# Design Optimization of Lightweight Lower Control Arm using Finite Element Method

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**Abstract:**
The lower control arm (LCA) is one of the important components in suspension system. The main function of the LCA is to manage the motion of the wheels and hold the wheels to go up and down when hitting bumps. In general, most of the control arm made from steel. Although it has higher strength properties but the weight of it can be found excessively heavy in automotive industry without any changes to its design. Light weight and high strength characteristic in the replacement of materials has become the mainstream method in the automotive industry since the weight of the vehicle will affected fuel consumption. In this article, the CAD Models were prepared using Solidworks Software & finite element analysis using ANSYS software. The main significance of the analysis is to determine the optimal design among the three models of LCA that have been designed by comparing the maximum Von Misses Stress, total deformation and safety factor. The FEA results show that the proposed design (third design) of LCA can be considered as an optimum design due to lowest maximum Von Misses Stress, total deformation and safety factor, 96.407 Mpa, 1.116E-8 mm and 1.0373 respectively In additional, the comparison based on the weight and material cost of aluminum and Polyetherether ketone (PEEK) LCA using optimal design also was made. The comparison result shows that the production of LCA using the PEEK material is cheaper and lighter than aluminium material which reduced the weight of LCA up to 67% and 21% reduced in term of material cost.

***Keywords***: Lower Control Arm; Finite Element Analysis; PEEK; Fuel Consumption; Design Optimization

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