UCSB Mini Baja Team B
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Abstract

SAE Mini Baja encompasses all aspects of product development, including Fundraising, Design, Modeling, Fabricating, Testing, and Competing. We designed a complete steering and suspension system using various engineering tools with the intent of creating a vehicle capable of handling rugged off-road terrain. Through extensive design and fabrication efforts, we were able to meet our performance requirements.

Methods

The following is a summary of the processes we used to design and test our vehicle:

- Systems completely modeled in Solidworks prior to fabrication
- Abaqus analysis of critical parts
- Building jigs allowed for easy manufacturing
- Extensive off-road testing to find design flaws and provide feedback for tuning

The use of various engineering tools allowed us to verify the integrity of our design before manufacture. We also limited the use of custom made parts in order to minimize manufacturing time and cost.

Results

<table>
<thead>
<tr>
<th></th>
<th>Desired</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning Radius (in)</td>
<td>&lt;150</td>
<td>146</td>
</tr>
<tr>
<td>Wheel Angle (degrees)</td>
<td>&gt;28</td>
<td>32</td>
</tr>
<tr>
<td>Wheelbase (in)</td>
<td>&lt;73</td>
<td>67</td>
</tr>
<tr>
<td>Front suspension travel (in)</td>
<td>&gt;12</td>
<td>12.5</td>
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Objectives

After benchmarking previous UCSB Mini Baja cars, we determined that the success of our design would be based on the following criteria:

- Smaller turning radius
- Better suspension performance
- Adjustable suspension geometries
- Driver safety & comfort
- Proper Ackermann and bump steer characteristics

By following these criteria the car would be ready for the SAE Mini Baja Competition in Rapid City, South Dakota.

Competition Highlights and Conclusions

- Tied for 6th in on-site design judging out of 101 cars
- Placed 12th in the rock crawl
- Completed every event with no damage to suspension and steering components

The results of the SAE Mini-Baja competition show that our car is both durable and forgiving, and performs extremely well on rugged and harsh terrain.

Acknowledgments

We would to thank the following people and corporations for their contributions to our project: