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## Electronic Diesel Indicator Targets Routine Cylinder Pressure Monitoring

The new EPM-XP electronic engine is designed to bring competitively priced microprocessor technology to periodic cylinder pressure monitoring aboard ships and in power stations.

"Tracking cylinder pressure trends on the basis of regular measurement is a long established method of monitoring engine condition,". "The traditional method is the mechanical indicator which produces an ink trace on a drum barograph. The trace has to be interpreted - which requires considerable operator experience - and the recorded values logged manually if they need to be transmitted to another location. The process is further complicated since the pen of the barograph is easily displaced by the vibration of the running engine, producing discrepancies in the readings. Thereafter, of course, a mechanical indicator has to be cleaned and oiled - neither of these operations is needed on an electronic device."

With the EPM-XP electronic hand held indicator, by contrast, up to 20 readings per engine are taken electronically on the basis of 10 working cycles per cylinder and values for maximum pressure (Pmax) and engine speed (r/min) - plus compression pressure (Pcomp) in the case of low speed two stroke engines - displayed for each cylinder.

The EPM-XP is built around IMES' highly accurate and robust type HTT pressure sensor which comes with a braided, high duty signal transmission cable and a Thompson adaptor and stand for connection of the sensor to the engine indicator cocks. The hand held measuring device features a small LCD display for digital read-offs of the most crucial data at the point of use and a USB port which serves both for data transfer and charging of the system's E-block-type accumulator.

The complete package comes in a robust instrumentation case together with IMES own visualisation and data processing software on a CD-ROM. In terms of data acquisition, the EPM-XP system is designed to record cylinder pressure values on a maximum of 20 cylinders, (i.e. up to V20 diesel engines) and for engine operating speeds of 40 to 500 r/min. for two stroke diesels and 300 to 1500 r/min for medium speed and large high speed diesels. It is capable of acquiring cylinder pressure data in a 0 to 300 bar range with an accuracy deviation of less than 1% (full scale).



The IMES type EPM-XP electronic engine indicator for diesel engines connected to a notebook for data download. The type HTT sensor and flexible pipe with thompson adaptor are visible on the left.

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The main operational benefit of IMES' new electronic indicator is that, after measurement, the stored data can be readily downloaded to a PC or notebook computer via the device EPM-XP's integral USB port. "Following downloading of the recorded data to a computer equipped with our visualisation and data processing software, they can be interpreted and processed off-line at leisure. Similarly, taking advantage of modern computer communications, the data can be immediately transmitted by telephone line or the Internet to a remote computer, for example at the shipowner or the service organisation of the engine OEM, for expert analysis."

Offline, the IMES software package uses the data downloaded from the EPM-XP electronic indicator's memory to calculate the maximum pressure gradient ( $P_{\alpha}$ ) and the mean pressure ( $P_{max-mean}$ ) of the 10 cycles acquired at each cylinder on the basis of the lowest and highest recorded values for  $P_{max}$ . Further data processing includes a  $P_{max-mean}$  balancing function in which the deviations from the calculated mean maximum cylinder pressure are computed for all the cylinders and displayed. In the pressure curve visualisation function, the mean pressure curves for all cylinders can be superimposed to give a graphic representation of the diesel engine's combustion pressure balance. The data curves produced by the software can be stored as ASCII files for display on a spread sheet, while for testing and validation, the EPM-XP is designed to be connected to a static pressure calibrator.

The basis of what IMES believes is very competitive pricing is the economies of scale the company is now achieving with the increasing numbers of type HTT sensors now sold. "In addition, we have intentionally restricted the range of on-instrument features to those which are really useful at the point of measurement," "And as regards the central component in the EPM-XP's accurate measurements - our HTT sensor - after over 10 years of daily, on-engine use, this is a very mature product with an effective life well in excess of anything which might be expected of it in the type of periodic cylinder pressure monitoring we are targeting with our EPM-XP electronic engine indicator."

### Cylinder pressure sensor for common rail application on Diesel Engines

The new imes common rail pressure sensor is designed to calculate  $P_{max}$  signals from combustion which can be transmitted directly to the engine controller via CAN-Bus or as an analog output signal.

