



Oil Diagnostic Services

Energy Services International, LLC
1020 Bay Area Blvd. Suite 224
Houston, TX 77385 – USA
281-286-9800 - Ph, 281-286-9803-FAX



The New Standard for Oil Diagnostic Services

Houston - TX 2006

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Let ESI “The leader in precommission flushing services worldwide” analyze you lube oil on the fly to determine if it meets the manufactures specifications. This painless and inexpensive exercise will keep your systems online and in operation.

Our PODS (portable oil Diagnostic System) is an intelligent portable and robust analysis instrument for measuring, storing and reporting oil condition parameters important for reliable hydraulic system operations. PODS provides the means to analyze pressurized fluids and lubricants in online or bottle sampling mode without interrupting machine operations.



Fig. 1. Portable Oil Diagnostic System

PODS MEASURES THREE OIL PARAMETERS:

1. Particle Concentration (from which cleanliness classes based on several standards are derived)
2. Oil Temperature
3. Oil Viscosity

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PODS HAS THREE OPERATING MODES:

1. Analysis from bottle samples
2. Online measurement at the pressure of the hydraulic system up to 420 bar or 6000 psi
3. Online measurements in combination with ECOLINE UPM 045 by ARGO ECOTEC e.g. during filling or off-line filtration of a hydraulic system.

PODS FUNCTIONAL CONCEPT



PODS

The heart of PODS is a new sensor for particle counting. Based on the concept of Light Extinction, it detects particles of $>2\mu\text{m(c)}$ ISO-MTD (Medium Test Dust). The pressure of the hydraulic systems moves the oil sample through the sensor during online operation. In bottle sampling mode, the necessary pressure to induce sample flow is produced by CO₂ stored in a small refillable pressure bottle (in the field) or compressed air (in the lab). Other sensors measure oil temperature and viscosity. The sample flow rate is measured and automatically regulated depending on oil viscosity. Each sample has one run for flushing (programmable) and three measurement runs of either 5, 10 or 20 ml. The analysis time depends on the oil viscosity and is as fast as 1 minute up to 2.5 minutes.

FLUID CONTROLLING CONCEPT

PODS is the key element to Fluid Controlling. Regular measurement of the oil condition of mobile and stationary hydraulic systems can be quickly conducted by the user at any time. The comparison of the results with preset oil quality and cleanliness guidelines will trigger oil service measures tailored to the needs of the system.

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The exchange of filter elements, the replacement of the oil or the cleaning and drying of the pressure fluid is now determined when accepted limit values are surpassed. Machine operating times are prolonged and the oil change intervals are extended, saving costs in maintenance and repair.

FEATURES:

Reliable Oil Monitoring

Monitoring oil contamination with PODS in the field proves immediate information about the machine's health under operating condition. Results from oil samples analyzed in laboratories are only available after weeks and do not reflect the condition of the oil under operating conditions.

Calibration to the newest standard with ISO-MTD

PODS is calibrated to ISO 11171:2000 with ISO-Medium Test Dust (MTD). Its Primary Calibration is with NIST Standard Reference Material SRM 2806, which is certified by NIST (National Institute of Standards and Technology), USA. SRM 2806 can be obtained from NIST in a reproducible size and number distribution. Through regular Calibration to ISO 11171:1999 and regular service, PODS has indisputable counting accuracy and its counting results can be compared to other NIST-calibrated instruments.

Portability and mobility



A practical advantage of PODS is its mobile concept. The instrument is easily portable which allows oil diagnosis and contamination measurement on machines under operating conditions. Due to its power independence (extended battery life and CO₂ pressure for bottle sampling) PODS finds use in the most remote locations.

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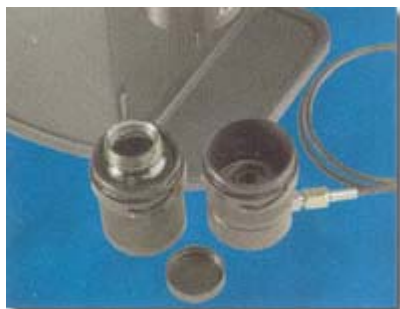
Cleanliness Classification to the new ISO code

PODS is the first portable particle counter in the world with cleanliness classification to the new three part ISO Code of ISO 4406:2000 (4/6/14up(c) ISO-MTD). Other Standards based on the previous ACFTD calibration to ISO 4402:1991 are also built into the PODS (NAS 1638, MIL-STD-1246C and NAVAIR 01-1A-17)

VERIFIABLE PARTICLE COUNTING

The particle sensor of PODS was designed and is tested to JIS B 9925:1997, the most demanding particle counter performance standard worldwide. It's counting accuracy is verified by and traceable to manual microscopic counting of particles. ART Instruments, Inc. (ARTI) is the only particle counter manufacturer following this practice for all its products. Regarding size resolution and count-accuracy, ARTI particle counters are unsurpassed in the industry. The uncertainty in particle numbers due to variability of the calibration medium, inaccurate and non-specific calibration methods and poor performing instruments are now part of the past.

ONLINE OR BOTTLE SAMPLE ANALYSIS



PODS provides automatic online or bottle sample oil analysis. A high pressure sampling adapter replaces the pressure vessel used for bottle sampling. The adapter is directly connected to the hydraulic system of the machine using a high-pressure hose with Minimes connector.

HIGH HYDRAULIC SYSTEM PRESSURE

The particle sensor built into PODS permits direct connection to high-pressure hydraulic systems up to 420 bar (6000 psi) for online oil sampling. This is made possible by using a proprietary Sapphire-cell construction, which does not require pressure reduction upstream of the sensor. Reduction of the oil sample pressure is downstream of the sensor preventing counting errors through air/gas bubbles in the fluid.

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CONCENTRATION LIMIT 90,000

PODS is the first Portable Oil Diagnostic System which permits high particle concentrations (up to class 24 after ISO 4406:2000) and high viscosities (up to 850 mm²/s or 4000 SUS). Time consuming impractical dilution is no longer required. The concentration limit of the sensor is 90,000 Particles / ml at 10% coincidence loss. Oil samples of higher concentrations can be analyzed if higher coincidence losses are accepted.

AUTOMATIC SAMPLE FLOW CONTROL

Continuous measurement and control of the oil sample flow and the flow rate insensitivity designed into the sensor, permits precise particle counting at rapid changes of fluid viscosity and pressure in the hydraulic system.

SECURE TRANSPORT

PODS is delivered in an air and watertight rugged plastic case with rolls. This case contains all accessories needed in the field – replacement Oxygen bottles, battery charger, sample pump for fluid extraction from compartments, high pressure online adapter, sample hoses, manual and space to store oil samples in bottles. The case can be locked and is intended for shipment from the user to a PODS Service Center without additional packing.

RELIABILITY THROUGH LASER TECHNOLOGY

Laser diodes have 10 times the lifetime of white light sources. PODS sets unprecedented standards for concentration limits, counting accuracy and sensitivity by applying the most advanced laser diode technology to accomplish optical stability and laser beam definition. The newest laser technology is also the basis for the ruggedness required from PODS in field applications. The lifetime of the PODS laser diode is 70,000 operating hours (8 years) at 21 degrees Celsius (69 degrees Fahrenheit) room temperature.

PODSWARE: MACHINE CONTAMINATION DATABASE AND TREND ANALYSIS

The PODS memory stores 500 measurements. This data can be downloaded, stored and managed with PODSware. Oil analysis data is displayed in tabular form, as graphical distribution charts using several international cleanliness standards as well as in printed oil sample reports. In addition, the measured viscosity is related to 40 degrees Celsius.

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