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# Effects of new materials on the crashworthiness of S-rails

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### Abstract

Weight reduction and economy in the use of material and resources, are among the most important goals of auto-body designers. In order to reduce car's weight without impairment of crashworthiness, a method of the S-rail's material replacement from mild steel to high-strength steel, like transformation-induced plasticity (TRIP) or dual phase steel (DP) is brought forward. These materials improve crash performance due to their great work hardening during the forming compared with high strength low alloy (HSLA) or complex phase steel. In the current paper, energy absorption and reaction force of S-rails that are made of these new materials considering forming history are studied and an optimum design for improving crash performance of the S-rail using trigger is proposed. The explicit finite-element code LS-DYNA3D is used to simulate the forming process and crash behaviour of S-rails.

[S-rail](#) [new materials](#) [crash performance](#) [forming history](#)

