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SUPERYACHT ENGINE ROOM

American Beauty
PALMER JOHNSON'S LADY M

Balance of Power
THE COLUMBUS 40M SPORT HYBRID



RIGHT: According to the builder, the Columbus 40M Sport Hybrid has a top speed of 22 knots in full diesel-engine mode.

Balance *of* Power

With her dashing exterior lines, crisp interior design and innovative powertrain, the Columbus 40M Sport Hybrid is causing a stir. But is the new superyacht from Italy's Palumbo Shipyard the final word in alternative propulsion technologies?

BY Justin Ratcliffe **PHOTOS** Thierry Ameller

THE VERY MENTION OF HYBRID PROPULSION USUALLY brings with it fashionable theorizing about global warming and carbon footprints. Hybrid propulsion, while not a cure-all solution, can indeed provide reductions in fuel consumption, emissions and noise levels. The Columbus 40M Sport Hybrid, built by Palumbo Shipyard in Naples, is the first motoryacht to receive RINA's "Hybrid Propulsion Y" along with "Green Star Plus Platinum" notation, based on a performance index that covers all aspects of the vessel's impact on the environment. But it is arguable that eco-friendliness is not the main attraction of hybrid propulsion. Much of the confusion arises from comparisons with hybrid automobiles, a misleading analogy as yachts are required to operate in a very different environment. They cannot, for example, recharge their batteries when braking or coasting downhill.







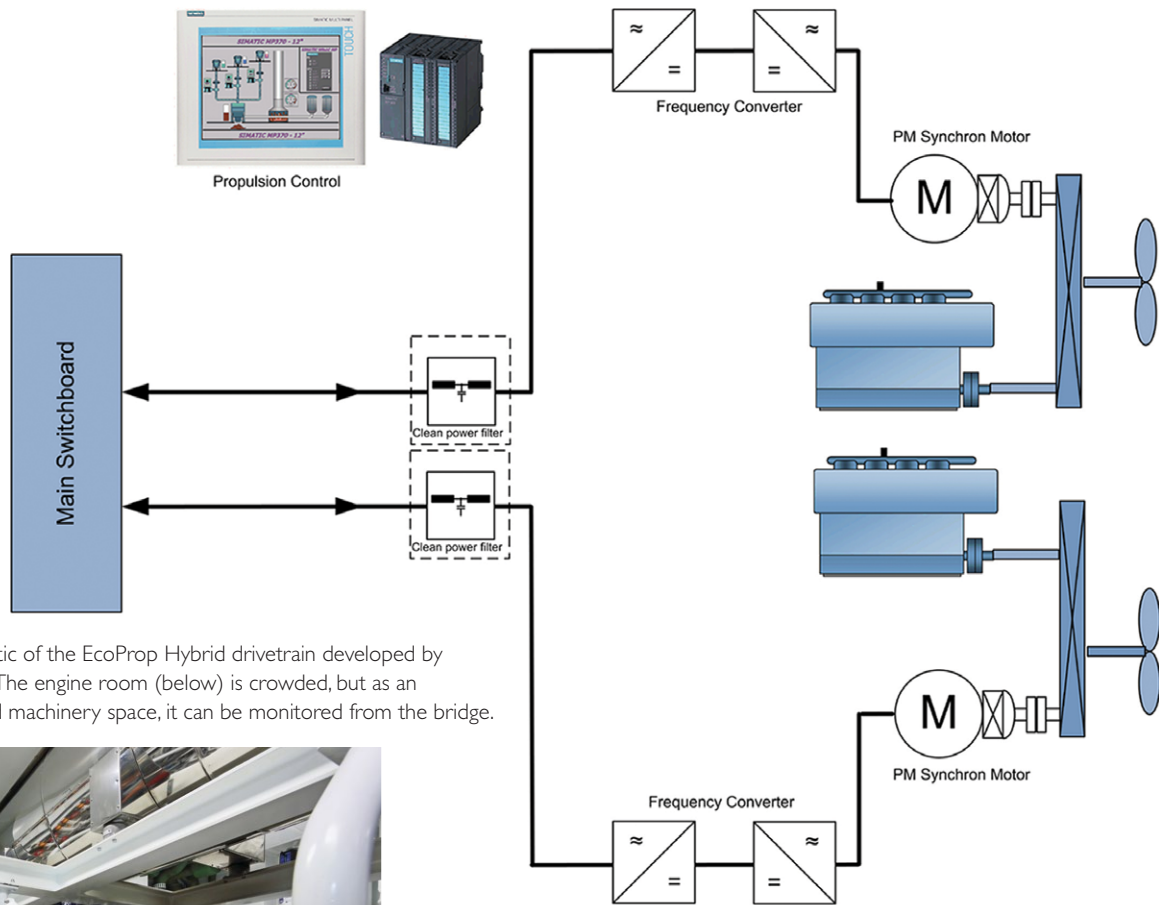
ABOVE: The integrated I-Bridge system by Team Italia provides a clutter-free wheelhouse. In the absence of wing stations, a wireless maneuvering device can be used to pilot the yacht.

“When we consider hybrid cars, we usually put the emphasis on energy saving and reduced emissions,” explains Sergio Cutolo, who heads up Hydro Tec, the firm of naval architects that designed the 131-foot (40-meter) Columbus Sport Hybrid for Palumbo. “Hybrid propulsion at sea has a different set of objectives and provides different, but just as significant, advantages. Batteries are not the answer on larger vessels because they’re big and heavy, have a limited autonomy and lifespan, and cannot cater to all the hotel power demands.”

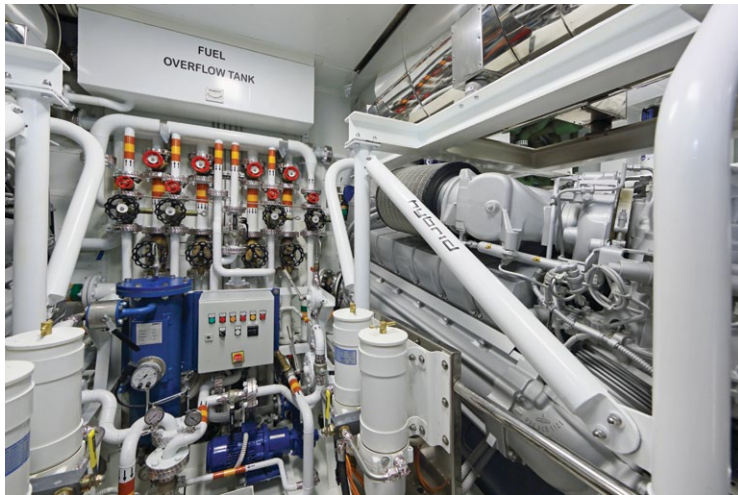
In line with this thinking, the Columbus Sport Hybrid does away with battery banks to focus on the efficient and flexible power management of its EcoProp Hybrid package, which was specifically devised by Siemens Marine Solutions to meet the requirements of yachts and small ships. The system combines twin 1,920-horsepower MTU main engines with two 60kW electric motors and two 80kW diesel generators (plus an emergency genset) in various operational

modes. One mode is for cruising up to the yacht’s top speed of 22 knots, when the main engines provide the propulsive power. A second mode is when the yacht is steaming up to its cruising speed of 15 knots, when the two electric motors can work as shaft generators to provide the hotel power demands. A third mode is for cruising at economical speed, when the diesel generators power the electric motors to drive the yacht at 7.5 knots in extremely quiet conditions with exceptionally frugal fuel consumption of just eight gallons per hour. There is also the option to cruise with one main engine only driving the two shafts: one directly, while the other is driven by an electric motor that is powered by the second motor operating as a shaft generator.

But there is no such thing as a free lunch, especially when it comes to propelling a large yacht through the water. Hybrid systems are generally costlier, heavier and bulkier than a conventional diesel drivetrain. In terms of cost, Palumbo’s client embraced the hybrid solution from the start. But from the shipyard’s perspective, considerable thought had to go into the layout of the engine room to take



A schematic of the EcoProp Hybrid drivetrain developed by Siemens. The engine room (below) is crowded, but as an unmanned machinery space, it can be monitored from the bridge.



into account the separate gearbox, clutch and various flexible couplings between diesel engines and electric motors, plus the parallel drivetrains that each require their own cooling, lube and monitoring systems. The result is an engine room packed to the proverbial gills. Gianpaolo Lapenna, Palumbo's project manager on the vessel, prefers to liken the space to the inner workings of a Rolex watch, but admits "the biggest challenge was how to place all the auxiliary equipment associated with the hybrid system without impinging on the guest spaces." Fortunately, as an unmanned machinery space, the systems can be monitored from the bridge without the permanent presence of a crewmember in the engine room.

Outside of technical manuals, the terms "diesel-electric" and "hybrid" tend to be used interchangeably. But Jeff Bowles,

technical director at Donald L. Blount & Associates, the Chesapeake, Virginia-based firm of naval architects and marine engineers, points to a subtle distinction. Diesel-electric drive systems use diesel engines as generators to either power electric motors or to charge battery banks that will drive electric motors. In other words, there is no direct shaft connection between the propellers and the diesel engines. A hybrid diesel-electric uses diesel engines as generators, but also as propulsive engines to directly drive the propellers. In any case, as with the Columbus Sport Hybrid, all the energy ultimately derives from burning diesel fuel, whether directly or indirectly. For Bowles, however, "a true hybrid suggests the integration of an alternative or recouped energy source, as in hybrid gasoline-electric automobiles."

As an example of a "true" hybrid, Bowles refers to Royal Huisman's *Ethereal*, the 190-foot (58-meter) ketch delivered to her owner, Bill Joy, in 2009. By allowing the propeller to freewheel while under sail, the prop acts as a generator to charge battery banks (the WhisperPower hybrid propulsion system aboard Holland Jachtbouw's J-Class yacht *Rainbow* employs a similar solution). Naval architect Rob Doyle of Rob Doyle Design in Kinsale, Ireland, worked closely on the *Ethereal* project with Ron Holland.

"*Ethereal* could run on silent ship for eight to 10 hours on the battery bank, including the a/c, but the electrical system behind



‘The main advantage today of hybrid propulsion is flexibility.’

—Sergio Cutolo

J. RATCLIFFE

it was massive,” Doyle remarks. “The computers managing the power drain and recharge were extremely complex and you needed a specialist electrician on board to manage them. Bill Joy loved the project, but other owners would turn around and ask where the advantage was for them beyond bragging rights.”

For his part, Jeff Bowles regards many of the advantages of hybrid/diesel-electric propulsion as perceived rather than real, and even argues that in certain circumstances such systems can be less efficient than a conventional diesel setup.

“The reality is that if you look at the typical operational profile of a motoryacht, hybrid or diesel-electric propulsion just doesn’t make that much sense,” he argues. “This is not to say that hybrid technology does not or cannot work on a yacht, rather it only makes sense under the correct operational profile and a prudent owner shouldn’t be swayed by industry buzzwords such as ‘green’ or ‘eco-friendly’ when it’s really only adding cost without benefit.”

The argument that hybrid propulsion is necessarily quieter than a conventional drive train can also be countered. “Using the shafts as generators can produce more noise and vibration because the shafts are always spinning, and if the A-brackets are under a cabin somewhere, that’s going to be annoying,” says Doyle. He goes on to point out that diesel engine rooms are becoming increasingly

quiet, to the point where owners are more likely to complain about the whoosh of air from the a/c than noise from the engines or generators.

“The main advantage of hybrid propulsion today is flexibility,” concludes Cutolo. “Batteries are the weakest link because you still need to use energy-hungry bow thrusters and have some reserve power. With everything we’re now studying, diesel engines are still the best option in terms of power production, despite all the noise, vibration and pollution they produce. This will only change when we have workable fuel-cell technology.”

In this context, the Columbus Sport Hybrid represents an aesthetic and technological step forward for owners who are mindful of environmental issues but are not ready to compromise when it comes to looks and performance. By providing the freedom to mix and match diesel and electrical power systems so that engines and generators operate at peak efficiency, it provides a progressive yet rational solution in an industry where diesel mechanical is likely to be the most efficient and cost-effective means of power production for some time to come. ■

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CONTEMPORARY CALM

“A yacht that is built only on the basis of technical considerations will be an ugly boat,” says Sergio Cutolo. “The preliminary layout represents the designer’s ideas as well as the owner’s wishes, but I always try to read between the lines. If you are able to create the right feeling at this stage, then you already see the boat and you know what kind of hull you are going to design; you detect what the critical points will be and everything flows naturally.”

With this in mind, Cutolo was keen that the exterior profile reflected the yacht’s sophisticated hybrid propulsion, monitoring system by Onyx Marine Automation, integrated I-Bridge by Team Italia and the handheld wireless Vessel Maneuvering Assistant device from Xenta Systems. With its near-vertical stem and automotive-inspired detailing, such as the Aston Martin lookalike ventilation grilles, the yacht certainly deserves its “Sport” appellation. Glass cutouts in the bulwarks on either side of the main salon reduce the hull mass in profile and provide uninterrupted views, but also serve as fold-down balconies. Full-height glass doors, engineered to either slide or hinge open, turn the salon into a floating terrace with



ABOVE: Fold-down bulwarks open up the main salon on both sides.

TOP: An aerial shot of the yacht reveals the sundeck layout and forward Jacuzzi.

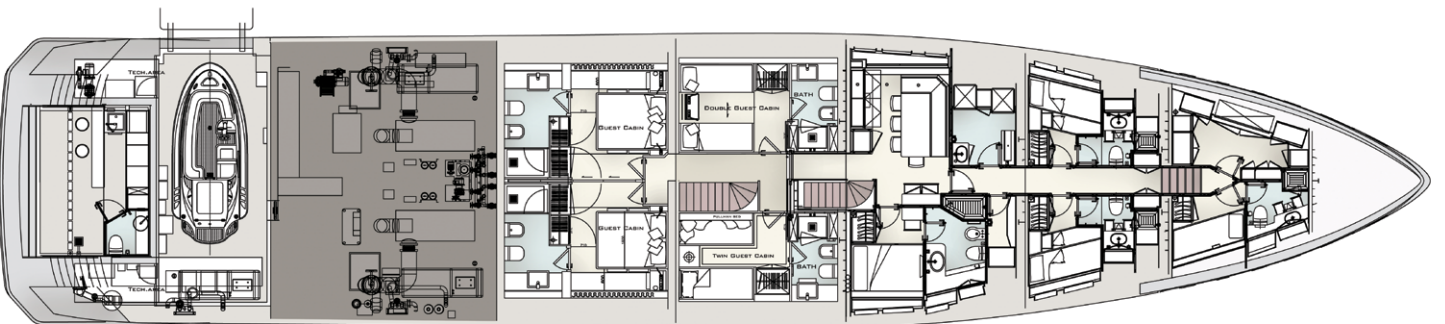
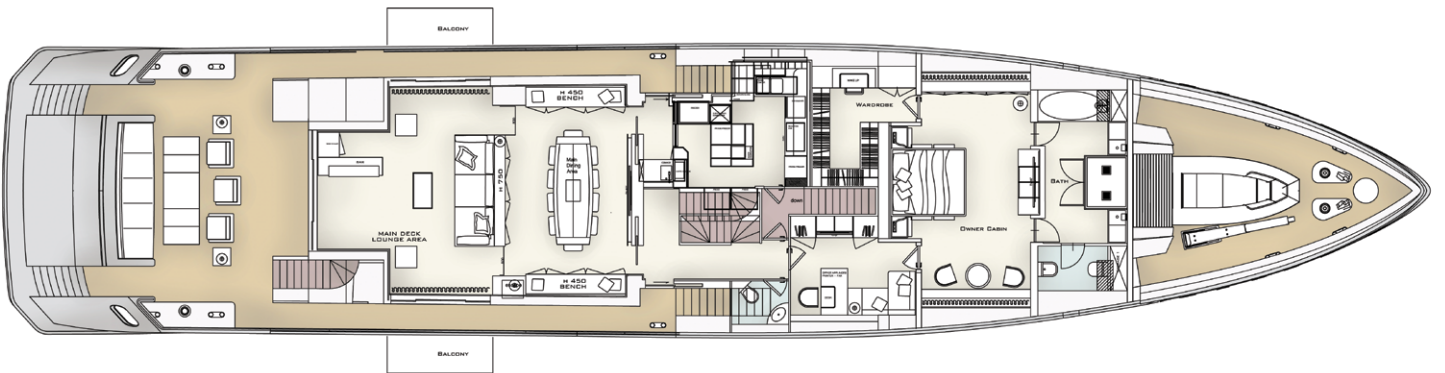
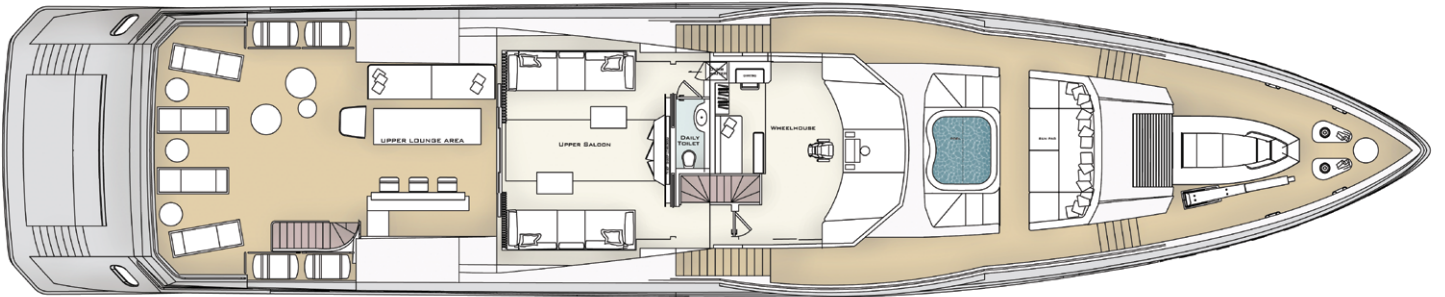


unrivaled sea views when the balconies are deployed. A late change order required replacing a dining table on the foredeck with the Jacuzzi.

The calming, contemporary interior is by Hot Lab in Milan and based on a combination of FSC-certified American walnut and Tay wood veneers with surfaces of honey brown Breccia Sarda and creamy Adria Venato marble. Bold contrasts have been avoided and much of the stainless-steel detailing has a soft, nickel finish. One of the owner's requests was for flexible living spaces, so a sliding partition between the double guest cabins on the lower deck allows them to be converted into a single VIP cabin. To add texture to the décor, the designers introduced scallops and three-dimensional shapes into doors, ceiling panels and the fitted furniture, which is contoured to avoid sharp edges. Thanks to the large windows and seven-and-a-half feet of headroom—exceptional on a yacht of this size—the main salon and full-beam owner's suite are flooded with natural light.



ABOVE: The contemporary, yet calming interior design by Hot Lab is based on a mélange of American walnut and Tay wood. The skylounge is shown above and the full-beam master suite is shown at top.



PALUMBO SHIPYARD Columbus 40M Sport Hybrid

LOA: 131ft. 4in. (40m)
LWL: 126ft. 2in. (38.45m)
Beam: 26ft. 10in. (8.20m)
Draft: 5ft. 9in. (1.75m)
Construction: aluminum
Displacement (full load): 203 tons
Gross tonnage: <500GT
Engines: 2 x 1,920-hp MTU 12V 2000 M94
Electric propulsion: 2 x 60kW Siemens ABT

Fuel: 11,782 gal. (44,600L)
Speed (max.): 22 knots
Speed (cruising): 15 knots
Range: 2,000nm @ 12 knots
Generators: 3 x 80kW
Freshwater: 1,505 gal. (5,700L)
Stabilizers: zero speed
Classification: RINA, Compliance LY2,
 Green Star Platinum Plus (Y)

Naval architecture:
 Hydro Tec/Sergio Cutolo
Exterior styling:
 Hydro Tec/Sergio Cutolo
Interior design: Hot Lab
Guest cabins: 4
Crew: 7
Builder: Columbus Yachts by Palumbo
Year: 2013