Analysis of thin walled tube Al 3003 H12 under quasi-static axial crush mode using finite element method

ABSTRACT

Experimental crashworthiness investigation on thin walled tube structure always contribute into a complicated process with huge amount of cost is wasted on specimen preparation perfection. Advance numerical solution has been found as a significant option in order to simplify the process while enhancing the understanding of this crashworthiness behavior. Therefore, current works have been carried out based on finite element method to perform a quasi-static axial crush on selected thin walled tube structures. Here, the circular and rectangular tubes of aluminium alloys Al 3003 H12 sections are selected based on its wide application on front chassis rail component. Essential boundary conditions have been applied in order to accurately simulate the quasi-static axial crush behavior. Preliminary verification results has shown that current numerical method is capable to produce a good correlation results with selected experimental data in terms of energy absorption, crushing length and collapse starting point. However, there is also a slight discrepancy observed in cylindrical 1.5 mm deformation mode behavior.