



Advanced Composite Construction

Cost-effective production method based on infusion technology

Utilizing a unique dual-resin and balsa system that includes epoxy infusion, we can achieve all the strength, stiffness and weight savings necessary.

It has an infused dual-resin sandwich around a balsa core. Specifically, the laminate starts with a gelcoat, onto which a three-ply laminate of chopped strand mat is overlaid by hand with a resin. Onto this hand-laid laminate a dry package consisting of various glass layers, infused under vacuum with epoxy resin. For impact security, the inner and outer epoxy skins are reinforced below the waterline with woven rovings.

The main reason for developing this system was to combine the cost-effectiveness of a gelcoat with the strength of epoxy. After the balsa is sanded, a skin of quadraxial glass fiber is laminated onto this core with epoxy resin under vacuum infusion.

This can foretell resin flow rates and absorption through the various areas of moldings, thus controlling phenomena such as 'race-tracking' where resin flow speeds up in indented areas such as chines. It can also compute the amount of filling time needed and the amount of resin that will be used. Given that, unlike with other resins, the curing of epoxy resin cannot be slowed down by adding inhibitors once catalyzed. Close control of the timing of the process is critical. Indeed, the panels are a lot stronger than they need to be. With the balsa core the force needed to make them sheer, could be three or four times higher than PVC foam of comparable density. The outer skin remains under vacuum for 24 hours and then post-curing at 65°C for more than 20 hours. This improves quality and avoids any unpleasant surprises such as reinforcement print-through after the boat has been operating for some time in hot countries.

As with any resin infusion, that developed offers the prime advantages of molding accuracy, reduced materials wastage and a cleaner working environment — particularly important when working with the chemically aggressive properties of epoxy — compared with traditional wet lay-up. Resin-to-fiber ratios are around 40:60, which means not only less (expensive) resin is used, but that the laminate is stronger too, not to mention the much higher end quality compared to wet lay-up.

With its 3D hull modeling capability OL has enabled to go from design straight to mold without the need for potentially wasteful trial infusions.