

# P14418: Better Water Maker-Power Generation Unit



## Purpose

The Better Water Maker was developed to disinfect water in nations with high mortality rates due to poor water and sanitation systems. The goal of our team is to provide a low cost, efficient power generation system for the Better Water Maker that does not tire the user while it is fun and easy to use.



Fig. 1: Previous Design

## Requirements

- Increase ease of use over current design
- Reduce cost to target of \$75
- Be able to produce water for 5 minutes without tiring the user

## Gearbox

- Increase gear ratio from 1:24 to 1:28. The increase of gear ratio will increase the RPMs at the motors. An increase in gear ratio produces more voltage out of the generating motors.
- Re-designed crank arms to include foot pedals. Leg powered devices are easier to operate due to higher lower-body strength.
- Reduce motors from 4 to 3. The torque translated from the motor to the user is decreased due to this change. This means it is easier to crank than the previous design.

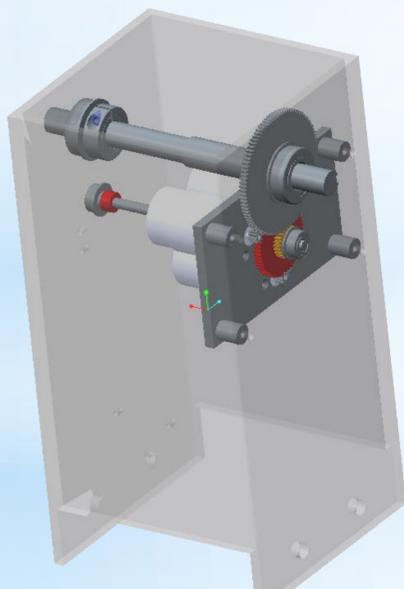


Fig. 2: Mechanical Components of Gearbox

## Electrical

- Incorporated the LM2576T voltage regulator to increase the regulation from 14.4 V to 15V. This allows the circuit to maximize the power output of the motors while protecting the UV bulb from damage.
- This change in design increases the efficiency of the circuit to 89%.
- Include 3 LEDs to communicate effectively to user when the power is 1) insufficient, 2) just enough and 3) too much. This is an improvement of the previous single LED design.

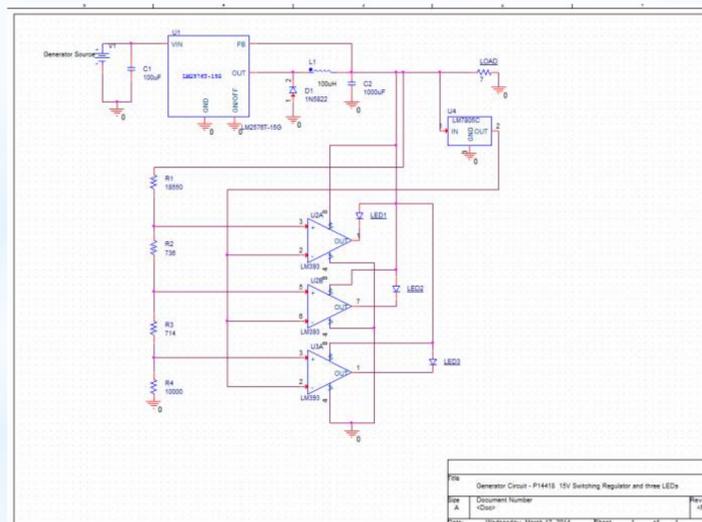


Fig. 3: Electrical Circuit

## Seat and Track

- Incorporating a recumbent seat design allows the user to utilize leg-power while in a comfortable position. Also, the drive shaft does not have to be as robust due to lower forces acting on it compared to an upright bicycle design.
- Adjustable track for different heights accommodating both women and children of various ages.
- The parts will be delivered with pre-drilled holes so the user can assemble the product easily.
- All low cost material used keeping budget in mind.

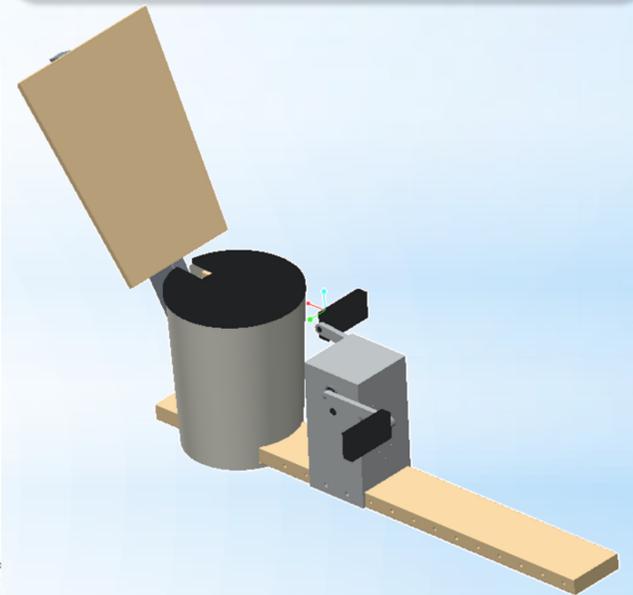


Fig. 4: Seat and Track Configuration

## Conclusion

- Gearbox is easier to pedal than hand-crank system.
- Recumbent seat is comfortable and allows leg-power to drive system.
- Lower torque experienced by the user is a trade off with slightly higher RPMs.
- Manufacturing cost is slightly above target but will be acceptable with re-sourcing.



Fig. 5: Full Integrated Product

## Future Recommendations

- Testing various motors will identify better match for application regarding torque; RPM vs. voltage.
- Add fourth motor back into design with lower torque may lower RPM requirement.
- Source a different material for the track to align holes with increased precision.

## Our Team (left to right)



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