Fuel Consumption Measurement for Diesel Engines

The Kral Volumeter is a robust liquid flow meter and offers laboratory precision even in harsh, industrial applications. The positive displacement meters operate with a screw spindle principle and measure independent from the flow profile. For that reason the very compact Volumeter never needs flow conditioning and can be installed directly after elbows, tees and other pipe components. Fuel consumption measurement of diesel engines is also possible despite pressure pulsation and temperature differences.

More information: www.kral.at

INTRODUCTION TO THE 'DYNAMIC MARINE POWER' CONCEPT

A Noval Approach to Fuel Effiency

The 'Dynamic Marine Power' concept represents the most advanced diesel-electric marine power supply system serving large power consumers on board. At almost any kW power demand the diesel engines are operated at their minimum specific fuel consumption rate, thus significantly saving on fuel. The 'Dynamic Marine Power' concept features electric power supply delivered by variable frequency diesel generator sets, induction motor drives and the use of electronic variable frequency converters in between them.

The 'Dynamic Marine Power' concept addresses two basic problems that have been waiting patiently for a very long time to be tackled@is:

a) diesel engine inefficient fuel consumption at partial load

b) energy losses caused by the natural mismatch of torque-speed characteristics of diesel engine and axial/radial flow machines like propellers and bow thrusters. Savings in space and weight, reduced pollutant emissions, low maintenance costs, low noise and vibration and the use of conventional rotating equipment add to overall economy and reliability. The simplicity of the concept allows the shipyard to reduce installation and commissioning time on board. This concept was presented for the first time at Europort Maritime 2007 in Rotterdam.

The steadily increasing price of fuel is a powerful drive towards a search for innovative solutions in the field of energy generation and distribution on board. Are significant savings on fuel feasible today? In recent years much has been done by manufacturers to achieve best efficiency for components like diesel engines and propulsion impellers. Major leaps forward regarding efficiency are not expected in the near future. Efficient route planning and logistics along with a fuel-conscious attitude may help to win a few percent. Could a more conceptual approach focusing on the entire power 'system' rather than focusing on a single 'component' add to more efficiency? The answer is yes, provided classic ideas are thrown overboard.

The basics behind Dynamic Marine Power concept.

As mentioned earlier there are two basic issues responsible for poor energy efficiency on board. Two solutions that tackle these two shortcomings are presented in here in this article.

Firstly, there is the problem of a diesel engine's inability to run efficient at partial load. At constant speed and reduced power demand the engine becomes inefficient very soon because the specific fuel consumption rate increases rapidly at reduced torque and fuel injection levels. In the past a diesel engine also lost efficiency once deviating from a nominal speed or from a confined speed range. Today, modern state-of-the-art diesel engines are capable of producing a high torque and low specific fuel consumption rate at a wide operating speed range thanks to common rail injection technology. Therefore, it is more efficient to respond to variations in kW (HP) demand by changing speed rather than by throttling back the fuel rack. Secondly, the problem of huge natural mismatch between supply and demand need to be solved. In other words, between the torque-speed characteristic of diesel engine and the torque-speed characteristic of axial or radial flow machines like a propeller, bow thruster or centrifugal pump. This mismatch inevitably leads to energy losses. For some applications the operating speed range characteristic may be helpful to overcome such a mismatch. In general however an electronic frequency converter is an ideal 'transformer' to eliminate the mismatch.

Dynamic Marine Power concept lay out.

It is basically the set up of the classic diesel - electric power supply system. However a fundamental difference is that the main power supply switchboard has a variable frequency. The induction motor driving the load is connected to the generator through a cable (electrical shaft) and in this power line the variable frequency converter is inserted.

Each variable frequency converter supplies the load with the required frequency, speed and required kVA power. The variable speed diesel generators choose a frequency and excitation level that meets the total kW and kVAr demand of all consumers. The Dynamic Marine Power concept is best suited for applications featuring several heavy duty consumers that have a varying kW power demand over varying time-scales. As an example, a dredging vessel may need 5 MW for a dredge pump whilst propulsion demand is reduced to 2 MW. When speeding to sea and going back 5 MW propulsion is needed. A conventional design needs 10 MW installed diesel engine power although a total of 7 MW is required. On the contrary, when 99 % of the time the power scenario is constant, other designs may be fuel efficient as well. This may apply to a long haul container vessel.

The basic advantages of the Dynamic Marine Power concept are:

- The maximum frequency at maximum kW power rating can be higher than the classic 50 hz or 60 hz. A higher frequency at same kW power level means lower torque level, hence lower size and weight of all rotating equipment in the entire power string. Price of rotating equipment is proportional to weight so a significant investment reduction can be achieved;
- Standard design diesel generators can be located anywhere on board, leaving room for more payload. Containerized version provides low-noise and low-vibration adding comfort to the crew on board.
- 'Oil-free' transmissions: no gearboxes, no bi-directional couplings;
- Reduced torsional vibrations, compact drives, no need for long base frames that are susceptible to torsional vibrations;
- Built-in redundancy;
- Standard 'proven design' components and technology, normal delivery times;
- Reduced commissioning time-line, a significant part of commissioning work can take place on land;
- Compact electrical drives saving weight and space. Reduced dimensions using water-cooled motors or motors with permanent magnet technology.

More information: www.ariemol.nl

MAN DIESEL SETS NEW WORLD STANDARD

APL, the global container-transportation company, has ordered eight MAN B&W 14K98ME-C7 engines, each generating a massive 84,280 kW or 115,000 bhp at 104 rpm, to power eight 10,000 TEU ships from Korean builders. When built, the diesel engines will qualify as the most powerful ever built in shipping history.

In placing this ambitious order, APL aligns itself with other significant container-ship owners such as Hapag Lloyd, NVA, OOCL, NYK and K-Line who have also selected MAN B&W K98ME-C engines with electronic