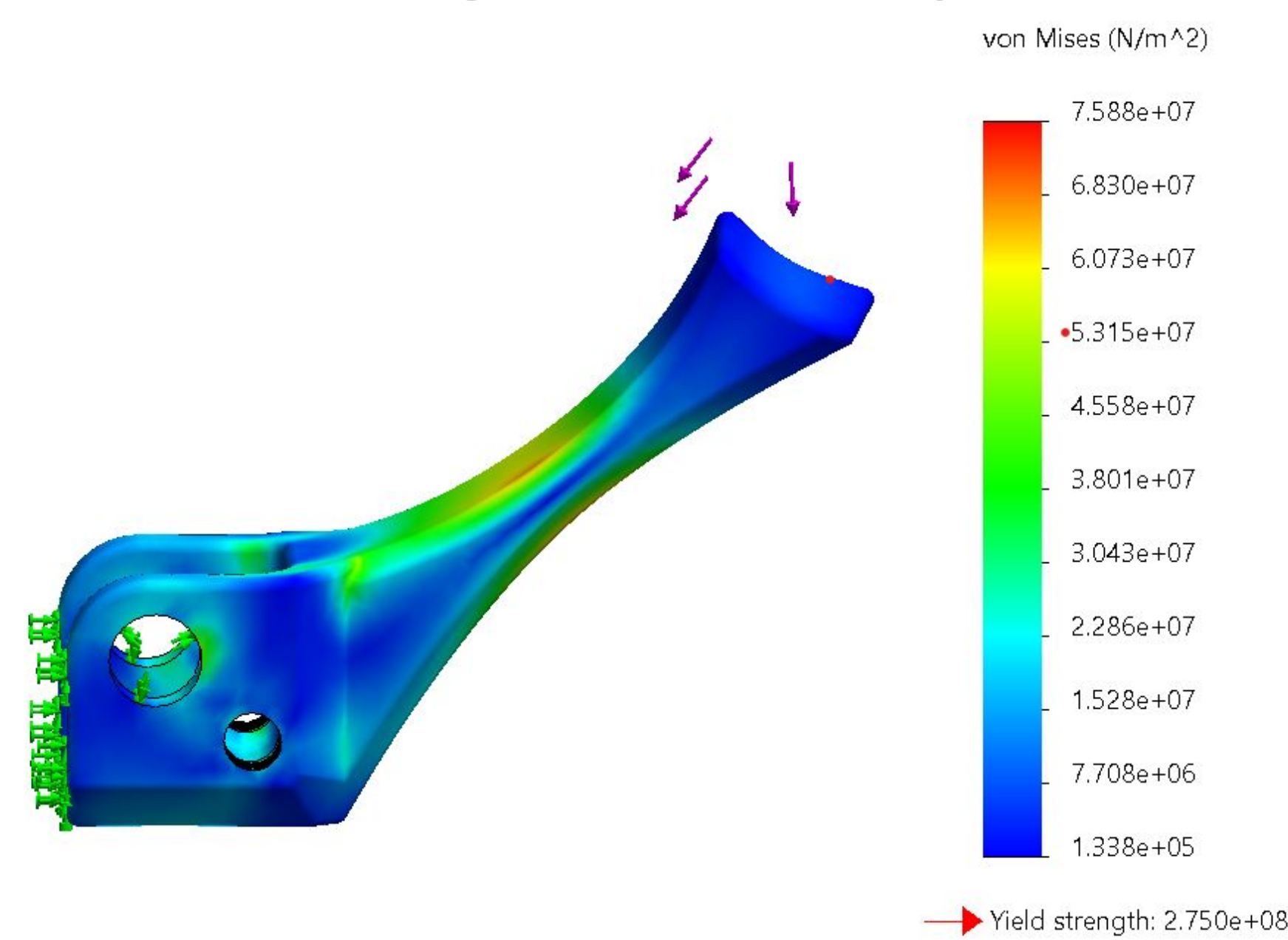Caroline Duong   Blake Motley   Amber McGrogan   Ethan Short   Tighe Reed
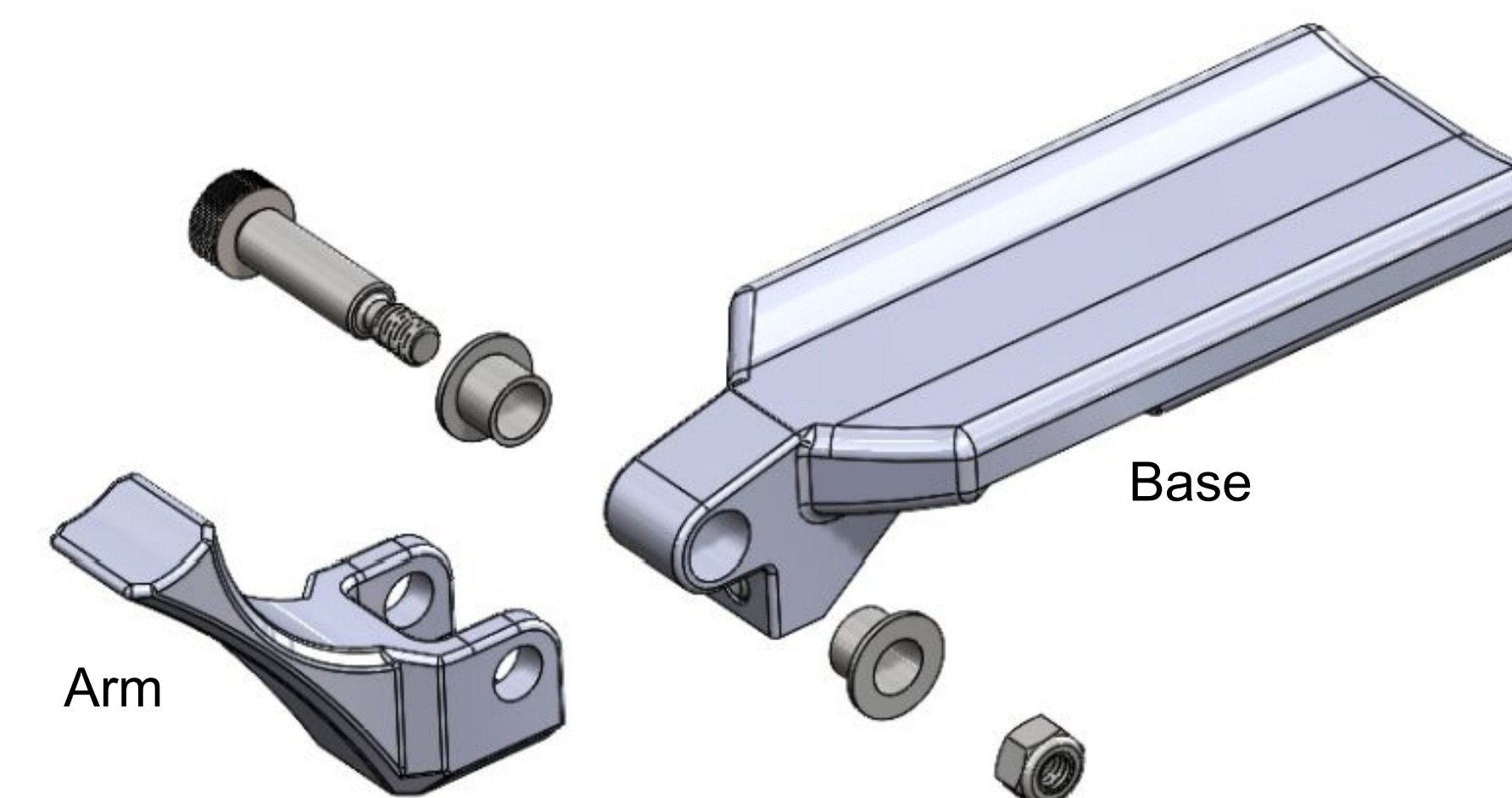
CAD Design

Previous Designs

Design Analysis

von Mises (N/m^2)

7.588e+07
6.830e+07
6.073e+07
5.315e+07
4.558e+07
3.801e+07
3.043e+07
2.286e+07
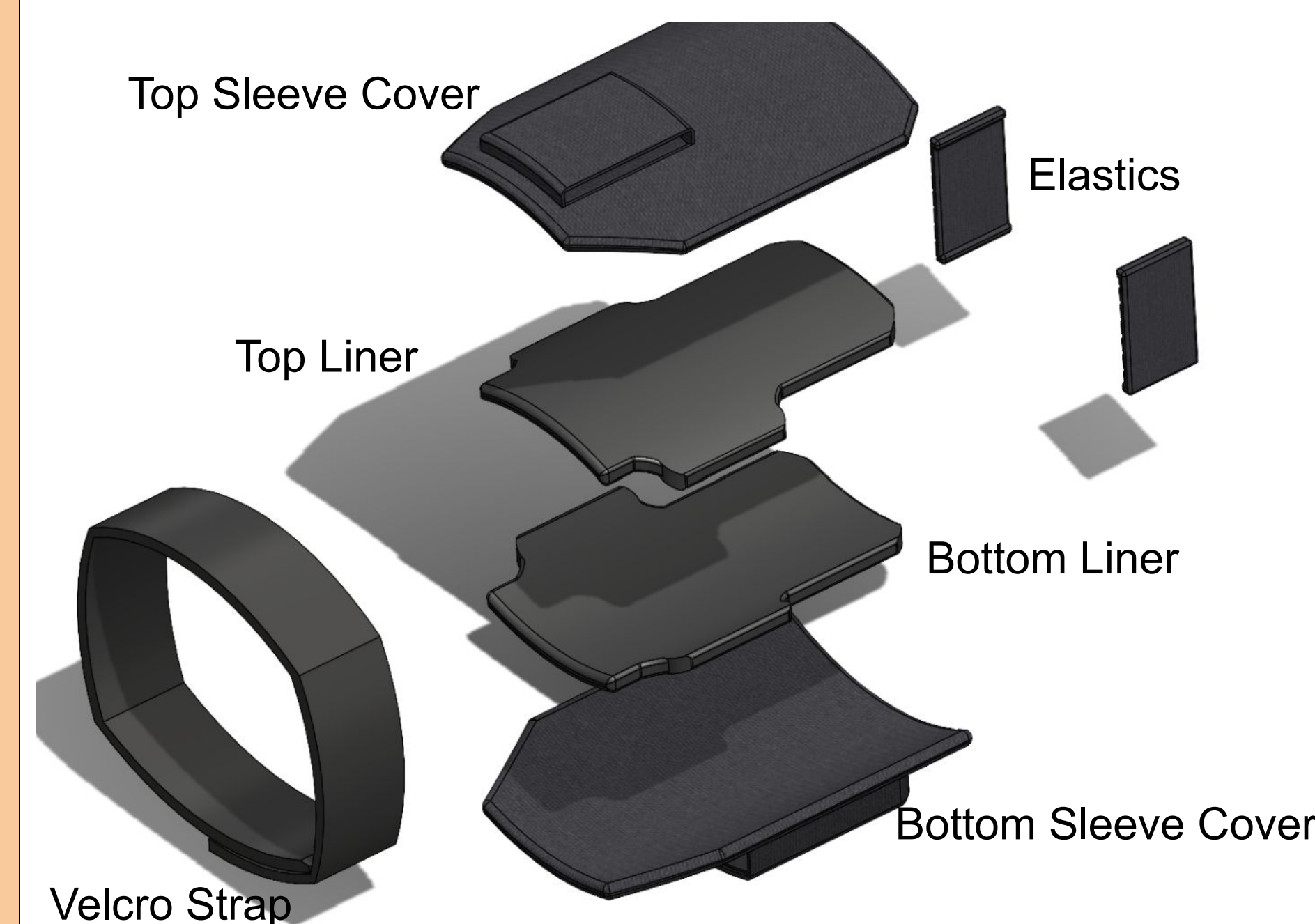1.528e+07
7.708e+06
1.338e+05

→ Yield strength: 2.750e+08

Components

The main components of the design are the Adaptive Support Arm (ASA) and the Sleeve. The ASA is an aluminum brace the presses against the handlebar as the user is riding in order to prevent his hand from slipping forward (his primary issue). The sleeve is a brace-like feature that simply secures the ASA to the users arm.

Adaptive Support Arm (ASA)

Base

Arm

Sleeve

Top Sleeve Cover

Elastics

Top Liner

Bottom Liner

Bottom Sleeve Cover

Velcro Strap

While the general idea of the ASA and Sleeve have remained constant throughout the entire design process, little components of each subsection have changed. As of now, these exploded views represent the current models
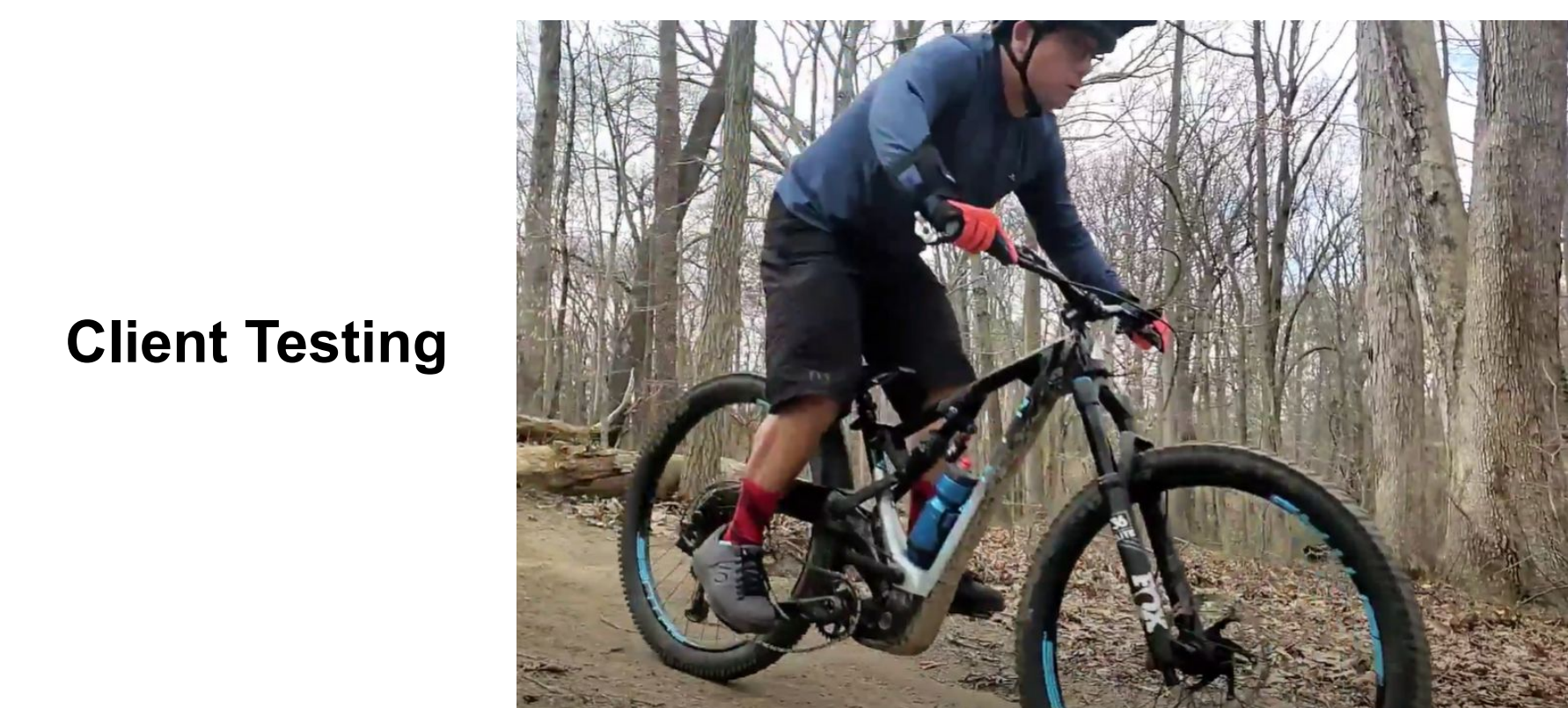
Testing

Failure Scenario

ASA Contact to Handlebar

Update In Progress

Correct Use Full Functionality

Client Testing

Acknowledgements

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