

OIL CONDITION MONITORING & WEAR DEBRIS ANALYSIS



Oil Condition Monitoring & Wear Debris Analysis | ASTM D8120 and D8184 Methods

Oil condition monitoring instruments detect, quantify, and characterize ferrous wear debris in used lubricating oils, hydraulic fluids, and greases, giving maintenance teams the data they need to identify abnormal wear before it becomes a failure. These instruments are used in predictive maintenance programs to trend debris levels across sampling intervals and guide corrective action decisions.

The range addresses three distinct layers of a monitoring workflow. Fast magnetometry-based meters give ppm or PQ index readings in seconds. Particle quantifier instruments deliver standardized PQ index measurements per ASTM D8184 with high sensitivity and traceable results. Analytical ferrograph systems separate debris from oil, deposit it on a ferrogram substrate, and support microscopy-based particle morphology review for wear mode identification that bulk quantitative readings cannot provide.

Why Choose Torontech for Your Oil Condition Monitoring Instruments

Torontech supplies testing and measurement equipment to laboratories and manufacturers across North America and worldwide, backed by responsive technical support and calibration service. The Oil Condition Monitoring & Wear Debris Analysis range is built for reliable, standards-driven results, so you can standardize on one supplier as your testing needs grow. Our team helps you match the right configuration to your samples, applicable standards, and throughput, then supports you through installation and beyond.

Request a Quote

Tell us your sample type, target debris level, and the depth of analysis your maintenance program requires, and we will recommend the right instrument. [Contact the Torontech team](#) for pricing, configuration details, and delivery timelines.

APPLICATIONS

Applications

Oil condition monitoring and wear debris analysis instruments are used across industries where lubricated machinery health directly affects uptime and operating cost.

- **Industrial Plant Maintenance:** trends ferrous debris in hydraulic oil, gearbox lubricant, and compressor oil to detect early wear and plan maintenance before unexpected failures.
- **Mining and Heavy Equipment:** monitors drive trains, gearboxes, and hydraulic systems on high-cycle machines where unplanned downtime carries significant cost.
- **Power Generation:** tracks debris in turbine lube oil and generator bearings, helping reliability engineers detect bearing or gear distress before a forced outage.
- **Marine and Offshore Operations:** evaluates engine oil, gearbox fluid, and hydraulic condition on vessels where on-board diagnostics reduce reliance on shore-based labs.
- **Aerospace and Defense:** supports oil analysis programs on aircraft engines and military platforms where early wear detection is tied to airworthiness and mission readiness.
- **Oil Analysis Laboratories and Tribology Research:** provides quantitative wear indices and morphological particle data to support client reporting, fleet programs, and wear mechanism studies.

TECHNICAL SPECIFICATIONS

Oil Condition Monitoring & Wear Debris Analysis Range

Three instrument families cover the range from fast on-site ferrous screening to complete laboratory-based analytical ferrography.

Ferrous Wear Meter (ToronFWM™ Series)

The ToronFWM™ series measures ferromagnetic wear debris in used oil by magnetometry, reporting ppm results in under two seconds. The ToronFWM™ 2500 covers 0 to 2500 ppm at 5 ppm resolution; the ToronFWM™ 3500 reaches 0 to 3500 ppm at 1 ppm resolution with embedded data storage and USB export. Both follow ASTM D8120 and D8184 measurement principles and suit maintenance teams running frequent checks at onboard or remote locations where full laboratory testing is not practical.

Particle Quantifier Instrument (ToronPQI™ Series)

The ToronPQI™ series quantifies ferrous debris in oil via magnetic flux disturbance, reporting a standardized PQ Index per ASTM D8184. All three models cover 0 to 15,000 PQ at ± 4 PQ or $\pm 1\%$ repeatability, detecting ferromagnetic particles from 1 μm upward in a 7-second test cycle with no sample preparation. The ToronPQI™ 1000 suits standard lab use, the 2000 adds adjustable sample volume control, and the 3000 offers battery-powered portable operation with a large touchscreen for field deployment.

Ferrograph Systems (ToronFG™ Series)

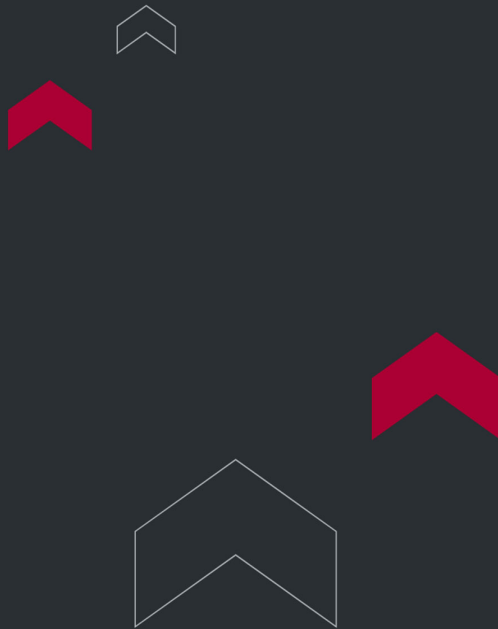
The ToronFG™ series provides the full analytical ferrography workflow, from quantitative direct reading and dual-channel ferrogram preparation through to microscopy-based particle morphology review and structured reporting. Eight sub-systems span varying levels of automation, lab-based and portable configurations, and dedicated image acquisition and analysis software, enabling wear mode identification and root cause diagnosis that ppm and PQ index readings alone cannot support.

How to Choose the Right Oil Condition Monitoring Instrument

- **For fast routine ferrous screening at maintenance intervals or remote locations:** choose the ToronFWM™ Ferrous Wear Meter for 2-second ppm readings using a simple tube-based workflow.
- **For standardized, traceable PQ index quantification per ASTM D8184:** choose a ToronPQI™ model — the 1000 for standard lab screening, the 2000 for variable sample volumes, or the 3000 for portable battery-powered field use.
- **To identify wear particle type, morphology, and probable wear mode through analytical ferrography:** choose the ToronFG™ Ferrograph system, pairing direct reading screening with dual channel ferrogram preparation and

microscopy-based diagnosis.

- **To build a tiered monitoring program:** use ToronFWM™ or ToronPQI™ instruments for frequent screening, then deploy the ToronFG™ for in-depth investigation when trends shift or an anomaly requires root cause confirmation.



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