

## UNDERCURE IN GELCOATS

Many of the problems associated with gelcoated fibreglass laminates can be traced back to under cured gelcoat.

In marine applications this may show up as whitening of a coloured gelcoat where the water has penetrated into the under cured layer. In swimming pools, under cure can be the cause of staining from chemical attack. In all laminates, the fault known as "tripe" or "wrinkling", can be caused by under cured gelcoat. Blistering of a gelcoat surface after weathering can be another fault caused by under cure. The list is lengthy and includes other faults such as poor abrasion resistance, excessive chalking, poor polish retention, colour changes from a single batch, etc.

With normal ortho phthalic gelcoats, catalyst levels for good cure are not critical. Between 1% and 2% of 60% M.E.K.P. (Methyl-ethyl ketone peroxide), should give good cure at normal temperatures. The promoter levels can be adjusted to provide the required gel times. Catalyst levels outside these recommended levels will almost certainly result in under cure. 3% is almost as bad as 1/2%; the resulting porosity will be just as annoying.

Under cure can result from heating of the gelcoat layer with lamps, etc. if not carried out correctly. There is not much point in putting lamps on a gelcoated mould 24 hours after the coating has been applied. By this time the reaction is virtually completed and external heat will not assist in any degree at all.

Conversely, it is bad practice to coat a mould and immediately place the mould under infrared lamps. This heat will only prevent the reaction-taking place normally and under cure will again result.

If lamps are required, they should be used at about the time when the gelcoat is starting to exotherm and left on until the reaction is well under way. This depends on temperature, etc. but will be at least 20 minutes after catalyst is added and left for at least 30 minutes after that.

Some of the solvents used to control gel coat viscosity can also be blamed as under cure agents. Acetone is very bad in this respect and is not recommended at all, but the trade still persist in its use. If it used for spraying gelcoats when no other solvent is available, then please be sure it has time to evaporate before any reaction commences. This can be achieved by holding the gun further away from the mould. The problem of "thick" gelcoats arises in winter when the ambient temperature prevents fast evaporation of acetone and will cause under cure. Thus, you can have three things all working to create under cure at once.

We all know exothermic temperature increases as we increase the bulk of resin in the reaction. The reverse also applies. It therefore becomes virtually impossible to obtain any exothermic (and hence poor cure) if there is only a very small amount of material involved. An excessively thin layer of gelcoat, i.e. below 0.30mm falls into this category and should never be used. Thick gelcoating is also bad practice, but for other reasons.

Many publications talk about Barcol Hardness of resins and gelcoats. These Barcol figures are a good tool to use when discussing the relative hardness of, say two resins, but are extremely difficult to measure on a gelcoat surface. The Barcol Hardness tester operates by allowing a stylus to indent an object and then measuring the depth of indentation. The very fact that the stylus penetrates below the surface is the cause of the difficulty in obtaining accurate gelcoat figures. A piece of glass behind the stylus, or alternatively, a resin rich area which is under cured can result in vastly different readings being obtained for the one gelcoat. The system obviously has major drawbacks.

An acetone soaked cloth is perhaps the easiest and most reliable method of detecting under cure. Acetone will not readily attack a well-cured gelcoat surface, but will dissolve an under cured one. Some practice and comparison of results with this approach may be needed, but with a little practice, under cure can be detected readily and reliably.

Another common factor involved in under cure or under cure in specific areas is a poor work practice in mixing the catalyst into the gelcoat. So often is the case where the operator stirs the catalyst into the gelcoat and then promptly immerses a brush into the mix for application onto the mould. The likelihood of picking up un-catalysed or under-catalysed gelcoat from around the sides of the container in the brush is very high. To prevent this occurrence, the gelcoat and catalyst should be mixed thoroughly in one container and then decanted into a clean container without scraping the sides of the first. The residue in the first container is discarded and application onto the mould is done from the contents of the second container.