

## High velocity impact response of Kevlar-29/epoxy and 6061-T6 aluminum laminated panels

### ABSTRACT

The high velocity impact response of composite laminated plates has been experimentally investigated using a nitrogen gas gun. Tests were undertaken on sandwich structures based on Kevlar-29 fiber/epoxy resin with different stacking sequence of 6061-T6 Al plates. Impact testing was conducted using cylindrical shape of 7.62 mm diameter steel projectile at a range of velocities (180–400 m/s) were investigated to achieve complete perforation of the target. The numerical parametric study of ballistic impact caused by same conditions in experimental work is undertaken to predict the ballistic limit velocity, energy absorbed by the target and comparison between simulation by using ANSYS Autodyn 3D v.12 software and experimental work and study the effects of shape of the projectile with different (4, 8 and 12 mm) thicknesses on ballistic limit velocity. The sequence of Al plate position (front, middle and back) inside laminate plates of composite specimen was also studied. The Al back stacking sequence plate for overall results obtained was the optimum structure to resist the impact loading. The results obtained hereby are in good agreement with the experimental (maximum error of 3.64%) data where it has been shown that these novel sandwich structures exhibit excellent energy absorbing characteristics under high velocity impact loading conditions. Hence it is considered suitable for applications of armor system.

**Keyword:** Composite structure; High velocity; Energy absorption; Impact behavior