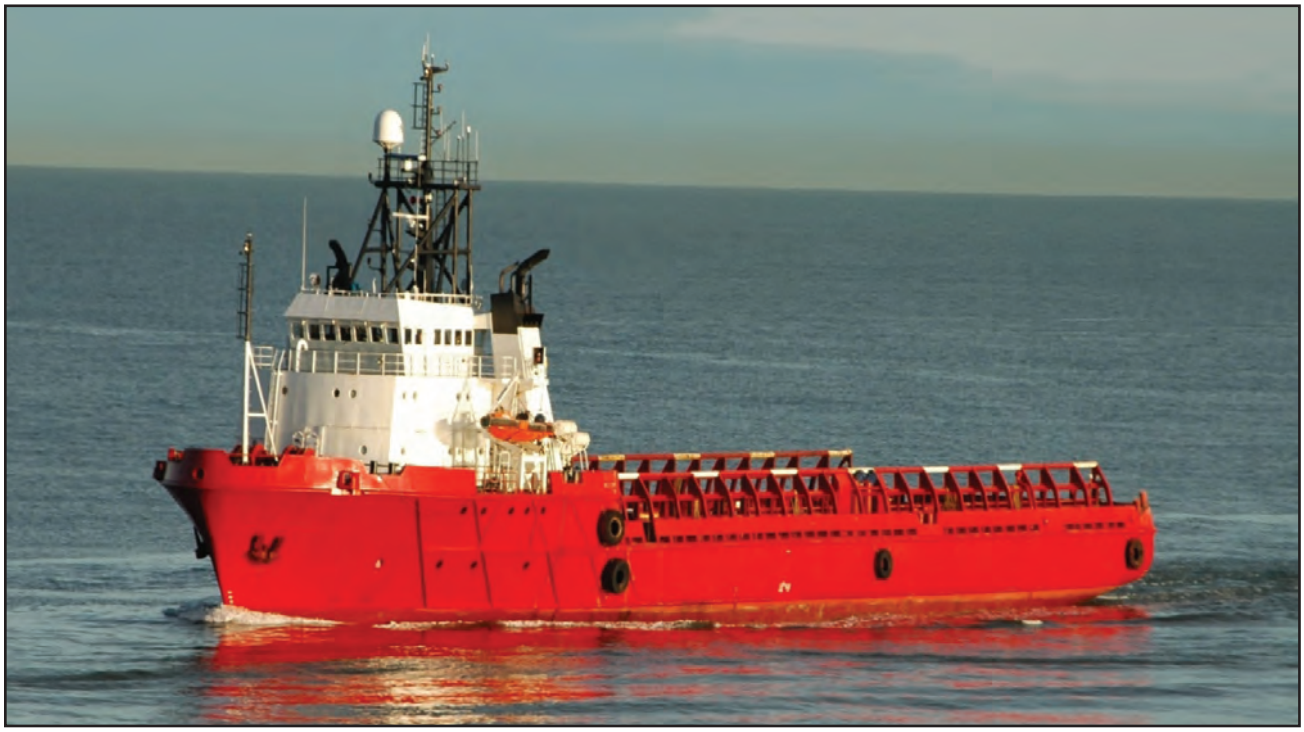
BY JON ARCHENHOLD



Understanding fuel usage on each vessel in a fleet has become critical in order to make the right decisions on operational strategies and to conserve as much fuel as possible.

Choosing A Marine Vessel Fuel Management System

For a typical fleet manager, diesel fuel is usually the second highest budgeted item after labor. When fuel prices soared during 2008, some operators spent more on fuel than on labor and/or found themselves significantly over budget.

Understanding fuel usage on each vessel in a fleet has become critical in order to make the right decisions on operational strategies and conserve as much fuel as possible. By using the data provided by a suitable fuel management system, an operator should be able to optimize fuel usage and save at least 2 to 5% in annual fuel costs.

When considering a fuel management system, requirements include accuracy, safety, reliability, ease of use, data recording and retrieval, and ease of configuration.

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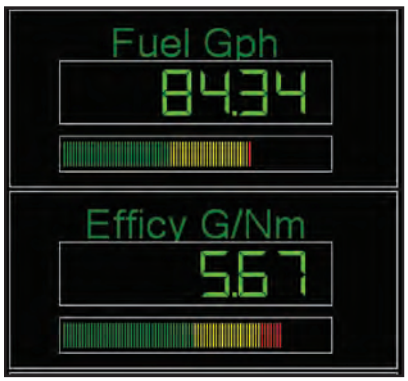
A fuel measuring solution should be accurate, however, fuel is not easily measured with a high level of precision. There are different types of fuel with regional and seasonal variations. In addition, fuel will vary in temperature, changing its viscosity and flow characteristics. Fuel also flows in pulses due to injector timing.

In a fuel measurement system, accuracy can be affected by the differential measurement when calculating supply fuel minus return fuel to determine net burn. Errors are typically higher at idle, where most of the fuel is returned to the tank. Since the amount of time vessels spend at no load on a typical trip is fairly insignificant, overall system accuracy of about 1 to 2% should be achievable. To consistently achieve this level of accuracy, the flowmeters used to measure supply and return fuel flow need to be very precise. Users should look for meters with accuracy in the 0.1% of reading range with calibration accuracy in the region of 0.05%.

Vessel safety is paramount and should not be compromised under any circumstances. If a flowmeter installed in a fuel line were to fail for any reason and block the line, the consequences could be catastrophic.

Some vessel operators may choose gear wheel (positive displacement) flowmeters for fuel flow measurement. Gear wheel meters have two rotating gears or impellers with interlocking teeth. If this type of meter were to lock up, fuel flow would stop and the engine would stall. The meter, therefore, fails closed.

Experience has shown turbine flowmeters are the preferred alternative to gear wheel meters for fuel-related applications. These instruments fail open, allowing fuel flow to continue with only a small increase in pressure drop across the meter. If the turbine is sized correctly, a typical working pressure drop of 0.102 bar would only increase to around 0.204 bar under a failed condition — not enough to cause a problem with fuel supply.



Fuel instrument readings should be distinguishable at a glance. It's important to choose a system with a clear display and simple readouts.

Vessel operators should mate their turbine flowmeter to temperature, compensating electronics to ensure the correct output of pulses-per-liter as the fuel viscosity changes with temperature.

While it is good practice to install bypass piping around flowmeters for maintenance purposes, this technique should not be employed as a backup for a failed gear meter. Fail-open flowmeters are the recommended meter of choice in marine vessel applications.

Since reliability of a fuel measurement system installed onboard marine vessels is of great importance, users should consider how well system hardware stands up to heat, vibration and fuel/oil/water spills found in an engine room. Electronics should be housed in sturdy NEMA 4X-rated enclosures with armored interconnecting cable.

A fuel management system should be user-friendly and easy to interpret. The wheelhouse is a busy place, and in most cases crewmembers are not "systems engineers" who have time to sit down and analyze data. Readings on the wheelhouse display should be distinguishable at a glance, so it's important to choose a system with a clear display and simple readouts.

A fuel management system should also have the ability to record data for future retrieval and analysis. There is little point in providing a real-time only readout that is overlooked or that lacks trend information for comparing the performance of different engines. The system should enable operators to compare the fuel consumption of multiple vessels of the same type performing identical work.

With graphical analysis capabilities, experiments can be performed using different operating speeds or propeller pitch angles in certain conditions to optimize vessel performance. Comparisons of vessel fuel consumption with vessel speed can also be performed to uncover additional savings opportunities. This allows fleet managers to truly understand their operating parameters and make the appropriate decisions to conserve fuel.

Satellite communication for transmission of the data can be a valuable asset. A satellite uplink or tethered modem connection allows vessels to send back real-time information for invoicing purposes or to look for indications of possible fuel theft.

Configurability is also a key feature when choosing a fuel management solution. An operator may have a large fleet consisting of many types of vessels with different engines, fuel requirements and flow rates. Variables range from single to multiple engines, mechanical or electric propulsion with or without electrical generators, fixed or controllable pitch propellers, and multiple fuel types. The fuel management system should be configurable to cover all of these variables.

A configurable wheelhouse display is another important feature, enabling crewmembers to see only what they want to see without viewing unnecessary data. In most cases, simpler is better. Since the fuel management system could be retrofitted to existing vessels that may have limited wheelhouse panel space, the display should be flexible to accommodate a wall or ceiling mount for optimum viewing.

Most fleet managers want to display and/or download real-time fuel usage for all engines and generators on the vessel, as well as a total for the vessel itself. They may also want data indicating total fuel consumption, gallons or liters per nautical mile, engine r/min and distance traveled by the vessel. As such, it's very important that the system include an integral NMEA0183 GPS interface for collection of vessel speed and position data. Otherwise, calculations of engine efficiency cannot be made accurately.

Finally, it is helpful if the system can take outputs from other sensors on the vessel in order to display and record data such as wind speed, wave height, propeller pitch angle and bunker fuel input. This information can be used for further data analysis.

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