

The Efficient Tugboat

Speed Pilots Improve Vessel Efficiency

Reprinted from *MarineNews* February 24, 2003

By Robert Speed

President, Stellar Marine

What does it take to make a vessel more efficient?

The word "efficient" is typically defined as being able to produce the effect wanted without wasting time, energy, etc. It follows that a vessel is efficient if it consistently arrives on time using the minimum amount of fuel.

So, how can you make your vessel more efficient?

Stellar Marine has been studying vessel efficiency for over twenty years. They have found 3 key components to improving efficiency. First, you must be able to accurately *measure* performance to have the ability to make informed decisions. Next, vessel operators must have the ability to *control* the vessel more efficiently. Finally, vessel operators should have the ability to improve *voyage planning* to ensure on-time arrivals.

Measurement

Accurately accessing vessel efficiency requires a shipboard data acquisition system capable of analyzing the effects of changes in vessel speed, fuel consumption, and RPM. To be effective, this information must be available in real-time to provide the operator with immediate feedback about vessel performance as conditions change.

Obtaining accurate and repeatable fuel measurement is key to detecting changes in vessel efficiency.

Conventional methods employing flow meters do not provide the accuracy or repeatability required. To detect small changes in fuel consumption rate requires advanced methodologies. Today's modern diesel engines with electronic fuel injection have this capability built in and provide precise, instantaneous fuel consumption data. Similar results can be obtained from conventional diesel engines using a fuel rack position sensor and engine RPM to determine fuel consumption rate (Stellar Marine employs this technology in its systems and has obtained a United States patent for it).

With the ability to measure performance, you have the ability to make informed decisions. For example, a vessel equipped with a Stellar Marine data acquisition system reported a 3 percent loss in efficiency of the starboard propeller, with no other signs of trouble. The Engineer decided to have a diver check it out the next time in port. The diver reported that a small length of mooring line was wound so tightly around the propeller hub that it had to be cut off. By reviewing the data log, the Engineer discovered the piece of line was picked up at the barge mooring area at the start of the trip. If this problem was not discovered until the next refit, it would have cost the company around \$15,000 in extra fuel.

Control

The next step to improving vessel efficiency, is to provide Captains with real-time vessel performance information and the ability to more precisely control the propulsion system. Since improvements in vessel

continued on reverse

efficiency can occur within a narrow RPM or speed range, an efficient vessel must have a control system capable of selecting and maintaining a precise RPM, or speed setting. In addition, to achieve maximum efficiency, the control system should automatically adjust as conditions change, to take advantage of favourable conditions and minimize inefficient propeller slip when conditions are bad.

The Speed Pilot combines precise engine performance monitoring with GPS navigation information and advanced propulsion control algorithms. Using this information, it continuously fine-tunes throttle settings as conditions change to provide the most efficient conversion of engine horsepower to thrust. The result, is a propulsion system that is always operating at the optimum point of the speed vs. power curve. By minimizing wasteful propeller slip, the Speed Pilot produces significant fuel savings with no loss in speed.

Voyage Planning

Improved voyage planning helps ensure on time arrival, which improves vessel and overall fleet efficiency.

A Speed Pilot assists vessel operators with voyage planning in a number of ways. First, the Speed Pilot can be set to maintain your requested speed, automatically adjusting throttles as wind or currents change. Alternatively, you can enter the average speed required to arrive at your destination, and the Speed Pilot selects a speed that gets you there on time, using the least amount of fuel. The Stellar Marine Speed Pilot allows a plus or minus speed variation depending on the cost per mile. If the cost per mile is low, a higher speed is used, and if the cost per mile is high, a lower speed is used. For either method, the Speed Pilot will continually update and display your progress so you will know if you're ahead or behind schedule.

When combined with a wireless communications link, a Speed Pilot improves the efficiency of dispatch and shore side support operations as well. Internet based satellite tracking and messaging allows shore side personnel to know exactly where a vessel is and to communicate with it, from any PC with Internet access.

The Speed Pilot also records voyage data, which can be later analyzed on the vessel and back on shore. Specialized PC software lets you generate graphs and compute statistical data for a complete voyage, or any part of it.

So, what does it take to make a vessel more efficient?

Vessel operators and shore side personnel all have an important role to play. To perform efficiently, they need good information and good tools. Stellar Marine's ESP 1000 Speed Pilot ensures that performance is accurately measured, the propulsion system is efficiently controlled, and voyages can be effectively planned and monitored.

The benefits of an efficient vessel are clearly illustrated in the following example. A 3000 hp towboat with a loaded oil barge departed for a terminal up river. Meanwhile, an equivalent 3000 hp towboat, with another loaded oil barge, prepared to follow. Several hours later the second tow departed. The only difference between the two tows heading up river that day was that the second one was equipped with an ESP 1000 Speed Pilot. The next day, the second tow caught up to the first tow and proceeded to overtake it and pull ahead. By the time the second tow reached its destination, it was over 15 miles ahead of its companion. Not only did it run faster, it also burned about 250 gallons less fuel per day.

A Speed Pilot brings new levels of performance, control and efficiency to any vessel. For fleet owners looking to get more done in less time while using less fuel, Stellar Marine has the answer.

