AUTOMATED TEST FIXTURE

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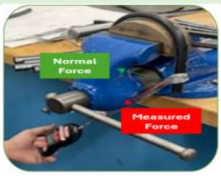
OVERVIEW

- Test machine designed to measure and record bend force
- Current method uses string tied to hose and attached to spring scale

FINAL PRODUCT

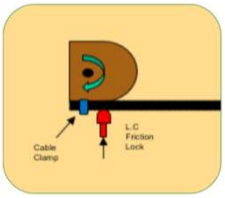
PREVIOUS TEST METHOD

- String tied to hose and attached to spring balance
- Types of errors:
  - Spring balance power times out
  - Force can fluctuate (human error)
  - Directional force error

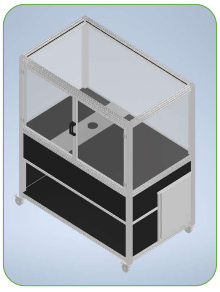


SCOPE

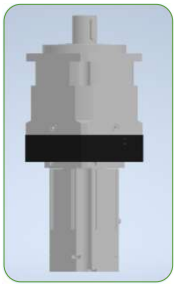
- Develop an automated test stand that measures the force to bend a hydraulic hose with data collection for analyzing hydraulic hoses
- Automated wire wrapping with machine
- Bend time: 10-12 seconds
- High repeatability and accuracy
- Safety measures to ensure operator protection



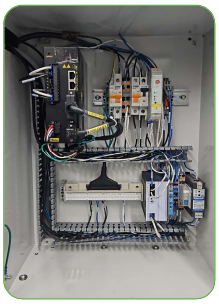
SYSTEM COMPONENTS



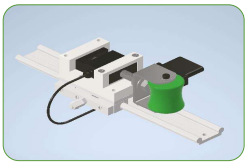

Aluminum extrusion with aluminum plates and clear/black acrylic sheets for enclosure




Motor & Gear Box provides power, modifies motor's speed and torque

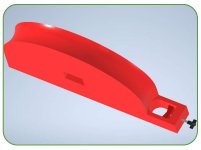


Electrical Panel servo drive, soft motor starter, DC power supply, relay



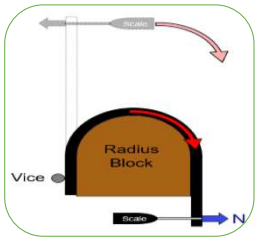

Roller assembly with load cell measures amount of force that is applied when hose is bent


Magnetic safety switch on door to prevent machine from running with doors open and e-stop for emergencies

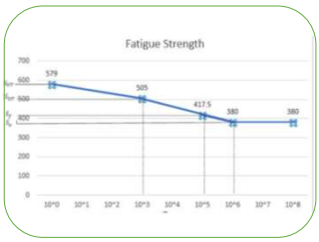


Mandrel with clamping mechanism holds and bends hose to required radius

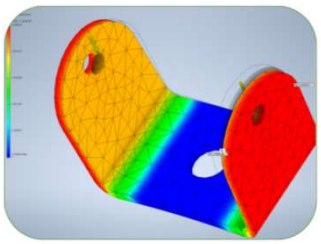
ANALYSIS



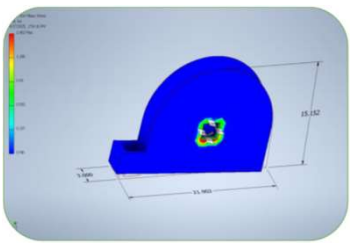
Force Schematic



Material Fatigue strength



FEA U-Bracket



FEA Mandrel

PROGRAM

- Rotates mandrel at a constant rate during testing
- Load cell attached to roller will measure amount of force during duration of test and will be graphically applied
- Data will be collected & displayed electronically

ISO 10619-1

"The apparatus shall consist of a mandrel, having an outside diameter equal to twice the minimum bend radius specified for the hose…"

ISO 10619-2

Condition the mandrel and hose test piece in the conditioning chamber at the chosen test temperature for 24 hours. Bend around the mandrel in 10-12 seconds after removal from chamber.