

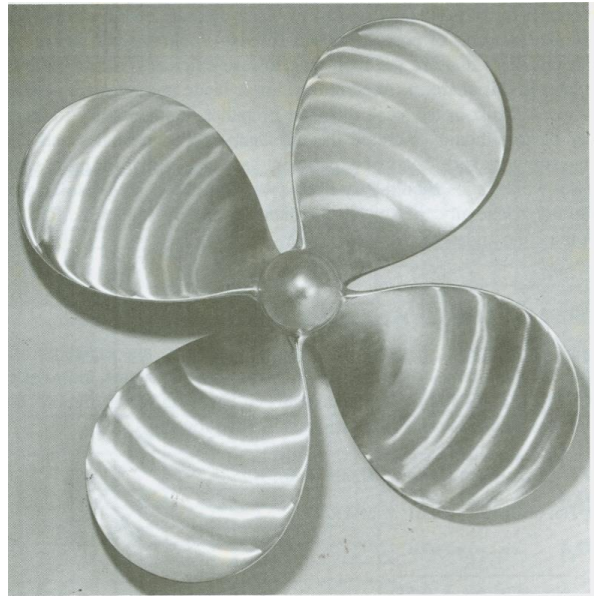
Propulsion system

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a) Propeller:

A marine propeller is a propulsive device which converts the power transmitted from the engine into a thrust force to propel the vessel. The purpose of the propeller is to convert the torque horse power provided by the engine attached to the propeller shaft (delivered horse power) into thrust horse power to propel the vessel.

It consists of number of identical twisted blades usually 3-5 equally spaced around the hub or the boss. The hub or boss is mounted on the propeller shaft. The hub of the propeller is fitted at one end of the propeller shaft by means of a nut.



b) Types of propeller:

The types of propeller used in a fishing vessel are fixed pitch propeller and variable pitch propeller. The propeller is made up of manganese bronze and stainless steel.

Fixed Pitch Propeller:

Fixed pitch propeller has fixed blades which are integrated with the propeller boss. The blades are fitted at an angle which gives a permanent pitch for the propeller. Pitch of the propeller is the apparent distance moved by the propeller on its axis on one rotation of the propeller. The boss of a fixed pitch propeller is seated on the tapered end of the propeller shaft with the help of the key and nut. The pitch of the propeller is measured at the maximum width of the propeller, normally at $\frac{2}{3}$ rd of its diameter.

Variable pitch propeller:

The variable pitch propeller is provided with detectable propeller blades. The propeller blades are mounted on a triangular slotted sliding block.

The triangular block is housed inside a hollow hub, which can be separated into two halves. A pitch control rod is attached to the triangular block. The triangular block on the base of the propeller blades are connected by means of a sliding block. When the pitch control rod is moved to and fro the axial movement of the rod is converted into an angular motion of the propeller blade by the movement of the sliding block inside the slot of the triangular block. Thus the pitch of the propeller blades is changed. Because of the changing of the pitch of the propeller blade, the direction of the movement of the vessel (ahead or astern) and the quantity of thrust applied on the propeller are varied. Thus the vessel is able to get ahead and astern motion and also a varied thrust on the propeller.

c) Factors in propeller selection

A common misconception in selection a propeller is that it is only necessary to specify diameter and pitch. Although these factors are the most critical, there are many other characteristics that must be considered.

The following are the some of the important points to be considered for selection of propeller.

- Diameter
 - Pitch
- Number of blades
- Hand (Left or right hand turning)
- Propeller shaft diameter and keyway
 - Blade area
 - Cupped or un cupped blades
- Super vavitating or standard non cavitating blades
 - Blade section shape
 - Skew
 - Rake
 - Blade thickness
 - Hub diameter

A propeller must satisfy two basic requirements. It needs to match the engine's power and shaft speed and it must match the size and operating speed of the boat. But the size of the engine effects boat speed and the type of hull affects the choice of engine.

d) Parts of the propeller

Hub:

The hub or boss of a propeller is the solid center disc, bored for the propeller shaft, to which the propeller blades are attached. Since the hub generates no drive the ideal would be to eliminate it. As a practical matter, though the hub can seldom be much less than 14 percent of the diameter in order for it to have sufficient strength.

Keyway:

Most propeller shafts transmit the torque from shaft to propeller through a key. The key is a long, slender rectangle of metal along the shaft that fits into a slot or key way milled (cut away) into the interior at the hub.

Blades:

The propeller blade is the twisted fins or foils that project out from the hub. It is the action of the blades that drives a boat through the water.

Blade face and blade back:

The blade face is the high-pressure side or pressure face, of the blade. It is the side facing aft, the side that pushes the water when the boat is moving forward. The blade back is the low pressure side or suction face of the blade, the side facing ahead.

Blade root and blade tip:

The blade root is the point at which the blade attaches to the hub. The blade tip is the extreme outer most edge of the blade, as far from the propeller shaft enters as possible.

Leading and trailing edges:

The leading edge of a blade is the edge of the blade that cleaves the water. The trailing edge is the edge from which the water streams away.

Rotation or hand

A critical aspect of propeller shape is its hand. A propeller that drives a boat forward when it rotates clockwise, as viewed from astern is called a right– handed propeller. By the same token a propeller that rotates counter clockwise, as viewed from astern, is left handed. If the leading edges are to your right, the propeller rotates clockwise and is right-handed propeller. If the converse is true, it is a left handed propeller.

Right handed propellers are almost, but not quite universal on single-screw vessels. In twin screw installations, propellers and engines of opposite hand are used port and starboard. A single right handed propeller will tend to push the stern of a vessel to starboard when going forward (to port going astern). The reason-in simple terms is that the water at the bottom of the propeller is a bit denser and freer to flow (there's no hull above it) than at the top of the propeller. This makes the lower blades a bit more effective, so the propeller and the stern “walk” sideways in the direction of rotation. On a twin-screw craft the propellers should be

out-turning. The starboard or right propeller should be right-handed and the port or left propeller should be left handed. This gives the best propeller efficiency.