

Marten Yachts' MY49

Steve Marten, founder of Marten Yachts, has been at the forefront of ground-breaking innovations in boat building for a quarter of a century. Involved with the build of a number of high profile boats over the years, including Kingfisher, Mari Cha III, and numerous New Zealand America's Cup challenge boats, Marten decided in 2000 to move his focus to another area of the marine world - the ultimate performance cruising boat. Marten Yachts' most recent range of production boats, currently in construction at their HQ in New Zealand, is the MY49, which uses SP's latest technology - composite tooling.

The MY49 production boats are being built with 100% carbon fibre SPRINT® and prepreg, which require an 85°C cure. To ensure high quality and longevity, the tool for this design must be physically and dimensionally stable at this cure temperature; for this reason, a carbon tooling laminate was chosen, to optimise heat conductivity and thermal expansion.

In order to achieve a very high fibre volume fraction and low void content, vacuum infusion was selected as the mould manufacture route. However, using this method for such a large structure is complex, and the set up and control of infusion has limited the wide use of this technology. Therefore, careful planning and an innovative approach were needed by both Marten and SP to ensure its success.

A key problem in using vacuum infusion has been predicting where to place the distribution channels and vacuum lines to ensure the laminate is fully wetted, and to avoid areas of inferior quality that subsequently need to be repaired. Without being able to accurately simulate the infusion process, larger builds have traditionally been tackled by companies who have gained enough experience on smaller parts to have the confidence to infuse these high value components.

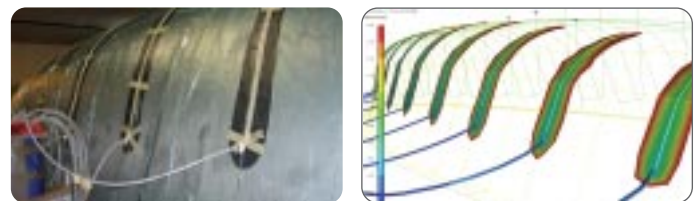
With these risks in mind, Marten Yachts contracted Gordon Lacy from the Vacuum Infusion Group Ltd. to design the infusion strategy and provide technical support during the build. The Vacuum Infusion Group Ltd. is licensed to run the Polyworx RTM-Worx Software that enables the simulation of vacuum infusion on different model surfaces. In order to get a realistic simulation of the part and to determine the permeability of the fabric stack, test panels were made by SP's Technical Team.

This was done in the warp and weft directions of the fabric, as well as vertically and horizontally, so as to account for gravity in the infusion of a large structure. The hull shape and permeability characteristics were imported into Polyworx RTM-Worx. Then the distribution pipe-work was altered until an infusion strategy was designed to fill the part reliably.

All of SP's ambient cure tooling products have been developed with the production boatyards in mind, helping to achieve a high quality gelcoated part, with a high gloss finish. SP's T-Gel 130 gelcoat was selected for the mould due to its seven day extended back-up window - essential in large structures, and T-Fleece 100, RC200T, XC611, RC663T reinforcements were selected to form the structural laminate. These materials provided Marten Yachts with the correct balance of cost versus performance, and removed the risk of print-through on the mould surface. T-Prime 110 was selected as the infusion resin to obtain the necessary mould thermal properties.

Achieving vacuum integrity is critical in infused components. For the MY49 build, high integrity levels were achieved, due to care being taken when applying the vacuum bag and pipe work, as well as the time taken to seal the plug during the initial manufacturing stages.

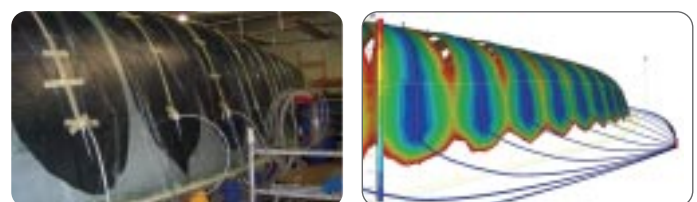
The following diagrams and photos demonstrate how closely the actual infusion followed the flow anticipated by the Polyworx program: The infusion followed the pattern of the simulation predicted by the Polyworx software very closely and took 120 minutes to complete. Once the part had infused, the temperature was raised to 40°C, reducing the gel time and the potential for vacuum leaks and excessive resin bleed. This temperature was maintained for six hours as an initial cure, followed by a freestanding postcure. This ensured the part was fully cured and would resist softening when taken to high temperatures.



10 Minutes into the Infusion



25 Minutes into the Infusion



50 Minutes into the Infusion

Following on from the success of the hull mould, Marten Yachts is now proceeding with the build of the deck mould, using the same infusion process. It is anticipated that the first boat's components will be completed in the summer of 2004, with the second boat to closely follow.

SPRINT® Tooling Range

SP has also developed a SPRINT® tooling range, which is suitable for high performance marine, wind energy and automotive applications. These materials will cure at 65°C and give an ultimate thermal performance of up to 160°C. They can also be used with SP's range of gelcoats. A SPRINT® surfacing technology is currently in development, which will enable customers to achieve a high quality mould surface without the application of a gelcoat.

