Background:

The fairing mounted on the roof of a truck’s cabin directs air flow around the front of a connected trailer and thereby improves the aerodynamics. The project objective is given by Volvo, location Greensboro, and will focus on a fairing mounted on a Mack Vision truck for the North American market. Volvo has found that when a truck is not carrying a load, the fairing greatly increases drag and decreases fuel economy. While today’s solution requires manual raising and lowering of the fairing, the main goal of this project is to allow the operator to control the fairing using a switch installed on the dashboard or outside of the vehicle. The secondary goal is to adjust the shape of the fairing to increase aerodynamic properties in both the up and down positions.

Objectives:

- Define the problem after researching on the subject and communicating with the customer.
- Provide a technical solution to lift the fairing and provide computer-aided design model.
- Assess the design by hand calculations and simulation softwares.
- Create full scale prototype base on the design.
- Test prototype to validate hand calculations and simulation software results.

Deliverables:

- Prototype containing actuator lifting device
- Report and poster regarding the entire project
- CAD model in SolidWorks format

Expectation:

A actuator lifting device that raise and lower the a roof mounted fairing by a switch located with in the cab of a truck. This device must also have improved aerodynamic properties to reduce drag and increase fuel economy. It should comply with given specifications and satisfy customer needs given by the sponsor company Volvo. This device must utilize the power sources currently found on the roof of the tractor trailer.

Outcomes:

A full roof style fairing design was equipped with foldable sides and a bracketing system that allows for the raising and lowering of the fairing. Using the air supply line found on the roof the truck, a pneumatic actuator was used raise and lower the fairing. Using a switch from within the cab, an electrical valving system will raise and lower the fairing.