



An Efficient Chase/Guard Vessel

ON WEDNESDAY 24 APRIL, REDERIJ GROEN'S NEWEST VESSEL WAS CHRISTENED IN SCHEVENINGEN, THE NETHERLANDS. NAMED LINDE-G, the newbuild will be used as a chase vessel providing support and crew transfers to seismic research vessels.

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Erik Groen, Operations Manager of Rederij Groen, comments, "We already have several chase vessels in our fleet, which provide assistance to seismic research vessels. They basically make sure that the large seismic vessels, which tow a wide array of expensive cables with kilometres of length, can sail their track undisturbed by other vessels, or without having to make a detour for buoys, fishing nets or other obstacles. A lot of these vessels are former fishing trawlers, but we have also built

dedicated chase vessels. Linde-G is the first one which adds a capability to this, which is the possibility to carry out crew transfers. We expect this to be in high demand, to reduce the cost of helicopter transfers."

Focus on Efficiency

Linde-G was built by Shipyard De Hoop as one of its 55m Fast Support Intervention Vessel (FSIV) series. The series was developed as a versatile and exceptionally efficient platform, with a strong focus on

Versatile Vessel

While the first vessel in De Hoop's FSIV series was built as a crew boat, there are many other applications for this model. Patrick Janssens, CEO of Shipyard De Hoop, comments, "The series was initially developed for the oil and gas sector as a FISV. This market has been difficult for the past few years, due to the low oil prices and a record number of crew boats in lay-up. However, we've noticed that the main characteristics of this vessel – a wide speed range and excellent efficiency and seakeeping – correspond closely with other vessel types. We're currently in the outfitting stage for two Offshore Patrol Vessels, which will be used as security vessels in West-Africa, and we're very close to signing a deal to build one as a Yacht Support Vessel, carrying all the toys and helicopter for a much larger yacht. We think that there's also a market as a compact inter-island ferry for passengers, vehicles and containers. The first vessel in the series, Karina, will be used as an FSIV in the North Sea."



seakeeping. One of the main contributors to this the vessel's steel hull; most crew boats have an aluminium hull. Anyone who has spent time at sea in rough water on both an aluminium and a steel vessel can vouch for the difference: a heavier steel hull ploughs better through the waves than a lighter aluminium hull, which feels more like a cork, bouncing on the water.

So while aluminium, the lighter metal, has an advantage when it comes to fuel consumption, it has its downsides as well.

Steel also has better fatigue strength properties, is more ductile and hence less prone to water ingress in the case of impact, is more fire-resistant and can be repaired easily in even the most remote regions. Equally important for the seakeeping is the hull shape. Linde-G has a very fine entry on the waterline, which means that she is less agitated in pitch motions and less prone to slamming than ships with a fuller bow. Above the waterline, the raked stem and reserve buoyancy mean

that there is a limit to the motions, and shipping green water on deck is avoided in all but the worst cases.

Linde-G has a small wave breaker on top of the shelter deck in case of necessity. Finally, both the bulbous bow and the Hull Vane contribute to pitch damping, in the same way that the bilge keels contribute to roll damping. This means fewer vertical accelerations onboard, leading to less seasickness and less exhausted crew and passengers after a trip in rough weather. >>



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In the design of the vessel, the accommodation is placed further aft than on most crew boats, again with the goal of reducing the ship motions felt by the passengers.

Fewer Waves, Less Energy

Fré Drenth, Technical Director of Shipyard De Hoop, comments, "For us, efficiency starts with a low-resistance hull. This is extremely important for a vessel like this, which we offer with a maximum speed of 25 knots. At speeds above 10 knots, for a vessel with a waterline of 50m, the wave-making resistance starts to become dominant, and we went to great lengths to reduce this as much as possible. The hull is a double-chine displacement hull with a fine entry on the waterline and excellent volume distribution. To reduce the bow wave, we asked the hydrodynamic specialists from Van Oossanen Fluid Dynamics to optimise a bulbous bow. This bulbous bow reduces the resistance by almost 9%."

During the development of the vessel's model in 2013, Van Oossanen also proposed trying out the Hull Vane, a hydrofoil-like appendage at the stern of the ship. The company optimised the Hull Vane specifically for this model, which was deployed during sea trial with and without Hull Vane, while measuring the fuel consumption. The tests showed a reduction in fuel consumption of 10% at 12 knots, increasing to 15% at the top speed. The difference in generated wave patterns was also clearly noticeable.

Mr Drenth adds, "Our goal initially was to offer the bulbous bow and the Hull Vane as options on the vessel, so clients could choose. At shipyard De Hoop, we are strong proponents of the KISS principle: Keep It Simple, Stupid. However, the results of both the bulbous bow and Hull Vane were so good, that it would have been stupid not to apply them from the design, so they are now both standard and all five vessels in the series have a bulbous bow and Hull Vane."

Speedy Crew Transfers

To be able to effectively carry out crew transfer, the speed of Linde-G also comes

into play. The distances to be crossed can be as large as hundreds of kilometres, which takes an eternity on a normal chase vessel or platform-supply vessel, which typically cruises at 12 knots. Another proviso is, of course, the passenger compartment, which provides comfortable and spacious seating for up to 55 passengers.

Last but not least, Linde-G is equipped with a large davit on the aft deck. The davit normally doesn't carry a boat, but this one is dimensioned to pick up the crew transfer vessels from the seismic ships, fully loaded with passengers. This means that the passengers can embark and disembark on deck of the Linde-G (and on the seismic vessel), and not have to undergo a more dangerous ship-to-boat transfer, which can be hazardous in heavy seas.

Linde-G's dynamic positioning system is furthermore perfectly suited to the creation of a calm 'lee' on its side, to pick up the transfer vessel. The control for the davit is placed on the starboard bridge wing, giving a very good overview. Right next to it, a removable Dynamic Positioning console can be placed, allowing for very precise joy-stick manoeuvring during launch and recovery of the crew transfer vessel.

Compared to the existing guard vessels in the fleet, Rederij Groen expects to have a 30% lower fuel consumption in spite of the added capabilities (speed and davit crane).

Hybrid Modes

The newbuild is fitted with a three-stage hybrid propulsion system. Rick Tempelman, Project Manager of Shipyard De Hoop, explains, "Linde-G is developed for applications with a wide speed range. The vessel needs to be capable of a high-top speed, but in most cases, many running hours will be spent at a much lower speed, such as on patrolling duty or when working as a chase vessel. It is known that a diesel engine does not like to be underloaded for long periods of time, it leads to sooting (visible as black smoke), inefficient combustion and a lot of NOx gas emissions. This is why we developed this series with a three-stage hybrid propulsion system, but with a minimum of components.



Up to 6 knots, the vessel can run in diesel electric mode, using only a 250kW generator which covers both the hotel load and drives the propellers through E-motors on each of the gearboxes. The control is very fluid and precise, and the newbuild is practically silent. The fuel burn in this mode is only approx. 55l/h. Above 6 knots, the 250kW genset becomes too small. The portside main engine is then powered up, but kept unclutched from its gearbox. Instead of driving the gearbox, it drives an alternator on its free end at the forward side. The power of this alternator goes through variable frequency drives, for to the E-motors on each gearbox. Effectively you are sailing on one main engine, but with both propellers, the bow thrusters and the hotel load all driven electrically by one 2.350kW engine in diesel-electric mode. This is also the operating mode used during dynamic positioning. The vessel can reach



13 knots in this mode with only 410kW of power and only burning approx. 144l/h.“ When more speed is needed, both main engines are started up in diesel-direct mode. In this mode, the top speed of Linde-G is just above 20 knots, but it could be increased to 25 knots with different propellers. There is currently a large power margin at 20 knots, which means that the ship can maintain its speed (and schedule) regardless of the weather or loading conditions. This is the notion of ‘speed-keeping’, where the vessel is designed for an operational profile and real-life conditions rather than a top speed which is achieved only during trials. At 20 knots in calm water, Linde-G runs at 75% of her maximum power and burns approximately 600l/h of diesel. Because of the diesel-electric modes, which provide very precise speed control through the variable frequency drives, the propellers can be fixed-pitch propellers, in spite of the

wide operating range. Fixed-pitch propellers have a higher efficiency than controllable pitch propellers, which lose some efficiency due to the larger propeller hub. The entire electrical installation was carried out by Eekels Elektrotechniek.

Stern Platform

Shipyards De Hoop has furthermore gone to great lengths to build a quiet vessel. This includes exhaust silencers – which are standard on pretty much any vessel except for crew boats – and completely flexibly mounted accommodation. Six spacious cabins are provided, each with a private bathroom. Another noticeable feature of Linde-G is the large stern platform, with green plastic grating on top. Easily mistaken for a driving range for golfers, it is actually intended to protect the Hull Vane which is located underneath. At the same time, it provides

easy access to the waterline, which is very important as these vessels are often used as a safety/standby vessel. It is much easier to disembark from a life raft onto the stern platform than it is via a ladder. During one of the sea trials, the platform was even used for a winching exercise by the Dutch coastguard.

Linde-G is equipped with a number of other rescue devices such as a Jason’s cradle and a deck crane. The 190m² aft deck also has container fittings for three 6m-high containers, while a fourth one can be placed on the sheltered foredeck. But perhaps the most striking feature of Linde-G is what is her efficiency: she sails competently in a very visible and audible way, from very low to very high speeds, showing almost no generated waves and no visible exhaust fumes.

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