

# Well Driver

William Vaughn (ASM), Cole Zeller (ASM)

## Background & Problem Statement:

In underdeveloped and developing countries water resources are unavailable for family households and small farms. The little water that is collected usually originates from polluted lakes and streams. Hot climate and little rainfall in many of these countries prevents surface water from accumulating for collection. These factors have negative health impacts on the people and livestock that live in these areas. The purpose of our project is to design and build a portable well driving device that will provide plentiful clean water. The device must be portable as well as rugged to withstand the unpaved, harsh road conditions seen in many developing countries.



## Constraints:

- Low cost for the Third-world Countries/developing countries
- Durability on tough, narrow roads
- Simple operation
- Materials are easy to obtain
- Deep enough drilling to provide good, clean water

## Global Impact & Sustainability:

If implemented correctly and used to its potential, this design will be a great way to help diminish the great thirst that many 3<sup>rd</sup> world countries face on a day-to-day basis. It will allow many rural communities to flourish instead of wither and vanish.

## Alternative Components:

### Frame Options:

#### OPTION 1: Dump truck style motion

- Short profile
- Higher weight limit
- Functional with hydraulic system

#### OPTION 2: Grain auger style motion

- Tall profile
- Lower weight limit
- Requires manual crank to operate
- More difficult to use and repair

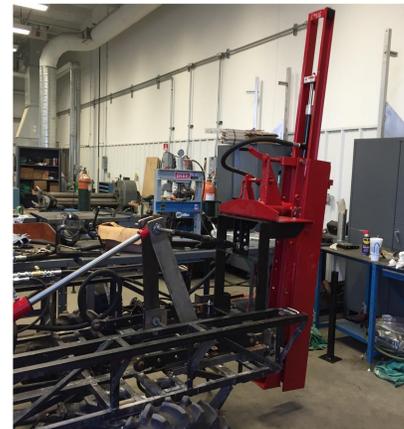
## Design Components:

### Practical Utility Platform:

This design project is based on the 2014 Generation Purdue Practical Utility Platform (PUP) which has been working in sub-Saharan Africa. The PUP is capable of carrying up to 2000 pounds on rugged terrain due to its dual coil spring and torsion bar suspension.



### Post Driver:



The post driver can operate at 1500 psi and deliver up to 3000 pounds of driving force. It is capable of driving up to ten foot sections of pipe forty feet into the ground. The weight of the driver is not an issue at a mere 500 pounds with the fact that the weight limit of the PUP is over 2000 pounds. It comes with stabilization legs and side to side tilt options for optimum performance.

### Frame:

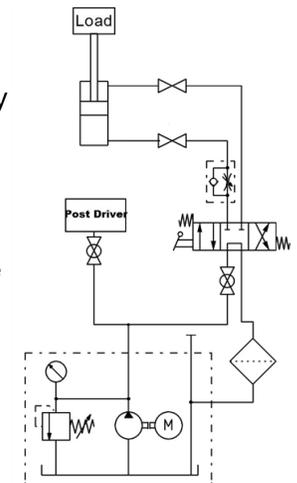
Consists of:

- Option 1: Dump truck style motion
- 6 support brackets
- Three-point arms
- Three-point hitch connection
- Arched support arms
- 3/4 rods for maneuverability
- Welded support structures
- Adjustable support legs



### Hydraulic System:

A concentric gear pump is powered by the engine drive shaft using a v belt pulley system tensioned with an idler pulley. The pressure from the pump supplies fluid to two control valves: one for the post driver and one for the hydraulic cylinder used for the dump truck motion. The system is regulated using a pressure gauge and an adjustable pressure relief valve.



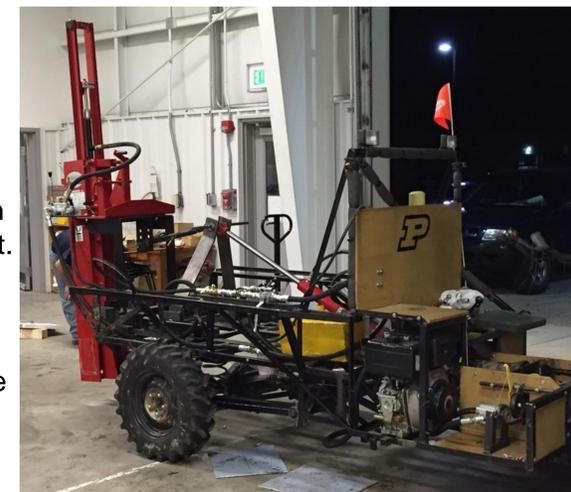
## Cost Analysis:

Items	Cost
<b>Practical Utility Platform</b>	
PUP vehicle*	\$2000
<b>Frame</b>	
Three-point hitch and arms*	\$200
Brackets and supports*	\$250
<b>Post Driver</b>	
Shaver HD 8 post driver	\$2500
<b>Hydraulic System</b>	
Hoses and fittings	\$350
Hydraulic cylinder	\$150
Hydraulic gear pump*	\$175
<b>Total</b>	<b>\$5625</b>

\* Items donated from various sources.

## Integrated Design:

The post driver was installed on the back of the 2014 PUP, with intention to drive 10 ft. sections of pipe to create water wells. It folds down to a safe driving level using the hydraulic cylinder to mimic a dump truck style motion.



**Sponsors:** Dr. Bob Stwalley & Siwen Zhao  
**Special thanks to:** Scott Brand  
The PUP team

**Instructors:**  
**Technical Mentor:** Dr. Bob Stwalley  
**Course Instructors:** Dr. Bernie Engel  
Dr. Bob Stwalley