



Contact Damage Resistance of Sandwich Panel Reinforced by Carbon Fibre Skins

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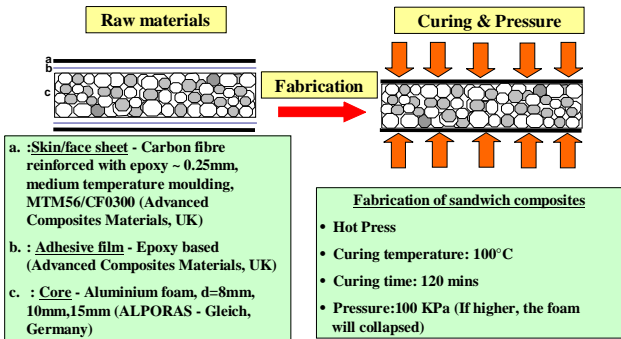
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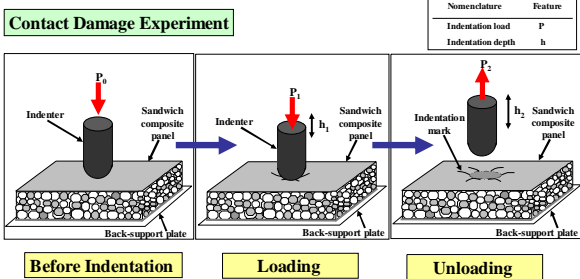
Introduction

In this work, aluminium foam sandwich panels are manufactured of ALPORAS aluminium foam core of a thickness ranging from 8 mm to 15 mm, and reinforced by carbon fibre skins of 0.25 mm thickness. To simulate the contact damage, spherical indenters of 5, 10 and 15 mm diameters were penetrated into the surface of the sandwich structures up to the failure point, and the load-indentation depth curves were recorded. The results revealed that the failure loads, the failure indentation depth and energy absorption depend on the indenter diameter and the sample thickness. The contact damage behaviour of the sandwich samples also can be observed from the failure modes analysis.

Sample Preparation

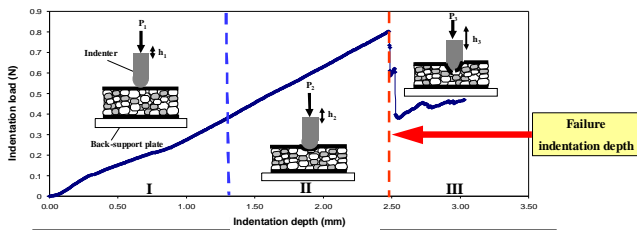


Contact Damage : Quasi - Static Indentation

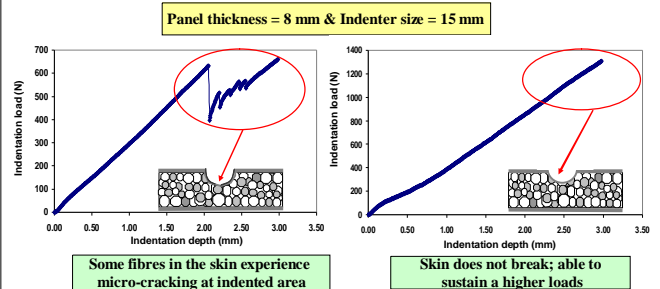


- ❖ Spherical indenters of 5, 10 & 15 mm were used to indent samples
- ❖ Indentation depths were varied using similar indenter sizes to all sample thicknesses until the minimum depth was identified before the skin fails
- ❖ Indentation speed is 0.50 mm/min

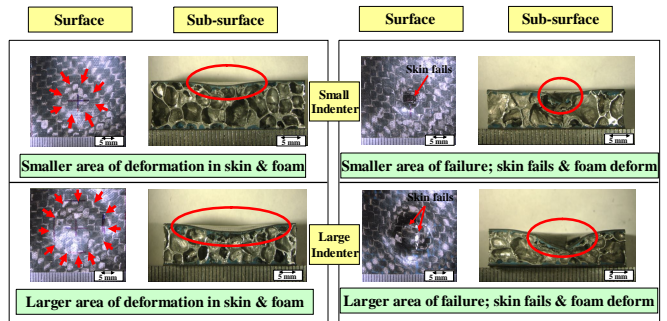
Load-Indentation Depth Curve



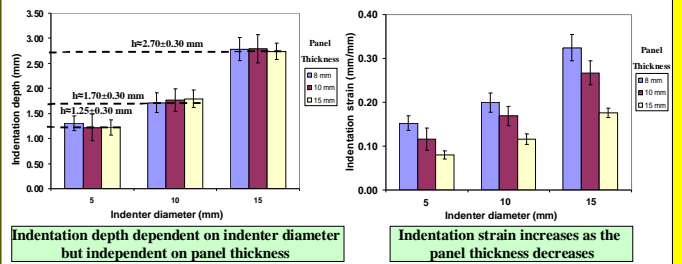
Identifications of Failure Point



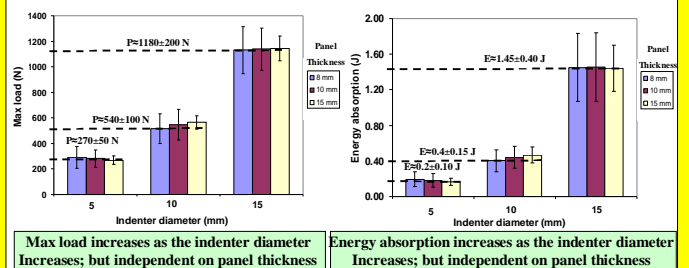
Failure Modes Analysis



Results : Indentation Depth & Indentation Strain



Results : Max Load & Energy Absorption



Conclusions

- I. Contact damage is dependent on indenter diameter but independent on panel thickness
- II. Energy absorption increases proportionally with indenter diameter
- III. Surface and sub-surface failure modes show different contact damage behaviour if samples are indented with small and large indenters