

# More than a tugboat Voith towing solutions





# Best available technology

## Voith towing solutions

Ship handling is an important link between land and sea transport and plays a key role in ensuring fast and smooth-running port logistics. The task of any ship-handling vessel is to bring the tow to its destination:

- Rapidly, and by the shortest route, using as little power as possible, but making the most of its capabilities, and
- Ensuring maximum safety for the tow, the tug, crew and port facilities.

To perform this task successfully, the ship-handling vessel must:

- Take the tow's lines quickly and safely, even at high speeds outside protected waters, in adverse wind conditions, swell and currents.
- Take control immediately, braking and steering to ensure a smooth transition from free movement of the incoming vessel to the towing operation.
- Substitute power for the tow's own controls in the event of rudder/engine failure.
- Exert forces continuously, avoiding long delays while the tug alters position relative to the tow.
- Ensure maximum maneuverability in restricted spaces with quick, precise movements.

# Voith Schneider Propeller (VSP)

The Voith Schneider Propeller combines vessel propulsion and steering in a single system, making it possible to apply power extremely accurately, and enabling safe, efficient maneuvering.

- Sensitive, stepless thrust variation irrespective of vessel speed
- Safe, swift berthing and unberthing
- Identical efficiency in all directions
- Symmetrical power distribution between propellers at both ends of the vessel
- Variable thrust using Cartesian coordinates
- Easily controlled, redundant steering; logically related to the vessel's movements
- Constant or variable propulsion under diesel or electric power without the need to reverse the direction of rotation
- Robust, low-speed marine engineering design made from high-quality materials
- Long service life, even in extreme operating environments

---

## The benefits to you



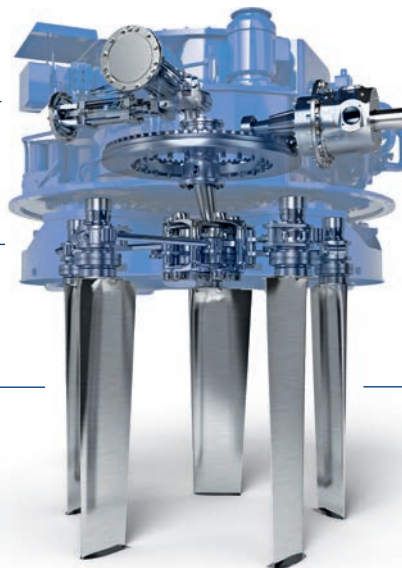
Safe and precise maneuvering



Fast response time



Robust against floating debris and ice



High reliability and low maintenance requirements



Low fuel consumption



Maximum safety for the vessel and the environment

# Voith Water Tractor (VWT)

**The Voith Water Tractor incorporates fully interlinked main systems – propellers with all-round protection, towing gear, a skeg and an integrated control station – for all duties in the broad field of ship handling.**

This concept is a standard-bearer for safety and has revolutionized ship-handling across the world, with more than 900 Voith Water Tractors currently operating in over 200 ports. The Voith Water Tractor offers reliability, speed and precision for towing and escorting, salvaging, firefighting, oil pollution control and offshore supply logistics and has won the classification accolade of

**“Best Available Technology!”**

Voith Water Tractor’s unique capabilities make it a key element of any port’s complex safety systems.

Its superior dynamic ship handling means less expenditure is required on shore-side facilities such as breakwater extensions and channel dredging.

A VWT fleet helps boost port traffic density, permitting vessel approaches in poor weather conditions.

Most damage to merchant vessels occur during adverse weather conditions. During these times, it is essential to have effective vessel assistance on hand to safeguard lives, vessel and port facilities, and – where necessary – avoid environmental damage. These critical tasks must be accomplished by marine support facilities.

The VWT is a useful asset in these scenarios, as the precise thrust control provided by the Voith Schneider Propeller helps counteract external forces with no delay and minimum risk.

## Features of the Voith Water Tractor

The VWT is propelled and controlled by the Voith Schneider Propeller (VSP) – a single system providing both steering and thrust, and also capable of active roll dampening (optional extra). The VSP is an outstandingly efficient propulsion unit, enabling precise maneuvering while maintaining high levels of safety.

- Swift, sensitive, stepless thrust variation in direction and magnitude, regardless of VWT speed.
- Variable thrust using cartesian coordinates.
- Easily controlled, redundant steering logically related to movement of the VWT.
- Robust marine engineering using top-quality materials.
- High resistance to external ship-handling stresses in rough conditions, and an extremely long service life.

# Dynamic vessel assistance and escort work

Today's ship-handling operations call for a wide range of speeds, from vessel at rest to the tug's free-running speed.

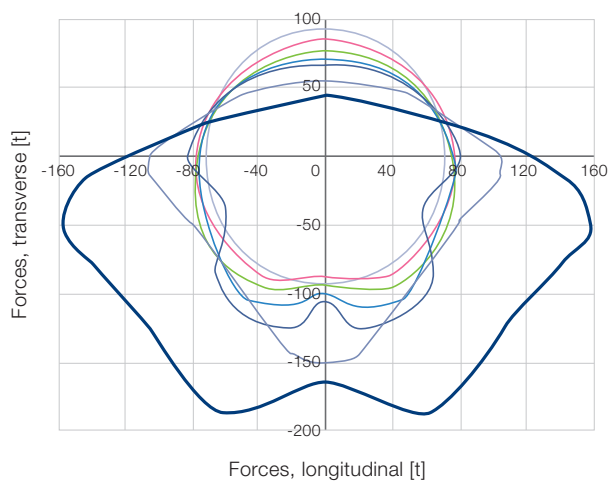
In stationary operation, the "direct" method of working is used, with engine power creating the necessary forces through the propulsion system. In dynamic operation, the "indirect" working method makes use of the hydrodynamic force of the hull.

The transition between the "direct" and "indirect" methods is kept smooth. The Voith Water Tractor performs this transition continuously and without any risk.

Further improvement is possible without undue complexity by installing the Voith Turbo Fin (VTF), a rotating tube at the leading edge of the skeg. The VTF exerts a specific boundary layer influence on the flow acting on the ship's hull and generates a considerable increase in lift. With VTF installed, steering forces can be increased by 18–20%. Escort forces of up to two times of static bollard pull have been certified by all major classification societies.

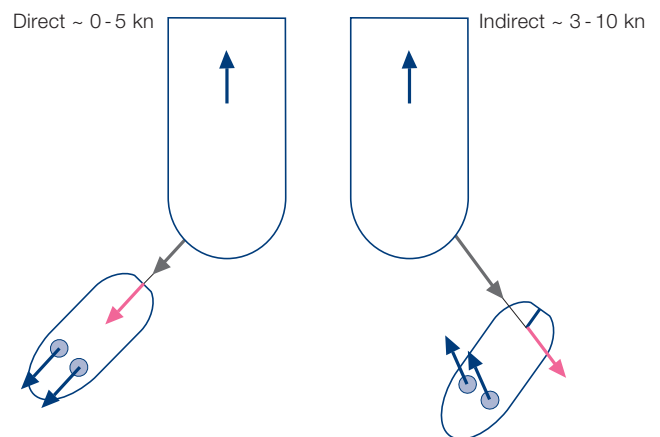
## "Butterfly" diagram for Voith Water Tractor escort

Ajax, Ostenjsjö Reederi A/S, Norway



## "Direct" and "indirect" methods

possible with VWT double static bollard pull in escort mode



# The benefits to you



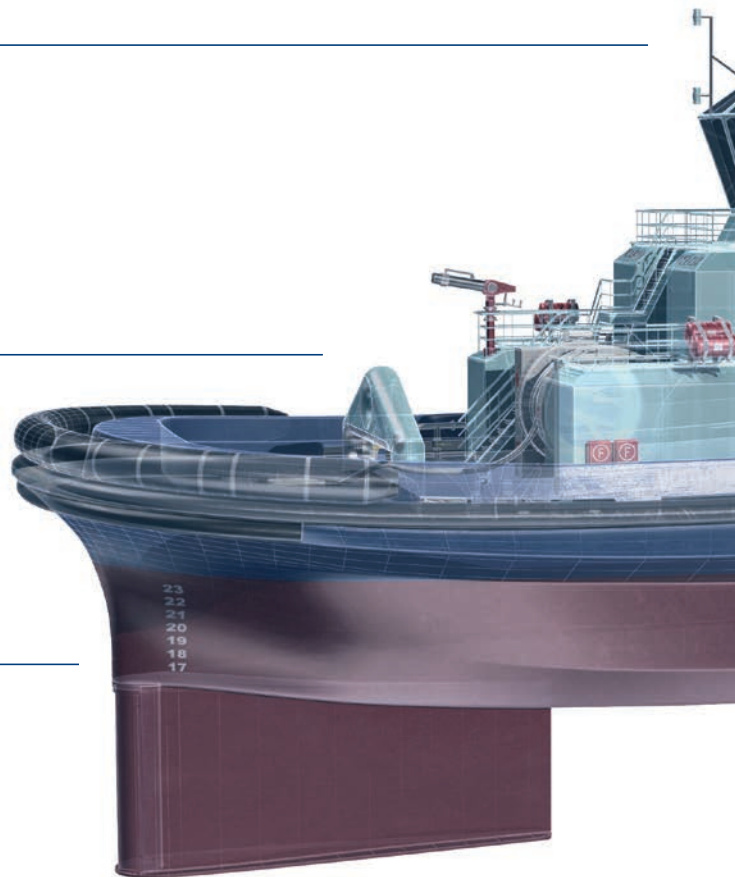
Excellent maneuverability



Faster operations



Better sea-keeping





Low maintenance costs



Excellent fuel efficiency



Safe operation



# CRT & RAVE

**The RAVE's in-line propulsion configuration enables a slender low-drag hull design, enhancing tugboat maneuverability as well as speed. The combination with Novatug's patented Carrousel system leads to the revolutionary Carrousel RAVE Tug (CRT).**

The RAVE (Robert Allan Ltd. Voith Escort) is a highly maneuverable escort and ship handling tug jointly developed by Robert Allan Ltd. and Voith Turbo Marine to tackle demands of modern harbors and terminals.

Its most unique characteristic is the longitudinal alignment of the two VSP drives, which gives the tug superior maneuverability in 360 degrees and uniform thrust in all directions.

Together with Multtraship, the team designed the revolutionary CRT, which was developed with the goal of alleviating bottlenecks and increasing safety in ports and shipping pathways. This highly advanced towing system combines the RAVE in-line propulsion configuration with Novatug's patented Carrousel technology. The CRT is thus optimized for effectiveness, safety, speed and ecological sustainability.

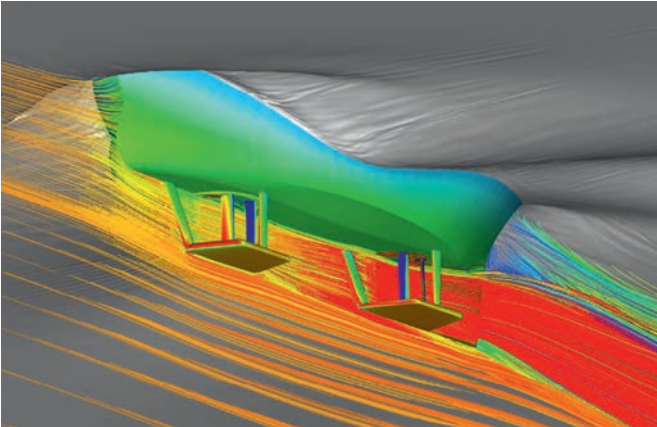
The CRT deploys dynamic towing forces, rather than relying on brute engine power. The patented Carrousel technology – invented by Marcus van der Laan in 1999 – features a towing winch mounted on a freely rotating ring that revolves around the superstructure. This provides a dynamic towing point, shifting the point of pull on the tug in function with the towing line direction. When the towing line is in a transverse position relative to the tug, the Carrousel arrangement ensures that the towing line force, generated by the resistance of the tug's hull, actually pulls the side of the tug out of the water. Thus, the system effectively eliminates the risk of the tug capsizing due to a towing line load.

The Carrousel system combined with in-line propulsion allows for a slender hull, enabling the safe and efficient maneuverability of the escort-type harbor tugboat. In turn, assisted vessels can maintain adequate speed to better utilize their own steering capacity.



---

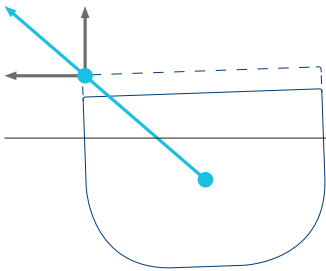
## RAVE



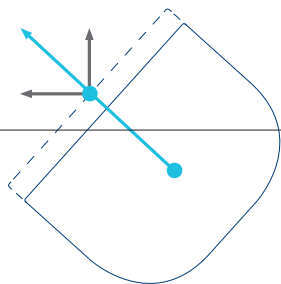
Hull and propeller optimized by state-of-the-art CFD methods to eliminate interaction effects between bow and stern VSP and ensure safe and efficient operation in 360°.

---

## CRT



## Conventional tug



The towing-point on the tug is on a freely rotating ring, with the diameter of the tug's beam, compared to the usual solution to have a fixed point somewhere along the tug's centreline. This in turn means that under a transverse line load the center of attack of the force moves to the side of the tug as well, so that the upward line force is more or less automatically lined up with the center of gravity of the tug. This is definitely not the case in the usual arrangement, where the tug will capsize under a transverse line load. The CRT's dynamic center of attack following transverse loads simply eliminates such capsize risk. The rendering shows the effect of the Carrousel arrangement under a transverse line load compared to the traditional set-up.

# The benefits to you



Built for agility – 360° performance



Faster port operations



Makes the most of your port infrastructure





Low maintenance costs



Eco-friendliness, fuel efficiency,  
emissions avoidance



Safe operation



Low water resistance





# Control systems

## Electronic control system

Voith supplies an electronic control system perfectly matched to the propulsion system. For Voith Schneider Propellers, Voith Inline Thrusters, Voith Radial Propellers and Voith Linear Jets, we offer an electronic control system with a modular hardware and software architecture allowing us to mix-and-match numerous helpful control features. Fast response and precise control (using controls designed by real-life professionals), as well as remote diagnostics via Internet are just some of the great benefits this control system offers.

## Mechanical control system

Absolutely reliable, straightforward to use and easy to maintain – these are attributes that have made the Voith mechanical control system stand out. It is primarily used in applications with a short distance between the wheelhouse and the propulsion unit. Additional electronic features, such as an autopilot, can be integrated via actuators. Various optional components, such as auxiliary servo motors, are available for increased ease of handling.



# Trainings

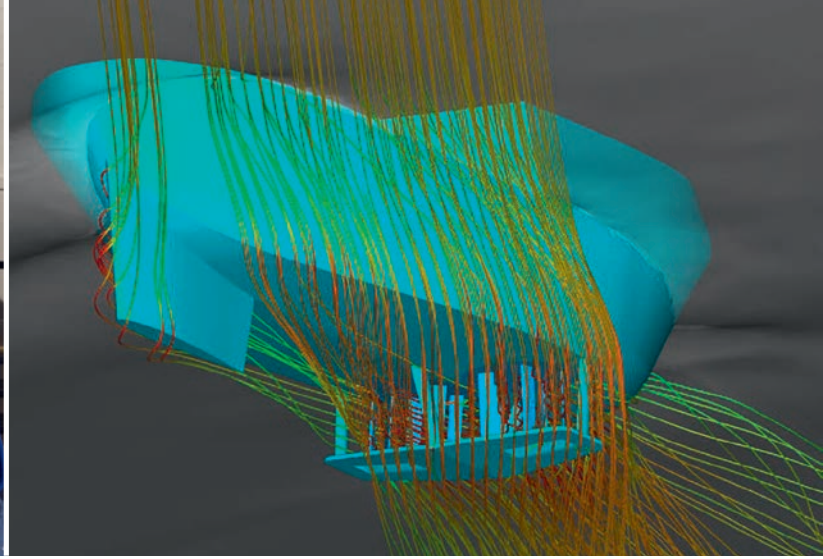
## Voith simulator training

The Voith simulator can be used to imitate various maritime maneuvers using a fully equipped control stand. With the help of software, control signals are applied as they would be by the relevant control system. Monitors display the view from the bridge onto a realistically modeled environment. Vessel speed, current propulsion system settings and fuel consumption are also indicated.

## Voith nautical training

To ensure that the crew have mastered the maneuvers and can execute them with absolute confidence, Voith provides a tailored nautical training program for crew members and pilots, conducted by senior tug masters. The training covers theory, as well as training aboard an actual tug.

Voith training is quite unique in the industry, but it is an integral part of Voith's holistic approach to our customers. It's how we help them to ensure the absolute safety and efficiency of their operations.



# Voith project support

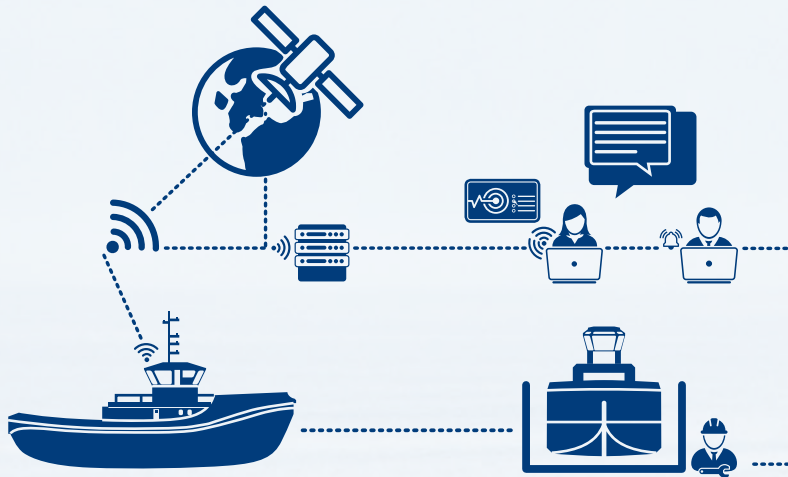
As well as building propulsion systems, we also provide comprehensive support when it comes to developing new vessel designs and solving complex technical issues. Using a wide range of computational fluid dynamics (CFD) calculations, simulator studies and finite elements (FE) structural analyses, we can forecast vessel behavior reliably and give you peace of mind when committing to a major investment. We also conduct model evaluations in our own test tank and at well-known international research institutes, and regularly perform large-scale measurements to exacting levels of quality.

What makes Voith customer support unique is our comprehensive mix of great tools, skilled engineers, a can-do attitude, and powerful hardware and software coupled with decades of experience. We don't just focus on props, we have the entire vessel in mind and are experts in performing all the calculations, simulations and measurements required.

- Model trials in our own test tank
- Assistance at model trials
- CFD studies
- Basic layouts of vessel designs, as generated arrangements, lines plans, installation proposals
- Bollard pull and speed forecast
- Escort force calculations
- Dynamic positioning calculations

# Remote access

Years of excellence: Voith propulsion systems are in service all over the world, and in a wide range of vessels. For each electronically controlled propulsion system, we have a perfectly matched remote access capability – meaning we can inspect and examine, irrespective of location, without the need to dispatch a service technician right away.







---

Reference projects spanning the globe



- 1 Multratug 32
- 2 VB Titan
- 3 L.A Fireboat 2
- 4 Mailiao Port
- 5 Shasa
- 6 Te Mata



Our Service –  
Part of  
Your Business.



# A lifetime partnership

**We offer customized service packages covering the entire product lifecycle. With over 90 years of marine experience, Voith customers are in good hands – both before and after the purchase.**

As well as innovative service solutions and product support, Voith offers personalized training courses to ensure your operating personnel receive the best training imaginable.

Our focus, throughout, is customer satisfaction, efficient operation of the Voith product, and short repair and maintenance times. Vessels equipped with Voith technology are in service all over the world. To ensure optimum service and minimize response time, we have established a global service network with experienced technicians providing support during installation, commissioning and during maintenance and upgrade work. Naturally, we ensure long-term availability of spare parts for all products.

---

## Technical support

**Phone: +49 173 3091918**  
**[Marineservice@voith.com](mailto:Marineservice@voith.com)**

---

Voith Group  
St. Poeltener Str. 43  
89522 Heidenheim, Germany

Contact:  
Phone +49 7321 37-2055  
[vspmarine@voith.com](mailto:vspmarine@voith.com)  
[www.voith.com](http://www.voith.com)



**VOITH**