Wind Powered Water Pump

Mohammed J. Haque, Asad Malik, Daniel Kempfer, Hussain Althabteh, Shengnan Xu

Problem Statement
Design a system to demonstrate the use of wind energy to pump water from a lower elevation to a higher elevation for rural third world countries. Using this system, one can irrigate crops in an easier, more efficient manner, without having to worry about high energy costs. The system consists of a windmill head, energy storage, and arrangement to pump water to a given height. The system is to be designed, optimized, fabricated, and tested.

Design Criteria
- Cost
- Safety
- Compact
- Reliability
- Environment
- Ease of Use
- Efficiency

Bill of Materials
- 1 Windmill Head
- 1 3D Printed Large Gear
- 2 Small Gears
- 2 Bearings
- 1 Rechargeable Battery
- 1 Motor
- 2 Shaft
- 3 Gear key
- 1 Alternator

Prototype and CAD Model

Innovation
Utilizing a robust gearbox system to store the windmill's mechanical energy by converting it to electrical energy using an alternator, while pumping the water by directly utilizing the windmill's mechanical energy.

Sustainability
- Renewable Energy Source
- Recyclable aluminum
- Recyclable Li-ion Battery
- Recyclable copper wire

DVP&R
<table>
<thead>
<tr>
<th>Test ID</th>
<th>Specification &amp; Test Method</th>
<th>Test Description</th>
<th>Test Duration (Hrs)</th>
<th>Acceptance Criteria</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Gear Endurance Test</td>
<td>Testing the gears endurance before fatigue and wearing out</td>
<td>4</td>
<td>Pass functionally during continuous monitoring</td>
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<tr>
<td>2</td>
<td>Alternator Test</td>
<td>Testing the needle bearings of the alternator</td>
<td>2</td>
<td>Pass functionally during continuous monitoring Must produce optimal power to produce efficient windmill water pump</td>
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<tr>
<td>3</td>
<td>Motor Power Output Test</td>
<td>Measuring the appropriate power output of the motor</td>
<td>2</td>
<td>Evaluation only</td>
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<td>4</td>
<td>Water Pump Test</td>
<td>Measuring the proper amount of water being pumped</td>
<td>1</td>
<td>Evaluation only Design a windmill water pump that produces an optimal amount of water from a lower elevation to a higher elevation</td>
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<td>5</td>
<td>Proof of Concept</td>
<td>Testing the final design prototype to ensure functioning properly</td>
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Summary
During the duration of this project, we worked toward achieving the goal of creating a reliable, affordable, user friendly, and sustainable Wind Powered Water Pump system. We have successfully achieved our goal by creating the displayed prototype.