

Transverse Tunnel Thrusters

FINCANTIERI
The sea ahead



Transverse Tunnels Thrusters

— The use of transverse tunnel thruster application is a must as it remarkably facilitates the ship evolution when manoeuvring in narrow waters or at low speed. This low-cost solution allows to achieve remarkable safety conditions and is also time-saving, the use of tug boats being no longer necessary. Since the beginning of the '60s Fincantieri has been joining the experience acquired in the production of controllable pitch propellers with the skills of high performances shipbuilders, and can offer a product of high efficiency and reliability, designed for easy installation and maintenance on board.

Low Noise

— All rotating components of Fincantieri thrusters are statically balanced and the blades are numerically machined, in order to achieve the highest levels of performance required by the Client. Skewed blades are manufactured by Fincantieri to comply with low noise requirements. The finishing of the blades surface and of the propeller components is designed to minimize the development of fouling and to improve efficiency and noise performances.

Materials

— The choice of material ensures a long life in underwater service and an optimisation of propeller components design due to its high mechanical properties. A stainless steel coating covers the blade tips to prevent local erosion of the tunnel.

Installation

— Fincantieri thrusters can be supplied either in a standard tunnel or in a tunnel manufactured according to special shipyard requirements. It also supplies loose thrusters with the relevant procedure to install them in a tunnel manufactured by the shipyard.

Types

— Fincantieri has developed two transverse tunnel thrusters designs:

- HMF type with fixed pitch propeller;
- HMC type with controllable pitch propeller.

Even though deriving from different concepts these two types have the same high performance level, in particular with regard to the blade construction which is carried out with high precision machine tools. Both types use a flexible coupling to connect the main driver to the bevel gear - with hardened toothings used to transmit power to propeller.



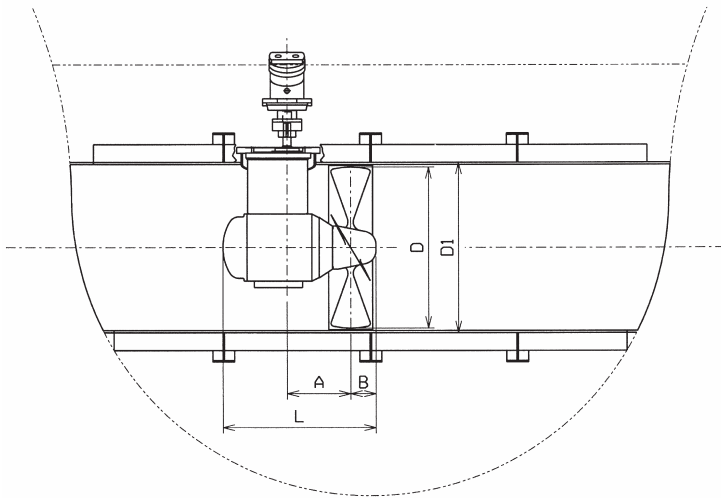
Special Features

- Shockproof execution
- Tunnel closing hatches, designed and appointed for ASW Vessels, SIGINT and Research Vessels: The possibility to close the tunnel holes in the hull, decrease in sensible manner the cause of noise and cavitation;
- Special tunnel covers with rubber seals, give the possibility of inspection, maintenance and repairs without drydocking the vessel.

_ transverse tunnel thrusters

HMF Type

— This type of thrusters - with fixed pitch propellers - is normally driven by hydraulic or electric variable speed motors, but it exists an alternative type driven by an internal combustion engine and a reverse gear.



The main standard characteristics are:

- low cost;
- monoblock high efficiency propeller;
- possibility to be furnished in blocks and bolted in a tunnel previously arranged by the yard in accordance with Fincantieri drawings.

Type	HMF 4.10	HMF 4.12	HMF 4.14
Power (kW)	70-110-150	150-220-290	290-370-440
Thrust (kN)	11.2-17.6-24.0	24.0-35.2-46.4	46.4-59.3-70.4
Propeller (rpm)	410-480-530	380-440-490	380-415-440
L	920	1.164	1.370
A	430	560	660
B	220	260	310
D	1.000	1.200	1.400
D1	1.056	1.256	1.464

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HMC Type

— The transverse tunnel thrusters with controllible pitch propellers can be used in more extended power range than the one foreseen for fixed pitch propellers. It can offer the following advantages:

- any type of driving motor can be used as the propeller rotation is unidirectional and the speed is constant;
- the starting torque of the main motor is reduced to a minimum as the propeller is started with blades at zero pitch, thus with a minimum resistance;
- the bevel gear, the bearings, the seals are less subject to shock and wear as the propeller rotation is unidirectional;
- the thrust can be adjusted to the required value in a very short time.

The transverse controllible pitch propeller plant can provide variation and reversal of the thrust - by means of high pressure oil - from the hydraulic power unit through pipes connected to the hollow propeller shaft. This hollow propeller shaft actuates the servo cylinder contained in the hub which controls the pitch of the blades.

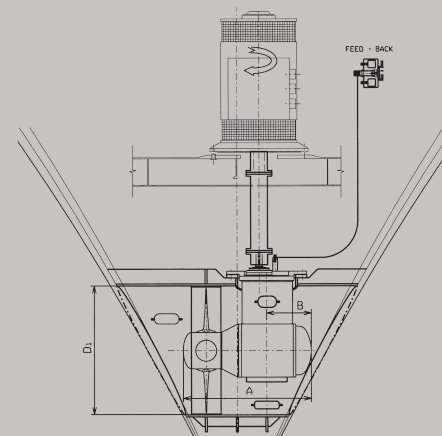
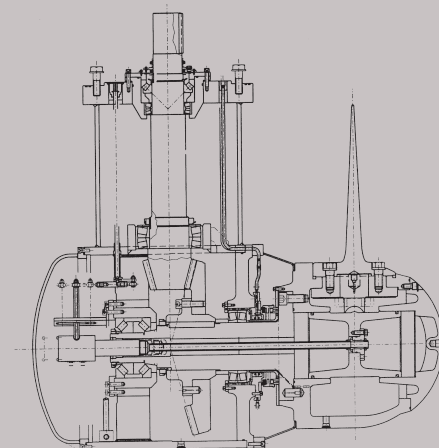
All the internal parts of the thruster are immersed in oil to provide an optimum lubrication. A gravity tank - placed at about two metres over the full load waterline - guarantees a head on the oil side, thus preventing water seepage.

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HMC Silent Type

— In case of special low noise and vibrations requirements, Fincantieri will carry out an optimized design of the blades and of the thruster body. The Silent Type thruster can therefore reach the most strict requirements in a variety of applications.

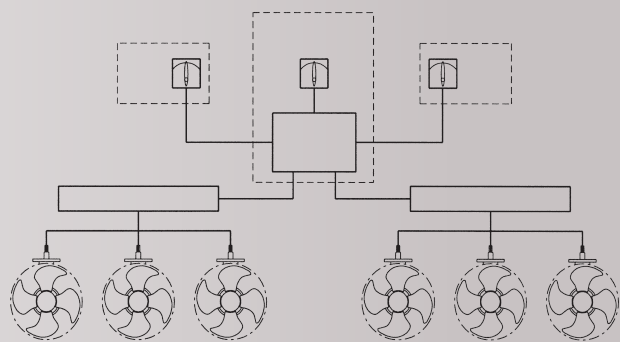
Type	HMC 0-4-10	HMC 0-4-11	HMC 0-4-13	HMC 1-4-15	HMC 1-4-17	HMC 2-4-20	HMC 2-4-22	HMC 3-4-24	HMC 3-4-26	HMC 3-4-28	HMC 3-4-30
Prop. Diameter Db (mm)	1.010	1.100	1.300	1.450	1.700	2.000	2.200	2.410	2.610	2.800	3.000
Power P (kW)	100-240	220-330	300-500	370-600	570-800	750-1.100	1.050-1.400	1.350-1.900	1.850-2.200	2.400-3.000	2.500-3.300
Propeller Speed (rpm)	490-505	490-505	392-471	305-428	320-370	280-330	280-330	255-315	235-300	185-235	185-220
Electric Motor Speed (rpm)	1.480-1.780	1.480-1.780	1.500-1.800	980-1.780	980-1.190	1.190-1.780	1.190-1.780	880-1.190	880-1.190	750-900	750-900
Main dimension											
Di (mm)	1.042	1.132	1.334	1.488	1.738	2.042	2.242	2.452	2.652	2.842	3.042
A (mm)	1.040	1.057.5	1.170	1.484	1.484	1.703	1.703	2.093	2.093	1.745	2.660
B (mm)	422	439.5	400	565	565	590	590	699	699	790	1.000



Control System

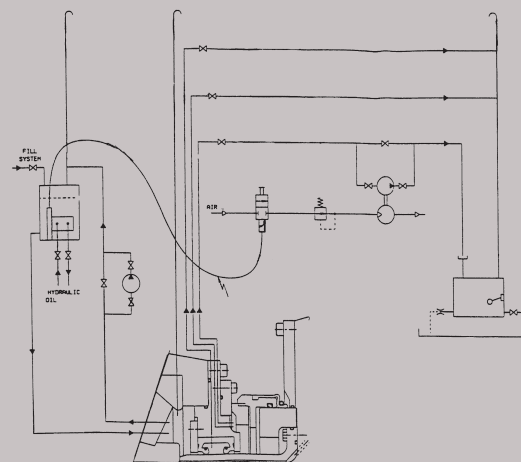
— The standard remote control from the control stations is of electrical/electronic type. It incorporates a device to allow the starting of the equipment only when the blade pitch is at zero setting and the hydraulic unit is correctly operating.

Control systems for bow and stern thrusters - run by a joystick interfaced with the ship automation system - can also be supplied.



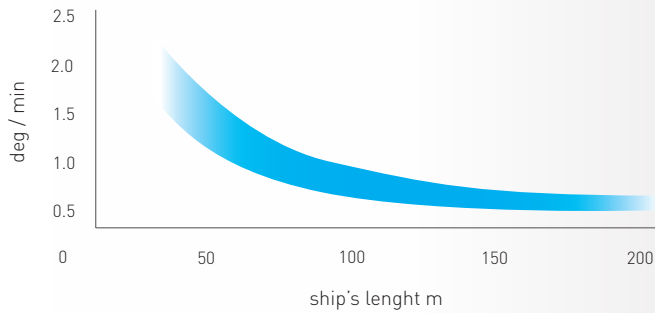
Antipollution Sealing System





— Fincantieri can apply a special antipollution system on the seals of the propeller shaft, which can be supplied upon customer's request.



Suggested Thrust

— Expected ship rate of turn with suggested thrust:

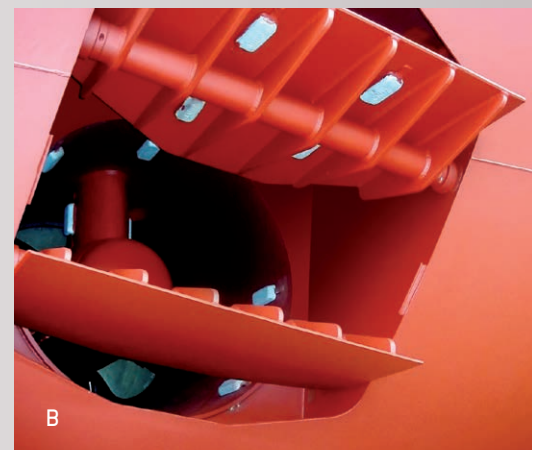
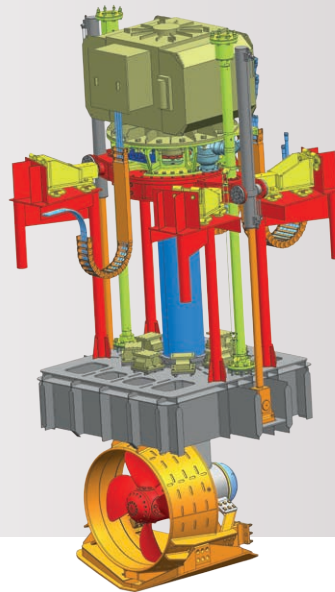


Type of Ship	Thrust requirement for area above water line N/m ²	Thrust requirement for area below water line N/m ²
 Tugs, supply vessel	50-70	70-90
 Seiners, special purpose vessels	50-80	100-120
 Tankers, bulk carriers cargo vessel	50-80	50-70
 Ferries, passenger vessel bulk carriers	50-80	100-140

Special Applications

Azimuthal Retractable Thruster

Prop. Diameter	1.700 mm
Power	1 MW
Thrust	120 kN
Application	propulsion and manoeuvring
Classification	RINa MIL
Maneuverability	more than 360° turning possibility
Particular features	shockproof when retracted, possibility to be installed in small room



A _ Bow Rudder Propeller Prototype installed on Board the Italian Railway Ship "Garibaldi"

B _ Transverse Tunnel Thruster with hatches



Quality Assurance

— The Quality System implemented for the design and manufacturing of the Fincantieri Mechanical Products is certified with reference to ISO 9001 standard.

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