



FOUR-BALL TRIBOLOGY TESTING

Four-Ball Tribology Testing

The four-ball test is the most widely used tribological method for evaluating the lubrication performance of oils, greases, and additives under conditions of extreme pressure and boundary lubrication. By pressing three stationary steel balls against a fourth rotating ball in the test lubricant, the four-ball tribology tester creates controlled contact stress conditions that reveal a lubricant's ability to protect metal surfaces from wear and welding — fundamental data for lubricant formulation, quality control, and specification compliance.

Torontech offers the most complete four-ball tribology tester portfolio available — from classic manual four-ball testers to fully automatic friction and wear tribometers with real-time data acquisition. Whether measuring extreme pressure (EP) properties, wear scar diameter, friction coefficient, or weld load, Torontech's four-ball range delivers the tribological data needed for comprehensive lubricant performance evaluation.

APPLICATIONS

Application

Four-ball tribology testing is applied throughout lubricant development, quality control, and specification programs:

- Gear oils and transmission fluids: Extreme pressure performance evaluation per ASTM D2783 (weld load, load-wear index) is a mandatory requirement for automotive and industrial gear oil specifications.
- Grease and specialty lubricants: Four-ball wear test (ASTM D2266 / IP 239) and EP test (ASTM D2596) for grease evaluation are standard methods in NLGI grease certification and OEM approval programs.
- Engine oil and crankcase lubricants: Four-ball wear scar testing provides data on boundary lubrication performance and anti-wear additive effectiveness in engine oil formulations.
- Hydraulic fluids: Anti-wear and extreme pressure performance verification for hydraulic fluid specifications including DIN 51524, ISO 11158, and OEM-specific approvals.

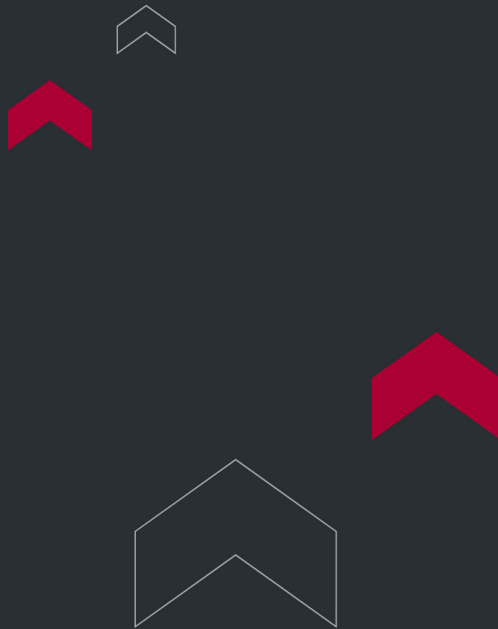
- Cutting fluids and metalworking lubricants: Four-ball tribology data characterizes the EP and lubricity performance of metal cutting, forming, and drawing lubricants.
- Additive development and screening: Friction and wear tribology data from four-ball tests enables rapid screening of anti-wear, extreme pressure, and friction modifier additive candidates during lubricant formulation development.
- Research and academic tribology: Torontech's automatic four-ball tribometer with real-time friction coefficient measurement supports fundamental tribological research programs.

FEATURES

Why Choose Torontech's Series for Your Four-Ball Tribology Testing?

Torontech's four-ball tribology tester portfolio offers the broadest capability range in the industry:

- Complete Range from Classic to Advanced: From the Toron4BT™-1000 manual four-ball tester for standard EP and wear testing to the fully automatic Toron4B10A™ tribometer with real-time friction force measurement and data acquisition — Torontech covers every four-ball testing requirement.
- Automatic Operation for Precision: Torontech's automatic four-ball wear tester and Toron4B10A™ tribometer eliminate operator variability in load application, speed control, and timing, delivering more reproducible results than manual configurations.
- Integrated Grinding Spot Analysis: The Toron4BGS™ four-ball grinding spot measurement system provides automated wear scar diameter measurement, eliminating the manual optical measurement step and delivering objective, digital wear scar data.
- Standards Compliance: Torontech's four-ball tribology testers are designed for compliance with ASTM D2783, D4172, D2266, D2596, IP 239, DIN 51350, and related international lubricant tribology standards.
- Real-Time Tribology Data: The Toron4B10A™ automatic four-ball tribometer provides real-time friction coefficient and wear data throughout the test, enabling detailed analysis of lubrication regime transitions and additive performance dynamics.



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