

Impact modelling studies for a three-wheeled scooter taxi.

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ABSTRACT

Three-wheeled scooter taxis (TSTs) are being used in many Asian countries and along with buses are the main mode of public transport for the urban middle class population. The TST chassis is made by the manufacturer and the body is fabricated by local body-makers. The vehicle is not subject to any crash safety specifications. This work is the first attempt to study the crash characteristics of TSTs using a crash simulation computer software (MADYMO) with the objective of developing practical guidelines to make the vehicle safer in collisions with other motorized road users and pedestrians. Impact modelling was done for the standard and modified TST occupied by a driver and one passenger at impact velocities of 10-30 km/h crashing with a pedestrian and a bus front. The results show that the passenger and the driver of the standard TST can sustain high HICs, face/head contact forces and tibia/knee contact forces in crashes with buses at velocities 20 km/h and greater. The magnitude of these parameters can be reduced slightly by small changes in the design of the interior and padding of critical surfaces. To increase the safety of the TST significantly major modifications need to be incorporated in the design of TSTs and bus fronts. Pedestrian impact simulations indicate that it may be possible to reduce the impact forces by changing the shape of the front of the TST. The results indicate that it should be possible to improve the crash safety properties of vehicles indigenously designed in Asian and African countries by the use of crash simulation models like MADYMO. This procedure is relatively inexpensive and can provide the first approximations for design of safer vehicles.