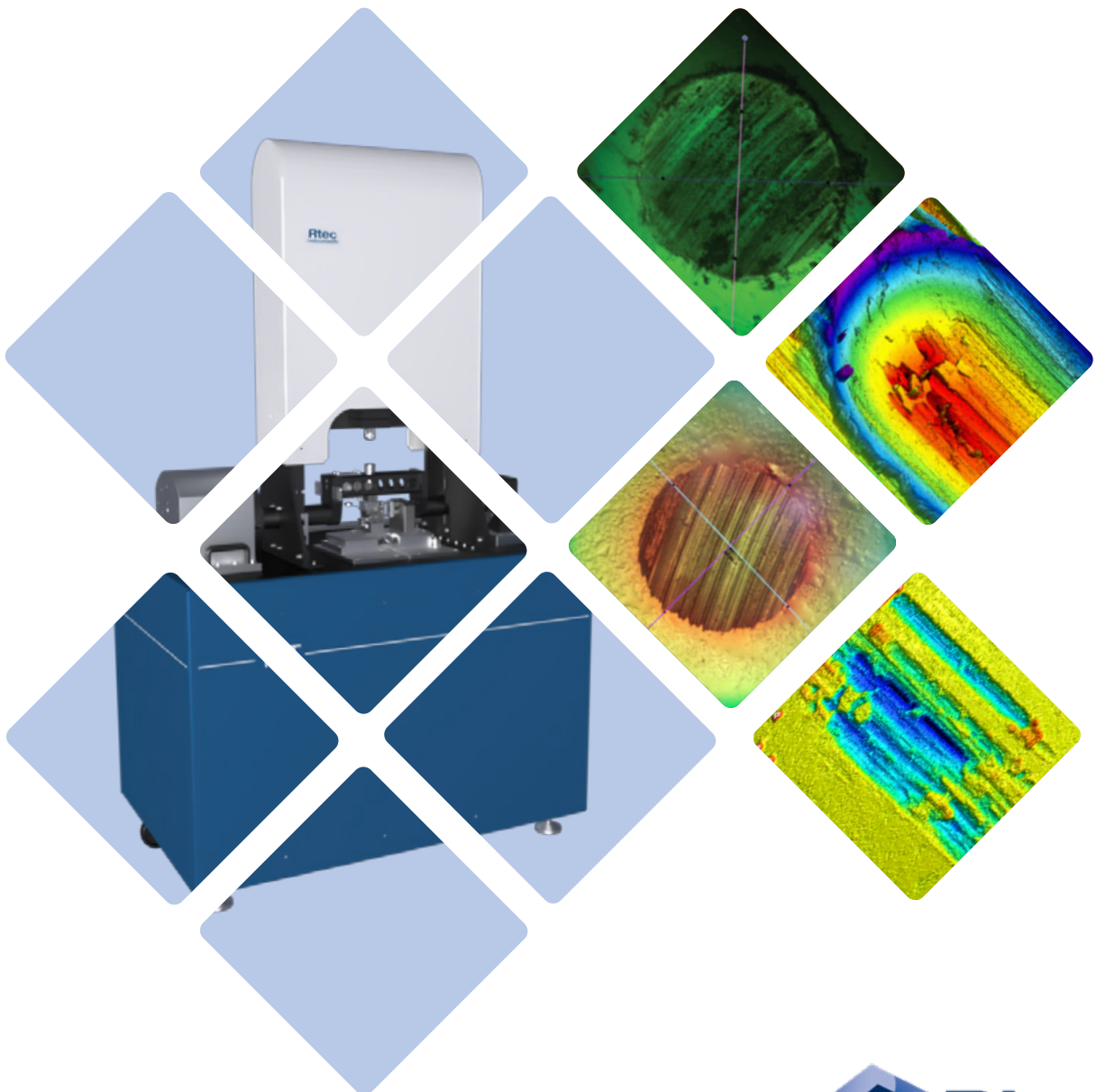


Fretting Tester

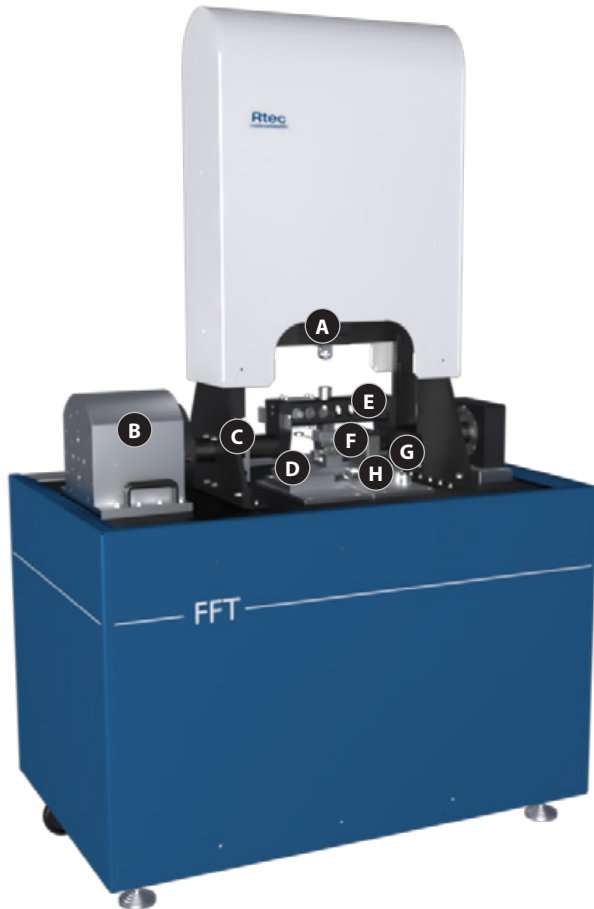
FFT Series

Fretting and Wear Tester with
Environment Control

Highly Accurate Stroke Control, Rigid Design



Fretting Tester Configuration



A Down Force Control

The applied forces can be controlled to gram force ranges with ease. Real time correction to account for sample wear, force change. The force can be maintained constant or dynamically changed during the test.

B Voice Coil

Electromagnetic actuators that imparts fretting motion. Dependent on the number of coils and coil power FFT series comes in 3 standard modules. FFT-M1, FFT-M2, FFT-1, FFT-2

C High Accuracy Position Control

The most accurate and precise displacement control in the market. Up to 1 nm resolution and micron level of accuracy. Extremely low noise. High responsiveness for dynamic performance of system.

D Environmental Controller

The environmental chamber allows to control and measure temperature and humidity. Dual high resolution thermocouple allows to measure heater temperature and the sample/lubricant temperature independently.

E Unmatched Waveform Control

Without the friction of rolling or bearings, the magnetic flexure based design provides the control required for the most sensitive of tests. The motor controls the smallest of increments of waveform change precisely to stroke control

F Friction Measurement

The tester comes with advanced piezo sensors to measure real time friction at high frequency. Ultra low noise amplifiers allows to detect minute changes in friction in real time with ease.

G Additional In-line Sensors

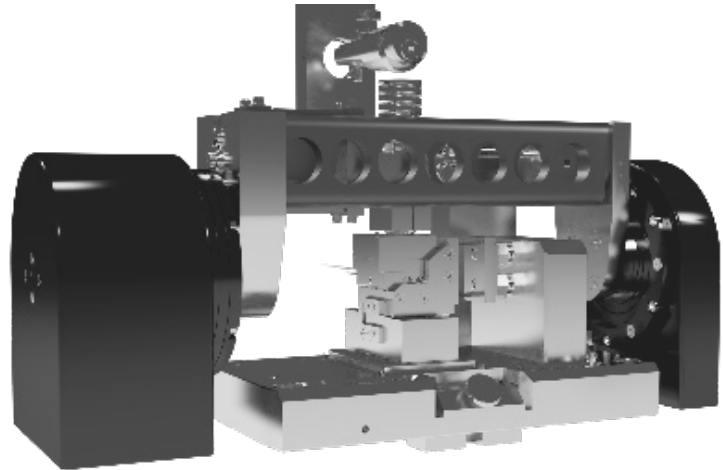
Sensors such as Acoustic emission to detect onset of cracks, ECR to measure surface resistance change allows to gain more insight on the material interface.

H Liquid Containers, Sample Holder

Liquid and sample holder both for standard and non standard tests. The holders and liquid container are easy to customise based on specific application need.

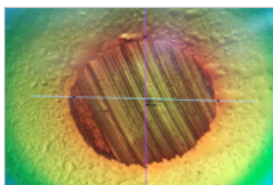
Applications

Fretting nm to mm
 Thick Coatings
 High Temperature

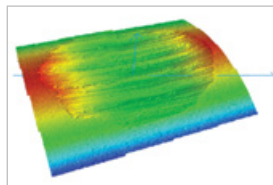


- Automotive
- Lubricant
- Aerospace
- Electronics
- Power Plants
- Coatings
- Composite
- Polymers
- Metals
- Components
- Biomaterials
- Medical

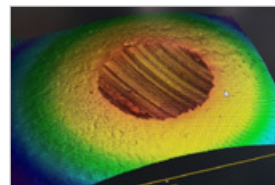
Test Data



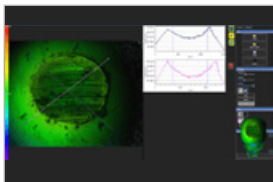
3D Wear Scar Mark



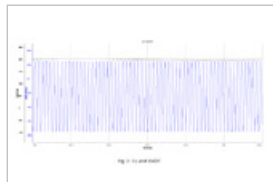
3D Wear Scar Mark



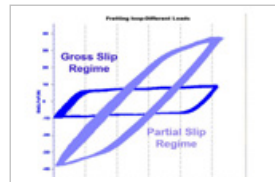
Volume Wear



4-Ball



High Frequency Data



Fretting Loops

Fretting Fundamentals

Fretting

Fretting wear is a test where surface damage occurs between two contacting surfaces experiencing oscillatory displacement of a small amplitude.

Debris

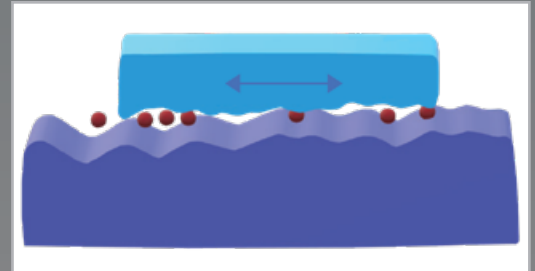
- Debris formation from asperity contacts
- Oxidation at contacting surface due to humidity, temperature, or chemical composition change
- Oil, lubrication starvation regimes causing wear
- Wear due to electric discharge
- Repetitive collision between surfaces
- Fatigue related cracks - onset of debris
- Polymerization of organic materials at surface
- Fine powdered debris - highly oxidized
- Residual steady stage flow of debris
- Diffusive wear
- Melting wear

Fretting Regimes

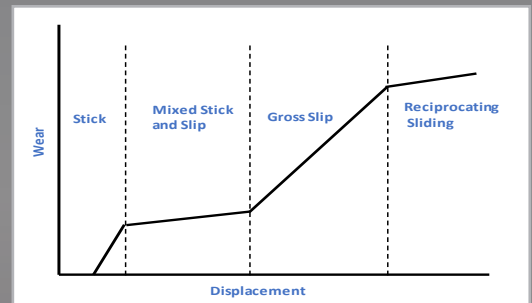
The tester can work across all fretting regimes stick, stick slip regime and gross slip regimes. The boundaries between these regimes are controlled by several fretting parameters including surface finishes, environment etc.

Fretting Loops

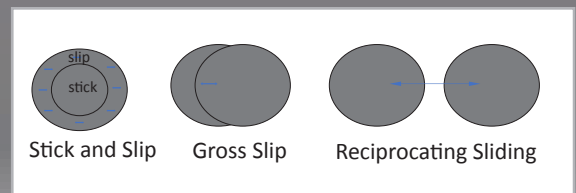
Fretting loop is a hysteresis plot for coefficient of friction (COF) vs. displacement. As the COF varies along the direction of motion the fretting loop given by $\mu(x,y) = q(x,y) / p(x,y)$ where $q(x,y)$ is the shear traction distribution along the interface and $p(x,y)$ is the normal pressure distribution.



Sample under fretting motion



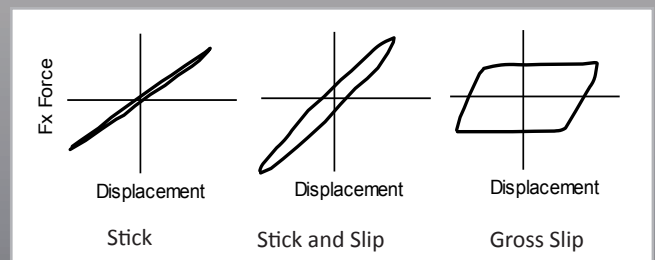
Regime Schematics



Stick and Slip

Gross Slip

Reciprocating Sliding



Displacement

Stick

Displacement

Stick and Slip

Displacement

Gross Slip

High Speed Controllers

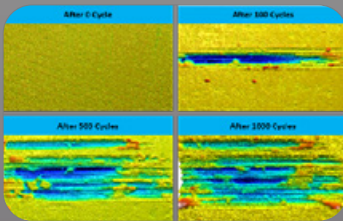
Software

The tester comes with operation and data analysis package. The test operation is recipe based software that allows it to run standard or previously created recipe with click of button. The analysis package comes with visualization and statistical data analysis. Multiple files can be opened for easy comparison.

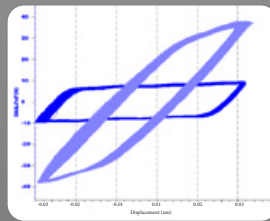
- Advanced control algorithms
- Intuitive and easy to use software
- Fully automatic motions
- Compliant with several standards
- Fast data reporting
- Set of features to analyze any kind of sample
- Automatic data analysis



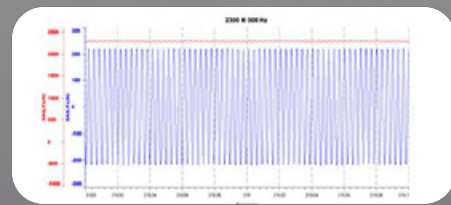
Test Programme



3D profiler wear track image



Fretting loop data



2 500 N, 300 Hz Data

Specification Summary

FFT-M2 1 000 N Down Force
FFT-M1 300 N Down Force

Actuators

- Displacement 10 μm - 2.8 mm
- Resolution: 0.1 μm
- Oscillation frequency: Up to 500 Hz

Environment

- Up to -40°C, 180°C, 500°C, 1000°C
- Humidity controlled chamber

Sensors

- Potentiostat
- Acoustic Emission
- Electrical Contact Resistance

Common standards

- ASTM E2789
- ISO 19291
- ASTM D6425
- ASTM D7421
- ASTM D5707
- ASTM D5706
- ASTM D7594
- DIN 51834-2
- DIN 51834-3
- DIN 51834-4

About us

Rtec Instruments develops and manufactures advanced imaging and surface mechanical property measurement solutions for research and industrial applications. Based in Silicon Valley, we are the leading provider of testing instrumentation such as tribometer, optical profilometer, 3D scratch tester and micro/nano hardness tester.

We share a philosophy that embraces collaboration and partnership with customers, leaders in academia and industry, to ensure that our products answer real needs with innovative solutions.



Rtec Instruments, US
1810 Oakland Road, Ste B
San Jose, CA, 95131, USA
Phone: +1 408 708 9226

Rtec Instruments, SA
Rue Galilée 6,
1400 Yverdon-les-Bains, Switzerland
Phone: +41 24 552 0260

Rtec Instruments, CN
Room 1002-2, Building 1, #69 Olympic St
Jianye District, Nanjing, China, 210019
Phone: +86 25 83210072,+86 18013892749