

Hoag Bone Fixation Plate Project

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Background

Bone fixation plates can slide after being screwed on and enlarge the holes in the bone, causing screw failure. This leads to improper healing of the bone and may require additional surgeries to fix.

Problem Statement: How can we prevent the bone plate from shifting and causing screws to toggle out of the bone plate?

Team organization Chart

Tensile Testing

- Assemble tensile testing specimen to measure displacement vs. applied force between smooth and textured plates

Fidel Lopez

Dynamic Testing

- Assemble dynamic testing specimen to measure force vs. number of cycles between smooth and textured plates

Adam Klaes

Hardware Performance

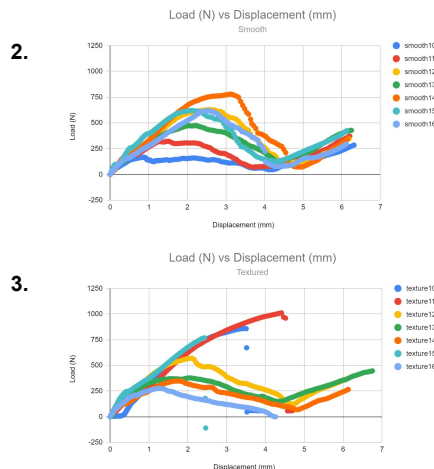


Figure 2: Results from Tensile Testing (Smooth Plates)

Figure 3: Results from Tensile Testing (Textured Plates)

Future Recommendations

- Tensile testing - use binding screws or shoulder bolts for the extensions for the tensile testing specimens to try to avoid fracture.
- Dynamic testing - modify load frame to reduce lateral motion. Use only 1 single-hole plate per specimen (instead of 2), and secure opposite end of specimen to load frame with sturdy U-bolt or pin.

Impact on Society

- Reduce the number of surgeries to repair fractured bones
- More efficient usage of bone fixation plates

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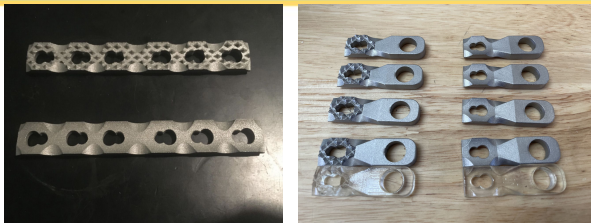


Figure 1: Smooth and Textured Steel 6-Hole Plates (Left) and 1-Hole Plates (Right)

Sponsors

- Hoag Medical Group
- UCI Undergraduate Research Opportunity Program (UROP)



4.



Figure 4: Tensile Test Specimens

5.

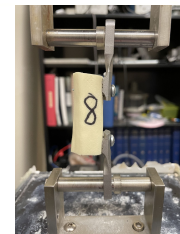


Figure 5: Dynamic Test Specimen on Fatigue Dynamics Machine