SIMPLICITY MARINE DRIVES

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Hull Design and Building Considerations

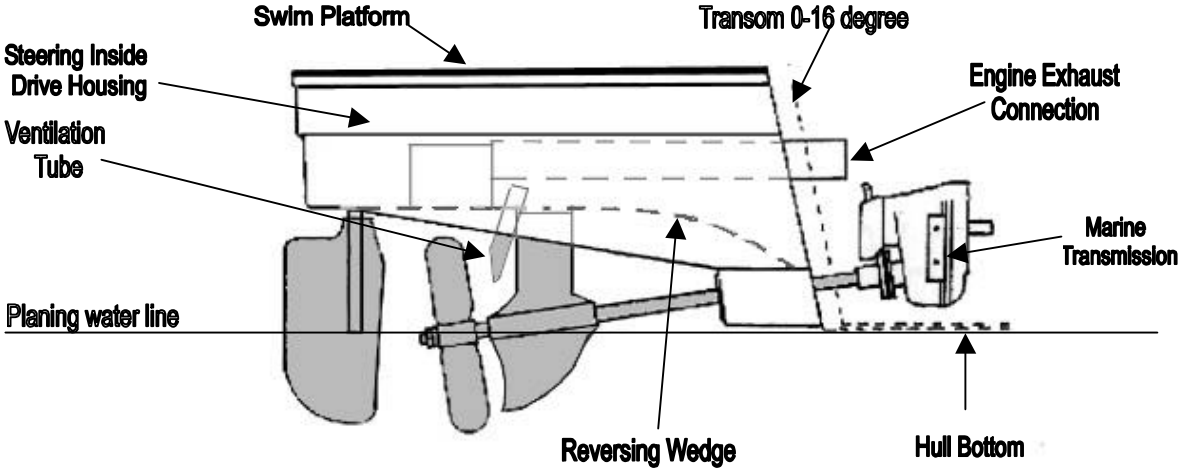
Simplicity Marine Drives can be used on a wide variety of vessel types. The best results will be achieved when the surface piercing technology are considered when retrofitting or designing the boat. Simplicity Marine Drives and Fowler Marine Inc. representatives are always willing to assist with design and installation advice. We recommend you consult a qualified naval architect and/or marine engineer before finalizing your hull design and propulsion system.
The following discussions are offered to assist the designer and builder achieve optimum performance and reliability from Simplicity Marine Drives.

Preparing Information for Calculations

When gathering information about the boat to have a drive installed on, be realistic with weight and center of gravity estimates. Nearly all boats weigh more than the designer and builder would like them to weigh, and this is by far the single most common cause of failure to meet anticipated sea trial speeds. Simplicity Marine Drives will be delighted to calculate vessel performance, recommend a gear ratio and propeller size for you, but we need accurate data.

The Transom

One of Simplicity Marine Drives special and unique design features is the ability to fit any transom from 0-16 degree and retrofit to existing sterndrives. The SMD drive will cover the old hole left by most brands of sterndrives, eliminating costly modifications.



Our innovative drive housing does many things, it supports the rudder, shaft tube and exhaust system, it also provides on the under side a unique wedge that directs the reversing water flow down and under the hull thus giving excellent reverse thrust and control.
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Clean Water Flow To The Propeller

The less disturbed the flow of water to the propeller, the better the surface piercing propeller will perform. It is important to ensure that there are no through-hull fittings such as engine cooling intakes, transducers, keels, skegs or planing stakes directly ahead of the propeller. There must be a minimum of 6 feet of smooth hull ahead of each propeller.
Trim tabs and transom mounted transducers or water pickups must not be installed directly ahead of the propeller. If needed, these should be mounted to the sides, out of the water flow to the propeller.

Propeller Trim

Trimming the Simplicity Marine Drive for varying loads is not required. Other surface drives have added drive complexity to adjust their vertical trim in order to help the propeller perform under certain conditions. With Simplicity Marine Drives design, these conditions do not impact the operation of the propellers.

Surface drives are designed to operate close to the surface of the water. When at low speeds the propeller is fully submerged and because surface drives use larger diameter propellers they have very high thrust at low speeds. As the boat increase speed the water pulls away from the transom and the top of the propeller is exposed to the air, this is called ventilating the propeller. The engine exhaust is also used to help ventilate the propeller. It is directed immediately on top of and in front of the propeller.

Also, a vent tube is added on some application were the engine is slow to develop turbo charge boost. The added air allows the RPM to increase faster, which makes boat increase speed and comes onto plane faster.

When the other drives with vertical trim are deeply submerged, they often do not have enough air to operate effectively. The vertical trim is used to raise the propeller closer to the surface in order to ventilate and start working. As the boat speed increases, the propeller is lowered to the normal operating position.

Some people believe the trimmable propeller will help trim the boat by compensating for poor balance or weight distribution. The effect of a surface drive propeller on planing boat trim is insignificant. Using the trimmable surface drive propeller to optimize boat speed may be applicable in high speed race boats where every tenth of a knot counts. However, it has negligible effect on most boats.

With correct installation of the Simplicity Marine Drive relative to the planing waterline, optimum performance is achieved without the complexity and maintenance of additional controls, hydraulic systems, exposed hydraulic cylinders, and complex mechanical drive shafts. The simple trailing rudder on the Simplicity Marine Drives provide excellent maneuverability without wandering at low speeds like most sterndrives and articulating surface drives.

Engine and Gearbox Selection

To achieve the best results from Simplicity Marine Drives; the drives should be matched to engine rpm and transmission gear ratios. All marinized gasoline and diesel engines can be used with Simplicity Drives. Simplicity uses surface piercing propellers that have been designed to take advantage of high torque to achieve efficient low speed operation as well as load carrying and maximum operating/cruise speeds. When engines with higher than 3500 rpm at full throttle are used, increased gearbox reduction ratios may be required to produce the required torque at the propeller.

Gasoline engines are higher revving and may require deeper reduction ratios when used on larger heavier boats.
Engine selection is always the responsibility of the designer, builder or owner.

Engine Exhaust

All Simplicity Marine Drives are supplied with internal exhaust systems to which the engine exhaust is connected. The exhaust gases inter the drive at the transom and exit the drive just on above of the propeller outside the boat. The exhaust gases help ventilate the propeller when the boat is accelerating to get on plan. This feature eliminates the need for a separate through-hull exhaust in the transom.

Marine Gearbox

To ensure the best results Simplicity should be consulted to specify the ideal reduction ratio; performance may be compromised if the reduction ratio is not optimum for the propeller type, selected power, and hull configuration.

The Simplicity Drives shaft angle is at eight (8) degrees on most models and should be considered when selecting a gearbox. Most modern gearbox's can provide both clockwise and counter-clockwise propeller rotations with the same gear.

Final selection of the gearbox is the responsibility of the owner/designer/builder.

Propeller

Surface propellers are usually associated with the stainless steel "cleaver" style common to race boat applications. These propellers have straight trailing edges, razor-sharp leading edges, and sometimes as many as eight blades. Probably because the roots of surface propulsion technology are so firmly imbedded in the race boat world, it's no surprise that the popular perception is that all surface propellers are cleavers. Yet the vast majority of surface propellers being sold today have round-tipped blades, are made of bronze or Nibral, and have only three or four blades. In fact, at first glance there is very little to distinguish them from conventional, fully submerged props.

What distinguishes a surface propeller from an underwater design? The pressure face of the blade is always concave, the leading edge is relatively sharp with a narrow entry angle, and the hub and blade root are built to with stand heavy eccentric and alternating loads.

There is major incentive to keep the blade section thin (it's the strength of the steel blades that really gives cleavers the edge at high speeds and loading). Nearly all-successful designs have moderate to heavy trailing edge cupping.

Propeller selection begins with an estimate of required thrust at the design speed. This is usually based on one of several computational methods, but can also be generated from empirical formulas or, if available, trial data from nearly similar vessels. Then a preliminary gear ratio and diameter is chosen, adjusting both until slip and pitch/diameter ratio are optimal and the required thrust is generated. This will generally result in a non-standard reduction ratio, so the remainder of the process involves adjusting diameter and pitch to fit the available drive train hardware. This is, of course, a somewhat simplified description of a "design spiral."

Usually the initial design conditions will be modified in the course of the analysis, and there are numerous other considerations such as number of blades, propeller submergence, drive train structural limitations, and vessel trim.
Note that unlike propeller selection for a large proportion of conventional applications, diameter remains a variable parameter throughout the entire process.
Simplicity Marine Drives will be eager to perform these calculations for you, and in some cases can supply you with loaner propellers for testing.