Your propulsion system is an intricate arrangement of machinery that requires much attention during the design, building, and life of your vessel. It is as important, if not more, than the design of the actual vessel and other onboard systems.

Many times the propulsion system is chosen simply for the engine size and horse power, without considering the propeller. This can lead to a system that is not specifically tuned to your vessel, promoting inefficiency.

These are the signs of a malfunctioning propulsion system:

- An abnormally low steaming speed vs. RPM compared to similar vessels.
- Trouble reaching or maintaining trawling speeds.
- High levels of vibration not attributed to engine, generators, or other onboard machinery.
- Little or no gain in vessel speed with significant RPM increase.
- Engine unable to reach target RPM.
- Black smoke expelled through exhaust.
- Chronic blade damage not attributable to striking underwater objects.

All of the above are indicators that your propulsion system is either malfunctioning or is not optimized for your vessel.

OPTIONS

Below are several options to improve the efficiency of your propulsion system. These are listed in order of the required capital investment.

1) Perform maintenance before, during, and after the season including inspection and replacement of all filters and lube oil. The shafting arrangement, especially the bearings, couplings, and stuffing box, should be inspected at these times as well.

2) Alter or replace your fixed pitch propeller. Many of the symptoms above are due to improper propeller selection. Unsuitable propeller characteristics (diameter, pitch, skew, and/or number of blades) can lead to major inefficiencies. The greatest gains in efficiency can be achieved by increasing the diameter, if you have the clearance.

3) Install a nozzle either ahead or around the propeller. Nozzles capture and positively alter water flowing towards the propeller. They typically increase bollard pull, steaming speed, and/or overall propulsive efficiency. Some offer increased ice protection for your propeller, although damage sustained by the nozzle itself is costly to repair. Each nozzle also has its downsides, the greatest being the increased drag the nozzle introduces being underwater.
4) Install a controllable pitch propeller (CPP). A CPP is a propeller that is equipped with complex machinery that allows the operator to alter the pitch on command. This makes it ideal for both optimized towing and steaming speeds. CPP’s also have drawbacks. They require significant upfront capital investment, and, if damaged, can be costly to repair.

5) Alter your engine and transmission. Depending on your operational situation, great efficiency gains can be found in changes to your engine and/or transmission. If your vessel is over- or under-powered, it means that the engine is most likely not operating at its optimal RPM. This could be remedied by an alteration to the gearbox, but in more severe cases, changes are required to both.

ALTERNATE RUDDERS AND ADDITIONS

Alternate rudders and additions can deliver an increase of 3% to 6% in fuel efficiency. This is due to the increased maneuverability and course keeping, increased lift and lower drag, and less cavitation erosion, fewer vibrations and reduced noise.

Discuss the various possible options with a qualified naval architect/engineer. There are a number of options available.

All of the above are viable options to increase the efficiency of your propulsion system. All require some degree of capital investment and should only be considered if your enterprise can support it.

Before deciding if new propulsion equipment is the correct choice for your operation, consider such factors as:

- the suitability of the proposed modification
- upfront cost
- payback period
- the age of the vessel and existing equipment, and
- the sustainability of the fishery in which you are currently involved.

You should discuss your options with your business manager/accountant/book keeper, equipment manufacturers, and a naval architect or engineer before making a decision.