Transverse thruster solutions
Wärtsilä specializes in complete ship propulsion systems. Besides our marine engines, we are also well known worldwide as a designer and manufacturer of LIPS® fixed pitch and controllable pitch propellers, Lips water jets, Lips transverse tunnel thrusters and Lips steerable thrusters.

Several thousand transverse thrusters are in operation today, the first of which were delivered back in 1964. Since 1996 Wärtsilä has produced a standard family of transverse thrusters (controllable, CT, and fixed pitch, FT) in the power range up to 3300 kW.

Many operators rely on the performance of the Lips transverse thruster while manoeuvring in harbour or for maintaining dynamic positioning all over the globe.

Design philosophy

Wärtsilä has given top priority to reliability and durability when designing the current range of thrusters.

The transverse thruster offers considerable savings in operational costs due to:

■ Reliable and durable components
■ Long lifetime of the bearings and gears
■ High efficiency
■ Maintenance-friendly design.

The Lips transverse thruster design is highly standardized and optimized for use in:

■ All sea-going vessels
■ Special ships with high demands for dynamic positioning (DP).

Although the Lips transverse thruster is a standard design, developed to cover the practical range of applications, special designs may be required in certain cases.

We have the know-how and skills to help our customers solve such problems and construct a system tailored to their needs.

The Lips transverse thruster offers major technical benefits:

■ Designed with the smallest possible tunnel diameter, which minimizes the mounting space in the vessel and increases hull efficiency
■ Designed for maximum thrust
■ High efficiency obtained by adapting the propeller design to the tunnel diameter and to optimize the flow towards the propeller
■ Standard blades of backward skewed design with rounded tips, resulting in optimum thrust efficiency while obtaining a more gradual change in the cavitation volume
■ A large blade area to keep cavitation volume as low as possible. This results in maximum thrust output at minimum noise and vibration levels, giving optimum comfort in the accommodation.
Market requirements

The market requires transverse thrusters with full performance capabilities in both normal conditions and during continuous running for dynamic positioning. High-quality materials and well-proven designs are a must.

We believe that flexibility and creativity in all projects is the best way to support owners, operators, consultants and yards. The design of the Wärtsilä Lips transverse thruster enables us to provide flexible and dedicated solutions for any requirement.

The concept further offers reduced lead times and easy availability of spare parts. Long design experience, use of the highest quality materials, and special solutions like double support for the pinion wheels, sealing solutions and the proven long lifetime of our gears and bearings, make Wärtsilä a unique ship power partner in all markets.

Whatever the market requires, Wärtsilä can deliver standard, can-mounted or low-noise Lips transverse thrusters. Wärtsilä also gives top priority to providing service and spare parts worldwide, anywhere and at any time.

Features and benefits

Bearing arrangement

Lips transverse thrusters make exclusive use of anti-friction spherical roller or tapered roller bearings, which run completely immersed in ISO 150 gear type lubricating oil.

A split axial and radial bearing layout is applied: each bearing has a specific function and therefore performs optimally. Bearing lifetime is in the order of 60,000 hours based on an average operating profile.

Seals

High-quality seals are fitted on the propeller shaft and pinion shaft to prevent water ingress or oil leakage.

Pinion shaft

Standard viton lip seal combined with a nitride hardened liner.

Propeller shaft

Standard NBR lip seals combined with a stainless steel liner and a rope guard (split steel cover).

Optional:

- Viton lip seals with ceramic coated corrosion resistant liner
- Special Wärtsilä’s JMT lip seals
- Specific customer requirements.

Gear set / contact pattern

The bevel gears (pinion and crown wheel) are of the Cyclo-palloid HPG type. The teeth are fine-machined when the hardening process is completed successfully.

When finished, the gearwheels comply with Class 6 or better under DIN 3965. Optimal tooth contact is achieved by precise adjustment of the gear wheels. Deflection of the gear
mesh under variable load is prevented because the pinion is supported by radial roller bearings at both sides (lower bearing in cast-in straddle).

All in all, gearwheel lifetime is infinite.

**Propeller design**

Hub and blades are cast of patented Cunial® bronze. The propeller diameter ranges from 1.25 m to 3 m.

A large blade area is chosen to keep the cavitation volume as low as possible. This design results in maximum thrust output with minimum noise and vibration to achieve optimum comfort in the accommodation. The thrust achieved is approximately 0.15 kN/KW based on our standard tunnel configuration.

The well-balanced combination of materials minimizes electrochemical corrosion.

**Selection of transverse thrusters**

**CT transverse thruster design offers:**

- Controllable pitch propeller blades (4)
- Standard blades of skew back design
- Compact hub design standard for transverse thrusters as well as for CPPs and steerable thrusters
- Blades actuated by a hydraulic cylinder yoke. Together with the mechanically linked feedback system, this creates a smooth, fast, reliable and accurate pitch control system

**FT transverse thruster design offers:**

- Propeller made to order (4 or 5 blades)
- Key-less easy (de-)mounting (oil injection method)
- Available with 3-step and stepless speed control
- Very compact motor on top of the tunnel (alternative arrangement possible).

**Selection criteria for applying CT versus FT**

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<tr>
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<th>FT 3-step</th>
<th>FT stepless</th>
<th>CT</th>
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<tr>
<td>Drive E-motor</td>
<td>slip-ring</td>
<td>squirrel cage</td>
<td>squirrel cage</td>
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<td>Speed control</td>
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<td>Thrust control</td>
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<td>Maintenance</td>
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<tr>
<td>Power efficiency</td>
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<tr>
<td>Noise and vibrations</td>
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<tr>
<td>Standby Full power</td>
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<tr>
<td>Dimensions</td>
<td>less compact</td>
<td>extensive</td>
<td>compact</td>
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Bladed fixed pitch propeller just before mounting.

- Standard equipped with pitch to “0” to minimize trailing under sailing conditions
- Special clearance seal (no wear) in the oil distribution box
- Very compact motor on top of the tunnel (alternative arrangement possible).
Tunnels

Our standard tunnel section is made of rolled mild steel, the thickness and length of which depend on the propeller diameter. The tunnel is reinforced by three rings that can be welded directly into the ship’s structure.

The tunnel arrangement can be manufactured for both vertical or horizontal installation.

Special arrangements are possible:
- (De-) mountable tunnel
- Low noise tunnel
- Split delivery (tunnel in advance).

Options
- With or without motor support
- Extra tunnel length
- Extra reinforcement rings
- Longitudinal stiffeners
- Stainless steel liner
- Cladded stainless steel liner
- Tunnel ends cut according to hull form
- Special customer demands fulfilled
- Demountable without docking.

Our specialists can advise you about the optimum tunnel location, the best configuration for the entrance and the geometry of the grids to ensure maximum efficiency.

The (de-) mountable construction is recommended for ships operating in rough conditions and to tight time schedules, where a damaged thruster must be replaced or repaired at short notice.

The (de-) mountable construction allows repair of a damaged thruster on board even when the vessel is sailing. For the non-demountable low-noise construction, a special design is available to reduce noise.
Auxiliary systems

Each transverse thruster has its own independent auxiliary system consisting of:
- Hydraulic/lubrication systems
- Remote control system.

Hydraulic/lubrication systems

Lubricating system:
- Header tank is loose supplied and mounted on a certain level above the thruster, to obtain over-pressure in the submerged part of the thruster
- No extra pump is needed
- Oil type: mineral ISO 150/100.

Hydraulic pitch actuating system (CT only):
- Power pack tank (located near thruster)
  - Pump E-motor driven
  - Control valve
  - Level switch
  - Filter mounted on top of tank
- Oil type: mineral ISO 150/100.

Options:
- Two pumps (each 50% or 100 %, DP class requirement),
- Oil cooler
- Oil heater
- Temperature switch
- Power pack air pressurized
Remote control system(s)

Wärtsilä can supply various types of remote starting equipment and remote controls.

Controllable pitch transverse thrusters have an electrically operated pitch control system. The control panels, normally located on the bridge wheelhouse and wings, can be situated at various locations depending on the type and function of the vessel.

Options:
- Portable control panel
- VDR interface

Worldwide service and maintenance

Worldwide service stations are available to provide you with spare parts and support by professional service engineers. Well equipped workshops contribute to our ability to give you high-quality local service.

We have thruster service stations in:
- The Netherlands
- Germany
- USA
- Brazil
- People’s Republic of China
- United Arab Emirates
- Singapore.

When necessary the service stations can count on dedicated support from Wärtsilä’s thruster engineering team. Professional and quick support at low cost is near to your place of operation.

Wärtsilä service: around the world, around the clock.

The Wärtsilä Plant in Wuxi, PR China, has produced transverse thrusters since mid-2005.
Wärtsilä is The Ship Power Supplier for builders, owners and operators of vessels and offshore installations. Our own global service network takes complete care of customers’ ship machinery at every lifecycle stage.

Wärtsilä is a leading provider of power plants, operation and lifetime care services in decentralized power generation.

For more information visit www.wartsila.com

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