

CRASHWORTHINESS BEHAVIOUR OF CAPPED CYLINDRICAL ALUMINIUM TUBULAR STRUCTURES SUBJECTED TO LATERAL COMPRESSION

A. PRAVEEN KUMAR¹ & D. MANEIAH²

¹Associate Professor, Department of Mechanical Engineering, CMR Technical Campus,
Hyderabad, Telengana, India

²Professor, Department of Mechanical Engineering, CMR Technical Campus,
Hyderabad, Telengana, India

ABSTRACT

Metallic cylindrical tubular elements have been prominent as an impact kinetic energy absorbing structures in various vehicles for their progressive deformation behaviour, long stroke and substantial energy absorbing ability. In the current research paper, systematic experiments on the crashworthiness behaviour and specific energy absorption features of deep drawn capped cylindrical aluminium tubes of different thicknesses subjected to lateral loading have been executed. Furthermore, the lateral deformation and energy absorption characteristics acquired from the quasi-static experiments were evaluated. The crashworthiness behaviour of the recommended shallow and hemispherical capped cylindrical tubes was compared to the conventional cylindrical tubes and the proposed capped cylindrical tubes absorbed more energy than the traditional cylindrical tubes. Based on the overall results obtained, it was observed that the proposed shallow and hemispherical capped cylindrical tubes showed desirable crash worthiness characteristics which is significant in the crashworthiness design of energy absorbing structures for lateral impact loading applications.

KEYWORDS: Capped Cylindrical Tube, Crashworthiness, Crash-box, Deep Drawing, Lateral Compression & Specific Energy Absorption

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