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NILO

Excuisite engineering on fastest Moonen

Photo by Flying Focus, Bussum, The Netherlands

During sea trials in May, Moonen Shipyard's first aluminium hulled fast semi displacement yacht, 94 foot 'Nilo' easily reached speeds up to 26 knots. A flared bow, roundbilged hull and classic styling elegantly cover the speed and power of the yacht, conceived through forward propulsion and exquisite naval architecture.

Thorough investigation preceded the construction and launch of Moonen's first semi-displacement yacht. As the yard has always strived to ensure sea keeping qualities of its yachts, and apply forward engineering for noise and vibration reduction, the step into the fast cruising yachts needed to be well prepared. The quality standard of the displacement yachts is maintained within the new line of fast semi displacement ships.

Hydrodynamic balancing

At Stolk Marimecs Naval Architects, conceiving the hydrodynamics for 'Nilo' was a special project. "At all yachts, including steel hulled displacement yachts, weight management is important. But in the process of creation of an aluminium fast semi-displacement yacht, minimising weight and balancing the hull is extra critical," explains constructional designer and engineer Jos Wiersma. Designing a balanced hull begins with weight calculations, that will eventually indicate the desired underwater hull volume at different sections of the ship. These calculations lead to additional weight distribution to be able to conceive a hydrodynamically favourable underwater hull shape. With 'Nilo', Stolk Marimecs created a round

bilge underwater profile, to ensure sea keeping and manoeuvrability. At the same time, the yacht had to be able to achieve surf, getting over the hull speed into semi-planing ride. This is not possible with most round bilge hulls. The special naval architecture of the Moonen 94 Alu consists of an under water hull profile that goes from a sharp front section to a round mid section and ends in a relative flat aft section. The stern section has two specially designed tunnels above the propellers. This helps improving propeller efficiency and also plays its role in generating lift at higher speeds. Sprayrails help create lift and keep the decks dry at high speeds. To ensure the hull would meet its calculated hydrodynamic performance, a hull model was tank tested at the Schiffsbau Versuchsanstalt (SVA) in Potsdam, Germany.

Sleek propulsion train

The 26 knot speed performance is achieved as a result of this hull form and of course the propulsion, consisting of twin Caterpillar C32 ACERT 1800 horsepower engines and Servogear shafts, controllable pitch propellers and a remarkable rudder lay-out. “Pitch control is automated,” explains Wiersma. “Modern diesel engines can generate enormous torque at relative low revolutions. Therefore, it might be tempting to set the propellers to a high speed pitch at moderate engine revolutions. But this can cause overload to the engine. Calibrating the pitch control to always have the most efficient propeller set-up with the engine output is a delicate process. The end result is smooth throttle control by use of an electronic combinator. Engine revolutions and the resulting boat speed must go up from dead calm towards top speed without jumps and bumps, so at every position of the throttle engine power corresponds with pitch position in the most efficient way.”

The shallow tunnels in the hull help decreasing the yacht’s draft, as the 1.25 meter propellers can be placed higher. Higher placed propellers in their turn make it possible to install shaft propellers more horizontally, thus improving on the efficiency of the propulsion. Special hydrodynamically shaped Servogear shaft bearings hold the relative long shafts. Behind the propellers are cones, reducing propeller wash. The rudders are installed tightly to these cones and also tightly to the hull bottom. Keeping the slot between the rudders, the hull and the propeller cones as small as possible, reduces drag.

Sturdy and light hull

Construction of 'Nilo's' aluminium hull is a masterpiece of weight minimisation and strength. This is one of Stolk Marimecs special fields of expertise. "Of course, one can not compromise on the strength of crucial parts of the hull, like the engine foundation. A stately margin above minimum strength requirements is essential, for safety and because a sturdy construction helps minimise noise and vibration. Extensive calculations show where weight reduction can be applied. The end result of weight management is again closely linked to the design of the yachts hydronamic shaping."

Moonen is building the entire "Fast Yacht Series" in light, strong, corrosion-resistant Sealium, an aluminium alloy that has achieved wide application in aerospace, shipbuilding, and commercial land construction, and which is conveniently cut, bent, and welded using the same methods as the more common 5083 alloys

Fast by client's demand

Moonen developed the "94 Alu," the first model in its new "Fast Yacht Series," out of the remarkable success of the Moonen 84, eight of which have been sold since 2001. With its classic lines and popular four-cabin layout, the Moonen 84 inspired several clients to inquire if the shipyard could build a Moonen-quality yacht with similar accommodations, but lighter and capable of significantly higher speed. René van der Velden designed the 28.90-meter "94 Alu" with a sportier flair than his Moonen 84, extending the horizontal lines for a more aerodynamic exterior. Moonen used the greater length of the "94 Alu" over the original 84-foot design to expand the forward accommodations, extend the swim platform, enlarge the lazarette, and create a longer engine room to include more powerful engines.

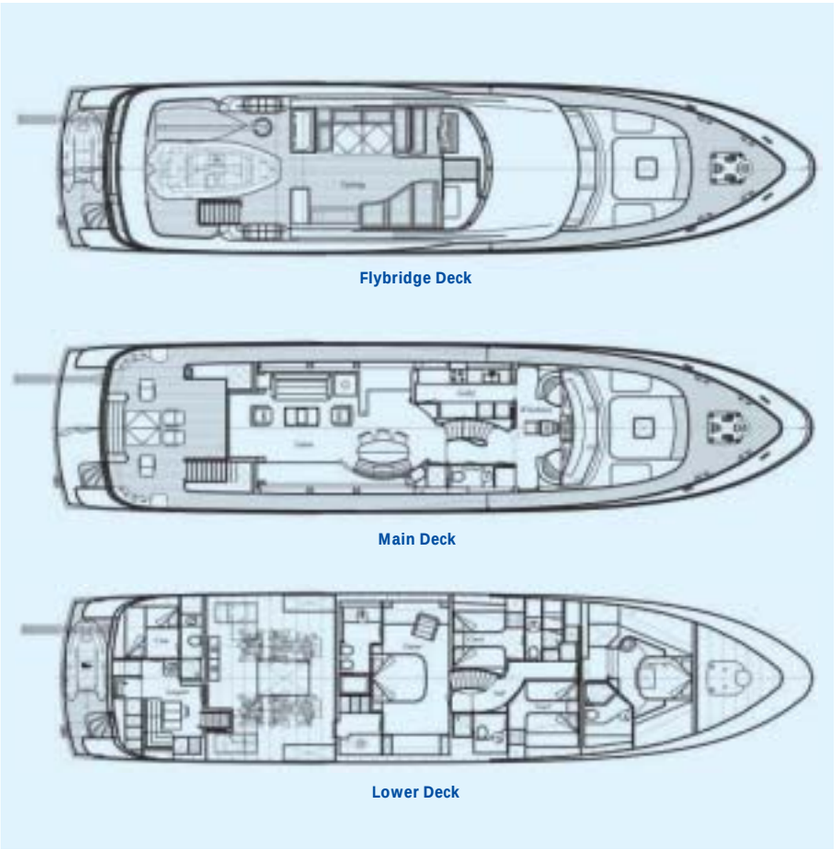
A second Moonen Fast series 94 Alu is already built and launched, but yet to be delivered to its owner. Sea trials have been successful. This second yacht has Caterpillar engines with a more conventional propulsion set-up, although the propeller tunnels are applied in this yacht as well. Both yachts have watertight bulkheads to meet MCA requirements, although only the second Fast 94 Alu is built according to this classification.

Subcontractors and suppliers of equipment fitted on board the 'Nilo'
(partial list)

Alfa Laval Benelux, Breda . . . .: fuel oil separator
AP-Marine, Reinfeld (G) . . . . . .: hydraulic WT sliding door
Angst & Pfister, Rotterdam . . .: *Racor* filters
Artline, Arnhem . . . . . .: interior design
Audipack, Gouda . . . . . .: TV lift
Awlgrip Europe,
Grobbendonk (B) . . . . . .: paint
Belship, Utrecht . . . . . .: gangway; *Tecma* toilets
Bloemen de Maas, Niftrik . . . .: teakdecks
Bose, Edam . . . . . .: audio
Bureau Veritas, Rotterdam . . . .: classification
Cramm Yachting Systems,
Leeuwarden . . . . . .: hydraulic installation ; deck crane
Econosto Nederland,
Capelle a/d IJssel . . . . . .: valves & fittings
Heinen en Hopman,
Spakenburg . . . . . .: air conditioning
Idromar, Milan (I) . . . . . .: watermaker
Inoferro, 's Hertogenbosch . . . .: stainless steel
Johnson Pump, Assen . . . . . .: pumps
Jong Scheepsstoffering, De,
Elshout/Drunen . . . . . .: upholstery
J.V.S. Scheeps- en Industrietechniek, Papendrecht . . . . . : sound & vibration control
Kemper & van Twist,
Dordrecht . . . . . .: *Kohler* generator sets

Klaver Yachtpainting,
Vollenhove . . . . . .: painting
Kongsberg Maritime Ship
Systems, Spijkenisse . . . . . .: *Kongsberg Simrad* navigational equipment
Kroon Technisch Groothandel,
Hoogezand . . . . . .: ship's hardware
MarinAssist, Rotterdam . . . . . .: life rafts
Muir Engineering, Australia . .: anchor winches
Nicoverken Marine Services,
Schiedam . . . . . .: *Hamann* sewage treatment plant
Nieuwburg & Zn, L.,
Krimpen a/d IJssel . . . . . .: insulation
Observator Instruments,
Ridderkerk . . . . . .: window wipers
Pon Power, Papendrecht . . . . . .: *Caterpillar* main engines
Rafa, Leusden . . . . . .: windows
R.P.M., Bodegraven . . . . . .: doors
Scana Mar-el, Dalen, (N) . . . . . .: electronic remote control system
Servogear, Rubbestadneset (N) : propeller shaft- and rudder shaft installations; gearbox and *Centax* flex coupling
Tijssen Elektro, Oss . . . . . .: electrical installation; navigation & communication equipment
Trinoxx, Rotterdam . . . . . .: WT ER doors
VT Naiad Marine Holland, Heerlen : stabilizers
Wortelboer, Rotterdam . . . . . .: anchors & anchor chains

Builder:	Moonen Shipyard
Naval Architecture:	Stolk Marimecs
Exterior design:	René van der Velden
Interior design:	ArtLine



Flybridge Deck

Main Deck

Lower Deck

Principal dimensions
Length over all: . . . . . ca. 28.90 m.
Length on waterline: . . . . . ca. 25.50 m.
Beam moulded: . . . . . ca. 6.55 m.
Draft:. . . . . ca. 1.80 m.
Displacement: . . . . . ca. 97 tons.

Power plant
Main engines:. . . . . twin Caterpillar C32 ACERT, 1343kW @ 2300 rpm
PERFORMANCE:
Maximum speed: . . . . . ca. 26.5 knots
Cruising speed: . . . . . ca. 19 knots
Range: . . . . . ca. 2500 nautical miles

Tank capacities
Fuel: . . . . . ca. 18,300 liter
Freshwater:. . . . . ca. 3,900 liter
Black water: . . . . . ca. 1,400 liter
Grey water:. . . . . ca. 1,400 liter