

Elevated Cure 101

Q. Should I be heat curing?

A. Elevated temperature cure (ETC) can give exceptional results. There is a reason why most composite parts in aerospace are cured this way. Here are some reasons to consider this technology.

- 1. Strength is advantaged to a fairly impressive degree. ETC creates a polymer with a higher crosslink density, in other words, it cures more completely and is stronger and quite a bit stiffer as a result.**
- 2. Higher HDT is achieved using elevated cure. In most applications heat stability is not an important feature, the standard with room temperature cure is adequate. But in the case of those that have this requirement, elevated temperature cure is the way to get it.**
- 3. In composites ETC can offer a better wet out of fabrics. When epoxy is heated viscosity drops significantly. This can allow resin to better saturate the fabric. If vacuum is also added (this is autoclave) the resultant part can have strength, stiffness and heat stability that is truly amazing.**
- 4. Longer pot life hardeners can be used. When curing with heat, pot life is an aspect of the resin system that virtually goes away. Consider that at just 150F (66C) a laminate of 2000/2100X reaches a full cure in about 3 hours while giving you work time of 2.5 hours. At room temperature that same resin hardener combination has a set time of 12-16 hours. And that's set time, not full cure. Full cure can be a week or longer.**
- 5. Cycle times can be tailored to application. This can be a big advantage in production where quick cycle times and maximum efficiency and work flow must be considered. Even a reasonably low temperature of 100-120F can significantly reduce cycle times.**

But for all the many reasons for using this tech there are a number of reasons why it may not work in many applications. In fact in most it's just not necessary. Here are reasons not to.

- 1. 99.99% of DIY applications don't need to consider this. The only aspects that would be considered might be strength and/or HDT in a particular part.**
- 2. Convenience. Curing with heat is a process. It takes time and many cycles to learn the process which adds to the complexity of making product. Adding numerous steps in a manufacturing process must be closely considered before implemented.**
- 3. Expense. Elevated cure is also not cheap. It requires equipment, time and space.**