



# Mini Traction Machines

## MFT-5000 & TM-2000



Traction, Wear, Pure Rolling, Pure Sliding,  
Combo Rolling Sliding



# Rolling and Sliding Traction Analysis

- Lubricity
- Grease Evaluation
- Sliding-rolling contact
- Traction Sensor
- Room and High Temperature

## Downforce Control

The applied forces can be controlled to gram force ranges. The force can be maintained constant or changed during the test.

## High Accuracy Position Control

Precise Z displacement control allows for micron level accuracy.

## In-line Sensors

Such as acoustic emission, detect onset of cracks and monitor surface properties in real-time.

## In-line 3D Optical Inspection

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

## Environmental Control

Dual high resolution thermocouples measure heater temperature and the chamber temperature independently.

## Mini-Traction Machine Versatility



- A** Platform
- B** Sample Container
- C** Traction Drive
- D** 3D Profilometer
- E** Z Stage
- F** Environmental Control

# Mini Traction Machine Overview

## Introduction

The Rtec-Instruments Traction Machine instruments include the MFT-5000 and the TM-2000. Both provide friction measurement of lubricated contacts under a wide range of sliding rolling ratios. Friction change vs. load, speed, and temperature reflects on several key properties valuable for assessing and comparing lubricants, grease, liquids, materials, and more.

Not only does the MFT-5000 provide reliable mini traction machine analysis, its versatility and interchangeable drives supply many other mechanical and tribology tests including HFRR, SRV, 4-ball, and more. For focused mini traction analysis, the TM-2000 measures the frictional properties needed for many applications including EV fluid quality and railway grease.

The instruments operate at a high sliding to rolling ratio using closed-loop servo drives. A wide speed range from -6 to 6 m/s allows for the coverage of the entire lubrication regime. Precise controllers monitor and control the down force and temperature in real-time, making these testers an ideal tool for researchers or a quality control team.

Standard configuration typically involves independently rotating a 19.05 mm steel ball against a rotating 46 mm steel disc. Real-time down force, traction force, and speed data allows for automatic Stribeck curves across a desired temperature range.

## Motors, Sensors, Stage, and Film Thickness

The high torque servo AC motors maintain smooth motion with precise RPM control.

The MFT-5000 and TM-2000 contain a traction sensor that provides dynamic high speed traction measurement. The automatic closed-loop XY stage changes positions, test radius, and allows for custom motions and test. Both instruments also include the option for a film thickness measurement module. The EHL film thickness measurement module can be accommodated on both platforms quickly and easily.

## Ease of use and automation

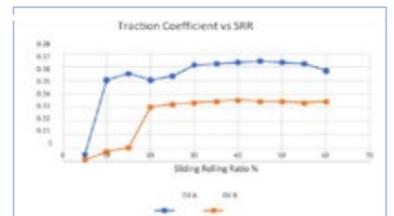
The instruments come standard with a powerful set of software, including tester control, post-analysis, and imaging. Each test can be controlled by a series of command blocks forming a protocol or "recipe." The data can export into many formats, including ASCII format. The software allows the user to stop the test using logic based on signals from several in-line sensors. This condition allows the user to do a post-analysis of the sample the moment failure starts to happen.

## Applications

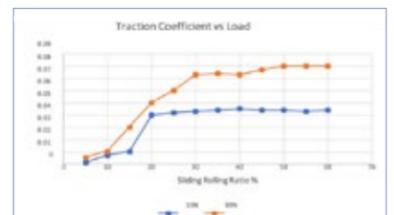
Broad testing conditions allow the MFT-5000 and TM-2000 to be used across several applications such as automotive, aerospace, lubricant, railways, coatings, turbines, EV vehicles, motors, and much more.



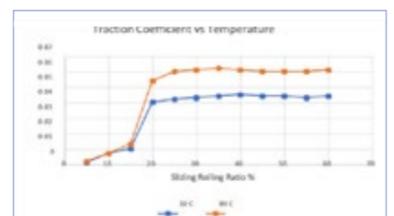
Traction Module and Sensor During a Test



Traction Coefficient vs. SRR Test Results



Traction Coefficient vs. Load Test Results



Traction Coefficient vs. Temperature Test Results

## Platform Specification

### Stage

- XY Stage
- Speed: -6 to 6 m/s

### Load

- Up to 200 N\*

\* More ranges available

### Additional Sensors

- Acoustic emission
- Eddy current
- In-line Wear
- Potentiostat
- Electrification

### Traction Drive

- Rolling and sliding
- Several Ball diameters (Standard size 19.05 inch)
- Several Disk diameters (Standard size 46 mm)

### Environmental

- Up to 180°C
- Lubricant, grease

### Computer console

- Latest Windows OS
- LCD monitor



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