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Development of an impact attenuator for a SAE formula vehicle

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Crashworthiness is one of the most challenging stages of a vehicle's design, as it involves in-depth knowledge of structural mechanics, energy absorption and biomechanical factors. Just as automakers are constantly seeking to improve the safety of their vehicles, the Formula SAE teams must demonstrate that their prototypes meet certain safety requirements In this way, this work aims to design and analyses the impact attenuator of a Formula SAE vehicle. The project encompasses three major fronts: investigation, numerical simulations and experimental tests. Different materials and structure configurations will be investigated. This work will present different possible solutions found in the literature, comparing their manufacturing processes and expected performances. Initially, experimental tests are performed to characterize the materials. So, different impact attenuator configurations will be tested numerically in LS-Dyna, being choose the best one. At end, a final test will be performed in the impact hammer to validate the designed attenuator. As final stage, a full vehicle crash-test will be numerically performed, intending to verify the structural behavior under frontal impact situation and the consequences for the driver, represented by a dummy.

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