Total design

International 14 guru and one of Oracle Racing's 'masters of execution', Paul Bieker has just launched another rather brilliant all-round design. Dobbs Davis has the story…

Most of what usually goes into a *Seahorse* Design feature represents the latest and greatest thinking in either traditional fully crewed inshore/offshore raceboats, or their shorthanded oceanic equivalents. We usually examine subtle nuances in design, equipment choice and/or materials used to demonstrate how a slight performance edge will be achieved over the boat's contemporary rivals. And more often than not this edge can only be realised by another key component to the project: the highly dedicated and trained professional sailor.

But rarely do we have the pleasure of reviewing a design concept and its full-scale expression that fits a rather rare niche, that of an endangered species among yachtsmen: the gentleman racer. But what does this mean – some character wearing a bowler as a caricature of a 19th-century yachtsman? Actually, no – in fact, it's a term that may apply to more of us than you would think.

Seattle-based naval architect Paul Bieker and his partner Eric Jolley come from a high-performance pedigree, where their International 14 designs are legendary in the world of planing dinghies. But many people may not know how their business has evolved to include numerous custom and semi-custom offshore-capable racers and cruisers from 25 to 55ft (most with the brand Riptide), plus an impressively wide and diverse array of design, engineering and production support projects. These range from structural hull and appendage design for Oracle Racing's AC31, 32, 33 and 34 yachts, and the wing-lifting system for the giant *USA 17*, to new daggerboards and centreboards for *Wild Oats XI* and a passenger conversion package for Oracle Racing's Version 5 ACC monohull *USA 76*. They are also active in the commercial shipping world, designing and engineering a carbon composite foil-borne passenger ferry, a freezer plate installation on a factory fishing trawler, and providing CAD lofting for various commercial boats.

This breadth of experience has allowed the Biekers to think outside the box when it comes to designing solutions to meet the needs of their clients as well as taking original approaches to solving thorny problems. An example of this is Paul's rudder tubercles, an interesting approach to reducing high-speed rudder ventilation through clever design. Drag is increased somewhat with the large serrated bumps on the top half of the leading edge, but stall angle is increased and, in the case of rudder arrangements that are likely to ventilate easily, the vortices caused by the tubercles at large angles of attack act a little like fences, reducing ventilation and subsequent flow detachment.

Like many in the granola-friendly Pacific northwest, they say they found their inspiration in nature, in this case from Megaptera novaeangliae – the 'big-winged New Englander', otherwise known as the humpback whale.

A look through the portfolio of Riptide designs reveals a common theme: fast boats, modern features and construction, plenty of sail area, but also lots of stability and creature comforts, whether racing or cruising. In fact, the Riptides could be viewed as modern interpretations of Bill Lee's famous 'Fast is Fun' maxim that revolutionised offshore racing over 30 years ago and kept a boat design and build culture sustained nicely 900 miles down the coast for over 20 years (and may have still been going had not Silicon Valley wealth spilled over into sleepy Santa Cruz).

Into this culture comes a seemingly unlikely client. Mike Schoendorf is an attorney from Milwaukee, the home of Harley-Davidson and a prime example of a mid-sized, mid-American manufacturing city whose prosperity rose in the late industrial age and has been more or less coasting on that fame ever since. Milwaukee has a small but active local yachting scene, with a reasonable diversity of boat types based locally, but in many ways it acts as a northern chapter of the much larger racing scene in Chicago, 100 miles to the south and on the same west side of America's largest and most populous inland sea, Lake Michigan.

That said, the most active raceboats in Milwaukee will race both locally and in the big events in Chicago, make the occasional race across the lake, and race yearly in the region's annual offshore pilgrimage, the 300-mile Chicago-Mackinac Race. It is in these distance races where Schoendorf

was looking for a new platform. Like many of us, he grew up in offshore sailing crewing on various old IOR boats with friends and family, with lots of miles both raced and cruised on the lakes. He then took an interest in smaller high-performance boats, and from then on did not want to go back to the lead mines of the past.

Schoendorf was introduced to Bieker in Seattle by a mutual friend who knew that he was in the market for a new design… one that provided for an efficient transfer of increased wind pressure into dynamic forward kinetic energy without increasing system complication. Schoendorf got to know Bieker and his design concepts by visiting Seattle and racing on *DarkStar*, Olympic gold medallist Jonathan McKee's Riptide 44 built by Ian Franklin in Christchurch, New Zealand in 2001. The *DarkStar* sailing experience provided the impetus to continue the design dialogue that started in the autumn of 2008.

Bieker then visited the Great Lakes to get a feel for the Chicago-Mackinac Race, and he sailed with Schoendorf in the 2009 edition to better understand the type of experience Schoendorf was after. After sharing a few brewskis during design sessions a five-point matrix was developed to guide the detail of the new design:

1. The boat needed to be safe and sound for ocean offshore racing.
2. The boat needed to have planing capability in high-medium wind speeds while keeping a balance and capability for effective upwind sailing.
3. The boat needed to be sailed efficiently with eight or fewer solid sailors who are not necessarily of grand prix calibre.
4. The boat should be fun to sail with uncomplicated sailing systems and no hydraulics.
5. The boat should be comfortable and practical for offshore racing, after-racing rest, after-race social time as well as during delivery to and from race venues.

Using the above design goals a budget was decided upon and a first rendering of a 14m yacht was developed by Bieker. After honest budget discussions the impracticality of sailing a high-performance 14m boat with eight people became apparent; the LOA of the design was duly reduced to 12.5m. The design was further refined over the following two years after collaboration and further sailing. Requests for builder bids were placed with four yards in the autumn of 2011.

One of Schoendorf's crew, Eric Cooper, suggested an overall project management system to help guide both the process of building the boat and the sailing programme. Organising and sharing data would be accomplished using Google Drive. At the centre of the process was creating a workbook with all the necessary budget categories including hull, sails, rig, deck hardware, mooring and anchoring, safety equipment, navigation, electronics, galley equipment, launch, running rigging, transportation and crew gear.

***Above*: Bieker's rudder tubercles act to provide better control for a given foil size. *Left*: hard chines allied to relatively soft aft sections ensure that for such a powerful design Paul Bieker's latest offshore creation still slides along easily in light air**

Systematic research was conducted for all procurement requirements for construction and sailing. After an analysis of cost and available technology, concrete decisions were made system by system to stay within the design and budget parameters. A schedule was developed and bids from vendors were solicited to verify cost and delivery requirements to launch the boat in the autumn/winter of 2012.

Key team members were now also engaged to perform their own holistic analysis of the project. These core sailors would form the initial crew of *Blue* and so would reap the benefits of their attention to the design and build.

Construction

Hull and deck were constructed on male moulds at Jim Betts' facility in Anacortes, WA, alongside the Riptide 35 MkII. Laminates are carbon sandwich using Divinycell core. *Blue* has a powerful hull shape with hard chine almost stem to stern and water ballast of 850kg each side with gravity-transfer system. Other features include twin carbon steering wheels, twin rudders, a 2.3m prod with dual tacklines, interior room for eight bunks, plus a comprehensive Harken hardware package with liberal use of soft shackles rounded out with a suite of Spinlock XX rope clutches.

Interior

Bieker's upbringing in the Pacific northwest meant time spent both racing and cruising, so he has a realistic feel for what works without unnecessary compromise to each purpose. To fulfil the design brief full headroom was required and adequate space for creature comforts for at least six on the race team. The functional modern interior layout also shows a clear focus on keeping weight in the right place, close to the boat's CG, not off to an end.

Ballasting

With the tremendous sail area needed for performing in the predominant light air of the Great Lakes, more stability is needed for when the wind blows without having to pile on crew weight. So water ballast is positioned in outboard tanks that when heeled not only places this weight centred about over the bulb, but positions it closer to the CG of the boat rather than out on the bulb. So in waves the boat actually pitches less with this feature. Water ballast is 850kg a side with a gravity-transfer system. Bieker reckons water is needed at about 8kt of wind with a reduced crew.

Rig

The fractional rig employs high-modulus carbon throughout, designed and constructed by Southern Spars. The rig is also two-part, using a regatta splice for ease of shipping. The design includes two sets of spreaders, EC6 carbon standing rigging; 2:1 main halyard, two masthead chute halyards (one set up as a 2:1 Code 0 halyard) and two fractional jib halyards with locks. The main is hoisted on a roller-bearing Battcar system with take-offs in place for lazy jacks for shorthanded cruising.

Notably the main and topmast deflector clutches are mounted on the mast itself to prevent the transfer of shock loadings to the deck. Finally, the forestay set-up attaches to a chainplate using multiple length strops for rake adjustment.

Standing rigging

The original design choice was for rod standing rigging with Kevlar backstays, but composite rigging was revisited when Southern offered a very competitive new package including EC6 (Element C6 cables are constructed from bundles of small-diameter pultruded carbon-fibre rods). The finished rig includes twin topmast backstays to accommodate a squaretop main, with the deflectors pulling the backstay into the hounds when desirable. The Kevlar backstays themselves go to 3:1 purchase system led to cabintop winches.

Sails

A diverse North Sails inventory includes a squaretop main, no2 and no3 jibs in 3Di, with 3DL used for the no1 and no4. A comprehensive offwind inventory consists of A0, A1/3 and A2.

Blue has one final progressive innovation… the boat's programme is the basis for a new non-profit corporation founded to raise money to provide clean drinking water to those in the world without it. So every time *Blue* goes racing there will be a further modest contribution to Blue H2O Inc. The term 'high-performance gentleman racer' thus seems the perfect moniker for this project: enjoyable and refined and with thought for others less fortunate.

Owner's verdict

'My first impression after our initial trial is that *Blue* is strong, pretty and playful. She has great feel and balance. Certainly a skiff-like feeling in 25-30kt. I'll probably never experience a first sea trial like that again. And I'm very pleased with the interior; she will be comfortable to deliver and sleep on... and functional to race.' ❑