ROYAL HUISMAN

PRESS RELEASE

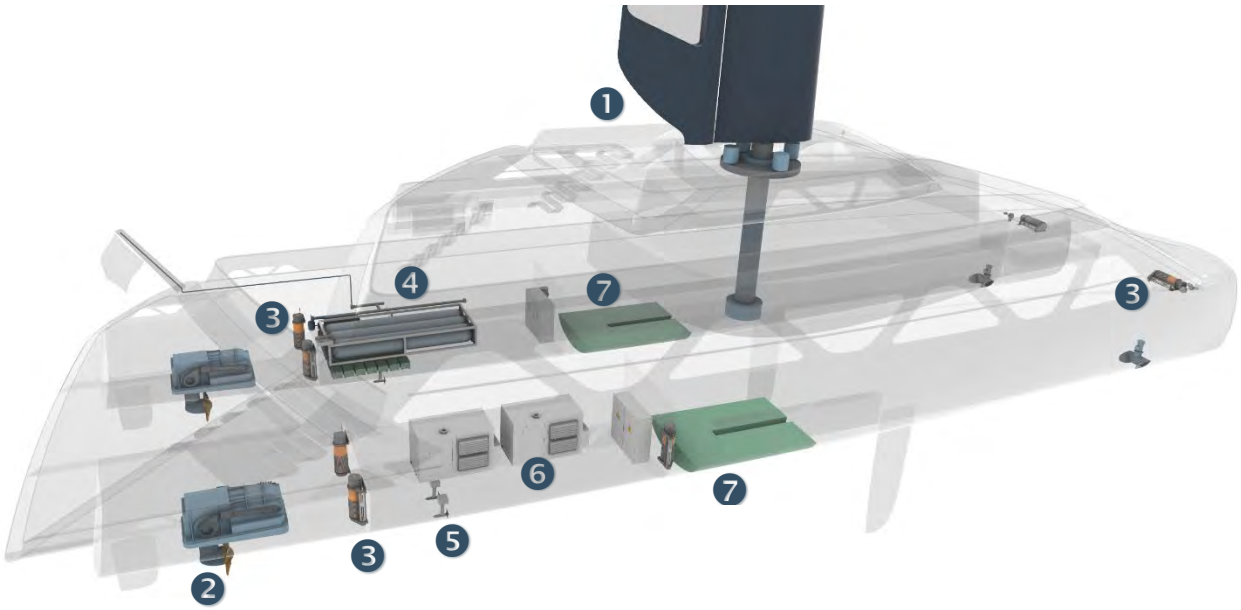
AERA
SMART. REVOLUTIONARY. GREEN.

Sustainability takes a new tack - Meet AERA

A wing sail and fuel cell energy answer today's clean cruising demands, wrapped in a dynamic package fit for tomorrow.

The shipyard celebrated for building the first hybrid superyacht leaps ahead with a concept utilizing an entire toolbox of cutting-edge technologies to boost efficiency and cut emissions. In 2009, Royal Huisman delivered Ethereal, the world's first hybrid superyacht requiring a fraction of the energy of comparable yachts. Today, the shipyard unveils a 50m / 164ft concept yacht at the confluence of trailblazing technology, stunning design, and sailing excitement. AERA looks at the sustainability question in a new way, blending the latest technology to redefine cruising in comfort for yachts under 500GT.

THIS BREAKTHROUGH CONCEPT IS THE RESULT OF A MULTI-YEAR R&D INVESTMENT BY ROYAL HUISMAN, RONDAL, COR D. ROVER DESIGN AND ARTEMIS TECHNOLOGIES



AERA'S DYNAMIC PACKAGE IS FIT FOR TOMORROW:
(1) Rondal wing sail - (2) retractable propulsion system (RPS) - (3) Rondal captive mooring winches
(4) energy storage system (ESS): compressed hydrogen + fuel cell + batteries
(5) Rondal hydro generators - (6) variable speed generators
(7) HVO biodiesel fuel tanks – not presented here: laser exterior lighting

AERA

SMART • REVOLUTIONARY • GREEN •

AERA builds on the shipyard's 2024 launch of Project Tidal Shift, an environmental awareness initiative focused on ecological preservation through environmental, social, and governance practices. Seeking partners with similar goals, Royal Huisman and sister company Rondal found kindred spirits in designer Cor D. Rover and Artemis Technologies.

The result of their collaboration is a totally new kind of superyacht. Is it a super-efficient sailing yacht with automated systems that make sailing easier, or a motoryacht that gets a big boost from wind to limit emissions to near zero? AERA is a yacht where one does not have to choose between sail or power; you can enjoy the flexibility and excitement of both.

ROYAL HUISMAN

THE MEANDERING STRUCTURAL FRAMEWORK UNITING AERA'S DECKS BRINGS A SENSE OF LIGHTNESS

TO KEEP VOLUME BELOW 500GT THE LATTICE STRUCTURE OPENINGS ARE NOT FILLED WITH GLASS: THE COVERED PASSAGEWAYS PROVIDE A SECURE, RESIDENTIAL FEEL AND REDUCE INTERIOR HEAT LOADING

ROYAL HUISMAN

AERA REDEFINES SUSTAINABLE TECHNOLOGY BY COMBINING A CUTTING-EDGE WING SAIL AND AN EFFICIENT DC ELECTRICAL GRID. HER BATTERY PACKS ARE RECHARGEABLE BY HYDROGENERATION OR A HYDROGEN FUEL CELL

“The exterior DNA of the concept is heavily inspired by traditional as well as modern lattice bridges.”

— Cor D. Rover, the designer of AERA

The culmination of a multi-year R&D program, Concept AERA propels hyper-efficient wing sails beyond America’s Cup and Sail GP into the world of superyachting. Paired with remarkable computer control technology, this next-generation Wing Sail makes AERA as easy to get underway and operate as a motoryacht.

GAME-CHANGING FEATHERING WING SAIL

Her radical-looking Wing Sail is more powerful and at the same time it will be less complicated, quieter, and easier to operate than traditional sails. The wing developed by Artemis Technologies is unstayed, as are the Dynarigs on Maltese Falcon and Black Pearl, and the three furling masts on Sailing Yacht A. Unlike those yachts, however, AERA's 245m^2 / 2,640sqft Wing Sail by Rondal will be capable of rotating 360 degrees for excellent sailing performance and to depower completely while staying upright.

It has no additional sails to deploy or flap, and it requires no sheets, blocks, furlers, or winches on deck, nor captive reels taking up space below. Two electric motors housed around the mast column inside the yacht rotate the wing mast. Hydraulic cylinders control the adjustable flaps along its trailing edge to generate lift and forward momentum, or feather it completely in a neutral position by aligning with the breeze.

AERA'S WING SAIL HAS MOVED FAR BEYOND THE SOFT WINGS OF AMERICA'S CUP RACERS FROM 2013 WHEN FOILING WAS IN ITS INFANCY

DECARBONIZING YACHTING

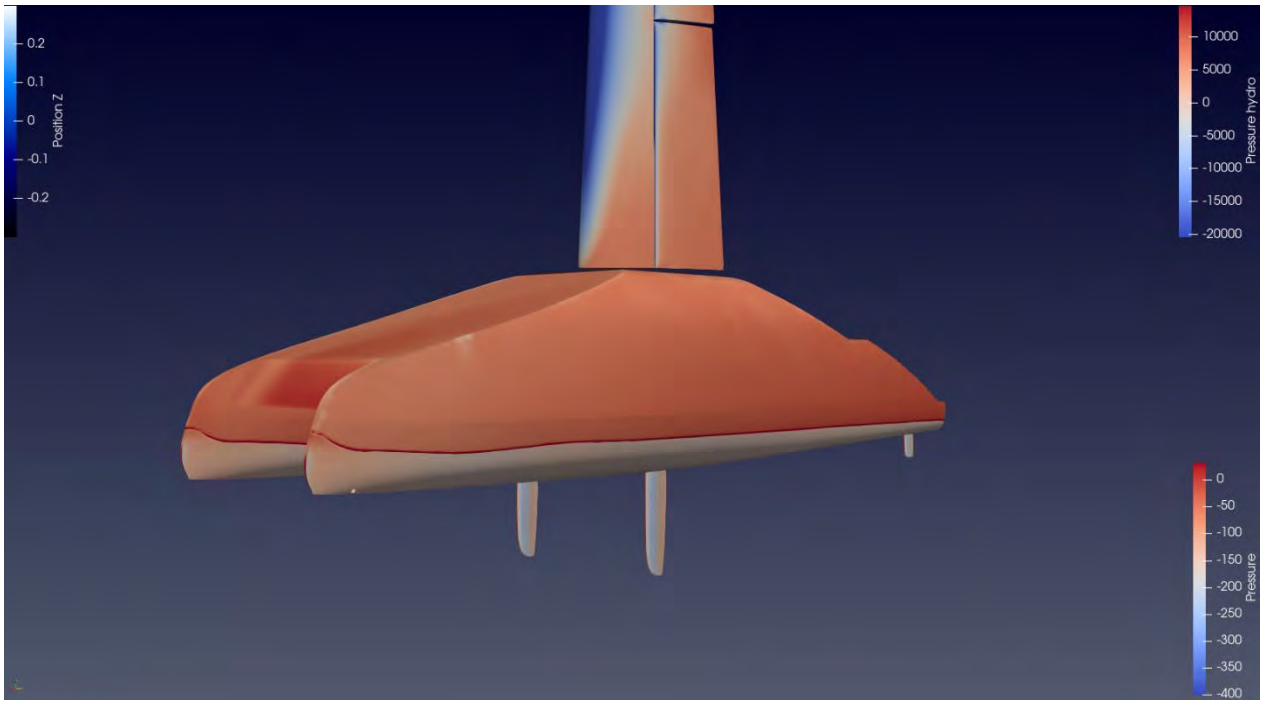
"We are about decarbonizing the maritime sector," said Dr. Iain Percy, CEO and founder of Artemis Technologies — a spin off from Artemis Racing. "While part of Artemis Technologies is still involved in high-performance sailing through their consulting division, Artemis Applied Technologies, much of its work is in developing electric foiling technology for commercial vessels, an area that's rapidly gaining traction."

"A few years ago, Royal Huisman and Rondal's Innovation Department contacted us about the possibility of using wing sails on sailing superyachts to reduce their emissions." Iain Percy said he at first thought that since the superyachts had sails, their carbon footprint should be, "no problem." Then he learned that, except when they might be competing in a regatta or unless guests request it, they don't sail as much as they could. Iain continues: "So our shared passion here was to take away the barriers to using the force of the wind to decarbonize."

EXTENSIVE TESTING WAS PERFORMED WITH A PROTOTYPE 8M / 26FT WING ON A 7M / 22FT KEEL BOAT

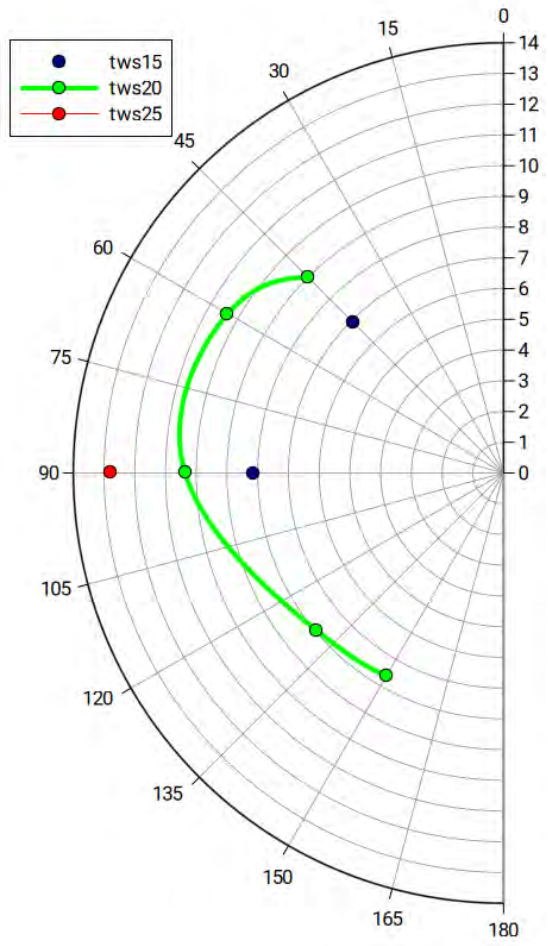
After many design meetings and simulations, Rondal and Artemis Technologies created a prototype of a wing sail for cruising sailboats. The 8m / 26ft wing was tested for more than two years on a 7m / 22ft keel boat at the shipyard's facilities in Vollenhove, the Netherlands. Some of the important data came from leaving it up 24/7 in all conditions, observing that it could handle high winds to ensure the safety of the boat below it while moored. In parallel, Artemis Technologies, Rondal, and Royal Huisman began scaling up.

The 35m / 115ft tall Wing Sail powering AERA is a distant cousin of the sail on America's Cup boats. Yet, the AERA Wing Sail has no stays or shrouds and no jib. It isn't controlled by a main sheet. Still, it applies the same very efficient aerodynamics, which is the same principle that allows airplanes to fly. The innovative, next-generation airfoil-shaped section at the front is paired with "flaps" aft that angle up to 30 degrees and can be controlled for more or less camber to power up or ease off by spilling air.



Preliminary Velocity Prediction Programs (VPP) predict she will be a solid performer in 15 knots of breeze, sailing well as close to a 45 degrees to true wind angle.

Like all wing sailboats, she'll need to broad reach and gibe downwind. But without any shrouds and stays, this narrow profile sail can safely gybe by rotating across the bow.



HIGH-FIDELITY RANSE SIMULATIONS (TOP)
AND VPP FOR AERA BY ARTEMIS TECHNOLOGIES

ROYAL HUISMAN

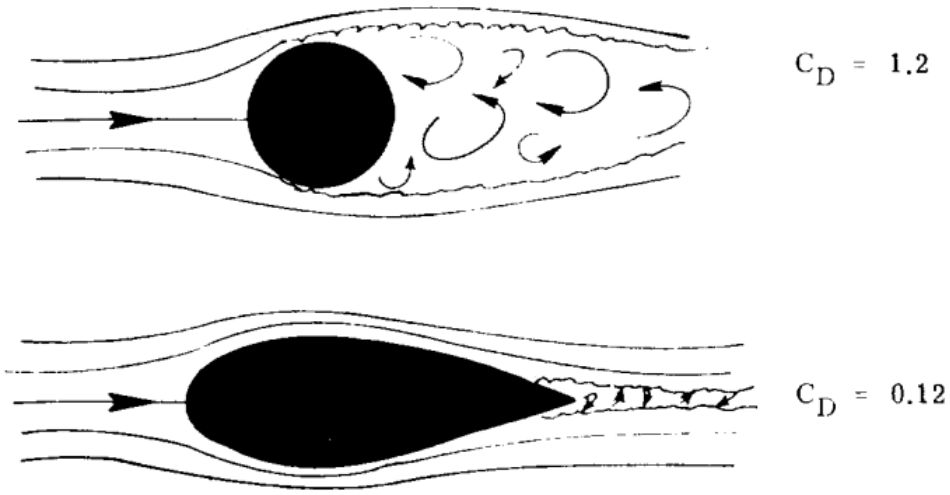
WING SAIL FROM LEFT TO RIGHT: UNSTAYED AND INFINITE ROTATION; INDIVIDUAL FLAP CONTROL TO MANAGE TWIST AND POWER; FEATHERING WHEN STATIONARY; TILTABLE FOR PASSING BRIDGES, RARE EXTREME WEATHER CONDITIONS AND YARD PERIODS

The forward portion of the wing is a thin-walled, carbon fiber structure, while the flaps behind are carbon fiber and Mylar foil. It rotates around its axis as needed, depending on wind angle and desired course.

To stop sailing, the flaps are centered and the Wing Sail simply aligns with the wind direction and freely rotates to stay set that way. The micro adjustments needed to accomplish this are part of the yacht's automated sail control system, along with data sensors such as wind speed and direction, and the yacht's motions.

Underway, automatic sail trim ensures optimal performance and fuel savings, prevents overload, and enhances onboard comfort. Crew can override and manually sail the wing, or use preset configurations to prioritize speed, course, comfort, or efficiency. The yacht has a draft of 3m / 9ft with her centerboards in the up position. With the boards down to full extension at 7m / 24ft, AERA will track like she's on rails.

SOURCE: T. A. TALAY, INTRODUCTION TO THE AERODYNAMICS OF FLIGHT
NASA SP-367, 1975, FIGURE 38



SCIENTIFIC COMPARISON OF AIR FLOW AND SUBSEQUENT
DRAG COEFFICIENT C_D FOR BOTH A TUBE (TOP) AND WING SHAPE MAST

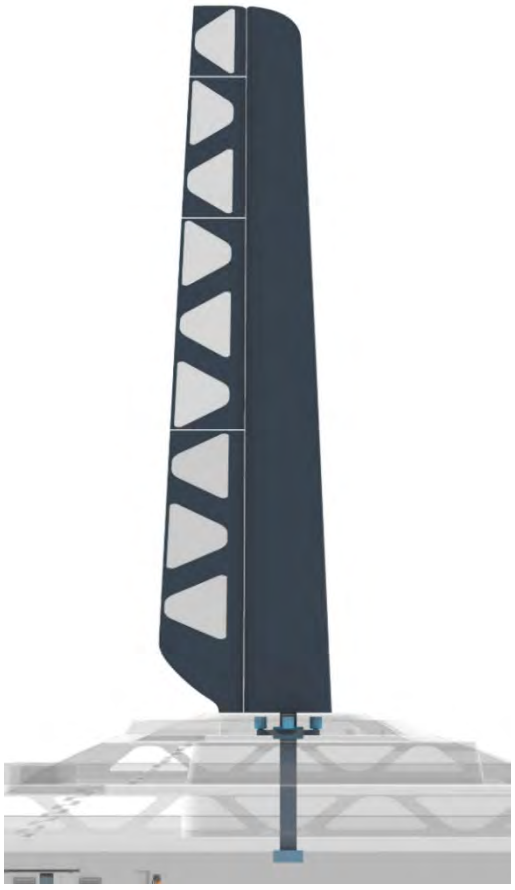
MORE POWER IN A SMALLER PACKAGE

While it might look large, the airfoil shape of AERA's Wing Sail has 10 times less drag than a conventional tube mast (even with the sails lowered) of the same frontal area due to its streamlined shape. What's more, calculations run by Artemis Technologies show Rondal's Wing Sail is so efficient that to provide the same power, a traditional Bermudian rig would need to be taller and fly 60 to 80% more sail area. To begin sailing, all the captain needs to do is set the desired course, and the onboard control system determines the optimal wing angle and trim.

If wind alone isn't enough to meet propulsion requirements, this Wing Sail is also highly effective at motorsailing. When wind is light or its direction isn't ideal for the desired course, the system will calculate how much power assist is needed and decide how to most efficiently power the retractable electric propulsion units in each hull.

The programmable logic system directing energy use can draw electricity silently from the battery bank or activate variable speed generators running on HVO biodiesel to keep the yacht's DC power grid topped up. This eco-friendly fuel reduces CO_2 emissions by up to 89%, eliminates 40 to 80% of particulates (soot), and produces 8% less NOx.

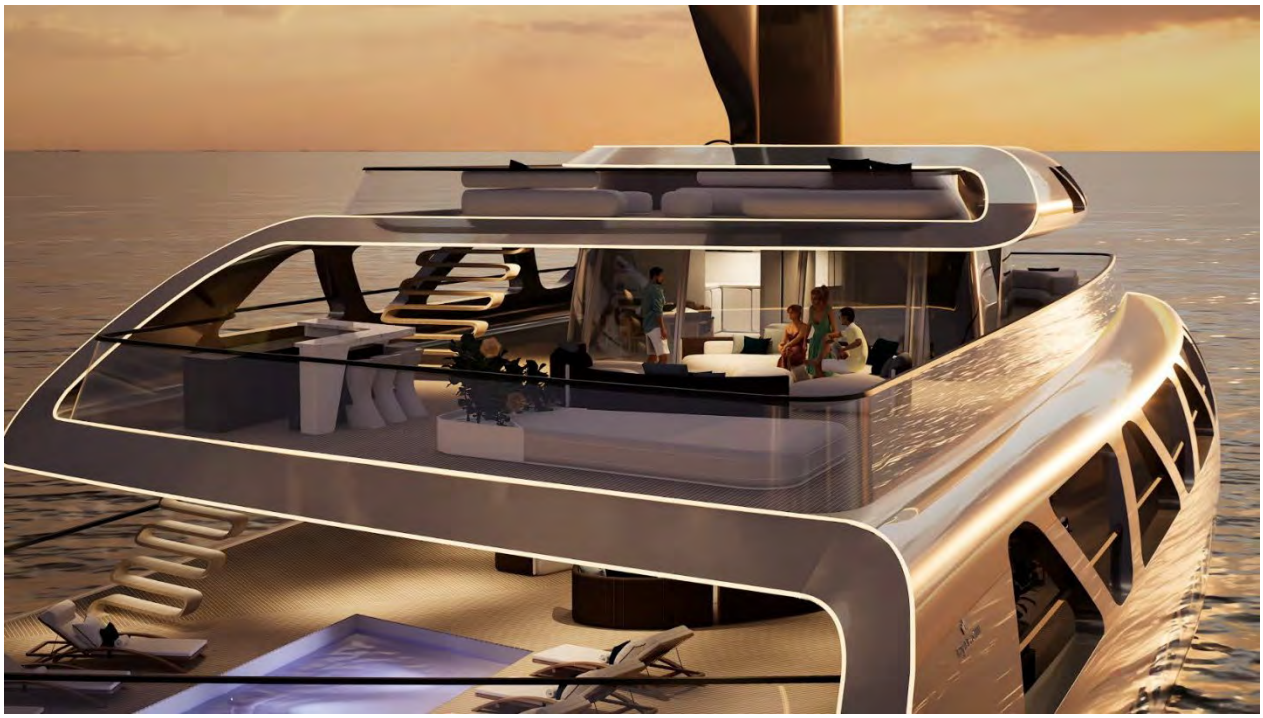
AERA performs well with a cruising speed of 12 knots and a top speed of 14 knots. At 8 knots, she has more than transatlantic range under power alone.



AERA'S WING SAIL RESTS ON TWO BEARINGS INSIDE THE YACHT

AERA, the groundbreaking hybrid catamaran that redefines sustainability offering her owner a near zero-emission option by combining wind power with electricity from a battery storage system charged by hydro-generators or a hydrogen fuel cell. For longer voyages batteries can be charged by gensets running on HVO.

The thought behind the concept, as Royal Huisman CEO Jan Timmerman puts it, is to make sailing more accessible. "We know from research that sailing yachts don't set the sails in full that much of the time, especially when they are going short distances between harbors. For some sailing superyachts, running lines, hoisting, and adjusting all sails can take half an hour or more. Additionally, the yacht requires a skilled sailing crew plus an interior team to secure furniture and other objects. For a short cruise to the next bay, we understand that it may not seem worthwhile."

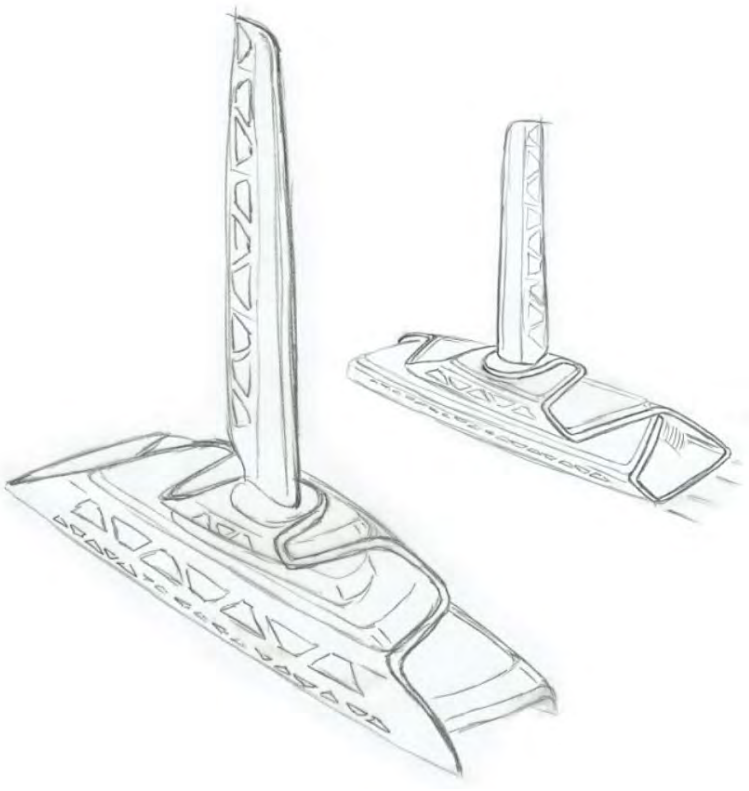


“Aboard AERA, while raising the anchor, the captain enters the destination, sets the wing to automatic trim, the wing sail responds, and you are sailing in less than a minute. Without the challenge of operating a conventional sailing system, no rigging, blocks, winches, and sail tracks, booms swinging overhead, or furlers, sheets and sails. It is basically as easy as operating a motoryacht. And, with just two degrees of maximum heel, it is comfortable and safe for guests to move around the decks while the yacht is underway. We have designed AERA with simplicity and safety in mind, so you can sail with confidence," says Jan Timmerman.

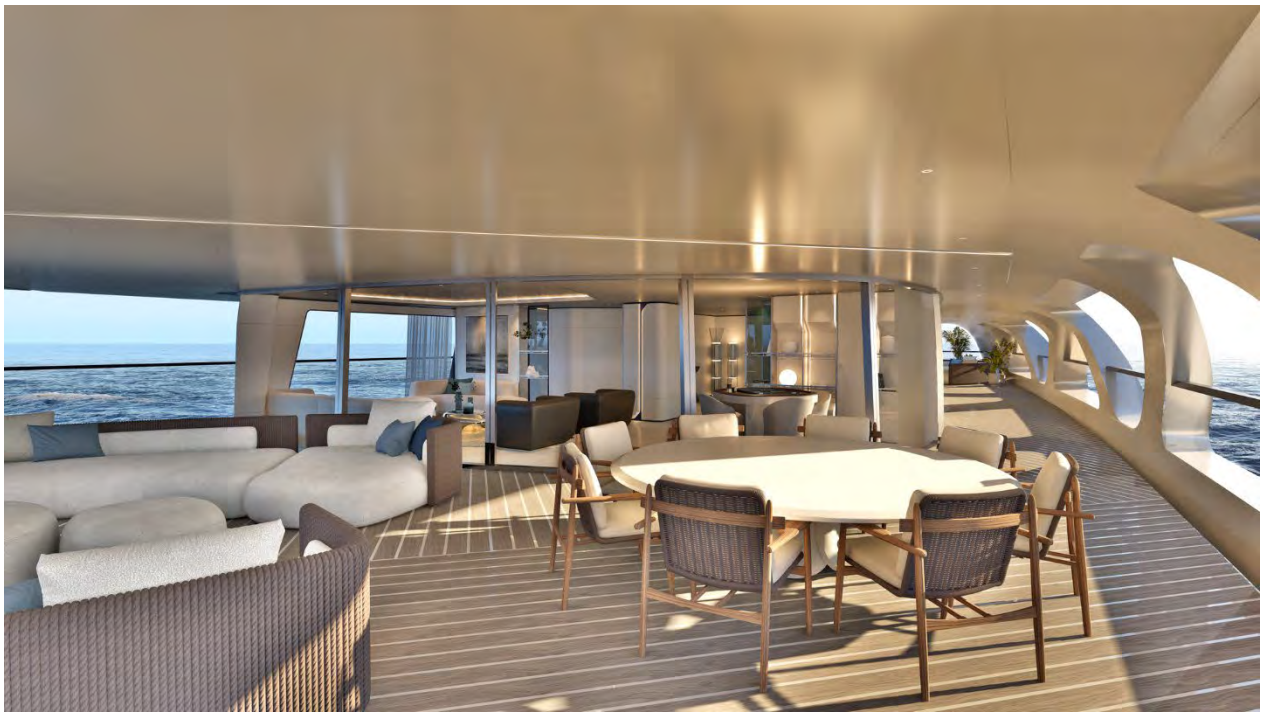
MAIN DECK SALON

TURNING TO THE DESIGN

“The wing sail concept was really intriguing to me. And of course, I was delighted to help Royal Huisman,” says Cor D. Rover, who, with his team, is the designer of AERA. “During a couple of months of exchanging ideas, we were convinced that a catamaran was the perfect platform, both for a psychological approach to the fixed wing and for a cat’s inherent stability under sail. And on top of that, you get phenomenal decks.”



INITIAL SKETCHES OF AERA



MAIN DECK EXTERIOR VIEW FORWARD WITH COVERED WALKWAY TO THE BOW

The designer's challenge included creating a look and a layout attractive to both sailors and non-sailors. This was another reason for choosing the multi-hull route. Catamarans, by their nature, provide incredible amounts of deck space for the alfresco living experience. AERA boasts 670m^2 / 7,212sqft of exterior deck space, spanning her 50m / 164ft length, comparable to a typical 65 to 70m / 213 to 230ft monohull motoryacht.

Cor D. Rover's unique and fresh approach to alfresco living resulted in a variety of exterior spaces for different functions and different size groups building a sense of destinations aboard the yacht.

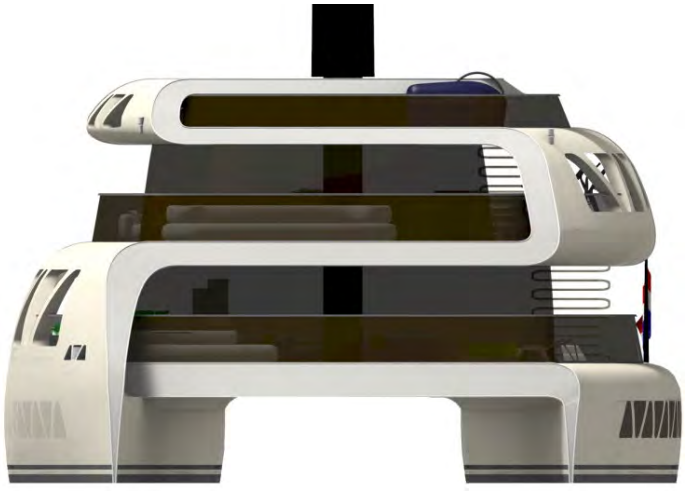
AFT BRIDGE DECK

BRIDGE DECK SKYLOUNGE

While most sailing superyachts have one exterior deck and sometimes a flybridge, AERA ups the attraction with three decks, plus a large stern section that can move between the main deck and water level to serve also as a swim platform or to launch the yacht's tenders and watersports equipment.

ON THE BRIDGE DECK, THE COVERED WALKWAY FLIPS TO PORT

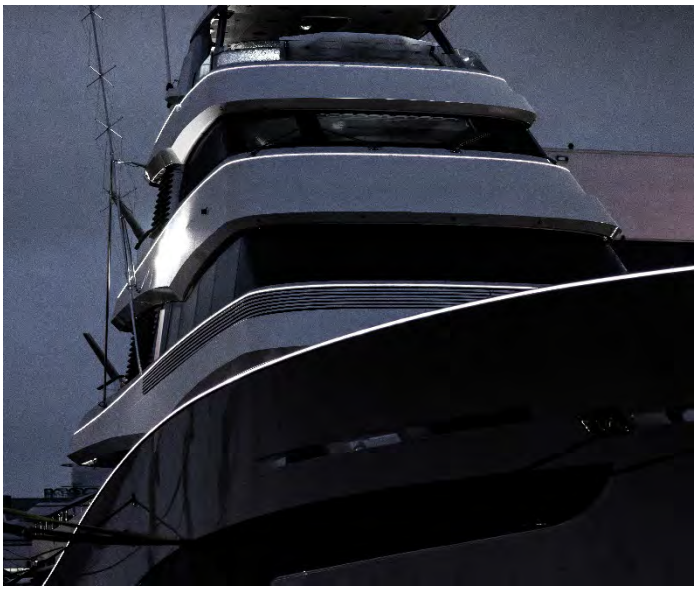
Some yachts are asymmetrical on one deck; AERA is asymmetrical on two. Alternating them creates a unique look to the structure and a fresh approach to arrangement plans. The designer notes that everything began from a “meandering shape” to connect the decks he had drawn in the structural plan with a serpentine line. This sensuous line starts at the mast collar and winds its way to the waterline.



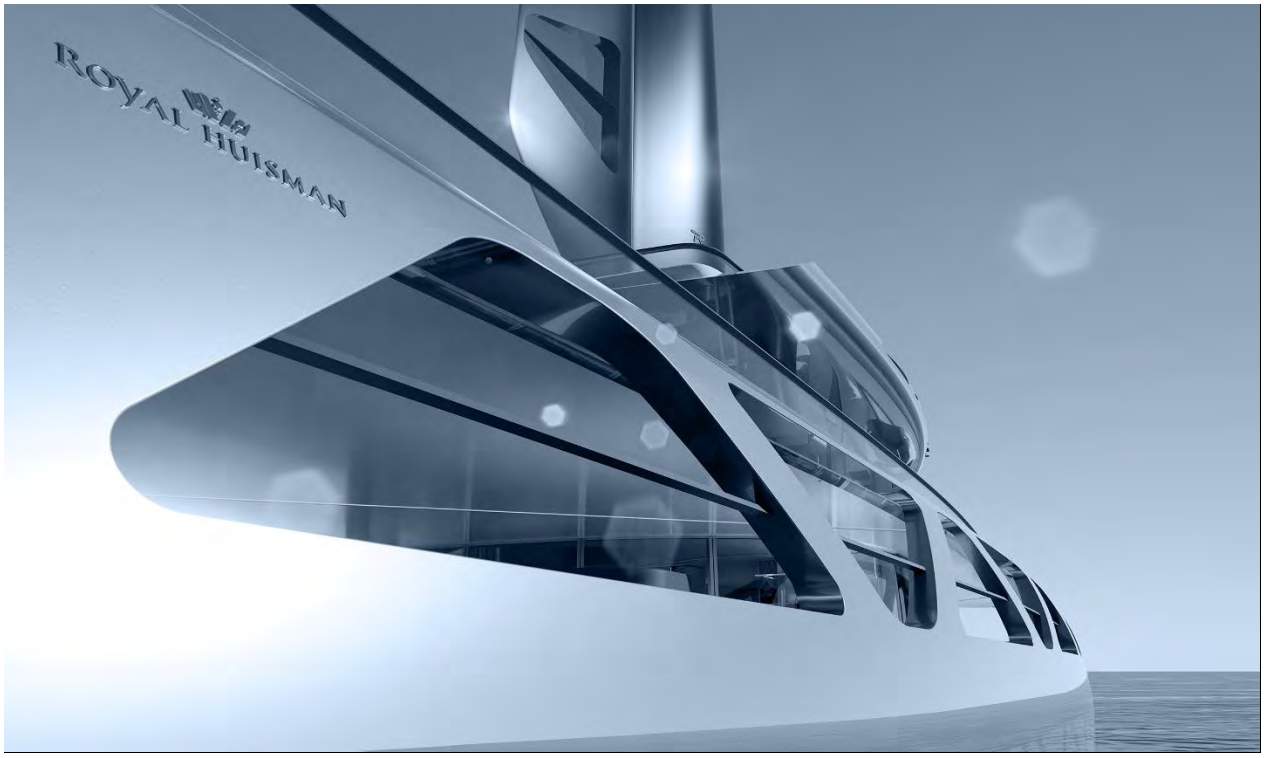
AERA IS NOT A COLLECTION OF BOXES OR A LAYER CAKE.
THE SUPERSTRUCTURE DESIGN DISTRIBUTES LOAD,
STIFFNESS AND STRENGTH IN A BOLD AND DISTINCTIVE WAY

LASER EXTERIOR LIGHTING ENHANCES THE SILHOUETTES

At night, the exterior laser light product showcased aboard Phi and Special One dramatically echoes the underlying shapes. This system, designed to enhance the yacht's silhouette, emits continuous glowing threads of light that highlights its exotic lines, creating dramatic visual effect in any chosen color.

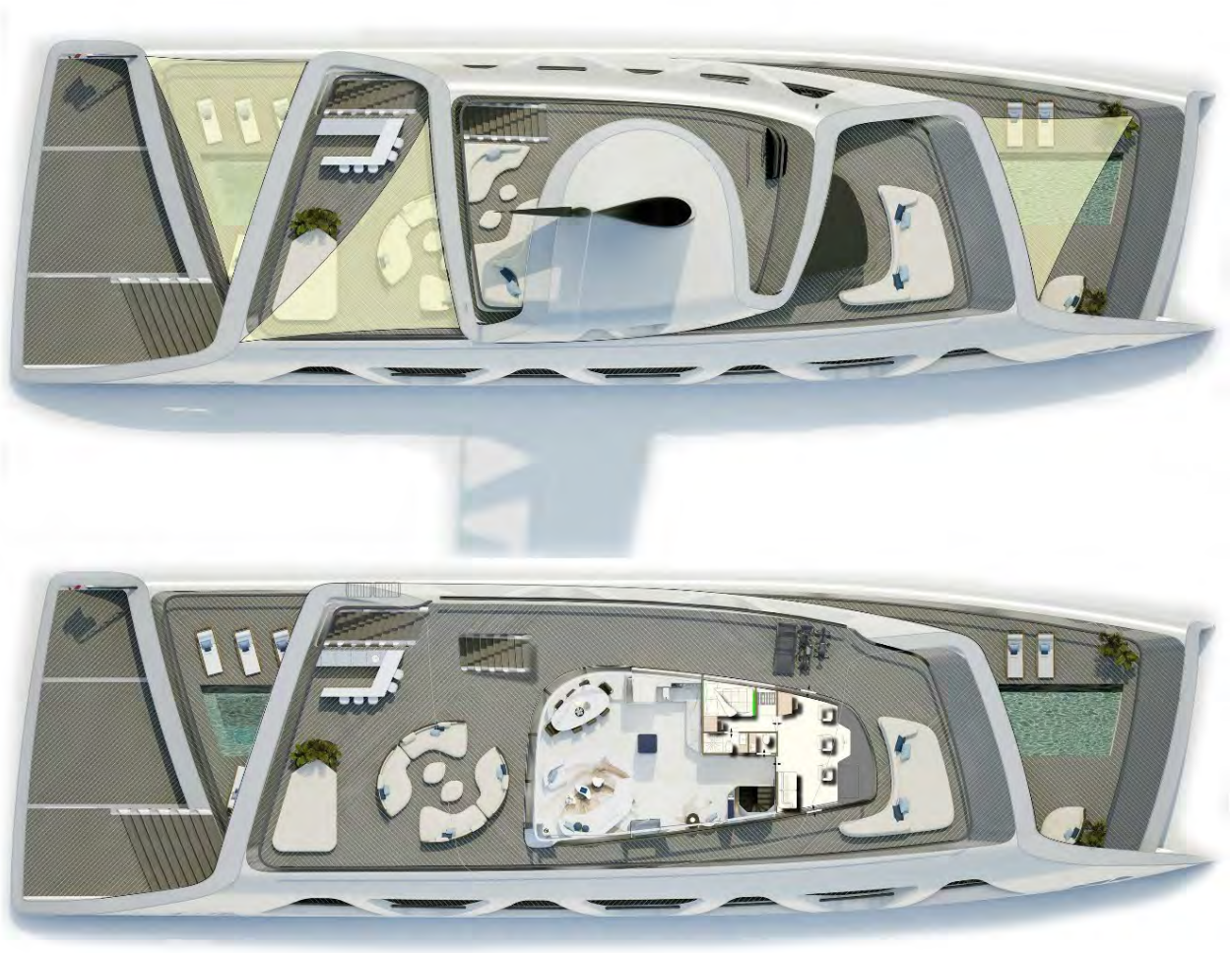


SPECIAL ONE



At first glance, the yacht's superstructure appears to fully fill the 15m / 47ft beam, but as Cor D. Rover noted, that would have resulted in a measurement above 500GT. A lattice superstructure framework reminiscent of many fixed bridges forms the profile, yet the openings are not filled with glass. While the exterior of the yacht is a very geometric shell, the free-flowing interior creates an intriguing, experiential contrast.

AERA'S FEATURE CUT-OUTS: INSPIRED BY BOTH TRADITIONAL AS WELL AS MODERN LATTICE BRIDGES: CUTTING-OUT AN EXTERNAL STRUCTURE AVOIDS ENCLOSED VOLUME IN ORDER TO STAY UNDER 500GT



FLYBRIDGE (TOP) AND BRIDGE DECK WITH SKYLOUNGE

AERA boasts 694 square meter / 7,470 square feet of exterior deck space, spanning her 50 meter / 164 feet length, comparable to a typical 65 to 70 meter / 213 to 230 feet monohull motoryacht.

AERA uniquely explores the idea of living spaces being irregularly shaped modules floating between the decks rather than constrained as part of the yacht's superstructure. The living spaces, linked by shaded walkways, become destinations rather than a series of adjacent rooms and hallways. Besides wow factor, the design has the very real benefit of reducing interior heat loading and HVAC demands due to the windows being shaded by the latticework and deck overhangs.

THE SKYLOUNGE CONTAINS THE PRIMARY INDOOR DINING AREA

OWNER'S SUITE: VIEW FORWARD OVER THE PRIVATE TERRACE

The general arrangement shows an owner's suite on main deck and four guest cabins below; however, the hull accommodations can be arranged in any number of ways, including four guest cabins or two VIP suites with their own sitting rooms.

OWNER'S STATEROOM ON FORWARD MAIN DECK

In the concept as presented, the interior section of the main suite is 44m^2 / 478sqft. Its private exterior deck is an additional 153m^2 / 1,647sqft, including a pool and a covered massage cabana.

Cabins for seven crew are envisioned below, plus a captain's cabin on the bridge deck. Additional features include a second glass-bottomed dipping pool located at the stern of the main deck, multiple dining options both indoors and outdoors, and exterior lounges situated on each deck.

THE FORWARD OWNER'S MAIN DECK INCLUDES A 5 x 3M / 15 x 9FT POOL

As one member of the team predicted,
AERA will have the space of a New York penthouse overlooking Central Park.
Yet, each day a different, and better view.

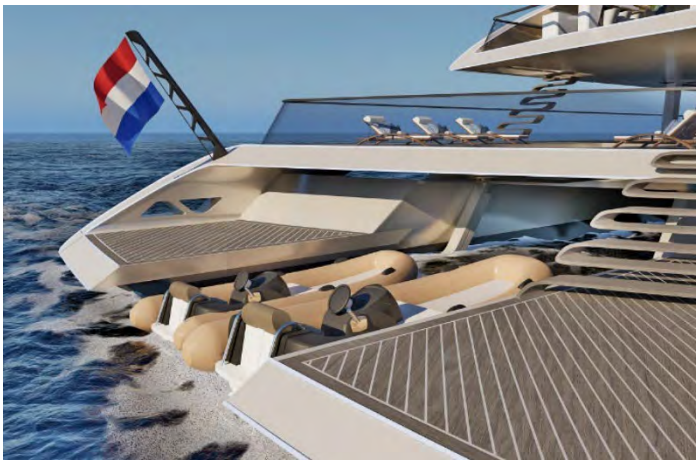
OWNER'S STATEROOM: FLOOR TO CEILING WINDOWS

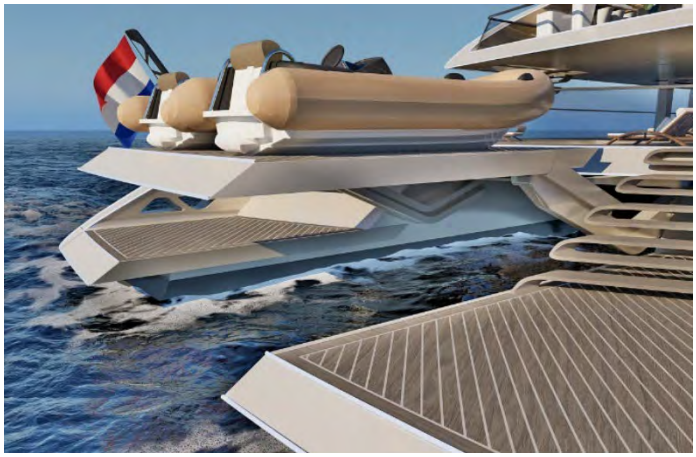
WITH BOTH 6M / 20FT TENDERS DEPLOYED THE SWIM PLATFORM BECOMES A HUGE 72M2 / 775SQFT BEACH

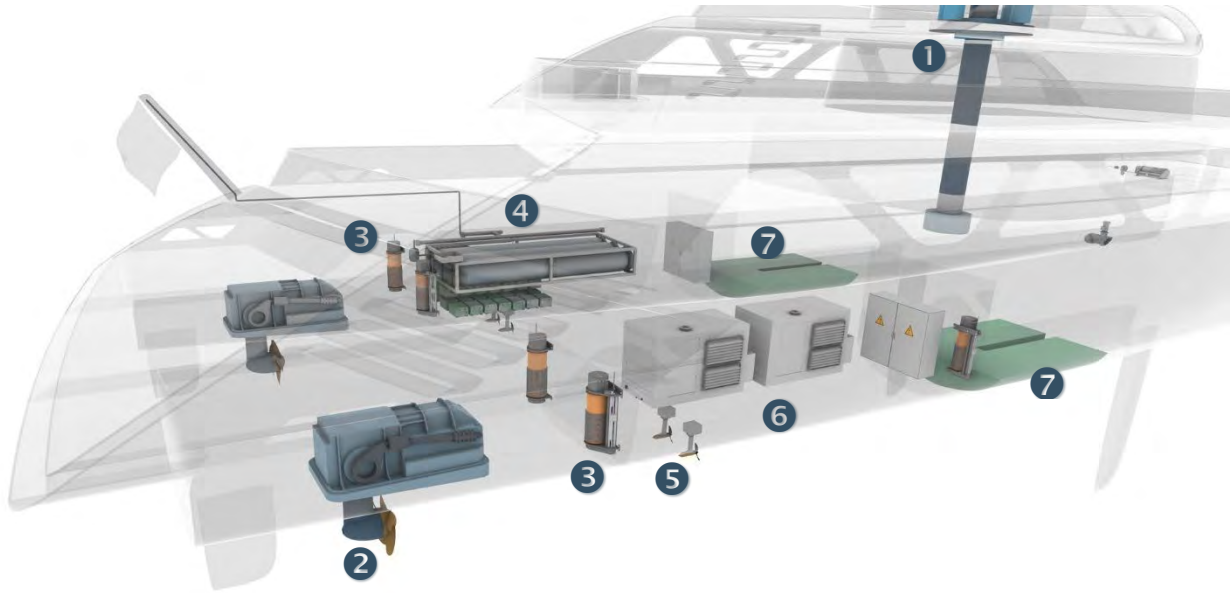
“I didn’t need to create a beach club area because the entire yacht is a beach club with the emphasis on outdoor spaces, except for the cabins in the hulls,” Cor D. Rover said. The fore and aft ends of the upper decks are at angles to the one above or below, creating different areas of light and shade on each deck.

MAIN DECK (AFT OF OWNER’S AREA). THE GALLEY CAN BE OPEN TO THE SALON, CREATING A BREAKFAST BAR, OR SEPARATED BY A SLIDING PANEL

To prepare for cruising, the tenders are loaded on the center section of the swim platform, which lifts to main deck level.







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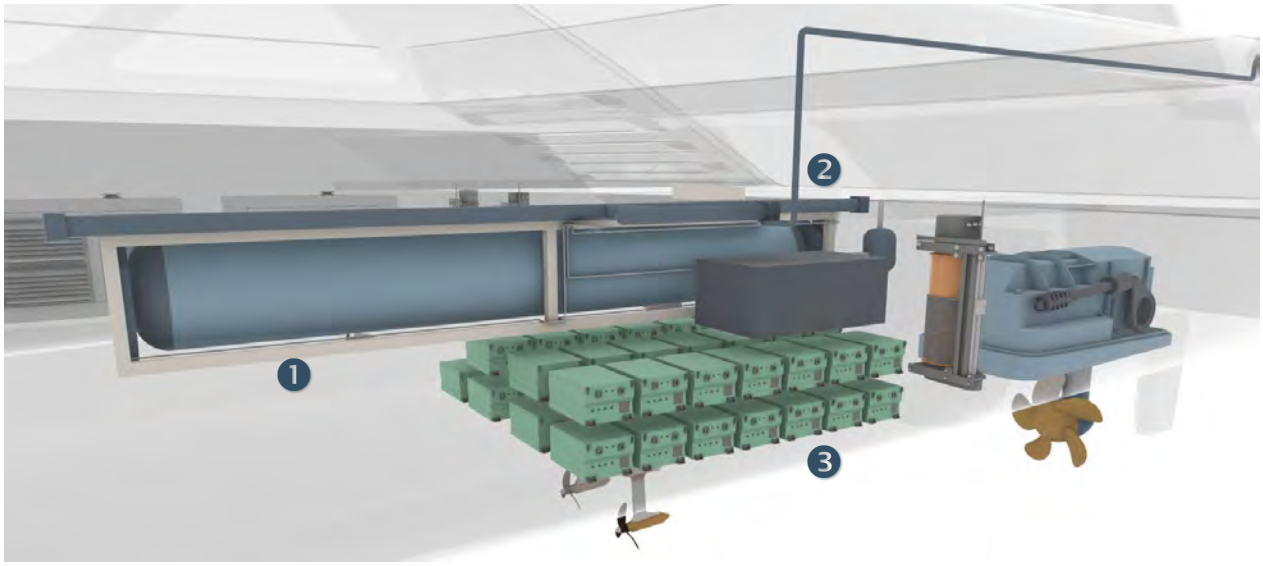
(4) energy storage system (ESS): compressed hydrogen (including vent line to flagpole)
+ fuel cell + batteries - (5) Rondal hydro generators - (6) variable speed generators
(7) HVO biodiesel fuel tanks – not presented here: laser exterior lighting

A NEW HYBRID APPROACH

Cruising propulsion is one thing, but much of the environmental load of a yacht comes from powering the household systems – often called the hotel load – of the vessel while it is under sail or at anchor. And here, AERA will be more environmentally sound as well. Royal Huisman has designed the yacht to power the hotel load, including air conditioning and pool heating, with a battery bank charged by the latest generation of Hydro Generators from Rondal, or low-temperature PEM hydrogen fuel cells. On her 580kWh DC battery bank alone, the yacht can operate for 11 hours while anchored or sailing.

Groundbreaking technological work by the shipyard is re-shaping industry practices

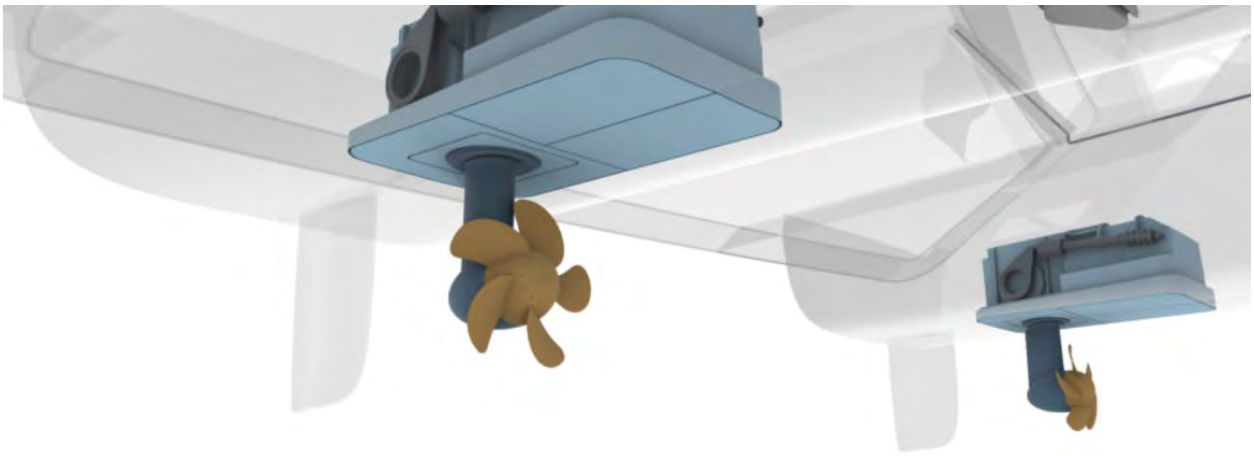
ROYAL HUISMAN



SILENT, ZERO-EMISSION PERIOD OF 72 HOURS
(1) compressed hydrogen - (2) fuel cell
including vent line to flagpole - (3) batteries

Three 62 kg / 137lbs hydrogen storage bottles, like those already in use aboard hydrogen-powered electric tenders give the 60kW high-efficiency fuel cell the ability to generate just over 3,000ekWh of electricity that can be stored in the battery banks Predicting the average energy consumption while anchored with guests aboard, this results in a silent, zero-emission period of 72 hours.

These alternative fuel sources, plus careful engineering incorporating the most efficient refrigeration, HVAC, and waste-heat recovery systems available, will give AERA an impressive YETI score according to preliminary calculations by the shipyard team. Validation by an independent third party is in process.



When AERA does navigate under power, the propulsion will come from a pair of forward-facing 500kW electric RPS (retractable propulsion system) units, the same technology pioneered for Royal Huisman's 60m / 196ft SARISSA, launched in 2023. These unique units, with their efficient electric motors housed below the hull in azimuthing drive legs, won an "Innovation of the Year" award in 2024. Independently controllable, they will give AERA excellent maneuverability and eliminate the need for stern thrusters.

With the propellers retracted, the hydrodynamic drag is significantly reduced, allowing the yacht to accelerate to her full sailing potential much more quickly. Since the drive units are electric, they can be powered by the yacht's batteries to operate silently (without any exhaust fumes) when leaving a harbor or navigating through a marine protected area.

AERA'S ELECTRIC PROPULSION SYSTEM (AND SARISSA'S IN CENTER): FORWARD-FACING AND RETRACTED (BOTTOM)

“AERA represents more than technological advancement”

— Jan Timmerman, Royal Huisman CEO

THE SUBSTANCE BELOW THE STRUCTURE

“Royal Huisman has long been at the forefront of technology. When other yards say something is impossible, we investigate and frequently conclude it can be done,” summarizes Jan Timmerman. ”With AERA, we are showcasing our commitment to research and development to advance positive ideas and to attract prospective owners with a new type of yachting. Every mile sailed by wind is a gain for sustainability. AERA is a vessel that embodies harmony with natural forces and an innovative spirit. As the name suggests, the yacht moves as one with the wind, seamlessly and gracefully.”

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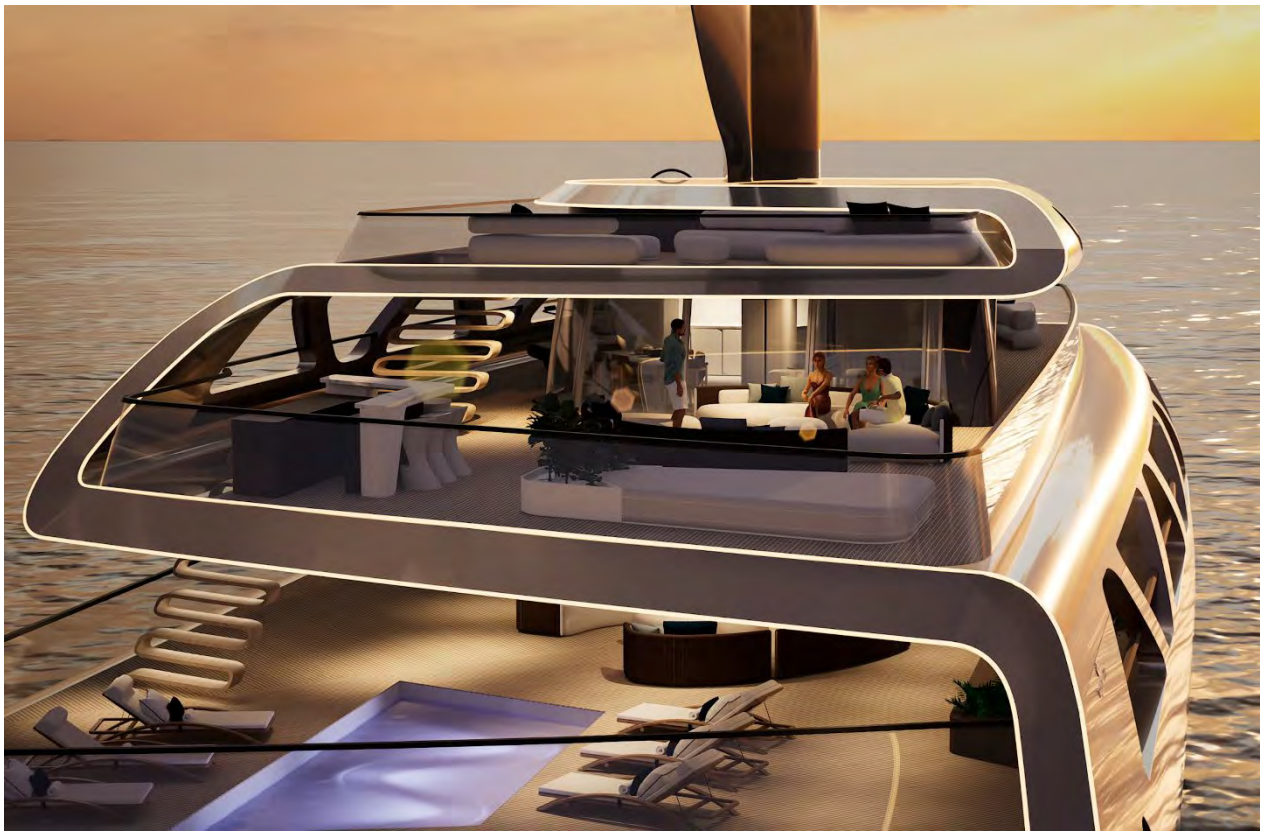

AERA

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EDITOR'S NOTES

ABOUT AERA

Aera is derived from the Latin and Greek word aer, meaning air or atmosphere.
Aera hints at a new beginning, one of clean air and clean seas.

WATCH VIDEO

royalhuisman.com/aera and available for embedding too:

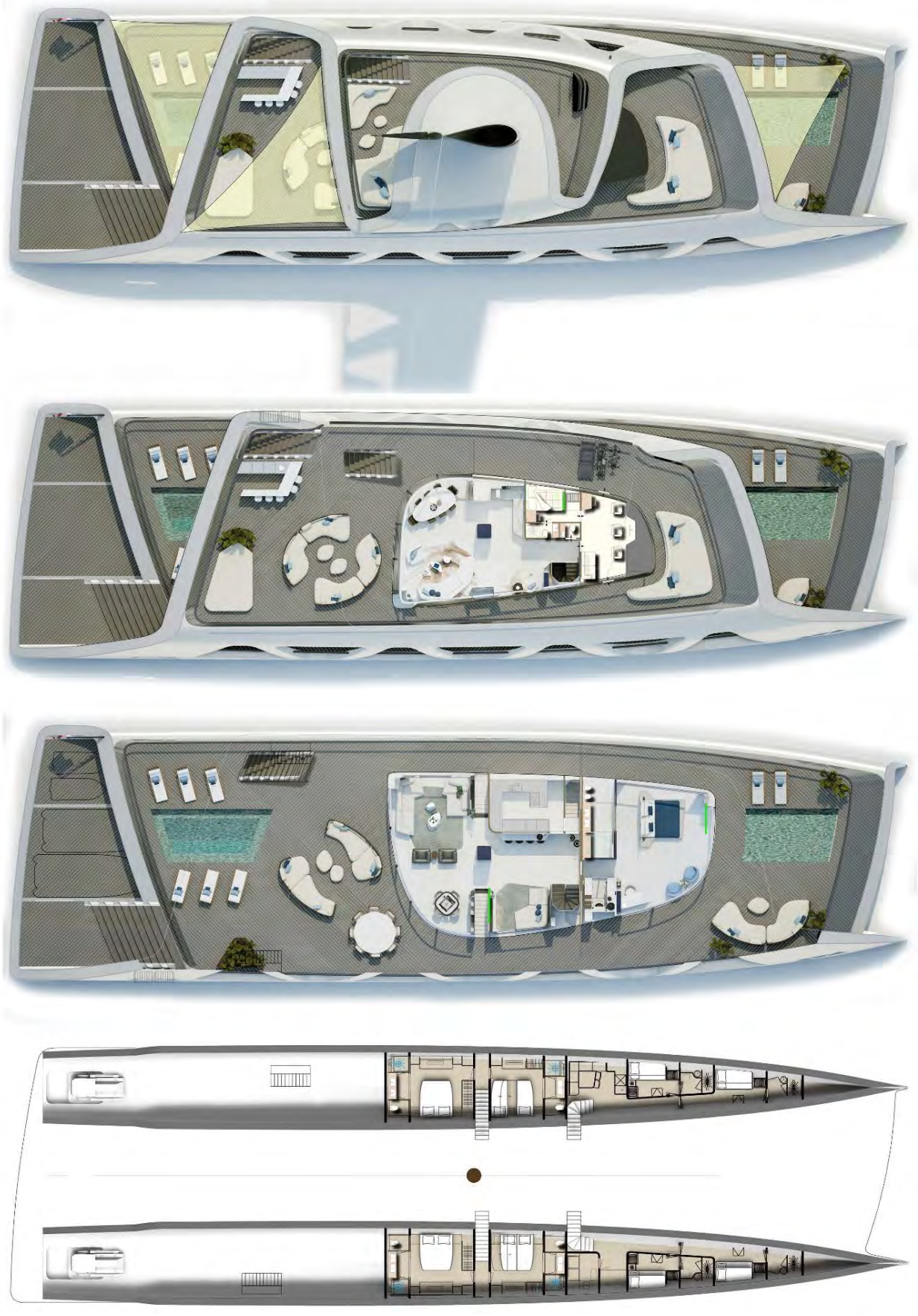
- YouTube: youtube.com/@Royal_Huisman
- Vimeo: vimeo.com/royalhuisman

MAIN DATA & SPECIFICATIONS

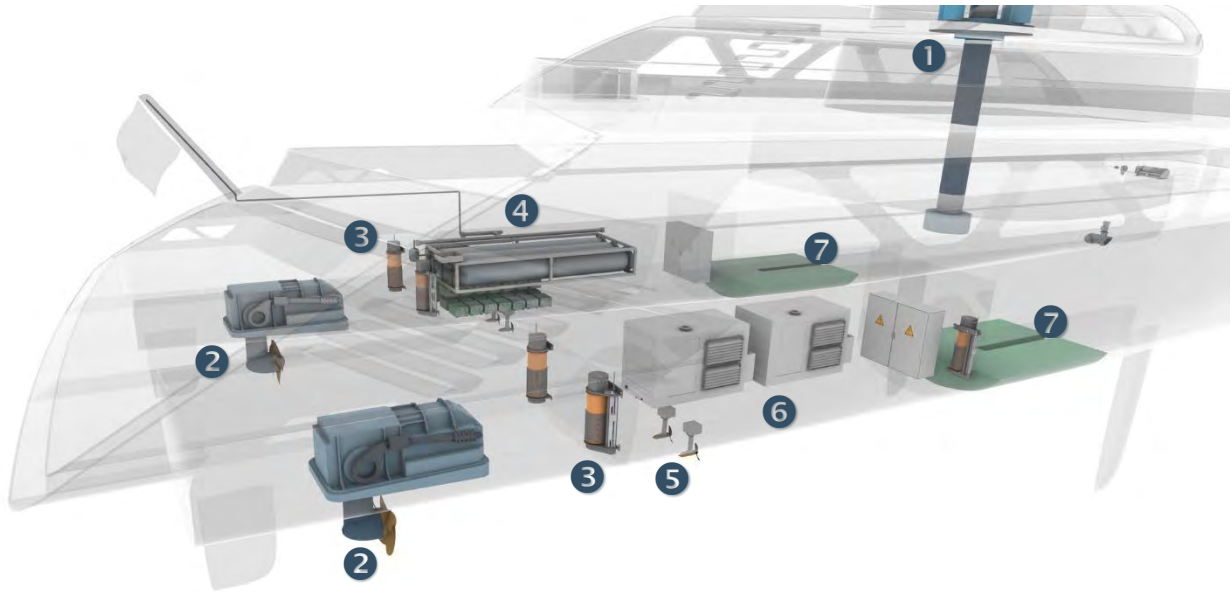
Exterior and interior design	Cor D. Rover Design
Naval architect	Artemis Technologies
Builder	Royal Huisman
Length	50m / 164ft
Beam maximum	14.5m / 47ft
Draft (board up - down)	3 - 7m / 9 - 24ft
Accommodation	10 guests + 7 crew
Gross tonnage	499 GT
Construction	Aluminum hulls and superstructure
Classification	Lloyd's Register: ✠ 100A1 SSC YACHT Mono G6, [✠] LMC, UMS, Hybrid Power. Royal Huisman has received Lloyd's type approval for the storage and use of hydrogen bottles aboard yachts.
Mooring winches	8x RW-6000HW, 6 tonnes pulling, 9 tonnes holding power
Spars	Rondal Aero Wing Sail, carbon composite, 35m / 115ft; air draft: 43m / 142ft; 245m^2 / 2,640sqft, automated wing control, wing stowing system

Propulsion system	Two swing retractable, azimuthing thrusters with direct connected PM motors, 500kW each; 5-blade fixed pitch pulling propellers
Generator system	Two variable speed Volvo D13-700 generator sets with 515bkW @ max RPM; 485 ekW-DC; HVO (Hydrotreated Vegetable Oil) compatible
Energy storage system (ESS)	Hydrogen Low Temperature PEM type fuel cell, 60kW nominal, 72kW peak; 3x 62kg hydrogen storage cylinders (total: 186kg / 410lbs), 500 bar: equals approx. 3,000ekWh after conversion; Lithium-ion LFP battery bank: 580kWh
Hydro generators	4x Rondal below water, ultra efficient regeneration pod of 15kW; at 12 knots speed: 40kW (matching hotel load)
Tank capacities	HVO fuel: 20,000lt / 5,283 gallon; Urea: 4% of fuel capacity; Fresh water: 16,000lt / 4,227 gallon Black / grey water: 6,000lt / 1,585 gallon
Speed	12 knots cruising / 14 knots maximum
Range	Transatlantic, 2750nm @ 8 knots motoring
Zero emission mode	72 hours

GENERAL ARRANGEMENT



ROYAL HUISMAN



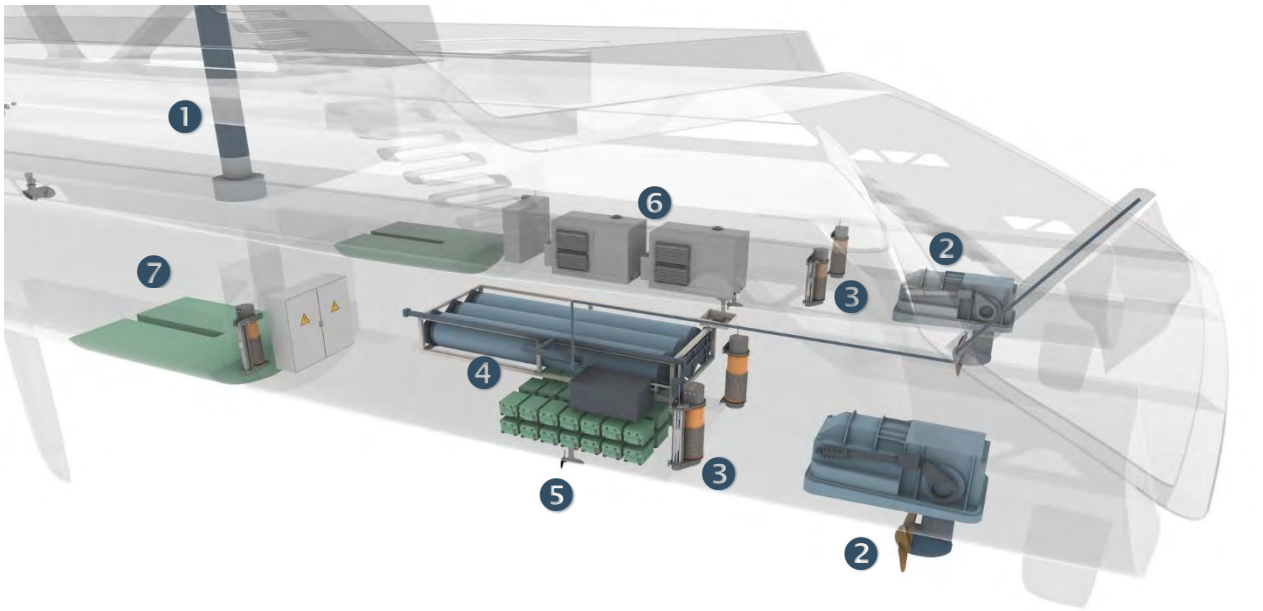
(1) Rondal wing sail - (2) retractable propulsion system - (3) Rondal captive mooring winches (4) energy storage system (ESS): compressed hydrogen (including vent line to flagpole) + fuel cell + batteries - (5) Rondal hydro generators - (6) variable speed generators - (7) HVO biodiesel fuel tanks

ABOUT THE ENERGY STORAGE SYSTEM

AERA's Energy Storage System (ESS) consists of 580kWh of batteries and the compressed hydrogen tanks supplying the PEM hydrogen fuel cell to enable a significant 'silent period' in which the yacht does not require a generator for electricity. Multiple sources, including shore power, the hydro generators during sailing, the hydrogen fuel cell, or the HVO gensets can charge the batteries. The ESS can be used for both propulsion and hotel load. For propulsion, it is perfect for short periods of pure electric cruising, for example, close to a harbor or in marine sensitive areas.

HYDROGEN HYBRID VS FULL BATTERY

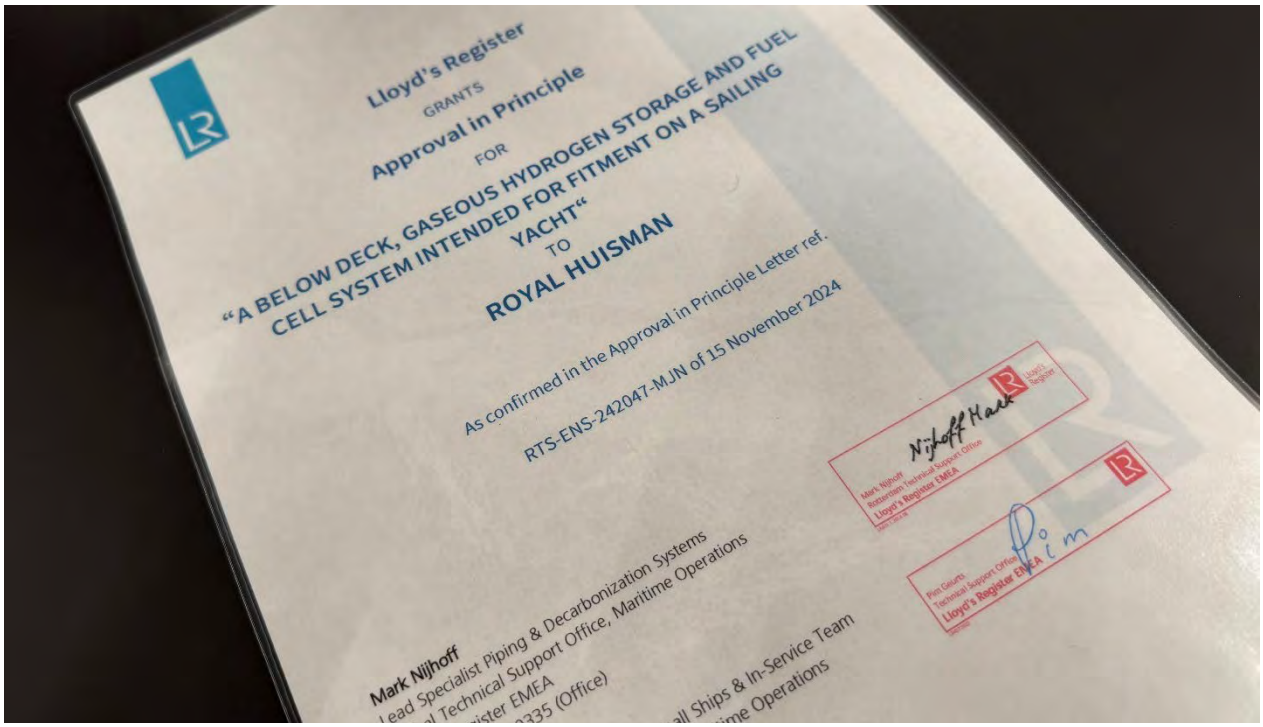
The advantage of storage batteries is that they can be charged multiple times, even during a voyage. Fuel-based energy systems (including hydrogen and methanol) on the other hand, require refueling ashore. Unfortunately, lithium-ion batteries are large and heavy. With her over 1,000kWh energy storage capacity, it makes sense to combine a smaller battery pack with a hydrogen fuel cell system.



(1) Rondal wing sail - (2) retractable propulsion system - (3) Rondal captive mooring winches (4) energy storage system (ESS): compressed hydrogen (including vent line to flagpole) + fuel cell + batteries - (5) Rondal hydro generators - (6) variable speed generators - (7) HVO biodiesel fuel tanks

This hybrid ESS allows charging the batteries by storing electricity generated by the hydro-generators and using a hydrogen gas system as a ‘range extender’ during periods when the yacht is not moving. These combined practical and available systems are much lighter, more affordable, and more compact than a full-scale multi-megawatt battery system would be.

For this concept, the maximum battery capacity is 580kWh. The hydrogen system using three hydrogen bottles each carrying 62kg / 137lbs of hydrogen under 500bar pressure, can generate approximately. 3,000ekWh of useable electricity. For comparison, the hydrogen system weighs approximately 4.3tonnes / 9480lbs, while a battery-only system with the same usable energy output would weigh more than 30 tonnes / 66,000lbs, (seven times more). The volume of the components in this hybrid system is also much smaller: 7m^3 / 247cuft versus 23m^3 / 81cuft , thus preserving more room for owner accommodations or other functions.



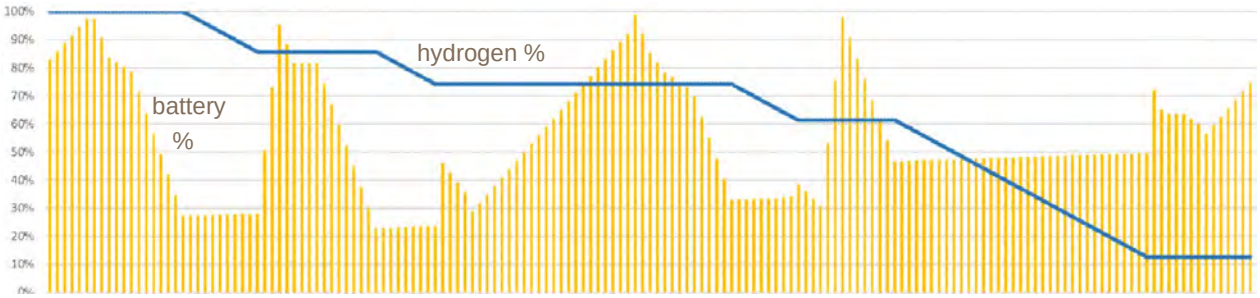
Royal Huisman received Approval-In-Principle (AIP) from Lloyd's Register in 2024 for its innovative and unique concept for using hydrogen on board sailing superyachts. The system developed by the shipyard's Innovation Team includes high-pressure hydrogen bottles, similar to those used to power America's Cup electric foiling tenders, and a fuel cell.

The goal is to produce enough energy to power the onboard hotel load. The AIP marks a milestone for Royal Huisman's sustainability efforts as part of Project Tidal Shift and shows that the shipyard is ready to incorporate fuel cell technology in future newbuilds.

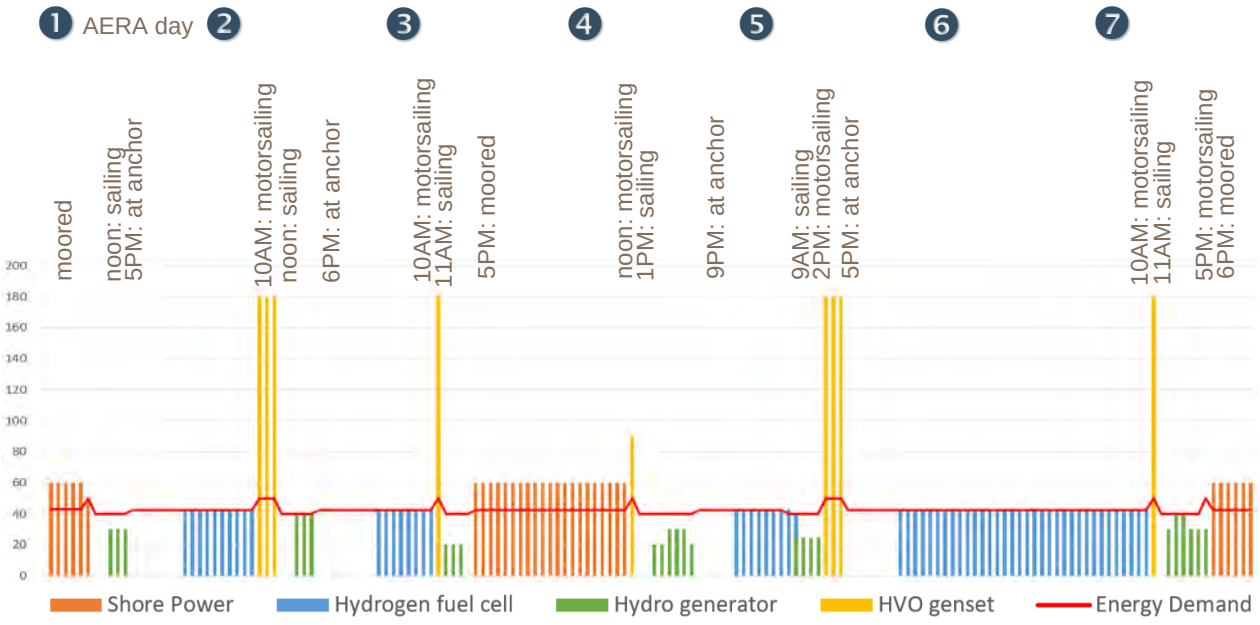
Read on: royalhuisman.com/en/royal-huisman-is-hydrogen-ready

IMPROVING CARBON FOOTPRINT: "WE HAVE DONE THE MATH."

A typical operating profile with owner and guests on board AERA predicts a combination of sailing, motor sailing, anchoring, and mooring with shore power. Simulations show that during a typical cruising week with sailing during the day and anchoring at night, including one visit to shore where shore power is available, AERA will not need to run the generator set for electricity to supply the hotel load. The gensets are only needed during motoring or motor sailing, generating electricity for the retractable propulsion system (RPS) units.

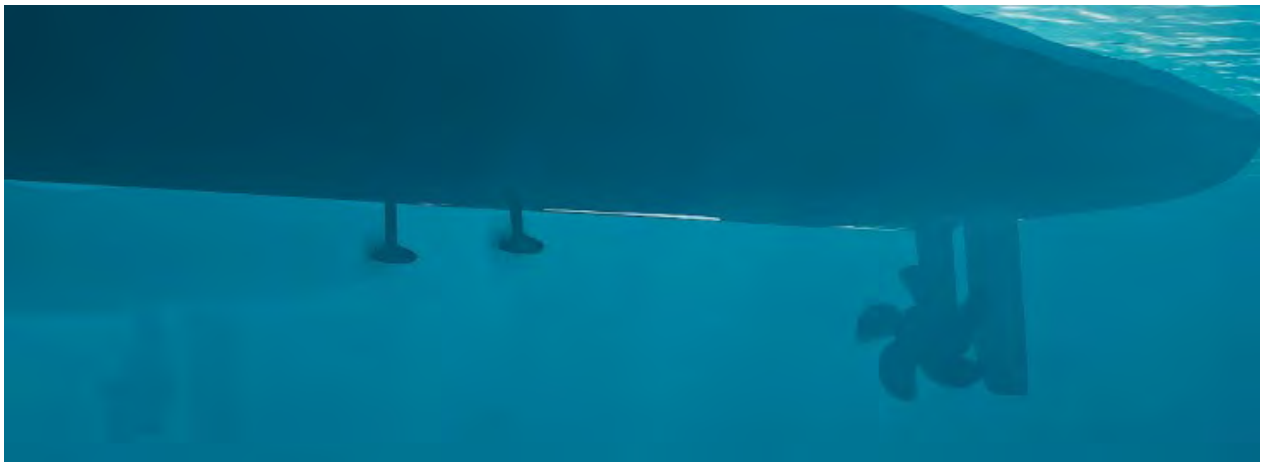


STATUS OF BATTERY AND HYDROGEN DURING ONE WEEK



HOTEL LOAD: ENERGY SUPPLY + DEMAND DURING ONE WEEK

In the simulation, this would total nine hours during the entire week (although this depends on the voyage and weather). The other 159 hours of this example week, guests will not experience noise, vibration or fumes from onboard combustion engines. Ninety-five percent of the time, the yacht will be battery powered. In this simulation, hydro generation kicks in when there is sufficient wind for sailing, and the hydrogen system is used as a battery extender. During this example trip, 90% of the stored hydrogen would be consumed.



FORWARD FACING RETRACTABLE ELECTRIC PROPULSION

Design & Innovation Awards 2024, innovation of the year. The powerful electric motors are installed within the retractable units resulting in a compact design producing silent and vibration-free propulsion when motoring. When the propulsion system is retracted into the hull for sailing, the hydrodynamic hull-form is maximized for efficient and fast sailing performance.

Read on: royalhuisman.com/en/innovation-of-the-year

ADD HVO TO THE EQUATION

Although the Wing Sail and energy system are designed to minimize reliance upon gensets, these will still be needed when the wind is not favorable. Running the gensets on hydro-treated Vegetable Oil (HVO) reduces the CO_2 emissions by up to 89%, gives a 40 to 80% reduction in exhaust particulate matter, and cuts NOx by 8% compared to fossil diesel, according to data from the Water Revolution Foundation.

RETRACTABLE PROPULSION OF AERA (TOP) AND SARISSA

THE LASER EXTERIOR LIGHTING OF PHI IS DESIGNED
TO ENHANCE THE YACHT'S SILHOUETTE

THE LASER EXTERIOR LIGHTING

A standout feature is the innovative laser fiber-optic exterior lighting system, which the shipyard team developed with Fibr8.com. This system, designed to enhance the yacht's silhouette, emits continuous glowing threads of light that highlight its exotic lines, creating a dramatic visual effect in any chosen color.

Beyond aesthetics, this lighting solution is practical, avoiding the common issues of LED gaps and failures, and is low on energy use and maintenance. Housed in a compact, accessible unit, this trendsetting technology is also installed onboard recent Royal Huisman motoryachts Phi and Special One.

Read on: royalhuisman.com/en/innovation/user-experience

RONDAL

Rondal is a leading specialist in the design and manufacture of high-performance sailing systems and equipment for superyachts. Founded nearly 50 years ago by Royal Huisman, the company has grown into a trusted partner for owners, captains, and shipyards worldwide. Renowned for its unrivaled Dutch build quality, Rondal delivers advanced carbon and aluminum masts and booms, winches and feeders, hatches, entrances, doors, windbreaks, custom composite parts, and mooring winches. Innovation is at the core of its approach, developing smarter, lighter, and stronger solutions that set new benchmarks for performance and reliability.

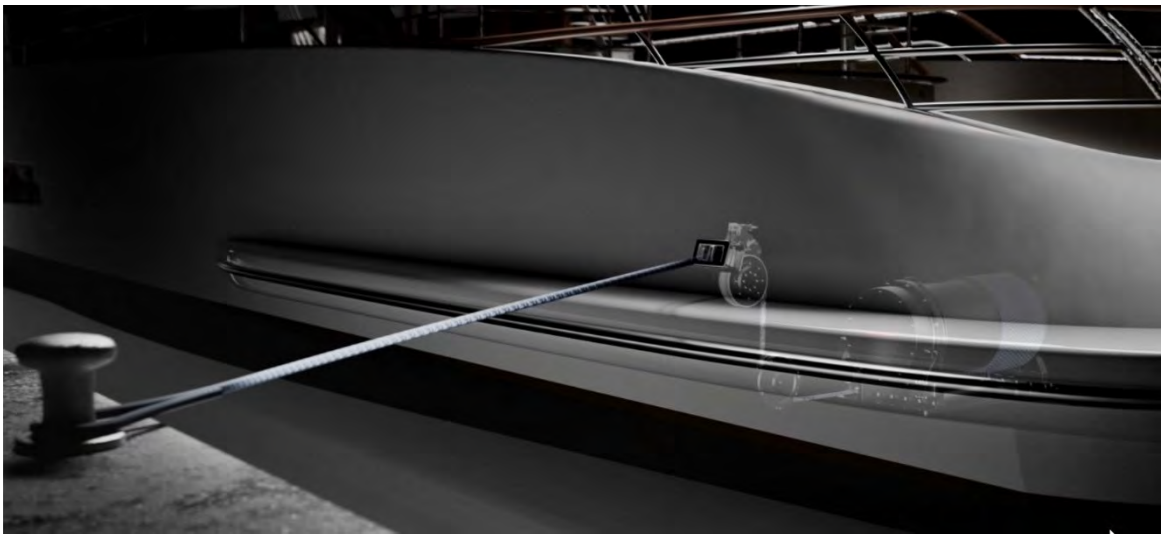
With a team of around 90 highly skilled engineers, composite experts, and technicians, Rondal manages turnkey projects from first concept through final commissioning. This hands-on approach ensures seamless integration and dependable operation. Rondal's mission is to continuously discover what can be achieved with a superyacht and to push the boundaries of performance and comfort. The company creates products that bring out the best in sailing and motor yachts, offering clients total ease of mind and ensuring ultimate reliability in any situation.

Rondal supplies various key technologies for this yacht:

- **Rondal Hydro Generators** enable regenerative sailing for sailing yachts, functioning independently of the propulsion system. Engineered for maximum efficiency, these systems minimize drag while maximizing electrical output while sailing. The Rondal Hydro Generator family includes three variants from 5kW to 15kW.

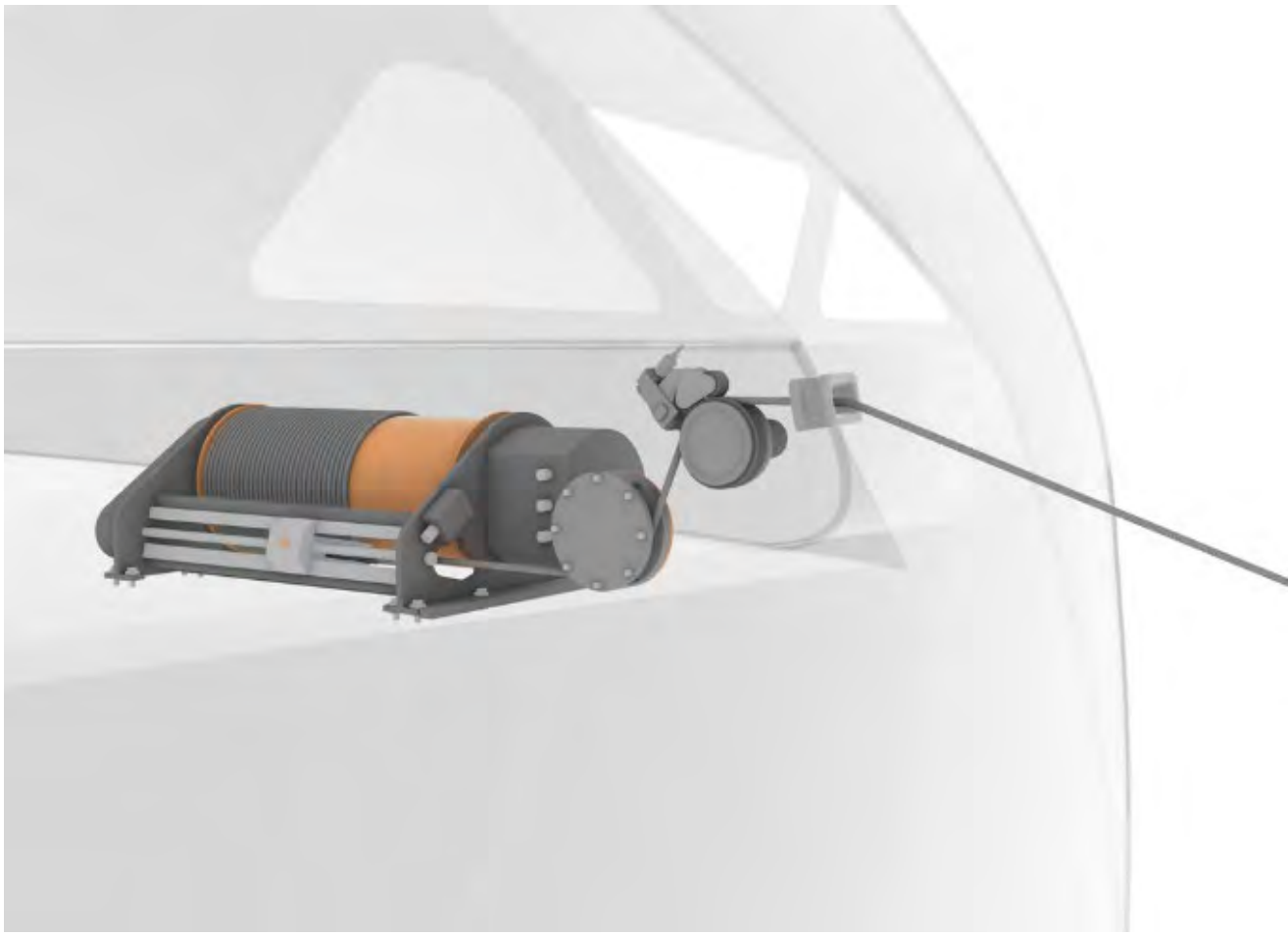
AERA will use four 15000 (15kW) hydro generators arranged on the inside of the hulls for a total maximum output of 60kW. The propellers have been tank tested at MARIN and on a test boat. They were found to be more efficient and produce less drag than CFD predicted. They do not retract but can freewheel when not producing electricity.

Link: rondal.com/en/hydro-generator



- **Rondal Mooring Winches**: replacements for long-ignored gear taking up deck space on the sides and at the sterns of yachts. Rondal retooled its large series captive sheet winches for use as innovative hands-free captive mooring winches. These captive reel winches store the line on the drum in a single layer to prevent jamming of lines.

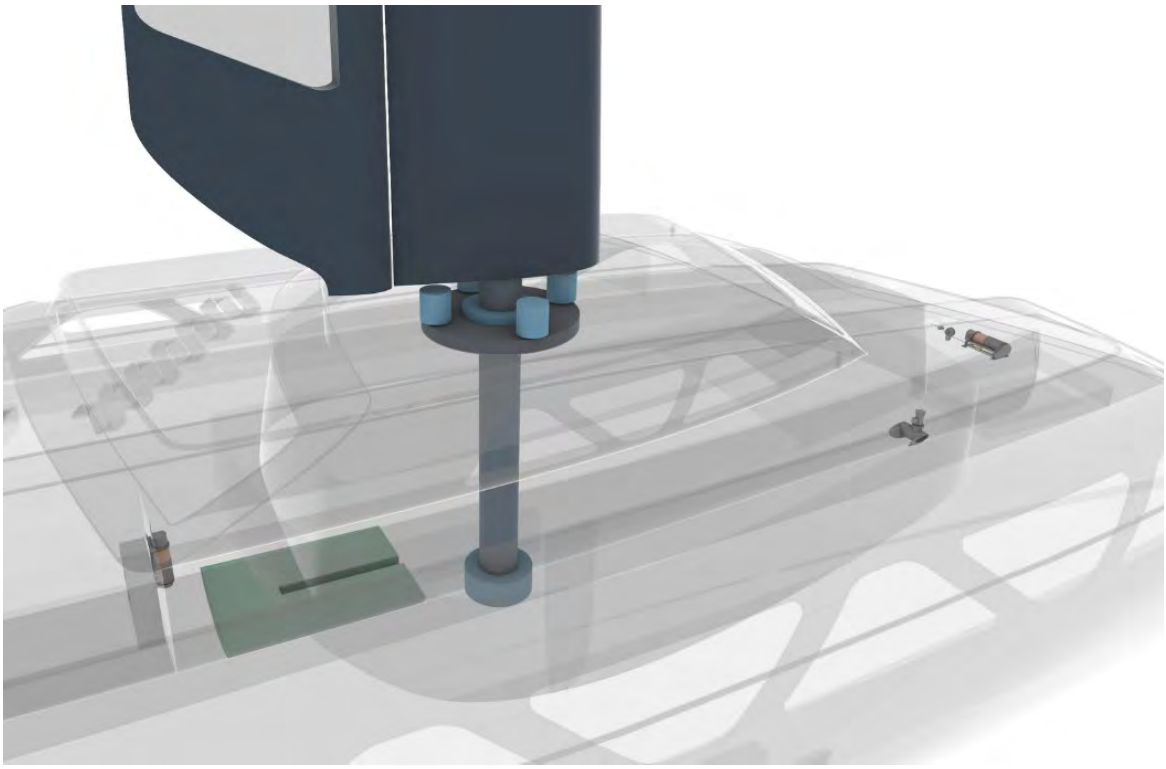
  A plus for crew efficiency, wireless remote control with load monitoring allows a single watchkeeper to select, check, and trim each line with precision while the winches themselves are out of sight, below deck. The system continuously monitors loads on all winch sheaves, which are integrated with the yacht's (Royal Huisman proprietary) Alarm & Monitoring (A&M) control system.



RONDAL CAPTIVE MOORING WINCHES CAN BE MOUNTED HORIZONTALLY, VERTICALLY OR UPSIDE DOWN

In 2024, SOLAS mandated hands-free mooring equipment for all yachts over 3,000 GT to enhance crew safety. Rondal's first set of these captive mooring winches and their controllers have already been installed on a 100m+ / 330ft+ motor yacht. Although they wouldn't be required for a yacht like AERA's gross tonnage, we believe crew safety and efficiency are valuable features for all yachts. The automated functions and the clean deck features align perfectly with the AERA Concept, which uses a total of eight RW-6000HW mooring winches, four per hull, each with a pulling power of 6 tonnes and a holding capacity of 9 tonnes.

Read on and watch video: rondal.com/en/products/mooring-winches



OUT OF SIGHT WITHIN THE SUPERSTRUCTURE
ARE POWERFUL ELECTRIC MOTORS TURNING THE WING SAIL

- **Rondal Aero Wing Sail**

  Commercial shipping has been adopting wind-assisted propulsion, including rotor sails, suction wings, and solid wings, as ways to meet reduced carbon emission limits. As of January 2025, 54 commercial ships with wind-assisted propulsion were in operation, with another 80 on order and 30 to 40 in the pipeline for delivery by 2027 – data shows such ships are reducing fossil fuel use by as much as 19% annually.

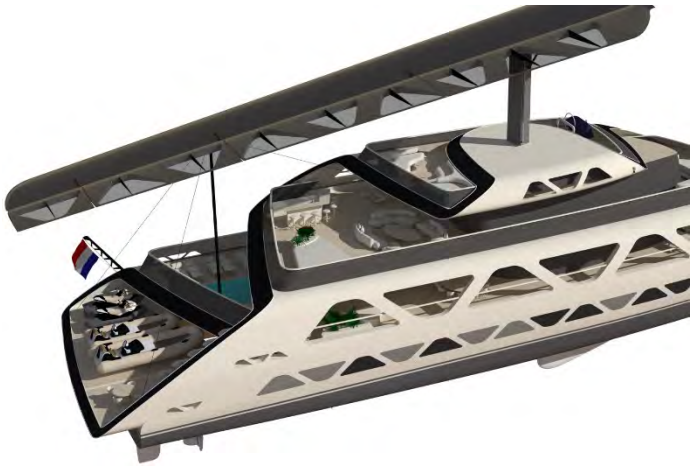
  The idea has lagged in superyachting, however, where carbon reduction has focused mainly on alternative fuels. Royal Huisman is exploring another approach. Unlike alternative fuels, a wing does not require chemical processes, bunkering, and on-board storage. Simply stated, a wing is a user-friendly, aesthetically refined, zero-emission propulsion force.

  The Aero Wing Sail developed by Rondal in collaboration with Artemis Technologies capitalizes on the growing demand for clean propulsion as the superyacht industry responds to regulations and initiatives such as FuelEU, the SEA Index, and the YETI scoring model.

Not simply a mast and sail, Rondal's Wing Sail is a complete system for catamarans and motoryachts incorporating the airfoil, the rotation system, and the controls. The product is available in six different spans (20 to 45m / 66 to 148ft) to accommodate a wide range of yacht sizes, with customization possible. These wings are up to 60% more efficient than triangular fabric sails.

TESTING OF THE WING SAIL DEVELOPED BY RONDAL IN COLLABORATION WITH ARTEMIS TECHNOLOGIES

At its core, the Wing Sail consists of a lightweight composite wing structure with a two-element airfoil (main structural element) and multiple flaps along the trailing vertical span for optimal aerodynamic control. For passing bridges, rare extreme weather conditions, or yard periods, the Wing Sail can be tilted to a horizontal position.



BY USING A POWERED SYSTEM, WITH ITS MECHANISM COMPLETELY HIDDEN INSIDE, THE WING CAN BE TILTED TO A STOWING POSITION

According to Rondal's innovation engineers, the Wing Sail is targeting an audience not fully knowledgeable about sailing, or an owner who may have a crew that's not thoroughly trained in sailing. The autonomy of the system means they can remotely operate the wing without difficulty and have it automatically trimmed. It does not need to be furled or removed when the yacht reaches its destination.

Link: rondal.com/en/aero-wing-sail

AERA SKYLOUNGE

COR D. ROVER DESIGN

Dutch naval architect Cor D. Rover has the sea in his veins. Cor was actually born on a boat and his family lived aboard while his father worked as a barge captain. Cor's office is in Rotterdam's old water police office, which is a floating building. When the water police moved to new quarters, the building was towed across the port and turned into a harbor manager's office. The Cor D. Rover design office occupies the top floor, and yes, it bobs up and down with the tide or a passing squall. His studio designs both production yachts and custom yachts. His previous project with Royal Huisman was the motoryacht PHI.

58M / 192FT MOTORYACHT PHI

AERA SKYLOUNGE

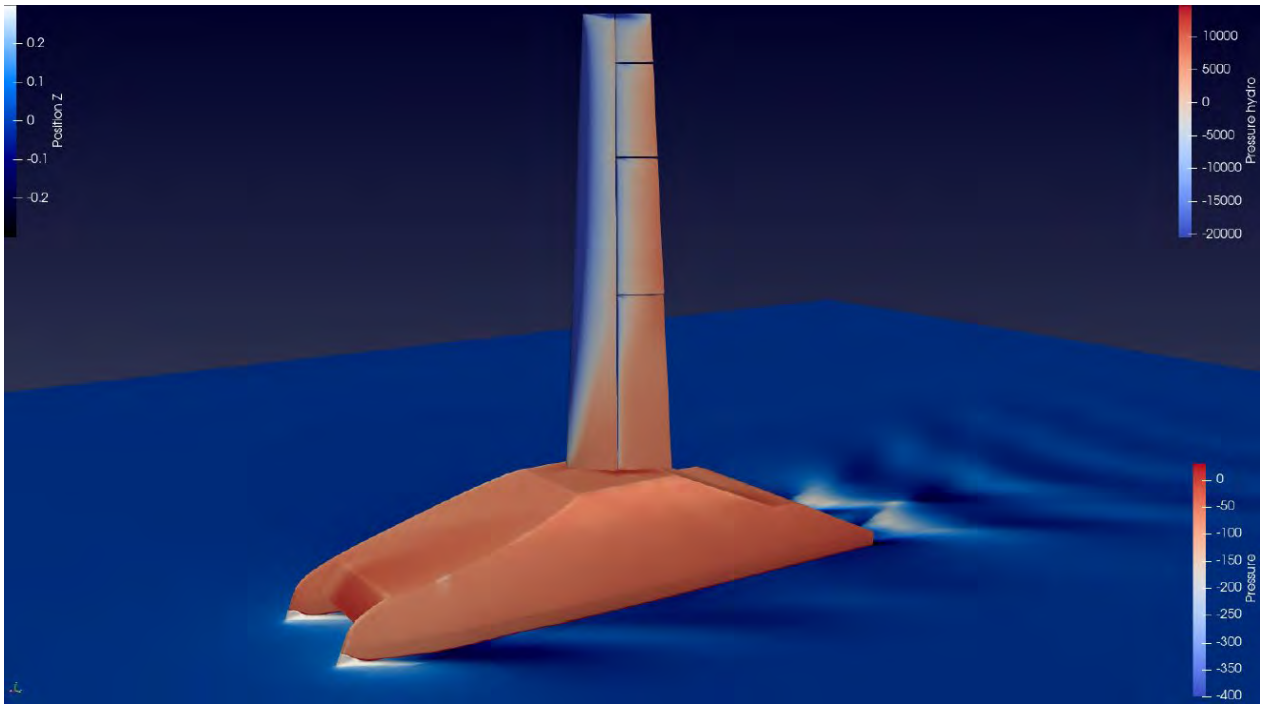
“At the beginning of this project, I was hired as a naval architect to propose a basic platform to support the Wing Sail technology. The more the project evolved, and the more other pieces of technology were adapted to the concept, the more we developed the hull. Royal Huisman pushed me to go outside my comfort zone, to do something really unusual. The end result is a unique design that packages all the innovations. I am very impressed by the amount of engineering that went into a design that has no client yet. The calculations are done. Royal Huisman wanted to make sure that it is truly feasible,” said Cor, “and it is.”

Website: cor-d-rover.com

ARTEMIS TECHNOLOGIES

The concept's naval architect, Artemis Technologies, is a world-leading clean maritime and applied technologies company with a mission to decarbonize the maritime industry. Offering multi-disciplinary consulting services through their Applied Technologies division, the company provides groundbreaking simulation expertise, high-performance sail team management, hydro and aerodynamic design optimization, computational fluid dynamics (CFD) and control system design. Their core philosophy is to develop techniques that allow for fast and accurate evaluation and optimization of designs for customers.

Artemis Technologies is a spin-off of the Artemis Racing America's Cup team. Their CEO, Dr Iain Percy OBE, is a four time Olympian, three time Olympic medalist and double Olympic champion. He is also a veteran of four America's Cup challenges. Iain Percy founded Artemis Technologies to see how the team's expertise in hydrofoiling and wing sail technology could play a role in the decarbonization of the maritime industry. It is no coincidence that the organization is named after the Greek goddess who was the guardian of nature.



AERA SIMULATION BY ARTEMIS TECHNOLOGIES

In 2022, it launched the world's first commercially viable 100% electric foiling workboats. This has been followed by pilot boats, water taxis, and a 150 passenger ferry under development. The mission is to lead the decarbonization of the maritime industry through the design and development of transformative technologies such as the Artemis eFoiler® electric propulsion system and commercial vessels that produce zero emissions during operation.

Iain Percy notes, "The work we are doing with Royal Huisman is cutting edge and focusing on our ability to simulate forces, loads, and actuation. It is able to support the skills Royal Huisman and Rondal have built to very large, complex structures. We work very well together because we bring unique skills to quite rapidly simulate something completely new, like this, on a new boat, in a new environment, and assess risks quite quickly. When it comes to mitigating those risks, we rely on Rondal and Royal Huisman, who possess the knowledge of large systems, practicalities, aesthetics, and other areas where we lack expertise. I think, if we're honest, we all set this out with a spirit of intrigue, investigation, and passion for decarbonization."

Website: artemistechnologies.co.uk/applied-technologies

ROYAL HUISMAN'S SHIPYARD: HOME TO THE WORLD'S FINEST SUPERYACHT BUILDING

ROYAL HUISMAN

Some names need no introduction. To anyone who ever genuinely considered acquiring a luxury super yacht, hearing the name "Royal Huisman" as the builder of those finest and most distinctive yachts in the regatta or marina will be a familiar experience.

When admiring the build quality and attention to design detail on a particular yacht, the reply from her owner or crew "It's a Royal Huisman" is virtually regarded as self-explanatory.

AERA

ROYAL HUISMAN

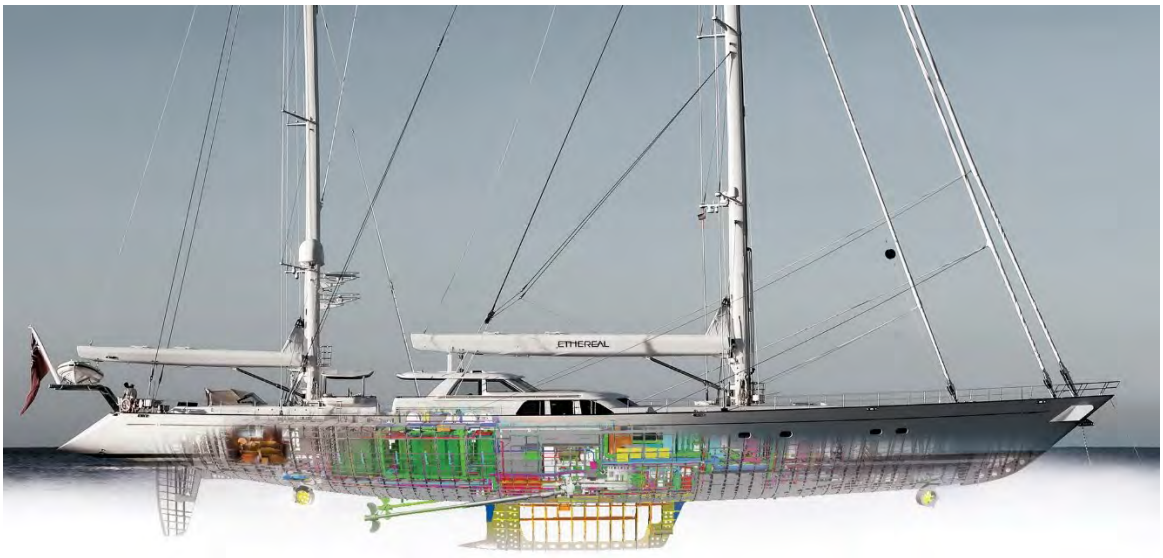
Royal Huisman sailing and motoryachts are deemed unique in conception, quality and execution. Award-winning superyachts that are rare, beyond compare: the ultimate expression of personal freedom.

- **Project Tidal Shift**

  Guiding the way to sustainable yachting: a comprehensive initiative to drive sustainable and responsible practices across the superyacht sector. This joint project by Royal Huisman, Rondal and Huisfit reflects the team's commitment to safeguarding the environment while leading by example in sustainable business practices.

  Based on more than 140 years of ocean exploration, Royal Huisman is committed to preserve the seas that sustain both its superyacht sector and the world. Recognizing that its actions impact the planet, the shipyard team is dedicating significant time, energy, and resources toward ecological preservation.

  Read on: royalhuisman.com/en/project-tidal-shift



- **The world's first hybrid superyacht**

  Royal Huisman launched Ethereal, the world's first hybrid superyacht, in 2008. Noted for her pioneering hybrid propulsion system and incorporating 400kWh of stored energy in her Li-ion battery bank Ethereal has now logged several hundred thousand miles traversing the world's oceans propelled either by sail, by mechanical propulsion, or via her stored energy source. She could recharge while sailing courtesy of shaft generators, also an innovation at the time. Furthermore, her entire domestic load – in addition to sailing systems and anchoring functions – can source its power from this same set of Li-ion batteries, enabling true stealth mode operation.

  Read on:

  - An Ethereal world: royalhuisman.com/en/an-ethereal-world
  - World's first hybrid superyacht launched (in 2008): royalhuisman.com/en/world-s-first-hybrid-superyacht-launched-in-2008

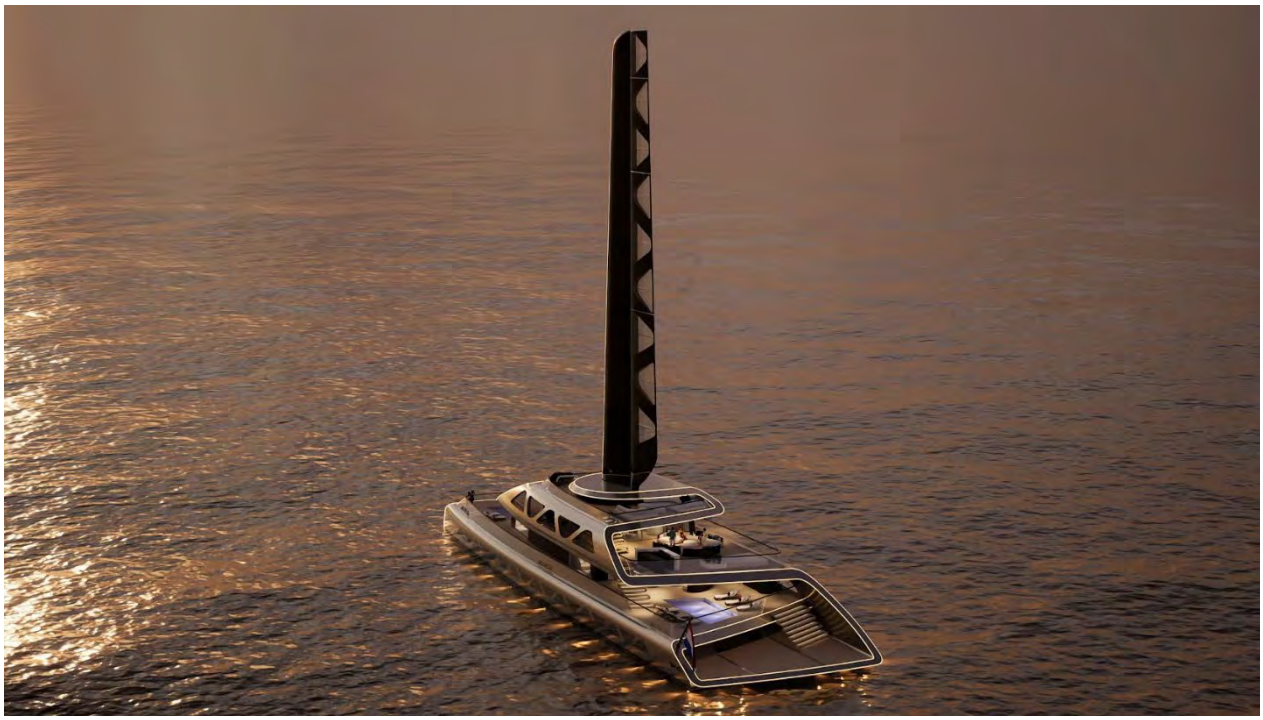
630 WORDS SUMMARY OF PRESS RELEASE

The ultimate hybrid superyacht combines wind, water, hydrogen and hydrogeneration to power luxury cruising

Royal Huisman unveils AERA — a groundbreaking 50m / 164ft hybrid catamaran that redefines sustainability and blurs the lines between power and sail, showcasing an unprecedented matrix of technical innovations in the process.

Royal Huisman, the innovative Dutch shipyard behind the world's first hybrid superyacht, now unveils AERA – a bold departure from traditional yachts. She transforms how luxury vessels use wind and water, fuel cells, and biodiesel to cruise nearly carbon free and to anchor with zero emissions for up to 72 hours.

The result of a multi-year R&D investment by Royal Huisman, sister company Rondal, Artemis Technologies, and Cor D. Rover Design, concept AERA pairs top research into wind-assisted propulsion, hydro-generator advances, a unique energy storage system, and a super-efficient, head-turning design. The result is a yacht that sails and motor sails with levels of efficiency, stability, ease of operation and comfort never before achieved.



Game-changing wing

At AERA's core is a towering 35m / 115ft Wing Sail that enables the yacht to go from stationary to sailing in as little as a minute. This groundbreaking 245m^2 / 2,640sqft unstayed wing, inspired by America’s Cup yachts, rotates 360 degrees and requires no sheets, winches, or deck hardware.

Automation is the key. The captain enters the destination or direction, and perhaps a desired speed or arrival time as well. The computerized control system handles all wing adjustments for the desired speed and conditions, adding a boost from retractable electric sail drive units if motor sailing is the best option

The dramatic-looking unstayed wing uses airfoil technology with adjustable trailing-edge flaps that automatically optimize performance or completely depower by feathering into the wind. Extensive testing on a prototype confirmed the wing's ability to safely handle extreme weather conditions while providing dramatically superior efficiency – calculations show a traditional sailing rig would need 40 to 60% more area to match this wing's power.

Zero-emission innovation

AERA steps up Royal Huisman's environmental mission with multiple clean energy systems. A 580kWh battery bank can power the yacht's entire hotel load silently for 11 hours. Escaping the weight and bulk of multi-megawatt systems aboard some next-gen superyachts, Rondal's latest hydro-generators constantly and silently charge this battery bank underway. When stationary and away from a marina, batteries can be topped up by a hydrogen fuel cell. Three 62kg / 137lbs pressurized hydrogen bottles powering the fuel cell can create enough electricity for an additional 72 hours of zero-emission operation. When motoring or motorsailing, generators running on HVO (89% less carbon emissions than diesel) power the yacht’s DC electrical grid and her retractable 500kW azimuthing electric drive units – the same award-winning technology created for Royal Huisman’s 60m / 196ft SARISSA, charging batteries simultaneously.

Through a combination of design and technology features, we expect AERA to offer owners the ability to enjoy the superyacht lifestyle with less environmental impact than comparable 10-passenger yachts.

Visionary design

Cor D. Rover designed AERA's bold asymmetrical profile atop twin hulls as the perfect complement to the Wing Sail. It provides an impressive 694m^2 / 7,470sqft of exterior deck space for up to 10 guests in a spectacular main deck primary suite and four cabins below yet stays below 500GT. Three deck levels – unheard of in sailing yachts – create unique experiential living spaces while reducing HVAC needs through smart shading. By uncoupling the walls of interior rooms from the superstructure, he reveals a uniquely fresh flow of spaces and the ultimate in relaxed, indoor/outdoor living.

Simplified operation

CEO Jan Timmerman emphasizes AERA's ease of use to be able to sail with confidence: “AERA represents more than technological advancement — it's a complete redesign of sustainable luxury yachting that makes clean cruising irresistibly attractive to owners seeking both environmental responsibility and comfort.”

END OF PRESS RELEASE SUMMARY

PULL-OUT-TEXTS / FACTS FOR PRESS

1. The next-generation Wing Sail by Rondal makes AERA as easy to get underway and operate as a motoryacht.

2. AERA boasts 670 square meters / 7,212 square feet of exterior deck space, spanning her 50 meter / 164 feet length, comparable to a typical 65 to 70 meter / 213 to 230 feet monohull motoryacht.

3. AERA's dynamic package is fit for tomorrow: Rondal wing sail, retractable propulsion system, Rondal captive mooring winches, energy storage system (consisting of compressed hydrogen, a fuel cell and batteries), Rondal hydro generators, variable speed generators, HVO biodiesel fuel tanks, laser exterior lighting

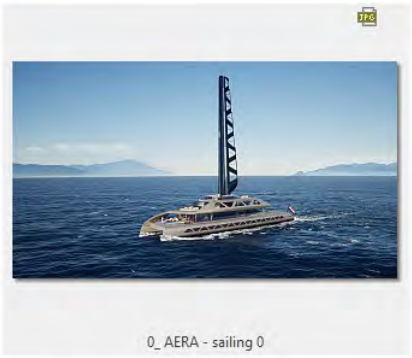
4. **"During a couple of months of exchanging ideas, we were convinced that a catamaran was the perfect platform, both for a psychological approach to the fixed wing and for a cat's inherent stability under sail. And on top of that, you get phenomenal decks."** - Cor D. Rover, Cor D. Rover Design

5. **"The work we are doing with Royal Huisman is cutting edge and focusing on our ability to simulate forces, loads, and actuation."** - Dr. Iain Percy, Artemis Technologies

6. **"Aboard AERA, while raising the anchor, the captain enters the destination, sets the wing to automatic trim, the wing sail responds, and you are sailing in less than a minute."** - Jan Timmerman, Royal Huisman

7. **"AERA will have the space of a New York penthouse overlooking Central Park. Yet, each day a different, and better view."**


0_ AERA - sunset 0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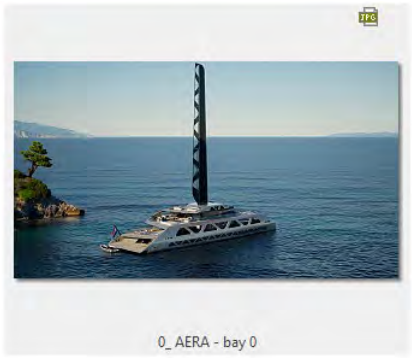
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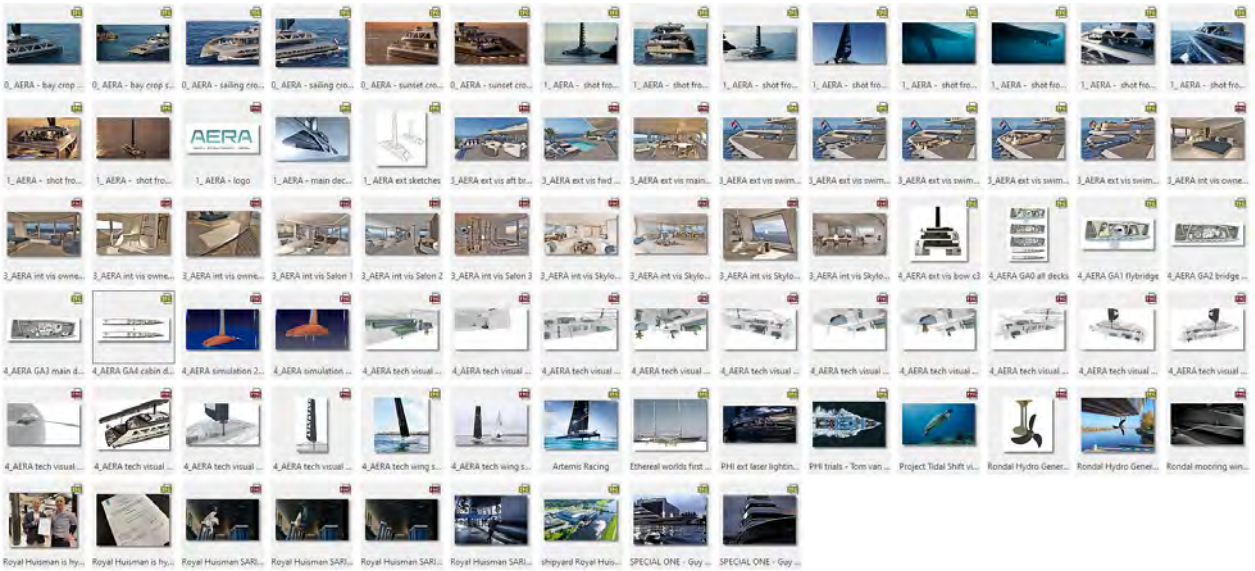

LAST, BUT NOT LEAST

As you might know Royal Huisman works closely with our clients and members of the yachting press. We do this in order to give all our media friends equal support and opportunity. Please introduce us to new press colleagues: we will be pleased to assist them and add their contact details to future press releases.

The above images from this press release can be available on request. For any questions, please contact Jurjen van ‘t Verlaat (jurjen@royalhuisman.com or +31 527 243131). Can you please send us a high-res pdf of the final article or link to the website page after publication?

ROYAL HUISMAN