Alternative Farming Solutions Vehicle

Project/Problem

In many third world countries there is a need for small, inexpensive, all-terrain vehicles. These types of vehicles are very similar to a small tractor, yet operate much like a small car. These vehicles can be used on the farms, bringing people back and forth from town, and can be adapted to many different uses. Some of these uses include; adapting a generator to run off the small engine, integrating a small plow for use in the fields, having a tilt deck for carrying produce etc., possible seeding machinery, and others that would be necessary.

Goals

- Cargo – Able to hold a full load of cargo in the bed along with two passengers
- Speed – Able to travel around villages in reasonable time while still gearing down to plow a field, initial goal of 15 mph top speed
- Plow – Will be able to cut through dry hard packed soil with limited kick back and wear on plow blade
- Generator – Able to output 5,000W while maintaining low rpm’s on the engine, will be able to support electrical uses of single family home
- Bed Lift – Lift the maximum load, initial limit of 1500 lbs.
- Tires – Must be able to withstand terrain without punctures or flats

Requirements

- Run strong through difficult terrain – engine capabilities along with appropriate ground clearance and tires provide desired off-road functionality
- Plow a field without bogging down and getting stuck in the field
Team

Ben Byma (ME)

Jon Goorhouse (ME)

Reuben Swinkels (ME)

Matt Hoogstrate (ME)

Seth Weaver (ME)
**Problems to be solved**

The largest hurdle will be the economics of the build. Many of the components are quite expensive. Therefore we will need to find donors for many items including the engine, generator head, and hydraulics. We will also need to find the optimum platform that will support the tilt bed and hold the plow system. The goal of the project is to keep the vehicle to a minimum size, yet have enough strength to withstand the typical uses.

**Constraints**

- **Cost** – Looking for possible donations from local companies, will work to keep cost of vehicle minus the engine below $1500
- **Size** – No larger than a small truck, possible to fit in shipping crate, so width less than 8 ft.
- **Weight** – Frame must be large enough to support tilt bed with full load but not oversized to limit speed, the team has put an initial limit of 1500 lbs.
- **Climate** – Withstand the hot temperatures
- **Maintenance** – availability of parts which may need to be maintained throughout the lifetime of the vehicle
- **Easy Use** – Vehicle functionality must be easily understood by any operator.

**Progress**

- **Outlined design schedule**
  - Gantt chart for design process
- **Research farming needs in developing nation**
  - What implements are desired in a basic utility vehicle
- **Research feasibility of implements**
  - Vehicles ability to plow a field
  - Generator size
  - Actuation of bed
- **Preliminary design of vehicle**
  - Frame
  - Bed
  - Engine specifications
Obstacles

- Transmission
  - Gearing to appropriate speeds
  - Implementing generator
- Bed Lift
  - Hydraulic actuation
  - Winch - Crank up bed
- Ergonomics
  - Safe – limit possibility of harm while driving and operating implements
  - Efficient – fulfills needs with limited cost and time