African Climate Exchange II

Overview
Mr. Sisay Shimelis, the sponsor and contact at African Climate Exchange approached the Industrial Engineering team to establish a facility around the Injera machine that was previously built in Fall 2010. Combining with a Mechanical Engineering team in Spring 2011, the goal was to work with the M.E. team while they improve the machine to produce one million injera per day.

Objectives
The I.E. team was tasked by Mr. Shimelis to establish baseline numbers behind the facility. Information to build his facility around includes volume and weight requirements for raw ingredients, storage and production areas, and a rough layout and numbers for the facility. Additionally Mr. Shimelis wanted the team to determine times for packaging of the product, to reduce automation and increase job availability.

Approach
- All required demands were provided by Mr. Sisay Shimelis, such as production numbers and background information. Email contact with Mr. Shimelis and the M.E. group was frequent
- Purchased requisite raw ingredients (grains, yeast) and performed tests such as volumetric expansion, mass and weight, water content. The information was used to calculate mass needed for an hour, day, and thirty days of production
- Reviewed United States patent number 7,063,008 B2 for a previously designed injera production machine and oven
- Purchased pre-made injera plates to determine packaging times through time studies
- Visited baking companies (Herr’s Foods and Reading Bakery Systems) to speak with design engineers and baked foods experts
- Researched existing plant layouts of bakery plants, primarily plants in non-Western countries
- Designed two facilities, one using Fall 2010’s machine and another using Spring 2011 machine. Reasoning is due to Fall 2010’s slower production and Spring 2011 untested nature.
- Tested baking injera in ovens to determine a heating curve. Calculated distance required for oven baking.
- Both designs based on all numbers tested and calculated.

Outcomes
A facility using Spring 2011’s injera machine
- Calculated for one million injera/day
- Another facility, seen in the final report, uses an older machine. That facility requires more lines.

2011 IE team design