

PRESENTING A CAR OF SPEED :-

RAPIDO



DREAM!

DEDICATE!!

DEFEAT!!!

PORTFOLIO

DESIGNING AND ENGINEERING

DREAM
CRUSHER



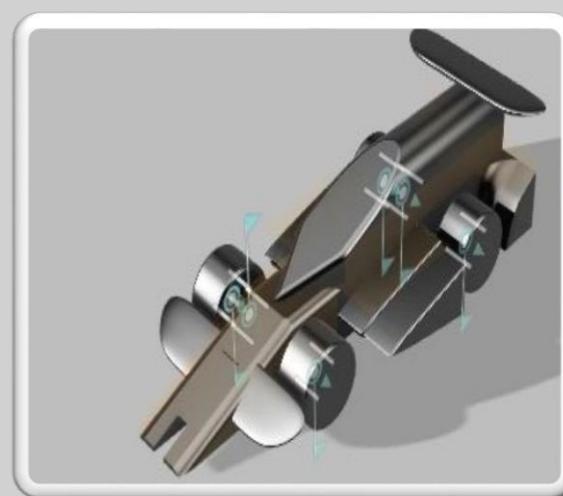
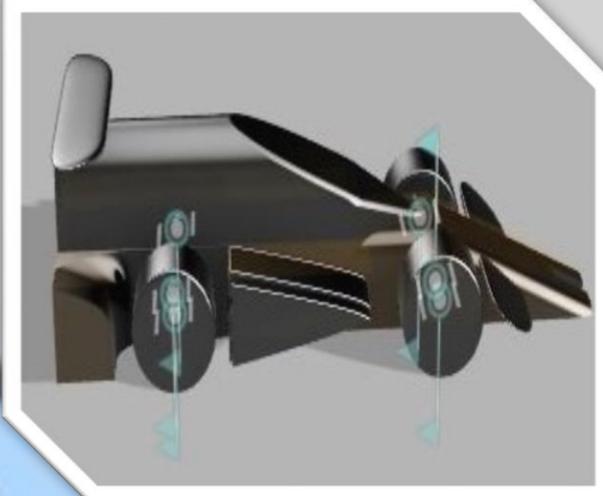
DESIGN CONCEPTS



It's a process full of learning, evaluation, correction and moving forward.

The most exciting, engaging, interesting, and lengthiest process of F1 in school competition is designing a car.

MY FIRST DESIGN



CHALLENGES OF DESIGNING A CAR

The challenge for the team was to make a car which applies to the concept and make it a best. Some other challenges were :

- CONCEPT 1 :- To minimize the cross sectional area of car
- CONCEPT 2 :- To minimize the friction and drag.



By a lot of efforts I anyhow managed to make something. It took researches, ideas, patience. Although it has many disadvantages and was not perfect. Some of them are:-

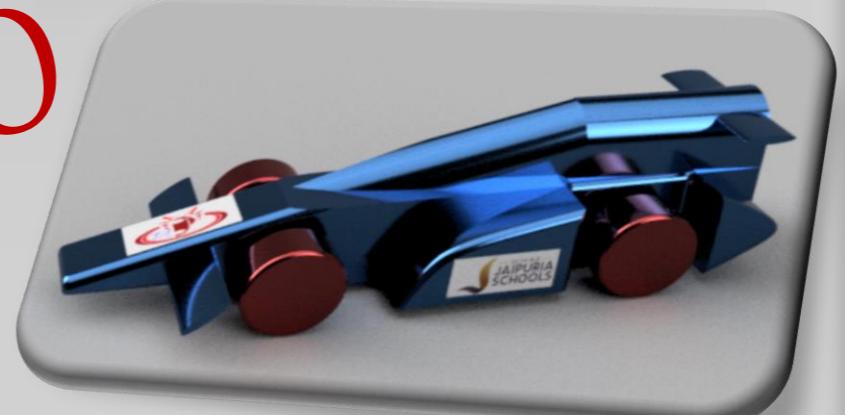
- It was more heavier than accepted to be.
- Low efficient and less aerodynamic..
- Low speed designing.

CRITERIA OF DESIGNING

Some of the criterion to fulfil the concepts were as follows :-

- Full compliance with rules.
- Strong design pro
- Fastest average times during track testing.
- More aerodynamic.
- Low cost.

RAPIDO



THE FINAL DESIGN

After many efforts I managed to complete my final design, one I expected.



RESEARCH



Doing research is the process of observing, gathering information, and making them in use.

There was a lot of research done on the shape and designing of every individual part of car.

- 1 Principle of a car
- 2 Front and back wings
- 3 wheels
- 4 body of the car

Drag Reduction System (DRS) is an adjustable rear wing aimed at reducing drag and to promote overtaking. Drivers are free to activate the DRS as they wish within the designated DRS zones during practice and qualifying, but during the race they may only activate it when they are within one second of the car in front (indicated to him via a dashboard light) at the DRS detection point.

Chassis Design:

The modern day Formula One cars are constructed from composites of carbon fibre and similar ultra-lightweight materials. Carbon fibre composite provides excellent strength to weight ratio. It is super light in weight and it can be moulded into different shapes easily.

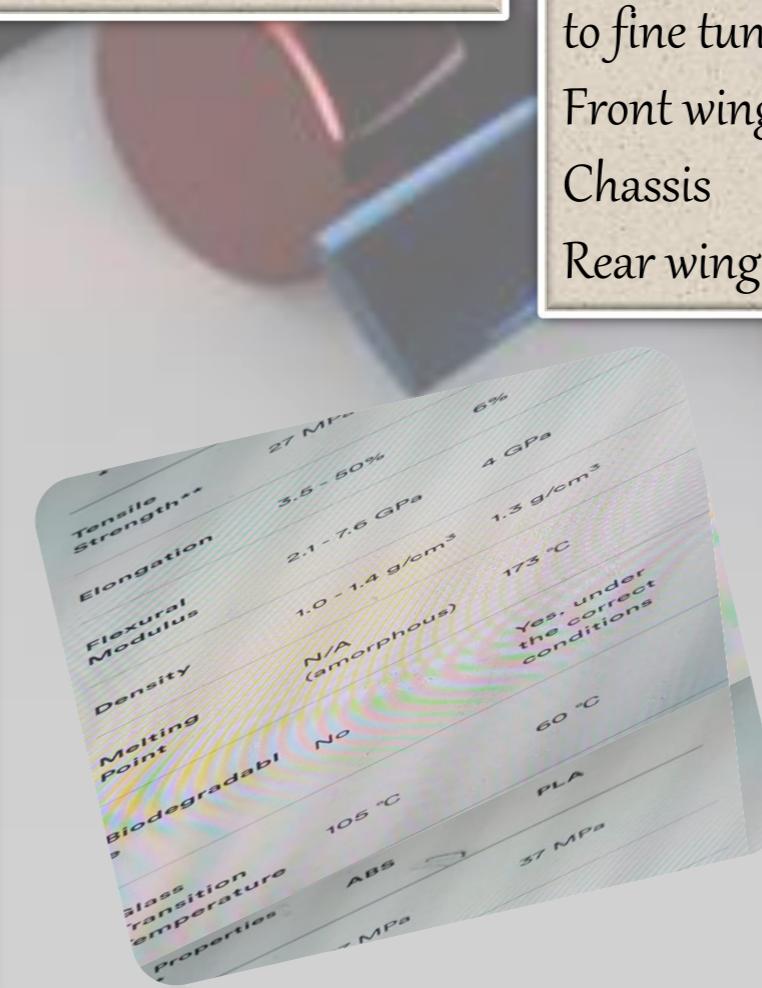
The front wing of an F1 car is to create as much down force as possible, the down force keeps the car on the road ...the rear wing functions as the DRS as well as it creates down force twice that of the front wing ,giving a better straight line speed ...Just a paw on the DRS (Drag Reduction System) it is an actuated wing employed on the rear side of the car which when actuated allows more air to swap through it ...reducing down force and giving up to 10-12 km/hr of boost ..

F1 Designers use CFD and Wing Tunnels to experiment and improve their designs. Racing cars have complex shapes and it becomes difficult to develop more effective aerodynamic design and calculate various properties precisely. The designer's objectives are to create down force, to help push the car's tyres onto the track and improve Cornering forces; as well as minimising the drag that is caused by turbulence and acts to slow the car down. The ongoing challenge for team engineers is to fine tune the airflow around these areas.

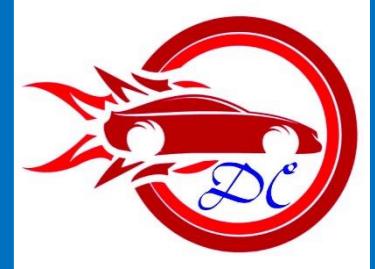
Front wing assembly

Chassis

Rear wing assembly



ENGINEERING PROCESSS



Manufacturing a car is a tough job .It involves patience, observation ,ideas and a lot of research

The steps of manufacturing a car is as follows :-

- Understanding the functions and requirement of car
- Research on every single part.
- Designing a car
- Looking for the defects and correcting them
- 5 testing of the car
- 6 evaluating the results
- 7 manufacturing of the car

Designing of car required some sketches and ideas. It was a good idea to make a sketch then making a scale diagram

To fix the error .Check the dimension and finally moving to the manufacturing process

DIMENSION OF THE CAR

MAIN BODY

length - 200 mm

breath - 65 mm

Height - 38mm

Weight -51 g

CO₂ CHAMBER

Diameter - 19 mm

Depth - 48 mm

Distance from track - 29mm

TETHER LINE

Guide Separation - 200mm

Internal diameter-

WHEEL

Distance between opposite wheel -38 mm

Diameter - 29

WINGS

Rear wing height

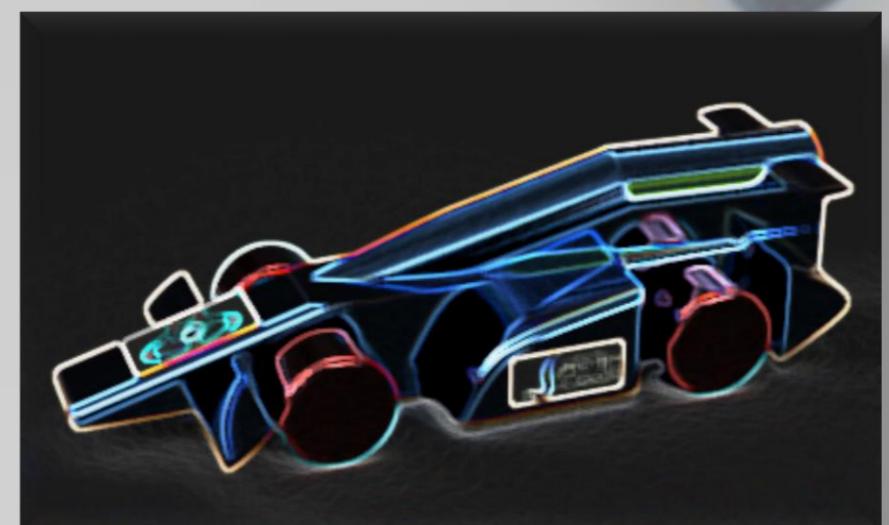
Front / Rear wing chord – 8mm

Front / Rear wing chord – 8mm

FUSION 360

It was very important to know and learn fusion 360.I learnt many new ways of designing a 3d model. To know how to render a object .

Surface modelling,filet, extrude, are some options which I used in my car



WINGS DESIGNING



CRITERIA OF THE WINGS DESIGNING

- Light weight
- Increases speed
- Decreases drag
- Do not break

MATERIAL OF THE WING

I have used polyurethane , it is easily processed by hand and machine. The product contains no halogen , plasticisers and is biologically friendly.

IDEA OF DESIGNING

The main thought was that wing get properly adjusted and don't break. It has to be inclined at a proper angle so that air passes easily. I used ellipse tool for making wings .

FRONT WINGS

The front wing, unlike the rear, does not just provide down force. As it is the aerodynamic device that precedes the entire car, it is also responsible for directing airflow back towards the rest of the car. The optimal direction of this airflow is of critical importance to the overall down force levels produced by the entire car.

STRUCTURE OF THE WINGS

I inclines it at an angle of 45 degrees so that it cuts the air. It had a shape to resist air friction.

THE FINAL WINGS



REAR WINGS

The rear wing on an F1 car is perhaps the most tightly regulated aerodynamic device. There are limits on the number of aerofoil profiles, geometry and flexibility.

With a rear wing installed on the rear part of a car body and generating a down force to hold a moving car against the ground, the grip force of the rear tire increases, which improves cornering performance, acceleration performance, and stability at high speed.

MANUFACTURING OF WHEELS



CRITERIA OF THE WHEELS DESIGNING

- Light weight
- Increases speed
- Decreases friction
- Do not break

MATERIAL OF THE WHEELS

I have used polyurethane , it is easily processed by hand and machine. The product contains no halogen , plasticisers and is biologically friendly

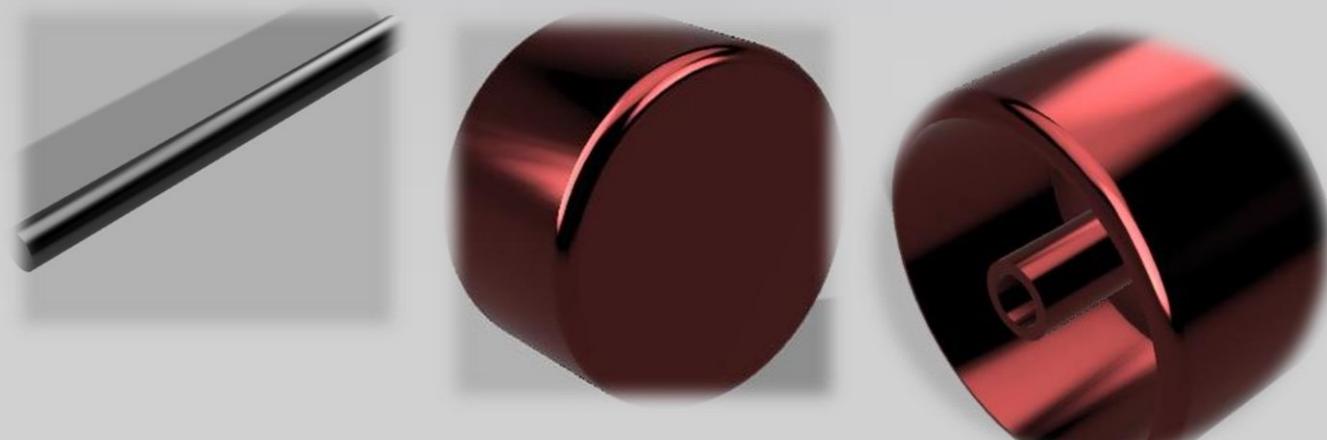
IDEA OF DESIGNING

I have used centre diameter circle for making wheel and used some fillet at edges of the will so that it provides more speed and it reduces ground friction.

AXLE

The step for making car axle are:-

First take 4 diameter circle
Second take extrude option in fusion 360 and take extruded option and extrude 50
Third click the option join and select axle circle and then select whole which you make in car body for axle click ok.



WHEELS

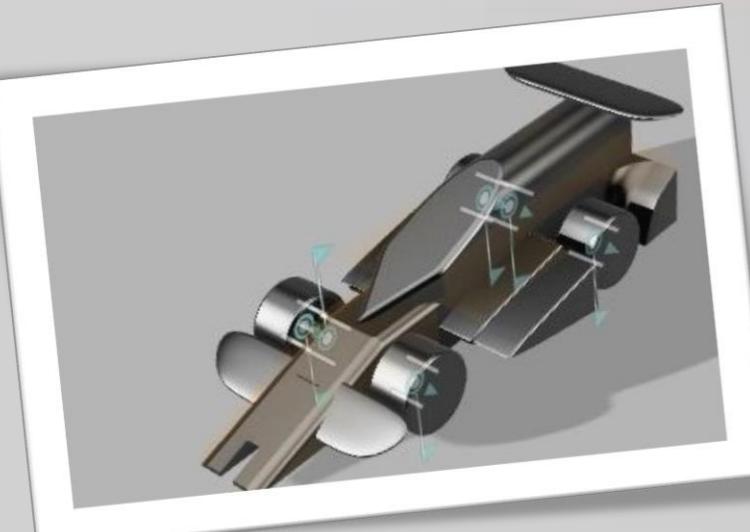
The cars have to include four wheels with a given scope of width and radius that are in contact with the surface of the track at all times. The wheels must be entirely visible from the right or left side and from the top. There is a 15mm long exclusion zone behind the width of the front wheels. That's why design which have reducing friction are used Centre dimension circle and some fillet it in for making a wheel. The dimension of wheel is 29 mm and depth is 15 mm And I have to fill it to the side corner of wheel for making it more Aerodynamic



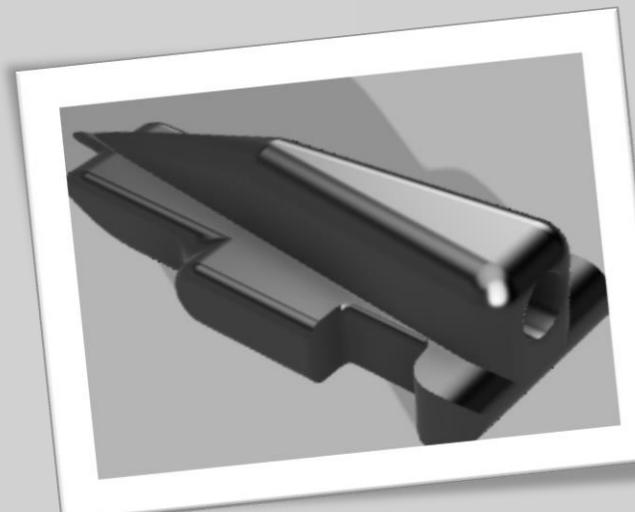
BODY OF THE CAR



My first car was fully aerodynamic but the car does not follow school rules and the wings are not comfortable with body



My second car look's good but is was heavy, also it was less aerodynamic and has slow speed



My third car is good but it is not very strong .

I choose blue and red colour because

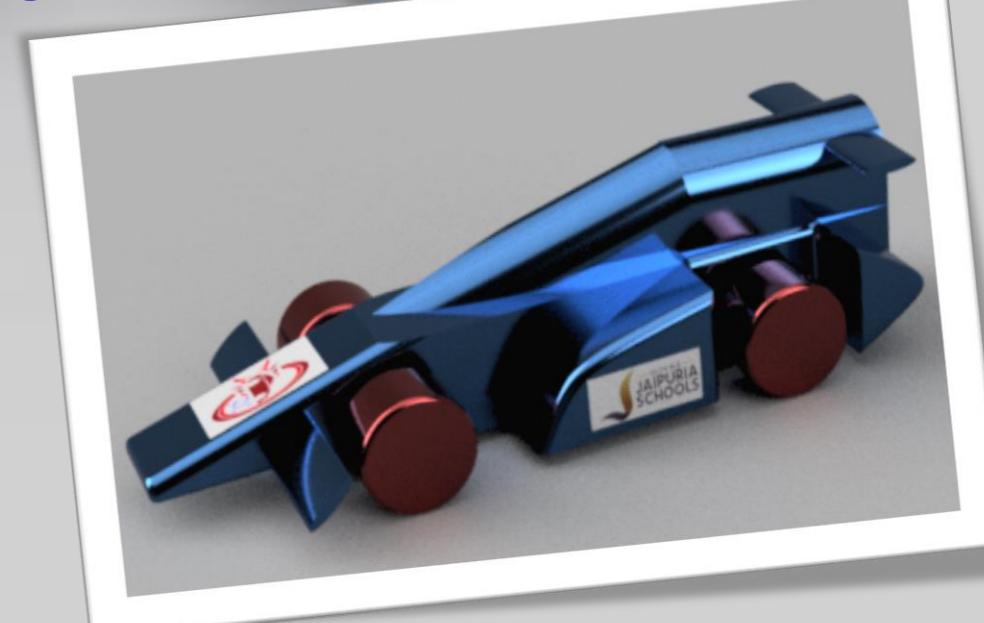
- **BLUE** represent wisdom, confidence ,intelligence
- **RED** represent power determination passion

FINALLY!!!!.....

MINE RAPIDO

- Full compliance with rules.
- Strong design
- Fastest average times during track testing.
- More aerodynamic.
- Low cost.

“RAPIDO” comes from Spanish language which means faster

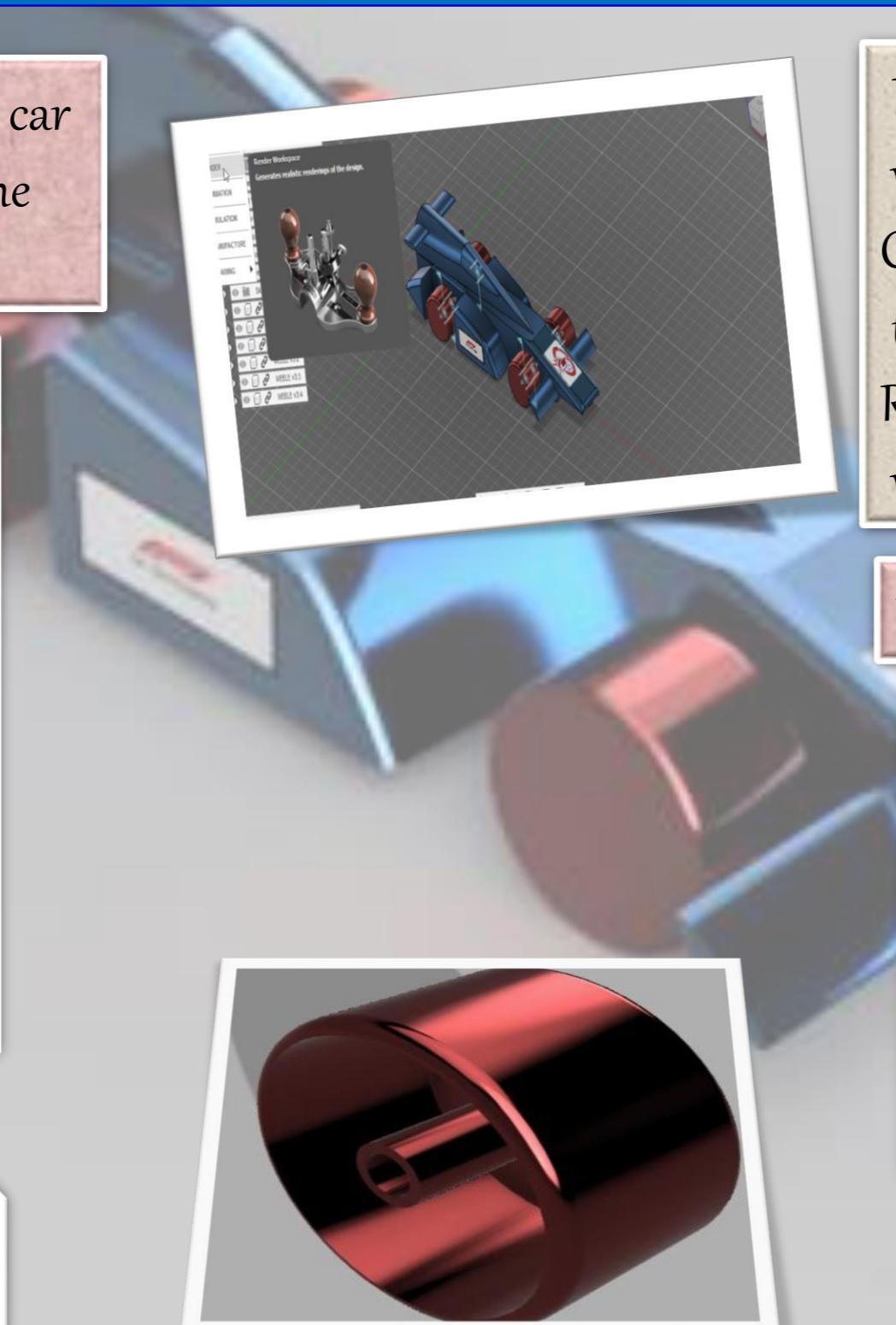
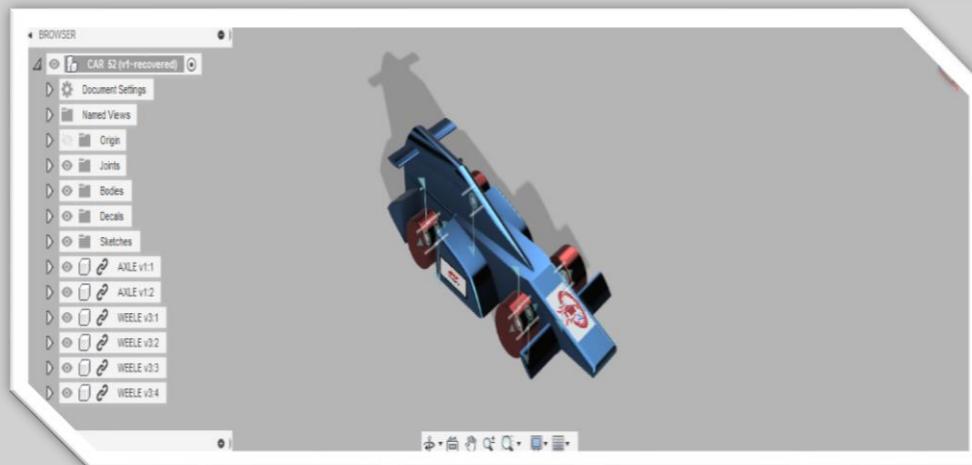


RENDERING



After making body we have to render the car what is rendering means that to colour the car in fusion 360

Rendering or image synthesis is the automatic process of generating a photorealistic or non-photorealistic image from a 2D or 3D model (or models in what collectively could be called a scene file) by means of computer programs. Also, the results of displaying such a model can be called a render.

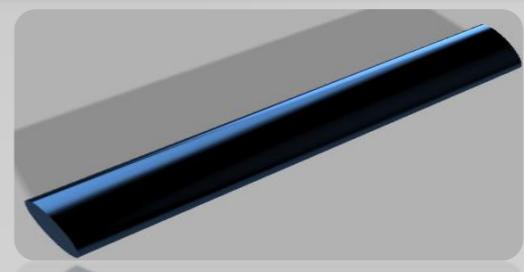


RENDERING OF WHEEL

In the Rendering workspace you will see a new icon under Render > Cloud Rendering. At the bottom of the Rendering workspace a new Rendering Gallery “carousel” window has also been added

How to render the car in fusion 360

- First click design
- Click render button
- appearance
- choose any material that you want
- drag down your material in car
- click render



RENDERING OF WINGS

VIRTUAL TESTING



Virtual testing is a process in which your product is tested like car building aeroplane etc. And also tested various characteristics such as drop resistance , deformations

WIND TUNNEL TESTING

It is a type of testing which we can test any object and software tell it is Aerodynamic or not It is passing air or not

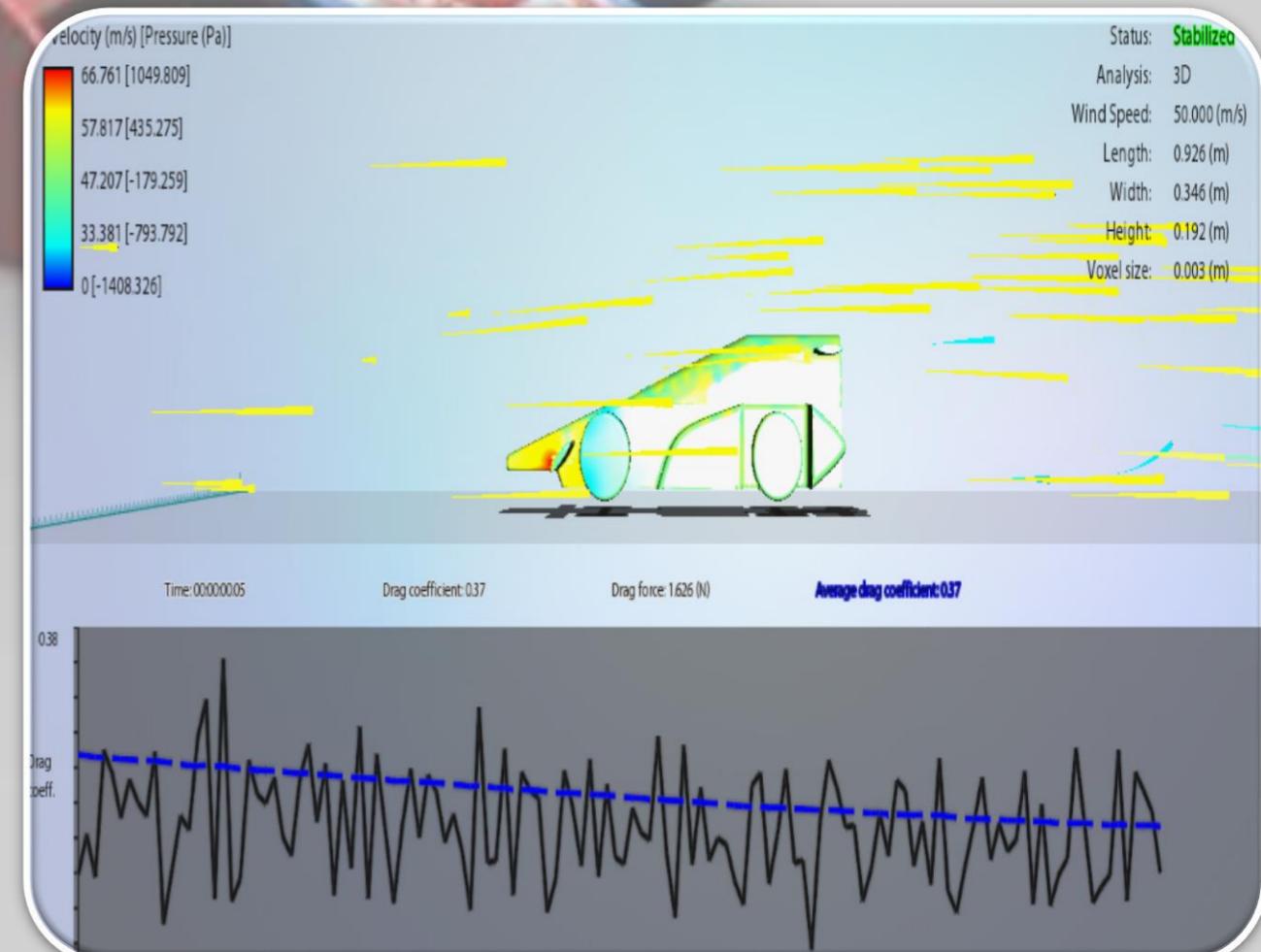
How to test any object in floor design insert your STL file

- Click wind tunnel
- Third adjust your wind speed
- Forth click ok
- After 1 hour it will give you result your object is Aerodynamic or not and lot of result like where it facing high pressure in your body etc.
- It is very amazing software for testing your object is Aerodynamic or not

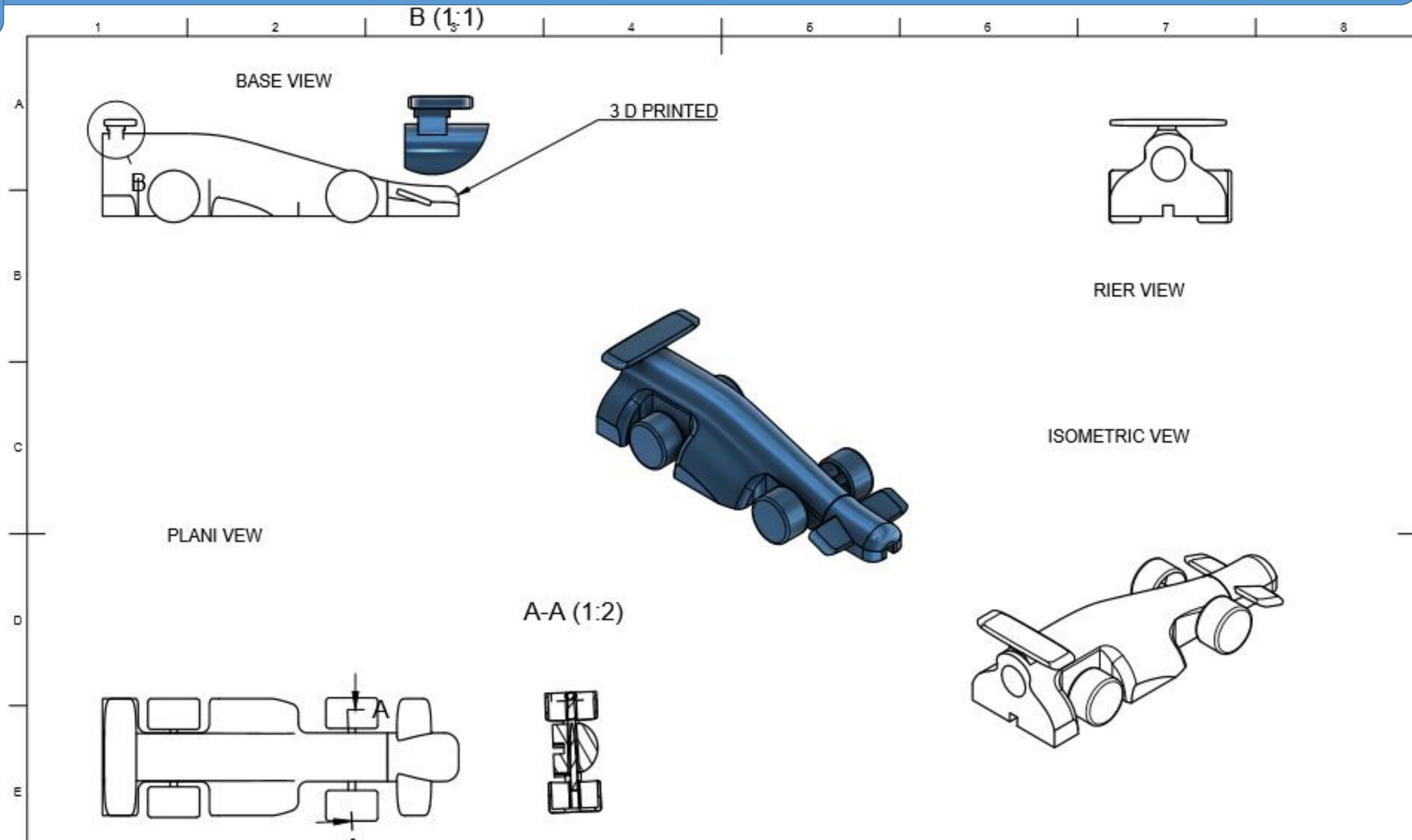


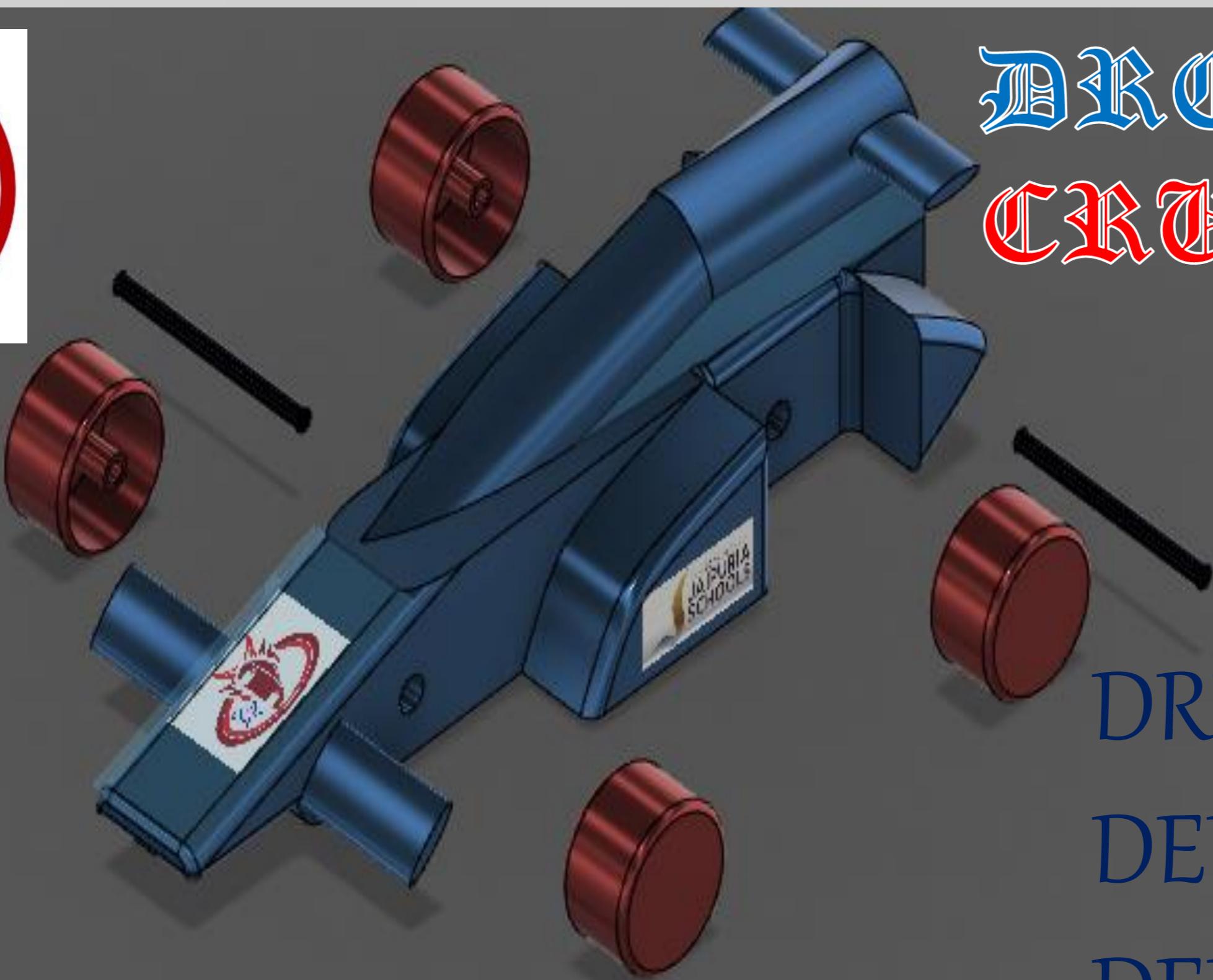
After completing my car design . I have to do analysis and virtual testing of my car, by the help of flow design software . The result of my car testing was:-

- Drag coefficient 0.37
- more aerodynamic
- Faster
- Strong design
- less friction.



DRAWING SKETCH





DREAM
CRASHER

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DEDICATE!!
DEFEAT!!!

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