

MEASUREMENT OF THE MECHANICAL PROPERTIES OF A CARBON REINFORCED BISMALIMIDE OVER A WIDE RANGE OF TEMPERATURES

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ABSTRACT

For high temperature usage (200 °C and above) such as in certain supersonic aircraft structures, the composites used are either bismaleimides (BMI) or polyimides reinforced with carbon fibres. The composite selected was Advanced Composites Group HTM552. It is a carbon fabric 0/90° laminate of high strength carbon fibres in a 2 × 2 twill weave impregnated with a BMI resin. To determine the mechanical behaviour of the BMI composite as a function of temperature, the following tests were performed. The longitudinal E (E_{11}) was obtained dynamically by vibrating a free-free beam in flexure from -55 to 200 °C. The ultimate longitudinal strength (σ_{11}) was determined using the 4-point flexure test. The through thickness strength (σ_{22}) was determined by bonding a piece of composite to steel blocks and loading in tension normal to the fibre direction. Finally, the coefficient of thermal expansion of the BMI composite was measured using strain gauges according to a method proposed by Lord.