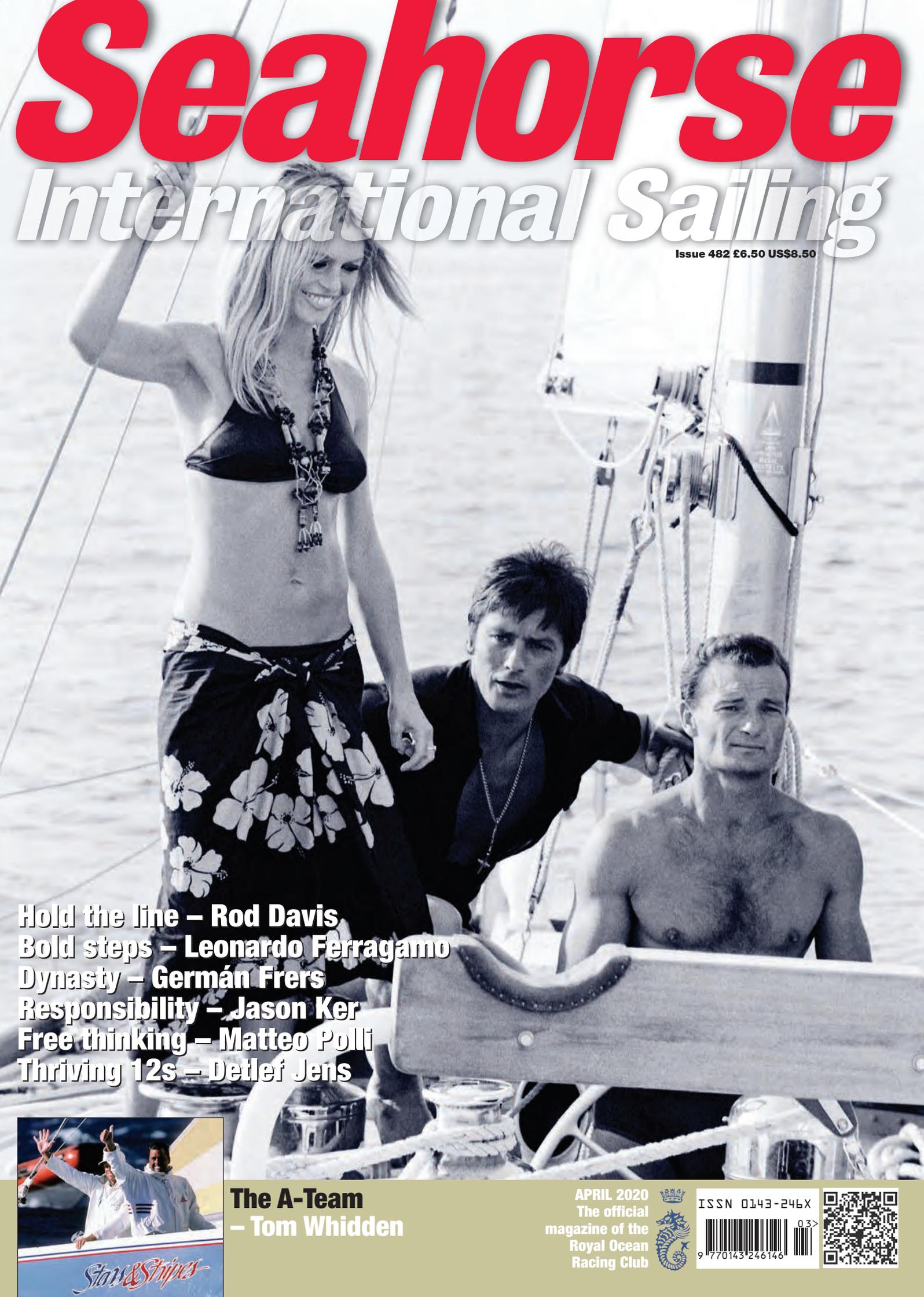


# Seahorse

## International Sailing

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# No limits

Today we can build pretty much anything (almost) – if the materials are good enough, strong enough and light enough

CANDELA/SICOMIN To most performance sailors, composite builders reveal their skills in the finished product: a boat that is strong, light and durable at a reasonable cost. They are aware of the trade-offs between these factors but maybe not completely aware of the details on how clever advances in materials and techniques can be used to optimise the final result. The specialists at Sicomin, however, are very much aware of this.

They are at the forefront of composites technology which helps builders produce structures that are indeed lighter and stronger and still meet their cost targets. Through careful formulations of the chemistry of both resin and hardeners, Sicomin helps to match its products to the specific assembly techniques that builders use and are comfortable with creating the structures they need. This working relationship is critical to optimising the results that benefit both, and ultimately the boat owner who gets the performance that he or she expects.

Sicomin is able to have a broad range and flexibility of products because the company works with an enormous range of composite builder

customers in the aeronautical, commercial marine, transport and military worlds, as well as recreational marine customers. Almost anywhere composites are used, Sicomin has a tailored resin solution to match the builder's needs, and is a market leader for bio epoxies.

An excellent example is when Sweden-based Candela needed help with building its highly innovative electric foiling Candela 7 powerboat, regarded as "the world's most advanced boat" for its simultaneous promise to deliver comfort, style and speed on a 7.7 m-long platform that also makes full use of eco-friendly electric technology. The Candela 7 has a maximum speed of 30kts, efficient cruising at 19-23kts and a range of 50 miles at this speed – all silent, without the noise and fumes of an engine.

This impressive performance cannot be delivered without having extreme demands in strength and weight for the hull and foil structures so that they are not only strong but also as low as possible in the overall weight budget of the boat since significant battery power is needed to drive the electric powerplant.

**Above: the Candela 7 is a remarkable boat, not just for its 50-mile range at foiling speed powered by a small electric battery, but also for its sophisticated foil control software and its ultra-low environmental footprint. Most of that could not have been achieved without the resin systems know-how of Sicomin, which enabled the Candela team to build some staggeringly light, strong and stiff structures**

Sophisticated software has been developed for the foil control system to manage the slightest changes in the angle of attack of the all-carbon foil so as to optimise steering and ride comfort, a feature that has attracted several early clients from Silicon Valley.

Yet without hitting some rather ambitious targets in weight and strength, this clever boat literally and figuratively will not fly. And while this is not an inexpensive boat, its production costs have to be kept to within reason to remain viable in the marketplace, requiring materials cost and production time to be minimised without any compromise on quality.

'We did a lot of testing with Sicomin on our infusion process to determine the right combinations of resin and carbon fibre,' said Candela CEO Gustav Hasselkog. 'Use of pre-pregs and autoclaves were simply not an option due to the higher material and energy costs beyond our targets.' Working with Sicomin, Hasselkog's team developed a process with impressive end results: the carbon hull structures are only 90kg in total, with the carbon-skinned cored hull shell having only 3mm laminate



thicknesses below the waterline and only 1.9mm above water, yielding a total weight of only 90kg, and a strong, light deck structure of only 90kg as well... In total, the boat weighs only 1,300kg, about half the weight of other boats in this class.

The foils are solid infused laminates with fibre orientations aligned to control torsional and bending loads so the foils can be trimmed accurately. With precise lamination process developed with help from Sicomin, the Candela team gets exactly the correct wetting properties and the precise resin-fibre ratios in these critical structures that take only 15 hours to build.

'We helped Candela reach their goals with the development and use of our 1710 high-performance resin matched with their choice of carbon fibre,' said Sicomin's Marc Denjean. 'We could adjust the working time and cure rate to match their process and help optimise the infusion and the post-curing time and temperature they needed. The overall result was a boat which came in at about 240kg, thereby allowing them to use a 230kg battery pack for greater power and range.'

It's the mechanical properties of Sicomin's 1710 resin that made it

**Above: the entire hull structure of this 7.7-metre boat weighs just 90kg – and it is built without using any pre-preg carbon or autoclaves to keep costs under control. The carbon fibre hull shell is only 3mm thick below the waterline and just 1.5mm thick in the topsides. A foam core provides the necessary rigidity. Right: the tall, slender foils require extremely precise control so they need to be immensely stiff as well as strong**



the right choice for Candela: infusing carbon laminates can be a tricky process that requires just the right viscosity in the catalysed resin to allow it to flow freely under the vacuum bag and achieve the correct saturation. Sicomin 1710 delivers this performance.

And finally, Sicomin's companion epoxy adhesive product Isobond

SR7100TH has proven perfect for bonding together the constituent parts of the Candela 7, whether in thin or thick beads. SR7100TH has adjustable working times to match the production process, which means it is user-friendly in application and not prone to micro-cracking in long-term fatigue testing. [www.sicomin.com](http://www.sicomin.com)