

Fuel consumption's sweet spot

The right rpm level will save you significant money while costing very little in speed



By reducing his rpm level and monitoring a fuel-flow meter the skipper of the crabber North American reduced in fuel consumption 45 percent.

ERLING SKAAR

By Ev Collier

In the spring of 2008, the price of marine diesel fuel hit \$4.65 a gallon in Kodiak, Alaska. It was the height of the flatfish season and 20 percent of the trawler fleet stayed tied up at the dock, unable to afford the price of fuel.

In the first six months of this year, the price for marine diesel in the Pacific Northwest shot up from \$2.80 to about \$3.20, and with the current outlook in the Middle East, perhaps it's time to think about reducing fuel costs.

Reducing fuel costs? No problem. Everybody knows that one way to reduce fuel consumption is slowing down. Well, as my boatbuilding mentor used to say, "Yah, but..."

It is true that boat speed influences fuel consumption, and reductions in fuel consumption can be achieved by reduc-

ing the engine speed.

Yah but, there's a bit more to it than that.

First of all, the relationship between engine rpms and fuel consumption is not linear. For example, doubling a boat's speed will necessitate burning much more than double the amount of fuel consumed. Illustrating this is a video on the web site of the North American, a 110-foot Bering Sea crab boat featured on the Discovery Channel's Deadliest Catch. (www.fvnorthamerican.com)

In the video, the skipper tells how he was running the boat around 1,025 rpm and burning roughly 42 gallons per hour. While watching the fuel-flow meter, he then brought the engine speed down to about 900 rpm, and finally settled out at 860 rpm and 23 gallons per hour. It only cost him half a knot in vessel speed. That's a 45 percent reduction in fuel

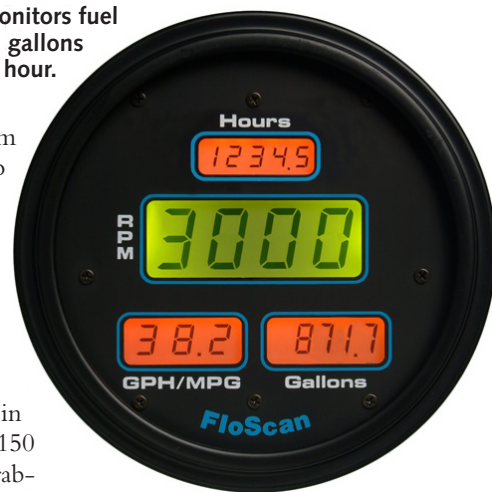
burnt for just a 16 percent reduction in rpm. Now that's not bad.

The skipper was able to find the rpm level where the engine operates most efficiently in terms of fuel usage by experimenting with reductions in rpm while watching the gallons per hour reading on a fuel-flow meter. Many people refer to that as the "sweet spot."

However most fishing operations require a boat to travel to the grounds at cruising speed, reduce rpms and fuel consumption while fishing, then increase speed and return to port. In this regard, gallons of fuel burned per nautical mile are more significant than gallons per hour when trying to find an engine's sweet spot.

Gallons burned per nautical mile reflect how engine performance changes with speed as well as propeller and hull interactions that are not evident from tracking gallons per hour. The gallons-

The FloScan Series 9000 gauge monitors fuel flow in both miles per gallon and gallons per hour.



FLOSCAN INSTRUMENTS CO.

per-mile measurement also has the advantage of allowing the skipper to monitor this reading and adjust his rpm level to maintain the economically optimum fuel-use setting.

Mechanical and early electronic engines included as standard an engine instrument panel with two-inch gauges that displayed basic engine parameters. These included oil pressure, temperature and voltage. There would also be a 3-inch tachometer. This left it to the boat's operator to find his sweet spot by running between known marks at various rpm levels, trips to the fuel dock and a bunch of arithmetic, or, alternatively, installing a fuel-flow sensor and a flow meter.

Newer electronic engines may offer analog gauge panels — lots of people are more comfortable with them — but with an LCD window at the bottom to display digital data such as engine hours, distance traveled and error codes.

More advanced options for monitoring up to 20 or more engine performance parameters are also available. These can be displayed with a standard gauge panel as well as with an LCD display capable of showing both text and graphics. Panel displays with the newer electronic engines can also show gallons per hour, which is, of course, an essential piece of information but still leaves the skipper to make numerous recordings of gallons per hour at various engine speeds to find the elusive sweet spot.

Electronic engines have optional capabilities that will automatically do the arithmetic and display all engine and transmission parameters. These are shown in real-time and include trip and historical data broken down in all sorts of useful ways, for example, diagnostic and fault indications together with suggested corrective actions. When interfaced with the boat's GPS, you get position, speed and the all important nautical miles-per-gallon reading.

Caterpillar has The Messenger and the Color Mini Marine Power Display. MTU Detroit Diesel offers its BlueLine and Bluevision. Cummins Marine (15 liter and above engines) has C-Command Elite. Volvo Penta markets its Electronic Vessel Control, which is actually F.W. Murphy's HelmView, and is also a John Deere option. Cummins MerCruiser has the SmartCraft System, standard on all Quantum engines, with VesselView for

its optional monitor.

The cost of these options vary from about \$450 for The Messenger to about \$2,800 for HelmView, and when installation costs are included the final figure can seem a bit pricey. But for boats that travel some distance to the fishing grounds, the pay back may be realized fairly quickly in fuel-cost savings.

The owner of the North American in the video says he's saving \$120 to \$150 a day on runs between Seattle and crabbing grounds in the Bering Sea. It won't take long to pay back an investment at that rate.

But is anything available for mechanically controlled and older electronic diesels? Take heart for all is not lost. There are options for these engines. The big dogs in this particular neighborhood are the FloScan Instrument Co. and Faria Marine Instruments.

Both of these companies have been supplying engine instrumentation for decades and both have broad product lines.

FloScan's Series 9000 Interface System brings together a digital LCD with engine-hours, tachometer, gallons per hour, fuel used, and nautical miles per gallon in a single 3-inch gauge that fits the panel space of a standard tachometer. It gets the boat's speed information necessary to compute the miles-per-gallon from a GPS with an NMEA 0183 serial output port.

The real beauty of this device, according to Joe Dydasco, sales manager at FloScan, is that it can be used for either gasoline or diesel engines and can be installed by the boat owner. "Our sensors are plumbed in-line, just like a fuel filter," he says.

On gasoline engine installations the sensor is inserted in the fuel line between the engine's fuel filter and fuel pump. In diesel installations a fuel sensor is installed in both the feed line and the return line, which is subtracted from total flow to get fuel remaining.

Prices for the Series 9000 start at \$570 and range up to \$1,735 for gasoline engines, depending on the size and number of engines. For diesel engines, the price range is from \$1,000 to \$1,735. FloScan also has another product, the FloNet Diesel Monitor.

The FloNet Diesel Monitor was de-

signed to interface with the increasingly popular NMEA 2000 electrical network and works with virtually all marine diesel engines from 25 to 6,000 horsepower, in single or twin set ups. The system features two fuel-flow sensors and can be installed by the owner. If the boat doesn't already use an NMEA 2000 network, a starter kit is available.

Street prices for the FloNet system are \$1,200 for the standard-flow version and about \$2,000 for the high-flow unit. (The engine model determines which one is used.) The NMEA 2000 starter kit is about \$100. A big advantage is that there is no need to buy a special display device because the fuel flow data is shown on what FloScan calls its "Hub."

Faria, the other major player in engine instrumentation, has a number of instruments that will do fuel monitoring but its Fuel Manager is the only one that is dedicated to fuel management. However, it is limited to gasoline engines.

Fuel Manager is a digital LCD mounted in a 2-inch hole on the dash that displays total or trip fuel consumed, fuel remaining, and fuel flow in gallons per hour. It works with all marine engine communication protocols, can be installed by the owner and has a list price \$255).

With the relatively modest up-front cost and the potential for some handsome returns, a fuel-monitoring instrument — gallons per hour or miles per gallon — certainly qualifies as a low-risk, high-return investment.

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Ev Collier owned a marine electrical installation business. He wrote "The Boat Owner's Guide to Corrosion."

For contact information on companies mentioned in this article, see page 69.