The goal of the project is to design, fabricate, and test a small vehicle chassis dynamometer for the Purdue Quarter Scale Pulling Team that will allow the testing and development of the quarter scale tractors.

**Problem Statement**

- Ease of operation for students
- Low build cost
- Reliable chassis roller connection to loading device
- Computerized data acquisition capabilities
- Accurate Testing Procedure

**Design Criteria**

- Four alternative designs considered
- Utilized combinations of hydraulic pumps and gear boxes
- Water brake dynamometer also considered
- All designs considered are vastly more expensive

**Alternative Solutions**

- Manual belt tensioning system developed
- PTO adapter and upper shaft modification to allow PTO dynamometer connection
- FEA performed on new loading conditions for the hinged upper shaft frame
- Hitch added for safe connection to PTO dynamometer
- PTO guard added and mesh guard modified to safely work with new testing requirements

**PTO Connection, and Hitch**

- Developed using AW ETS software and LabVIEW
- Retrieves data collected by ETS and corrects for tire size and the power transfer through the chassis rollers
- Allows the user to easily view and interpret the data without extensive data modification

**Data Acquisition**

- Developed to allow any user to safely obtain all of the benefits of the chassis dynamometer
- Outlines safety procedures, maximum loading conditions, and maximum speed conditions
- Describes in detail the operation of the data acquisition system and its uses
- Ensures accurate testing procedures that will offer the user meaningful data for their application
- Specifically outlines the testing procedure for Purdue Quarter Scale Tractors to allow for future development of powerful, winning tractors

**Testing Procedure**

**Design Area**

<table>
<thead>
<tr>
<th>Item/Category</th>
<th>Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTO Dynamometer</td>
<td>$30,000.00</td>
<td>Already obtained by department</td>
</tr>
<tr>
<td>Chassis Rollers</td>
<td>$5,000.00</td>
<td>Already donated</td>
</tr>
<tr>
<td>PTO Adapter</td>
<td>$50.00</td>
<td></td>
</tr>
<tr>
<td>Ramps</td>
<td>$100.00</td>
<td></td>
</tr>
<tr>
<td>Various components</td>
<td>$600.00</td>
<td>Nuts, bolts, etc</td>
</tr>
<tr>
<td>Data Acquisition</td>
<td>$1,000.00</td>
<td>Computer, cables, ETS software</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$5,750.00</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total New Purchases</strong></td>
<td><strong>$1,750.00</strong></td>
<td></td>
</tr>
</tbody>
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**Cost Summary**