Safety: **Making a Case for a 'SOFT' Forefoot**

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Francis Joyon Takes the Jules Verne Trophy

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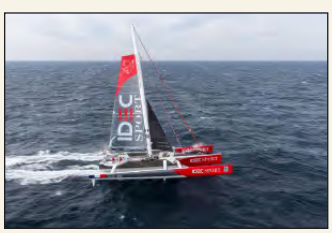


On the cover:
Francis Joyon, Bernard Stamm, Alex Pella, Sébastien Audigane, Clément Surtel and Gwénolé Gahinet pilot IDEC Sport in the quest for the Jules Verne Trophy. Article on page 52.

A Case for a 'SOFT' Forefoot For More Safety at Speed

by Naval Architect Mike Waters

Based on a personal experience of collision with a huge underwater, uncharted rock some years ago that caused both boat damage and personal injury, Naval Architect Mike Waters was in the process of incorporating some defense against this within a new design, when he read about the horrific collision suffered by a competitor in the recent Vendée Globe. Here is what he reported in January 2017 under a "What's new for 2017" article posted on his website www.smalltridesign.com.

"French skipper Thomas Ruyant on board *Le Souffle du Nord*, collided with a low floating container as he was travelling at a reported 17 knots! He was extremely fortunate to be sleeping and tucked down behind a 'bean-bag' at the time, so his head was cushioned as it slammed into a forward bulkhead. If he had been standing, he could well have been catapulted through the boat like many other items were, that ended up travelling 30 feet to the forward end, and possibly been fatally injured.

Here's a photo showing the failure in compression of the skin – virtually smashing the hull in two, with only the bottom of the boat and a very weakened deck, holding things roughly in place."

Along with this story and the realization that several other boats in the same ocean race were also damaged from such collisions, he was pushed to share a concept that he believes could save serious injury in the future.

Now this is not for every boat, but with the hundreds of containers now reportedly lost at sea from the decks of ships, ocean going sailors who also want to sail fast need to seriously consider this added risk. He personally considers Sinking, Collision and Capsize to be the three most challenging risks for the ardent ocean voyageur. He is referring here to relatively high-speed collision and most likely with a UFO (Unidentified Floating Object).

So for any boat capable of continuous speeds much over 10 knots, he thinks the following concept is worth considering and becomes even more justifiable for faster boats:

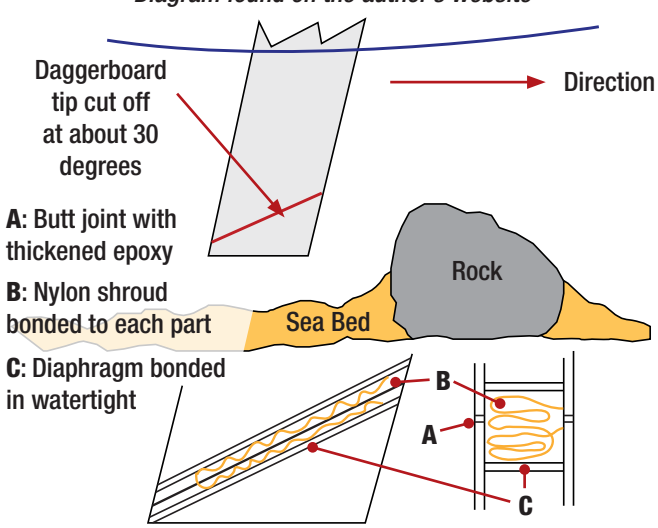
I call this 'the SOFT forefoot' – SOFT being an acronym for Shear-Off-Forefoot-Tip.

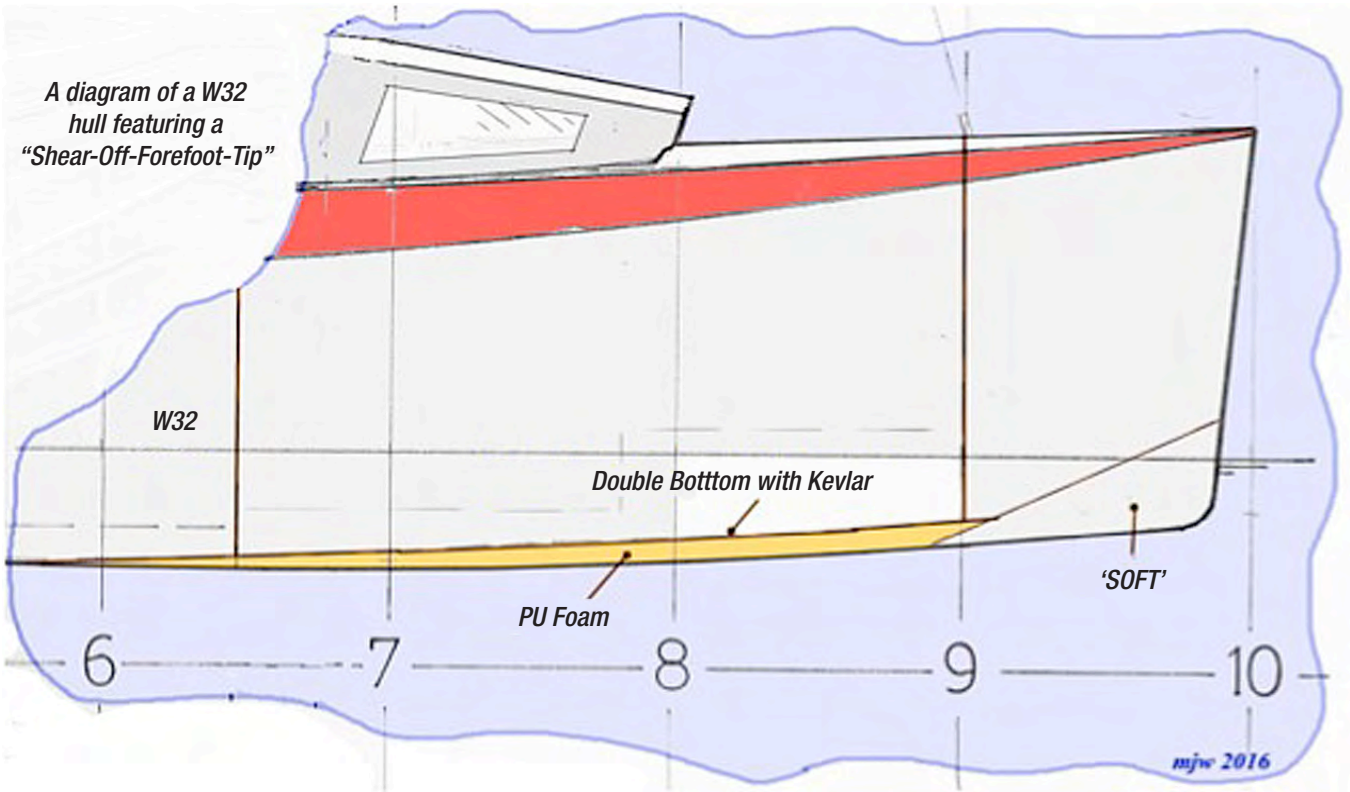
I have used this basic concept before on dagger boards in the 1990s and has been shown in a sketch in the Header on my 'What's New' webpage since 2008.

The idea is simple enough… To have a forefoot that shears off to absorb part of the shock and reduce the deceleration to something more tolerable for the boat and personnel onboard. Many existing slender boats could be converted, with a straight cut made at 25-30 degrees – the final angle being decided by

The damage to Le Souffle du Nord

Diagram found on the author's website





A diagram of a W32 hull featuring a "Shear-Off-Forefoot-Tip"

the starting height up the stem and the feasibility of its extension aft.

The SOFT would then be bonded back in place and the surface re-faired to be invisible – with the bonding being calculated to shear at a pre-determined load. I'd suggest considering something in the order of 150 kg shock load, meaning it would resist a static load of more than double that. Assuming the main risk was for containers (or similar) floating at say 300 mm or less above the water, the slope of the cut would allow the bow to lift slightly and give increased deceleration space that would significantly reduce the initial shock. If correctly designed, this might still throw a crew off their feet, but the SOFT attachment is a trade-off between serious injury and something that basically stays in place for all practical use of the boat.

Naturally, the part of the boat above the cut must be refinished in robust fashion and effectively, the boat without the SOFT in place, will look and act somewhat like an icebreaker. The bonding I use is simply a thickened epoxy, with the filler tailored to give the required shear-off value. In the case of such applications for daggerboard tips, I've also built-in a small watertight cavity into both the board and the tip, so that a long nylon cord can be attached between each part. In this manner, the tip is recoverable and can be rebonded after serving its purpose, and be ready for another collision.

In the case of a safe-fast-cruising trimaran design I am developing, this boat uses a basically similar hull form to that of the 'simple but efficient' W17, so, except for the extreme bow, the bottom of the main hull is flat. In this case, the bottom for the forward half of the boat, will appear as a composite panel with about 100 mm of foam sandwiched between two bottom panels, and designed so that the inner one will complete the essential boat structure. This means that such a boat will have a strong ability to survive even grounding on rocks, as the foam-backed Kevlar-lined outer skin, will absorb the brunt of the damage, while the inner skin will retain the hull integrity. I suggest that such design steps will add important protection and significantly lower the risk of collision with the numerous near-surface obstacles a fast boat can meet.

About the Author

Mike Waters studied naval architecture at Southampton, UK to later become one of Canada's leading ship designers. Parallel to this, he built, sailed and designed sailboats since he was a teenager and has been a multihull enthusiast since 1976. Since officially retiring, he has published many quasi-technical articles and still maintains an encyclopedic website dedicated to small multihulls. His unique W17 small trimaran design can now be found in 32 countries.

For more information, visit: http://www.smalltridesign.com or e-mail: trimarandesign@earthlink.net MM