DESIGN & ENGINEERING PORTFOLIO

F1 in Schools™

JAI JAGAT CMS CITY MONTESSORI SCHOOL

“The secret of getting things done is to act”

By Dante Alighieri

ABOUT US

We are Team Inferno from City Montessori School, Cambridge Section. A group of highly enthusiastic people came together to accomplish a common goal.

Team Inferno inferno_automotive Project Inferno

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DESIGN & ENGINEERING

Overview

“At its heart, engineering is about using science to find creative practical solutions. It’s a noble profession.” -Queen Elizabeth.

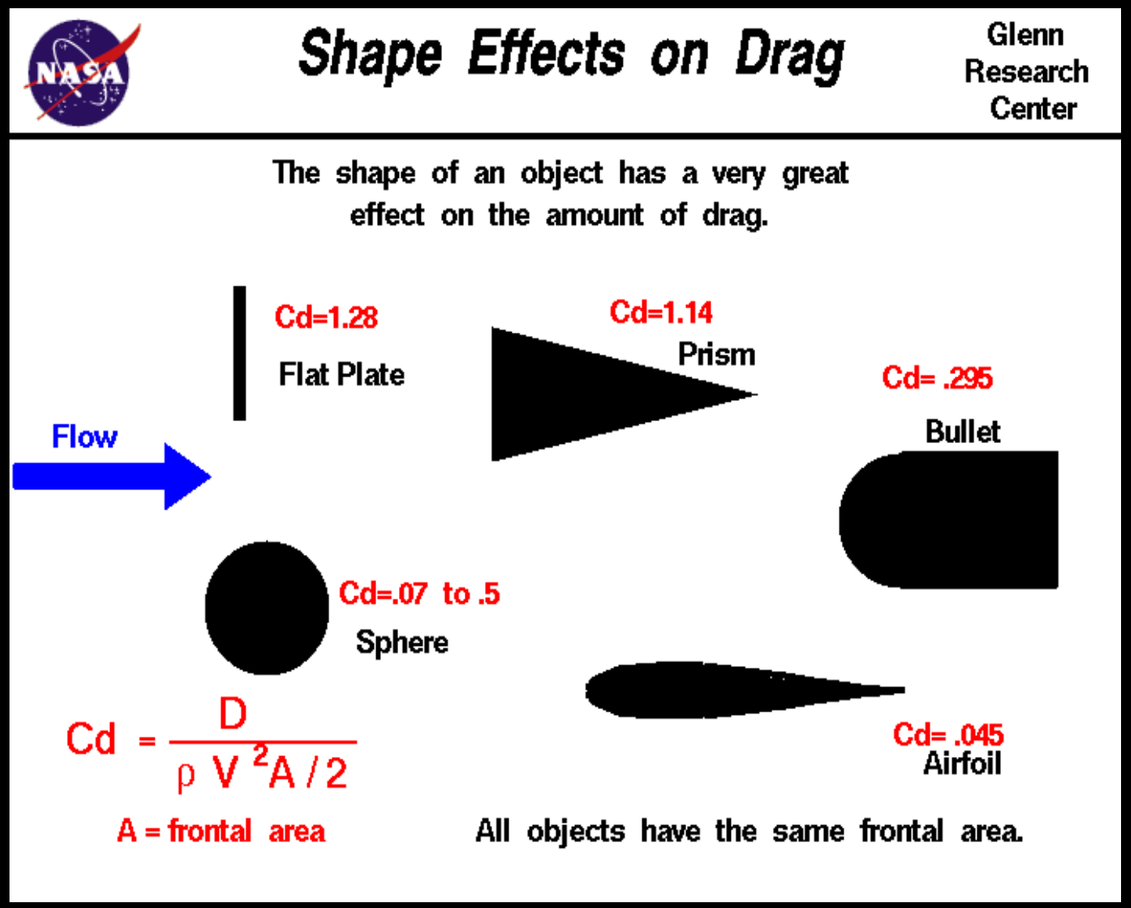
The heart of the entire experience was the design and engineering of the car. As we browsed through the net and sketched and sketched, each design was made with the intention to win. Though the actual design was made just by the design and manufacturing managers, each member had their own individual element embedded into it. This has been the most difficult and engaging process amongst the rest. Our goal was definitely to make the most aerodynamic car that we could. The result of our efforts was greatly appreciated by us all. Though we believe that there’s always space for a little improvement.

ENGINEERING PROCESS

RESEARCH

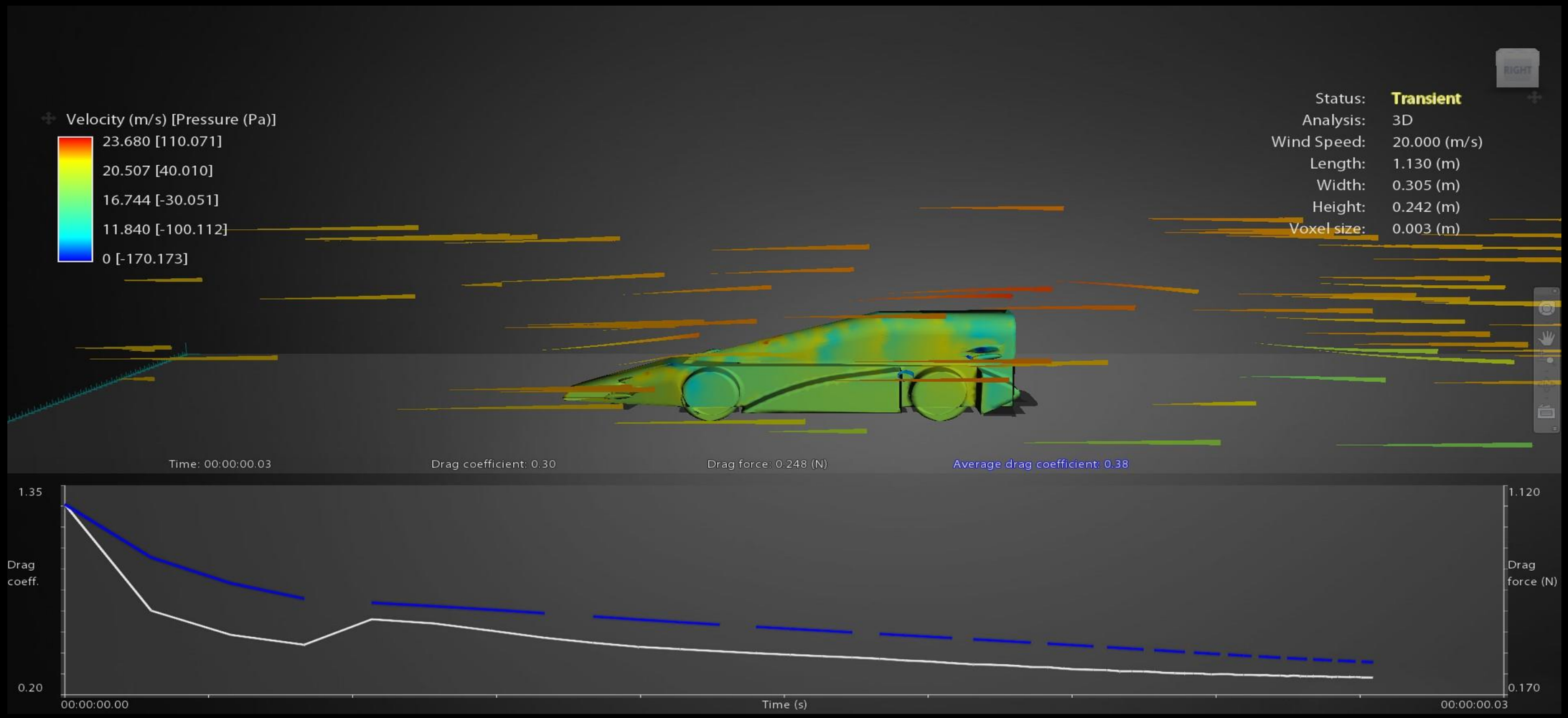
- Aerodynamics

With how vast this topic is, we learned how gases interact with objects. Though the aerodynamic force that we associated with was drag. Drag can be applied to nearly any object that moves through air. Drag can be beneficial in some cases like a parachute, however, it's undesirable in the case of automobiles and aircrafts as it takes power to overcome it. We wanted to make sure our car was as aerodynamic as it could be and also had the least drag possible.



"Dreamers, engineers, racers and entrepreneurs were lured by the potential for the profound gains aerodynamics offered," wrote Paul Niedermeyer, author of "Automotive History: An Illustrated History Of Automotive Aerodynamics," on the website Curb-side Classic. "The efforts to do so yielded some of the more remarkable cars ever made, even if they challenged the aesthetic assumptions of their times."

DRAG COEFFICIENT

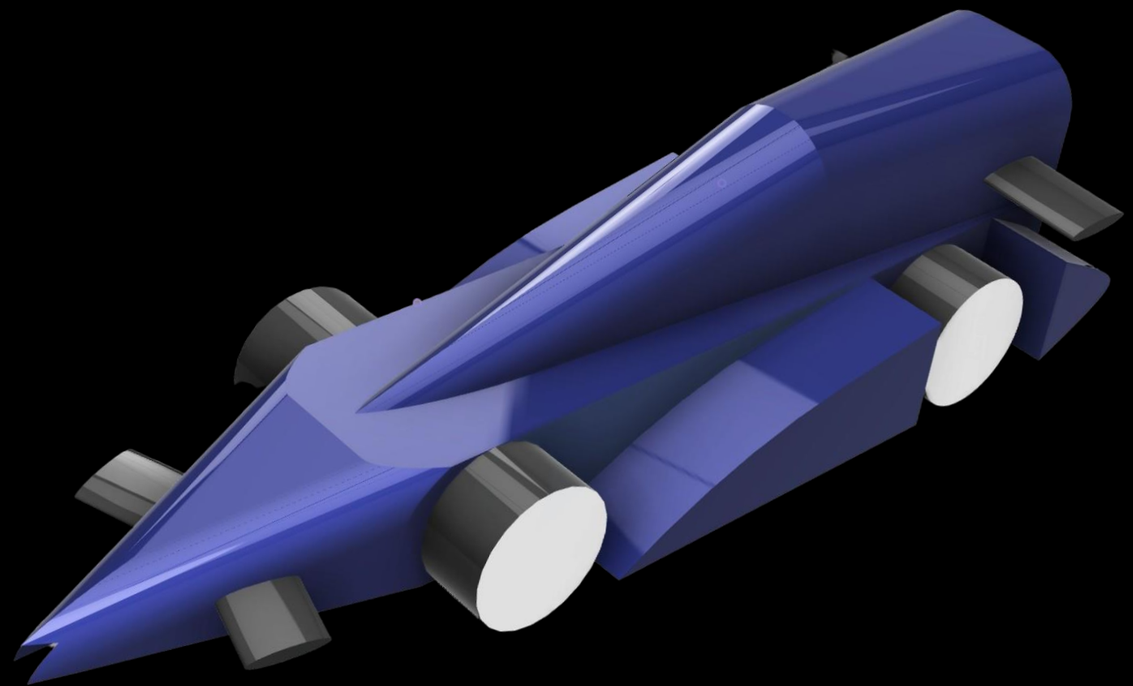


To describe the amount of drag in our car we used a value called drag coefficient(C_d). After our designs were made we tested the C_d of our car through computer simulations and wind tunnel tests. We used a software called flow design to do this. The average drag coefficient was 0.38

PAINTING OUR CAR

Painting our car was one of the hardest jobs to do. As it is winter climate, it makes it hard for the paint to dry. Our graphic designer painted both the cars using spray paints and poster colors. We used the color combination of blue, white and black as per the theme of our team. It gives it an elegant look and totally compliments the beauty of our logo.

OUR DESIGN IDEAS



NOSE CONE

As we already told you how shape and size affect the acceleration of the body,

our idea came from that too. We tried to make a pointed nose cone with slanting height, so that when it accelerates through the air, the air gets away from the streamlined body.

CAR BODY

The car is in rounded squared shape to make the air flow through it. We also made a conic shaped C02 cartridge chamber so that maximum gets past through it. It is always a wise idea to leave some areas of the body sharp pointed while other parts being little curvy so that air can flow smoothly.

MEASUREMENTS

CAR A

CAR BODY – 45.3 g

NOSE CONE – 16.2 g

WHEEL (1) – 3.6 – 3.7 g

WHEEL (4) – 14.6 g

AXLE – 3.5 g

BEARING – 0.3 g

STICKER – 0.1 g

Estimated total: 80 g

CAR B

CAR BODY – 43.8 g

NOSE CONE – 16.2 g

WHEEL (1) – 3.6 – 3.7g

WHEEL (4) – 15.0 g

AXLE – 3.5 g

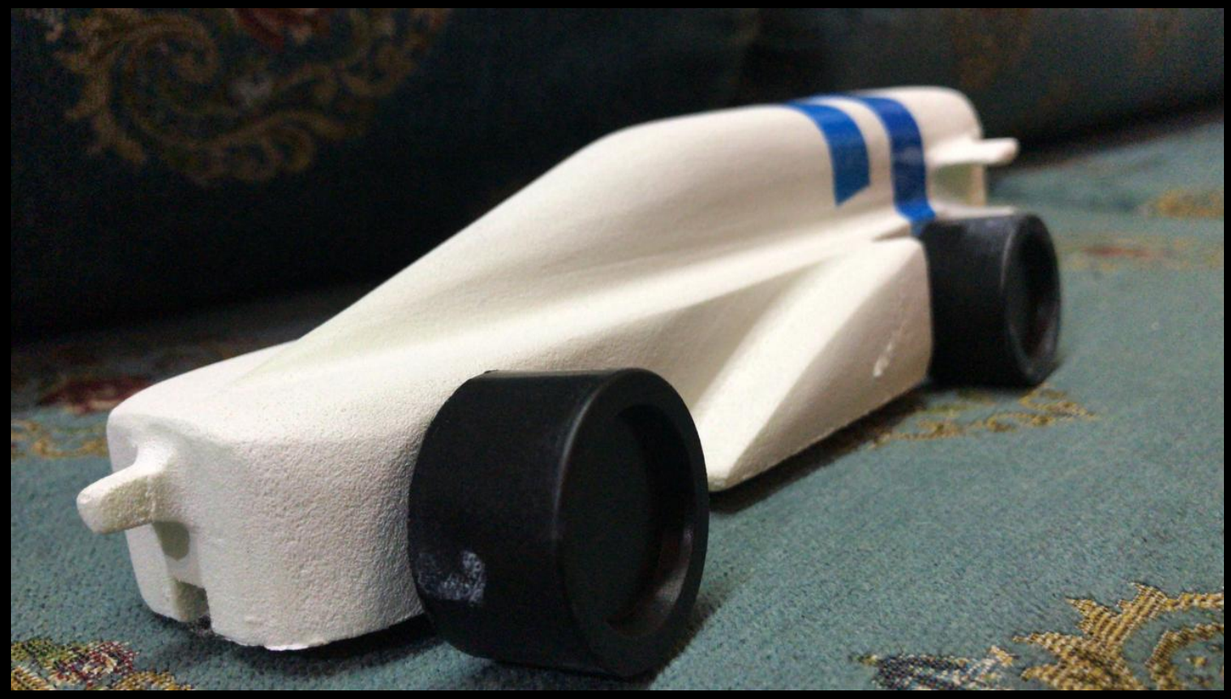
BEARING – 0.3 g

STICKER – 0.1 g

Estimated total: 78.9g

MANUFACTURING

Our car body was manufactured using the F1 model block through CNC MACHINE while the nose cone was 3D printed. We also encountered few defects in the body for example, our cars back wing was broken. This created a big problem for us but we still managed to fix that.



EVALUATION

Failure is central to engineering. Every single calculation that an engineer makes is a failure calculation. Successful engineering is all about understanding how things break or fail. - Henry Petroski.

After the manufacturing, and testing, we were pretty confident about the potential of our car. Although, it would be a lie if we say that the research and development process was an easy job. We spent a lot of time finding a new way of developing our model. It was fun job to do but at the same time it was a bit problematic.

We are participating in this event for the first time, so we really have no idea on how to test for pressure and other areas of the car. But we are pretty thankful for getting this opportunity to take our innovation to a whole new level.

PRESENTING OUR ARION V2.0

READY TO FLY...