Two teams, Switzerland's SP80 and France's Syroco, are taking aim at the world speed sailing record in 2022, with a pair of thoroughly remarkable kiteboats that both teams believe can smash previous records, targeting top speeds up to 80 knots (92 mph/148 km/h).

The standing world speed sailing record was set in 2012 by Australia's Paul Larsen, who recorded a crazy 65.37 knots (75.23 mph/121.06 km/h) aboard the Vestas Sailrocket II , an inclined-rig hydrofoil designed in Britain. The video of the record run makes compelling viewing; 75 miles an hour over the surface of the water looks pretty damn hairy even on the beautifully flat sea Larsen was working with.

But Larsen was using a sail on a mast, and two teams now believe they'll smash that record using kites instead. Why kites? Well, when you start generating huge power from a sail attached to a mast that's joined to the hull of your boat, you don't just get lateral force to work with; the boat also wants to roll. The higher the power, the greater the roll moment. So even enormous, wide catamaran designs can sometimes tip over and capsize.

Kites are much harder to control – and this will be a key challenge for both contenders – but roll can be completely designed out of the equation, letting kiteboats harness significantly more power. Let's meet the contending designs.

Where many quick sailboats "fly" up out of the water on hydrofoils, the EPFL team's SP80 boat is designed to stay in contact with the water. There are two reasons for that. First, the team plans to take it up to speeds where flipping over is a genuine and dangerous possibility if the wind gets under it and lifts the front. Secondly, the phenomenon of cavitation – water boiling into vapor as it passes quickly over the foils – causes so much drag and instability that hydrofoiling boats are more or less limited to around 100 km/h (62 mph).

Thus, it'll be a trimaran, shaped like some sort of future high-speed VTOL aircraft. It'll be 8 m (26.2 ft) long, and its two outriggers give it a "wingspan" of 6 m (19.7 ft) for stability.

Its large kite is attached low and to the rear of the boat, and there's a specially curved foil in the water on the other side to balance against the huge power the kite will generate. For this, the team has used a triangular-sectioned "ventilating" shape designed to carve an air pocket into the water behind it as it moves through the water at high speed, eliminating the instability of cavitation caused by a traditional foil shape.

These will perform poorly at slower speeds, but unlike regular foils, they impose no theoretical speed limit on the boat. They're proven in high-speed motorboats capable of doing up to 350 km/h (217 mph). Getting the SP80 up and running could be a team effort; the rules of speed sailing allow the team to launch the kite from a motorboat or a floating platform.

The team has profiled the SP80 in a series of five short videos, starting with the one below.

Syroco's approach is entirely different, and it looks completely bonkers. It's a "weightless boat" that looks a bit like a speared fish flying along over the water. One side of that spear are the lines leading to the kite, and the other, directly opposite, is a thin wing leading down to a submerged hydrofoil.

The hydrofoil opposes the pull of the kite, holding itself in the water and handling steering duties, and the design looks remarkably simple; Syroco says the cabin itself is not particularly necessary to the design, other than as a place to put the people in to control the thing.

It might look simple, but the Speedcraft runs a hydrofoil. As speeds increase, the foil will start pulling hard against the kite, creating a high-pressure zone on one side of the foil and a very low-pressure zone on the other. When the pressure gets low enough, the water around it will start to vaporize. Yep, cavitation – the speed limiter on all previous hydrofoils.

Syroco is counting on it. "We won't even try to avoid cavitation," writes the team . "Instead, we work to make it steady. We need to achieve a supercavitating regime." The idea here is to create a homogenous pressure field near the surface of the foil, which will form a stable pocket of vapor that doesn't close up and create shocks and vibrations until a point well behind the foil.

The team is bringing some monster computing power to bear on the problem. In the first round of computational fluid dynamics simulations, the team took a standard cavitation foil designed by NASA in the 1950s, and modified it into 400 different designs. Each of these was run through some nine hours of simulations on a specially designed HPC system with 9,216 processing cores. The result: a design the team believe will perform 50 percent better than the original.

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* https://newatlas.com/marine/sp80-syroco-speed-sailing-record/?utm_source=New+Atlas+Subscribers&utm_campaign=0416de7704-EMAIL_CAMPAIGN_2021_08_17_08_10&utm_medium=email&utm_term=0_65b67362bd-0416de7704-90431105