Abstract

The overall materials for the cover needed to be waterproof and highly elastic in order to prevent water from penetrating the prosthetic when the user is in contact with water. The material located at the knee region and the sole of the foot should be more durable when compared to other regions of the cover in case of falling or if the knee or sole of the foot comes in contact with a rough surface during physical activity. Since, the materials needed to have high elastic properties by not only to prevent water from penetrating but also when creating an airtight seal around the prosthetic leg, leaving limited amount of folding of the excess material. This would help the product to be more aesthetically pleasing and lower to cost material used. By saving money on the amount of material used per cover, the overall product cost would be more affordable when compared to other prosthetic covers on the market.

Customer Needs

- Fully Waterproof
- Tight seal at opening
- Foot sole grip
- Vacuuming Timing
- Failsafe of vacuum pump
- Reusable

- Longer Wear Time
- Light weight
- Easy to put on
- Price < $50
- One size fits all
- Automatic Vacuum Pump

Design Concept

Design

- Leg Component
- Boot Component
- Vacuum Pump System

Final Leg and Boot Component

Test Plan

<table>
<thead>
<tr>
<th>Customer Needs</th>
<th>Requirement</th>
<th>Test Case</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failsafe of Vacuum Pump</td>
<td>280: Automatically turn off after 2 minutes</td>
<td>300: Functionality of Vacuum Pump</td>
<td>Pass</td>
</tr>
<tr>
<td>Fully waterproof</td>
<td>310: able to withstand rain and snow</td>
<td>400: System Testing</td>
<td>Fail But Water resistant</td>
</tr>
<tr>
<td>Tight seal at opening</td>
<td>310: Deflated cover</td>
<td>500: System Testing</td>
<td>Pass</td>
</tr>
<tr>
<td>Vacuuming Timing</td>
<td>340: Deflate cover in 2 minutes</td>
<td>300: Functionality of Vacuum Pump</td>
<td>Pass</td>
</tr>
<tr>
<td>Reusable</td>
<td>340, 410,420: usable for minimum of 50 uses</td>
<td>500: Weather Condition Testing</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Acknowledgement

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References