Introduction

The goal of this project is to develop an engine-powered system that reduces the labor required to manually drill wells, while retaining portability and low capital investment required. The technology used to percussively produce shallow bore holes is currently used by our client in Burkina Faso, West Africa. The wells drilled by our client provide water access in the dry season for agriculture.

This spring we have been working on designing a metal prototype of the mechanized system. In the fall we designed, built and tested a concept machine. We used the results from our testing to guide the design of a steel prototype. In January 2016 we aim to bring this system to our clients and train them in its use.

Concept Development

In the fall of 2014, our team designed and built a transmission system to test the basic functionality of the capstan, and mounted the concept system to a wooden base. The transmission system was designed to lift drill bits at 3 ft/s, using a belt and chain. A 3 horsepower engine provides power to the transmission, which allows the capstan to rotate.

After assembling our machine, we tested it for nearly ten hours. Beyond ensuring that the system functioned as expected, we recorded the advantages of different rope types and sizes used while drilling with this system.

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Metal Prototype

We began work this semester to design a metal prototype that fulfilled the desired specifications we determined after testing the concept machine. Additionally, we designed a steel tripod to interface with the prototype. Part of our team built a drilling jar, which helps to loosen stuck drill bits. Our team is planning to test the steel prototype on campus next semester. In January 2016 our team will be bringing this prototype to Burkina Faso for testing.

Conclusions

- **Goal:** Create a mechanized drilling system that reduces the labor required by manual well drillers, while retaining the benefits of low capital investment and portability.
- **Progress:** This year we have built a concept machine and have designed a metal prototype.
- **Future Goals:** We plan to have the steel prototype built and tested before the site team trip to Burkina Faso in January 2016.

Acknowledgements

- **Project Advisor:** Joseph Longenecker
  jblongen@gmail.com
- **Research Mentors:** Dr. Thomas Soerens, Tony Beers, Brendon Earl
- **Consulting Engineers:** John Meyer, Dr. Brian Swartz, Dr. Tim Van Dyke

Clients

**Matt Walsh with Open Door Development, SIM**

Matt Walsh was the first Collaboratory Manager. He is now a missionary with SIM in Burkina Faso, West Africa.

**Open Door Development**

ODD is an SIM community development ministry based in Mahadaga, Burkina Faso. Their mission is to share the gospel by equipping the local church for community service and by ministering to human needs. ODD was officially founded by Dale Johnson and Matt Walsh, in 2012.

Our Team

Front: John Hannon, Katie Moyer, Amanda Luger (Project Leader), Althea Mavros, Damaris Gehman, Luke Betteridge
Back: Marcus Upton, Joseph Longenecker (Project Adviser), David Wilson, Aaron Film, Calvin Dunmire
(Note: Spencer Mott not pictured here)