PlanetSolar

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The 100-foot Turanor PlanetSolar - the world's largest solar-powered boat - set off Sept. 27 from Monte Carlo with six European crewmembers aiming to become the first to circumnavigate on a motor vessel powered by the sun alone.

Raphaël Domjan, the Swiss paramedic, pilot and mountain rescue specialist who conceived Turanor, was skippering the catamaran across the Atlantic toward Miami at an average of 5 to 7 knots in early November. The name Turanor, inspired by the fictitious language of J.R. Tolkien's "Lord of the Rings," means "power of the sun."

Turanor should complete the 32,000-mile voyage in 160 days. The route is laid out so the boat spends as much time as possible in the equatorial regions, where its 5,776 square feet of photovoltaic cells can draw the most energy.

Unveiled Feb. 25 at the HDW Shipyard in Kiel, Germany, the cat looks more like the Starship Enterprise than a boat. It stands 25 feet high and has a 50-foot beam, a pod-like cockpit, wave-piercing floats on both sides of the main hull and an array of solar panels on a large, flat aircraft carrier-type deck. Wings fold out to extend the deck at the sides and stern, these flaps adding almost 15 feet to the vessel's length and 25 feet to its beam at deck level.

Kiwi Craig Loomes, designer of Pete Bethune's biodiesel-powered wave piercer Earthrace, designed Turanor; custom builder Knierim Yachtbau in Kiel built it. Turanor is scheduled to stop in Miami and Cancun before transiting the Panama Canal and heading to San Francisco, across the Pacific to Sydney and then Singapore and Abu Dhabi as it makes its way to the Red Sea, the Suez Canal and back to the Mediterranean (see www.planetsolar.org).

Five years in development, the $10 million vessel is spartan inside. Its purpose, however, is not to showcase luxury, but to demonstrate the reliability and maturity of solar technology, says Swiss atmospheric scientist Pascal Goulpié, a co-founder of the project and its chief operating officer. "We want to show that we can circumnavigate thanks to solar energy," he says.

Turanor is fitted with two electric motors - one 20 kW, the other 40 kW - in each float. The solar panels can deliver 94 kW on a bright, sunny day - about five times what the motors need (20 kW) to push the boat at a cruising speed of 7.5 knots, Goulpié says.

"To be more efficient at slow speed, we use only one engine [on each side]," he says. "If we need more effort, we use two."

The boat carries 800 lithium polymer battery cells weighing 11.7 tons; that would be 75 tons if comparable automobile batteries were used. The batteries store 1.2 mW hours of electricity, enough to power the boat for three days - or about 625 miles - with no sun at all, he says.

The bridge software is designed to factor in long-range weather forecasts in setting courses to maximize the amount of sunshine the boat encounters. It also regulates speed so in case of bad weather ahead there is enough stored electricity to make it through without running short. "[The software] is always looking for sun, but if it can't avoid bad weather it reduces your speed to conserve electricity," says Goulpié.

Knierim Yachtbau built Turanor of carbon fiber composites to keep weight at a svelte 60 tons without sacrificing strength. The floats are wave piercing for maximum efficiency in light to moderate conditions when the center hull is out of the water. When seas are high, the center hull - a deep-vee, Goulpié says - rides up and down the waves.

The drives feature large surface-piercing props that reduce drag and deliver greater efficiency by rotating only part of the prop through the water. "They were specially developed for this application," says Goulpié.

Domjan, who in 2001 co-founded a company that built the first solar-powered computer server, recruited Immo Stroher to help bankroll the project. Stroher is president and CEO of Rivendell AG, a Swiss firm that invests in renewable energy; he owns Turanor. The pair partnered with 28 companies, institutions and scientific organizations, and recruited an international team of physicists, engineers and boatbuilders to fund the project and acquire the expertise, technology and materials to build the boat.

"We want to prove it is possible," says Domjan in a press release. "More than a dream, it is a real conviction. We want to be the Phileas Fogg of the 21st century." Fogg is the Jules Verne character who circumnavigated in 80 days in a hot-air balloon.

Domjan says carbon dioxide emissions could be halved if alternative fuels were adopted in a whole range of applications on land and sea. He wants to go beyond Jules Verne's dream and demonstrate that alternative fuels can replace fossil fuels on the sea.

"Planet Earth deserves it, that we use its resources wisely and employ the immense power provided by nature sensibly," Domjan says.