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Better Pumps: Promoting Reliable Water Infrastructure for Everyone

Emma L. Workman

Caleb E. Danehower

Darren Kulp

Jacob Valentine

Joshua L. Maxson

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Better Pumps

Promoting Reliable Water Infrastructure for Everyone

Caleb Danehower, Darren Kulp, Joshua Maxson, Jake Valentine, and Emma Workman

Mission

Engineering support for partners working to sustain reliable water infrastructure for users of handpumps

~ 1.3 billion people rely on wells
~ 30 % of India Mark II and Afridev handpumps are non-operational due to component failures

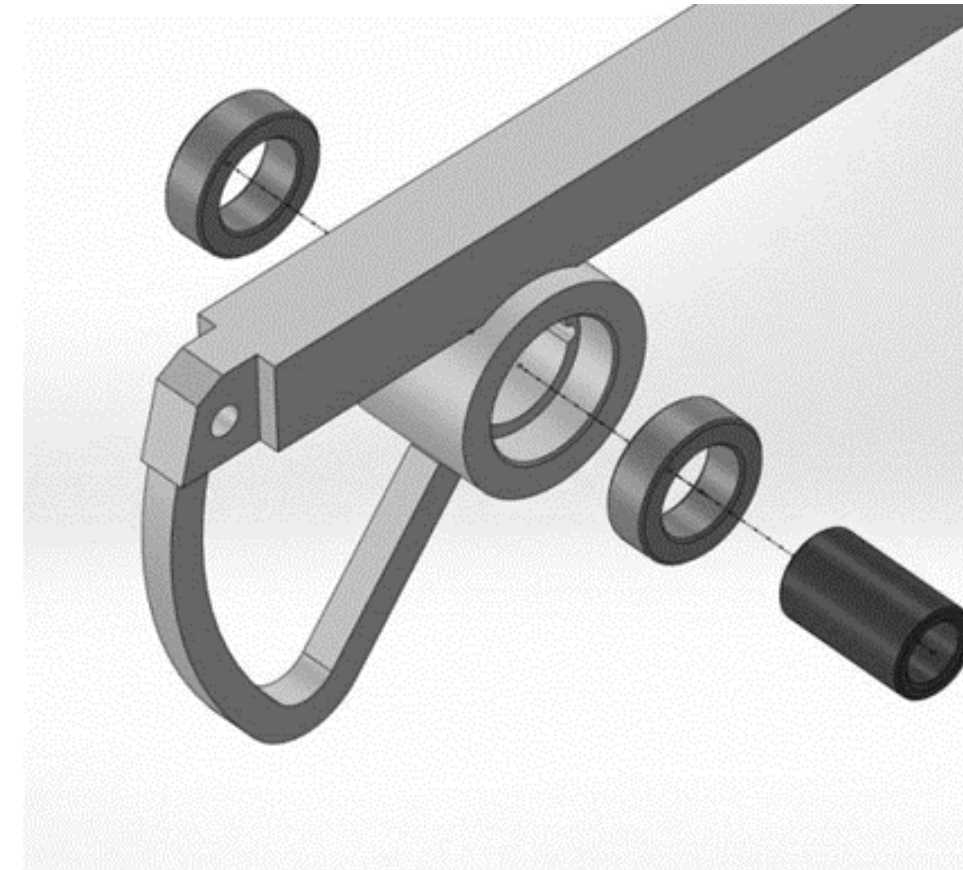


Select Bearings

Problem: Early failure of standard ball bearings (left) causes additional damages to pumps. Current bearings need replaced every 6-9 months.

Solution/Design: Testing Select Bearings (right) made of sintered iron with two Delrin adaptor rings to determine if it is a longer lasting bearing.

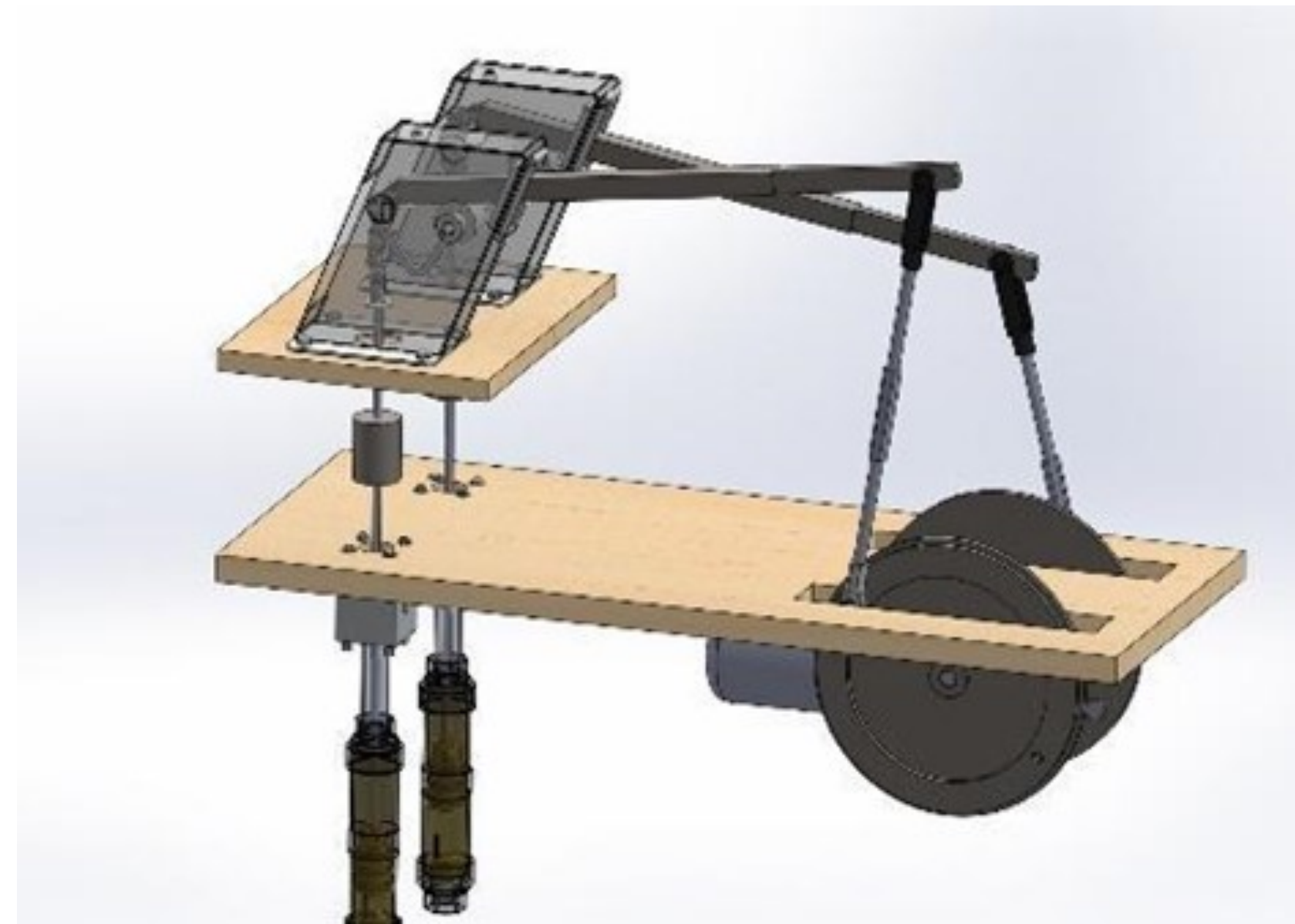
Action: Longevity testing of Select Bearings and cost reduction by testing alternative materials for the adaptor rings.



Testing Apparatus

(Designed by alum: Anthony Beers)

- Replicates motion of the India Mark II hand pumps
- Simulates pressure head above the pump cylinders
- Allows testing for Select Bearings and Superior Seals simultaneously



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- Clients: Anthony Beers & Matthew Schwiebert
- Partners: BIC World Missions, AlignedWorks, & Rural Water Supply Network

Partners

Anthony Beers: Chief Engineer for Select Bearings.
Organizations: BIC World Missions/AlignedWorks

Matthew Schwiebert: Chief Engineer for Superior Seals
Organization: Rural Water Supply Network



Superior Seals

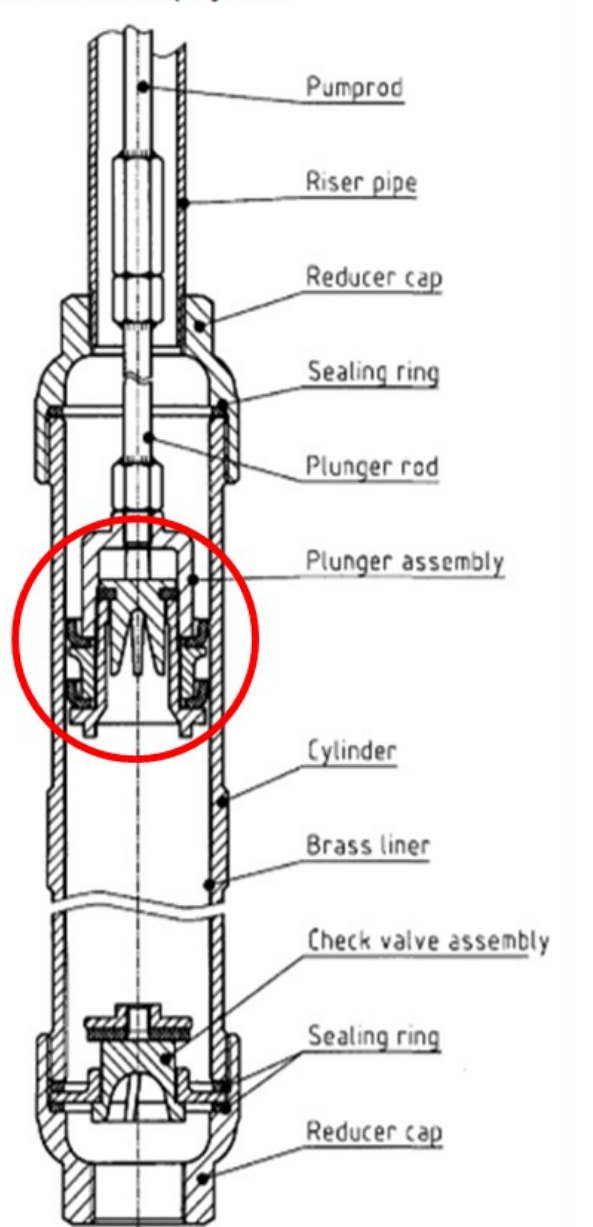
Problem: Seal failures cause pump inefficiencies. Current seals need replaced every 6 months.

Solution/Design: Providing numerical evidence that the new polyurethane seal design (left) has a longer useful life than the old nitrile stock rubber design (right).

Action: Static leak and longevity testing on the seals to determine their condition.



Drawing of the India Mark II Pump Cylinder



Rural Water Supply Network. Installation & Maintenance Manual for the India Mark II Handpump. 2008. Microsoft Word file.