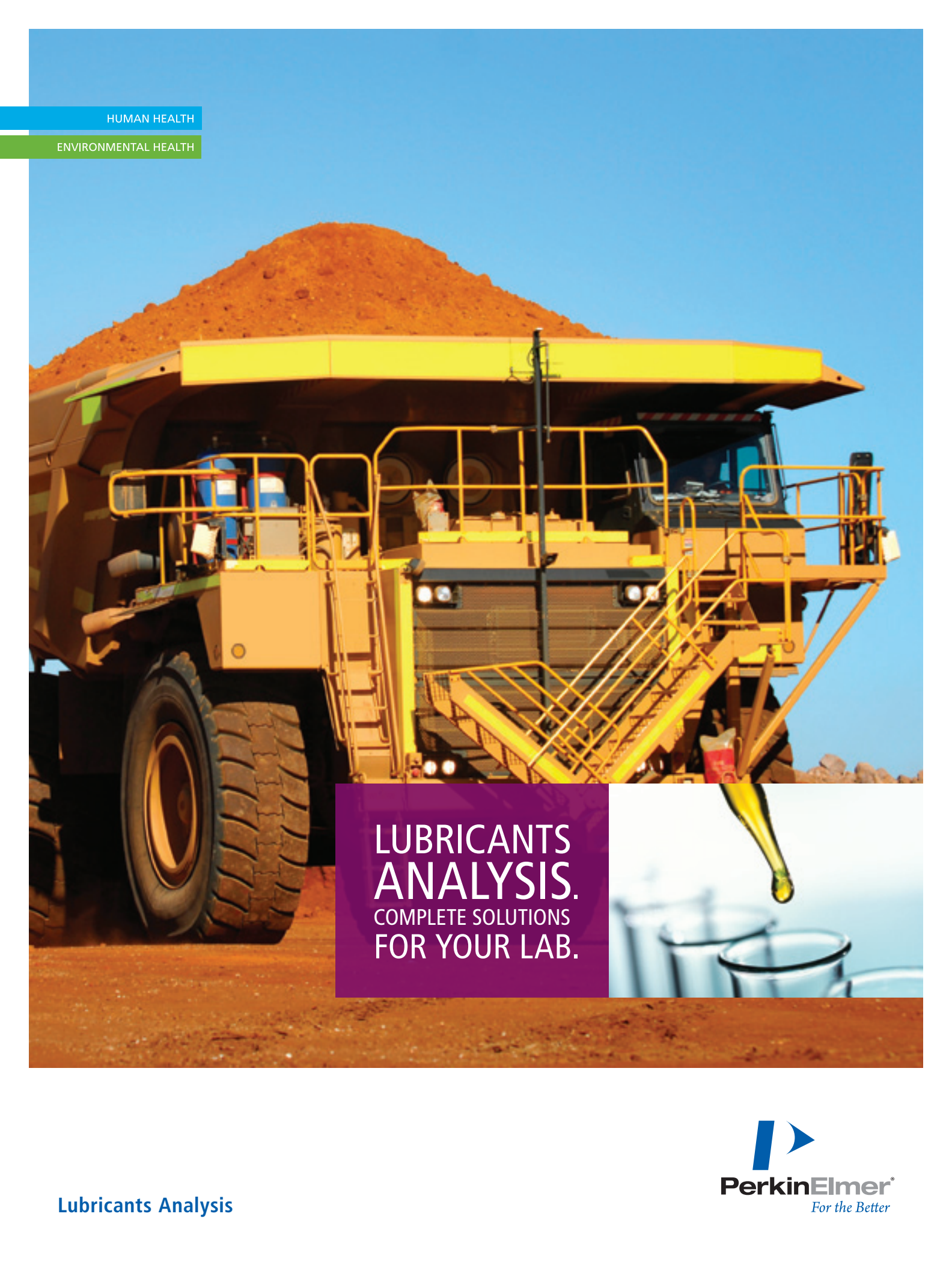


HUMAN HEALTH

ENVIRONMENTAL HEALTH



LUBRICANTS
ANALYSIS.
COMPLETE SOLUTIONS
FOR YOUR LAB.

Lubricants Analysis



PerkinElmer[®]
For the Better



RUN MORE
SAMPLES
RUN MORE
SMOOTHLY



PARTNER WITH A PROVEN LEADER

As a pioneer and world leader in lubricants analysis, PerkinElmer has been providing fast, robust, easy-to-use solutions since 1965. By leveraging our industry experience and partnering with global organizations like ExxonMobil™ and Caterpillar®, we offer customers a unique level of understanding, commitment and expertise.

Answering the Changing Needs of the Industry

With throughput demands continually increasing, and an ongoing need for more detailed sample information, PerkinElmer systems are setting the standard for speed and productivity in all areas of lubricants analysis:

- Wear metals analysis
- Oil condition monitoring
- Confirmatory testing

Modular and scalable, each solution can adapt as your needs change—no matter what the size of your organization or the demands of your application.

A Single, Complete, Integrated Solution

Cutting-edge instrumentation



Quality consumables



Maintenance and repair for
equipment from all manufacturers



Training



Advanced business
intelligence services



Minimized costs and
maximized productivity

Trusted Across the Board

PerkinElmer technologies are used to analyze more than 20 million lubricant samples each year across a variety of fields:

- Aircraft and large ships
- Power generation
- Heavy equipment
- Mining
- Lumber



Flexibility. Simplicity. Assurance.

Running an analysis and obtaining quality data is quick and easy with an array of built-in plug-and-play methods and protocols, including:

- ASTM®
- JOAP
- Turbine Oil
- Custom/User-defined

WEAR METALS ANALYSIS

Minimize Equipment Downtime with the OilPrep 4 Oil Diluter and Optima 7300 V or 8300 ICP-OES

Benefits of the Analysis

- Provides advance warning of wear problems before component failure and breakdown
- Reduces the need—and expense—for regular equipment dismantling and inspection
- Lowers costs by extending the life of replaceable fluids
- Minimizes unexpected operational downtime
- Reduces waste and environmental impact

Highlights of the System

Fast, robust solution delivering excellent data:

OilPrep™ 4

- Precise, reproducible dilution across a range of oil products
- Upgradable to include FTIR analysis

Optima™ 7300 V ICP-OES

- Vertical torch ensures fast, stable operation, dependable results and a low cost per analysis

Optima 8300 ICP-OES

- Flat Plate™ plasma technology uses half the argon of load-coil systems while generating the same robust plasma

OilPrep 4 Oil Diluter—Rapid, Fully Automated Oil Dilution

OilPrep Varispan Technology

automatically adjusts probe spacing for multi-tipped processing of samples in different vessel types.

Automated Multi-Channel Design

can dilute more than 2000 samples in eight hours, significantly outperforming manual or single-tip systems.

Disposable Pipette Tips minimize cross-contamination, helping to avoid false-positives with reduced solvent waste by eliminating the wash steps.



Innovative Ultrasonic Liquid-Level Detector allows unattended dilution of samples of different volumes, unaffected by viscosities, colors or ambient lighting.

ROUTINE METALS ANALYSIS

| Metal Present | What It Could Mean |
|---------------|--------------------|
|---------------|--------------------|

Wear Metals

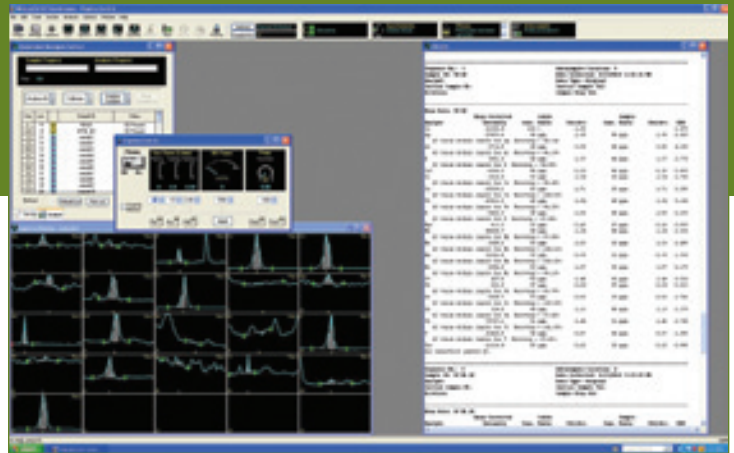
| | | |
|----------|------------|----------------------------------|
| Aluminum | Molybdenum | Wear within the engine or system |
| Antimony | Nickel | |
| Cadmium | Silica | |
| Chromium | Silver | |
| Copper | Tin | |
| Iron | Titanium | |
| Lead | Vanadium | |

Contaminant Metals

| | | |
|-----------|---------|--|
| Boron | Silicon | Oil contaminated by dirt or antifreeze |
| Potassium | Sodium | |

Additive Metals

| | | |
|-----------|-------------|--|
| Barium | Phosphorous | Depleted levels may undermine lubrication effectiveness and lead to wear |
| Calcium | Zinc | |
| Magnesium | | |



Software at a Glance

WinPREP® and WinLab32™ software packages offer:

- Built-in lubricant methods for fast, easy operation
- Simple custom method development
- Flexibility to work with various vessel types (vials, bottles, tubes)

Optima Series ICP-OES—Fast Measurement of Additives and Wear Metals in Oil



Advanced Optical System

simultaneously measures across the entire wavelength (UV and visible), collecting data on more than 73 elements in a matter of seconds for exceptional sample throughput. Engineered with no moving parts for minimal maintenance and reliable long-term performance.

Optional Sampling Valve

enables fastest ICP analysis times, as little as 25 seconds per sample.

Vertical Torch Design minimizes routine maintenance by limiting carbon build-up (7300 V model).

Baffled Cyclonic Spray Chamber and Low-Flow GemCone™ Nebulizer deliver robust, reliable, trouble-free operation.

OIL CONDITION MONITORING

Optimize Your Oil Testing Knowledge with the OilExpress 4 and Spectrum Two IR

Benefits of the Analysis

- Provides early warning of lubricant failure through contamination (soot, water, glycol, unburned fuel), degradation (caused by oxidation, nitration, sulphur compounds or ester breakdown) or additive depletion
- Optimizes interval between oil changes by monitoring trending data
- Minimizes equipment downtime
- Maximizes service life of machinery

Highlights of the System

A rugged, scalable, high-throughput solution offering exceptional productivity and multiple built-in methods (including ASTM compatibility) for easy-to-interpret results:

OilExpress™ 4

- Fast, automated operation allows oil condition monitoring of up to 100 samples per hour for all types of lubricants
- Minimized wash solvent usage (3mL/analysis)

Spectrum Two™

- Compact, portable design for on-site analysis
- ASTM and JOAP methods allow the generation of industry-standard results in minutes
- Unique humidity shield (OpticsGuard™) ensures reliable operation in challenging environments

OilExpress 4—Fully Automated System that Delivers Maximum Throughput

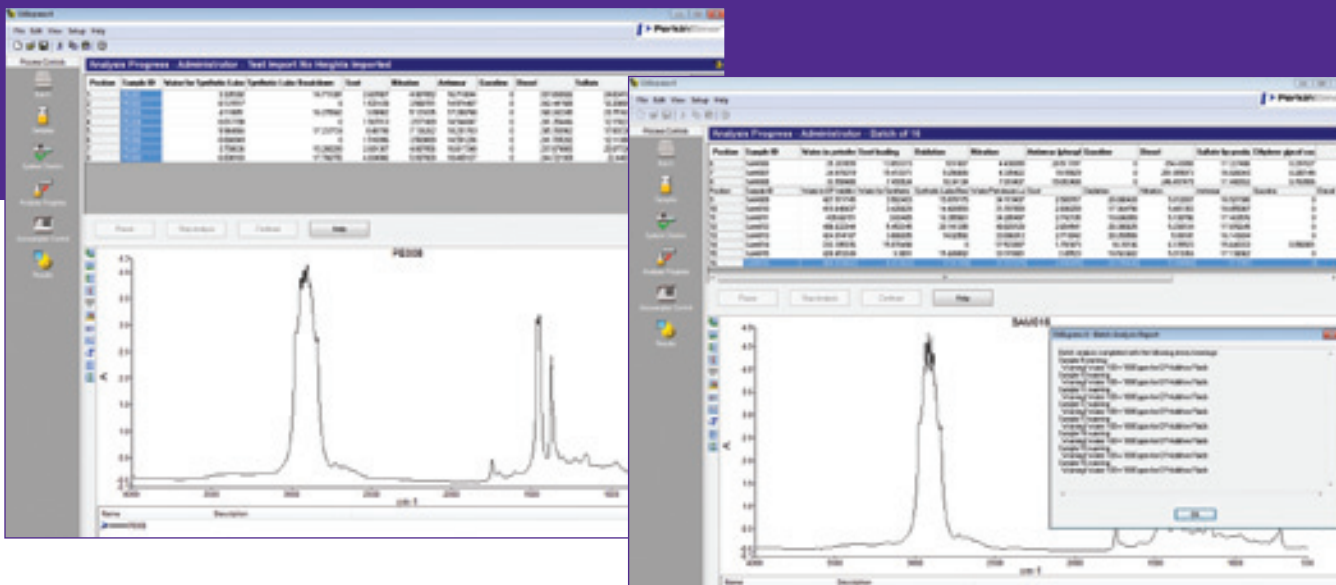
Precision, Vacuum-Assisted Syringe System accurately dispenses samples of varying viscosities (up to 1000 cSt @ 40C) and operates far faster and more reliably than peristaltic pump systems.

Disposable Tips avoid cross-contamination and eliminate time-consuming cleaning procedures.

Innovative Shuttle Station automatically obtains background reference IR spectra for faster, more accurate results.



Built-In Sensors ensure fast fill times and efficient operation by reading everything from sample heights to system pressures and waste overflow.



Software at a Glance

Application-specific software and Spectrum 10™ systems provide:

- Simplified data collection, processing and results generation through an intuitive, wizard-style interface
- LIMS import/export capabilities
- Full data management capabilities, including archiving and backup
- Standard and user-configurable methods including Beer's Law, PCR and PLS chemometric models for analytes like TBN

Spectrum Two—High Performance FTIR with Compact Design



Absolute Virtual Instrument™ (AVI) allows data to be transferred precisely between instruments whether they're next to each other or in different remote locations.

Atmospheric Vapor Compensation (AVC) allows the instrument to compensate for CO₂ and H₂O absorption in real time. By effectively eliminating these interferences—as well as the need to purge your instrument—AVC enables more consistent and reliable results.

Field-Proven, Fixed-Mirror Dynascan™ Interferometer eliminates the dynamic alignment required to offset the errors of moving mirror systems. Delivers unmatched longevity and reliability with a simple, non-critical bearing.

Optional In-Service Lubricants Application Pack allows for manual oil analysis.

CONFIRMATORY TESTING

Quantify Fuel and Coolant Contaminants in Oil with the TurboMatrix HS and Clarus 580 GC

Benefits of the Analysis

- Provides deeper, more specific insights into the state of your oil
- Quickly confirms presence of potentially damaging compounds
- Offers precise results on fuel or coolant contamination levels
- Allows more precise and effective scheduling of preventative maintenance

Highlights of the System

A fast, simple, rugged and reliable turnkey solution that delivers ultimate productivity, versatility, sensitivity and analytical precision:

TurboMatrix™ Headspace Autosampler

- Simultaneous, automated 12-sample thermostating for faster analysis times and dramatic cost savings
- Automated, unattended processing of up to 110 vials for exceptional sample throughput

Clarus™ 580 Gas Chromatograph

- Fastest injection-to-injection time boosts productivity and increases return-on-investment
- Unique PreVent backflush technology provides fastest fuel analysis
- Robust, integrated liquid autosampler provides reliability with extremely small sample sizes

TurboMatrix Headspace—Reliable and Robust Coolant Determination

Innovative Pressure-Balanced Time-Based Sampling provides superior precision and more reproducible results.

Fully Automated Sampling with Programmable Shutdown and Wakeup Modes enables unattended operation, keeping your laboratory running after hours and on weekends.

Touch-Screen Graphical User Interface makes it fast and easy to perform everything from reviewing methods to setting parameters and initiating an analysis.

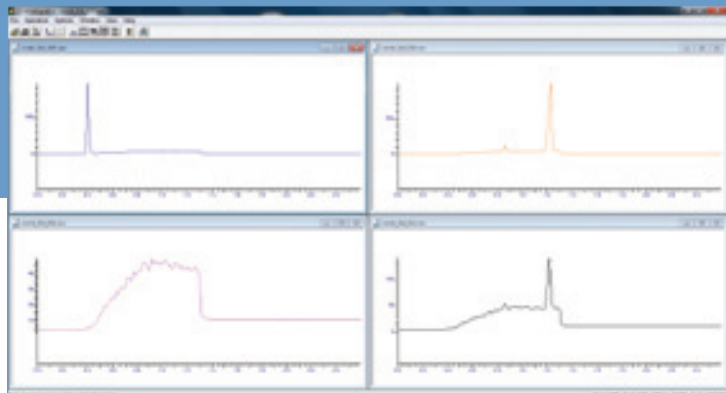
12-Position Oven delivers uniform heat distribution for precise thermostating and higher throughput.



Setting Standards with Turnkey Solutions

Working closely with customers and industry groups, PerkinElmer is constantly looking for ways to improve, create and facilitate new methods. Currently under review at ASTM are the following methods that take advantage of the PerkinElmer system:

- Ehtylene Glycol in In-Service Lubricants by Headspace Gas Chromatography
- Determination of Fuel Dilution for In-Service Engine Oils by Gas Chromatography



Software at a Glance

Award-winning, scalable TotalChrom® Chromatography Data System offers:

- Turnkey fuel and coolant methods
- Easy and intuitive data generation and management
- Customized data reporting and presentation capabilities
- Ability to run multiple GCs from a single computer

Clarus 580 Gas Chromatograph—Simple and Flexible Turnkey Fuel Analysis



Single-Channel or Dual-Channel Configurations give you the flexibility to perform fuel or fuel and coolant analysis.

Intuitive Full-Color Touch-Screen Interface that features real-time signal display and eight-language support (English, Spanish, French, Italian, German, Russian, Japanese, and Chinese) to reduce learning curve and speed routine interaction.

PreVent™ Micro Channel Flow Technology provides high-speed analysis time.

Temperature-Programmable Injectors and Programmable Pneumatic Control (PPC) minimize downtime and simplify even the most complex analyses.

PERFORMANCE OPTIMIZATION

Get the Most Out of Your Instrumentation—and Your Business—with a Tailored Array of Consumables, Informatics and Laboratory Services

As a recognized leader in the world of analytical instrumentation, PerkinElmer brings more than 60 years of experience to the lubricants industry. We understand the unique challenges you face, and we provide the most comprehensive and customized solutions to help you optimize your lab operations. It's more than just cutting-edge instrumentation and turnkey systems. It's a complete range of consumables designed expressly for lubricants analysis; a full suite of informatics technologies to help you manage your data; and the most comprehensive worldwide service and support network that can free you up to focus on what matters most—results.

Quality, Robust Consumables for Reliable Results

To complement the array of specialized technologies shown throughout this brochure, PerkinElmer offers a broad range of consumables designed to meet the demands of the most challenging lubricants analysis applications:



Extended-life Organics Torch

Designed specifically for the Optima 7300 V ICP-OES, the extended-life Organics Torch lasts up to three times longer than standard torches, enabling you to dramatically reduce maintenance and operating costs.

High Quality Autosampler Tubes

With a wide variety of volumes, pack sizes, and styles (round-bottom, conical and freestanding), PerkinElmer autosampler tubes are ideal for virtually all lubricant analysis applications. Manufactured from the highest quality plastic, each tube ensures reliable results in AA, ICP-OES and ICP-MS autosamplers.



Certified Metallo-Organic Standards

To streamline and simplify oil analysis and assure the quality of your results, PerkinElmer offers a broad selection of Metallo-Organic Standards. These include calibration and verification standards for the analysis of lubricant additives, new and in-service lubricants, petroleum products and organic fluids. Prepared and certified under ISO 9001, ISO Guide 34 and ISO/IEC 17025, each product must pass stringent quality controls and is accompanied by a comprehensive Certificate of Analysis with actual concentrations.



Integrated Informatics to Enhance the Accessibility and Usability of Data

Lubricants analysis laboratories produce enormous amounts of digital data that need to be sorted, analyzed, visualized and shared. To help you accelerate the flow and exploitation of information throughout your organization, PerkinElmer provides some of the industry's most advanced and innovative informatics technologies:

iLAB LES—Purpose-built for QA/QC laboratories, this proprietary solution integrates people, procedures and lab systems to reduce the time spent on manual activities, data review and rework. Laboratory personnel can focus on processing lubricant samples as quickly and efficiently as possible, increasing capacity and reducing operational costs.

LABWORKS LIMS—A robust Laboratory Information Management System, LABWORKS accommodates high volumes of testing requirements, adapts to your laboratory workflows and helps ensure that process and production problems are identified and resolved before they become costly. The system manages time, resources and risk with a flexible, configurable design that lets you avoid lengthy customization requirements for fast implementation and instant benefits.

LimsLink—An invaluable tool for lubricants analysis labs of all sizes, LimsLink reduces the errors and costs associated with manual data management by ensuring that sample information and results are accurately and efficiently transferred between instruments, instrument data systems and informatics systems in real time.

E-Notebook for Formulations—Document your analyses and leverage the knowledge gained from previous experiments using the system's workflow support functionality, specialized calculations and units, analysis, reporting and ELN capabilities.

The World's Most Complete Laboratory Services for Increased Productivity and Efficiency

With PerkinElmer OneSource, your lubricants analysis lab can take advantage of the world's most experienced laboratory services provider. Behind the industry's most comprehensive offering of services is a global team of engineers providing a unique level of technical support and scientific expertise.

Far beyond the traditional model of a laboratory services company, OneSource becomes an integral part of your business, a partner focused on delivering superior flexibility, customizability and profitability.

Not only do we offer the convenience and cost efficiencies of a single, consolidated care and repair program for all your instrumentation. We also focus on the operational issues you face every day, streamlining workflows, consulting on scientific challenges, even supporting the computer systems behind your instruments.

Discover the most integrated approach in the industry. And take advantage of the ideal set of tools to optimize the operation of your lubricants analysis lab.

OneSource Laboratory Services

- Business intelligence solutions
- Science and laboratory IT services
- Instrument service and repair
- Regulatory compliance
- Method services
- Asset procurement and disposition
- Relocation services
- Training



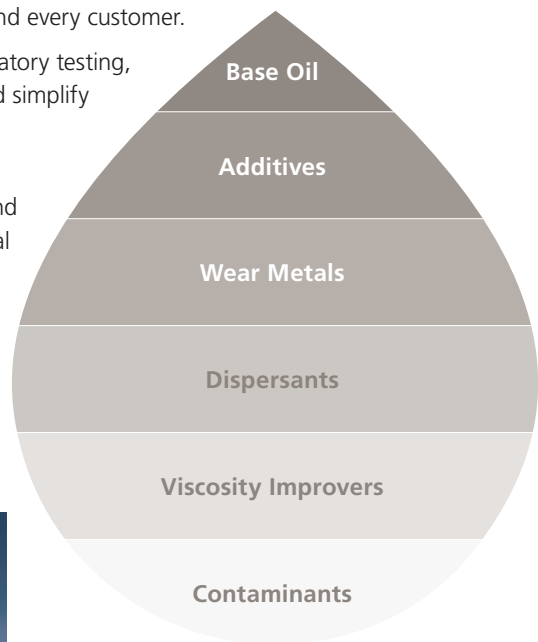
COMPLETE SOLUTIONS FOR LUBRICANTS ANALYSIS

As your partner in lubricants analysis, PerkinElmer understands the unique demands of your applications, the challenges of your matrices, and the requirements of your industry. By offering the ideal combination of specialized technologies and knowledgeable people, we deliver the most complete, integrated, focused solution for each and every customer.

From wear metals analysis to oil condition monitoring and confirmatory testing, we provide the instruments and experience you need to speed and simplify every area of lubricants analysis.

Staying at the forefront of the industry requires a commitment to keeping up with ever-changing regulations and developing new and better ways to analyze lubricants. By partnering with leading global organizations and collaborating with customers, we're continually addressing specific needs, developing new methods, and creating innovative solutions.

For more information on how we can help you and your team efficiently analyze the specific samples in your lab, visit us at www.perkinelmer.com/lubricants



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