Rapid, Cost-Effective Oil Condition Monitoring – Spectrum OilExpress System

Faster analysis, lower costs

Designed specifically to meet the requirements of the Caterpillar® S.O.S™ program, the JOAP program, and the new ASTM® Methods D7412, D7414, D7415, D7418, Spectrum™ OilExpress is the fastest, most cost-effective Oil Condition Monitoring (OCM) solution for busy test laboratories. The system integrates a proven FT-IR spectrometer and rugged autosampler with fourth generation dedicated oil analysis software to deliver very high sample throughput and a much lower cost per sample.

OilExpress analyzes samples more rapidly while maintaining superb accuracy and reproducibility. A unique viscous liquid sampling procedure doubles sample throughput compared to alternative systems. This satisfies the productivity requirements of the busiest laboratories. OilExpress also uses less than half the solvent required by competing systems, dramatically reducing day-to-day operating costs and making laboratories more competitive.
The system’s flexibility meets the demanding needs of a wide variety of laboratories by offering a choice of sampling vessels, user configurable method protocols, report formats and result reprocessing options. PerkinElmer®’s world-class service and support keeps the system running day after day, making OilExpress the preferred choice for laboratories under pressure to consistently process large sample volumes and meet deadlines.

Redefining oil analysis
Spectrum OilExpress provides much faster sample throughput compared to other automated FT-IR Oil Condition Monitoring systems. A typical oil sample analysis takes less than 75 seconds enabling laboratories to either double the sample throughput or reduce the number of systems required to cope with the volume of samples.

This remarkable sampling speed is a direct result of the innovative design of the sampling system, which features syringe pumps that allow faster sample aspiration and dispensing, and improved reliability compared to systems relying on peristaltic pumps (Figure 1). The system allows the needle to be washed and the collection of the next sample to start in parallel with the FT-IR scan, further optimizing throughput by minimizing instrument idle time.

Reduced solvent costs
All FT-IR based OCM systems use an organic solvent to flush between oil samples. The flush volume required contributes significantly to the cost of the sample analysis, not only from the cost of the solvent purchase, but also from the waste-disposal costs.

The syringe pump system also allows OilExpress to utilize a unique turbulent flushing routine to facilitate removal of soot particles from tubing walls. This, in conjunction with the short tubing lengths permitted by the autosampler design greatly reduces solvent consumption.

Test Methods Supported
- JOAP analyses for lubricating and hydraulic fluids
- ASTM® E2412 direct trending and differential methods
- PerkinElmer reference-spectrum methods for mineral and synthetic lubricants and hydraulic fluids
- Dedicated methods for turbine oils

Flexible sample presentation
It’s often desirable to present the sample to the system directly from the sample bottle to reduce sample preparation. With OilExpress this is no problem since up to 30 standard 4 oz sample bottles can be placed on the autosampler at a time. The sample tray simply lifts off so the operator can prepare and enter data for the next tray while the current batch is being processed.

Alternatively, to run a large number of samples unattended, test-tube strip racks allow the autosampler to accommodate up to 240 test-tube vials. The sample presentation options are shown in Figure 2.
**OilExpress can measure:**

- Water
- Soot
- Fuel
- Ethylene Glycol
- Sulfation
- Nitration
- Oxidation
- Phosphate antiwear
- Phenolic antiwear
- Any other properties by user calibration – e.g. TAN, TBN

**Dedicated software**

The application specific OilExpress software meets the specific requirements of oil condition monitoring. For the non-spectroscopist, there is no need to learn a ‘free-style’ software package, so training and start-up costs are significantly reduced. Using a standard Microsoft® Outlook® ‘look-and-feel’, the software guides the user with a series of intuitive, wizard-style interfaces. Additionally, the on-line tutorial and context sensitive help ensures even the most inexperienced operator will find the Spectrum OilExpress system easy to use.

**Oil condition monitoring made easy**

After a measurement it’s essential to obtain immediate diagnostic information on the analyzed oil and the engine from which it came. OilExpress is built on a Microsoft® Access® SQL database, which simplifies querying of results files and provides full data-management capabilities such as archiving and back-up.

**Flexible analysis algorithms**

PerkinElmer is the only FT-IR vendor to support all industry standard oil analysis methods, including the absolute and reference oil protocols. Whether a laboratory is following the Joint Oil Analysis Protocol (JOAP), ASTM® Methods or traditional reference methods, OilExpress provides the preferred method protocol as standard. For the more demanding laboratories that may want to change or create their own methods, OilExpress software includes user configurable Direct Trending or reference methods. These methods can include Beer’s law calibrations and QUANT+ Chemometric models, and can use the JOAP or ASTM® methods as a starting point.

**Customization**

OilExpress provides considerable customization capabilities to meet specific laboratory needs. Translation of the software into a local language is simple and can be performed by an administrator or supervisor. Additional data entry fields can be added to accept extra information about each sample. This data can be stored with the FT-IR results to provide a complete profile of each sample.
Complete confidence in results

OilExpress incorporates unique technology to ensure the FT-IR spectrometer consistently delivers optimum performance allowing comparison and correlation of results across systems and laboratories. For example, the spectrometer includes the patented AVI (Absolute Virtual Instrument) routine, which standardizes instrument response characteristics to ensure consistency between systems. Additionally a suite of system suitability tests is built-in to ensure optimum performance during day-to-day operation.

These include checks for cell contamination and repeated monitoring of cell path length and throughput.

Lower cost of ownership

As well as lowering the cost-per-analysis, OilExpress lowers the costs of maintaining the system. For example, the syringe pump design provides reproducible sampling for years without replacement, unlike peristaltic pumps, which are prone to wear leading to variations in pumping speeds and the potential for solvent leaks.

A total oil analysis solution

Only PerkinElmer can supply oil condition monitoring systems based on FT-IR, gas chromatography (GC), thermogravimetric analysis (TGA) and inductively coupled plasma optical emission spectroscopy (ICP-OES) technologies. The ICP-OES system provides a total solution for the measurement of wear metals and additives to perfectly complement the oil contaminants, oxidation and nitration products monitored by FT-IR.

Global service and support

PerkinElmer offers unrivalled global service and support. This includes on-line and telephone support and a wide variety of preventative maintenance and service agreements tailored to your exact needs.