Chassis Suitable for a Formula Student Car

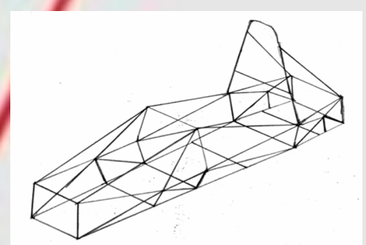
Group B1 Asher, Daniel, Noel, Hasan

Aim of the Project

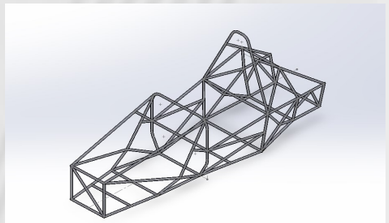
The aim of this group project is to design and prototype a chassis suitable for a formula student car.

Concept Designs

Three concept designs were sketched, steel, aluminium and titanium. The best elements from each was brought to the final design



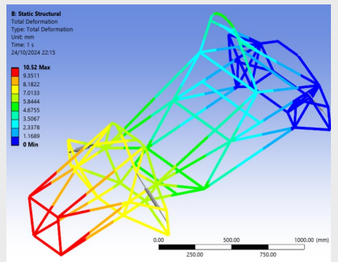
Cad Model



The tubular spaceframe chassis for our Formula Student car was designed in SolidWorks for optimal performance, safety, and manufacturability. Made from lightweight, high-strength BS4 T45 steel, it provides excellent torsional stiffness to handle racing loads. The design, prioritizes driver ergonomics, and complies with Formula Student safety standards. Finite Element Analysis (FEA) validated the structure, ensuring a balance between strength and weight for peak track performance.

Simulations

Using the Formula Student database, we conducted analyses on a sample chassis to interpret key performance metrics. Chassis tests, torsion & cornering, and frontal impact were conducted using steel, aluminium, and titanium. This section highlights the results for structural steel.



Calculations

	Constants
Imparct Area (M^2)	0.1295
Mass(Kg)	250
Speed (M/s)	19.44
Air Density	1.204
Kinetic Energy	47239.2
Impact Distance (M)	0.2
CSA (M^2)	0.001092
Turning Radius (M)	10.625
Skid Pad Angular Velocity	0.8415
Assumed Coefficient of friction	0.7

Impact Force (N)	Axial Stress (Pa)
236196	216296703.3

Centrafugal Force (N)	Breaking Distance (M)
1880.949727	13.72

Material Selection

T45 Steel was chosen, all properties are listed below

Material	BS4 T45
Yield Strength	600MPa
UTS	700MPa
Youngs Modulus	620MPa

Conclusion

The final design, created in SolidWorks, uses T45 steel tubing for a strong yet lightweight build, combining durability with efficiency