NON-LINEAR ELASTIC-PLASTIC BEHAVIOUR OF ALUMINIUM SHEET METAL USING FINITE ELEMENT ANALYSIS

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ABSTRACT

Aluminium is one of the most used metals in today’s industry, having properties of strength, durability, conductivity, lightness, and corrosion resistance. Sheet metal forming is a process that widely used and costly manufacturing process. A materials problem is one of selecting the right material from the many thousands that are available. Aluminium has a low density, good corrosion resistance and relatively cheap. Aluminium sheet becomes favourable comparing with steel regards to some improvement at the designs. Automotive parts and products are used wide range of these materials included bumpers, doors, bars, seat frames and roof panels. Nonlinear analysis is much more complicated than simple linear analysis because it is required many variables such as changes in geometry, permanent deformations, structural cracks and buckling. This paper was carried out to study the elastic-plastic analysis of sheet metal forming using finite element method. LUSAS simulation was carried out to understanding the behaviour of aluminium sheet and accurate results of this process. Axi-symmetry and plain strain element mesh were used to model and study this metal. Deep analysis was carried out and the effect of geometry of sheet metal forming process has been studied. A good agreement between the load and the displacement test was obtained that verified the program.

KEYWORDS: Elastic-Plastic, FEA, Aluminium, Geometry & LUSAS Simulation

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