Computational and Experimental Analysis of Gas Formed Hemispherical Shaped Components for Air Bottles

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ABSTRACT

Superplasticity is defined as the ability of a material to be stretched to many hundreds or thousands percents of its original length without producing a neck. Such enormous stretching capability has received increasing interest from the commercial forming people. Thus superplastic deformation has no longer remained a scientists curiosity or a dramatic laboratory experiment. In many cases this has replaced the age old fabrication processes particularity in aerospace industries. Superplastic forming and diffusion bonding, combined together can from complex monolithic shapes replacing the conventionally heavy multi component structures.

The super plastic forming (SPF) processes is one of the advanced manufacturing methods for producing very complex thin-sheet components, used especially in aerospace industry. A number of methods and techniques have been reported for forming superplastic materials, each of which has a unique capability and develops a unique set of forming characteristics. The characteristics of superplasticity-low stress and large elongation - have been utilized widely in superplastic Forming (SPF) processes such as Gas Forming, Forging, Extrusion, Blow-forming, Vacuum forming and so on.

The aim of the proposed project work is to design a hemispherical die, model and perform analysis in suitable a software. Experimental evaluation of the results obtained in computational analysis will be performed.

CONCLUSION

It is concluded that the air bottle and the die are safe from the strength point of view for all the pressure levels tested. Also it is observed that the air bottle is structurally safe for the aluminum material also. But considering the criticality of the component function, it is suggested to use the existing Titanium material only.

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