# Project Overview

**Background**
- Elastomer diaphragms are used in pressure regulators to maintain constant pressure by matching downstream flow demand.

**Problem**
- Inability to perform dynamic testing on elastomers compounds while submerged in typical working fluids.

**Goal**
- Provide Emerson the means of dynamically testing elastomer material properties while submerged in working fluids.
- Perform both tension and compression tests.*

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**Key Specs**

- **Stroke 0.25” (Tension & Compression)**
- **Sealed**
- **Measure Internal Temperature**
- **NI Hardware/ LabVIEW**
- **Grips & Platens**
- **Required Chemicals**

- Pentane $\text{C}_5\text{H}_{12}$
- Hexane $\text{C}_6\text{H}_{14}$
- Motor Oil
- Methanol $\text{CH}_3\text{OH}$
- Trimethylpentane $\text{C}_8\text{H}_{18}$

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**Pillars of Design**

- **Transportable**
- **Modularity**
- **Chemical Compatibility**
- **Eliminate NI Hardware**
- **Eliminate LabVIEW**
- **Visibility**

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## Integrated Prototype

- Step down push rod integrates with Instron locking in place with clevis pin; shaft collar ensures proper alignment.
- Brake assembly secures push rod during set-up and transport.
- Seal is made of nitrile rubber for chemical compatibility and secures to the lid with a nitrile o-ring allowing no vapor leakage.
- Tensile grips and compressive platens from Instron secure samples in place during testing.

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**Conclusion**

- Prototype fully solves problem and addresses all specifications according to project goal.
- Transportable, modular nature helps with overall function.
- Solution addresses a stretch goal and is ready for future additions.

* ASTM D412, D575

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The Lid creates a seal with the glass chamber by using an O-ring. This secures the internal and external frame to transfer compressive and tensile forces around the glass and through the assembly.

The thermocouple threads into the lid and provides temperature readings to a LCD display.

Prototype has negligible effect on experimental data. This indicates seamless integration with the Instron hardware.

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Industry Mentor: Tim Hawkins
Faculty Mentor: Dr. Robert Hart
Machine Shop: Mark Powell, Jerry Beavers
& The University of Texas at Dallas

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