

# Finite Element Analysis of a Front Double-Sided Swing Arm for Electric Motorcycle

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**Abstract:** *This project focuses on the structural analysis of the front double-sided swing arm of an electric motorcycle, created recently to address the demands of the era of vehicle electrification. The major goal is to create a swing arm that can handle the stresses encountered during motorcycle operations while remaining as light as possible. Different force loading scenarios are addressed, with a focus on braking forces in emergency braking situations where heavier loads are imparted to the vehicle's front wheels. Through a series of finite element analysis simulations, specific Computer-Aided Engineering (CAE) software is utilized to evaluate the structural integrity of various swing arm designs. A topology optimization approach is also used to aid the redesign process and minimize the final design's weight. According to simulation findings under the worst-case loading conditions, the proposed structure is effective and promising for actual prototyping. A direct comparison of the results of the initial and final swing arm designs demonstrated a weight reduction of 7.14%.*

**Keywords:** Swing Arm; Double-Sided; Finite Elements Analysis (FEA); Two-Wheel Motorcycle; Topology Optimization.

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