Tension Tester Fixtures

Kyle St. John & Joe Whitens
Purpose of Project

- Add additional value to existing machine
- Benefits future students
- Broadens reach of current lab
Compression Tester

• Can be used for a variety of applications

• i.e.:
  – Finding spring rates
  – Small cylindrical samples
  – Various materials
  – Rigidity of samples
Flexure Tester

• Allows students in real time to see bending stress
• Different spans, with the same material.
• Can compare rigidity.
• Compare breaking point for brittle materials

Standard Instron flexure tester
Design Compatibility

- Designed a standard attachment for use with the present Instron tester for both the compression and flexure fixtures.
Design Details-Compression Tester

Key design feature of Compression Plates.

- In the new design accuracy of the sample placement is controlled through the use of engraved incremental measurements (1”).
Static Loading-Compression Tester
In the new design accuracy of the span is controlled through the use of engraved incremental measurements.
Design Details-Flexure Tester

Key design features of anvil
- Rollers made of hardened tools steel
  - High strength
  - High wear resistance for longevity
- Lower anvil made of Stainless Steel
  - Allows rollers to move with the flexing of material to minimize drag and decrease testing error.
A “T-slot” design was used in the lower flexure fixture for the following reasons.

- Ease of machining.
- Enhance accuracy of anvil placement.
Static Loading-Flexure Tester

Model name: Instron Flexure Fixture - Lower
Study name: Study 2
Plot type: Static nodal stress Stress1
Manufacturing
Pictures - Flexure Tester
Pictures - Flexure Tester
Pictures - Compression Tester
Pictures - Compression Tester
## Estimated Total Rough Stock Cost

<table>
<thead>
<tr>
<th>Name of Part</th>
<th>Material</th>
<th>Max Attainable Rockwell Hardness</th>
<th>Yield in PSI</th>
<th>Dimensions (in.)</th>
<th>Price of Stock (Each)</th>
<th>Quantity</th>
<th>Sub. Total</th>
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</thead>
<tbody>
<tr>
<td>Intron Standard Attachment</td>
<td>Multipurpose Air-Hardened A2 Tool Steel</td>
<td>C62-65</td>
<td>50,000</td>
<td>1.75 Round x 12</td>
<td>$57.93</td>
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<td>$115.86</td>
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<td>Compression Plates</td>
<td>Multipurpose Air-Hardened A2 Tool Steel</td>
<td>C62-65</td>
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<td>6 Round x 1.5</td>
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<td>Lower Anvil Support, Flexure</td>
<td>Ultra-Machinable 12L14 Carbon Steel</td>
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<td>High-Strength Copper (Alloy 182)</td>
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<td>Upper Support</td>
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Actual Total Rough Stock Cost

- Actual Rough Stock Cost
  - $645.78
  - **Savings to Dept. = $85.75**
  - Accomplished with last consultation session with Dr. Marlor.
Questions?