Bean Thresher for Central America

Advisor: Dr. Luis Flores

Zach Albright
Ben Ambrose
Erika Crosby
Khoa Nguyen
Introductions

- Zach Albright
  - albrig40@msu.edu

- Ben Ambrose
  - ambros24@msu.edu

- Erika Crosby
  - crosbyer@msu.edu

- Khoa Nguyen
  - nguye217@msu.edu
Project Background

- Bean thresher for small-scale Central American farmers
- Current process involves large amounts of manual labor
- Mechanical threshers have thus far failed
- Must create a device that can be manufactured and maintained in poor Central American countries
Target Country: Guatemala

- Cultural Influences
  - Spanish colonial rule, Mayans, indigenous peoples
- Average Income
  - $4,900 annually for each family
- Agriculture
  - 75% export earnings, 50% of labor force
  - Coffee, sugar, beans, bananas, cotton, tobacco and rubber trees
Guatemala Adventure
Video: Male Threshers

http://www.youtube.com/watch?v=MtiNSzf2xC4&feature=youtu.be
Video: Female Threshers

http://www.youtube.com/watch?v=bw4ce1s3xLE&feature=youtu.be
Problem Statement

- Need for more efficient bean threshing process
- Current process involves using a wooden rod to force the beans from the dried pods
- Future process will involve a mechanical device to minimize work and time required
Primary Resources

- Patent Search
- Tillers International
- Dr. Luis Flores
- Julio and Fernando
- Evan Wright

Julio Cesar

Dr. Fernando Aldana

Dr. Luis Flores
Design Parameters

Must meet the top 5 design parameters:
- Performance
- Maintenance
- Safety
- Quantity
- Weight
Concept Generation
Top 3 Concept Designs

- Chosen based on the decision matrix
- These designs scored best in fulfilling the top 5 design parameters
Final Concept Choice

- Auger Mechanism Design
- Evolution of Concept
- Bicycle Driving Force
Final Design

Plant Input

Bean Output

Power Input
Implementation in Central America

- Write detailed fabrication process and operations guide.
  - Including detailed illustrations
- Coordinate with Julio and Fernando as the native implementers to persuade the local people to use the bean thresher.
- Request status updates at 3 month intervals to ensure that the threshers are being used properly and maintained.
Fabrication Process
Prototype Fabrication

- Order auger from Lundell Plastics.
- Modify hexagonal shaft to allow for bearing attachment.
- Weld angle iron frame together.
- Bend expanded metal grater into a halved cylinder to fit the auger.
- Assemble device with frame, auger, bolted steel end plates and expanded metal grater.
Future Plans

- Complete prototype by Design Day.
- Complete poster and report.
- Connect with Fernando and Julio to set up the implementation plan.