

IDAHO NATIONAL LABORATORY: TENSILE TESTING SYSTEM

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Objective

Design a tensile testing system that will fit through an 8-inch access port inside a glovebox and can perform tensile tests at temperatures reaching 700°C.

Background

A glove box is required to protect people from the potentially harmful conditions that could arise from the testing of certain alloy such as INL's current project using U-Pu-Zr alloys.

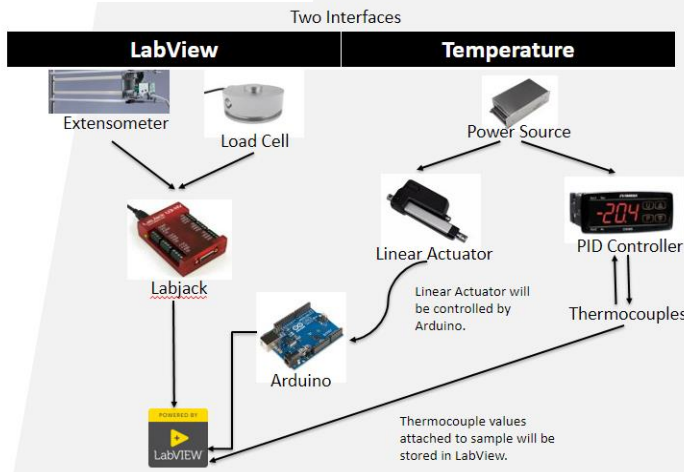
Value Proposition

The goal is to create an easy to assemble and use small-scale tensile testing system for an existing glovebox, fitting through an 8-inch hole in five or less easily assembled subassemblies.

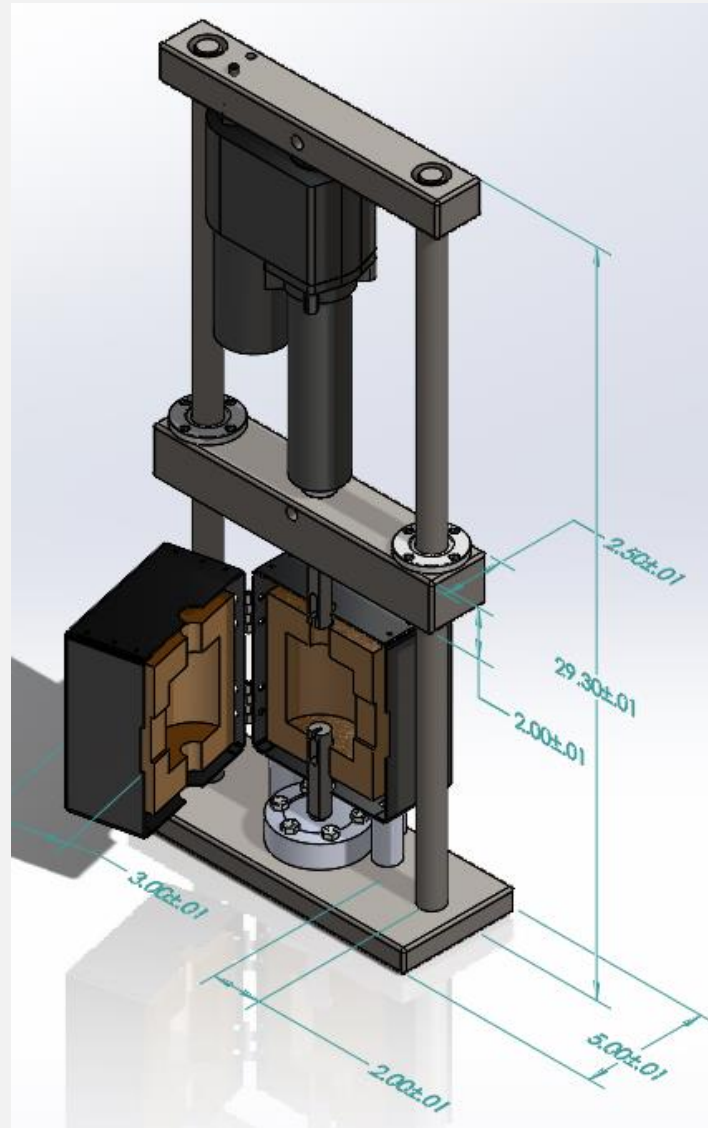
Key Requirements

- Must be able to complete a tensile test and gather data
- Must be able to run a test at 700 degrees C
- Must fit through an 8-inch glove hole
- Must be easy to assemble with gloves on

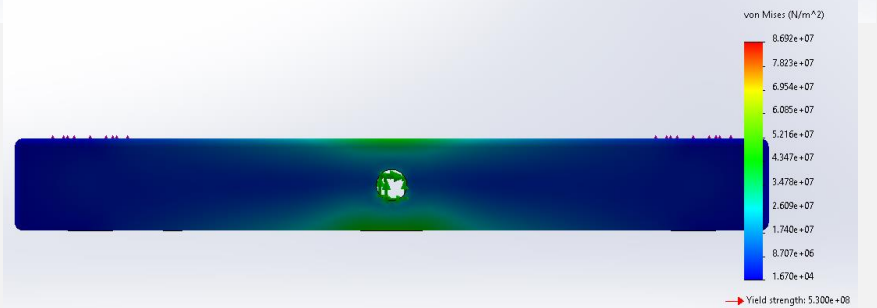
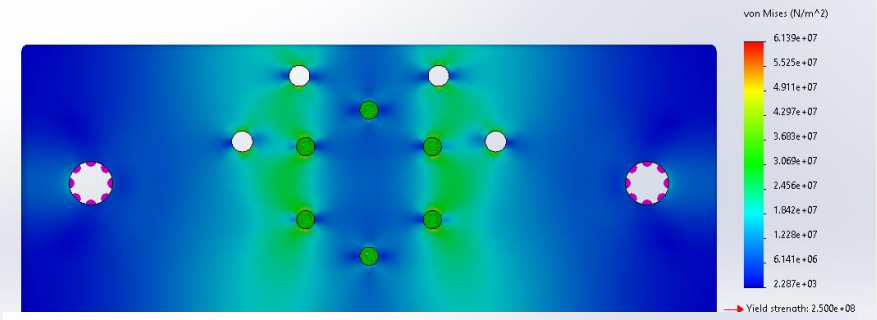
Instrumentation



System Design



Validation



Summary

- The finalized design can withstand loads up to 1500 lbf and test samples up to 38.1mm long by 2.5mm in diameter a factor of safety of 2.
- All component materials have been delivered, with 90% of milling work completed.
- Power supply, load cell, DAQ system, and motor control components have been delivered with 20% integration completed.
- Heater PID and load cell interface need to be finalized, awaiting manufacturer feedback.

Acknowledgements

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Lead Instructor: Michael Maughan

Shop Expert: Bill Magnie