

# Crashworthiness Optimization: Materials, Structures, and Vehicle Bodies

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## Abstract

Safety, Environmental protection and energy saving is the development themes of automobiles. Life is the most precious, everyone only once, so crashworthiness in the vehicle body design is particularly important, it is related to the personal safety of the driver and passengers. When it comes to the collision safety of automobiles, it can be considered and studied from three aspects: materials, structures and vehicle bodies. For materials, cross-scale optimization design can be considered. For the structure, the dynamic energy absorption structure with high specific energy absorption can be obtained by multi-objective optimization algorithm. For the vehicle bodies, the crash safety of the whole car can be improved by changing the body material, structural form or equipment technology. This report intends to introduce the model, algorithm and mechanism of collision safety and dynamic energy absorption from aspects of the multi-objective optimization design model and algorithm of vehicle collision safety, lightweight high-specific energy absorption structures, and bio-inspired composite material design.

**Keywords:** crashworthiness, optimization, energy-absorption, bio-inspired, composite material

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