conferenceseries.com

Adv Automob Eng 2017, 6:3(Suppl)
DOI: 10.4172/2167-7670-C1-009

An evaluation of aluminium-composite combined geometry tubular structures for automotive frontal crash safety applications

Praveen Kumar and **M Nalla Mohamed**
SSN College of Engineering, India

Tubular structures are one of the automotive frontal crash safety devices which can protect occupants during impact collisions apart from airbags and ABS braking system. These tubular energy absorbers are one-shot items, i.e., once plastically deformed, they are discarded and replaced. Thus, the design requirement for such device is usually to achieve high energy absorption with less weight, corresponding to high specific energy absorption (SEA), while keeping the reaction force low enough to minimize the injury and damage to people and cargos. Metal tubes with externally wrapped Glass fibers are one such candidate with notable high specific energy absorption capacity and mean crushing force compared with the metal tubes and hence proposed. Thus, this research work addresses the deformation behaviour and specific energy absorption capacity of combined geometry tubes made-up of aluminium overwrapped with glass fabric through static and impact experiments. The combined geometry tubes consist of cylindrical segment with end plain cap, hemispherical cap and shallow spherical cap which were fabricated using multi-stage deep drawing process. Hybrid composite aluminium tubes were prepared by wrapping glass fabric over the aluminium tubes with required thickness by hand lay up process. The energy absorption characteristics of different tube configurations were analyzed by varying thickness of the composite. Further, the performance of the hybrid tube was compared with bare aluminium tubes and it was found that the specific energy absorption capacity of the hybrid tube is 10-20% higher than the aluminium bare tube. Overall, the study highlights the advantages of using hybrid tubes as best energy absorbers in automotive structures.

praveenphd15@gmail.com

Notes: