Abstract

The UCSB racing team competes in a series of challenges testing the performance and durability of their vehicle with various drivers behind the wheel. The comfort of the drivers plays a pivotal role in their safety and performance while driving. This presents the challenge of adjusting the position of the steering wheel to accommodate the different-sized drivers.

Prototyping

To make the part durable, yet lightweight for the vehicle, the parts were machined with the appropriate materials. Due to the geometric restrictions of the 2014 BAJA car, the dimensions were not trivial. It was necessary that it attach to the car giving a maximum extension of 4 inches from equilibrium. Research concluded that steel should be utilized for the pins and column for its durability and its potential to be welded.

Testing and Analysis

Stress analysis was done to ensure the pins could withstand the maximum force experienced in competition. A SolidWorks® simulation was performed to replicate various torques and vibrations put on the pin from both the driver and the car. Figure 4 shows the corresponding stresses at different locations of the pin indicating that the pin can endure sufficient stress at crucial locations.

Results

The design proved to be efficient and comfortable for the different drivers. The prototype weighed in at 1 lb and was able adjust up to 4 inches in both directions as specified. The locking pins proved durable in extreme cases of force application ensuring the column will not fail. The design did not affect the steering ability of the vehicle and proved efficient for use in competition. All other performance requirements were fulfilled.

Acknowledgments

UCSB Racing, Ahdiya Melkote, Stephen W. Laguette

References

Baja SAE 2014 Rulebook