The Epic Arm

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Project Objective
In order to help arm amputees in third world countries, our group is working with the Ellen Meadows foundation to develop a cost effective solution.

The group objectives are as follows:
• Create a product that restores patients ability to perform routine daily tasks
• Create a product that is durable and will last for several years.
• Create a product at a price point between $50 and $150.
• Create a product that is intuitive, user friendly and adaptable to people of all sizes.

Problem Description
• Of the estimated three million arm amputees the world over, 2.4 million live in the developing world. Thirty percent of these (750,000) possess amputations above the elbow. [2]
• Currently there exists no low-cost treatment option for these patients with trans-humeral amputations
• Advanced prosthetics exist which can restore functionality, but they are prohibitively expensive and have many failure modes
• Therefore, there is a need to develop a low-cost prosthetic option to restore quality of life

Our Product
Features
1. A self closing hand for ease of grasping
2. A wrist-ratchet for 360 degrees of motions and locking mechanism
3. A removable pin elbow joint with preset angles
4. A attachment harness for weight distribution

Mechanical Testing
• Arm components maintain a factor of safety over 7 for lifting a 25 pound load
• Attachment harness can support weights well over 100 pounds

Manufacturing
Material and Methods
• The epic arm will be made out of poly-carbonate
• The benefits of using this material include: high durability and impact resistance, and ease of manufacturing
• The arm will be manufactured by injection molding, which is a process where the plastic melted, injected into a mold and then allowed to cool and harden into its desired shape

Cost
• Factoring in the cost of creating the molds used for the injection molding, and the cost of the raw material, the total cost for the epic arm is estimated as $125.72 after the first 5000 arms produced

Current Products
A current low-cost prosthetic device is the LN-4, created by the Ellen Meadows Foundation. Their mission is to provide a light, durable, functional prosthetic hand to every person who wants one and can benefit from it, and do so at no charge.

However, the LN-4 is strictly a below-elbow device. It restores daily functioning to those with below elbow amputations.

The LN-4 is distributed with the financial assistance of Rotary International to amputees in such places as Uganda.

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References