

# Excellent Solutions for Wind Farm Offshore Vessels. Installation and Support



# Voith is an Expert in Propulsion Systems.

Voith Turbo, the specialist for hydrodynamic drive, coupling and braking systems for road, rail and industrial applications as well as for ship propulsion systems, is a Group Division of Voith GmbH.

With nearly 41 000 employees and sales of €5.6 billion during the fiscal year 2010/2011, Voith is one of the large family-owned companies in Europe. The company is active in the energy, oil, gas, paper and raw material markets, as well as in the transportation and automotive industries.

# Voith Propulsion Solutions for any Wind Farm Vessel.

Over the next few decades, the number of offshore wind farms will grow rapidly all over the world. The remote locations of these offshore wind farms and frequently hazardous operating conditions at sea make extreme demands on wind turbine installations, equipment and supporting service logistics.

High waves, tidal currents and gusty winds characterize the working environment for people and equipment during the installation and maintenance of offshore wind farms. Human safety, risk management and OPEX (Operational Expenditures) are key challenges, which must never be compromised in this demanding business.

Voith is a professional partner and manufacturer of key propulsion components in the offshore shipbuilding industry, offering maximum personnel safety, as well as high efficiency and long uptimes for equipment operating under the most severe offshore conditions – all year round. No matter how strong the winds or currents, Voith has the propulsion solution to successfully safeguard your offshore business. Whenever a special feature for propelling an offshore vessel is required, Voith is your perfect partner for accommodating these needs, offering custom-designed solutions for:

- · Widening operating windows
- Sustainable technology
- · Maximum service life of your equipment
- Human safety
- Reduced installation times

Voith's long presence in all global and offshore markets has resulted in a vast accumulation of expertise, which not only covers state-of-the-art propulsion components, but also complete standardized or customized wind farm vessel design packages.

With our propulsion systems, your vessel will perform optimally and safely all year round.

### Offshore Vessel

Voith products have proven their added value for decades – in the most severe conditions continually, day after day. They offer prompt and precise maneuvering, as well as unparalleled roll stabilization combined with excellent dynamic positioning.

The Voith Schneider Propeller is a well-known synonym for safety and maneuverability, and its special features go hand in hand with "best-in-class" propulsion efficiency and reliability standards. The comprehensive Voith product portfolio offers flexible solutions for modern offshore vessels in the offshore wind farm industry. A wide range of wind farm vessels can be fitted with Voith propulsion components, providing maximum benefits to owners of vessels in the offshore sector.



![](_page_5_Picture_0.jpeg)

## Wind Farm Installation Vessel

The key success factors for the offshore installation of wind turbines are installation times, costs, safety and risk management. The successful deployment of modern state-of-the-art construction vessels for offshore wind farms should not be compromised by external factors. Wind farm installation vessels are highly capital-intensive assets. Maximum operational uptime during a wind farm construction phase is therefore of the utmost importance. Propulsion solutions from Voith help to achieve this goal: Excellent dynamic positioning and roll damping performance enable a wind farm installation vessel to operate within a wide range of conditions, such as high seas, high wind forces and strong tidal currents.

These features enable a wind farm installation vessel to quickly transfer from sailing or floating to crane-lifting mode by extending its legs. Voith offers the following products for this application:

- Voith Radial Propeller (VRP) for main propulsion and dynamic positioning
- Voith Schneider Propeller (VSP) for main propulsion, dynamic positioning and roll stabilization
- Voith Inline Thruster (VIT) for bow-steering purposes
  to support maneuverability and dynamic positioning

![](_page_6_Picture_0.jpeg)

- 1 Wind farm Installation Vessel Brave Term
- 2 Wind farm Installation Vessel Sea Installer
- 3 Infield Support Vessel Siem Moxie

## Wind Farm Feeder Vessel

The often extreme wave conditions in high seas require offshore vessels with special features to guarantee smooth and reliable support services between harbor and off-loading position at the wind farm construction site.

Highly precise maneuvering of a wind farm feeder vessel positioned alongside a wind farm installation vessel is imperative to minimize the risk levels for human safety and costly assets. Off-loading heavy wind turbine components at sea requires a stabilized supply vessel.

The Voith Roll Stabilization (VRS) feature of the Voith Schneider Propeller combined with precise dynamic positioning provides a wide off-loading window, offering maximum uninterrupted service for both the wind farm installation vessel and the wind farm supply vessel.

The Voith Schneider Propeller (VSP) working as ship propulsion can generate both propulsion and steering forces. Magnitude and direction of thrust can be adjusted extremely fast. This very rapid thrust variation and generation of very high moments make it possible to use the VSP for efficient reduction of the ship's rolling motion both during sailing as well as when keeping position. Voith offers the following products for this application:

- Voith Schneider Propeller for main propulsion, dynamic positioning and roll stabilization (VRS)
- Voith Inline Thruster (VIT) for bow-steering purposes to support maneuverability and dynamic positioning

## Voith Offshore Wind Farm Shuttle

Once an offshore wind farm has been completed and put into service, a logistic supply chain of service staff and material must be secured under all circumstances. Unscheduled wind turbine downtimes have a major impact on the total kWh costs of the electricity generated.

Scheduled and unscheduled repairs and maintenance intervals call for an efficient and flexible deployment of staff and instant availability of spare parts. The type and size of the vessels required to support this logistic supply chain is highly dependent on the size and the location of the wind farm. Hotel accommodation platforms are sometimes positioned near wind farms in order to reduce commuting times of service staff and material. The safe transfer of service staff at sea is of maximum importance. Simultaneously, docking and undocking of a vessel at the turbine boat landing must be quick and smooth, even under the most adverse wind and wave conditions.

In many cases, repair and maintenance jobs require extra material. A stabilized vessel is required for the safe off-loading of such items. Whatever the need or the environmental conditions, the Voith product portfolio offers optimum coverage and perfect solutions for any wind farm service and maintenance vessel. Voith offers the following products for this application:

- Voith Schneider Propellers for main propulsion, dynamic positioning and roll stabilization (VRS)
- Voith Inline Thrusters for bow-steering purposes to support maneuverability and dynamic positioning

![](_page_7_Picture_7.jpeg)

Voith Offshore Shuttle - conceptual design (2 x VSP + 1 x VIT)

# Marine Engineering

Voith offers technically sophisticated state-of-the-art offshore vessel design packages. Experienced senior naval architects combine decades of operating experience with the latest developments in naval architecture and propulsion technology.

To support offshore wind farms, a specific design concept for a wind farm feeder vessel has been developed meeting the following operational demands:

- Safe transport of maintenance crews consisting of up to 24 people to the wind turbines in harsh conditions such as in the North Sea
- Transport of containerized maintenance equipment and spare parts
- · Devices for safe access to the wind turbines
- Station-keeping during transfer of personnel and material from the vessel to the wind turbine

Alongside their offshore shuttle design activities, the naval engineers of Voith offer a range of standardized and customized design packages for complete wind farm vessels. These include naval architecture design services such as:

- · Hull lines
- · Intact and damage stability calculations
- General arrangement plans
- · Diagrams for machinery and outfitting systems
- Structural design and strength calculations
- Class approval drawings

![](_page_8_Picture_14.jpeg)

# **Voith Propulsion Features**

### Voith Schneider Propeller

Propelling and steering – forwards and backwards, sidewards and more: The Voith Schneider Propeller (VSP) allows thrust in all directions and at all levels – fast, steplessly and accurately. A rotating body with four, five, or six blades moves around its vertical axis. Like the tail fin of a dolphin, the propeller blades generate thrust by additional oscillations around their own axis.

## Voith Inline Thruster

The Voith Inline Thruster (VIT) and the Voith Inline Propulsor (VIP) are thruster systems driven by a permanent magnetic (PM) synchronous ring motor. The PM motor is cooled by the surrounding water, hence no additional cooling is required. The motor windings are housed in the stator, the permanent magnets are housed in the rotor. The rotor is supported by water-lubricated bearings for the radial and axial load. The propeller blades made from CFRP are directly connected to the inner ring of the rotor, which eliminates the need for a central shaft or gearbox. The sense of rotation as well as the speed is controlled by frequency converters.

The Voith Inline Propulsor combined with a steerable nozzle is designed as a main propulsor or assistant system for DP or tracking modes, while maintaining highest comfort class criteria.

![](_page_9_Picture_6.jpeg)

Voith Schneider Propeller (VSP)

![](_page_9_Picture_8.jpeg)

Voith Inline Thruster (VIT)

## Voith Radial Propeller

The Voith Radial Propeller (VRP) is a 360° thruster specifically designed for the requirements of large offshore vessels configured as semisubmersibles or for wind turbine installations.

Special features include underwater assembly, a pressurized lubrication system and bearings for DP requirements. Retraction systems are available as an option. Hydrodynamically, the 8° axis tilt by special gear technology ensures more useful thrust by avoiding losses due to interaction effects. Patented high lift nozzles and individually optimized propellers ensure optimum propulsion efficiency.

#### Voith propulsion advantages

- + Dynamic performance through rapid thrust variation
- + Voith Roll Stabilization (VRS) = stable operating platform
- + High maneuverability
- + Dynamic positioning
- + High availability no gear failures
- + Wide operating window
- + Excellent OPEX due to low maintenance costs
- + Underwater assembly
- + Safety and crew comfort due to fast reaction times and VRS
- + Energy-efficient and eco-friendly
- + Low noise
- + Everything from one single source
- + Product range covers all performance ranges

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## References

Voith has been successfully producing propulsion systems for over 85 years and has excellent references in various offshore application performance classes.

#### 1 Sea Installer

- Ship type: Wind Farm Installation Vessel
- Propeller type: 3 VSP 36R6 ECR/285-2
- Classification: DNV, DP2
- Length x beam/draft: 130.80 x 39.0 m/5.80 m
- Speed:
  12 kn

#### 2 Forte

- Ship type: Platform Assist Vessel (PAV)
- Propeller type: 2 VSP 36R6 ECR/285-2
- Classification: ABS, DP2
- Length x beam/draft: 51.21 x 15.85 m/3.56 m
- Speed:
  14.5 kn

#### 3 North Sea Giant

- Ship type: Offshore Construction Vessel
- Propeller type: 5 VSP 36R6 ECR/300-2
- Classification: DNV, DP3
- Length x beam/draft: 145.60 x 30.00 m/7.00 m
- Speed:
  16 kn

![](_page_12_Picture_0.jpeg)

#### 4 Brave Term

- Ship type: Wind Farm Installation Vessel
- Propeller type: 3 VSP 36R6 ECR/285-2
- Classification: DNV
- Length x beam/draft: 132.0 x 39.0 m/5.30 m
- Speed: approx. 12.0 kn

#### 5 Edda Fides

- Ship type: Accommodation & Service Vessel
- Propeller type: 5 VSP 32R5 ECR/265-2
- Classification: DNV+ 1A1, SF, EO, ICE C, DYNPOS AUTRO, CLEAN DESIGN, CONV-V (2), COMF-C (3) NAUT AW, HELDK-SH, PMS, ISM
- Length x beam/draft: 130.0 x 27.0 m/6.20 m
- Speed: approx. 12.5 kn

# Performance Range

#### **Propulsion systems**

Precisely adapted to even the most challenging requirements

![](_page_13_Figure_3.jpeg)

Up to 4 MW/unit Voith Schneider Propeller

![](_page_13_Figure_5.jpeg)

![](_page_13_Figure_6.jpeg)

Above 4 MW/unit Voith Radial Propeller

# Service

High availability and trouble-free operation of all systems are of the utmost importance during wind farm construction and maintainance. The worldwide service of Voith ensures:

- Maximum uptimes
- Offshore-qualified service technicians
- Global service network
- · Availability of spare parts and key components

![](_page_14_Picture_6.jpeg)

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