Abstract
The basic function of a wetsuit hanger is to reduce the stresses in the wetsuit material due to the increased weight of a water-saturated wetsuit. Our design team wanted to create a wetsuit hanger that could do something more than just hang up a wetsuit. The ultimate wetsuit hanger is an all-in-one wetsuit care product that combines the basic functionality of a wetsuit hanger with several additional features that make wetsuit care less of a hassle for a tired surfer.

Benchmarking
In order to create specific design objectives, the performance characteristics of a Tri-zone brand wetsuit hanger were analyzed. Additionally, 38 wetsuit owners were surveyed to determine what features the surfing community would like to see in a wetsuit care product, as well as what aspects of wetsuit maintenance were the biggest hassle.

Design Objectives and Evolution
From our surveys, we decided on two main design objectives:
1. Reduce stress in wetsuit material when hanging
2. Make rinsing routine easier for the user

Two rinsing processes were tested in order to help decide how to best incorporate an easier rinsing routine into our product:
1. Spraying of the wetsuit with a hose
2. Submerging and agitating the wetsuit in 2 gallons of water and changing the water after 1 minute

For the test, we quantified the “dirtiness” of the wetsuit by measuring the total dissolved solids (TDS) content of the runoff from the water saturated wetsuit. Data was recorded to quantify the dirtiness of the wetsuit versus net water use for both rinsing methods.

Results and Final Design
The Ultimate Wetsuit Hanger incorporates a more effective submersion rinsing method with an improved hanger design to reduce material stress.

Calculations were performed to analyze the stresses in the wetsuit material. We found that by hanging the wetsuit in the folded position from the waist, rather than upright from the shoulders, the Ultimate Wetsuit Hanger reduces the stress in the wetsuit material by a factor of 2. This is because in the folded position, both the front and back wetsuit material contributes to the effective cross-sectional area. Furthermore, the wetsuit material is usually the thickest in the core region, making it the ideal location from which to support the weight of the wet wetsuit.

Performance Analysis
<table>
<thead>
<tr>
<th>Performance Characteristic</th>
<th>Benchmark</th>
<th>Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of Washing</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Less Water Usage</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Less Strain on the Wetsuit</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Faster Dry Time</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Can Be Used Anywhere</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Low Cost</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ease of Transport</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Provides Changing Station</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Contained Wetsuit Storage</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 1 – Performance comparison: The Ultimate Wetsuit Hanger versus benchmark

When using the Ultimate Wetsuit Hanger to rinse a wetsuit the user can expect:
• Water savings of over 55% compared to using a standard hose.
• 50% reduction in stress on wetsuit material.
• Longer wetsuit lifespan

Conclusion
The Ultimate Wetsuit Hanger is much more than your typical wetsuit hanger. The collapsible design allows the user to hang their wetsuit in locations that would normally be impossible when using a standard wetsuit hanger. The wash tub design ergonomically incorporates several additional features that allow the user to keep their wetsuit off the ground when changing, keep their wetsuit safe and contained during transportation, and helps reduce environmental impact by reduction in water use.

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• Stephen Laguette, Senior Design Advisor
• Sharice Handa, Design Advisor

References
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• US Patent # 4,949,842 – Wetsuit carrier
• US Patent # 4,949,739 – Wetsuit washing hanger device
• “How to Care for a Wetsuit” www.wetsuitwarehouse.com

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