

SIMPLICITY MARINE PRODUCTS, INC.

635 PALMETTO PT. DR., PALMETTO, FL. 34221

941-722-8475 FAX # 941-721-9070

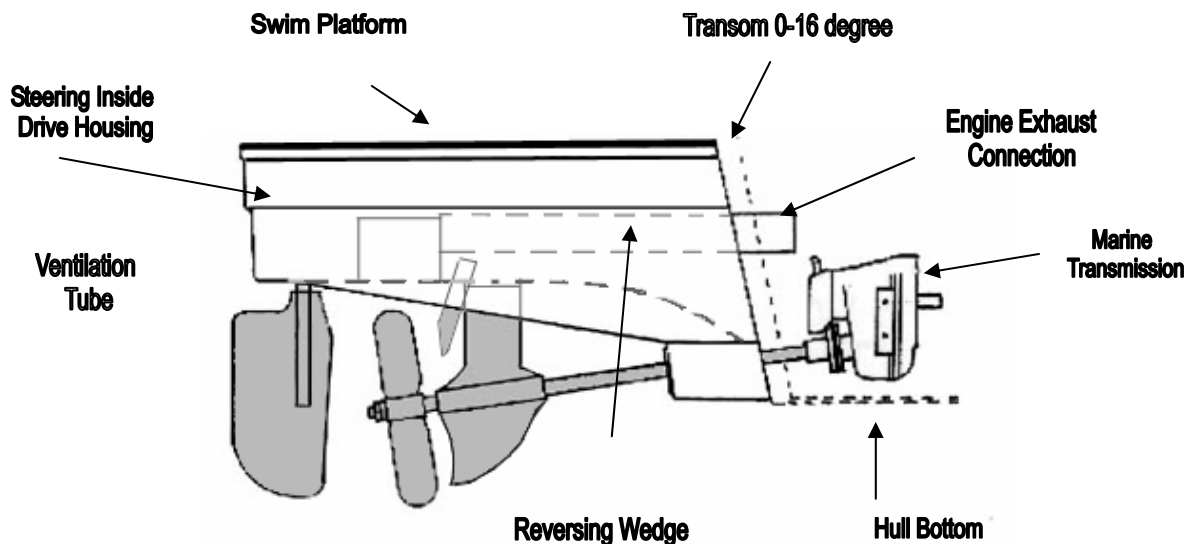
Hull Design and Building Considerations

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 Products, Inc. representatives are always willing to assist with design and installation advice. We recommend you consult with us before finalizing your hull design and propulsion system.

The following discussions are offered to assist the designer and builder to 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

Because Simplicity Marine Drives are semi-custom it allows us 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 drive housing does many things, the top is a swim platform, the under side provides a

unique wedge that directs the reversing water flow down and under the hull thus giving excellent reverse thrust and control, it also supports the rudder, shaft strut. Inside you find the exhaust system and steering cylinder.

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 and skegs directly ahead of the propeller. There should be a minimum of 4 feet of smooth hull in front 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 discharged on top forward of the propeller.

Also, a vent tube is added on some applications were a low torque engine or an engine with slow to develop turbo boost. The added air tube allows the RPM to increase faster when the propeller is fully submerged, which makes the boat increase speed and comes onto plane faster. When the boat is on full plan the propeller operates at between 50%-60% submergation.

To insure proper propeller submergence the drive unit must be properly submerged at rest. The boat should have a draft depth to submerge the propeller and drive housing so that the bottom of the drive housing is under water by several inches. This is very necessary to insure proper control in reverse. Depending on the model we recommend a hull draft at the transom at rest of a minimum of 14" for the SMD 100-400 and 16"-18" for all the Horseshoe Rudder Models.

With some other drives systems they use vertical trim cylinders and pumps to raise the propeller closer to the surface in order to ventilate it. As the boat speed increases, the propeller is lowered to the normal operating position. This is done were the transmission ratio and propeller size are not matched to the boats size and weight correctly.

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 planning boat trim is insignificant.

Using a trimmable surface drive 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 the installation of the Simplicity Marine Drive relative to the planning 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 enter the drive at the transom and exit the drive just forward and above 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 thru-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 (6-8) 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, its

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 withstand 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 is 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.