

Controllable and Fixed Pitch Propellers



Propellers System

— Fincantieri has more than fifty years of experience in the design and manufacture of propellers. This long experience has resulted in the development of a wide range of propellers, from 1,3 up to 44 Mw, with a corresponding diameter from 1,5 up to 6,4 meters.

— Our propellers focus is on the performance to be matched in terms of propulsive efficiency in all operating conditions, cavitation behaviour, underwater noise emissions and induced vibrations.

— In order to satisfy all these design constrains, we custom design our propellers for each vessel, including: aircraft carriers, OPVs, IPVVs, destroyers, frigates, auxiliary vessels, submarines and luxury yachts, assessing the particular features for each hull.

— Fincantieri controllable pitch propellers are 3, 4, 5 blades and they are 5 or 7 blades for the fixed pitch (built-up) propellers.

The Range of Fincantieri Propellers includes:

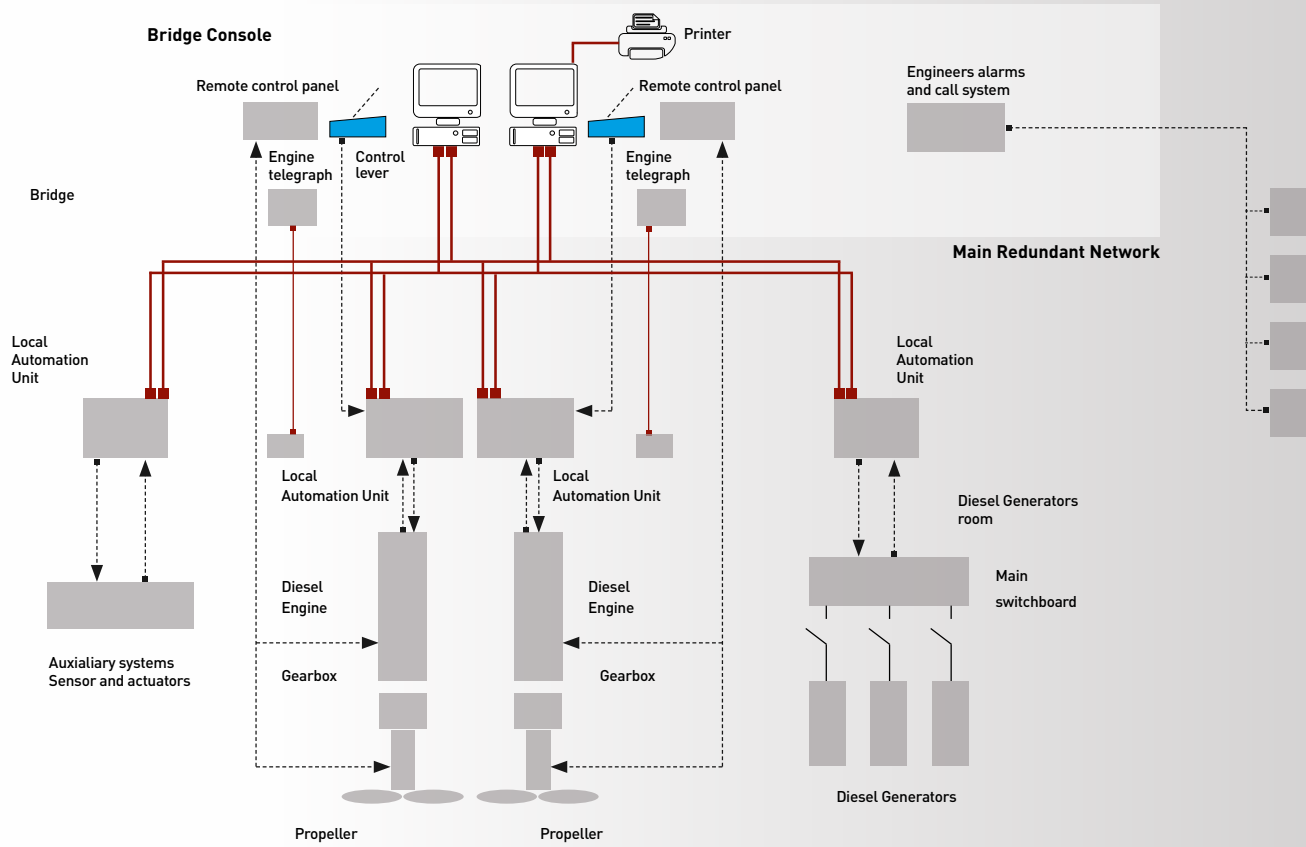
- Controllable pitch propellers (CPP)
- Featherable controllable pitch propellers (FCPP)
- Fixed pitch propellers (FPP)



Integrated Platform Management System

— Fincantieri Marine Systems has the know-how to offer an Integrated Platform Management System (IPMS) allowing the control and monitoring of:

- Propulsion (Diesel Engines, Reduction Gears and Propulsion Auxiliaries)
- Electric power generation and distribution
- Ship ancillaries, Hull Systems, Damage Control



Quality Assurance

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



FPP Type

— The built-up propellers for submarine and oceanographic ship applications are able to offer important advantages in terms of maintenance, logistic support, material quality and hydrodynamic performances.

Being the blades casted and machined separately and mounted on the boss through blade bolts, the operative advantages can be easily imagined: considering a higher initial cost of the propeller itself with respect to a monoblock type, the management of the spare parts, their entity, the possibility to perform a quicker and easier corrective maintenance brings this kind of propeller to lower global costs.

The technical advantages cannot be omitted: the built-up propellers, numerical control machined, are characterized to have much lower machining tolerances with respect to the monoblock ones; this aspect becomes important especially for the tolerances in the gap between each blade.

Therefore the higher precision obtained guarantees lower underwater noise emissions, less vibrations and therefore a better hydrodynamic behaviour.

At boss level the hydrodynamic performances are guaranteed by filling the holes interested by the blade bolts with proper material.

Moreover the quality achievable by casting separate blades is better than the procedure used for a monoblock type especially if non conventional materials are used (low magnetic, high damping ones,...), which are very difficult to cast.

The use of separate blades allows to get other advantages already mentioned and described here on the right:

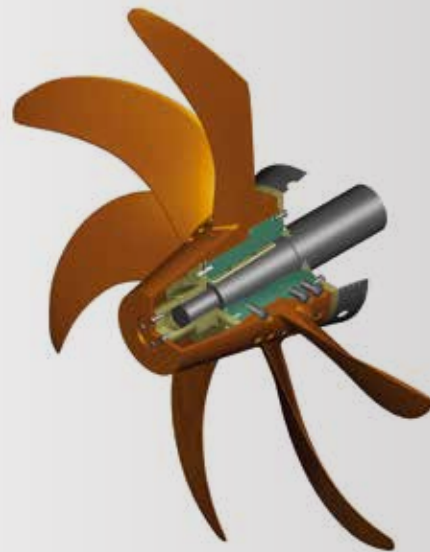


- Logistic benefits: the adoption of a built-up propeller allows to manage a cost effective store keeping of a number of spare blades that depends on the total number of propellers manufactured; the separate blades are all interchangeable each other, by monitoring during the production phase the parameters that influence the complete propeller balancing.
- Maintenance: the time to substitute only the damaged blades is much lower in comparison with the monoblock propeller: the substitution can be also performed in emergency condition at sea without the use of any dry dock.



5 Blades Fixed Pitch Propellers

Model	Hub Diam. (mm)	Max Power (kW)	Propeller Diam. (mm)
HPR 50 72	720	1.600	3.350
HPR 50 85	850	1.600	3.350



7 Blades Fixed Pitch Propellers

Model	Hub Diam. (mm)	Max Power (kW)	Propeller Diam. (mm)
HPR 7S 340	767	3.200	3.400
HPR 7S 365	767	3.000	3.650
HPR 7S 405	1.050	3.600	4.050

FCPP and CPP Type

— Fincantieri Marine Systems has long experience in design and production of controllable pitch propellers. Our propellers are installed on some of the most challenging projects worldwide as Fincantieri Marine Systems is supplier for many Navies all over the world. Our propellers are installed also in some Mega Yachts and more traditional Commercial Vessels. Our products focus is on the performance to be matched in terms of propulsive efficiency in all operating conditions, cavitation behaviour, underwater noise emissions and induced vibrations.

In order to satisfy all these design constraints we custom design our propeller for each vessel, from the aircraft carrier to the OPV and from the luxury Mega Yacht to the tanker and to the small pleasure boat, assessing the particular features for each hull.

— Fincantieri Marine Systems propellers are 3, 4 or 5 blades made of Ni-Al bronze, with the provision to get featherable or not featherable configuration in order to select always the most appropriate solution.

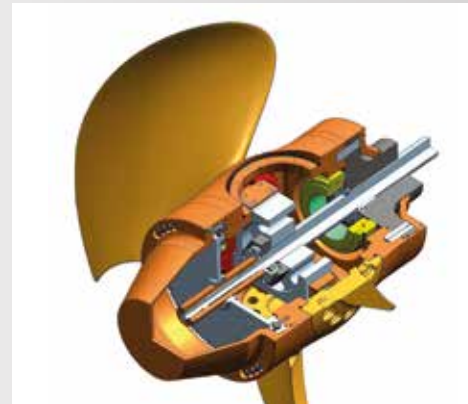
— Fincantieri manufactures complete shafting lines with controllable pitch propellers; our programme is very extensive and includes, among others, the configurations that we manufacture:

— In the low range of hub size and power (up to 1500 kW) the control of the pitch is achieved by means of a piston rod connecting the oil distribution box to the propeller's hub pitch control mechanism passing through the Shaft-lines. This solution for low power range has the advantage of reduced cost and weight and is oil-free in the water immersed components. There are reduced risks of pollution at sea.

— In the high range of power (above 1500 kW) we manufacture the system with the hydraulic piston contained in the propeller's hub, the oil supply come from the oil distribution box through internal oil pipes passing inside the shaft-lines. This solution permits the transmission of higher level of power to the propeller's hub with very accurate precision of pitch control.

4 Blades Controllable Pitch Propeller - Piston Rod

Model	Hub diam. (mm)	Power (kW)	Propeller Diam. (mm)
HPC 4S 05 M	500	1.500	1.500



4 Blades Controllable Pitch Propellers

Model	Hub Diam. (mm)	Max Power (kW)	Propeller Diam. (mm)
HPC 4S 05 N	500	2.300	1.500
HPC 4S 06 N	600	2.750	1.950
HPC 4S 07 N	720	2.300	2.400
HPC 4S 09 N	930	7.000	3.150
HPC 4S 10.5 N	1.050	6.000	3.750
HPC 4 19 N	1.900	19.200	6.250



5 Blades Controllable Pitch Propellers

Model	Hub Diam. (mm)	Max Power (kW)	Propeller Diam. (mm)
HPC 5S 07	720	2.350	2.300
HPC 5S 13 N	1.300	20.000	4.100
HPC 5S 14 N	1.400	21.000	4.800
HPC 5S 20 N	1.990	44.000	6.400





— The additional technical advantages related to the feathering configuration cannot be omitted: the maintenance and operating cost reductions following the capability to operate with one propulsion line and the other in “flag position” instead of both shaftlines at low rpm are quite remarkable both in terms of fuel consumption and operation at design pitch and following improved margin against cavitation.

Also the pitch setting mechanism (Oil Distribution Box) is designed in two configurations to match the propeller system to the engine rooms arrangement: installed along the shaftline (ADR) or directly mounted on the gearbox (AVR). The former is designed for extremely long shaftlines and for applications where the pitch setting accuracy has to be at the top; the latter is designed for more standard applications and is proportionally smaller, lighter and cheaper.

The propeller pitch is set by means of the hydraulic oil pressurised by a dedicated HPU connected to the ODB: the same oil is brought from the ODB to the hub by internal pipes completely independent from any other oil system of the vessel.

The HPU is always resilient mounted and designed to satisfy any ambient condition requirement including, where present, high shock loads.

The complete system is controlled by a dedicated PLC based control system optimized for the application and interfaced with ship automation system.

The high performances coupled together with the high reliability and low maintenance of Fincantieri Marine Systems propellers are the consequence of a design, production and commissioning process that are based on:

- accurate hydrodynamic design based on model test campaigns carried-out in co-operation with reputed model test facilities and research institutes, full scale measurements and CFD simulations both for the blades design and for the hub;
- state of the art computer aided design (e.g. FEM) for structural strength of the blades both in terms of design load and of fatigue assessment: the key equipment are designed to overcome the ship life;
- low geometric and machining tolerances gained with the Numerical Control Machining at Fincantieri Marine Systems premises, where the propellers are machined, balanced and assembled;
- the most demanding quality assurance and quality control methods, which is extended to all the supply chain including the raw material sources;
- several years of installation records and worldwide support experience.

FCPP-CPP Type Main Features

- Material: Ni-Al Bronze, LOMAG, SS
- Shock qualification: MIL STD 901
- Low noise & vibrations
- Blades dimensional tolerances: better than ISO 481 Class S
- Pitch response time from full ahead to full astern: 35 s
- Twin configuration sense of rotation standard: inward over the top
- Low-magnetic signature

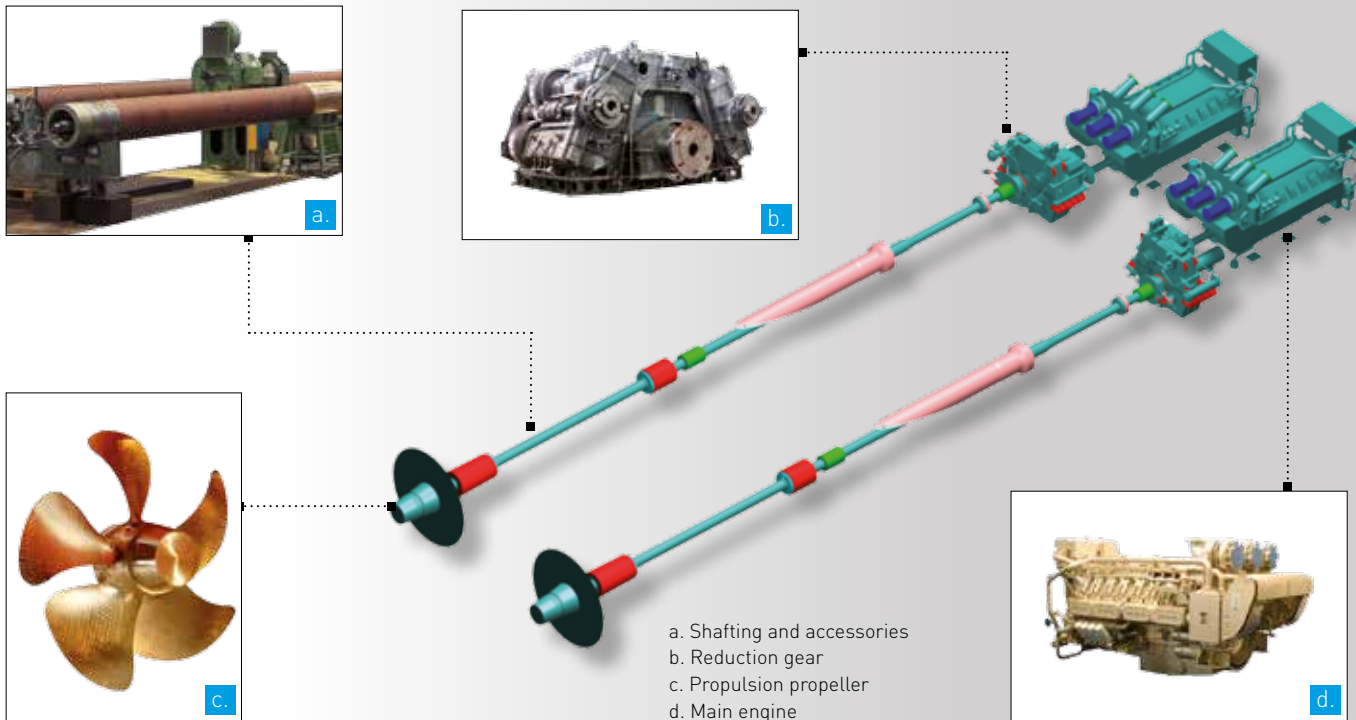
FPP Type Main Features

- Material: Ni-Al Bronze, LOMAG, SS
- Shock qualification: MIL STD 901
- Low noise & vibrations
- Blades dimensional tolerances: better than ISO 481 Class S
- Low-magnetic signature

Propulsion System

— Fincantieri Marine Systems is able to design and tailor a complete Propulsion System based on Customer requirements. Thanks to the wide experience in the Naval and Civil ship design, Fincantieri Marine Systems is able to propose a turnkey project of Propulsion Systems. Fincantieri can offer to the Customer a propulsion system of the vessel by integrating:

- Main engines
- Reduction gears
- Shafting and accessories
- Propulsion CP propellers
- System automation (IPMS)



— Fincantieri acts as design authority for the entire propulsion system of any kind of non-nuclear Naval vessels. Fincantieri references as Propulsion System Integrator include the following vessels:

Vessel Type	Inst. Power per Shaft (MW)	Propeller Diam. (m)
Aircraft carriers	44	6,4
Destroyers and frigates	22	4,8
Corvettes	6,5	3,1
Patrol vessels	9	3,0
Mega yachts	3÷5	2,0÷3,5
Coastguard patrol vessels	5	1,5



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The sea ahead



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