

HIGH-SPEED END-FACE TRIBOMETER



High-Speed End-Face Tribometer - ToronTribo™ HS

High-speed end-face tribometer evaluates sliding friction and wear performance at elevated rotational speeds, serving seal manufacturers, materials laboratories, and component developers working with high-speed rotating equipment. The ToronTribo™ HS presses two flat end faces together under a controlled normal force and rotates one against the other at speeds well beyond typical end-face testers, reproducing the demanding sliding conditions found in high-speed seals and rotating machinery components.

The tester applies a normal force range of 20 to 2000 N with a maximum friction torque of 20 N·m, and drives the spindle from 100 to 5800 rpm with stepless speed regulation for precise velocity control across the entire range. Surface temperature is monitored up to 300°C, while a circulating oil tank controls test temperature from room temperature up to 200°C, letting engineers evaluate combined high-speed and elevated-temperature contact conditions. Microcomputer control integrates industrial computer technology, modular data acquisition, and network communication, with system software monitoring the test in real time and recording all relevant parameters and curves throughout the run.

Seal manufacturers, materials researchers, and component developers use the ToronTribo™ HS to characterize how face materials and lubricants perform under sliding velocities that exceed the range of standard end-face testing equipment. The combination of high speed and controlled oil temperature makes it suited to evaluating components intended for high-RPM rotating machinery where standard-speed testing would not reveal velocity-dependent wear behavior.

APPLICATIONS

High-Speed End-Face Tribometer - ToronTribo™ HS Applications

The ToronTribo™ HS supports friction and wear evaluation for face-to-face rotating contacts operating at elevated sliding speeds.

- High-Speed Mechanical Seal Testing: evaluates seal face material performance under sliding velocities representative of high-RPM rotating equipment
- Turbomachinery Component Material Testing: assesses wear resistance of materials used in pumps, compressors, and turbines operating at high rotational speeds
- High-Speed Bearing and Thrust Face Testing: characterizes friction and wear behavior of thrust-bearing face materials under demanding speed conditions
- Lubricant Performance at High Sliding Velocity: measures how lubricants and circulating oil systems perform at elevated rotational speeds and controlled temperature
- Spindle and Rotating Shaft Seal Development: supports development of seal materials for high-speed spindles and rotating shaft applications
- Automated Test Data Research: supports research programs requiring continuous computer-monitored data acquisition across long or repetitive high-speed test series
- Material Velocity Sensitivity Studies: investigates how sliding velocity affects friction coefficient and wear rate independent of load or temperature changes



FEATURES

High-Speed End-Face Tribometer - ToronTribo™ HS Key Features

The ToronTribo™ HS combines a wide, stepless speed range with integrated temperature control and automated data monitoring.

- High Maximum Speed: reaches spindle speeds up to 5800 rpm with stepless speed regulation for precise velocity control across the full range
- Elevated Surface Temperature Monitoring: tracks surface temperature up to 300°C, giving direct insight into thermal conditions generated at the contact
- Circulating Oil Temperature Control: maintains test oil temperature from room temperature up to 200°C for controlled thermal test conditions
- High Friction Torque Capacity: measures friction torque up to 20 N·m, suited to higher-load, higher-speed face contact conditions
- Microcomputer Process Control: integrates industrial computer control, modular data acquisition, and network communication for full test automation
- Real-Time Monitoring and Recording: tracks and records test parameters and curves continuously throughout each run without manual data logging

THEORY & METHOD

Theory and Method

End-face friction and wear testing evaluates materials using a face-on-face contact geometry, in which two flat surfaces press together under axial load while one surface rotates relative to the other. Sliding velocity at the contact interface increases directly with rotational speed, and as velocity rises, the contact can shift from boundary lubrication, where direct asperity contact dominates, toward mixed or hydrodynamic lubrication, where a fluid film increasingly separates the two surfaces. This shift changes both the friction coefficient and the wear mechanism at play, which is why velocity is a key variable to control deliberately in face-contact testing.

The ToronTribo™ HS applies this principle through a stepless variable-speed spindle drive that reaches up to 5800 rpm, far exceeding the speed range of standard end-face testers. A torque sensor measures friction continuously as speed increases, letting engineers observe how a material pair transitions between lubrication regimes as sliding velocity climbs. The circulating oil tank maintains a controlled temperature at the interface throughout this process, so that any change in friction or wear behavior can be attributed to velocity rather than uncontrolled temperature rise from frictional heating.

Because heat generation at a sliding contact increases with both speed and friction, high-speed testing places additional demand on temperature control compared to lower-speed tests. Monitoring surface temperature separately from the circulating oil temperature lets engineers see how effectively the lubrication system manages heat at the contact as speed increases, information directly relevant to designing seals and rotating components that must maintain performance at sustained high rotational speeds.

TECHNICAL SPECIFICATIONS

High-Speed End-Face Tribometer - ToronTribo™ HS Technical Specifications

Parameter	Specification
Normal Force Range	20 to 2000 N
Spindle Speed Range	100 to 5,800 rpm, stepless speed regulation

Parameter	Specification
Surface Temperature Measurement Range	Room temperature to 300°C
Circulating Oil Tank Temperature Control Range	Room temperature to 200°C
Maximum Friction Torque	20 N·m
Standard Sample Size	Upper sample outer diameter < Φ120 mm, inner diameter < Φ110 mm; lower sample < Φ125 mm



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