

An Aerodynamic Study of Bulk Commodity Tractor Trailers

Project Statement

The Trailer Park Boys are tasked with testing aerodynamic features of existing Western Trailer Tractor Trailers to document the drag coefficients, emissions output, and fuel consumption rates. The configurations are:

- 48/53-foot Trailer



- A-Train Trailer



Team Trailer Park Boys:
 Liam Johnson Jacob Frost Brandon Hilliard

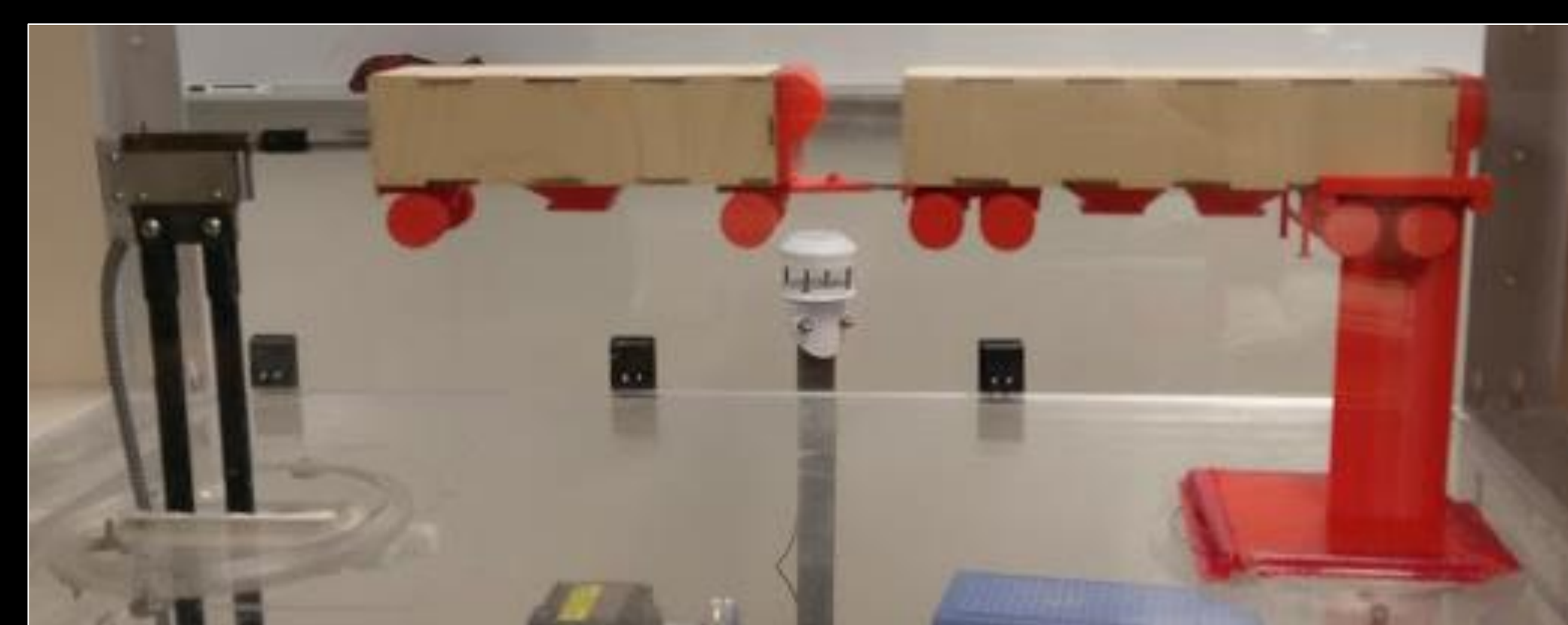
Trailer Configurations



Interchangeable features on our models were located on the front and bottom of the trailers.

Front-End	Under-Carriage		
No Nose Cone	No Under-Carriage	Hopper Bins	Possum Belly
Nose Cone	No Under-Carriage	Hopper Bins	Possum Belly
Bull Nose	No Under-Carriage	Hopper Bins	Possum Belly

The A-Train configurations were tested at distances of 7 feet, 9 feet, 14 feet, 16 feet and 21 feet separation between one another, along with hopper bins and nose cones, resulting in 10 total combinations.

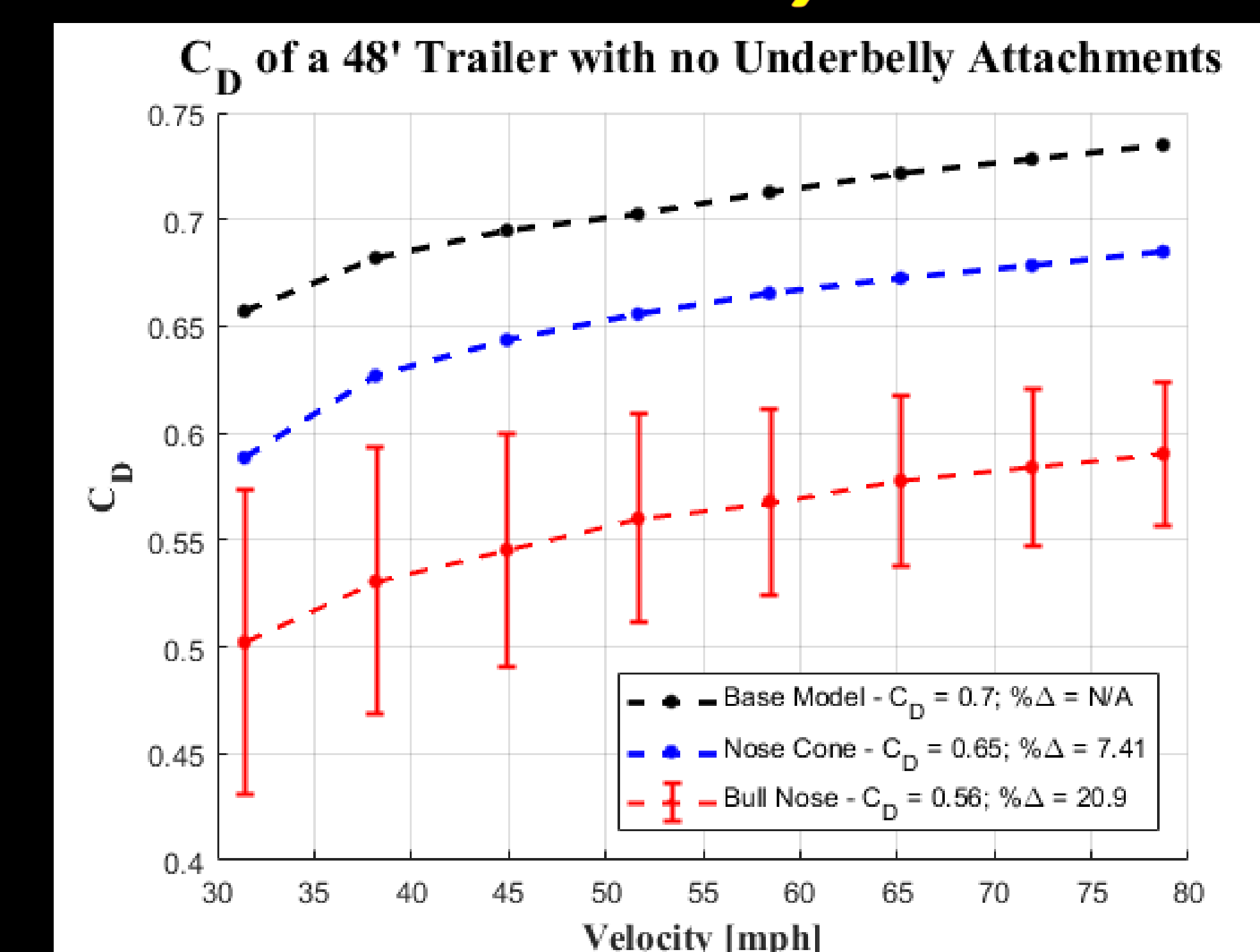


Wind Tunnel



Drag force data, acquired from readouts on the wind tunnel, were collected from two separate runs of each model to reduce error. The wind tunnel was ran from about 30mph to about 78mph.

Data Analysis

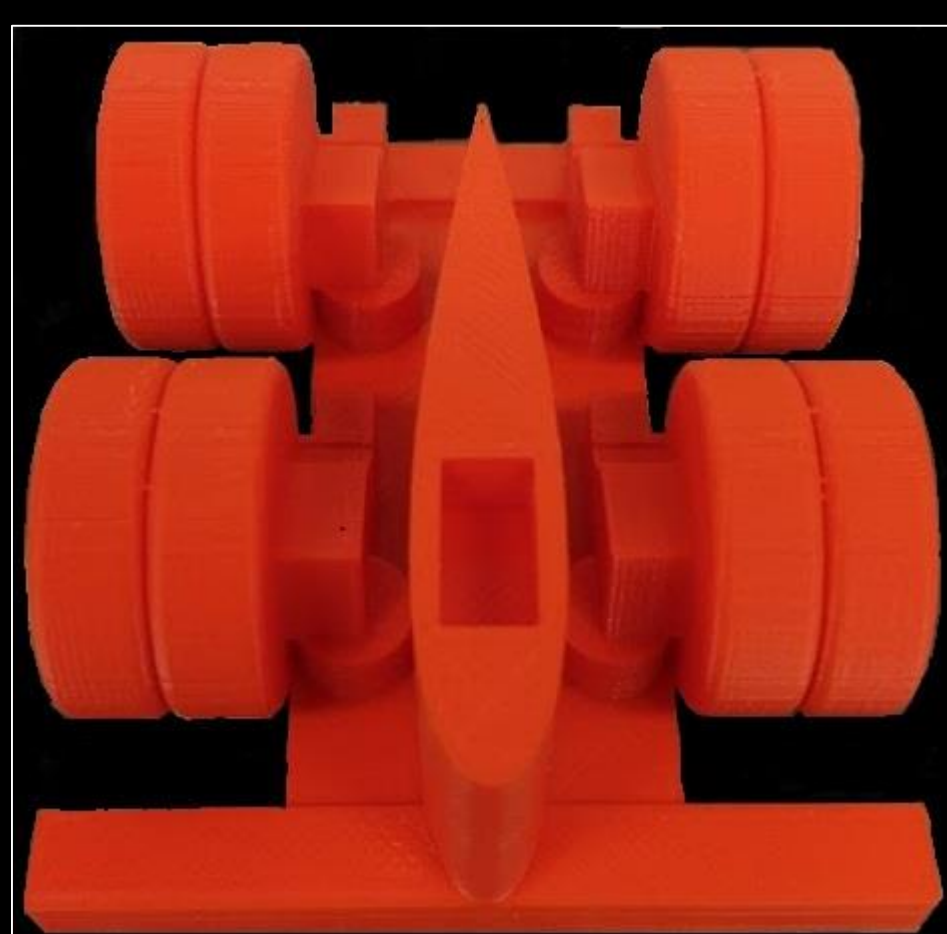


From the data analysis, we saw that every attachment created significant reductions in aerodynamic drag with respect to the base model.

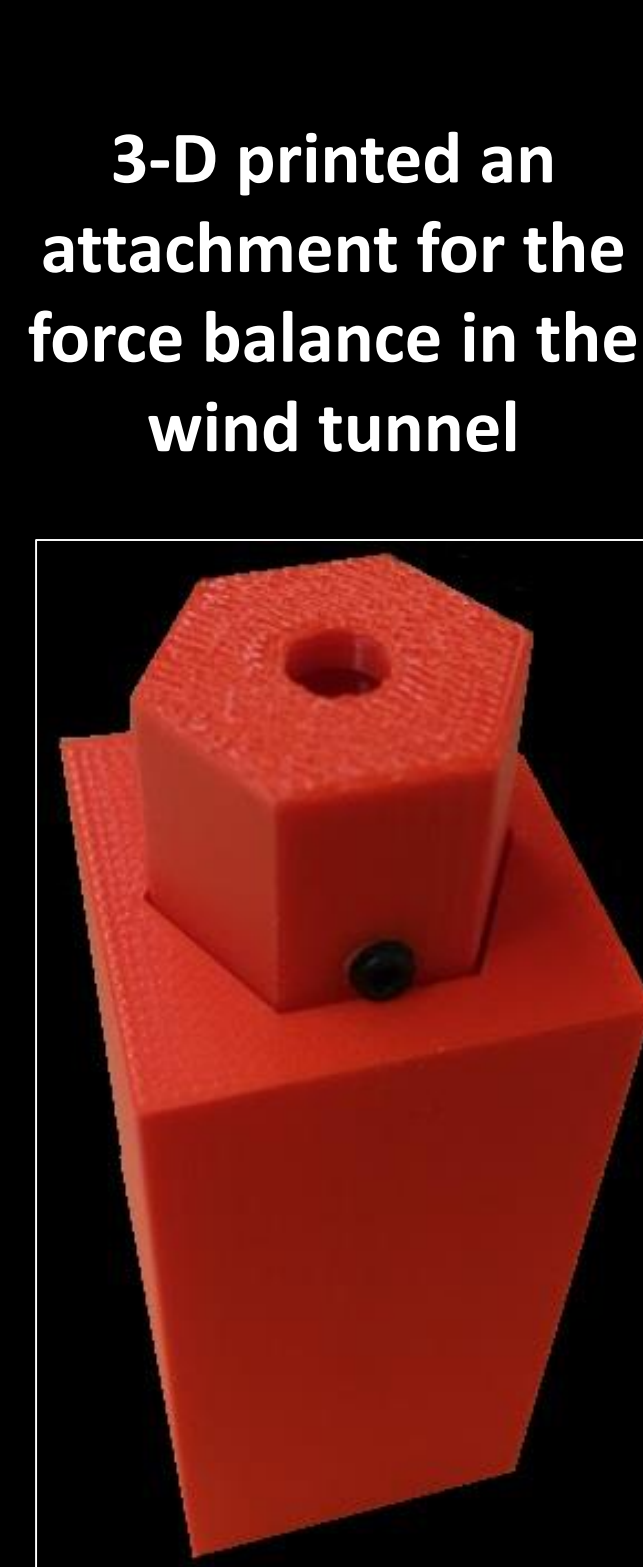
Acknowledgements:
 Dr. Steve Beyerlein Dr. Ralph Budwig Sarah Willis
 Cole Lewis Todd Swanstrom

Project Learning

3-D printing models accurately and effectively has taken many unexpected modifications.



Implemented an airfoil strut for additional front-end support.



3-D printed an attachment for the force balance in the wind tunnel



Laser cut side panels for our 48-foot model.