

CASE STUDY: EAGLE 46 - TOOL-LESS BUILD USING A THERMOFORMED CORECELL KIT

When Paul Dijkstra Composites began the build of Leonardo Yachts' new Eagle 46 sailboat, a decision was made to try new approaches to sustainability and efficiency. Dijkstra approached Curve Works, a leader in adaptive mold technology.

SAVING MOLD AND TOOLING WASTE THROUGH THERMOFORMING

Curve Works created a 3D Core Kit of thermoformed Corecell™ M foam core, which then served as the basis for the lamination of the inner and outer carbon structure, while reducing lead time and tooling waste.

To meet Dijkstras needs, Curve Works created 3D Core Kits of thermoformed Corecell M structural foam core. Sheets of Corecell were thermoformed into shape using automated adaptive molds, and cut to shape, including any chamfers and cut-outs.

Image: 3D Core Kit bonding and assembly of wooden jig

OVERVIEW

The Eagle 46 was built using thermoformed Corecell M 3D core kits, reducing tooling waste and accelerating production. The pre-shaped structural foam replaced traditional strip-planking and 2D core kits, delivering a vacuum-tight surface with lower resin uptake, faster installation, and superior impact performance. The result was an accurately built, lightweight carbon composite hull with minimal waste. This innovative approach supports more sustainable, efficient series production while maintaining high structural quality.



Finished hull of the first Eagle 46 from Leonardo Yachts

INNOVATIVE SOLUTIONS FOR A TRADITIONAL PROCESS

The kits replaced strip-planking or 2D core kits, which utilize cut or scrimmed core to conform to the shape of the part. Thermoforming core, rather than the alternatives mentioned, results in significantly less resin take-up (up to 3kg/m^2), has 4 times better impact (slamming) performance compared to cut core, and is faster to install.

Paul Dijkstra Composites' innovation was to use the Corecell M 3D Core Kits as both mold and substructure for a new boat, the Eagle 46. A simple, but accurate, wooden frame was used as a female assembly jig for the assembly of the thermoformed foam core. A recess was made at the seams of the foam core kit and these recesses were subsequently sealed with core-bond. In this way a perfectly vacuum-tight surface was created because the Corecell M is closed-cell and has no perforations.

This vacuum-tight core surface forms the basis for the lamination of the complete inner structure which consists of the inner skin, reinforcements, stiffeners, and bulkheads.

After the stiff inner structure was completed, it was removed from the jig and flipped in preparation for layup on the outer skin.

The Eagle 46 will be a series-production boat and building in this way has provided a boat with a short lead-time and tooling waste. After completion, the faired first series hull will be again overlaminated to create a production-ready mold, and will avoid the plug-mold build process. The wooden strips from the assembly jig are reused, frames of the jig are re-machined into smaller frames and wood that cannot be reused gets recycled by wood-recycling plants.

By using thermoformed Corecell M, Curve Works helped Paul Dijkstra achieve his goal of greater sustainability and shorter build times for this new production vessel.