

The Backroom Boy



Building Design's Foundations

Because they are responsible for what we see, the designers are the rock stars of the superyacht world. The naval engineers and architects rarely get to share the limelight, because they are responsible for what we don't see – unless we go looking. One such working quietly away behind the scenes is Sergio Cutolo of Hydro Tec in Italy. After cutting his professional teeth with shipyards such as Baglietto, where he (twice) served as Technical Director, and Rodriquez in Sicily designing fast ferries, today Cutolo heads up one of the foremost yacht engineering studios in Europe. Justin Ratcliffe visited the Varraze based company to learn more about what goes on in the superyacht backstage area.

EVIDENCE FOR HYDRO TEC'S STATUS IS THE FACT THAT THE company appears unaffected by the economic crisis with 16 projects in build totalling 630 metres overall. These projects vary from the small Sumhuram 54, an open model of 16 metres, to two 70-metre steel and aluminium megayachts in build at Proteksan Turquoise. In between there are fast aluminium yachts, steel trawlers, planing fibreglass boats and even two 34-metre wooden schooners under construction in Bodrum.

In contrast to the industry talk of doom and gloom, Hydro Tec is expanding its client portfolio both at home and aboard. In Italy, Cutolo is engineering the 50-metre *Aifos* (opposite top) for CBI Navi with exterior and interior styling by Giorgio Vafiadis and the Columbus 177-foot (below) and 187-foot, the first yachts to be built at the Palumbo commercial shipyard in Naples. Besides restyling the

successful Naumachos 82 explorer vessel (with four delivered or in build and a further four on order) and the new Naumachos 105, construction has also begun on the 45-metre steel and aluminium *G Two* at Cantieri Navali di Pesaro. This is in addition to his role as owner's representative on the CRN hulls #128 of 60 metres and #129 of 80 metres (plans for a 50-metre fast project with CRN have been put on hold). Outside of the country, besides the two aforementioned 70-metre projects at Proteksan (opposite bottom) in Turkey and two Sumhuram 54s (opposite middle) in Tunisia, Hydro Tec is also working on a 53-metre motoryacht and a 39-metre fast open yacht for Golden Yachts and a 60-metre project for Lambda Yachts in Greece. Moreover, Hydro Tec developed the propulsion engineering and hydrodynamics for Nauta Yachts' 80-metre Project Light and is working with Toy Marine to optimise its existing range.



Creative Naval Architecture

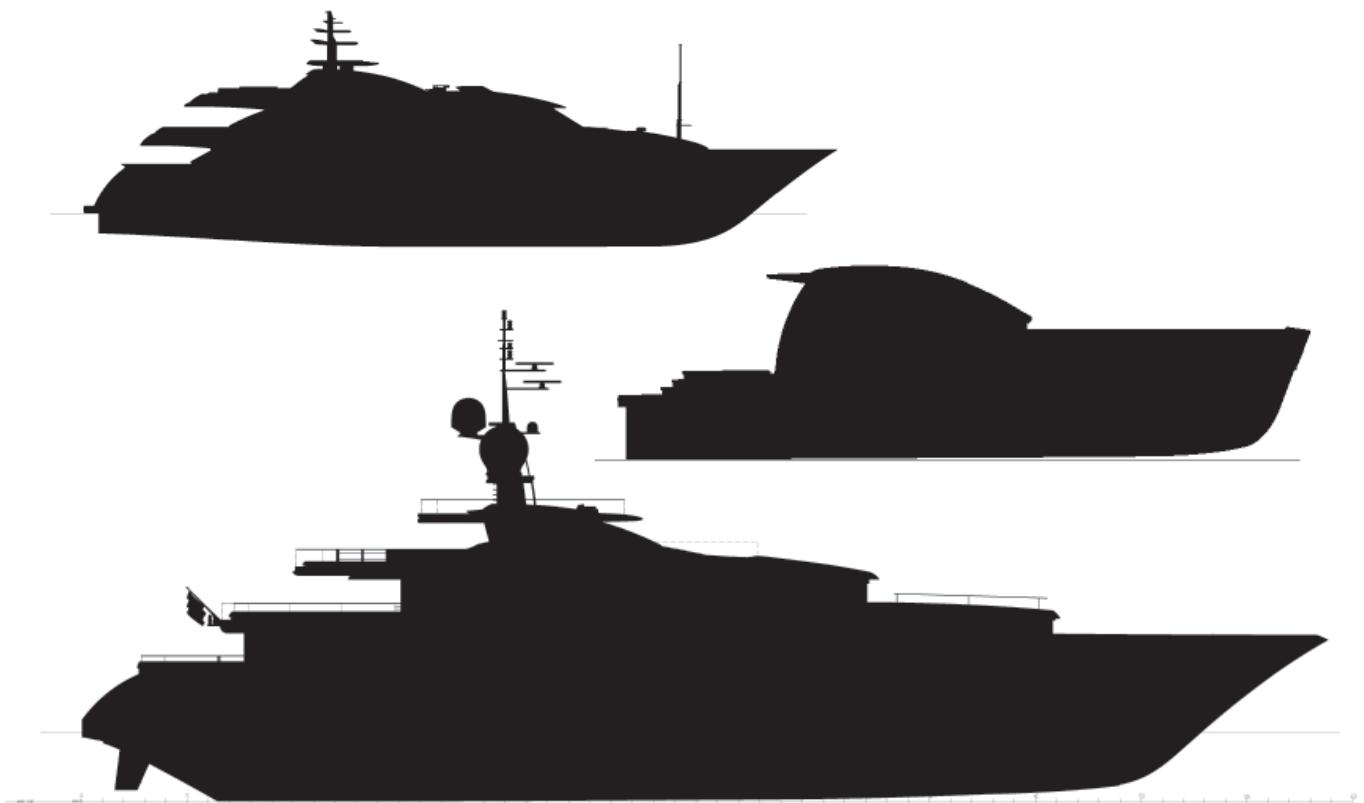
Back in 2004 Cutolo wrote a chapter for an intriguing little book called *Megayacht Wisdom* along with 17 other specialist contributors, each commenting on the pros and cons of designing, building, owning, chartering and selling a superyacht. In his chapter, entitled ‘The Role of Naval Architects’, Cutolo sows the seeds of an approach that is today at the centre of his working philosophy.

“The preliminary layout represents the designer’s ideas and imagination, as well as the owner’s wishes and experiences and I always try to see what lies between the lines”, writes Cutolo. “This is the most fascinating moment of the design process, when imagination and creativity come together. If you are able to create the right feeling at this stage, then you already see the boat and you already know what kind of hull you are going to design, you detect what the critical points will be and everything flows naturally.” This is not the sort of talk you might expect from an experience-hardened engineer, but it sums up an approach that Cutolo calls “creative naval architecture” and considers essential to the successful outcome of a new project. The slogan is even embroidered on the company shirts.

“I consider creativity to be the core skill that allows the designer to adapt to the needs of the client, allowing for a broader choice of materials and building techniques”,

explains Cutolo. “Interaction in this process allows the engineer to solve numerous technical problems, which, in turn, means the designer can expand his own frontiers. Most engineers and technicians will try to stem a designer’s flow of creativity and imagination.” Cutolo recalls working with Stefano Natucci on a 50-metre project for an Italian shipyard when the designer came to him asking where he should design in the engine room ventilation, because he was afraid of disrupting the work of the technical office. Another time he was collaborating on a bidding package for Lürssen (for a project that was later built by Codecasa) and an engineer had to re-route his piping because the designer refused to have his lines interfered with.

“We don’t work like that”, continues Cutolo. “We ask the designer to present us with his ideas and we will do our best to work with them. If there is something that cannot be accommodated for technical reasons, then we will find an alternative solution together with the designer. Apart from very fast yachts, or perhaps the Naumachos explorers, a yacht sells on its looks on the outside and the inside. A yacht that is built only on the basis of technical considerations is likely to be an ugly boat. So it is in our own interests to work with the designer. In this context, creative naval architecture is the ability of an engineer to take on a project without a prescriptive idea of the final result, but with an open mind that allows him to both challenge and respect the needs of a client.”





Aluminium v Steel

In the same book, Cutolo claims that, given the choice, his preferred building material is aluminium. This is no doubt a consequence of his work experience with Baglietto and the fast-ferry industry, but he cites additional reasons and they all boil down to one thing – efficiency. “The two main advantages are weight and resistance to corrosion”, he says. “Aluminium alloy is about three times lighter than steel and even if the tensile strength value is lower an aluminium hull weighs about half that of a steel hull. To translate it into figures based on a conventional steel/aluminium 50-metre project, the final lightship displacement would be about 400 tons with a steel hull weight of about 100 tons. Building the same structure completely in aluminium would bring the final lightship displacement to about 350 tons, a saving of more than 10 per cent. If we’re dealing with a fast hull, this is a lot in terms of speed and/or power, but even in the case of a semi- or full-displacement hull capable of speeds between 15 and 20 knots it means we can reduce installed power and draught, while increasing range and fuel economy.”

Five years ago when *Megayacht Wisdom* was published, steel was by far the preferred choice of hull material for yachts over 50 metres – and it still is with most displacement yacht builders. Cutolo cites yachts such as Lürssen’s 57-metre *Izanami* and Palmer Johnson’s

59-metre *La Baronessa* as unconventional early examples of all-aluminium yachts, but as the industry searches for ways to improve efficiency in an effort to be seen to be green, aluminium makes increasing sense. To prove his point Cutolo points to more recent yachts such as Espen Oeino’s *Silver*, which at 73 metres is the longest all-aluminium yacht in the world and the fastest conventionally powered motoryacht in terms of power-to-length ratio with a top speed in excess of 25 knots. Thanks to her lightweight construction, relatively narrow 10-metre beam and very fine bow entry, she is also extremely economical. “*Silver* is relatively under-powered”, he says, “but because she is long and thin can still easily reach her top speed. The all-aluminium *Aifos* we’re designing for CBI Navi is just under 50 metres and half the displacement, but is only one metre less in the beam than *Silver* and so needs correspondingly more horsepower to reach her top speed of 24 knots.”

The Naumachos Story

Considering the allure of aluminium for Cutolo, it might seem ironic that his most successful design to date is the heavy-displacement, steel-hulled Naumachos 82 (opposite), albeit with an aluminium alloy superstructure. The concept for the first in this series of rugged explorers, for which Cutolo also designed the chunky “Tonka Toy” exterior lines, came from the Italian scuba diver-adventurer Stefano Carletti and was named after the book of the same

CURRENT YACHT WORK LIST

Name	LOA (m)	Number	Total (m)
<i>SCHOONER 111</i>	34	2	68
<i>NAUMACHOS 105</i>	32	1	32
<i>SUMHURAM 54</i>	16	2	32
<i>AIFOS</i>	50	1	50
<i>BELENA</i>	53	1	53
<i>PROTEKSAN NB 53</i>	70	1	70
<i>BLU DESIRE</i>	60	1	60
<i>COLUMBUS 177</i>	54	1	54
<i>O'REA</i>	39	1	39
<i>PROTEKSAN NB 54</i>	70	1	70
<i>COLUMBUS 187</i>	57	1	57
<i>G TWO</i>	45	1	45
<i>CRN 128</i>	-	1	0
<i>CRN 129</i>	-	1	0
Total		16	630

name recounting his diving experiences around the world. "Owners have matured," says Cutolo, "and some are no longer interested in taking their yachts to Ibiza or Portofino. They are looking to cruise to far-flung destinations and for that they need long range, good sea keeping and lots of storage space. Put all those elements together and you have an explorer. The choice of steel is also a logical one as weight is unimportant on a high-displacement, high-volume vessel – in fact it is a positive advantage if you want in-built stability at anchor."

It would seem that this variety of mature owner has also been less intimidated by the economic recession and the contract for hull number eight in the 82 series was signed for in January when uncertainty surrounding the financial crisis was peaking. Cutolo thinks he knows the reason why: "Yachts like the Naumachos have a value that goes beyond the sum of its parts", he explains, "It has a value in terms of the quality of life for the owner. It provides the opportunity to do things he could never normally do. This is not the sort of yacht you buy because your colleague or friend has one like it."

Like its workboat exterior styling, in engineering terms the Naumachos 82 is designed more like a ship with a single five-bladed 1.60-metre screw and a hydraulic auxiliary motor to save on space, maintenance and weight. A major innovation on the most recent order was the decision to go for a hybrid drive system similar to that introduced



by Ferretti on its Mochi Craft Long Range 23, but on a significantly larger vessel. “When we consider the advantages of a hybrid propulsion system, we usually put the emphasis on energy saving and reduction of emissions”, says Cutolo. “Hybrid propulsion at sea has a different set of aims and gives different and even more significant advantages.”

“When it comes to being greener or more efficient, the argument is one of low speed and low power”

The hybrid system studied for Cantieri Navali di Pesaro together with Pronaves, an engineering group set up by Stefano Carletti to research propulsion technologies, is composed of a diesel engine and a high torque/low rpm electric motor coupled to the direct drive prop shaft. The advantage is clear when you consider that the electric motor can work as a propulsion motor as well as an electric generator. In cruising conditions, the diesel engine is usually used for propulsion and the shaft generator for producing electrical power instead of the gensets with a consequent saving in terms of maintenance, fuel consumption and emissions.

In addition, noise and vibration levels are also reduced. At slow speeds (approximately 6–7 knots) propulsion is via the electric motor driven by the electric generators only, which means quieter, more comfortable sailing conditions, especially suitable for night sailing. For short periods it is also possible to feed the electric motor through a battery pack to provide a few hours’ range. In this operating mode it is possible to manoeuvre quietly in port as well as access environmentally protected areas in zero emission mode. When at anchor, the same system that feeds the electric motor in propulsion mode, utilises the batteries to generate the AC power required for the hotel utilities (of course, how much electrical power and for how long depends on the size and number of batteries). The co-axial electric motor also has a back-up engine function, which means the auxiliary diesel engine and “take me home” hydraulic systems (including PTI/PTO) can be eliminated.

The Green Debate

“When it comes to being greener or more efficient, the argument is one of low speed and low power”, claims Cutolo. “Until fuel cell technology is developed further, there is no other reliable solution. This means hybrid or diesel-electric systems are suitable only when the energy required for propulsion is proportionate to the energy required to run the on-board utilities.” He draws on the example of a fast Baglietto he helped design a decade ago that required 5,000hp for propulsion and under 150hp for the

hotel services. “I think that kind of solution is no longer an option”, he admits. “When we’re talking about 500–600hp for propulsion and 200hp for on-board utilities then diesel-electric or hybrid systems start to make sense.”

“The main advantage of hybrid propulsion today is flexibility”, he continues. “The batteries are the weakest link, because you still need to use energy-hungry bow thrusters and have some reserve power. Battery technology is improving, but your electrical power is still being produced by running diesel engines. 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 conclusion, Cutolo draws on the controversial book by Czech President Václav Klaus entitled *Blue Planet in Green Shackles*, which basically refutes Al Gore’s interpretation of global warming. “We cannot deny the existence of global warming”, says Cutolo. “But one of the most interesting points he made was that the Stone Age didn’t come to an end because we ran out of stones, or the Bronze Age because we ran out of bronze. Likewise, the Petroleum Age will come to an end when we find better alternatives.”

Justin Ratcliffe

Images: Justin Ratcliffe & Hydro Tec

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After graduating in Naval Engineering from Federico II University in Naples, Cutolo began his career with Cetena, the research branch of Fincantieri in Genoa. He went on to become Technical Director at Baglietto, during which time he worked on several iconic yachts such as Al Fahedi, Adler, Baroness, Lady Anfimara, Chato, Topshida and Pia W. What distinguished these yachts in the late '80s was that they were very fast, with aluminium hulls and some had water jet propulsion. In 1989 he moved to Messina, Sicily, to become Vice-Technical Director of Rodriguez where he assisted in the design and construction of fast monohull ferries from 50–100 metres capable of cruising at over 40 knots. In 1991, he returned to manage Baglietto’s technical office and helped design yachts such as Romita, Maffy Blu, Alba, Elsewhere and Opus. In 1995, 11 years after graduating, he decided to take a leap of faith and founded his own design studio based on his varied experience of the commercial and superyacht sectors. Today, the company employs 12 naval engineers and architects, while his wife, Silvia Himsolt, heads up the non-technical management of the company.