



Fretting Tester - FFT Series



FFT-M1, FFT-M2



Single Coil FFT-1



Dual Coil FFT-2

Highly Accurate Stroke Control, Rigid Design

Temperature, Humidity, Environmental Controls

Fretting Tester FFT series

Voice Coil

Fretting testers with three models cover a wide test load range. A technology break through in voice coil control, high frequency signal processing algorithms allows to run fretting wear test from 5 micron stroke.

The tester allows to comprehensively characterize fretting wear from micron to macro scale. Ultra sensitive piezo based load cells , combined with rigid design, high stiffness holders, low floor noise and robust design provides quantitative fretting wear characterization of materials, interfaces, thin films, components etc.

To simulate real life scenarios the tests can be done in room or controlled environmental conditions. Easy to use and interpret the data makes this tester an ideal tool in hands of researcher or quality control engineers.

Real Time Stroke Control

The smallest controllable stroke - 5um to 5mm, upto 500Hz

Real time stroke, frequency monitoring and correction using LVDT

Environmental control, surface electrical measurement

Humidity, Temperature, Inert Gas, Electrical measurements for real life simulation.

High reliability - flexure design, no bearings

The flexural suspension guides the magnet assembly without contact or lubrication.

High frequency response force sensors

Piezo based sensors that can measure friction force with ultra high accuracy.

Unmatched Performance

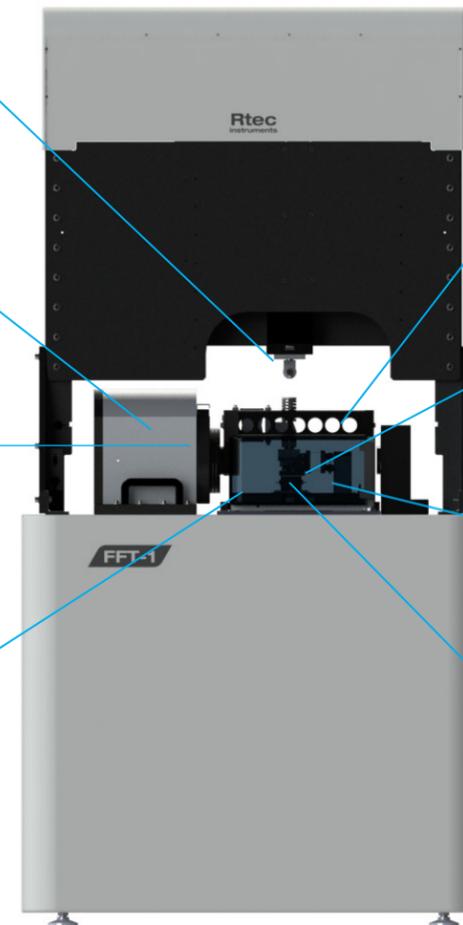
Fretting Tester Configuration

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.

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

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

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.



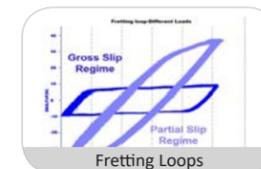
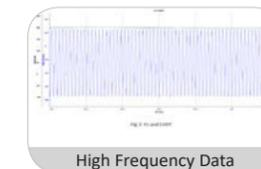
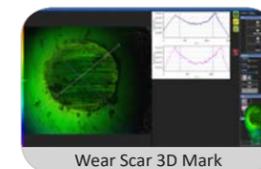
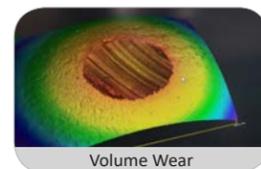
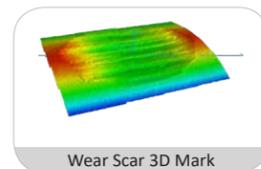
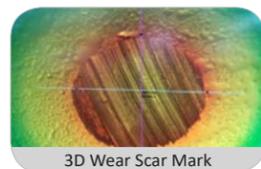
Unmatched Waveform Control
 Without the friction of rolling or bearings, the magnetic flexure based design provides the control required for the most sensitive of tests. The motor controls the smallest of increments of waveform change precisely to stroke control

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.

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.

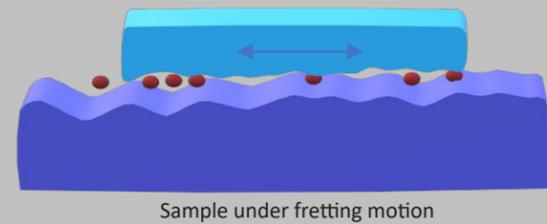
Liquid Containers, Sample holder
 Liquid and sample holder both for standard and non standard tests. The holders and liquid container are easy to customise based on specific application need.

- Automobile
- Lubricant
- Aerospace
- Electronics
- Power Plants
- Coatings
- Composite
- Polymers
- Metals
- Components
- Biomaterial
- Medical



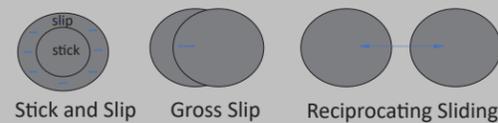
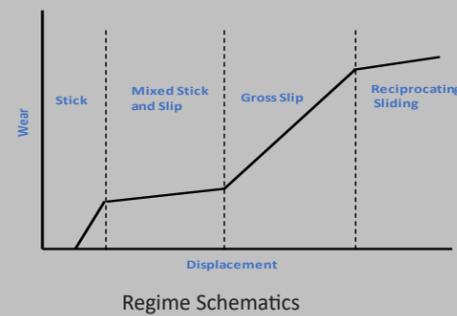
Fretting

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

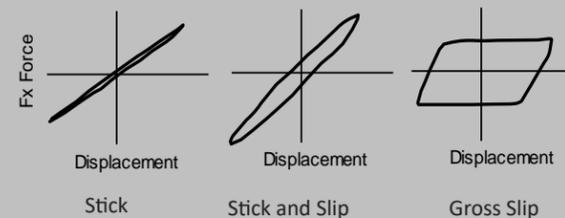


Fretting Regimes

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.



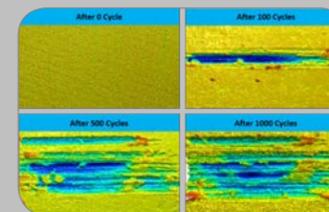
Software

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.

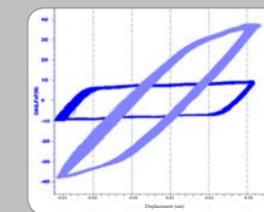
- Advanced control algorithms
- Intuitive and easy to use software
- Fully automatic motions
- Compliant with several standards
- Fast data reporting
- Set of features to analyze any kind of sample
- Automatic data analysis



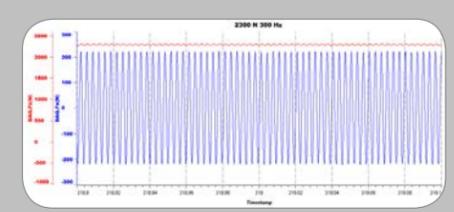
Test Programme



3D profiler wear track image



Fretting loop data



2500N, 300Hz Data

Specification Summary

FFT-2 5000N Down Force
 FFT-1 3000N Down Force
 FFT-M2 1000N Down Force
 FFT-M1 300N Down Force

Environment

- Up to -40, 180, 500C, 800C
- Humidity controlled chamber

Sensors

- Potentiostat
- Acoustic sensor
- Electrical Contact Resistance

Actuators

- Displacement 5um-5mm
- Resolution: 0.1um
- Oscillation frequency: Up to 500Hz

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 out of Silicon Valley, we are a leading provider of test instrumentation such as tribometer, optical profilometer, scratch tester, micro hardness tester etc.

We share a philosophy that embraces collaboration and partnering with customers and other leaders in academia and industry to ensure that our products answer real needs with innovative solutions. Our San Jose, California headquarter houses all research, development, manufacturing and factory support operations.



Other Products

Multi Function Tribometer
3D Scratch and Indentation Tester
Universal Profilometer
High Temperature Indentation
CMP Polishers
Hot Hardness Tester
Air Jet Erosion Tester



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