

Intelligent Solutions in Engine Management



IMES Expands into New Premises, Extends into New Products

In a major corporate milestone, German engine indicator specialist IMES GmbH has recently moved to new, purpose-built headquarters in Kaufbeuren, Bavaria. In its fourteenth year of existence, the commercial and production needs of IMES have grown progressively to the point where a dedicated building had become a priority.



With 1,200 square metres of floor space and target capacity of 25,000 cylinder pressure sensors per year, plus ample room for further buildings on a large surrounding site, the company expects the new premises to cope with continuing growth in demand for IMES cylinder pressure indicating devices and systems for some years to come. In particular, IMES president and founder Stefan Neumann is enthusiastic about the new headquarters' potential for rationalising production flows and expanding IMES' research and development, system integration and application engineering facilities and activities. "As this purpose built factory, we aim to introduce all that's best in rational organisation of production. At the same time, we are much better placed to receive customers and demonstrate our products."

Overall, Neumann sees the start of operations at the new building as a coming-of-age. "Since IMES' 1996 foundation, engine builders and operators have increasingly come to rely on cylinder pressure as the value which can tell them most about both actual engine performance and overall engine condition. Accordingly, following our most recent product introductions we now have a line of cylinder pressure indicating products to meet the needs of both builders and operators of diesel and gas engines. On the one hand this means products and complete systems for continuous monitoring of cylinder pressure as an input value for engine monitoring and control. On the other hand it means a range of portable and hand-held sets of devices and sensors for periodic monitoring of cylinder pressure or setting-up and re-setting engines, for example during commissioning or after overhaul."

Going back to 1996, IMES was formed to exploit the excellent performance and longevity of its robust cylinder pressure sensors employing TION thin film measuring technology. "Our sensors are at the heart of all our products associated with cylinder pressure measurement and are now in their fourth generation. They are affordable and their robustness and performance has been proven in many applications. As a result, standard effective life is more than 16,000 operating hours on both diesel and gas engines. On this basis we believe they offer the best combination of robustness, reliability, price and above all accuracy available on the market."

Sensors

The IMES product range divides neatly into three groups. It starts with the sensors the company sells direct to engine builders for integration into their own electronic control, monitoring and diagnostic systems or overriding systems in the power plant or aboard the ship in question.



Building on the success of the types HTT-01 and HTT 04 sensors, the most recent landmarks in this product range were the 2007 launch of the miniaturized CPS-01 sensor for small engine applications, the delivery of the 10000th sensor in 2008 and the early 2009 attainment of an Approval Certificate for the type HTT-04 sensor in marine applications from classification society Bureau Veritas.

Hand-held and Portable

The second group is a range of hand-held and portable electronic engine indicators and indicating systems. The hand-held devices comprise products for both the regular cylinder pressure measurements carried out at specified intervals by engine room staff to monitor the performance and condition of marine diesels - the EPM-XP unit - and the more elaborate EPM-XC device which targets more exacting combustion monitoring tasks in contexts such as field testing of prototypes and trouble-shooting.



Currently, EPM-XP is the rising star in the IMES hand-held and portable engine rang. Battery powered, EPM-XP aims to replace traditional mechanical indicators used for periodic checking of engine cylinder pressure. The traditional mechanical devices produce an ink trace on a drum barograph which has to be interpreted by an experienced operative. With its LCD display the EPM-XP hand-held measuring device allows immediate read-off in digital form of the most crucial data at the point of use, while a USB port allows data transfer to a PC or laptop as well as charging of the device's accumulator.

Already selling well, the EPM-XP is now available with the option of a protective casing to supplement the tough plastic of its standard housing. The casing is designed to prevent possible damage if the device is dropped by the user, for example.

In addition with the aim of covering a wider range of applications, IMES is also introducing two further versions of EPM-XP. While the level of data which can be read-off the hand-held device at the engine will remain the same, more sophisticated software packages will allow a substantial increase in EPM-XP's offline data processing potential. Following downloading of the recorded data to a PC or notebook, IMES visualisation and data processing software is used to interpret and process the acquired data offline and at leisure.

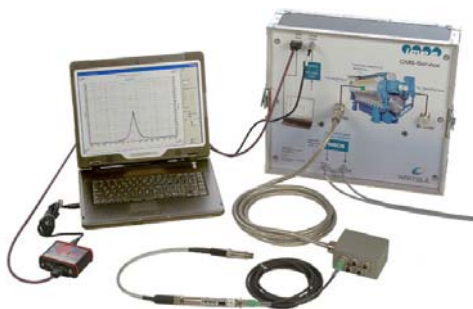
In contrast to data from mechanical indicators, which need manual logging, the data can also be immediately transmitted by telephone line or the Internet to a remote computer for expert analysis. Moreover, as a part of the software upgrade, EPM-XP can now be equipped to calculate the output of every cylinder.



A further recent development is the portable "CMS Cargo Box", where CMS stands for "combustion monitoring system". Developed in cooperation with Wärtsilä Service Finland, CMS Cargo Box consists of sensors, a measuring device and cables with which engines can be set-up, either during commissioning, at prescribed intervals thereafter or following overhaul or repair.

For ease of transport, the Cargo Box itself is an aluminium chest with a telescope grip, handles and wheels. It is divided in two parts with the lower part used to store the measuring equipment like sensors and connecting cables during transport and the upper the data acquisition electronics. All sockets to connect the power supply, input signals and the CAN-Bus output signal are located there.

In operation, CMS Cargo Box allows pressures on up to 20 cylinders to be monitored and based on the data acquired engine operating parameters set and optimised. With a special emphasis on dual-fuel gas engines, CMS Cargo Box targets both terrestrial power plants and dual fuel diesel electric (DFDE) propulsion and onboard power generation systems on LNG carriers – and, if current concepts become reality, cruise ships. A particular emphasis on modern engines with common rail fuel injection or advanced gas admission is balancing of cylinder outputs.



Already looking at the next generation, IMES is working on a CMS Cargo Box for use on two stroke, low speed diesel engines in order to be able to balance cylinder outputs better with special emphasis on optimising exhaust valve timing on the latest generations of electronically controlled two strokes.

Continuous Data Acquisition

Finally based on its sensor range, IMES designs and integrates CMS Combustion Monitoring Systems for permanent installation on diesel and gas engines, based on signals from IMES cylinder pressure sensors mounted on each cylinder of a medium speed diesel or gas engine. By referencing the data acquired to the engine's crank angle position CMS is able to evaluate cylinder pressure information continuously in real time for use as an engine monitoring and control parameter. The calculated information is available via CAN-Bus to an industrial notebook.

With these capabilities, this product group is already very popular among operators of gas engines for the safe detection of combustion knock. By ensuring that detonation is reliably determined and appropriate counter measures automatically initiated, the operator can run his engine at optimised performance as close as possible to the knock and misfire boundaries without risk of damage.

With CMS applications expanding steadily on stationary gas engines, IMES is now looking closely at applications on engines in marine applications, especially on dual-fuel gas engines. In a similar vein, Neumann also sees possibilities for using systems based on the robustness and long term accuracy of IMES sensors to exploit the full power potential of diesel engines. "With common rail fuel injection, variable valve timing and variable geometry turbocharging, engine builders and operators are able to set operating parameters more extensively and accurately than ever before," Neumann forecasts. "Being such a central value to engine operation, accurate data on cylinder pressure is an ideal feedback on the effect of changes to injection, turbocharging and valve timing parameters. This would be ideal for adaptive control concepts, for example."

Extracting Maximum Performance

As well as allowing the fine tuning of engine settings IMES also foresees cylinder pressure signals being used to exploit the structural reserves built into every engine to ensure operational safety. "For example, every engine builder sets limits on firing pressure and these currently reflect the fact that for many years there was no way of measuring combustion pressure accurately," Neumann explains. "However, in a similar way to its use on gas engines to operate as close as possible to the knock and misfire boundaries, IMES CMS systems can continuously process accurate signals from our sensors to permit full exploitation of the engine builder's specified maximum firing pressure."