

## DESIGN, ANALYSIS AND OPTIMIZATION OF A MULTI-TUBULAR SPACE FRAME

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### ABSTRACT

Multi tubular space frames, often referred to as roll-cage acts as a structural embody for various types of automotive vehicles. A space frame serves a dual function of giving structural safety to the vehicle and at the same time incorporates the different subsystems like suspension, steering, transmission on to it. This makes the space frame a very vital and most cautious designed component, especially in case of vehicles like race cars and All-Terrain Vehicles. In order to ensure maximum safety along with due consideration to the weight aspect, the roll-cage of an All-Terrain Vehicle is designed. To fulfil these criteria it is important to consider various parameters involved in the design of a roll-cage, right from the material to be used up to the forces and impacts that it might encounter. Through this study, we aimed to design, analyse and optimize a roll-cage so as to achieve the target of apt strength to weight ratio. With the help of MATLAB, CAD modelling softwares' and ANSYS workbench 14.0, the model was designed and optimised to serve the desired purpose. Material was selected after conducting an extensive market survey and on the basis of weighted point method. This sequential approach was adopted for the roll-cage design of BAJA vehicle and proved to be effective.

**KEYWORDS:** Multi-Tubular Space Frames, Roll Cage, Analysis, FEA, ANSYS 14.0, Optimization