Petrochemistry-2013

OMICS Group Conferences
Accelerating Scientific Discovery

World Congress on
Petrochemistry and Chemical Engineering

November 18-20, 2013 Hilton San Antonio Airport, USA

Numerical investigation of polyurea coated composite aluminium plates subjected to low velocity projectile impact

Damith Mohotti

Department of Infrastructure Engineering, The University of Melbourne, Victoria 3010, Australia

Abstract

Impacts of objects into the structures are a common catastrophe of many industries such as armour, aerospace and petroleum. Therefore designing of structures shall consider the effect of such dynamic loadings during their service life. Over last few decades, many reasechers have been focused on finding new materials such as elastomers and fabrics to mitigate the impact effects by applying them as protective layers. Polyurea is such elastomer which has proved its ability to absorb more energy under severe load such as blast and ballistic. The main objective of this study was to numerically investigate the behaviour of square aluminium-polyurea composite plate systems supported by a bolted frame subjected to low velocity impact. A gas gun projectile launching system was used to strike a 37 mm diameter rigid bar at the centre of 300 mm x 300 mm square composite plates of different thicknesses with velocities in the range of 5–15 m/s. In this study, a finite element model (FEM) of the complete experimental setup has been developed using advanced finite element code LS-DYNA. A high strain rate test program on aluminium alloy and polyurea were carried out in order to obtain the material parameters for the for the FEM analysis. Results obtained from FEM were validated using the experimental results. Peak deformation and deformation time-histories show a very good agreement with the experimental results.