Second Bicycle Seat Attachment

Team Leader: Ken Noffsinger
Members: Anthony DeMarco, Derrick Na, Jose Muro, Eric Welsh

Abstract
Currently, the only means by which a passenger can ride on a single person beach cruiser is by way of the handlebars. This inconvenience causes the rider and passenger discomfort, impaired vision of the road, and a very unstable center of mass. Steering is extremely unmanageable because of the extra weight, and as a result, the drivers and passenger’s balance is compromised. Our solution to these problems involves adding a second bike seat to the frame of a bicycle. This standard beach cruiser attachment mounts above the back wheel, therefore eliminating any vision impairments and stability issues while providing comfort.

Problem Definition
Transporting passengers by way of the handlebars impairs the driver’s vision, decreases maneuverability, decreases driver and passenger comfort, and is illegal.

Benchmarking
We analyzed the CoPilot Limo Child Bike Seat -CS4002 for transporting infant passengers. From analysis and research of this product, we developed several design goals to improve the quality of transportation.

Design Objective
Our objective is to create a frame attachment that allows a second seat to be mounted to the bike. This attachment will be placed behind the driver leading to improved stability and visibility.

Product Modeling

Engineering Challenges
- Connect the frame to the rear axle
- Attach the frame to the rear cross bar
- Make the seat height adjustable
- Support a 200lb load with a SF of 1.5
- Maximum vertical deflection of 0.5in
- Maintain elastic deformation

Methods & Results
Finite element analysis using ABAQUS/CAE showed that the largest deflection in the vertical direction was 0.0023in downward. It also showed the maximum stress to be 2.285ksi which is less than the yield strength of 14ksi. Thus, our frame will undergo purely elastic deformation.

Acknowledgments
Steve Laguette Design Advisor
Nelson Bednersh Student Shop Superintendent

References
CA Vehicle Code: 21204
U.S. Patents:  6,485,044  5,777,254  4,730,758  6,612,597