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ABSTRACT

Keywords: Go-kart, torsional stiffness, energy absorption, collision performance, LS-DYNA 3D

In this study, a numerical simulation has been developed to study the torsional stiffness and collision performance of Go-kart. The finite element code LS-DYNA 3D was used to analyze the impact of Go-kart to investigate the torsional stiffness of kart frame and the collision performance of kart bumpers. The torsional stiffness of kart frame was calculated by the numerical simulation of Go-kart subject to high speed impacts. The non-linear finite element code LS-DYNA 3D was also used to study the collision performance of kart bumpers. The works mentioned above were concentrated on how to improve the torsional stiffness of kart frame, design good kart bumpers which can absorb more energy during impacts, and optimize the kart performance. The results showed that the model with an inclined member arranged in front of the center member was the best one, and in the model of frame with width increased, it was found the torsional stiffness of frame was proportional to the width between two kingpins. In the analysis of crash test, three factors which would affect the collision performance of kart bumpers were investigated, including the angle between the front upper bumper and the horizontal plane, the thickness and diameter of kart bumpers. Deceleration, intrusion, and energy absorption of bumper were investigated. The results showed that whether in frontal or lateral crash tests, the best ones were the model with diameter increased. In the impact analysis of kart bumpers, three cases of different velocities were studied to observe the dynamic behavior of kart, including the velocity of 10.7km/hr which is the regulated velocity in CIK-FIA homologation crash test, and 60km/hr and 80km/hr are the regulated velocities in FIA impact test for safety barriers. Due to the lack of ability to design legal domestic Go-kart, it was believed the works mentioned above could provide relative information to people who are willing to design and manufacture new Go-kart in the future.
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