

## **Effect of cure on the mechanical properties of MTM45 woven carbon-epoxy composite: tensile, compression and shear properties from ambient and non-ambient temperature testing.**

The motivation to achieve a 'proper cure' seems obvious or intuitive but what really happens if we don't cure a thermoset composite properly? How does the degree of cure affect the mechanical properties of the material? How does the degree of cure affect the material's ability to stand up to 'hot' conditions and/or 'wet' conditions?

In this presentation we will discuss thermal management of the curing process and identify potential situations where a composite may be under-cured or thermally degraded (exposed to excessive temperature during cure). Then we will look at the results of over 125 mechanical tests including tensile, compression, in-plane shear (Iosipescu), and short-beam shear (interlaminar shear strength) on specimens that have been significantly under cured, moderately under-cured, cured according to the manufacturer's recommended cure cycle, and thermally degraded to identify the effect this has on mechanical properties. We will also look at the effect on specimens that have been conditioned in moisture ('wet' condition) and tested at both ambient temperatures and elevated temperatures ('hot' condition), commonly referred to as 'hot-wet' conditions. This data will be compared to NCAMP data on the same material as a benchmark.

This work was done in collaboration with Dr. Hannes Körber, Industry Manager Composites, ZwickRoell and Luciano Avila Gray, Research Group Lead, Chair of Carbon Composites, Technical University of Munich.

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