CAR 3 WING HEIGHT STUDY

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SUMMARY:

A sub-team of 4 members of the body team ran wind tunnel simulations to determine the optimal height for the back wing of the car. The dimension can be seen in pink in Fig. 1.

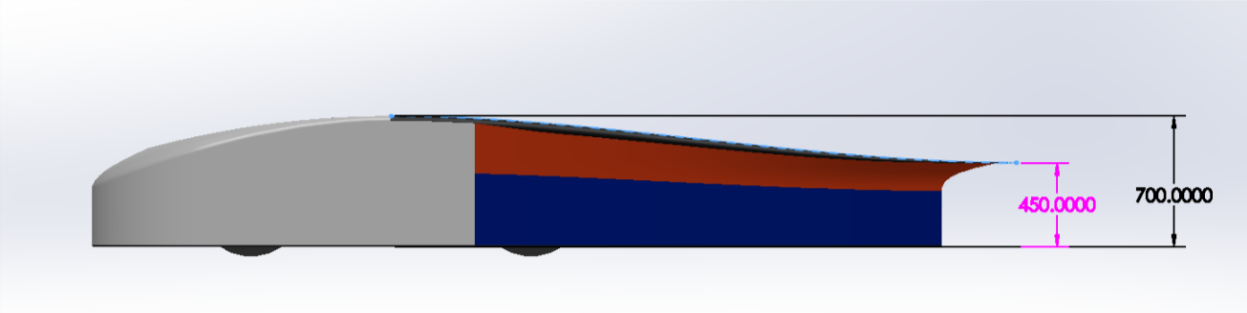

Fig. 1: Car body and tested dimension, seen in pink.

Values between 550mm and 200mm were tested, with 550mm being the point at the slope of the wing is near-zero and 200mm being at or below the value that allows clearance for the rear wheels and other internal components.

RESULTS:

Results showed that lowering the wing lowered the drag force on the vehicle. At a height of 330mm, the drag force at 15m/s reached approximately 15N, and stabilized around that value for all lower wing heights, as can be seen in Fig. 2.

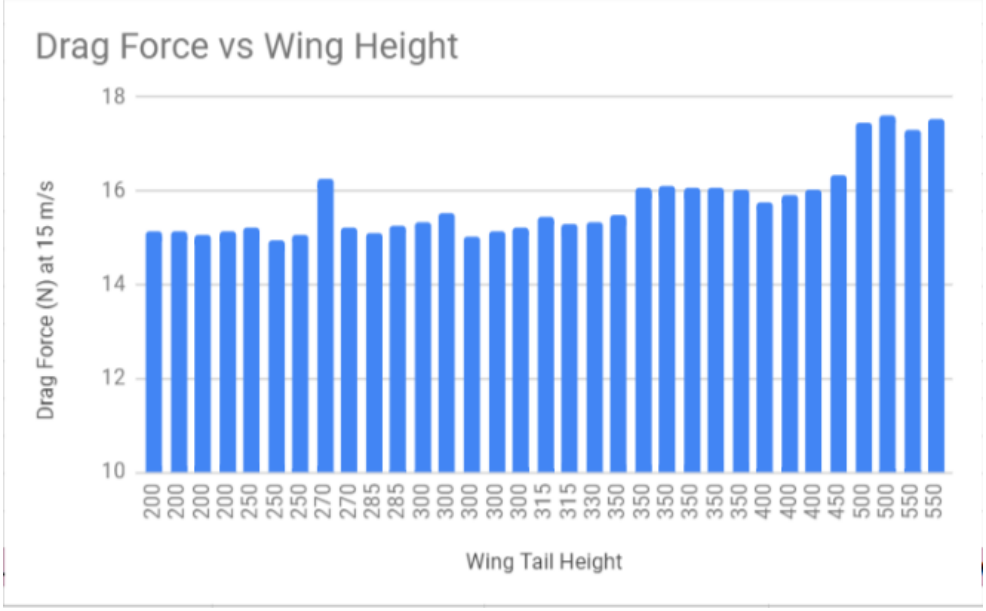

Fig. 2: Bar chart of drag force compared to wing height.

Changing the height of the wing also had the effect of changing lift: based on principles of airflow and streamlines placed in the simulation, we believe that lowering the wing increases pressure beneath the wing, hence the lower drag: this also, however, increases the lift on the wing. Results show that lift was

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maximized around a wing height of 200mm, where lift was 34.17N at an air speed of 15m/s. Between values of 200mm and 300mm lift was significantly increased but difficult to predict, due to large variations from simulation to simulation. Regardless, it is the opinion of the experimenters even a lift force of 40N at 15m/s will most likely not have much influence on the handling of the vehicle, given its large weight in comparison.

Our conclusion is that the ideal wing height is 330mm or below, with preference given to lower values. If there is concern about lift or a moment around the center of mass, the wing can be raised to decrease lift, with the consequence of increasing drag, especially if the wing is raised past 330mm.