

# Water Pump

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## Aim of the Project

Design and build a human-assisted water pump. With the materials that best adapt to the device and incorporating a bespoke cylinder system composed of two vertically positioned cylinders, where the piston is driven by a crank shaft using solid parts

## Purpose

A challenge for rural areas in the developing world is the irrigation of agriculture crops and the provision of drinking water. The purpose from this project is to help with that by making a corrosion resistant Water Pump.

## Objectives

**Objective 1:** Design the human assisted water pump incorporating a bespoke cylinder system where the piston is driven by a Crank shaft.

**Objective 2:** Model the human assisted water pump incorporating a bespoke cylinder system where the piston is driven by a crank shaft using solid works.

**Objective 3:** Build the human assisted water pump incorporating a bespoke cylinder system where the piston is driven by a crank shaft.

## Main Design Aspects

### Cylinder Design

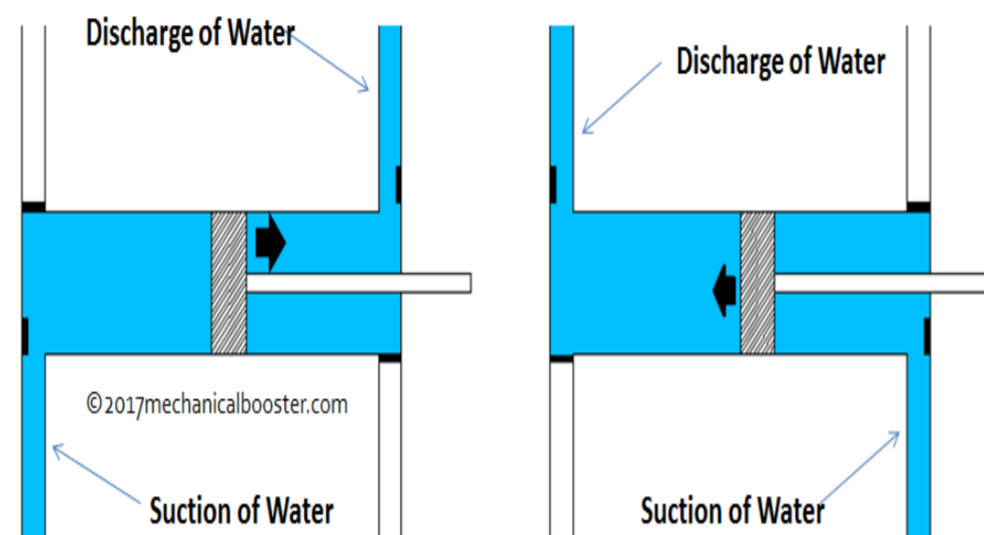


Figure 1: Double acting Reciprocating Pump

The double acting cylinder design makes use of the sides of the piston. Both sides can work independently from the other without any issues. Using this design it allowed us to make the pump more efficient and allow it to provide a consistent water flow.

### Crank Slider Mechanism

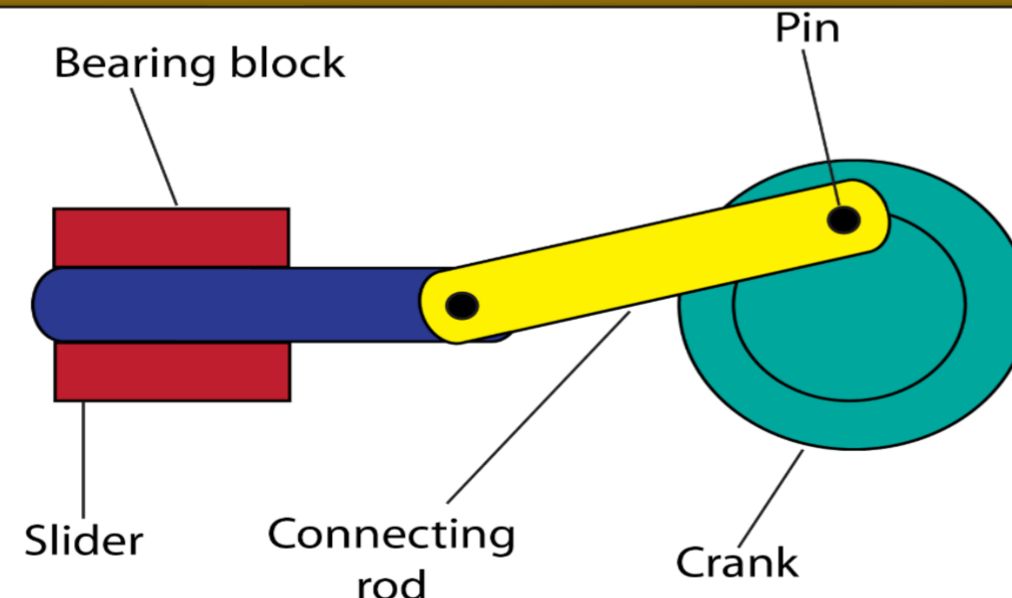
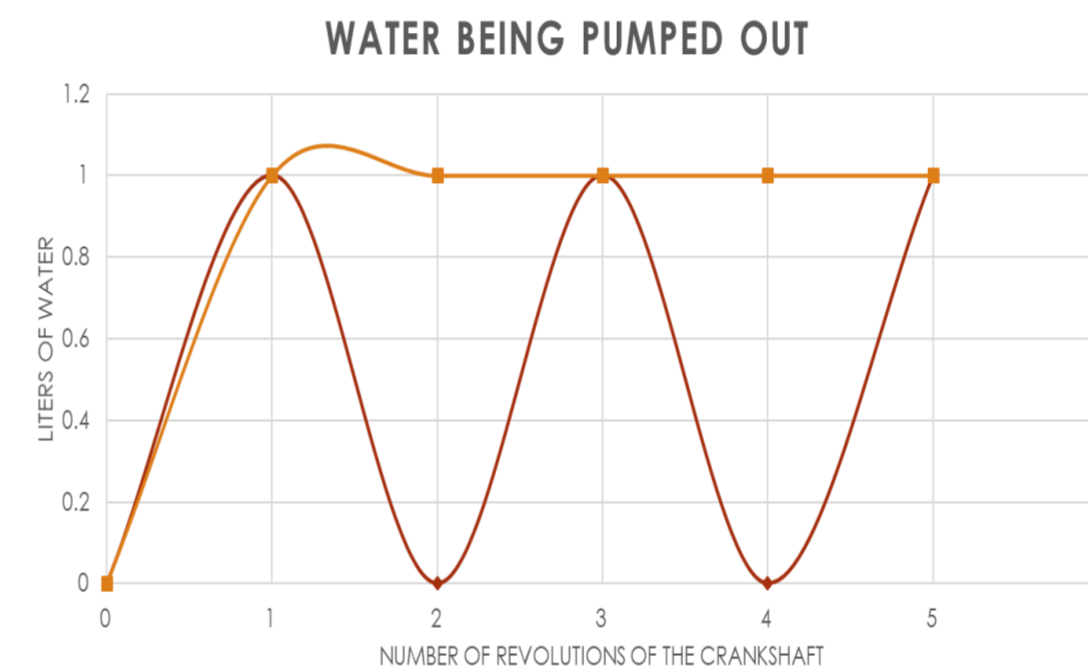


Figure 2: Crank Slider Diagram

The Crank Slider Mechanism allows a portion of the con rod to move along a straight line without it moving side to side. This allows for a better seal to be made around the conrod that is moving along only one plane. This allowed us to seal the cylinder fully.

## Multiple Cylinder

Using a single cylinder that is operated at only one side would provide an inconsistent flow of water as it will have to suck in water and push out water in separate strokes. In a Pump design that would have two cylinders allow for the flow to be consistent as the second cylinder would always be doing the opposite of the first. The Graph below shows the water in the system.



Graph 1: Water In the pump system

## Final Design



Figure 3: Final Design Model

## Conclusion

We set out 3 main objectives for this project

We successfully did our research and were able to design a human assisted water pump incorporating a bespoke cylinder system where the piston is driven by a Crank shaft.

We were also able to Model the human assisted water pump incorporating a bespoke cylinder system where the piston is driven by a crank shaft using solid works.

The Build of the project was the most difficult part. This was because with the minimal amount of contact we had and the limited numbers in workshops the project build was very difficult.

## Future Work

In the Future It would be recommended that the time would be watched carefully. Another area for improvement would to look at the crank slider to see how to make it more efficient.

Also to allow for the crank turning mechanism to easily be changed and modified so that the pump could be used in multiple ways. Also to add in a fly wheel.