

Monitoring of ship diesel engines

For the beginning - a fragment of article from the newspaper "Ленский водник" (Lena Seaman), official publication of Lena shipping company (Yakutsk):

"Thermo dynamical laboratory of Open Society LORP in 1998 has been equipped with the computer monitoring system of ship diesel engines parameters of working process "DEPAS"... It allows to increase service life of engines and to reduce expenses for its service due to the detailed analysis of key parameters of working process, the control of the fuel injection beginning (commencement of delivery) and the inlet/exhaust valves timing.

"DEPAS" system is irreplaceable for ships which are up to the next survey of mechanisms after finish of the navigation. The Shipyards should be equipped with the same diagnostic sets, and in due course so there will be ". 1st of October'99 the standing order № 251 on Lena shipping company vessel "Портовик_9" has been renamed as "DEPAS". What was so interesting for distant Siberian shipping company in technical research of the Odessa laboratory?

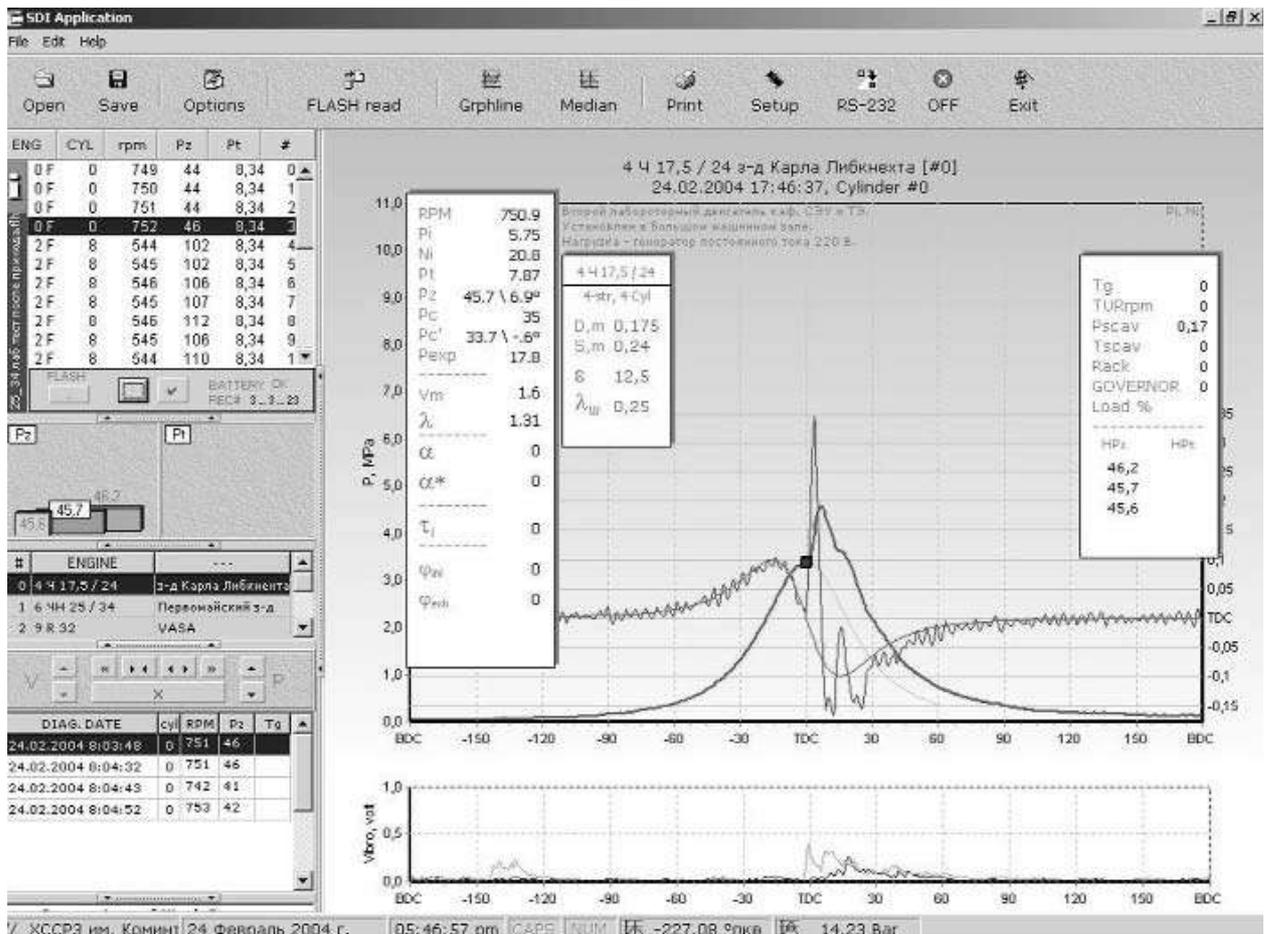
What is DEPAS? DEPAS is Diesel Engine Performance Analyzing System. The said system was developed by the laboratory "Monitoring of the Ship's Diesel Engines", created on the basis of faculty "Ship power installations and technical operation" of the Odessa National Sea University (by the rector's order ОНМУ № 31_опр от 17.04.2003)

The research of the systems for monitoring of working process of ship diesel engines had initially been determined as specialty of the laboratory. The task for which equipment is developed is the following: to determine key parameters of working process of Ship Diesel Engines in operation. Engine power calculation, characteristics of thermal and mechanical stresses, a fuel injection and inlet/exhaust valves timing, and a general estimation of a technical condition of the fuel equipment and the valve timing mechanism. Such detailed information on each cylinder of diesel enables the exact control of diesel engine power and technical condition. During operation it is possible to make qualitative maintenance of a diesel engine and to prevent development of the defects resulting in failures.

Work in the field of designing systems of diesel engines monitoring occurred on faculty "Ship power installations and technical operation" long before the rector's order, which date April, 2003 has coincided with the finish of new generation system development (so-called system of the divided monitoring).

Previous versions of system (till 2003) have been designed as uniform hardware-software complexes (DEPAS 2.29...2.31). The first systems were based on stationary computers. Information from sensors was taken through analog-digital converter ISA or PCI executions. The software has been written in DOS and worked in a real time mode. Despite of obvious advantage - getting immediate result of system diagnostics said system had a number of lacks. The main of them was the system cost, which was dictated by presence of a plenty of the cable lines connecting a computer (in ECR) and sensors (in Engine Room); necessity to install the industrial computer which price was 3-4 times higher that similar PC, etc.

The next class of monitoring systems - portable systems - has been designed on the notebook basis with use of analog-digital converters with PCMCIA interface (DEPAS 2.34). New systems main features were increased reliability and shorter cable lines which were laid in Engine Room only for a indicating time. However presence of expensive, specific former of signals and notebook as integral components of systems did not allow lowering a total cost of measurements. The radical solution of a system cost question, its availability to carry out the current maintenance of diesel engines became possible in "divided monitoring" system (DEPAS 3.1). The "divided" means, that gathering and preliminary computing is made on the separate device (the real time module), and full calculation and printing of the report - on a computer, in the external software. From these systems are completely excluded



Working screen DEPAS 3.10H



Tests of DEPAS 3.10H system at the Kherson ship-repair yard.

cable lines, the software is installed on any PC and works under Windows (98/Me/2000/XP). Diagnostics of a diesel engine does not need any preparation because of application of special thoroughly tested algorithm of phaseless data synchronization (PSA). Recently successful tests of new generation system DEPAS 3.10H in Kherson ship-repair yard have been carried out.

The organization of a new laboratory research course for senior students of Ship Engineering faculty of ONMU is planned. Also modern methods of Diesel Engines monitoring are useful for ship's engineers training and "Ship power installations and technical operation" faculty can form good laboratory base for increase of their qualification.

Activity of "Monitoring of the Ship's Diesel Engines" laboratory is marked at the Seventh international exhibition and conference on shipbuilding, shipping, activity of ports and ocean & shelf development "NEVA 2003" - the medal and the diploma of honor are received.

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