Degree of Cure

With the ever-widening use of composite materials in critical applications, the long-term performance of these materials must be predictable and causes in variability in physical performance must be tightly defined. These properties are highly dependent on the degree of cure of the resin (and this is particularly true for room temperature cured resins), such as VARTM (vacuum assisted resin transfer method) which is used for example in manufacturing ship structures. These physical properties of composites are often differentiated by the duration and temperature of the curing and post-curing process.

FTIR spectroscopy has been shown to be a powerful analysis tool for tracking the degree of conversion in these resins and the molecular information provided by the technique can be correlated to the physical capability of the resin. Test coupons have been routinely measured by FTIR; however, measurement of the actual part was limited because large parts could not be measured on a laboratory FTIR without disassembly. The Exoscan can easily measure these parts because it is hand held. This is especially important because in manufacturing large structures, such as in ship building, where the composite actually cures in relatively uncontrolled environments, the ability to determine the degree of cure is most important. Therefore, the Exoscan FTIR system is an invaluable tool for assessing the degree of conversion and thus the degree of cure of the resin in these applications.

In other applications, where a normally well controlled curing process may undergo unexpected or unwanted variation, measuring the degree of cure via the Exoscan system provides a means to accept or reject those parts.

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