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Vessels highlighted
Geo Focus
Stellar Maestro
Ambiorix

The vision of
Ben Vree
CEO APM Terminals Europe

Special
SMM 2012





Photo by Flying Focus, Bussum, the Netherlands

Ship owner Geo Plus started business near Groningen in the north of the Netherlands about 18 years ago. Throughout the years, the company specialised ever more in the field of hydrography in the international market. The company's principal customers include dredging contractors, offshore businesses and governmental agencies.

During the last decade, Geo Plus has built up a fleet of four fastsurvey and crewtender vessels, a multi-purpose catamaran and a small survey boat, all equipped with advanced hydrographic surveying equipment. Because of the expansion of the business, and the trend towards projects offshore, Geo Plus started to look at the option of building a dedicated ship purpose-built for hydrographic surveying. The new ship also had to provide the capability to work with ROVs (Remote Operated Vehicles) and AUVs (Autonomous Underwater Vehicles). Both types of underwater robots are extensively used in deepwater research.

Design brief

By careful placement of the survey equipment such as singlebeam and multibeam echo

sounder systems, side scan sonars and post-processing of the data, Geo Plus has concluded there is no need for ships as large as a typical offshore supply vessel to carry out high-quality survey work. The required length and width were settled on 35 and eight metres respectively. The design brief the new vessel included the following demands:

- low underwater noise signature,
- a transit speed of approximately 15 knots,
- a large aft working deck with space for a container,
- efficient operation at low speeds,
- a high level of comfort for the crew,
- a shallow draught.

Diesel-direct and diesel-electric

Survey operations often include very long

GEO FOCUS

TECHNOLOGICALLY ADVANCED SURVEY VESSEL FROM SHIPYARD DE HAAS

Builder

Shipyard De Haas, Maassluis, the Netherlands

Owner

Geo Tender IV B.V. (Geo Plus),
Scheemda, the Netherlands

Principal particulars

Length o.a.	34.50 m
Length b.p.p.	32.07 m
Height (mast down)	13.00 m
Beam moulded	7.83 m
Depth moulded	4.23 m
Draught max.	2.00 m
Speed max.	15 knots
Transit speed	13 knots (230 l/h)
D.E. speed	8 knots (50 l/h)

Accommodation

Single cabins	2
Double cabins	8
Total occupants	18 persons

Tank capacities

Diesel	17.50 m ³
Fresh water	2.60 m ³
Grey water	5.20 m ³
Black water	2.60 m ³

Power

Main engines	2 x 651 kW
Generators	2 x 209 kW
Electric motors on PTI	2 x 75 kW



The stern is well protected by impact-resistant fendering

periods of low-speed sailing. During ROV operations, the sailing speed is typically two to three knots. With conventional diesel-direct driven propellers, such low speeds would result in poor combustion in the main engines, excessive smoke production and increased wear and tear on the main engine parts.

In a quest to combine efficient sailing at cruising speed (15 knots) and efficient trolling, the designers proposed to use the new hybrid-system gearboxes from Reintjes. These give the possibility to drive the propellers either by the main diesels, or after disengaging the clutch for the main engines, through power-take-in (PTI) connections on the aft side of the gearboxes. To each of the PTIs of the Reintjes 344 RHS gearboxes, a 90 kW electric motor

is permanently connected. This allows the main engines to be switched off entirely, and run the ship in diesel-electric mode, powered by the auxiliary generators. In this mode, the maximum speed is 8.5 knots. Besides a fuel consumption of only 50 l/hour in D.E. mode, the noise produced is also significantly lower. The running hours of the main engines (type C18 Acert from Caterpillar) are kept low, resulting in reduced service costs.

A requirement from the owner was that the transfer between diesel-direct and diesel-electric

mode would be as seamless as possible, to ensure that the system would be used as much as possible. Indeed, a single switch in the wheelhouse console is enough, with the same bridge controls useable in both operational modes.

Integrated solution

The solution with the hybrid gearboxes was sourced entirely from Reintjes, including the electric motors, the variable frequency drives and the control system from Bosch Rexroth. Given the market potential, the company is now working to extend this as an option on all their

"With a single switch, the captain can change over from diesel-direct to diesel-electric mode"

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Hall B6 booth 400

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We wish the GEO FOCUS and her crew a long and safe voyage.



Regularly used navigation functions are integrated into the helm seat armrests, photo by Edu Calicher

gearboxes. Marc Koole from Reintjes Benelux: "Although this is not the case on *Geo Focus*, the electric motor can also be powered by a battery bank, or it can be used as a generator during main engine sailing to charge the batteries in a complete hybrid drive system."

The electrical installation was done by Verhoef Electrotechniek B.V. and includes a complete BIMAC alarm, monitoring and control system from Bakker Sliedrecht. A glassfiber data cable connects the engine room with the wheelhouse and the survey room.

Polar regions

The main engines and generators are both seawater-cooled. The main engine exhausts feature wet noise dampers from Halyard. The cooled exhaust gases are discharged over the side, while the water is drained either overboard or to the seachests, to keep them free from ice in polar regions. The 209 kW generators, which are based on John Deere diesel engines and were supplied by Shipyard De Haas' daughter Powerport, also have cooled exhausts exiting above the waterline. Another measure for operation in cold climates is the electrical deck heating system from Speedheat, which keeps the decks ice-free without manpower.

DP-system

Geo Focus has a dynamic positioning system from Navis with class notation DP-1, which can be used in both diesel-electric mode and diesel-

direct mode. For this reason, both rudders can be operated independently, and two electrically powered bowthrusters are fitted from Voith Turbo. Naval architect Bas Sonneveld from Studio Yacht explains: "Because bowthruster noise is strongly related to the amount of air which makes it into the bowthruster tunnels, it was preferred to install two smaller units lower in the hull than one larger bow thruster. An added benefit is the increase in redundancy. It is particularly in the long periods spent

"Low noise levels, a high-grade interior and well-studied ergonomics ensure crew comfort"

in DP mode that bowthruster noise is an important factor." Furthermore, the rim-driven bowthruster units from Voith Turbo do not suffer from blade-tip cavitation and are notoriously silent.

Comfort level

Bas Sonneveld: "Fuel consumption and the amount of emissions are increasingly important factors when deciding which support vessel is to be chartered. Another issue is the level of comfort: the client's surveyors, who sail along on the survey vessel, expect the same level of comfort as on the ships in their own fleet. That is why *Geo Plus* has aimed for a

very high comfort level." Each cabin features an adjoining private wet cell, an internet connection and an individual climate control. The *Geo Focus* complies with the new MLC2006 rules of the ILO convention regarding the crew accommodation. For the required cabin floor areas - practically impossible to achieve on a 35 metre ship - substantial equivalence was obtained by using a very high standard of finish. For the survey room, a full-scale mock-up was built to ensure this is a functional working area for *Geo Plus*' clients. The upper deck is equipped with a drop-air air conditioning system: a slight overpressure of conditioned air is created above the ceilings, from where it drops down through small perforations in the ceiling panels. This ensures an extremely good distribution of cold air at low air speeds, making the air conditioning unnoticeable.

Silence

Another comfort-enhancing feature onboard is the silence. Even at cruising speed, with the main engines at 80% of their maximum continuous rating, all accommodation areas show noise levels of 50 dB(A) or less, due to the use of floating floors and other noise-reducing measures, as stipulated by noise and vibrations experts JVS.

The ship's hull design deserved ample attention and was first tank-tested at MARIN. It is essentially a hard-chine hull for excellent roll-damping, but with a very fine entry and

Hal A3 - booth 218

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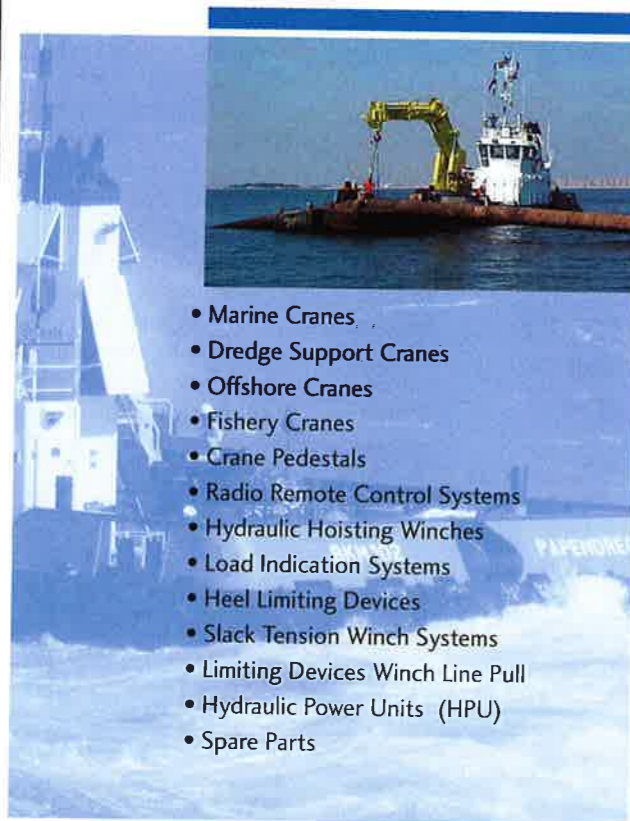


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deep propeller tunnels for optimal efficiency. By mounting the side-looking sonars from Kongsberg in the keel, a separate blister was not needed.

Communications

Because data processing is increasingly done onshore, *Geo Focus* is donned with an exceptional array of communication systems. Four UMTS antennas ensure a broadband internet link whenever land is nearby, while satellite communications at sea are ensured both by VSAT subscription-based service and a Fleetbroadband pay-per-use satellite link. A Viprinet system manages the data bundles which are transferred to a dedicated hub on shore, ensuring the most is made of the available bandwidth. An Exinda system makes sure the most cost-effective communications link is used at any time. It also limits the bandwidth for entertainment and VoIP phonecalls to ensure enough capacity is available for the transfer of survey data. These systems, along with the entire navigations and communications package and the IT-system on board, were supplied by Alphatron Marine. To ensure VSAT connectivity even in the polar regions - *Geo Plus* has among others worked on a number of projects in Siberia-, a large-diameter VSAT antenna was installed with a diameter of 1.4 metres. A third radome is reserved for satellite TV reception.

When asked whether diesel-electric propulsion on the 'house generators' would create problems for other electronic equipment onboard, Shipyard De Haas' technical manager Ruben Kalisvaart points out that all sensitive equipment is safely shielded by a UPS (uninterrupted power supply).

Construction

Kalisvaart: "As the construction started as soon as two months after the signing of the contract, and thus engineering during the build would be inevitable, it was decided to build the hull in the Netherlands. This way, we could ensure the build quality, while maintaining a degree of flexibility." The hull was built at Bijlsma Wartena, in the north of the Netherlands. Notable features include a moonpool, which for now is still closed at the bottom, and four hoisting eyes, which are certified by Lloyd's Register as lifting appliances. These hoisting eyes allow *Geo Focus* to be easily loaded onto a heavy lift vessel for deployment on the other side of the globe, as the range of 650 nautical miles at 13 knots is insufficient for transatlantic crossings. However, a tanktainer can be loaded on the aft deck to increase the range.

The *Geo Focus* is certified for operations up to 200 nautical miles from a safe haven, with the understanding that in offshore situations, a mother ship can also be designated as safe haven. Lloyd's Register also issued a Green



The main engines can be switched off in diesel-electric mode, photo by Edu Calicher



A deck crane renders the aft working deck even more versatile



A permanent broadband link to shore is ensured with V-SAT, Fleetbroadband and four UMTS antenna's



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"Built-in hoisting eyes on deck allow the Geo Focus to be easily shipped to its destination on a cargo ship"

Passport for the vessel, which ensures that all materials used onboard are properly catalogued for responsible recycling at the end of life of the ship. In the construction, a lot of attention was paid to keeping the steel weight down. This was done by using longitudinal stiffening for the hull. As the stiffeners contribute to the overall bending strength, thinner shell plating could be used.

On the sides and stern, fenders from Fender Innovations are glued with Sikaflex. Featuring different hardnesses in the core and top coating, these fenders are very impact-resistant, while having a lower weight than standard rubber fenders.

Equipment

The survey and positioning equipment includes multibeam and single beam sonars from Kongsberg, a gyro/motion reference device, a HiPap USBL positioning device, several DGPSs and a sound velocity probe and sensor. On the top deck, a wildlife observing position is created, with a pre-mounted support for the possible later installation of a 3D laser-scanning device.

The latter would allow the creation of a 3D map of the surroundings both above and below the water at the same time. The aft working deck is equipped with container fittings, a large A-frame and a knuckleboom crane. A smart detail is the pre-installed cable ducts for cabling from a container on the aft deck to the switchboard room and to the survey room.

Conclusion

The *Geo Focus* shows a new way of combining the efficiency of diesel-direct propulsion at cruising speed with the advantages of diesel-electric propulsion at low speeds and in DP mode. The boat is literally packed with smart ideas making the operations more efficient and pleasant for the workers onboard. It comes as no surprise that Geo Plus has already ordered a sister ship, which is currently under construction. De Haas Maassluis is also completing a small tug with a hybrid drive system, including battery power, for maintenance and lifting operations in the no-emissions zone in Amsterdam.

Bruno Bouckaert



Two inline thrusters from Voith Turbo ensure silent DP operations

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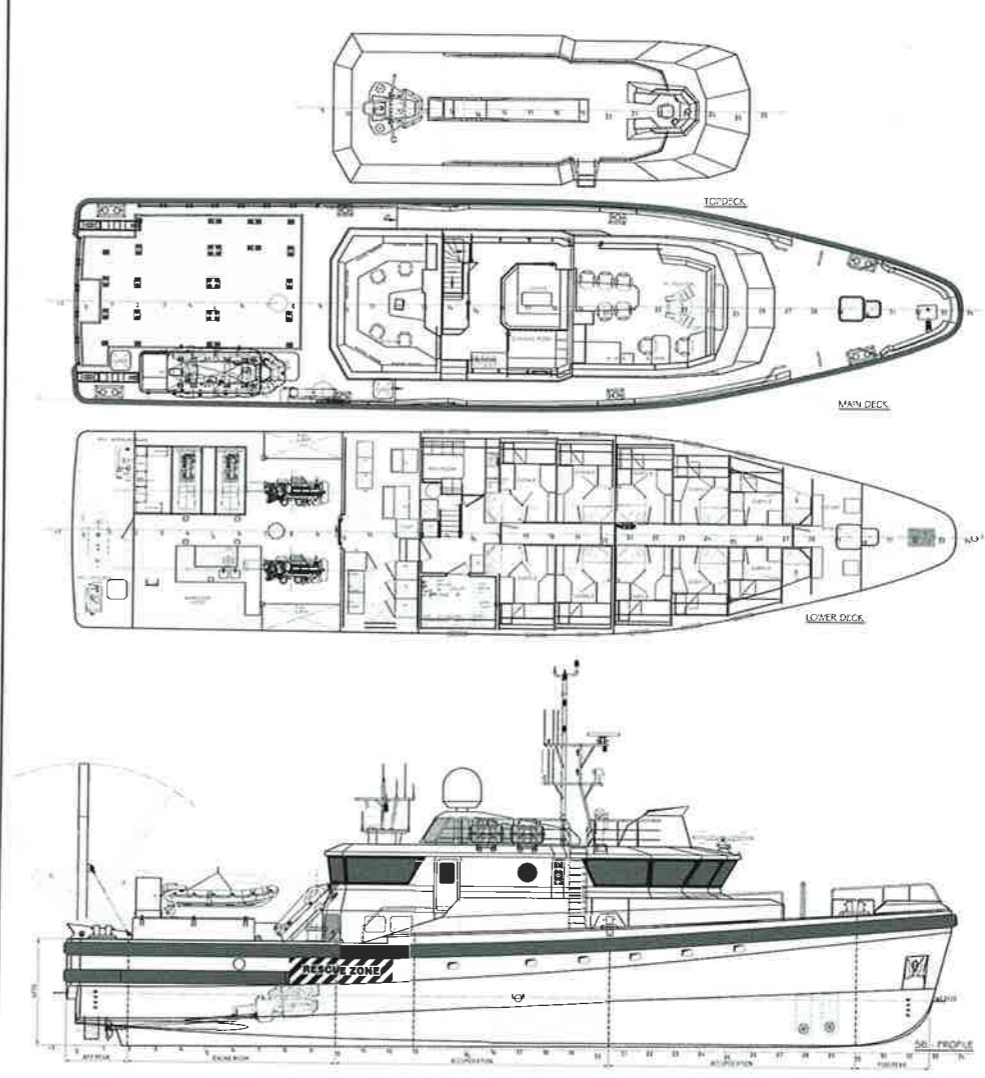
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Subcontractors and suppliers of equipment fitted on board the *Geo Focus* - YN 194

AAA Pumps, parts & engineering,	: pumps
Papendrecht	: ACV heat exchanger
Inoxcom, IJsselstein	: rict and connectivity
Alphatron IT & AV Solutions, Rotterdam	: navigation & communication; NAVIS DP installation
Alphatron Marine, Rotterdam	
Bakker Sliedrecht Electro Industrie, Sliedrecht:	: BIMAC electric installation
Bijlsma Wartena, Wartena	: casco
Bosch Rexroth, Bodele	: control system for main engines
Bouler, Zoetermeer	: galley equipment
Corrosion & Water-Control, Moerkappelle	: cathodic protection
Breejen Schilders, Den, Sliedrecht	: painting
Doedjins Hydraulics, Waddinxveen	: hydraulics
DOUBLE D marine equipment, Waalwijk	: Heila deck crane
Fender Innovations, Den Helder	: fendering
JVS Scheeps- en Industrietechniek, Papendrecht	
Kongsberg Maritime, Spijkenisse	: noise and vibration
La Mar Technisch Bureau, Ammerzoden	: survey equipment
Lloyd's Register, Rotterdam	: furniture; carpentry
MARIN, Wageningen	: classification
Meubelatelier Rotterdam, Rotterdam	: model testing
Meubelatelier Rotterdam, Rotterdam	: furniture; carpentry
Mostert Pijpleidingen, Papendrecht	: pipeline system
N.R. Koeling, Krimpen a/d IJssel	: HVAC systems
Powerport, Maassluis	: Caterpillar main engines; John Deere genset
PS Marine Coatings, Alblasersdam	: paint
Reikon, Spijkenisse	: Gefico FW generator; Azcue hydrofoor unit
Reinijes Banelux, Antwerp, Belgium	: gearboxes; diesel-electric propulsion
Schmitt Anchors & Chaincables, Rotterdam	: anchors & anchor chain
Smits Neuchâtel, Utrecht	: Solvolan navydeck (non-skid finish)
Speedheat Nederland, Schoondijke	: electric deck heating
Studio Yacht, Rotterdam	: design
TOS, Rotterdam	: compass adjustment & crewing
Theunissen Technical Trading, Malden	: LED lighting
Thermalras, Barendrecht	: insulation
Trinox, Hardinxveld-Giessendam	: windows
Verhoef Electrotechniek, Sliedrecht	: BIMAC electric installation
Viking Life Saving Equipment, Zwijndrecht	: rescue boat; life rafts
Voith Turbo, Twello	: inline thrusters