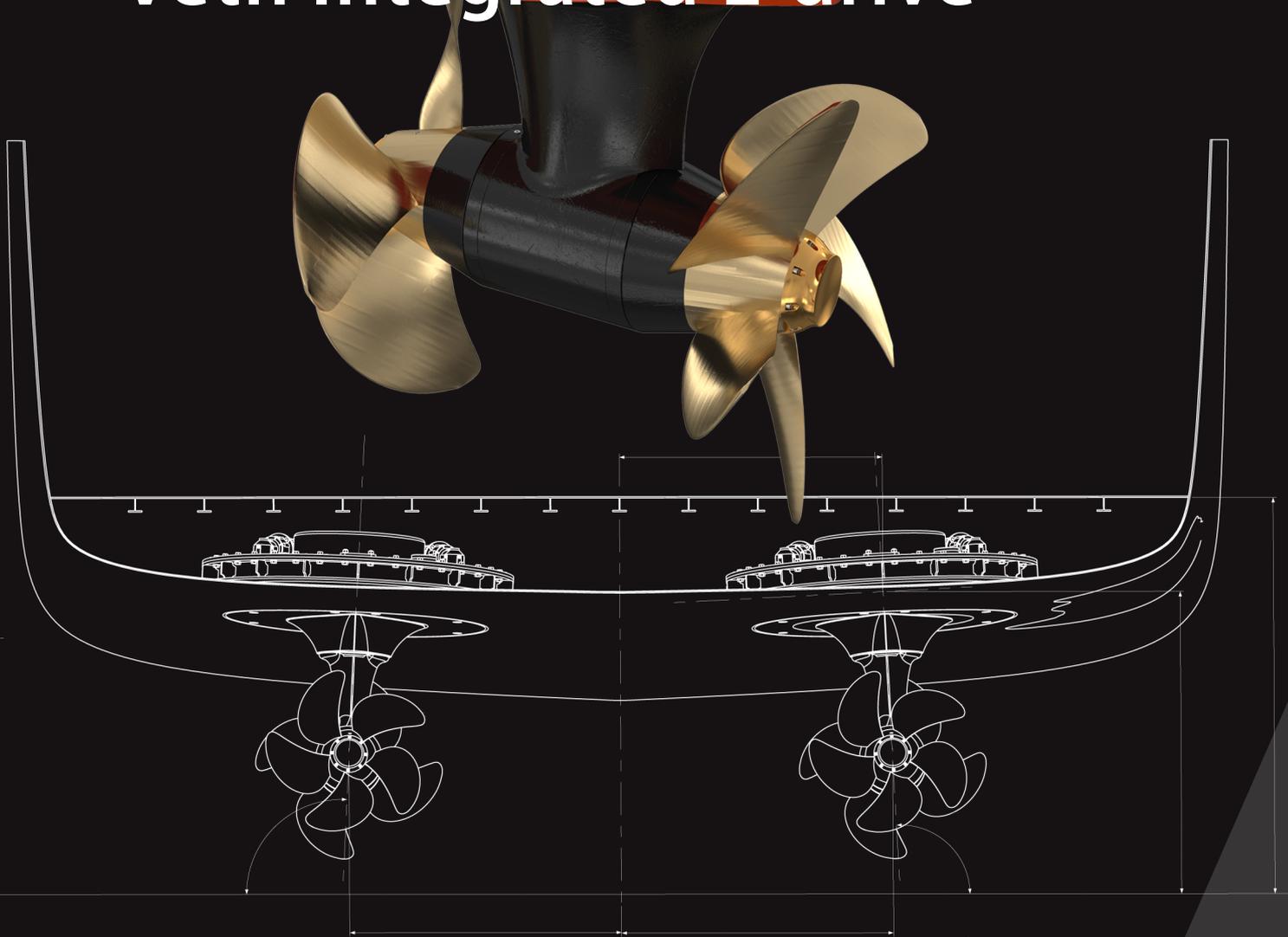




Veth Integrated L-drive



THE POWER 360°
TO TURN YOUR WORLD

VETH
PROPULSION

The most compact propulsion system

Increasing numbers of vessels are being fitted with the Veth Z-drive azimuth thruster because of the 360-degree full thrust, the optimal manoeuvrability and the simple and compact installation method. Now, Veth Propulsion is presenting a revolutionary concept in the field of electric propulsion: the Veth Integrated L-drive. This innovation offers the following benefits:

- Compact design: extremely low mounting space requirements
- High efficiency
- Quiet; minimal noise production
- Built using proven Veth Propulsion technology
- Outstanding manoeuvrability thanks to the 360-degree thrust
- Low weight
- Electric motor inside the ship; few vulnerable components underwater
- Simple to install
- Slip ring cabinet unnecessary
- Optimal flow of water thanks to 'Shark Tail' on counter-rotating propeller

Electric propulsion

Veth Propulsion designs and manufactures different types of azimuth thrusters. Azimuth thrusters are capable of 360-degree propulsion. Which azimuth thruster suits you best depends on the type of ship, the type of drive and associated requirements. A diesel-electric driven propulsion is a commonly chosen solution. We also see a trend developing in the use of alternative fuels, such as LNG and, in future, hydrogen (for fuel cells) in order to reduce CO₂ emissions. These motors often run at a constant RPM: in this case, electric drive is an ideal solution. The constant speeds can be converted to variable speeds by means of a frequency drive. An additional benefit of electric propulsion is redundancy.

For electric propulsion, you can choose between a Veth Z-drive and a Veth L-drive. A Z-drive has two gears, whereas an L-drive has one. Each gear transmission results in a 1% efficiency loss. In addition to higher efficiency, an L-drive is also less expensive to install. That is why an L-drive is preferable, provided there is enough space for the electric motor.

Until now, asynchronous short-circuit anchor motors have been widely used. Veth Propulsion has developed the Veth Integrated L-drive with a permanent magnet (PM) motor. The PM motor was designed in collaboration with Visedo and allows for a much lower mounting height. While designing this innovation, a conscious choice was made to house this PM motor inside the ship. The major advantage of this choice is that the PM motor is much less vulnerable than if it were located underwater.

The Veth Integrated L-drive is available with power ranging from 300 kW to 1,325 kW. Larger units are still being developed and will eventually also be available. The Integrated L-drive can be fitted to various types of vessels, ranging from huge luxury yachts to work boats.

The Veth Integrated L-drive is constructed using technology that we are familiar with. For example, Veth Propulsion has already made 1,500 of the underwater housings that are used for this new concept.

During the development of this innovation we adhered to the following principles:

- space
- efficiency
- noise reduction

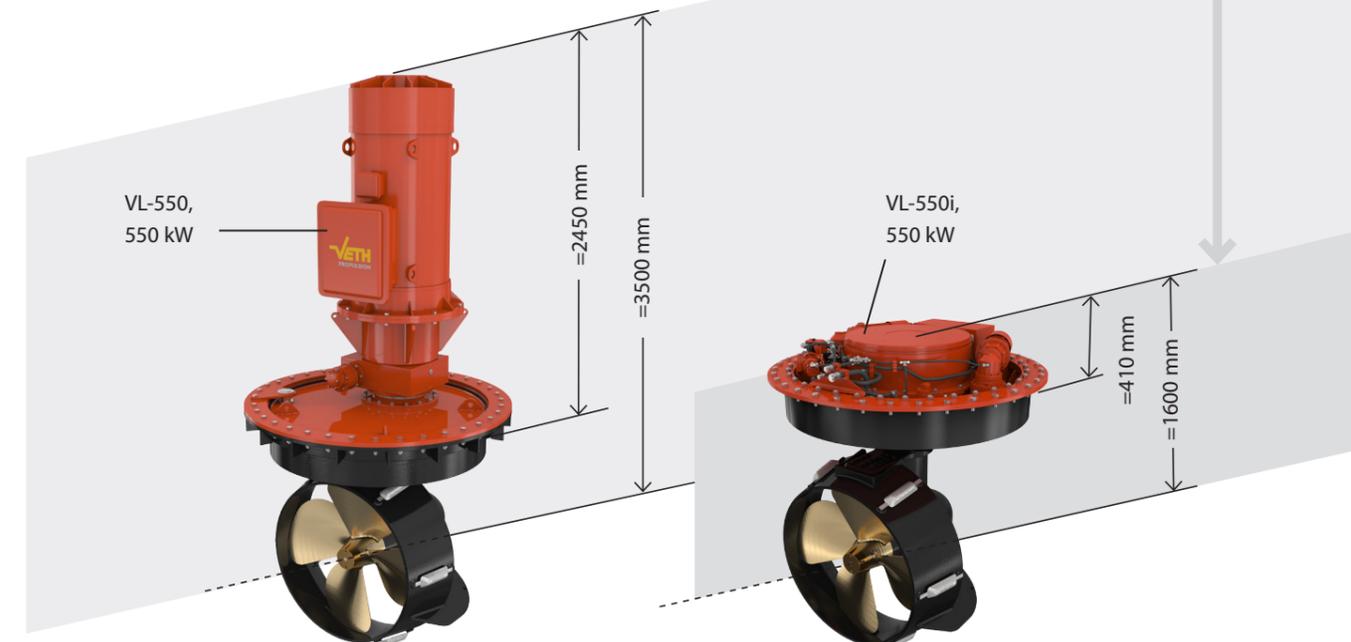
Space

The patented and innovative Veth Integrated L-drive is constructed using proven mechanical components. The PM motor is integrated into the thruster. When designing this thruster, no concessions were made with regards to the hydrodynamic design of the submerged section. The thruster is optimally streamlined thanks to the small diameter of the underwater gearbox.

40-60% more compact

The design makes use of every millimetre, without compromising quality. On average, a PM motor is 40% to 60% more compact than an asynchronous motor. This PM motor, when combined with the special mounting method, the alignment of the headsets and the adjustments to the control box, makes for a very compact thruster.

The figure below shows a comparison of the heights of the VL-550 (550kW) and the VL-550i (550kW).



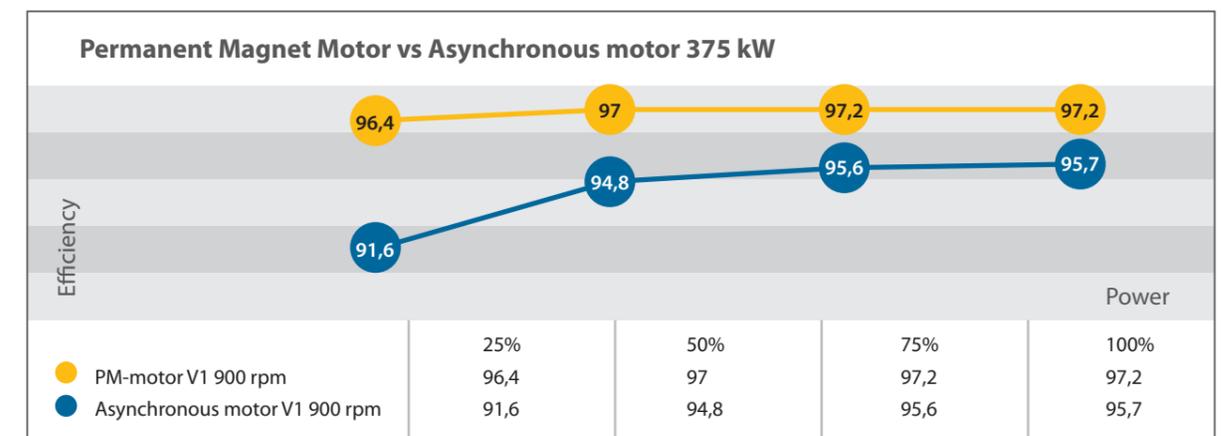
This minimal mounting height allows the thruster to be fitted below deck height, so that few vulnerable capital assets are underwater. In addition, this means that the thruster is easily accessible for periodic servicing.

In addition to the compact design, on average a PM motor is 30%-60% lighter than an asynchronous motor.

Efficiency

A PM motor is more efficient than an asynchronous motor. In particular, the part load efficiency is higher. In the diagram below, a PM motor with an output of 375 kW is compared with an asynchronous motor of the same output.

At 100% load, the efficiency of an asynchronous motor is 95,7%, and that of the PM motor is 97,2%: an improvement in efficiency of 1,5%. At 25% load, the efficiency of an asynchronous motor is 91,6%, and that of the PM motor is 96,4%. This means an improvement in efficiency of 5,2%.



Noise Reduction

The Veth Integrated L-drive does not have a gear transmission in the ship, which means that it generates less noise. The PM motor is water-cooled, which produces less noise than the air-cooling of an asynchronous motor. In addition, the Veth Integrated L-drive is electrically controlled, which further reduces noise production.

The Veth Integrated L-drive is simple to install. It can also be mounted flexibly. The mounting box is fitted with a clamping edge, which is hung between two rubber rings.

Benefits:

- Very quiet when in use due to flexible suspension
- Easy to remove thanks to mounting via the underside of the ship

All of these benefits ensure that this thruster is a very quiet propulsion device, which make it ideally suited for luxury yachts, for example.

Fairing plates

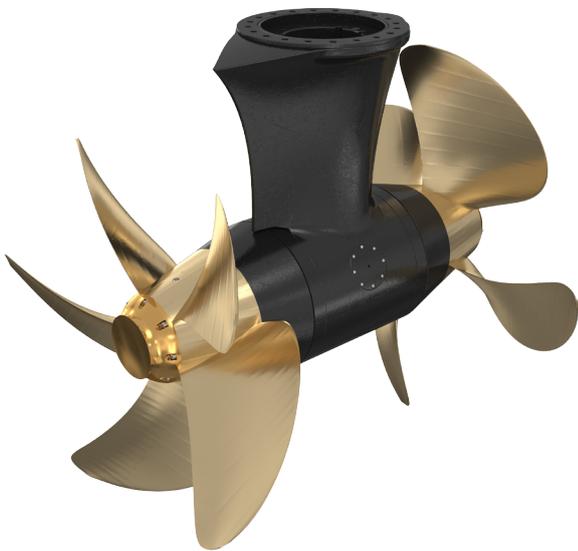
The Integrated L-drive is fitted with streamlined fairing plates, which reduce resistance. The fairing plates are flow caps which are affixed around the stationary parts of the thruster. They are shaped according to the surface of the ship, and help to reduce drag.

Depending on the application, the thruster can be fitted with an open propeller, a nozzle or counter-rotating propellers.

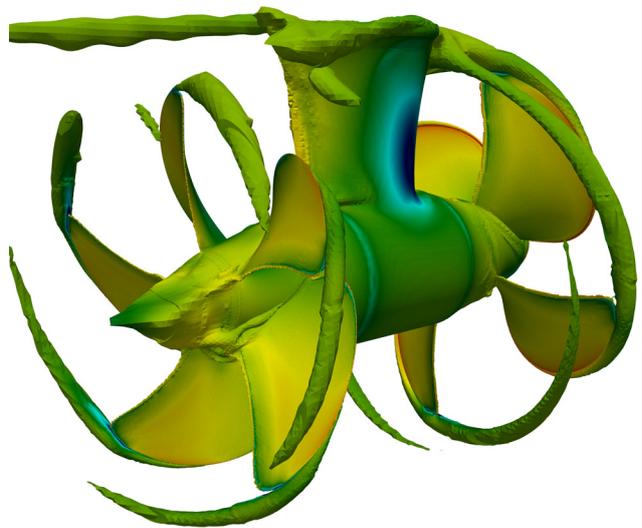
Patented Shark Tail

For fast ships with shallow drafts or when low noise production is paramount, a counter-rotating propeller is an attractive choice. A patented Shark Tail is used for this tail. The tail has been further optimised using CFD calculations and as a result it is shaped asymmetrically (see image no 1). This shape ensures an optimal flow of water toward the second propeller.

This innovation was developed in collaboration with Promarin and leads to a reduction in drag and noise production.



1. Patented Shark Tail



2. Shape patented Shark Tail after research with CFD

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Veth Propulsion is a thruster manufacturer with decades of experience delivering high-quality products, service, innovation and sustainability. The Veth Integrated L-drive is an excellent example of the combination of innovation and durability, resulting in a competitive, high-quality product. The new standard in electric propulsion is made.