



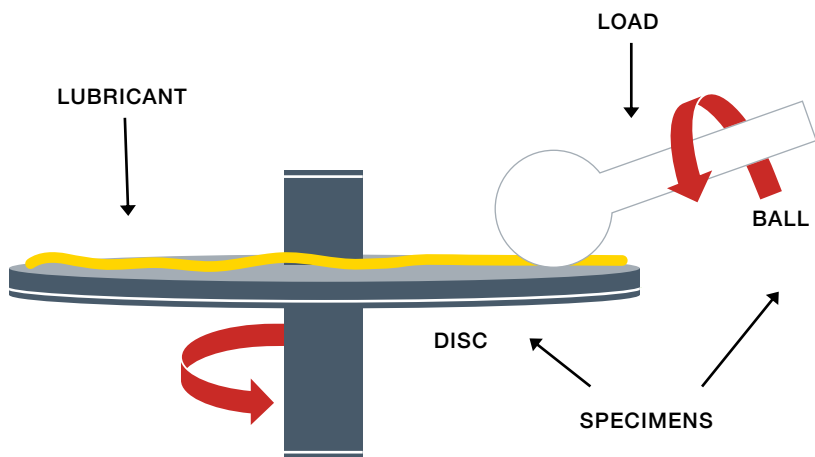
Ball-on-disc instrument for measuring the frictional properties of lubricated and unlubricated contacts under extreme pressures and a wide range of rolling and sliding conditions.

extreme

Launched in 2019, the ETM uses the same specimen geometry as the laboratory standard MTM. Using high precision components, the ETM allows testing up to 3.5 GPa with standard specimens in a compact, controlled environment.

The unique ball and disc set up enables mixed rolling and sliding conditions to be simulated. All three regimes (boundary, mixed and EHL) can be duplicated, whilst applying extreme load and realistic temperatures and speeds. The frictional properties of lubricants and additives can be analysed under realistic conditions for quick comparison between formulations.

**Contact Area Schematic**



**Current ETM applications:**

**Scuffing Resistance**

**Toroidal Traction Drives**

**Rolling Element Bearings**

**Mechanochemistry**

**E Mobility Fluid Development**



**Specimens**

Material: 52100 AISI Steel

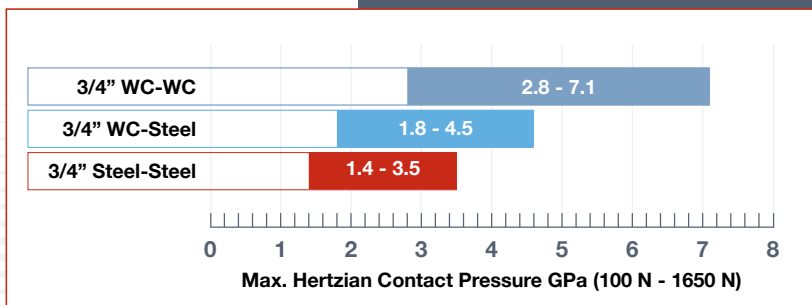
Readily available, single time use, ensuring highly accurate, repeatable results are produced every test.

Affordable specimen packs enable multiple samples to be analysed and compared for full optimisation of the lubricant, whilst keeping costs low.

Tungsten carbide (WC) alternatives are available for achieving pressures up to 7.1 GPa.



ETM Pressures using various material combinations



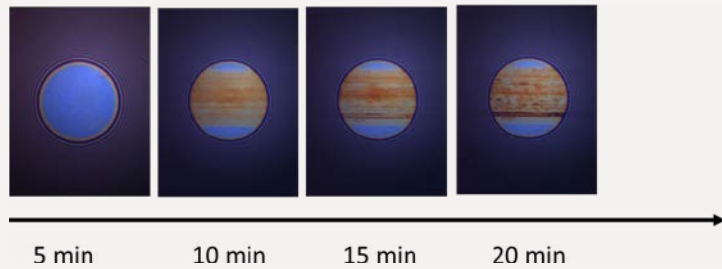


## ◀ SLIM

The SLIM has been specifically designed to automatically measure the additive film formation on the upper specimen at predefined intervals throughout the duration of a test. This allows a direct systematic comparison to be made between different additive packages.

Cutting edge research using the ETM SLIM has confirmed that, at high pressure, tribofilms can be formed under full fluid film conditions and that direct metal to metal contact is not necessarily a prerequisite to forming such films. The interaction of these protective films with other lubricant components can be studied over a wide range of conditions, giving experts improved understanding of the lubricants' performance under realistic operating conditions.

When used in tandem with the friction measurement, this provides a fundamental, real time picture of both the chemical and physical effects of the films formed in the contact.



## Fluid Extraction System (FES)

A sleek, stand-alone accessory for quick, safe removal of the lubricant and cleaning fluids after each test.



Operated immediately by one push of a button, the FES can contain approximately 20 lubricant samples before disposal is required.

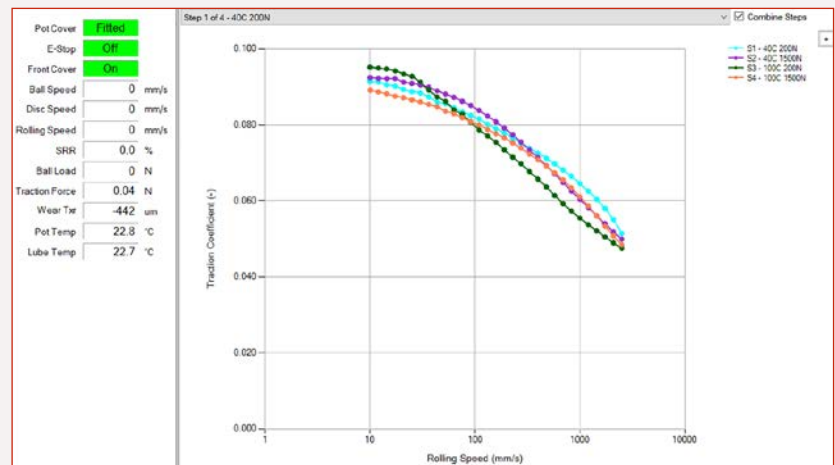
- Significantly reduces turnaround time between tests
- Improves ease of cleaning
- Reduces risk of spillage



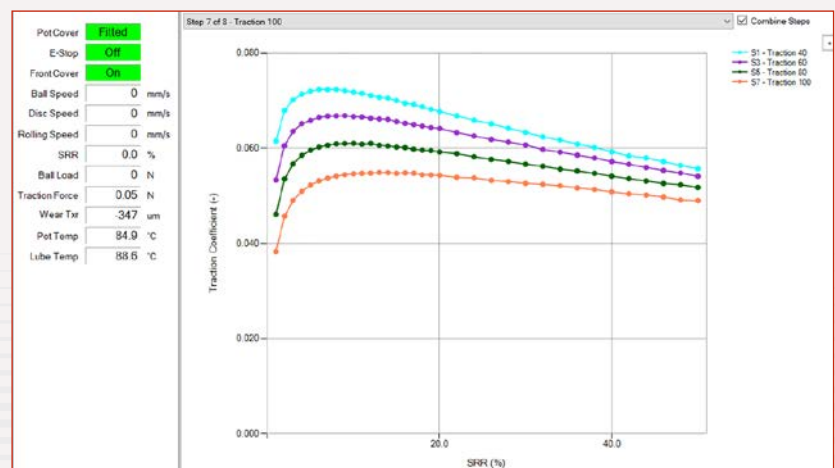
## Results:

Example results displayed on the ETM software at a range of loads, speeds and temperatures.

### ▼ Stribeck Profile, lubricant: 20w50



### ▼ Traction Profile, lubricant: mineral oil



## Technical Specification

The ETM system comprises a single integrated mechanical and electronic control unit, separate FES, cooler and power supply, and a PC with data logging software.

### Industries



#### TEST PARAMETERS

Load	100 to 1650 N
Contact Pressure	Up to 3.5 GPa using standard steel specimens Up to 7.1 GPa with alternative specimens
Speeds	Up to 3.5 m/s
Temperature Range	10 to 150 C*
Test Sample Volume	30 ml (10 ml with optional pot filler)

#### CONTROL SYSTEM

PC	Custom software running on Windows 10
Safety Checks	Dual platinum RTD's for temperature measurement, emergency stop button, safety switch on lubricant pot cover
Power Supply	100-240 V, 50/60 Hz, 1600 VA

#### DIMENSIONS & WEIGHT

Weight (Main Unit)	52 kg - 115 lb
Size ( h x w x d )	425mm/17in x 400mm/16in x 605mm/24in

\* subject to test conditions

For further information or a demo, please contact PCS Instruments on:  
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**www.pcs-instruments.com**