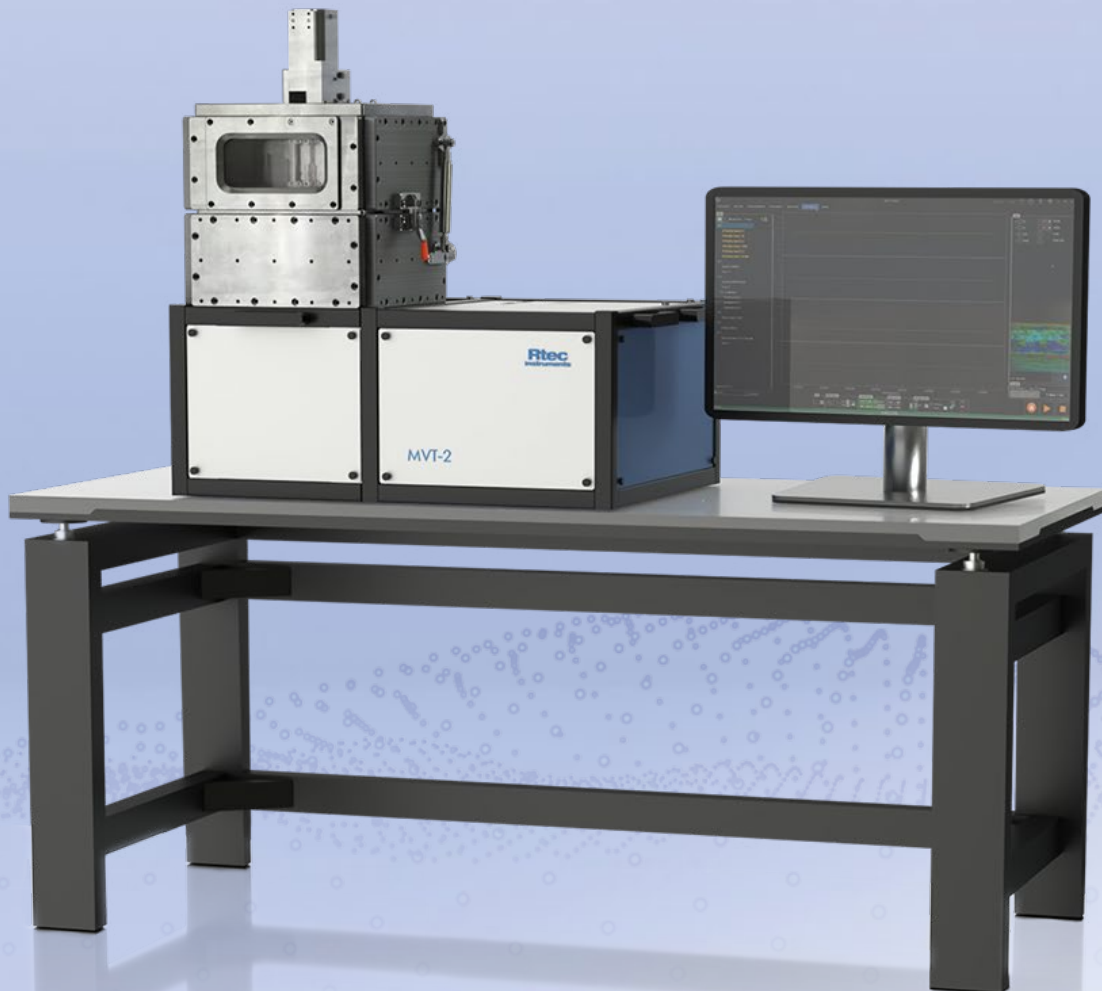




Multi Function Vacuum Tribometer

MVT-2



Wear, Friction, Coefficient of Friction, Adhesion,
Scratch Hardness, Modulus, High Temperature,
Cryogenic



Versatile Vacuum Testing

- Wear
- Friction
- Coefficient of Friction
- Hardness
- Adhesion
- Scratch Hardness

Environmental Control

Study properties under vacuum and a wide temperature range of -150 to 1000°C.

Closed-Loop Down Force Control - Nano, Micro, Macro Range

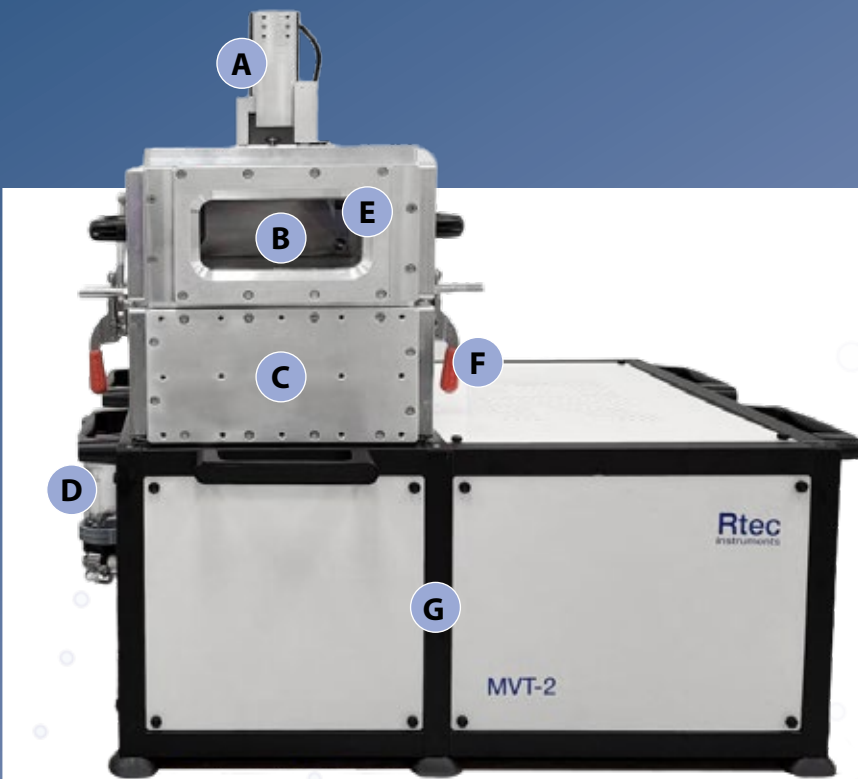
Patented capacitive sensors with a test range from mN to 200 N.

Rotary and Linear Motions

Tests can be performed using both rotary and linear modes.

System Design

The unique open-face system architecture allows for easy access and customization. It also allows for adding custom ports.



- (A) Upper Z Gantry
- (B) Force Sensor
- (C) Lower Test Module
- (D) Thermal Management
- (E) Linear System
- (F) Vacuum System
- (G) Data Acquisition, Motion Controller

Vacuum Tribology for R&D to QC

Why Vacuum Tribology?

Advancements in space, semiconductors, thin films, and 2D materials have resulted in several studies focused on material and coating properties under vacuum. Friction, wear, and adhesion of surfaces under vacuum are very different from ambient conditions.

The MVT-2 has vast force, speed, and test temperature ranges to analyze material properties under vacuum conditions. Our unique design with patented force sensors comes with easy wide front access, capable of generating data with high accuracy and repeatability. Run several standard friction, scratch, adhesion, hardness, lubrication, and wear tests on the same platform.

Active Feedback Loop Control

The tester comes with closed-loop active feedback controls over many channels. The applied force is controlled during the test using electro servo drives. The force is measured using high-precision force sensors with negligible drift. The tester can operate at constant or linear changing force profiles. The rotation speed is controlled using servo-controlled feedback. This allows tests at constant or changing RPM.

Environmental Control

The tester allows for environmental control under vacuum conditions. A single setup allows testing across a wide temperature range -150°C to room/400°C/ 1000°C. In addition, the design enables circulating gases during the test. MVT-2 is equipped

with water-cooled circulators and anti-condensation features for effective thermal management during the test. The advanced control system allows temperature measurement at multiple points simultaneously. The temperature is closed-loop controlled, and the requested conditions are controlled using the software automatically.

Accurate Determination of Failure Events

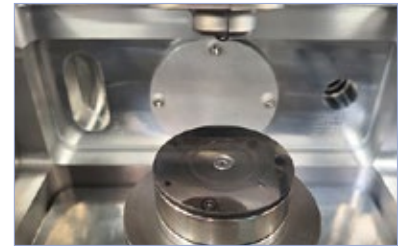
The tester can accommodate various in-line monitoring sensors to quantify real-time surface dynamics. For example, the acoustic emission sensor is a wide frequency sensor that detects crack initiation points during the test.

Ease of Use and Automation

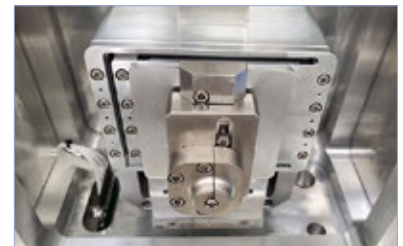
The instrument comes standard with a powerful set of software: from control to post analysis and imaging software. The data can export into many formats, including ASCII format. The software allows the user to stop the test using logic based on signals from several in-line sensors. Each test can be controlled by a series of command blocks forming a protocol or "recipe." The MVT-2 has advanced high speed, low noise, fast feedback, and multiple channel data acquisition rate controllers.

Applications

The versatility of the tester allows the MVT-2 to play an essential role in several applications. It can be used for thin or thick films, lubricants, materials, soft materials, hydrogels biomaterials, smooth or rough surfaces, transparent or opaque surfaces, nano or macro scale, coating or bulk materials, and more.



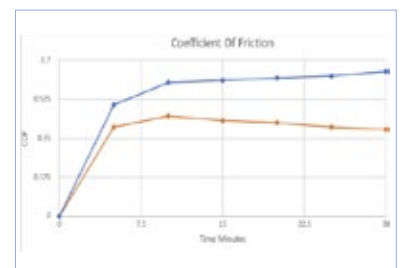
Coated Sample Test View



Force Sensor and Holder



Nitrogen Controller



Friction Comparison



Software Interface

Platform Specification

Platform

- Floor standing or bench top

Vacuum

- Up to 10^{-7} torr
- Rough and turbo molecular pump

Z Stage

- Max speed: 10 mm/s
- Motion resolution 0.25 μ m

Computer Console

- Latest Windows OS
- LCD monitor, printer

Facilities Requirement

- Power Requirements: 240 VAC

Environmental Chambers

- -150°C to Room/ 400°C/1000°C

Additional Sensors

- ECR

Various Mechanical Heads

- Tribometer
- Indentation
- Scratch

Load Range

- mN to 200 N (various ranges available)

Rotary Drive

- Range 360°
- Up to 2500 RPM

Linear Drive

- Speed up to 50 mm/s
- Stroke 0.1 mm to 60 mm



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