YOUR PROPULSION EXPERTS

PROPULSION AND AUTOMATION FOR POWERFUL TUGS

108t BP Dual Fuel ASD Ocean-going Escort Tug Audax 2 x SRP 630 CP (3000 kW each)

photo credit GONDAN SHIPBUILDERS

MAXIMUM MANOEUVRABILITY

Tugs play a key role in the efficient handling of cargo in ports. Their tasks are manifold: from ship handling and escort to salvage operations and berthing manoeuvres. Tugs need to be both powerful and manoeuvrable. These are two features that distinguish the SCHOTTEL RudderPropeller and make it the world's leading propulsion unit for tugs. SCHOTTEL Automation Systems and Marine Services can be used to exploit the further potential of individual vessels or even an entire fleet.

+ INTEGRATED FIRE-FIGHTING SOLUTIONS

+ MAXIMUM MANOEUVRABILITY

+ POWERFUL PROPULSION

+ PROFESSIONAL AFTER SALES SERVICES

+ EFFICIENT OPERATION

+ OUTSTANDING DURABILITY

+ RETROFIT FOR ENHANCED SERVICE TIME

SCHOTTEL IN THE TUG MARKET

1967
First harbour tug with SRP

2,000+
Azimuth tugs worldwide

10 ->120t
Bollard pull capacities

20+
SRP sizes

140
Service engineers worldwide

HIGH QUALITY AND RELIABLE PROPULSION

YOUR MAIN PROPULSION OPTIONS

SCHOTTEL RudderPropeller
SRP

- Optimum efficiency for maximum manoeuvrability
- High propulsion efficiency: lower operating costs and lower emissions
- Precision positioning in DP operation
- Exclusive features such as ProAnode, HTG, highly efficient nozzles, LeaCon or DuroVario
- A whole range of configuration options enabling adaptation to diverse ship designs and individual requirements
- Minimal maintenance effort, long-term availability of spare parts as OEM
- Compatible with SCHOTTEL hybrid solutions (SYDRIVE-E and SYDRIVE-M)
- CP is possible (optional)

SCHOTTEL RudderPropeller, variant with unique embedded L-Drive design
SRP-LE

- Natural choice for diesel-electric or pure battery driven tugs
- Electric motor is customer choice, all types and brands suitable
- Suitable for any common tug design due to extra-low installation height inside thruster room, comparable with Z-Drive
- Reduced fuel consumption due a lacking of upper bevel gear: +3% mechanical efficiency against Z-Drive
- Enhanced crew comfort due to noticeable reduction of propulsion-related noise and vibration
- CP is possible (optional)

SRP IN DETAIL

+ DIFFERENT INSTALLATION OPTIONS

+ ELECTRICAL OR HYDRAULIC AZIMUTH STEERING SYSTEM

+ WIDE RANGE OF POWER SOURCES

+ FP OR CP PROPELLERS

Click on www.schottel.com for more details

SOLUTIONS FOR TUGS

AUXILIARY PROPULSION

SCHOTTEL TransverseThruster

STT

- Maximum thrust
- Compact design for easy integration
- Less maintenance required due to its robust, high-quality design
- LeaCon
- Well installation for easy access to the propulsion unit (optional)
- Resiliently mounted installation for lower noise and vibration → increased comfort level (optional)

Click on www.schottel.com for more details

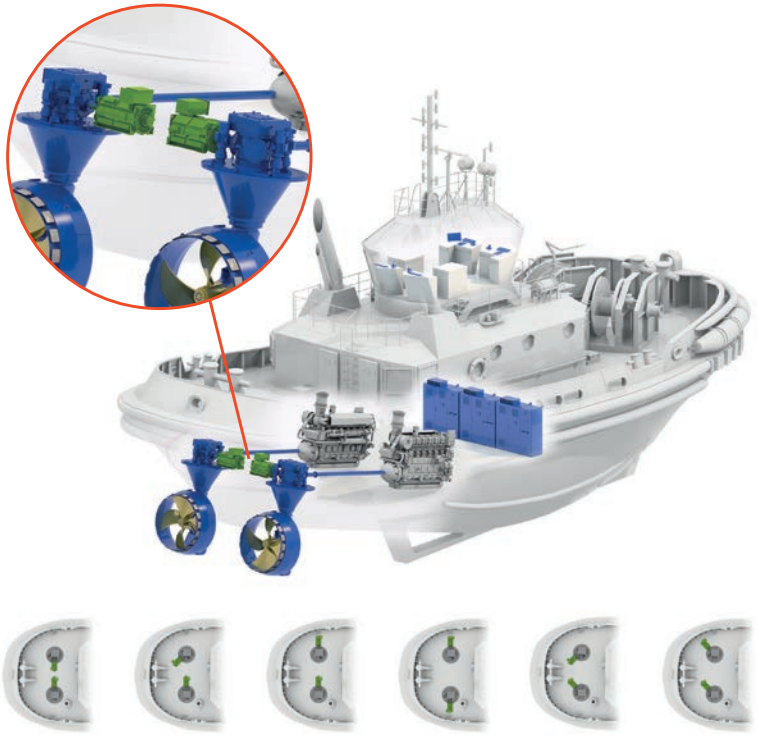
HYDRID TUGS – REDUCTION OF OPERATING COSTS AND EMISSIONS

Operation profiles of tugs and workboats feature low engine loads for up to 90 percent of operation time. In such instances, an engine that is rated for maximum propulsive power works in an unfavourable partial-load range that is inefficient in terms of emissions and fuel consumption.

Hybrid drive systems are predestined for applications with highly variable power ranges. These generally consist of two separate power sources (diesel and/or electric motors) per propeller with different power ratings. SCHOTTEL has further extended the system to a broader understanding of hybridization with SYDRIVE.

SYDRIVE-E

Thanks to the combined or sequential use of combustion engine and electric motor, SYDRIVE-E with its extensive and intelligent operating modes enables efficient energy and thrust generation in many different operating conditions. A unique feature is the flexible configuration of power input positions, which allows the drive train to be designed in various manners. This provides greater freedom when designing a vessel and ensures that the individually available installation space can be used optimally. Three power input positions for a ± 90° or ± 135° installation angle form a Y-shaped arrangement. The individual power inputs are not subject to any power limitation which means that any arrangement of primary and secondary input with variable load distribution can be realized.



Three power intake positions allow installation angles of ±90° or ±135° creating a Y-shaped mounting option

SYDRIVE-M

The mechanical hybrid solution allows two thrusters to be driven together by only one of the main engines. This concept physically connects a port and starboard-mounted azimuth thruster with each other. Since the second motor remains off, overall engine hours are reduced. This results in less maintenance and operating costs.

EXCLUSIVE ADVANTAGES OF SCHOTTEL

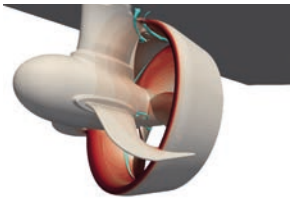
In addition to developing new products and services, SCHOTTEL works continuously to optimize existing systems. Special features ensure that customers worldwide benefit from state-of-the-art solutions.

ProAnode

Improved corrosion protection

+ Longer protection for the propulsion unit
+ No flow disruption
+ Resulting in fuel savings
+ Lower operating costs
+ Patented

VarioDuct



The SCHOTTEl DuroVario (SDV 45) combines proven higher efficiency during free sailing with excellent bollard pull values. In conjunction with optimally designed propeller geometries, the nozzle is able to fully utilize the outstanding performance values. Assuming the same propulsion power, the bollard pull is higher than the thrust of previous nozzles, while efficiency is significantly enhanced in the medium and higher speed range. This makes a major contribution to fuel savings.

DuroVario

Fully integrated clutches

- **DuroVario-D**
  - Standard clutch
- **DuroVario-LS**
  - Slipping clutch for occasional slipping at idling speed
- **DuroVario-S**
  - Slipping clutch that combines permanent slipping with maximum comfort at engine idling speed
- **DuroVario-PS**
  - Performance-enhanced slipping clutch that allows FiFi operation (up to FiFi Class 1) without any additional changes to a ship's design, while still allowing full manoeuvrability of a vessel with FP propellers

HTG

SCHOTTEL's self-developed High Torque Gear (HTG) extends the service life of the gearbox, resulting in significant reliability gains. State-of-the-art milling and calculation methods are used to achieve shapes that enable a highly efficient, robust and safe gearbox with ideal gear geometry.
Customers appreciate the high degree of reliability and minimized gearbox damage. The gearbox is designed in such a way that the risk of flank fracture or scuffing is considerably reduced. This increases the service life and reliability and reduces servicing costs.

LeaCon

- Reliable seal monitoring system
- Certified by DNV-GL
- Safe protection against contamination of the seawater
- Complies with the VGP regulations of the US-American Environmental Protection Agency (EPA)
- No need to use bio oils (EAL)

TUGBOATS – POWERFUL MANOEUVERS

50t BP Harbour Tugs Sirapinar XI, Sirapinar X 2 x SRP 360 (1500 kW each)

65t BP ASD Tug Hermes 2 x SRP 430 (2000 kW each) with SYDRIVE-M

80t BP Stern Tug Captain Brian A. McAllister 2 x SRP 510 (2524 kW each)

CUSTOMER FEEDBACK

"With the success of the first SCHOTTEL RudderPropellers in 1986, any new builds gave us no reservations about installing the SCHOTTEL units. In addition to the unit performance, the support we have received from SCHOTTEL in regards to service has been priceless. The spares have never been an issue. If we need a simple little part or a gear set, SCHOTTEL will send it over from the German headquaters if it isn't in their U.S. stock. Experienced service technicians are always available to assist with service and repairs."

Martin Costa, Engineering Manager at McAllister Towing

Many more references on www.schottel.com


www.SCHOTTEL.com

AFTER SALES SERVICE – DURING THE VESSELS LIFETIME

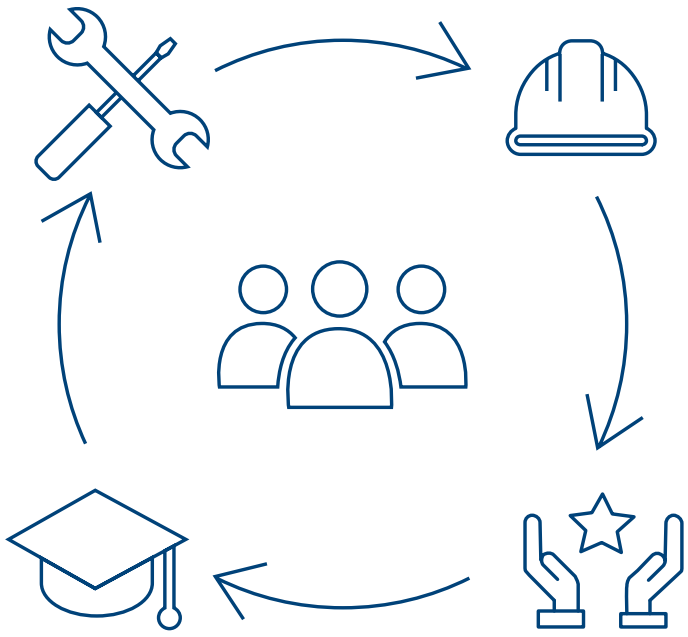
Delivering state-of-the-art propulsion and automation solutions is not enough for us. Thanks to decades of experience in the field of propulsion technology, we are able to offer high-quality services tailored to your individual needs throughout the vessel's service life.

SPARE PARTS

- Fast delivery time thanks to global warehouse logistics
- Decades of documentation for clear identification of spare parts
- Production of almost all spare parts
- OEM warranty
- Original spare parts with all technical revisions known up to the time of manufacture

MAINTENANCE

- Globally standardized and proven high-quality service levels
- Preventive and predictive maintenance concepts
- Remote service support with augmented reality tools
- Vibration measurement with SCHOTTEL VibCheck
- More than 140 highly qualified service technicians worldwide



TRAINING

- Customer training courses in local language
- Courses on site or in one of 4 SCHOTTEL training centers (GER, USA, AUS, SGP)
- Permanent international knowledge transfer for service technicians

UPGRADES

- Increase of the shipowner's profit

UPGRADE LEVELS:

- Control systems
- Thrusters
- Systems for intelligent operative monitoring

Click on www.schottel.com for more information

BEHIND THE SCENES

Since the invention of the rudder propeller in the early 1950s, SCHOTTEL has acquired a wealth of expertise in the development, design and production of state-of-the-art marine propulsion and control systems.

Today, a team of more than 100 engineers develops propulsion systems and digital solutions, which are manufactured to the highest quality standards in our modern production facilities in Germany.

70+ years
Expertise in the development and production of propulsion systems

>10
Product series in our portfolio

50 to 30,000kW
Power range

500+
Propeller designs per year

39,000m²
Production area

PROPULSION TECHNOLOGY – COMPETENCE IN CUSTOMIZED ENGINEERING

MECHANICAL DESIGN

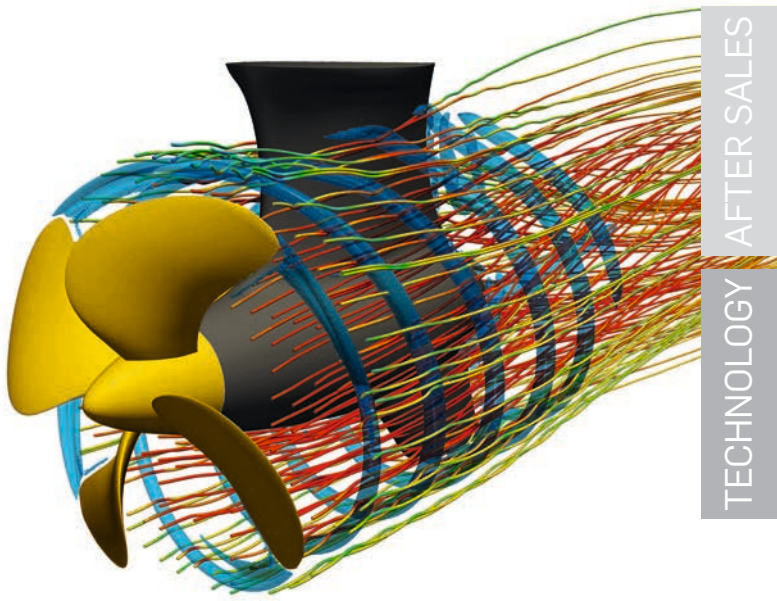
- Mechanical power transmission
- Structural mechanics
- Hydraulics & pneumatics
- Sealing technology

HYDRODYNAMICS

- Propeller design
- Model testing
- Computational fluid dynamics

ELECTRICAL ENGINEERING

- Automation
- Power electronics
- Assistance systems



+ GERMAN ENGINEERING

+ CUSTOMER-ORIENTED DEVELOPMENT WITH EXPERIENCED IN-HOUSE R&D

+ SUSTAINABLE MANUFACTURING FACILITIES FOR STATE-OF-THE-ART PROPULSION SOLUTIONS

YOUR QUALITY BENEFITS

- Ongoing certification process
- Quality controls during production
- Standardized FAT procedure
- Close dialogue with our suppliers

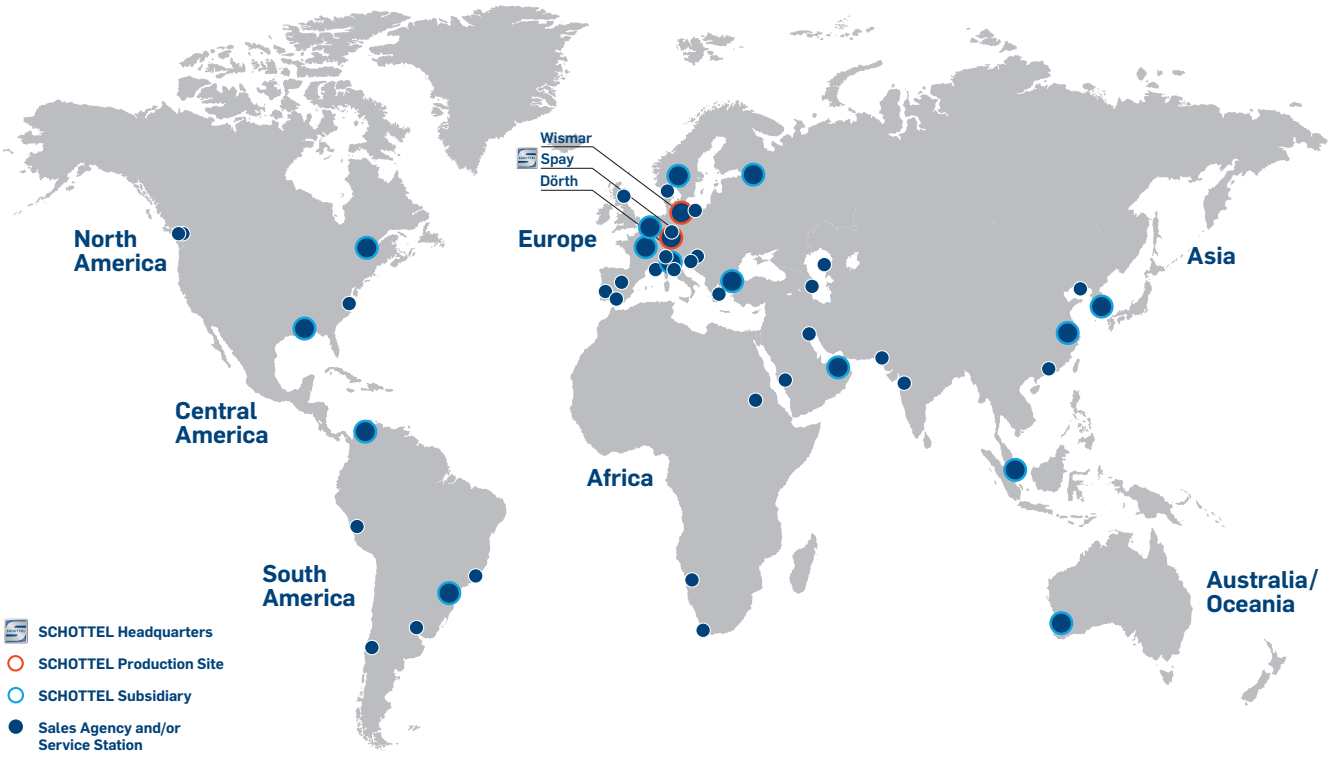
WE KNOW WHAT MOVES SHIPS

Push Boats | Offshore Vessels | Fishing Vessels | Ferries | Yachts | Dredgers | Naval Vessels

... and many more vessel types

Please contact **sales@schottel.de** for information about your next new build or conversion project.

SCHOTTEL Worldwide



Your local partner

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