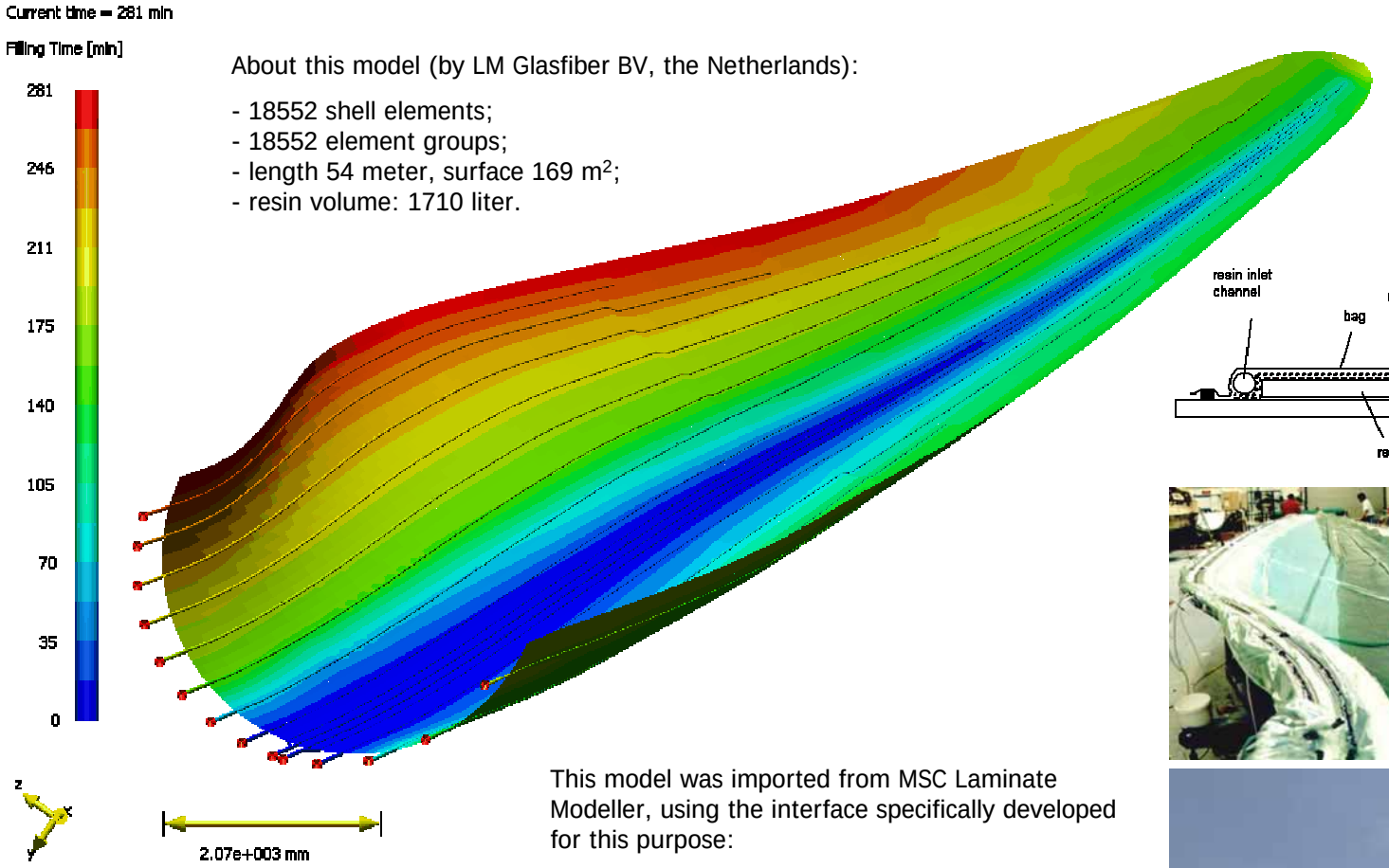
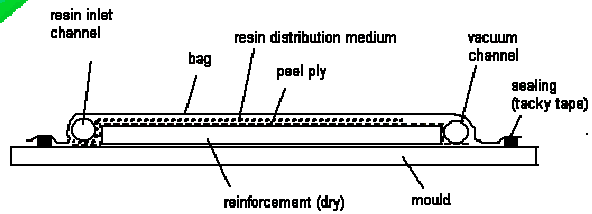
54 meter wind turbine rotorblade, infusion method developed by LM Glasfiber Denmark / the Netherlands

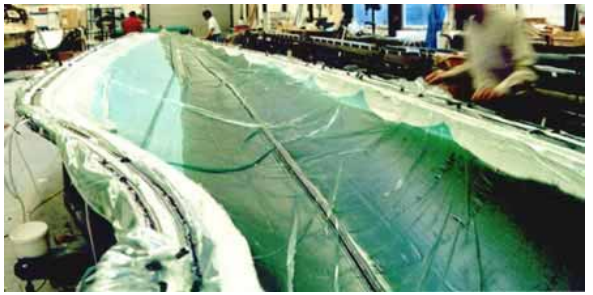
The RTM-Worx flow analysis results below show one of the injection strategies that has been evaluated.



About this model (by LM Glasfiber BV, the Netherlands):

- 18552 shell elements;
- 18552 element groups;
- length 54 meter, surface 169 m^2;
- resin volume: 1710 liter.







This model was imported from MSC Laminate Modeller, using the interface specifically developed for this purpose:

- Read mesh, plies and materials from the .Layup file generated by Laminate Modeller;

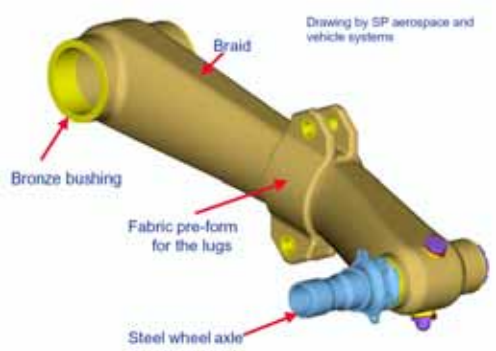
- Porosity and permeability is read from the .XData file (generated with defaults if not present);

- RTM-Worx uses the fabric deformation (as calculated by Laminate Modeller) to adjust permeability and porosity.

- Result: accurate flow model and 60 hours saved!

Polyworx

NH90 Trailing arm by the Dutch Aerospace Laboratories (NLR), Vollenhove, the Netherlands.
Helicopter landing gear development in cooperation with SP Systems, Eurocarbon and MSC Nastran.





Right, top: Melting tin-zinc alloy with bonded composite prepreg tubes as core.

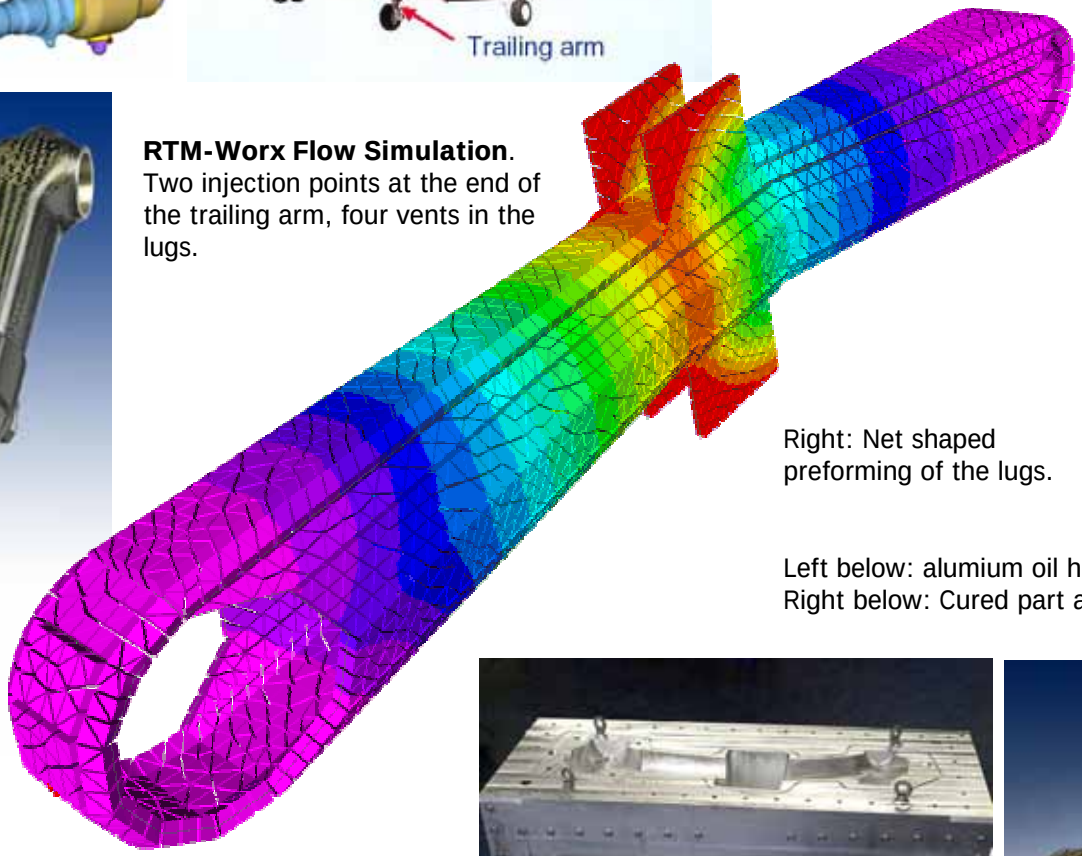


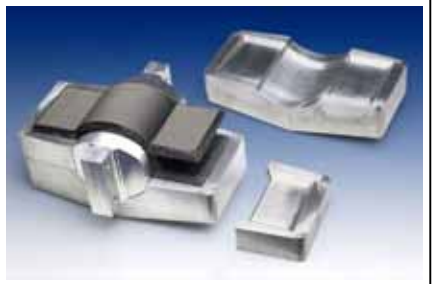
Right, middle: braiding at Eurocarbon.





RTM-Worx Flow Simulation.
Two injection points at the end of the trailing arm, four vents in the lugs.





Right: Net shaped preforming of the lugs.

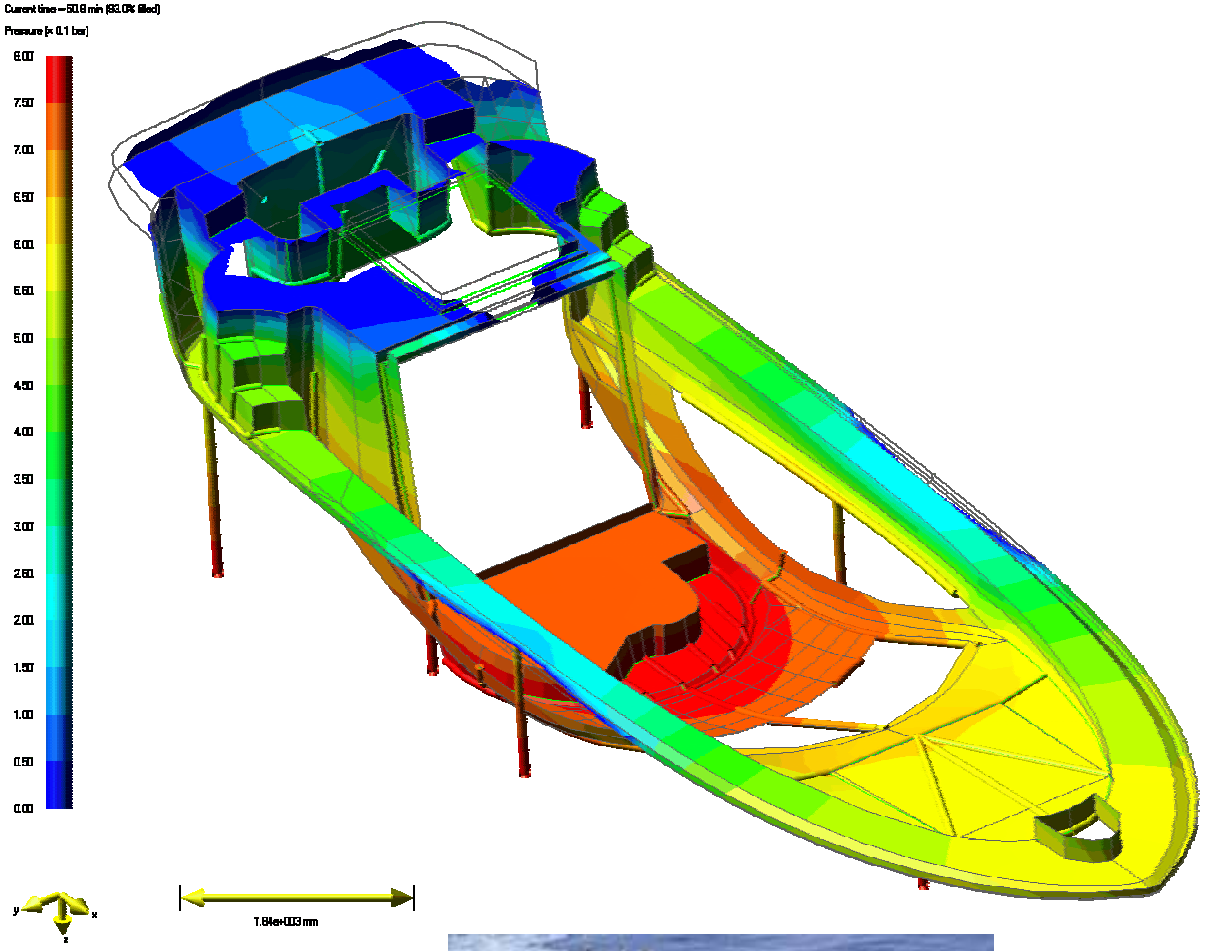
Left below: alumium oil heated RTM mould.
Right below: Cured part after machining.

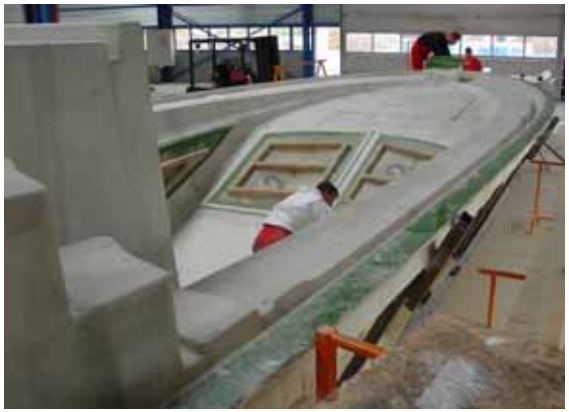


Polyworx

Deck of the Prinz 40’ fly, by Prinz Adriatic, Oroslavje, Kroatia

Infusion strategy for the very complicated deck: glass/polyester, partially cored with PVC (1 mm grooves).











Polyworx

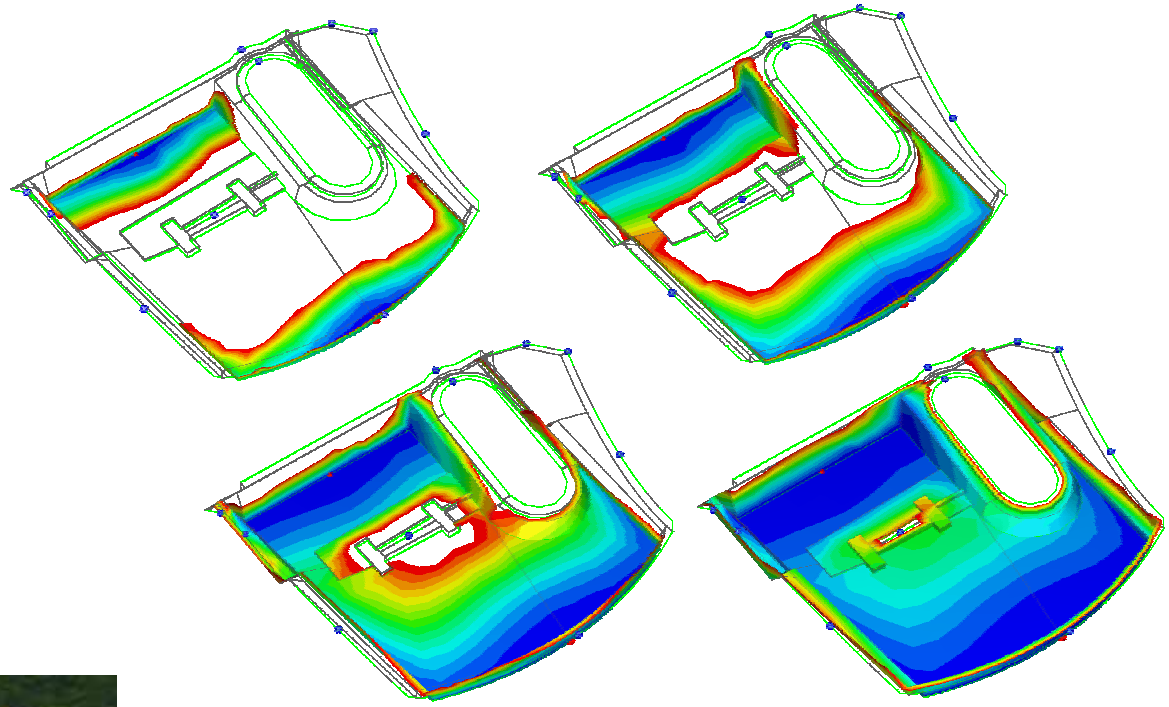






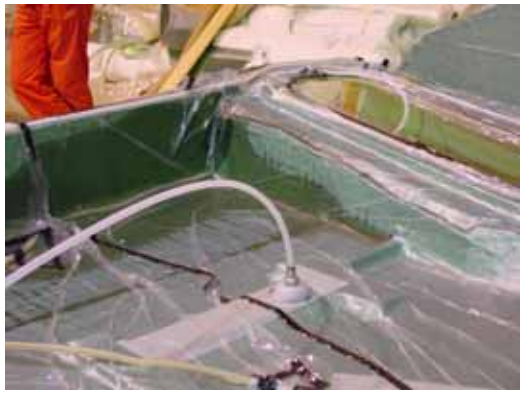
Flybridge base by Prinz Adriatic, Oroslavje, Kroatia

Infusion of the flybridge base for the Prinz 40' fly, glass/polyester, partially cored with PVC (1 mm grooves).



Result from RTM-Worx flow analysis at 20%, 40%, 60% and 80% fill. Injection strategy optimised for minimum risk and repeatability.

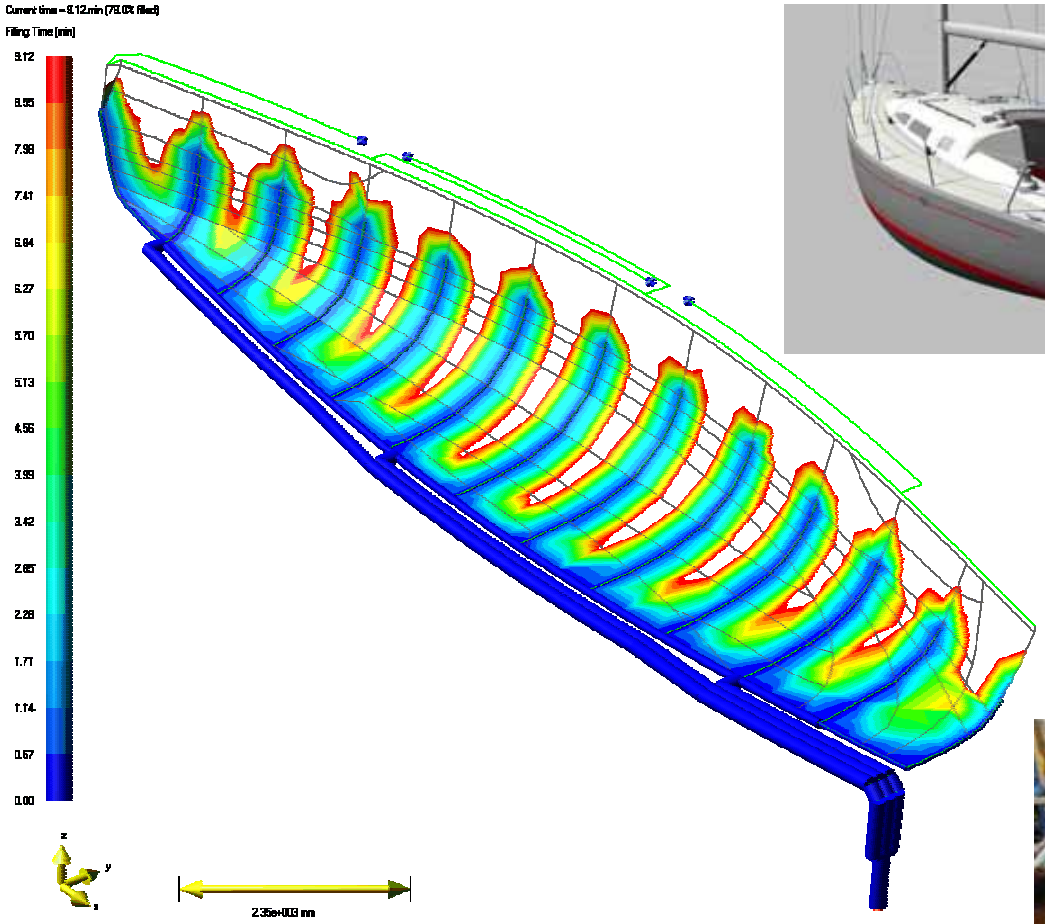




Polyworx

Infusion of the inside of the hull of a Satellite 44 by Bolt Maritiem, Nieuw Scheemda, the Netherlands

The injection strategy is pretty straightforward, most of the work went into the details; because of previous experience with the reinforcement and resin, we were able to predict the filling time (45 minutes, about 200 kg epoxy resin) within one minute of accuracy!













RTM-Worx flow analysis result shown at 79% filled.

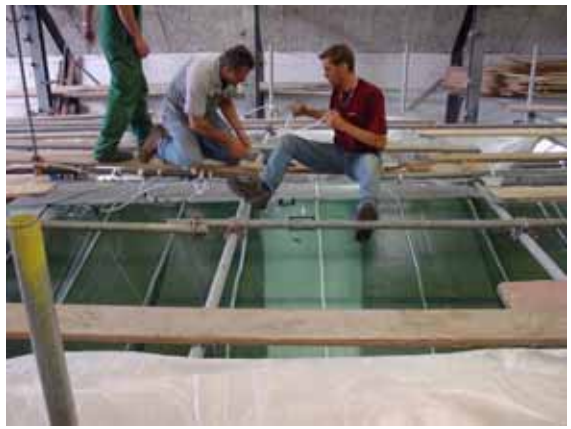
The image at the right shows infusion of the stringers, lots of tubes but it worked!

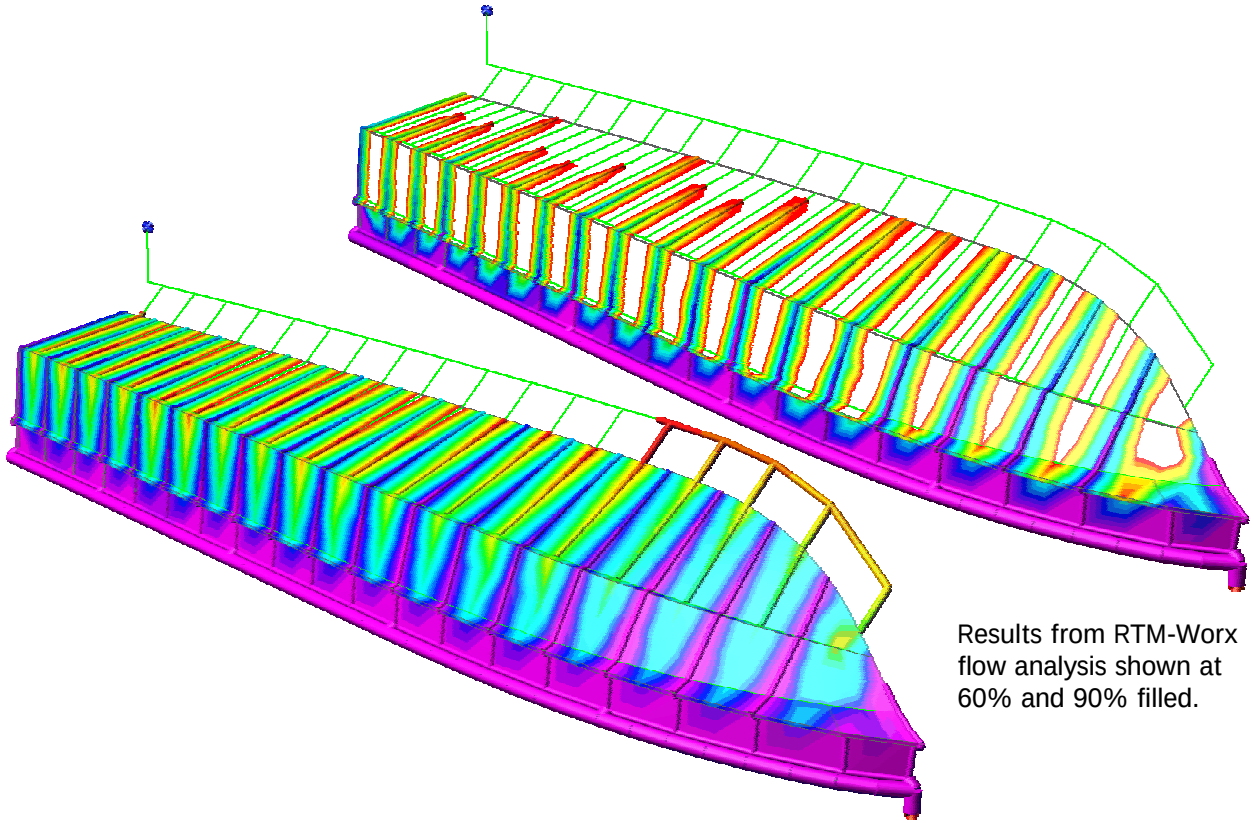
More information: http://www.boltmaritiem.nl

Infusion of the hull of the skilla 2000 by Classicon Yachts, Waal, the Netherlands

Length 20 meters, glass/kevlar reinforcement, epoxy resin. Because of the height (gravity slows down the infusion considerably) and geometrical features of the hull, a special strategy was used to infuse the resin with alternating resin feeds and vacuum lines.

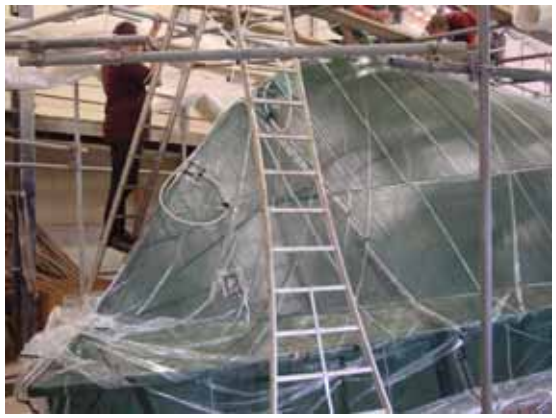






Results from RTM-Worx flow analysis shown at 60% and 90% filled.

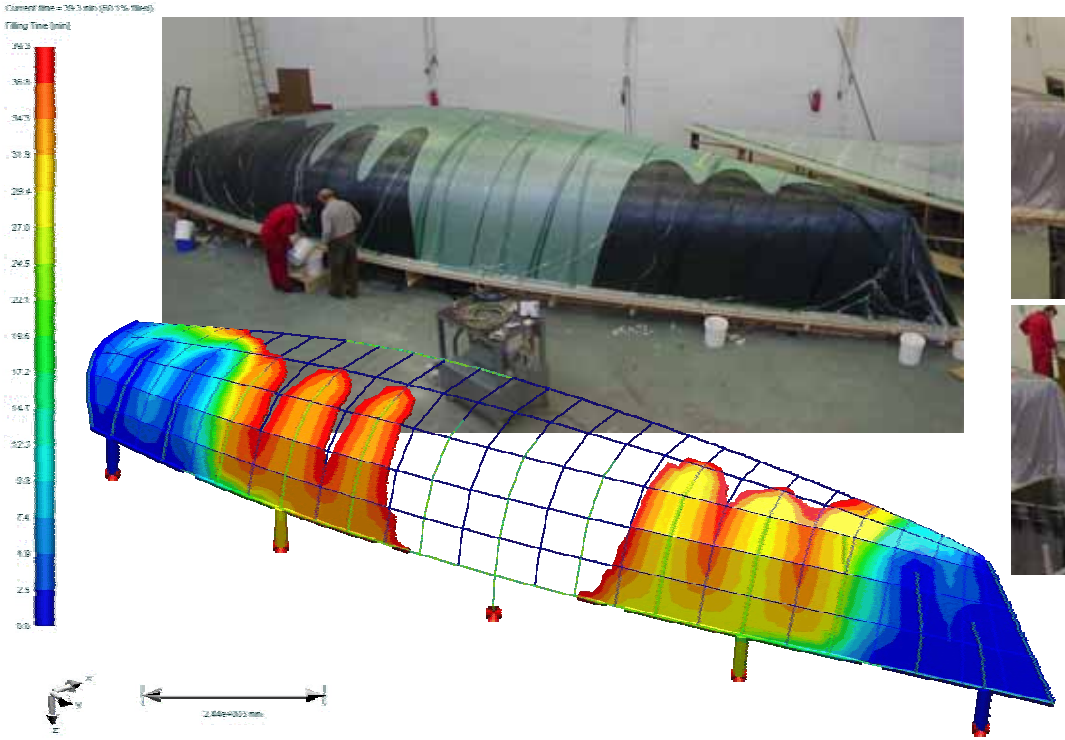
Above: one of the vacuum lines mysteriously failed. However, thanks to the strategy with alternating resin feeds and vacuum lines this was easily fixed.





Polyworx

Vacuum Infusion of 43’ carbon/epoxy hull and deck by Standfast Yachts, Breskens, the Netherlands

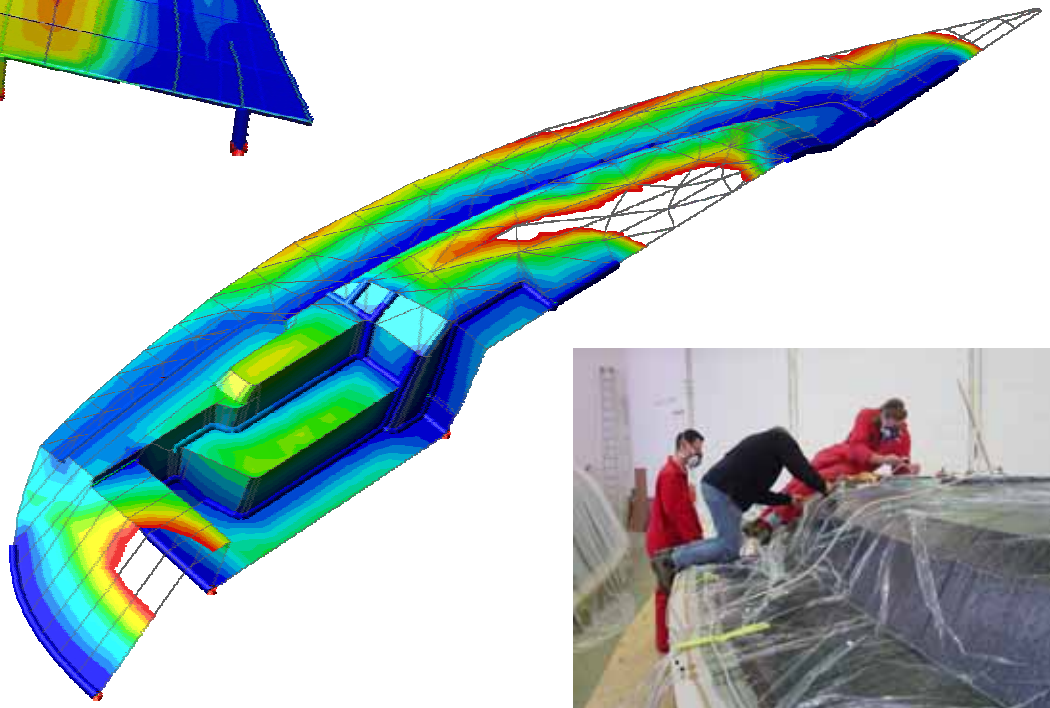






Above: Infusion of the hull, note the very good match between flow analysis by RTM-Worx and actual filling pattern!

Right: Infusion of the deck. The injection strategy was optimised to eliminate racetracking, minimise the risk for dry spots and optimal control using multiple inlets and vents.



Infusion by Standfast Yachts, Flow analysis by Standfast Yachts and Polyworx.