Manual Block Press
School of Science, Engineering, and Health Symposium
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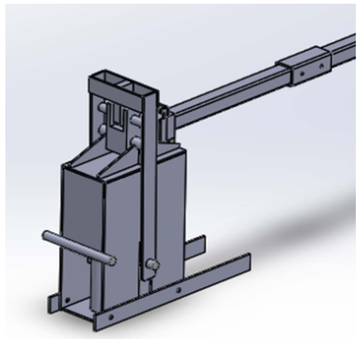
Problem
Rama Cay, a small island in Nicaragua, is overpopulated with poor living conditions. The Rama people are looking to move inland, which requires the construction of affordable houses. The relocation area has an abundance of clay, which can be used to create compressed earth blocks, but aggregate for concrete is expensive and difficult to obtain. We are partnering with Friends In Action to develop a simple and affordable block press that allows the Rama people to create their own blocks to build houses for their families.

Specifications
- An optimal mixture of clay, sand and cement with mixing procedure
- SolidWorks Design of Prototype
- Fabricated fully-functional design for site team trip in June
- Design must be light enough for two people to move and operate
- Must produce blocks with consistent size and strength for successful house building
- Prototype must last up to one year

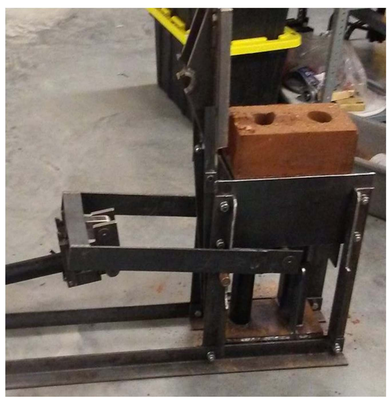
Fabrication
- The design for this block press was developed by modifying the Cinva Ram Block Press in order to meet our criteria.
- Model for our block press was created in Solidworks.
- The drawings were sent to a local volunteer metal fabricator, Jake Hitz, who began the fabrication process.
- Fabrication was completed and brought to Messiah for modifications.

Reference:
Permies.com: I built a Cinva-Ram CEB Press
https://permies.com/t/33406/built-Cinva-Ram-CEB-press

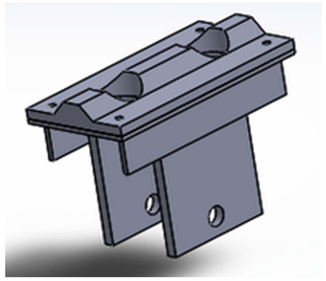
Mixture and Block Design
- The blocks are composed of 70% clay, 20% sand, and 10% cement.
- Water is required in order to bond with the cement. The amount varies depending on time of the year (rainy or dry season).
- Design of the block includes holes and grooves which allow rebar to run through the wall both vertically and horizontally. This design also allows the blocks to interlock with each other.



Solidworks Model



Final Prototype

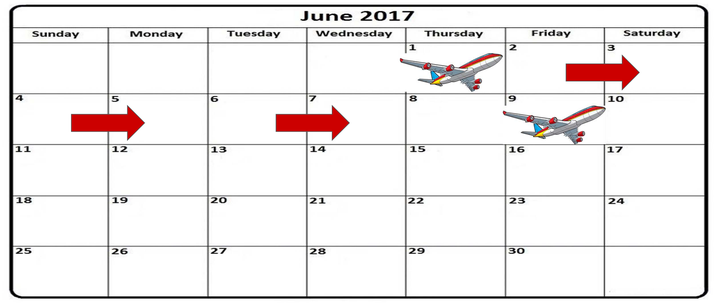


Bottom Form for Inner Chamber

Block pressed and cured

Modifications
After fabrication was complete, the block press did not work smoothly and a few adjustments had to be made.
1) Took off 1/16” from the sides of the top and bottom form to decrease friction resistance.
2) Inserted small metal piece in between two pistons to keep them at an exact distance apart. Warping had caused the pistons to be slightly out of plum, resulting in contact with the bottom plate.
3) Added guide rails to prevent binding when ejecting a block.

Upcoming Site Team Trip
Our team will be headed to Rama Cay, Nicaragua, the first week of June 2017 in order to introduce our prototype and complete testing. We will be testing the soil mixture with the clay available to the local people. Friends in Action will be partnering with the Collaboratory in this trip. Tim Johnston of FIA has well established relationships with the Rama people and will be leading our group throughout the week. We are extremely excited about the trip and would appreciate your prayers!



Conclusion
This project started in Spring 2016 with the aspirations of delivering a practical manual press that can be used to build homes in Rama, Nicaragua. Our prototype is built and in the final stages of modifications and testing. This design meets our client’s needs and will hopefully be a viable asset to home building in Nicaragua in the future.

Moving Forward
The design will be tested in Rama during the site team trip and brought back for analysis. We will discuss areas for improvement and begin working on a long-term design in Fall 2017.

Partners and Acknowledgements
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