Project Name – Injera Making Machine

Overview
Injera is a staple flatbread for the people of Ethiopia. It is made by hand everyday and cooked over a wood fire, which has caused mass deforestation in the country. The African Climate Exchange has decided to build a mass production injera assembly line in Ethiopia to help offset this. The team has been tasked with developing a device to deposit and form injera batter onto a moving conveyor belt, to be used in the assembly line in Ethiopia.

Objectives
The team was to develop a working prototype for a very simple machine that could be fabricated, assembled, operated, and maintained in Ethiopia. This required that the machine have no complicated or specialty parts, no computer control, etc. Additionally, the machine had to produce at least 5400 injera per hour, with each injera being 15” in diameter and under 1cm in thickness.

Approach
- Analysis of provided proof of concept
- Industry research and patent search
- Blue sky brainstorming – concept generation
- Concept selection via multiple concept weighting formulas
- Selected two designs and developed system level designs
- Developed detail designs for both designs
- Chose to prototype the sliding plates concept over the cylindrical drum
- Modified the actual oscillating plate design
- Fabricated an alpha prototype of the machine
- Conducted initial testing with success
- Provided a list of recommended revisions for a beta prototype

Outcomes
Outcomes of the project:
- Developed a successful alpha prototype of a new batter deposition and formation machine.
- Further simplified the machine from the originally provided proof of concept

Recommendations for further refinement and development:
- Build a beta prototype.
- Increase oscillator plate thickness to 1/8in steel plate
- Analyze leakage encountered within the plates.
- Modify tank design to better funnel batter to the slot.
Project Name – Baobab Project

Overview
The Agricole de Baobab utilizes a mortar and pestle to grind the pulp of the baobab fruit of Africa. This process is labor intensive and the seeds and fiber are separated by hand. A machine is desired that will effectively grind the pulp of this fruit and enable easy separation of the seeds and fiber.

Objectives
The main objective of this project was to implement a machine that could produce at least 400 kg per day of pure baobab pulp that is 300-600 microns.

Approach
- Analysis previous research and prototype
- Patent search and industry research
- Concept generation
- Selection of concept using different equations
- Narrowed down to one design
- All working parts drawn in Solidworks
- Different mesh selected from original prototypes
- Alpha prototype constructed of machine
- Initial testing successful
- Revisions suggested for a beta prototype

Outcomes
- Alpha design and prototype completed
- Processing time went from one fruit per hour to 50 kg of pulp/hr
- Less workers needed for operating
- New approach fabricated for separation and grinding of fruit
- Sanitary materials used
- All parts of design documented to ensure easy reproduction of prototype for future use