

Propelling Facts

When you buy a boat propeller, are you getting screwed? Technically, yes: "screw" is another word for propeller. Marine propellers work by converting power produced by your boat's engine to thrust. As a propeller rotates, much as a screw rotates into wood, it draws water from ahead (the suction side) and pushes it out astern (the discharge side). It is this resulting force that **propels** your boat. In this article we'll examine how to avoid the more common, slang meaning of getting "screwed", when buying a propeller for your boat.

Any given prop's size is described by two numbers. For example, let's discuss a propeller that is sized 20" x 24". The **first** number (in this case, 20) represents the **diameter** of the propeller. Diameter is a critical dimension when converting engine horsepower to thrust. The larger the diameter of the prop, the larger the column of water in which it's working. To calculate the correct diameter of any prop, measure the distance from the center of the propeller to the tip of one of the blades, and then multiply by two.

The **second** number (24, in our example) represents the **pitch**. Pitch is the theoretical distance the propeller moves through the water with each complete revolution. There is, however, always a certain amount of slippage between the prop and the water, so the distance actually traveled will be less than the theoretical distance.

Propellers come with 2, 3, 4 or 5 blade configurations. Having enough blade area is an important factor in transferring horsepower to thrust. Too little blade area causes high blade loading, making the prop incapable of using all the available power from the engine. This leads to cavitation, vibration and even pitting of the prop. On the other hand, too much blade area puts excessive load on the engine and does not allow it to produce its maximum hp.

Using a four-blade prop instead of a three-blade prop has several advantages. Your boat will accelerate and come up on plane faster, and stay on plane at lower rpm's. You experience less vibration with a four-blade prop. You will also have an increase in speed at mid-range rpm's, but there will probably be slightly *less* speed at Wide Open Throttle.

Cupped propellers have an extra curve on the trailing edge of their blades, which enables the prop to cut through water better. A properly cupped propeller should give your boat a higher top speed or allow you to go faster at the same rpm's. A rough rule of thumb for cupping says that a medium cup equals 2" of pitch. In other words, a 14" x 17" un-cupped prop could be replaced with a 14" x 15" cupped propeller and produce the same engine performance with higher speed.

The four most common materials with which propellers are made are:

1. Composite- The "new kid on the block" as far as propellers are concerned, it's quite durable and some models allow you to replace a single damaged blade instead of the entire prop. In spite of what the manufacturers say, they do appear to have more flex in them than a metal prop, thus losing some performance.

2. Aluminum- The most common material used in outboard and I/O installations. They are relatively easy to repair and have the lowest initial. They also have some flex in them with a small loss in efficiency.

3. Stainless Steel- These props give higher performance than composite or aluminum and have much less flexing, but are more expensive to purchase and repair.

4. Bronze- Offers high performance and good durability. These props are mostly used on inboard installations, such as tournament ski boats, cruisers and yachts. They have a higher initial cost but are relatively easy to repair.

Are you still wondering which prop is right for your boat? Start with the manufacturer's recommendations. After that, make sure any advice you get is from someone in the propeller business who knows what they're talking about. Feel free to drop me a line. **The wrong prop - whether too big or too small, can cause serious damage to your engine!**

Propeller Material Comparisons

	Weight	Flex	Repair	Cost
Composite	Light	Some	Easy	Medium
Aluminum	Light	Some	Medium	Low
Stainless Steel	Heavy	Very Little	Difficult	High
Bronze	Heavy	Very Little	Medium	High