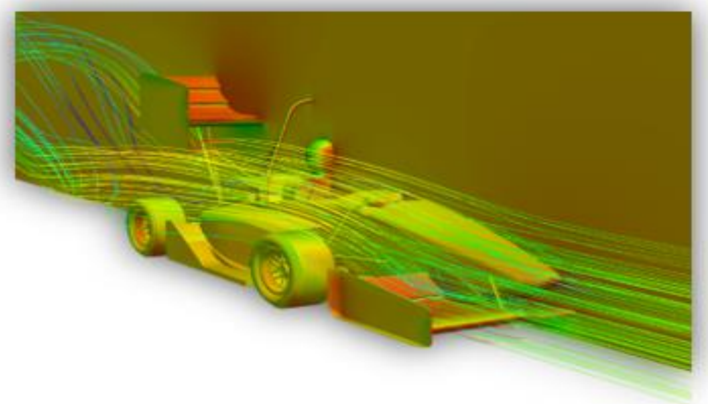
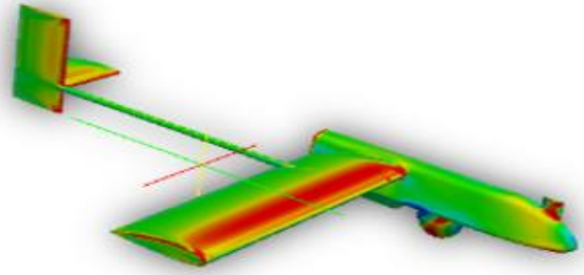
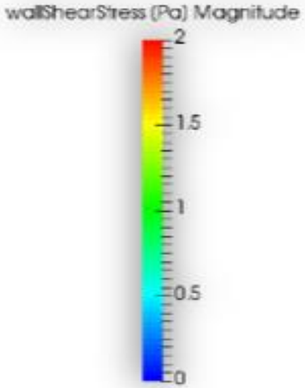
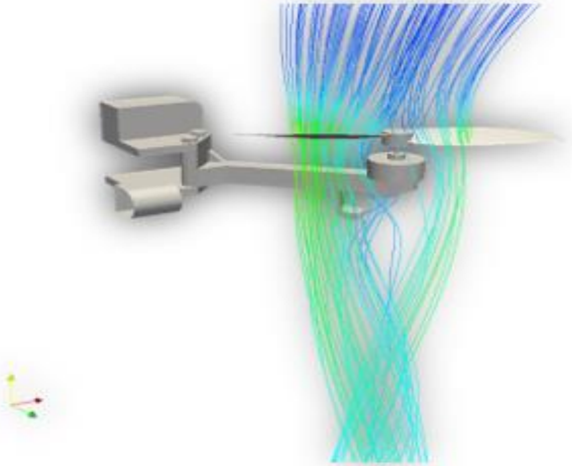
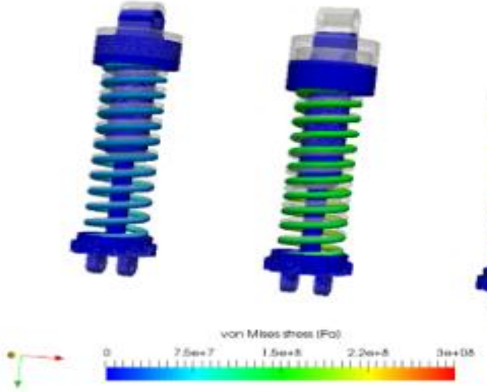
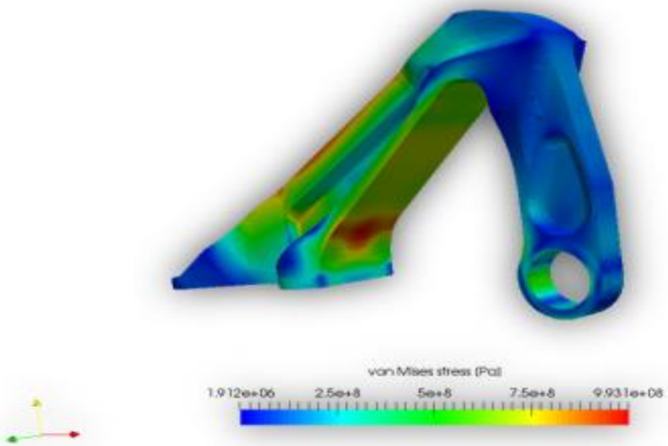


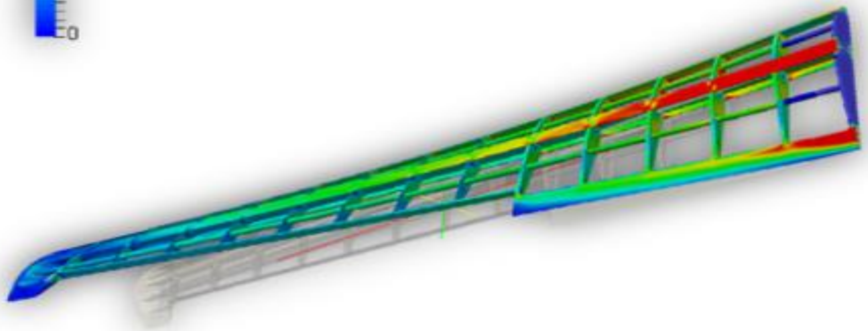


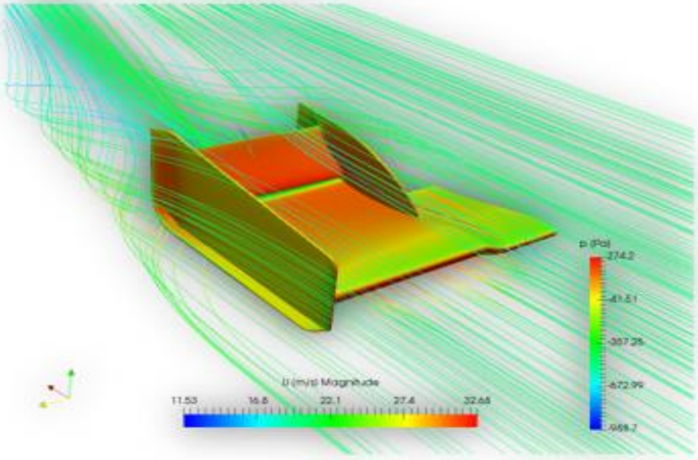


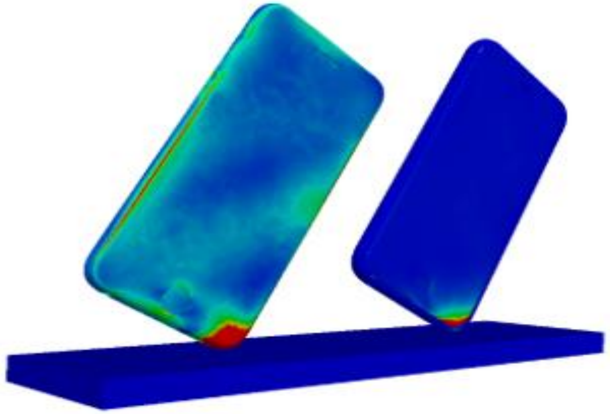












CFD/FEA Projects
Rohit Gupta

INDEX

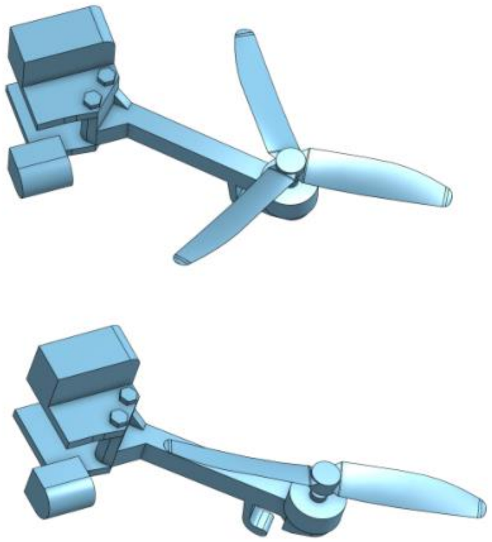
All the simulations are performed on Simscale platform, which is a full cloud CAE simulation software which helps perform CFD/FEA and thermal simulation on CAD models on cloud.

Thank you for looking at my portfolio. I would be happy to discuss more about this projects and can be reached by contact information at the bottom of this page.

Rohit Gupta | email:-rohitgupta3821@gmail.com | contact no.:- +918247299733

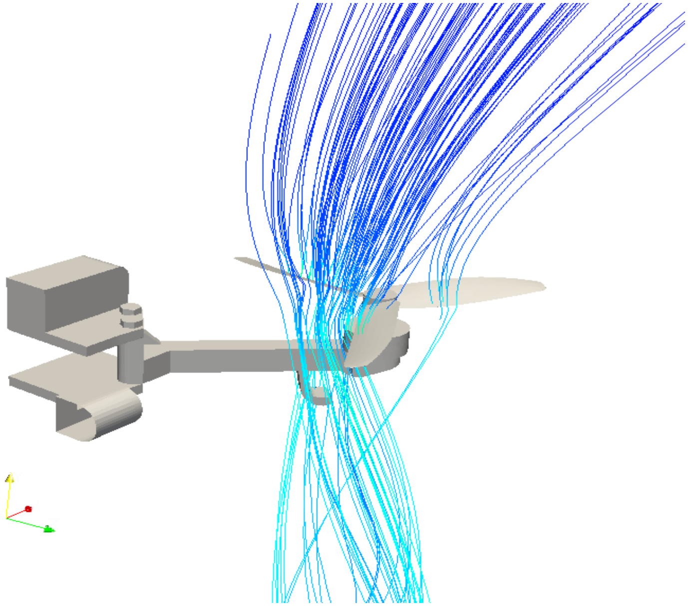
Drone blade analysis at different rotational speeds

One Quarter of Drone



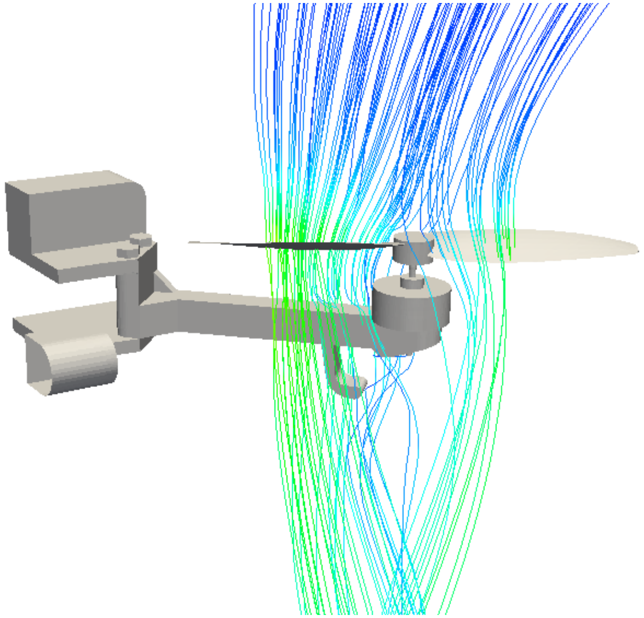
Streamlines No. points 100

Three blade Drone



Streamlines No. points 100

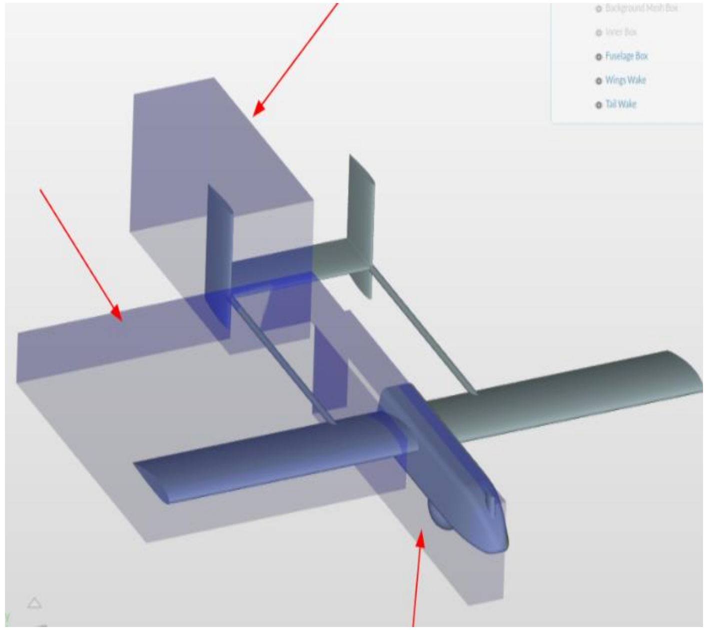
Two blade Drone



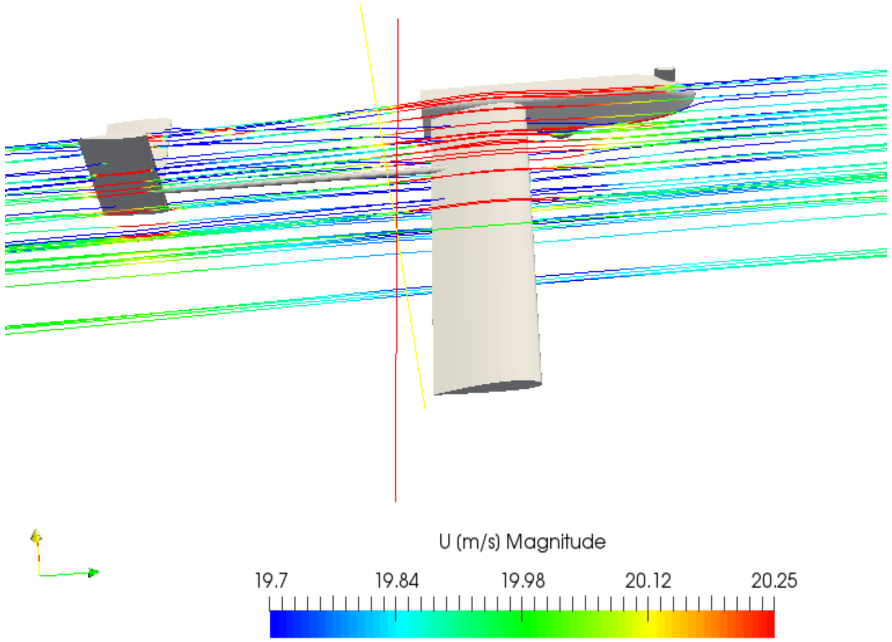
The aim of this simulation is to investigate the aerodynamic characteristics of different quad-copter propeller designs by changing the angle of attack (0-12deg) of blades and number of propeller blades. We consider only the quarter of geometry because the drone is symmetric body. We analyze the lift generated by propeller at different rotational speeds 1200,1600 and 2000 rad/s. We use multiple reference frame to simulate the effect of rotating propeller. Fluid dynamic simulation of incompressible fluid and steady state. K-Omega SST turbulence model was used for simulation

Aerodynamics of a UAV and Analyzing the performance of wing at different angle of attack.

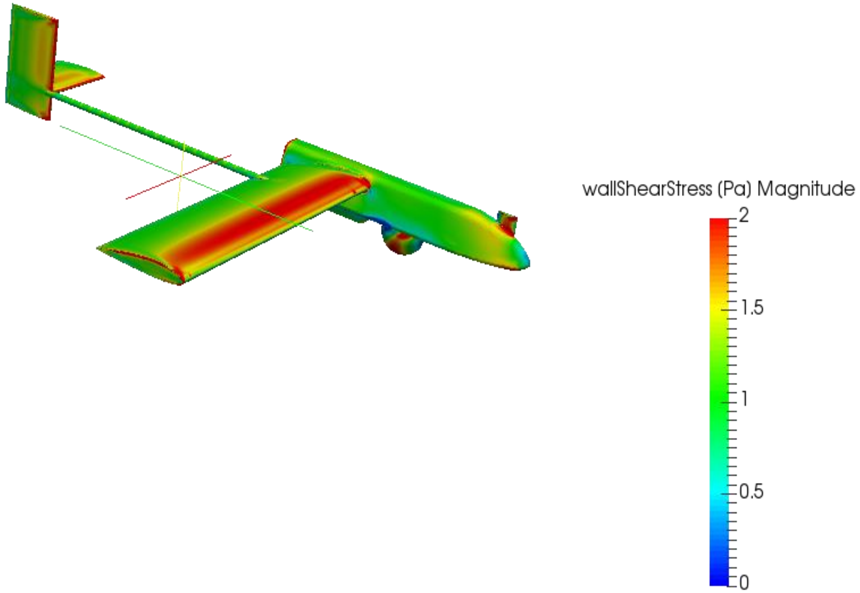
Mesh refinements at wing tail and fuselage to capture more accurate details



Streamlines - Number of points 50, U-point data



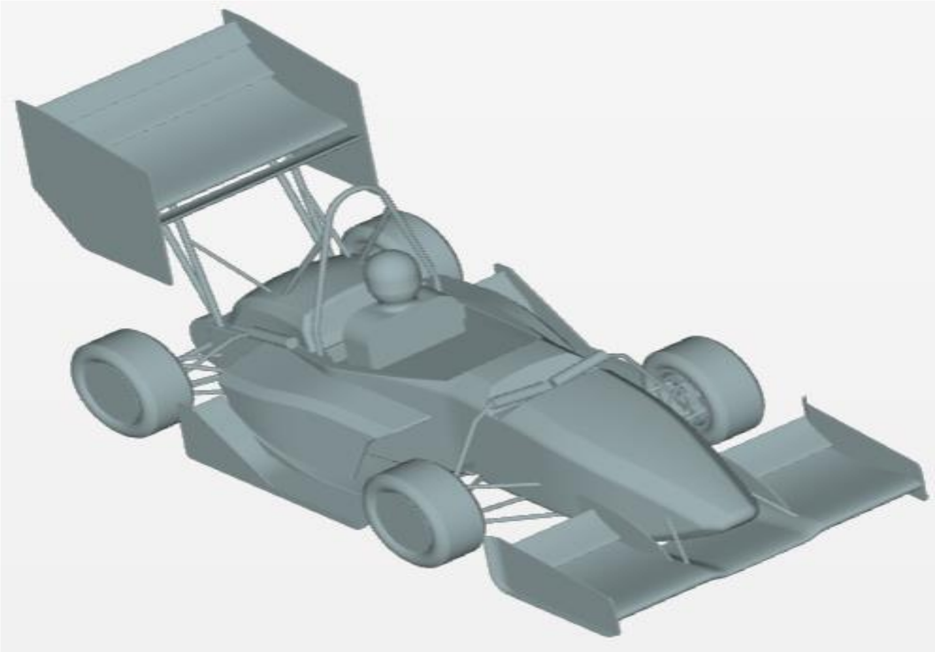
Wall shear stress rescaled from 0-2



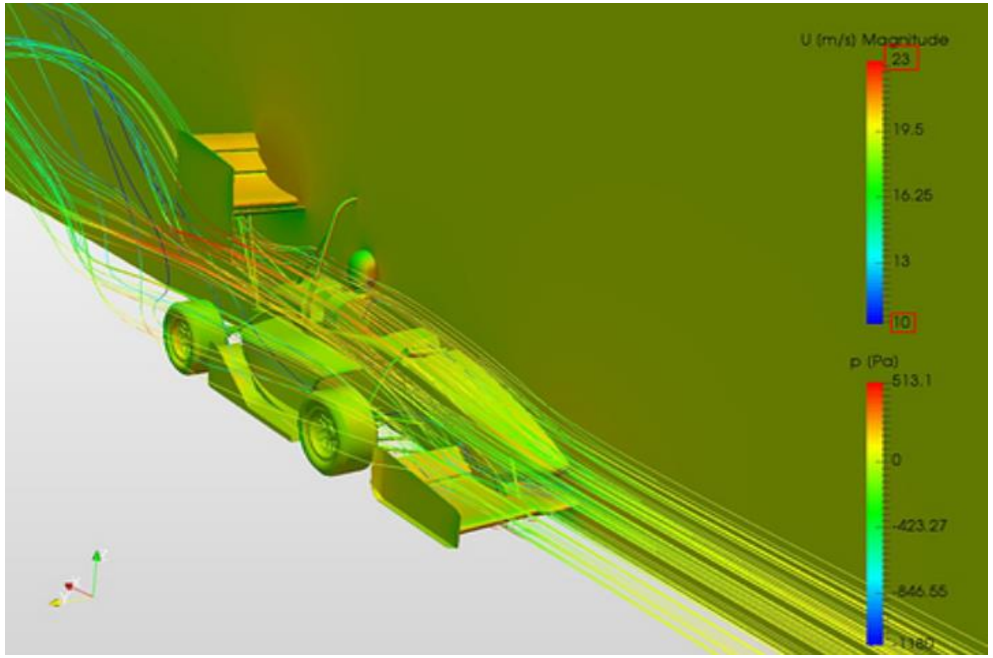
The focus of this simulation is to investigate the performance of the airplane in particular the wing by looking at drag and lift forces at different AOA, Analysis type was incompressible, K-Omega turbulence model was used. Boundary conditions Inlet velocity 20 m/s. Simulation end time value was set to 1200s

Aerodynamics of Race Car

Full car FSAE model



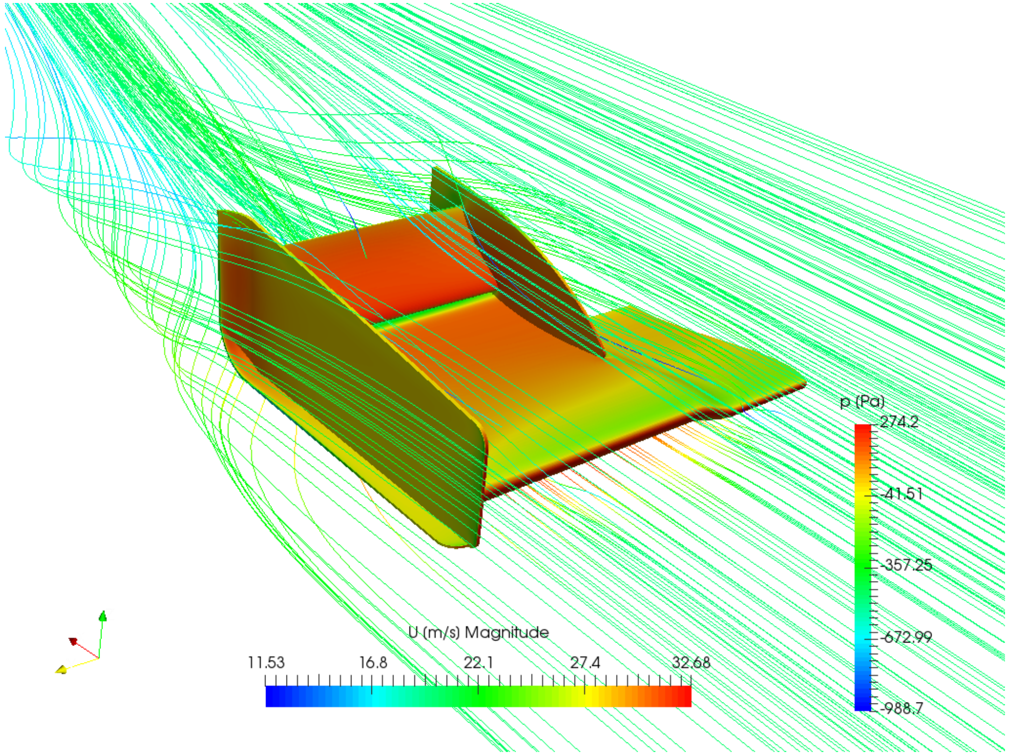
Streamlines P,U magnitudes



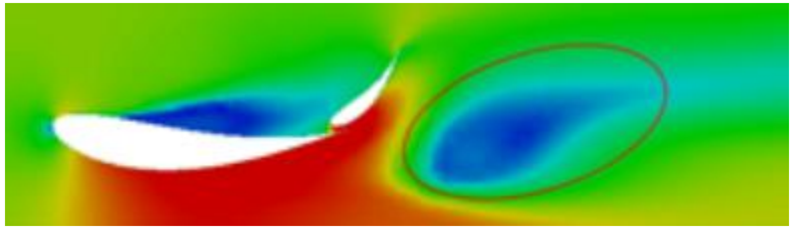
In this simulation we investigate the Full car model FSAE with a radiator using the porous media approach, rotating wheels using the rotating wheel boundary condition, and rotation of the car rims using Multi Reference Frame (MRF). The front wing flap angle was set to 0 degrees and the velocity of the car is set at a constant 20 m/s. K-Omega SST Turbulence model was used for this simulation. Also differences between porous media vs nonporous media and MRF vs No MRF media where analyzed.

Wing Analysis of a Race Car

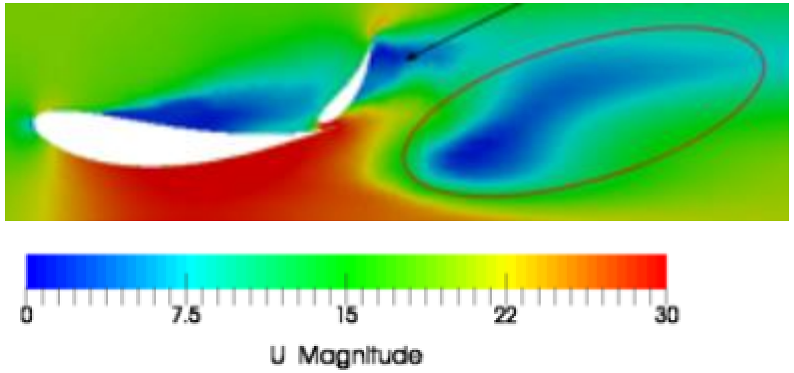
Pressure distribution on surface of the wing



6-degree Standard, less drag in the oval region



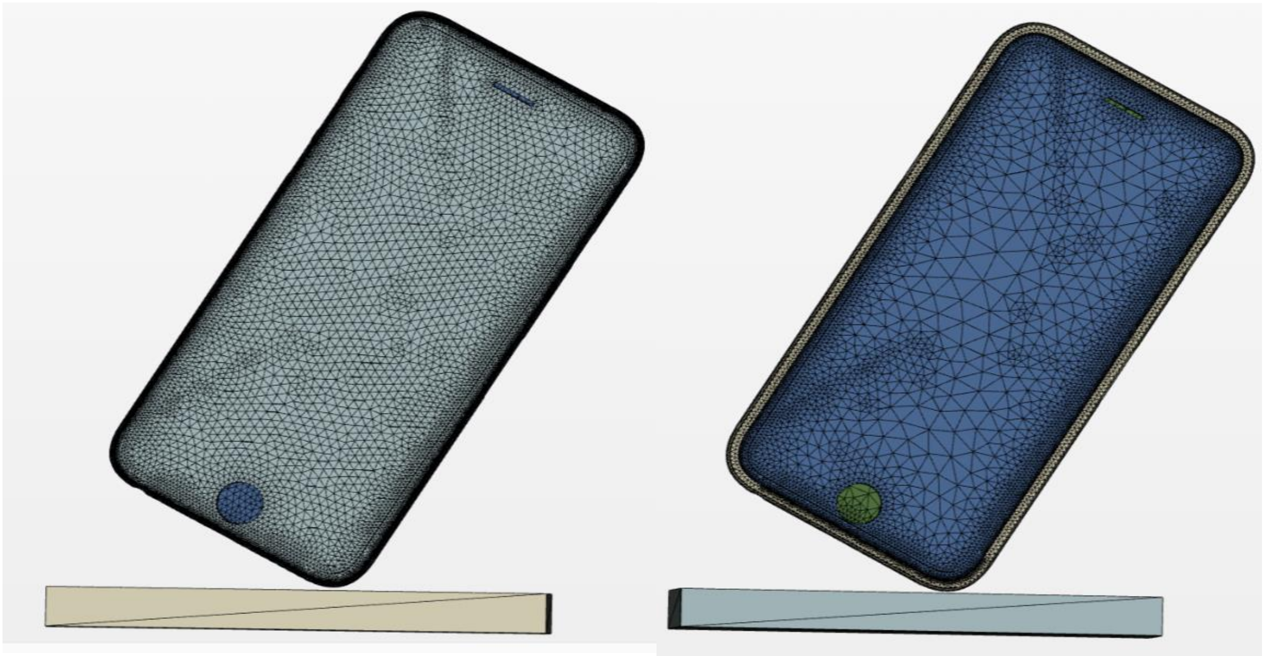
18-degree High downforce, and results in flow separation, high drag and less downforce



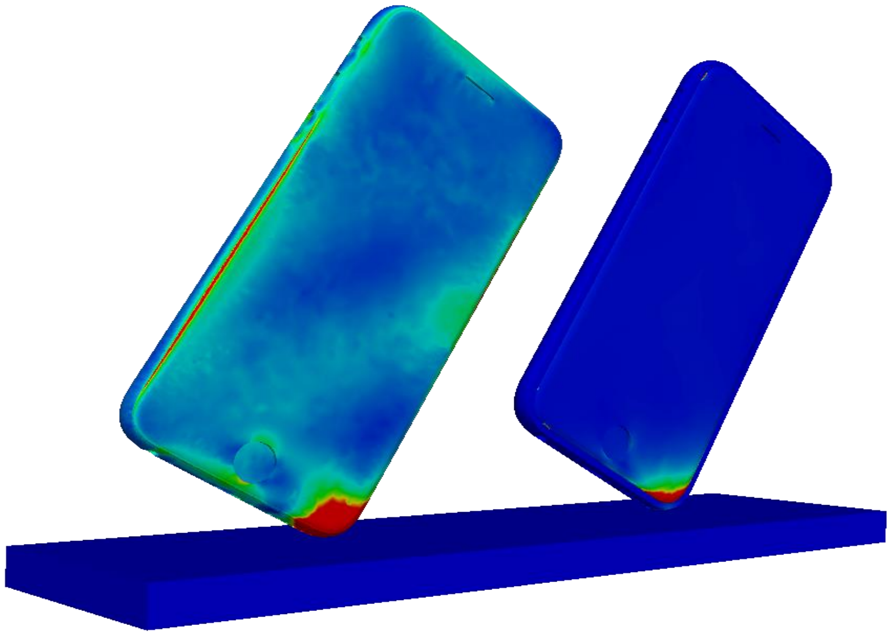
The goal of this simulation is to investigate the drag and lift forces on wing ,identify flow separations and determine the stall zones for different front wing flap angles 6-degree standard ,18-degree high downforce considering a constant inlet velocity of 20 m/s .

Drop analysis of iPhone 6 with case and without case

Tet-dominant mesh iPhone 6 without case and with case



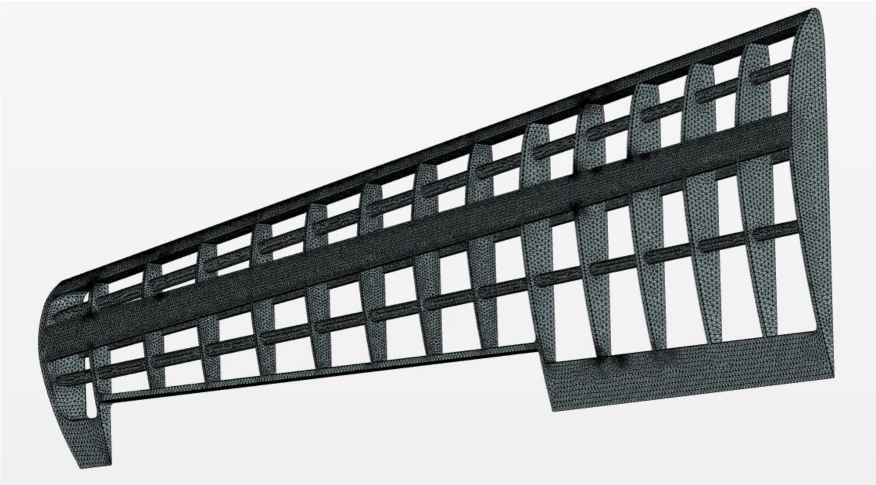
Dynamic analysis simulation, Impact velocity -4.4 m/s



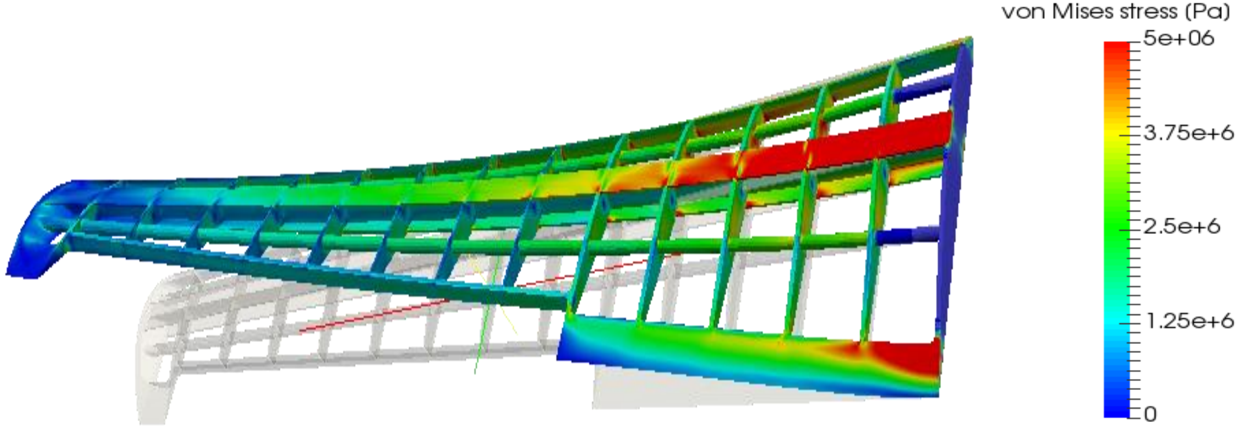
The goal is to determine whether the drop causes the iPhone to plastify or not i.e., create a dent on it. iPhone body material Aluminum, material density is modified to match the weight of iPhone (172g), Material for the case is set to rubber and its behavior to hyperelastic. First set of contacts between iPhone and glass Bounded contact and Contact between iPhone and the floor is the friction-less penalty contact. We visualize the range for stresses by limiting the range around 65 MPA which is yield strength (or the breaking point) of iPhone glass.

Aircraft Wing structural Analysis

Automated Tetrahedral Mesh



Maximum Displacement under bending and torsional loads and maximum stress locations

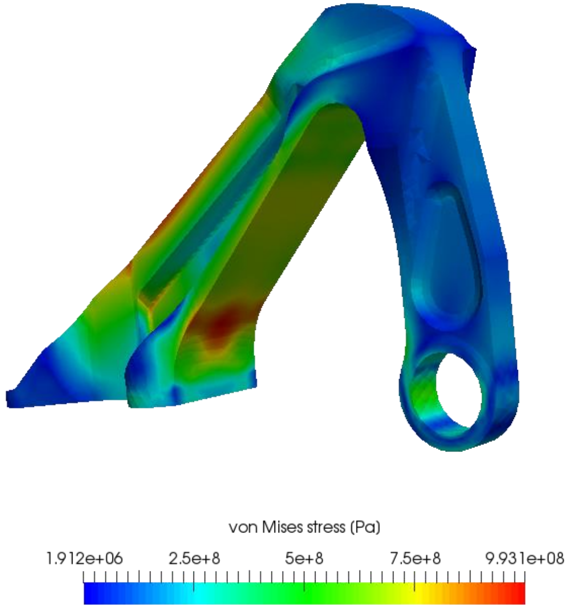


This project involves a static structural simulation of an aircraft wing which is subjected to bending and torsional load due to wind pressure. We only have one body, but in reality, they are connected, and influence of the connections is quite low hence we consider one body. Also, different optimized designs were analyzed by applying bending and torsional loads.

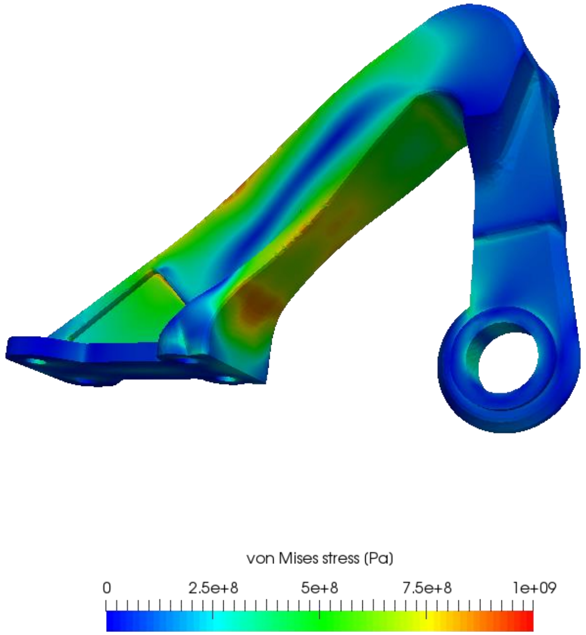
Linear static analysis to analyze several configurations of an aircraft engine bracket under a vertical load

Model 1 Tet meshed cad model

Model 1 weight 0.222kg



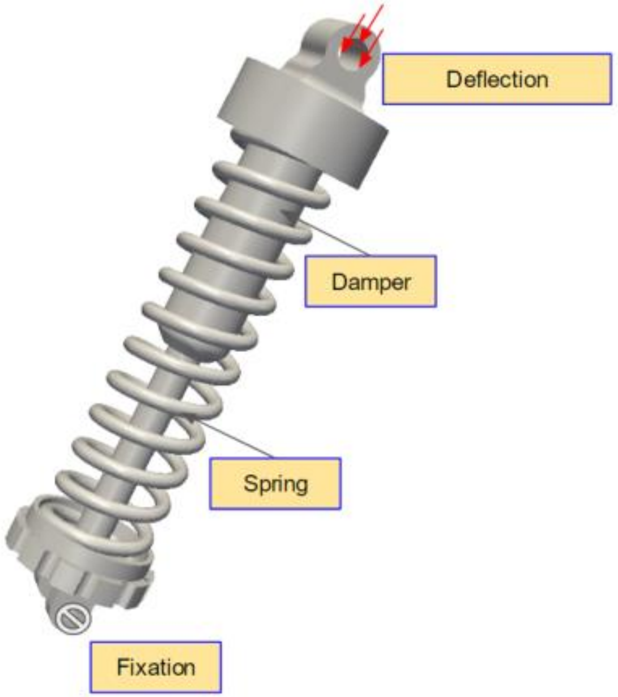
Model 2 weight 0.287kg



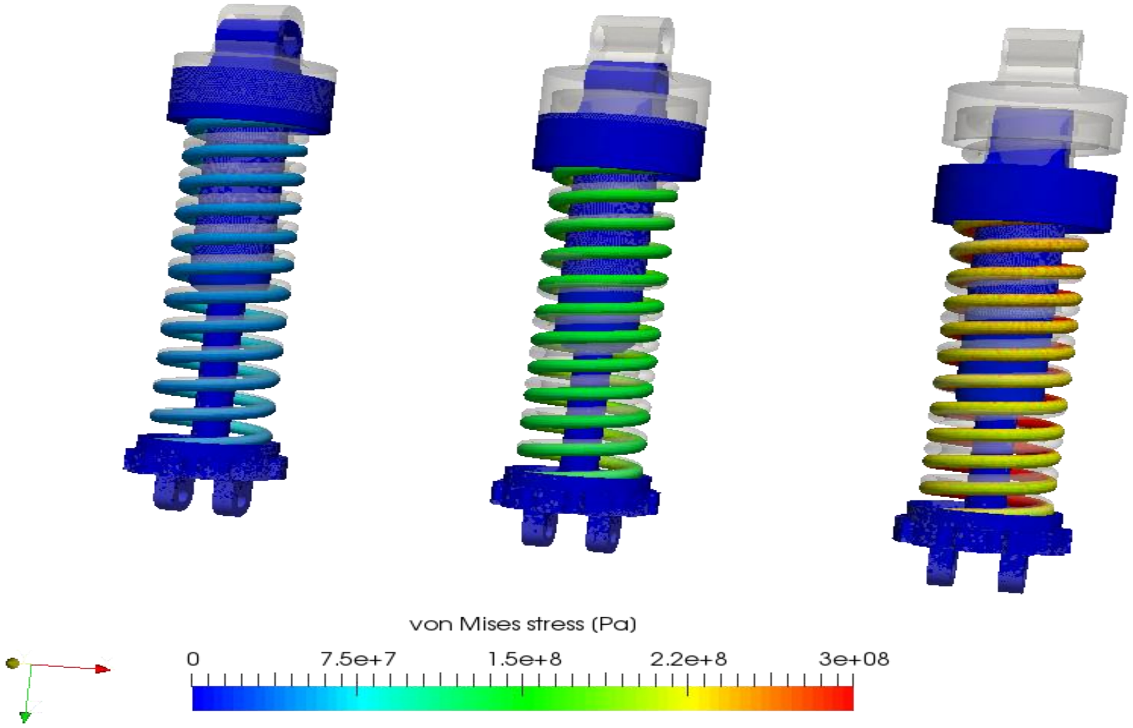
Bracket is made from stainless steel with a yield strength of 1GPA density 7833 kg/m3. Von misses stress tells us whether the material has reached the yield point. By observing where the highest stresses are on the model, we perform simulation on different bracket by optimizing or reducing the weight of model.

Analyzing the plastic deformation in an All-Terrain Vehicle (ATV) Suspension

Loading and Constraints



Von Mises stresses subjected to deformation 3-5cm and rescaled to 300 MPA



As the All-terrain vehicles are subjected to steep climbs and drops hence the suspension system is the central design decision which is responsible to absorb the shocks , we develop a methodology to analyze the suspension undergoing this deformations which allows us to calculate maximum allowable drop heights.