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STRUCTURAL OPTIMIZATION OF FOURWHEELER CHASSIS

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Abstract

A chassis, the main part of an automobile, carries all mechanical components and must be strong enough to withstand instant and fatigue loads, high friction, and vibration under various conditions. It requires high cross section strength and adequate bending stiffness, making steel the most commonly used material for automotive chassis production. This research aims to build a high strength to weight ratio truck chassis among various materials like Mild steel, ASTM A148 Gr 80–50 mild steel, Structural Steel AISI 1015, ASTM A710 Steel, and High Carbon Steel AISI 1065. The chassis model is constructed with two C-section side rails and rectangular cross members, using ANSYS Parametric Design Language (APDL). Here cross sectional dimension of the side rails and different steel materials are considered as the design parameters, and Taguchi DOE method is used for optimization. FEA analysis and model parameterization are done in APDL. This study uses APDL-based FEA to analyze stress and deformation parameters, Signal to Noise ratio, Taguchi DOE and Mean analysis using Minitab software. Conclusions were drawn considering the Strength to weight ratio, safety factors to determine optimal design parameters for cross section and material for the chassis.

Author Keywords

ANSYS APDL Coding, Chassis, Minitab, Optimization, Taguchi Method.

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