Title: Mechanical Testing System Coupled with an Environmental Chamber for Hydrogels

Names:
Team: Gabriel Martinez-Diaz, Darcee Nelson, Charlie Haggart, Mike Piche
Client: Prof. Weiyuan John Kao
Advisor: Paul Thompson

Date: 11/13/02 – 11/19/02

Problem Statement: To update an existing procedure to make dog-bone stencils, approved by the American Society for Testing Materials (ASTM), and to test an environmental chamber, built in BME 301, to be used with a mechanical testing system in order to test the mechanical properties of hydrogels including stress, strain and creep.

Restatement of Team Goals:

Tensile Testing
1. Incorporate new pieces into chamber when they are finished.
2. Testing of the new chamber pieces.
3. Continue work on the final paper.

Creep Testing
1. Place order for pulleys, acrylic for design.
2. Check status of LVDT order.
3. Research data acquisition while waiting for parts.
4. Continue work on the final paper.

Summary of Accomplishments:

Tensile Testing
1. Inspected adaptations to chamber made by ME shop.
2. Added new dowel pin and spring, and filling/draining components (tapered pipe nipple, a two-way ball valve, and a barbed hose nozzle).
3. Ordered a new bottle that will allow filling and draining of the chamber by raising or lowering the bottle.
4. Searched for inexpensive aquarium heaters that can be used to maintain relatively constant temperature.
5. Worked on final paper.

Creep Testing
1. Verified final design dimensions, added dimensions to Auto-Cad drawings.
2. Ordered and received pulleys, and all acrylic pieces needed to make chamber.
3. Researched grips, and A to D converter that can be used in final design.
4. Checked status of LVDT order (to be shipped Nov 25th)
5. Worked on final paper.

Statement of Team Goals:

Tensile Testing
1. Validation testing of all new parts with chamber.
2. Test entire system with environmental chamber.
3. Make IPNs for tensile testing.
4. Heat transfer calculations to determine appropriate wattage of aquarium heater and continue searching for appropriate heater.
5. Continue work on the final paper.

Creep Testing
1. Build creep testing apparatus (acrylic structure and pulley system).
2. Order grips and A to D converter.
3. Continue work on final paper.
4. Research data logging systems.

Project Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Tasks</th>
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<tbody>
<tr>
<td>9/4 - 9/10</td>
<td>Define team roles and outline semester goals</td>
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<tr>
<td>9/11 - 9/17</td>
<td>Make a schedule for semester, update PDS, and set-up meeting with client</td>
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<tr>
<td>9/11 - 9/20</td>
<td>Testing of existing chamber (temp, seals, visibility, compatibility with Instron 1000)</td>
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<td>9/17 - 9/24</td>
<td>Brainstorm designs for creep testing apparatus, and for modifications of chamber for Tensile testing</td>
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<tr>
<td>9/25 – 10/17</td>
<td>Make modifications to chamber for tensile testing, develop and finalize designs of creep testing apparatus</td>
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<tr>
<td>10/14-10/17</td>
<td>Work on mid-semester presentation</td>
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<td>10/18</td>
<td>Mid-semester presentation</td>
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<tr>
<td>10/19-11/25</td>
<td>Update PDMS stencil procedure, obtain more EPON masters, finish/test modifications of Chamber for tensile tests, build creep testing apparatus. Finish a draft of the paper.</td>
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<tr>
<td>11/26-12/5</td>
<td>Tensile testing and creep testing/data analysis</td>
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<tr>
<td>12/5 - 12/12</td>
<td>Preparation of final paper and poster presentation</td>
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<tr>
<td>12/13</td>
<td>Poster presentation</td>
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<tr>
<td>12/14 - 12/20</td>
<td>Final meeting with advisor</td>
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Last updated: 11/5/02

Difficulties: None at this time.

Activities:

Gabriel: Final Paper, 0.5 hr
PDS Update, 1.0 hr
Emails, miscellaneous, 0.5 hr

Total: 2 hr
Cumulative Time: 66.75 hr

Darcee: Meeting with Mike to order parts and discuss design dimensions, 1.5 hr
Class time, 0.5 hr
Progress report, e-mails, notebook, etc. 0.5 hr

Total: 2.5 hr
Cumulative Time: 71.25 hr
Charlie: Troubleshooting with Bill Hagquist, 1 hr
Verification of the new grip adaptor and taking measurements/observations of the chamber/grip
adaptor/grip apparatus set up on the Instron 1000, 2 hr
Class time, 1.5 hr
BSAC, 0.5 hr
Emailing/internet (aquarium heaters), 0.5 hr
Notebook/final paper planning, 3 hr

Total: 8.5 hr
Cumulative Time: 66.5 hr

Mike: Drawings, 3 hr
Researching ADCs, 4 hr
Writing for paper, 1 hr
Notebook, 1 hr
Updating website, 0.5 hr
Meeting with Darcee to discuss design dimensions and order parts, 1.5 hr

Total: 11 hr
Cumulative Time: 69.5 hr