

EXPO

engineering ▲ design

OBJECTIVE

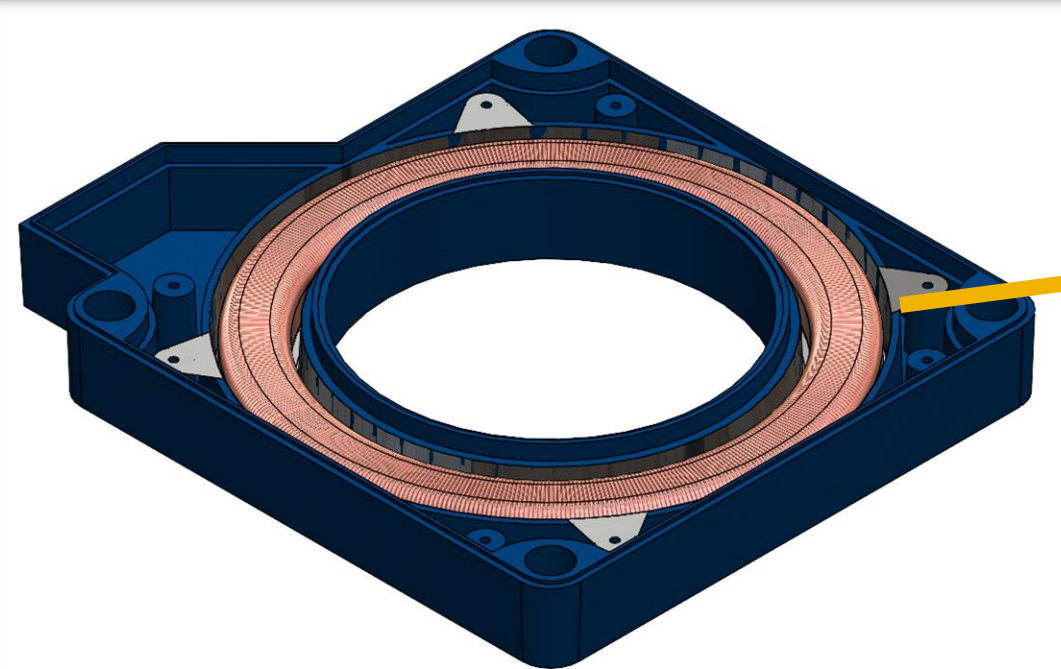
To investigate the feasibility, then design and build a prototype of a low-volume metallic foil shaping process using low-cost tooling

BACKGROUND AND VALUE PROPOSITION

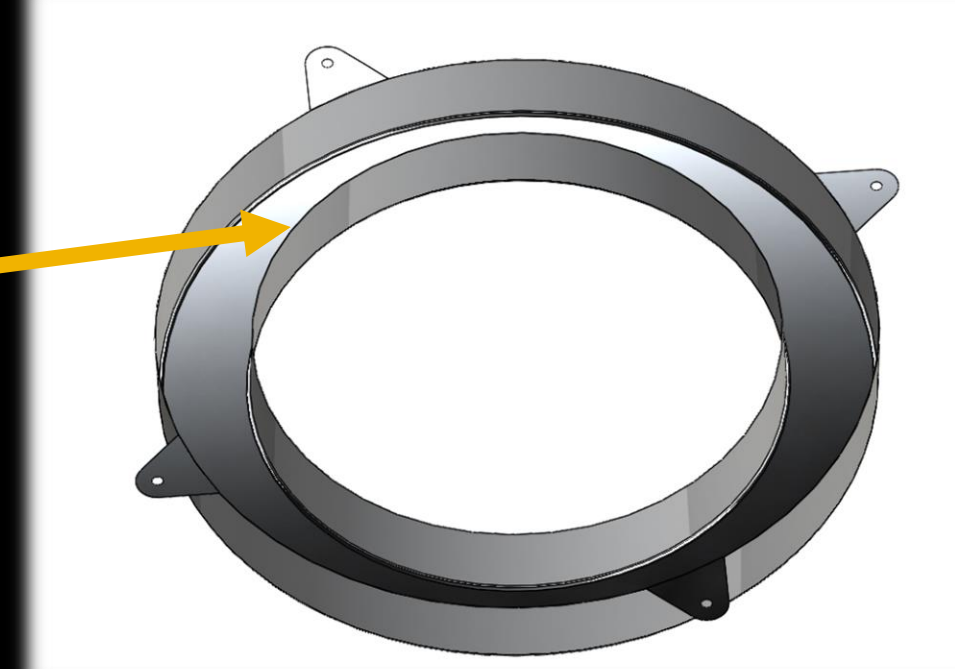
- Electrical current measuring device requires shielding from external interference
- Current process used to form this shielding is slow and labor intensive
- Due to complex geometry, no low-cost metal forming processes are easily adaptable
- New process will reduce required cost to create a shield

KEY REQUIREMENTS

- No more than .005" from wall of casing at any point (including thickness of shield)
- Ability to create 10 parts in a workday
- Maximum resistance of 1 Ohm between any two points
- Must withstand temperatures up to 100 °C
- Flanges must make electrical contact with PCB



Full Assembly With Coil



Shield Geometry



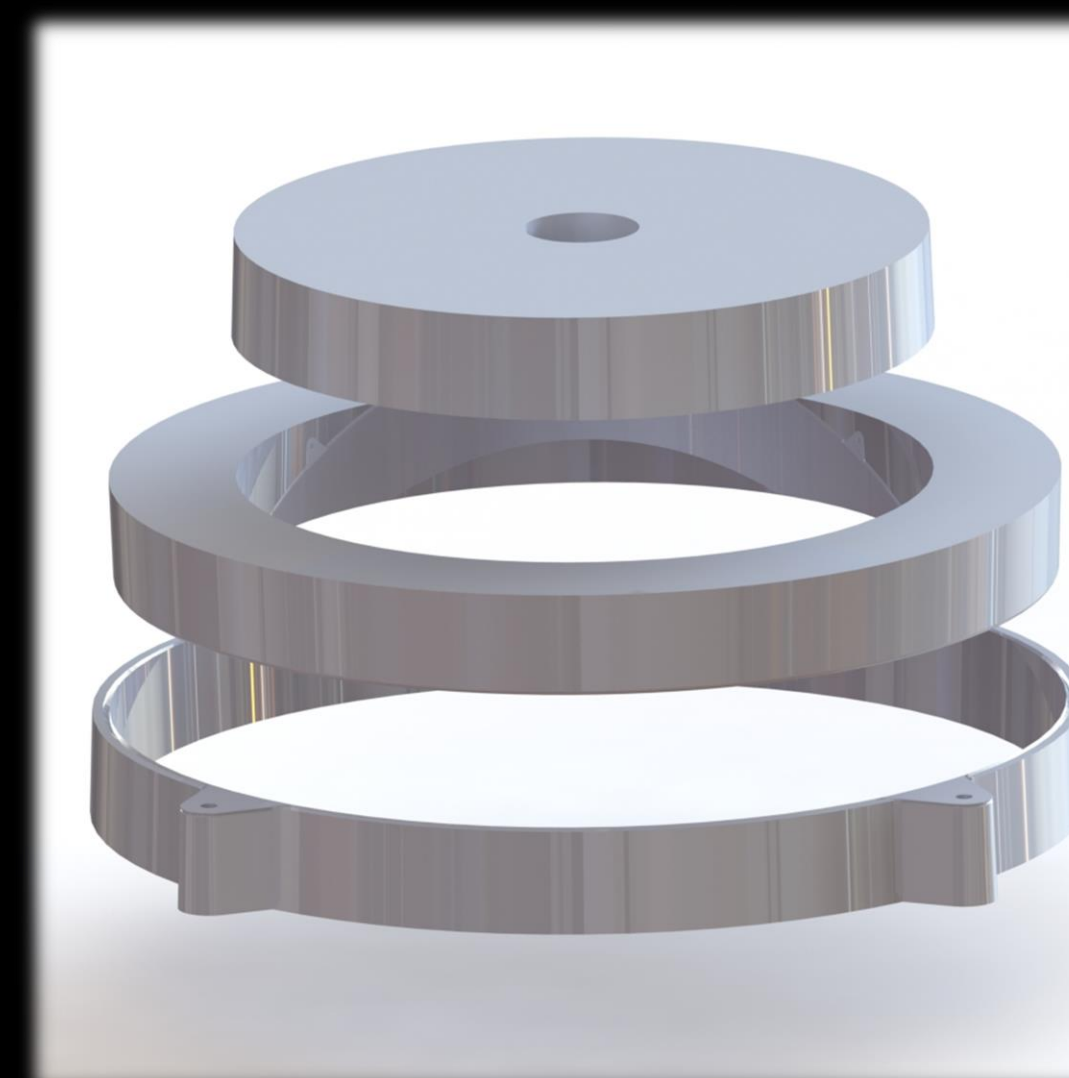
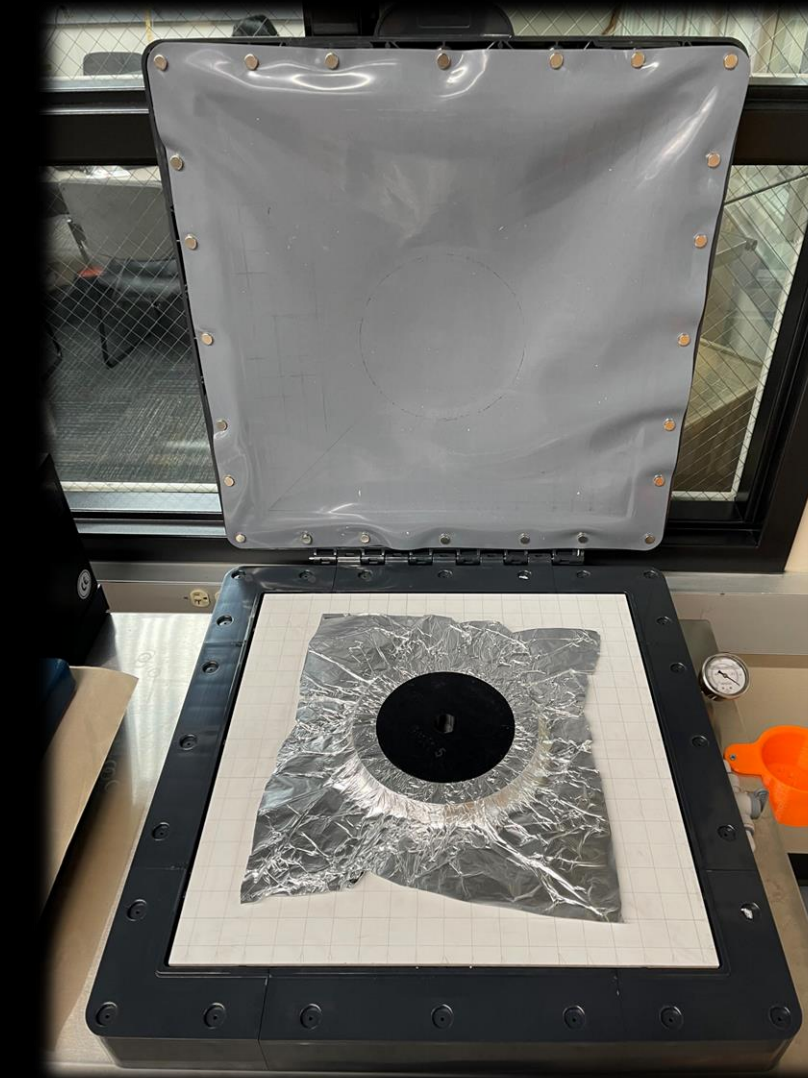
Shield In Injected Molded Housing

DEVELOPMENT OF LOW-COST PROCESS TO CREATE EMI SHIELD

KEATON HEWITT, KHRISTIAN CEBALLOS, STEPHEN WRIGHT, PAUL SANCHIRICO, KYLE RICHMOND

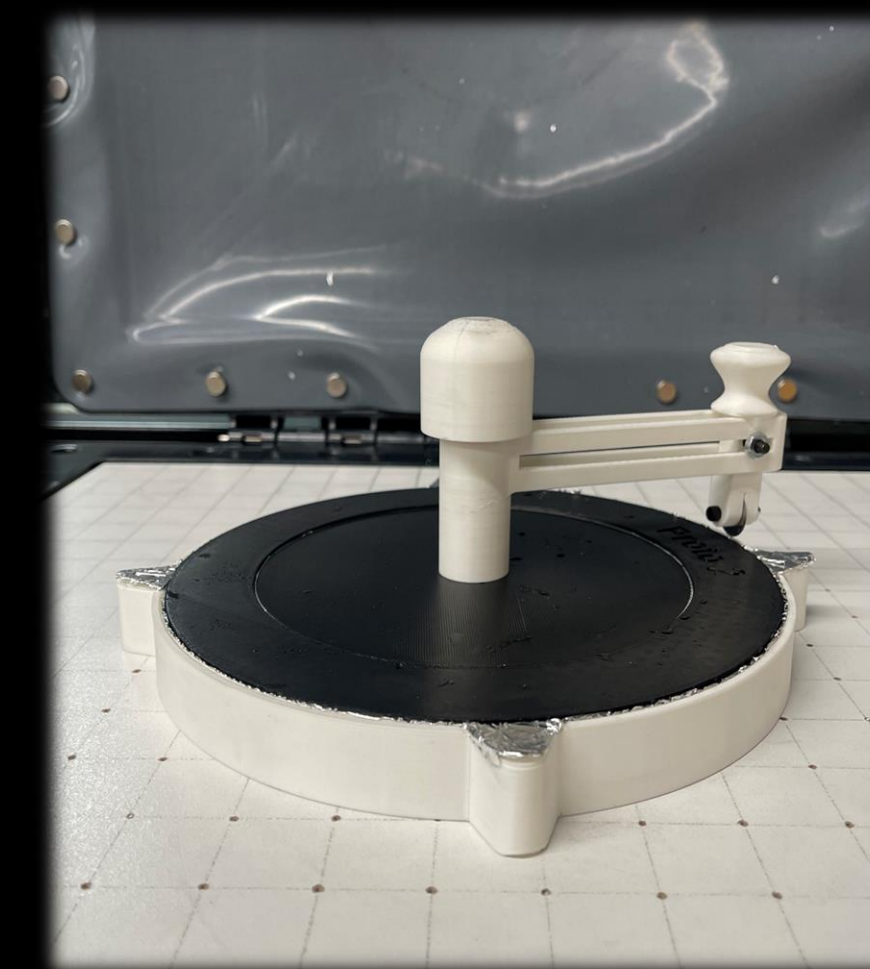


FINAL PROCESS



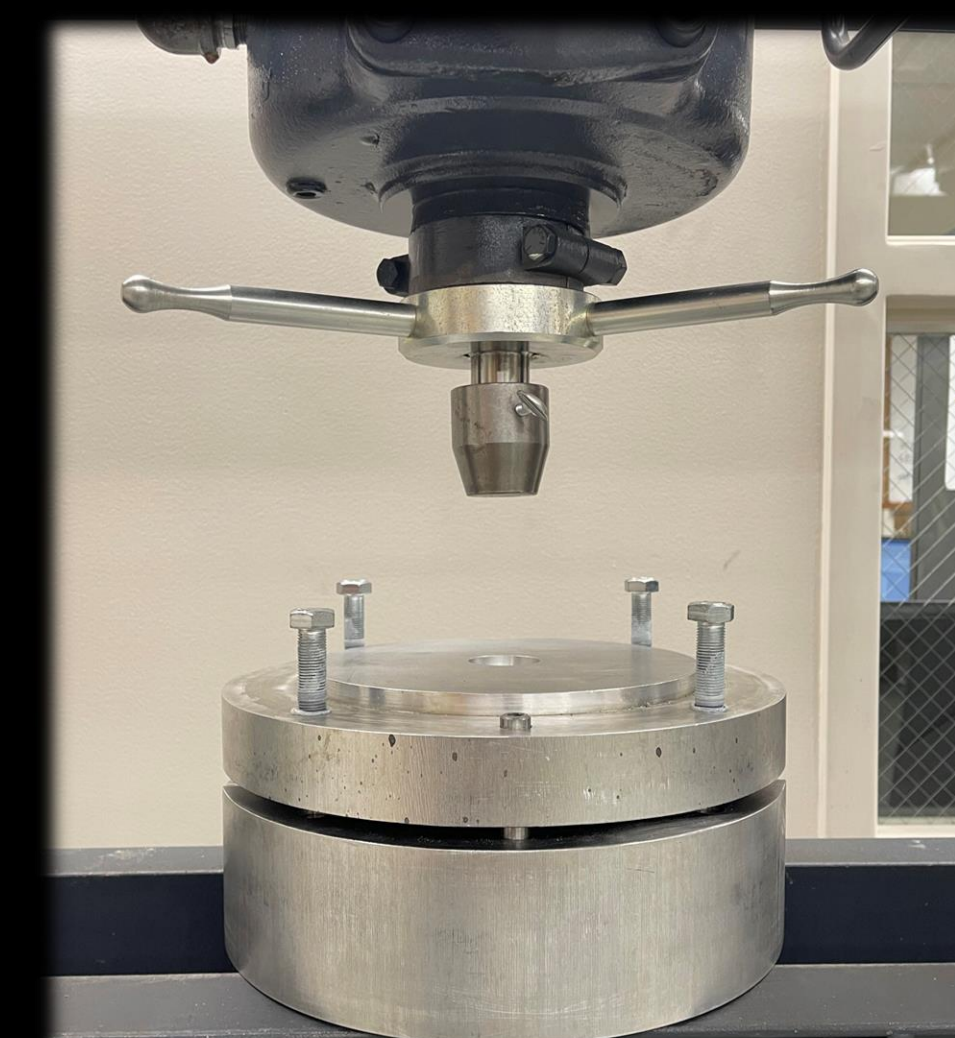
Vacuum Forming

- Multi-step process with a set consisting of three 3D printed dies
- Forms rough geometry



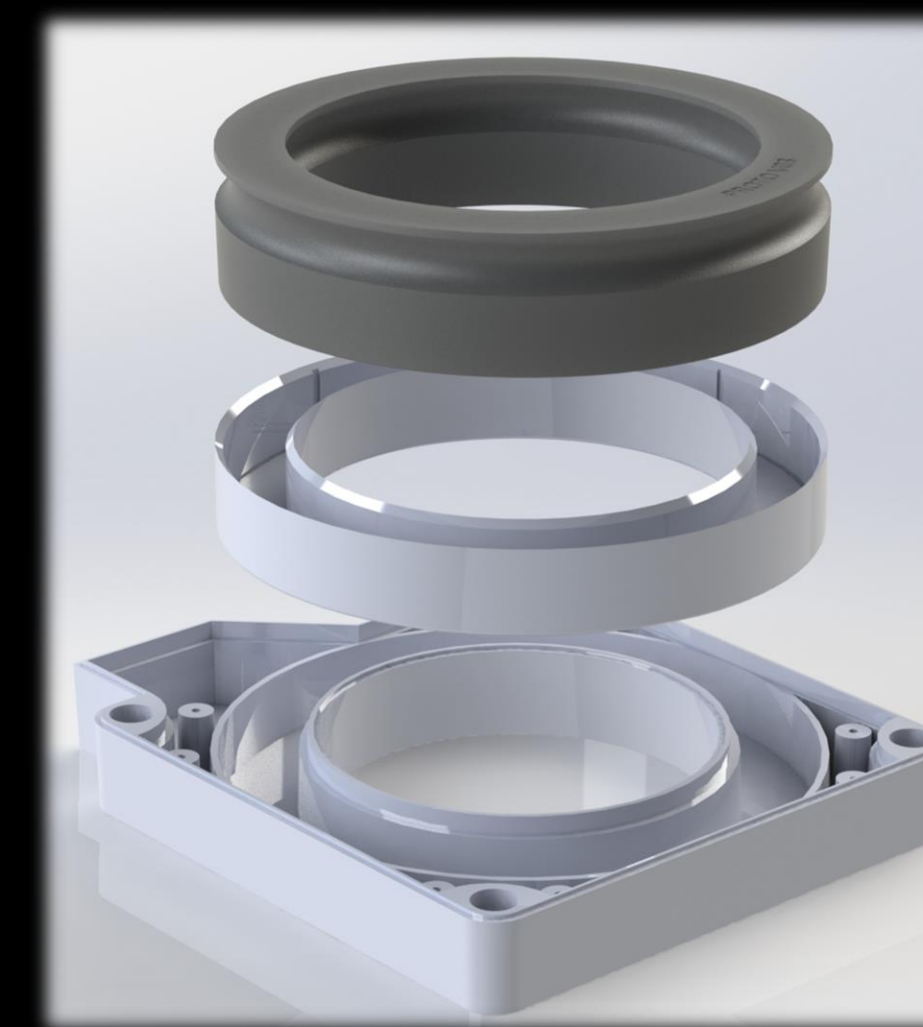
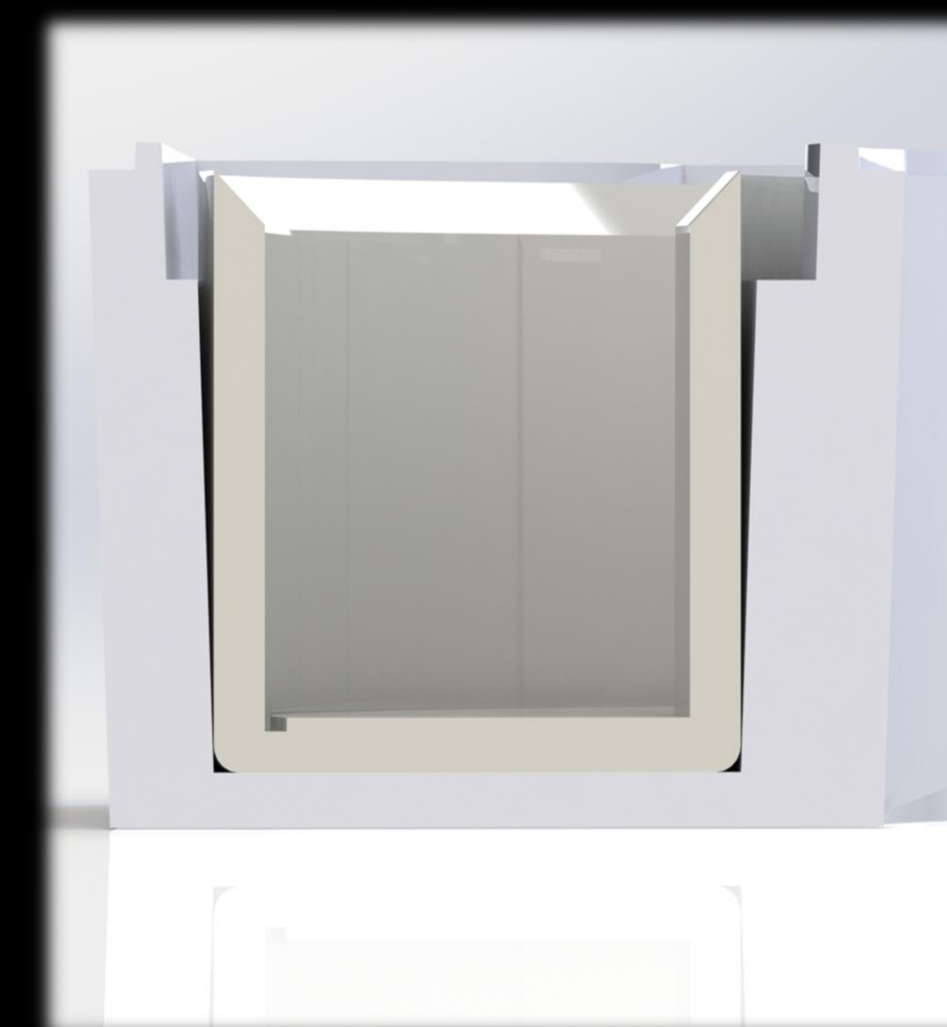
Removing Material

- Rotational cutting tool
- Done in sync with forming
- Cuts relieve stress that occurs in bends during forming



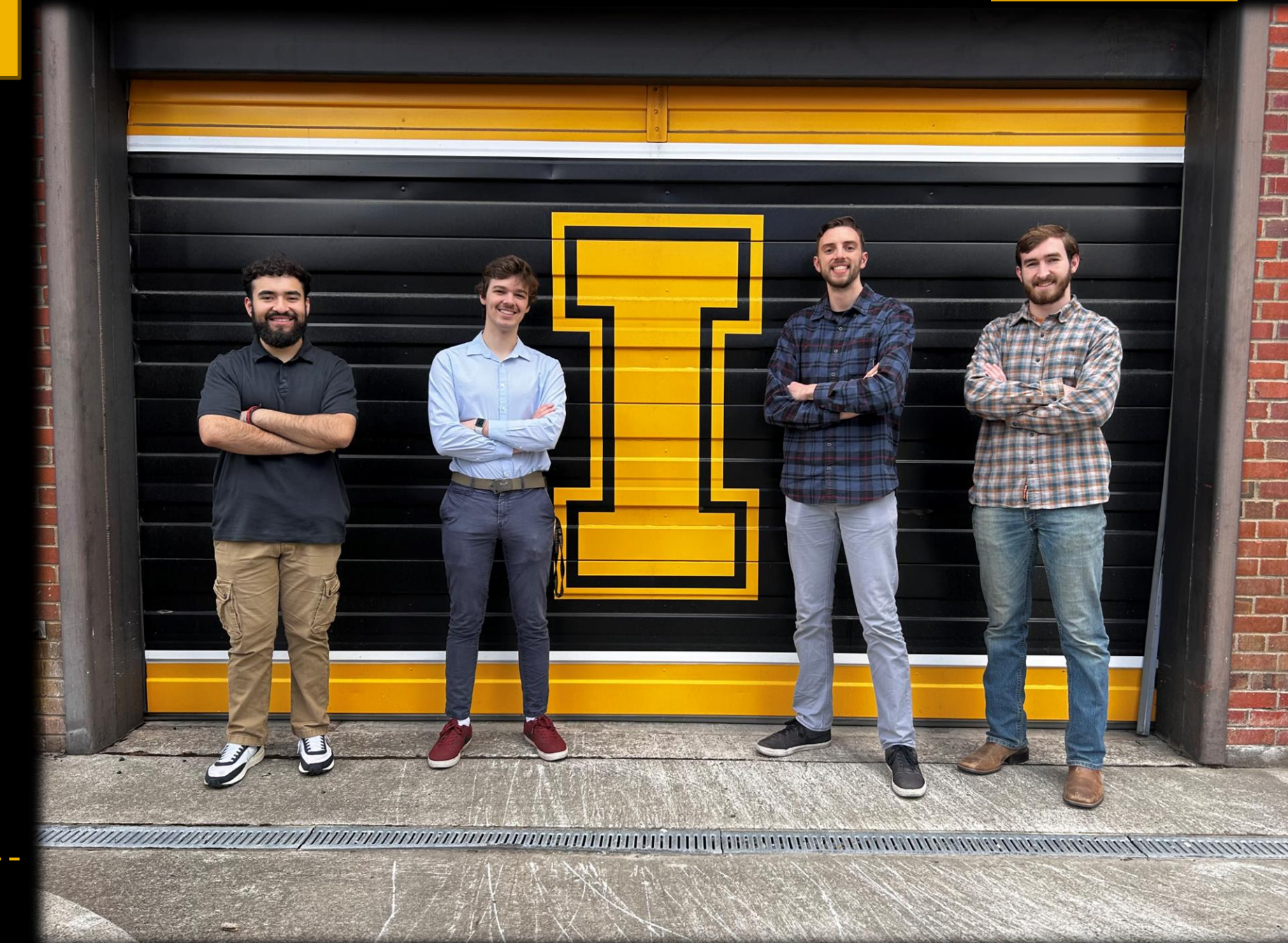
Thickness Reduction

- Aluminum Dies w/ membrane
- Application of force presses wrinkles down to roughly 3x-5x thickness of foil ~0.00165"-0.00275"
- Forms exact geometry

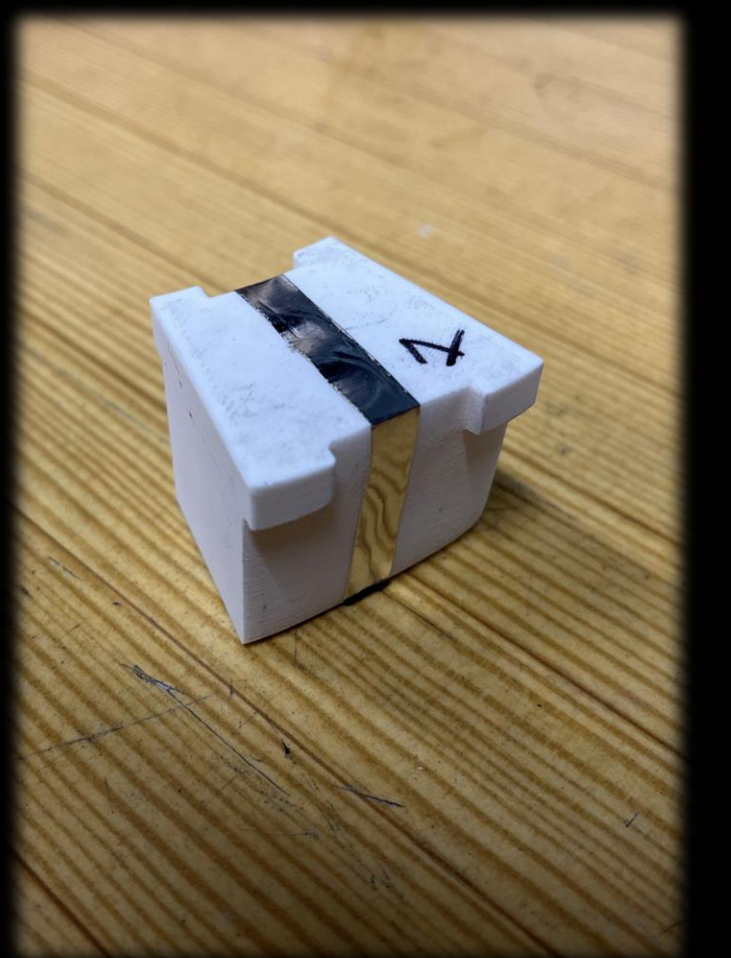


Encasement

- Placement in casing
- Flexible TPE press to push shield into all corners
- Adhesive on back side to prevent spring back



VALIDATION



- Within 0.005" from the wall
 - 3D printed gauge, carefully sanded to match casing profile
 - Electrical contact between gauge and shield indicates a failure
- Blocks EMI
- Adaptable to other Geometries
- 10 parts per day and tool Life greater than 1000 cycles



ACKNOWLEDGEMENTS

- Sponsors: Jonathon Richards, Alex Olsen, & Matthew Bevington
- University Faculty: Dr. Mark Roll, Tyler Sand, Keenan Bryan, Brian Petty



University of Idaho
College of Engineering

2024 Capstone Project