

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:

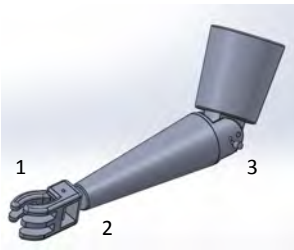
- Create a product that restores patients ability to **perform routine daily tasks**
- Create a product that is durable and will last for **several years**.
- Create a product at a price point between **\$50 and \$150**.
- Create a product that is intuitive, user friendly and adaptable to people of all 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**



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.

Acknowledgments

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References

1. Lovejoy, William, Sebastian Fixson, and Shaun Jackson, comps. *Product Costing Guidelines*. N.p.: U of Michigan, n.d. Print.
2. "Amputee Statistics You Ought to Know." *AdvancedAmputees.com*. Advanced Amputee Solutions LLC., 2012. Web. 19 Feb. 2015.
3. "Working for Your Safety." *What We Regulate*. FOOD AND DRUGS AUTHORITY GHANA, n.d. Web. 19 Feb. 2015.
4. "The Medicines Control Council." *The Medicines Control Council*. Department of Health: South Africa, n.d. Web. 19 Feb. 2015.
5. "Erratum: Studying the Transition to Socialism in the Nicaraguan Health System." *Medical Anthropology Newsletter* 15.4 (1984): 105. Web.

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

