
FUEL SAVING FOILS
hullvane®
LIFTING EFFICIENCY
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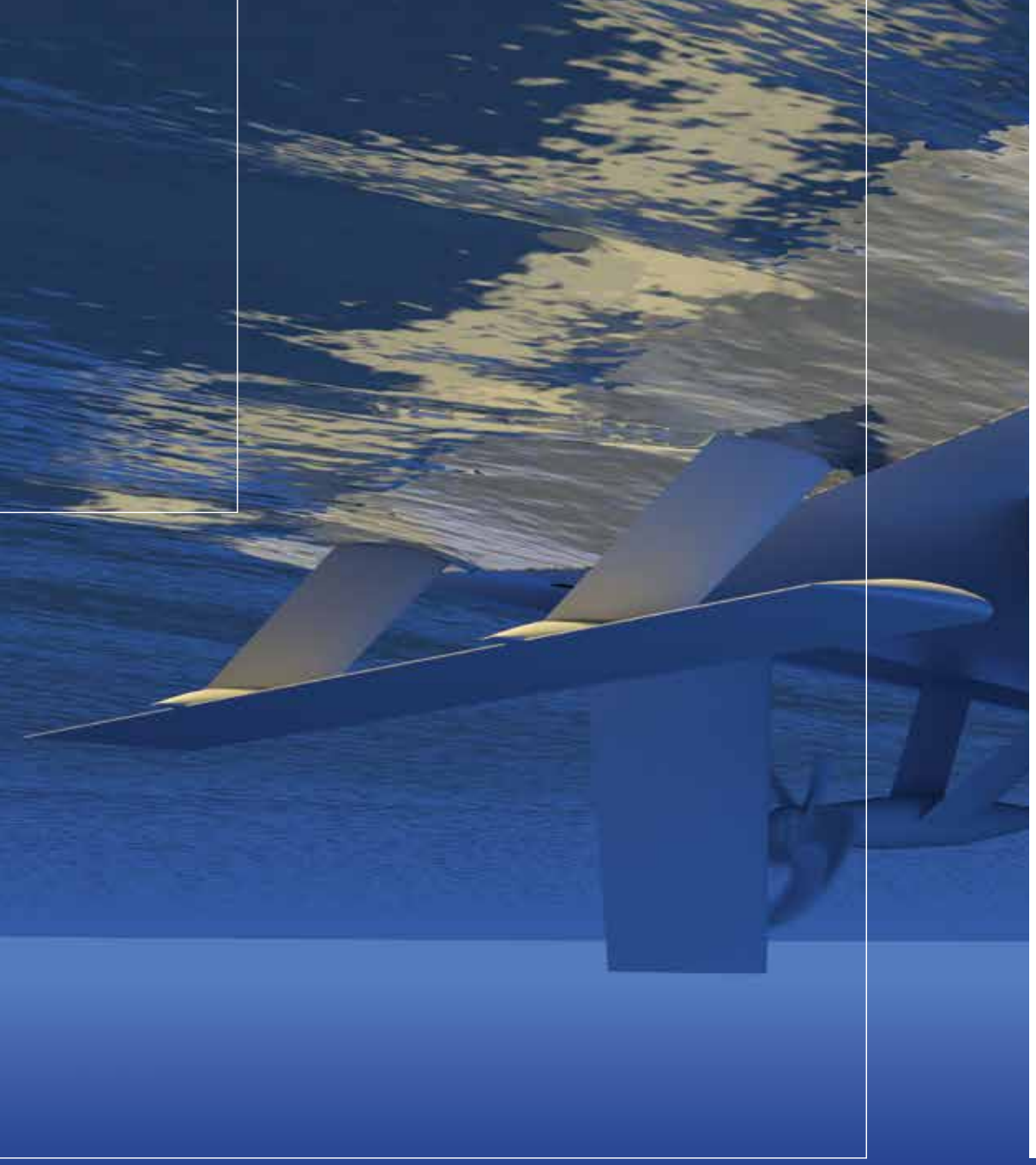


Hull Vane® – An energy saving and (passive) seakeeping device for medium-speed and fast displacement vessels

The Hull Vane® is a fixed hydrofoil positioned below or behind a ship's transom. It modifies the vessel's stern wave pattern and generates hydrodynamic lift with a forward component. This reduces the ship's resistance and dampens the pitching, heaving, rolling and yawing. For certain vessels, the fuel efficiency can be improved by between 5% and 20% depending on the vessel's length, speed and hull design.

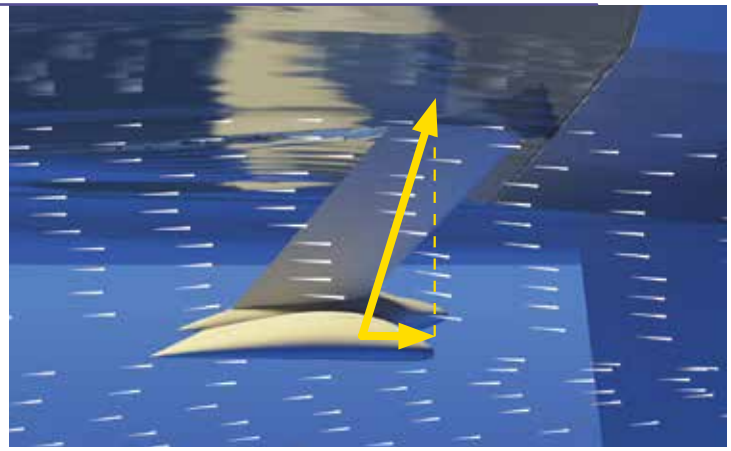


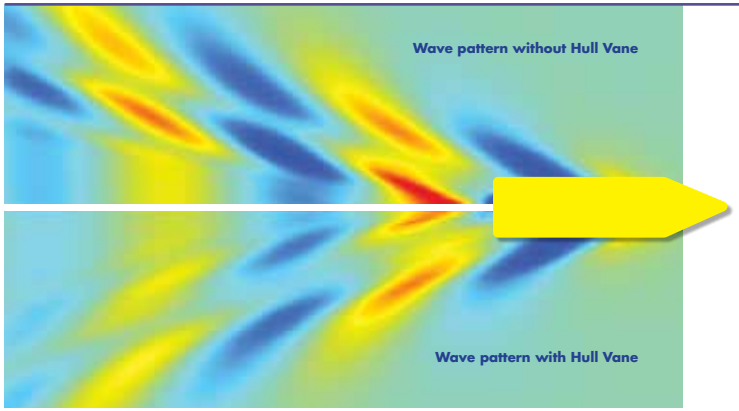
The Hull Vane® was invented by Dr Peter van Oossanen and is protected by patents in all major shipbuilding countries.

Hull Vane® – Four effects towards improved fuel economy

1 Forward Thrust

The flow of water under a vessel's stern is often not horizontal, but angled upwards. The Hull Vane® has a horizontal wing profile, which generates lift perpendicular to this flow. The horizontal component of this lift provides a forward thrust force transmitted through the Hull Vane's struts. The hydrofoil's hydrodynamic profile is such that the thrust it generates is usually greater than the drag it creates. Hence, the net result is reduced resistance for the vessel as a whole.



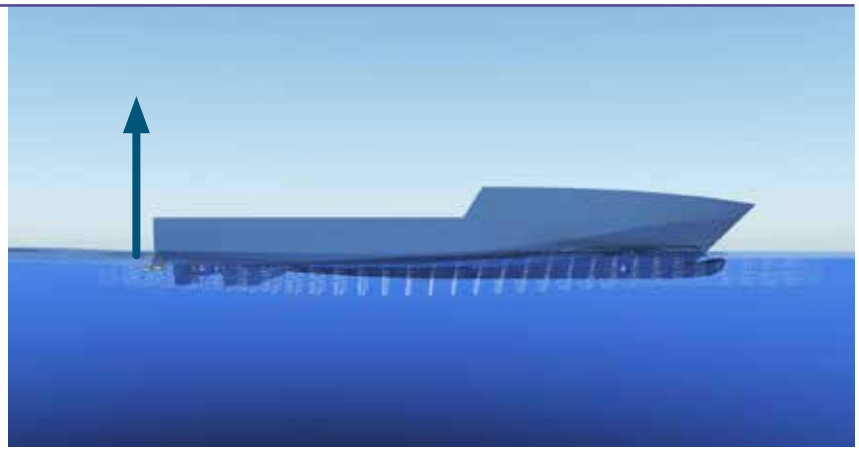


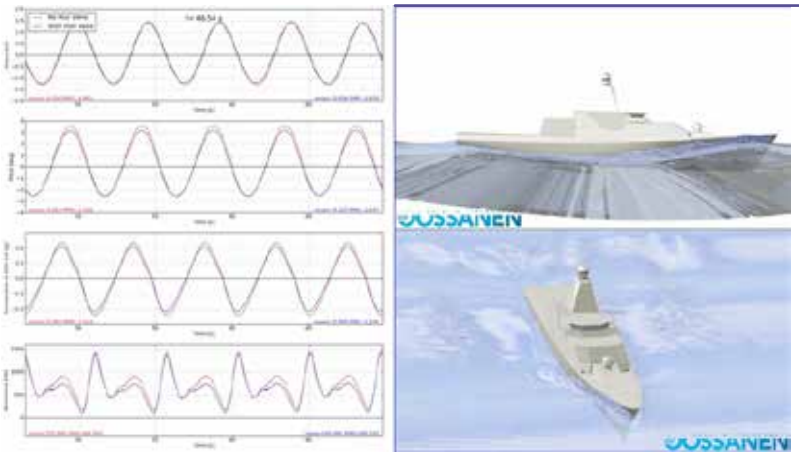
2 Stern Wave Reduction

The accelerated flow of water over the Hull Vane's top surface creates a low pressure region that interacts with the vessel's wake, suppressing its stern wave – in much the same way as a bulbous bow suppresses a vessel's bow wave. A vessel's wake or wave pattern correlates with the energy used for propulsion purposes. Suppressing the stern wave therefore reduces fuel consumption.

3 Trim Correction

Many vessels travelling at higher speeds can benefit from trim correction. The vertical lift component generated by the Hull Vane® reduces running trim, keeping the vessel at or near even keel. At intermediate speeds, it achieves this with lower drag than using transom wedges, trim tabs or stern flaps.





4 Reduced Pitching

Moving a large horizontal plane vertically through water requires a lot of energy. The same applies to the Hull Vane®. In heavy seas, it dampens the pitching motions, thereby reducing resistance and improving onboard comfort and operability. The Hull Vane® also reduces rolling and yawing.

Effec-tive-ness

The Hull Vane® is particularly effective when used on relatively high speed, high-displacement vessels, or expressed in naval architecture terms at Froude numbers between 0.2 and 0.7. For a 50 m vessel, this equates to a speed range between 8 and 30 knots. Similarly, for 100 m and 200 m vessels, this equates to minimum speeds of 12 and 17 knots respectively.

Ideal candidates for a Hull Vane® include coastguard and naval vessels, ferries, ro ro ships, cruise ships, supply vessels and motor yachts. For these types of vessel, fuel savings of between 5% and 15% are commonplace and in some cases even 20% savings are attainable.

Comparative sea trials with a Hull Vane® attached to *Karina* – a 55 m fast supply vessel – demonstrated a 10% reduction in shaft power at 12 knots and up to 15% at 21 knots.

Design pro-cess

A computational fluid dynamics (CFD) study forms the basis for the design process. It is impossible to estimate a savings percentage without creating a preliminary design and analysing performance using CFD. This is due to the way that the Hull Vane® interacts with the hull's wave profile and pressure distribution pattern.

The Hull Vane® study provides an accurate minimum savings percentage and cost estimate for supplying a suitable Hull Vane®. This allows owners, shipyards and naval architects to calculate a return on investment and payback period for a specific vessel. The study also provides a complete insight into pressure, flow line and viscous resistance patterns over the entire hull – with and without a Hull Vane® attached (for benchmarking purposes).

Model basin testing and independent, third party verification of CFD calculations are two additional options available on request.

Hull Vane® Benefits

- improved fuel economy
- reduced emissions
- greater range
- reduced installed propulsion power for same top speed
- reduced wave formation
- improved seakeeping – reduced pitching, rolling and yawing
- zero moving parts – no additional maintenance required
- proven technology
- new build or retrofit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