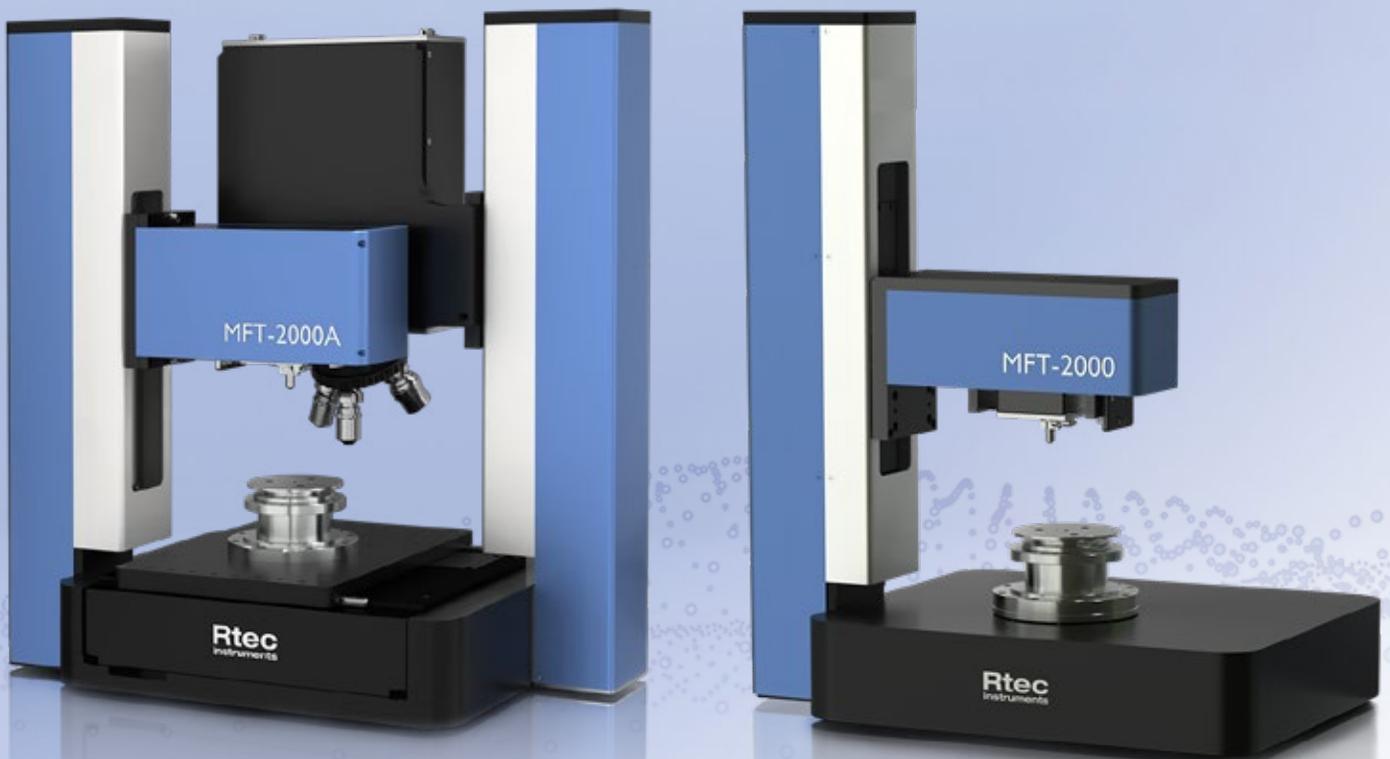




# Multi Function Tribometer

## MFT-2000



Friction, Wear, Scratch Hardness & Resistance,  
Coating Adhesion, Friction Coefficient, Roughness,  
3D Topography, Film Thickness



# Research and Quality Control

- Rotary Friction
- Linear Friction
- Wear
- Hardness
- Adhesion
- Mar Resistance
- Surface Roughness
- Volume Wear

## Servo Control Downforce Control

Real-time down force control - linear & constant load

## Wide Load Range - Nano and Micro

Load cells with forces from mN to 100 N

## In-line 3D Optical Inspection

Generate sub-nm 3D images of the surface during the test

## Environmental Control

Control temperature with high-resolution controllers

## Scratch, Tribology, and Material Tests

XY stage & force control enables wide application use



- (A) Profilometer
- (B) Lower Drive
- (C) Force Sensor
- (D) Imaging Z Drive
- (E) Main Z Drive

# Automation and Analysis

## Introduction

The Multi Function Tribometer MFT-2000 is a versatile and technologically advanced benchtop tribometer for essential mechanical, scratch, and tribological characterization. An open platform architecture design, fully automated test programs, and advanced controllers allow for high repeatability and precision measurements. The servo control load, patented multi-dimension force sensors, and XY stage enables the MFT-2000 to run several tests covering scratch, tribology, wear, mechanical tests, and profilometry 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. The tester comes with several environmental control options. The temperature controller allows for the maintenance of chamber temperature and measurements at multiple points simultaneously.

## 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

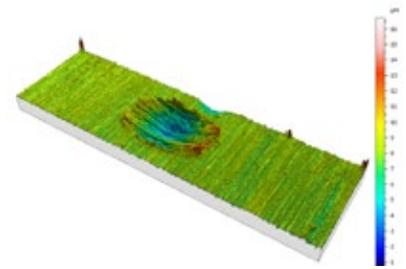
The instrument comes standard with a powerful set of software: from control to post analysis and imaging software. The data can export into many formats, including ASCII format. The software allows the user to stop the test using logic based on signals from several in-line sensors. Each test can be controlled by a series of command blocks forming a protocol or "recipe." The MFT-2000 comes with advanced high speed, low noise, fast feedback, and multiple channel data acquisition rate controllers.

## Integrated Imaging

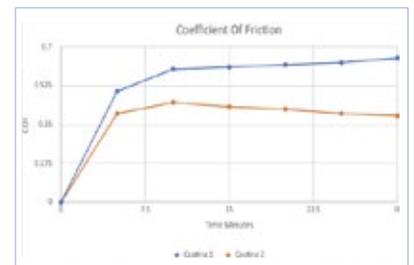
The MFT-2000 comes with a patented in-line 3D profilometer. This sub-nm profilometer provides quantification of topography (roughness, volume wear, cracks, step height, etc.) with nm resolution. This allows the creation of high-resolution maps of surface change vs. time. In addition, the XY stage allows stitching entire wear tracks automatically with ease.

## Applications

The versatility of the tester allows the MFT-2000 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.



Wear Mark Profile



Friction Comparison



Software Interface



Force Sensor



Rotary Drive



Reciprocating Drive

## Platform Specification

### XY stage

- Range: 150 x 200 mm
- Position repeatability: 1  $\mu\text{m}$
- Maximum speed: 50 mm/s

### Multiple Z stage

- Range: 150 mm
- Resolution: 0.1  $\mu\text{m}$ , 0.02  $\mu\text{m}$
- Max speed: 10 mm/s

### Computer console

- Latest Windows OS
- LCD monitor, printer

### Facilities requirement

- Power: 240 VAC, 50/60 Hz

### Environmental chambers (optional)

- 35°C up to 1000°C
- 5 to 95% RH
- Liquid

## Surface Inspection

### Various Imaging Modules

- 3D Microscope
- White Light Interferometer
- Confocal Microscope

### Various Other Modules

- Tribo-corrosion
- Acoustic Emission
- Electrical Resistance

## Test Modules

### Various Mechanical Heads

- Tribometer
- Indentation
- Scratch

### Lower Drives

Easy to interchange drives. Several combinations of speed and torque available

- Rotary Drive
- Fast Reciprocating Drive
- Linear Stage



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