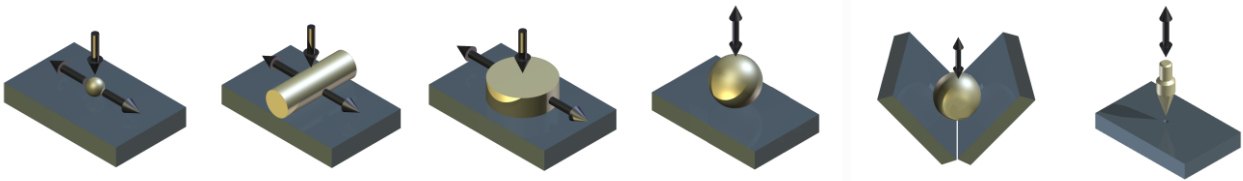
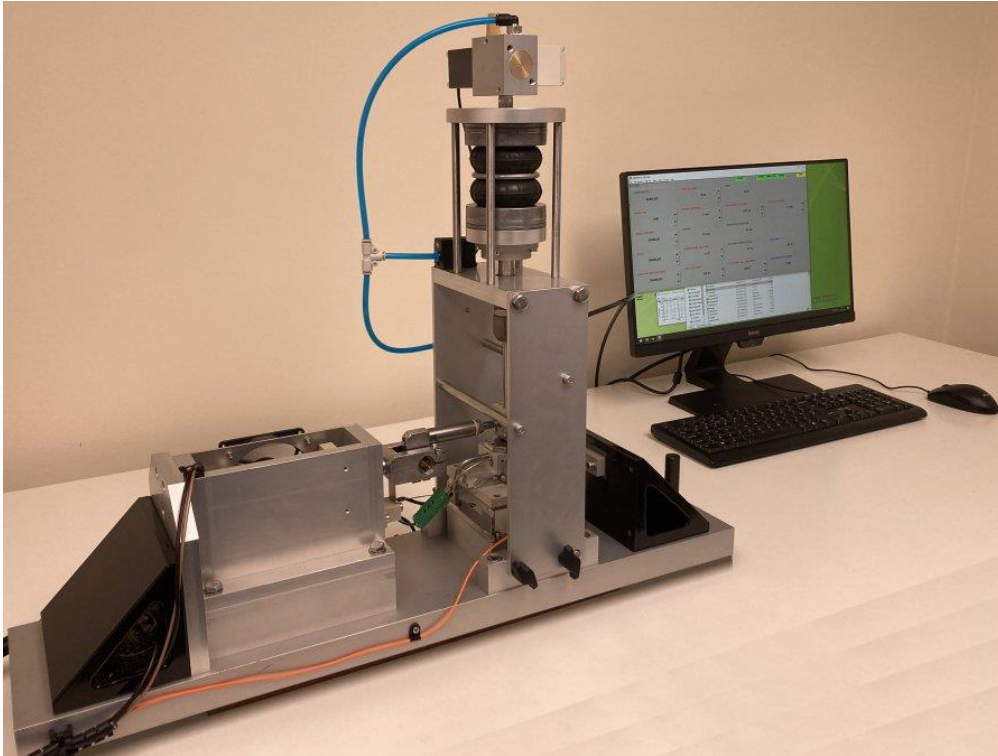


# TE 44 PIEZO FRETTING RIG



## Description

The TE 44 Piezo Fretting Rig incorporates a piezo actuator driven by a high frequency analogue controller, which derives its set points via a 16 bit control and data acquisition card from a standard PC, running COMPEND 2020 software. Real time adaptive control features provided within the software allows high precision control of the actuator when working against highly non-linear loads. Sine, square and triangular waveforms may be programmed and at oscillating frequencies up to 100 Hz.

A servo pneumatically controlled loading system is provided for performing conventional parallel motion fretting tests. With the loading system disabled, the specimen orientation can be changed from parallel to perpendicular motion, allowing hertzian fretting, impact fretting and depth sensing micro-hardness tests to be performed. Specimen heating is provided for the parallel motion test configuration only.

Sensors include:

Piezo Transducer for:

- Friction Force
- Hertzian Fretting Load
- Impact Force

Strain Gauge Transducer for:

- Parallel Motion Load

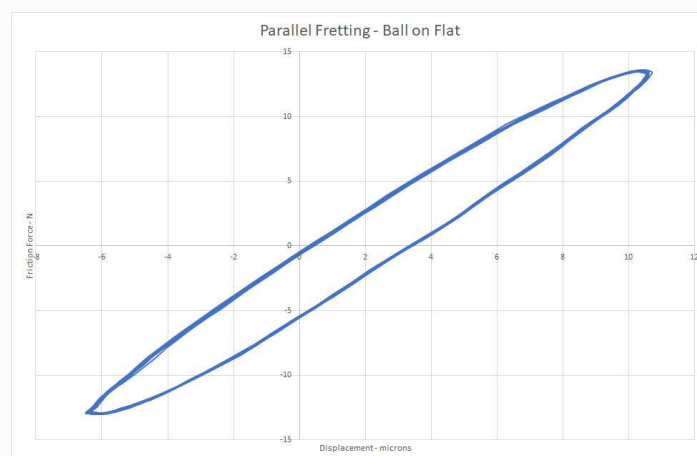
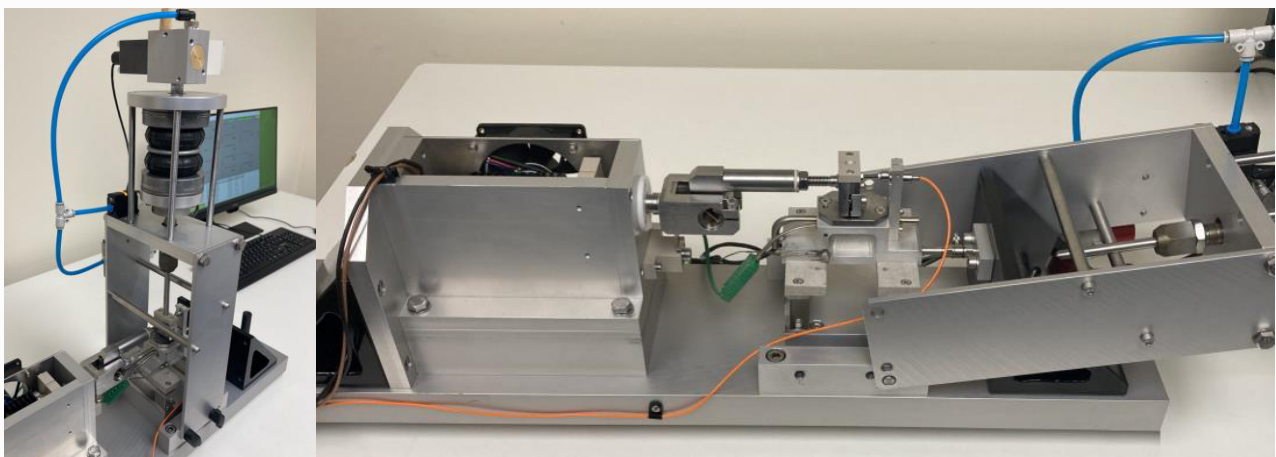
Strain Gauge Transducer for:

- Hardness Indentation Force

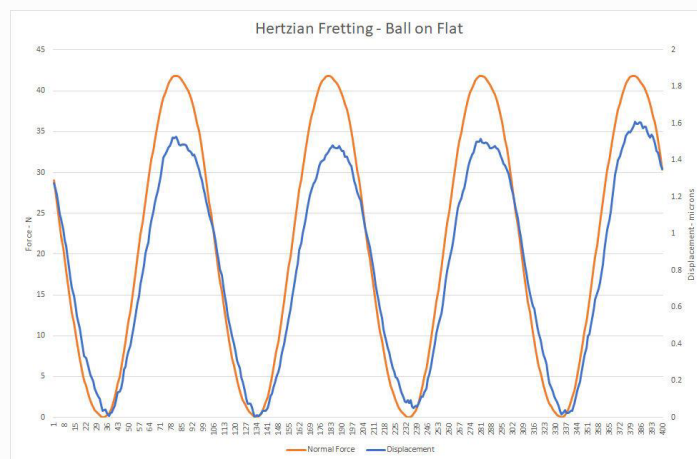
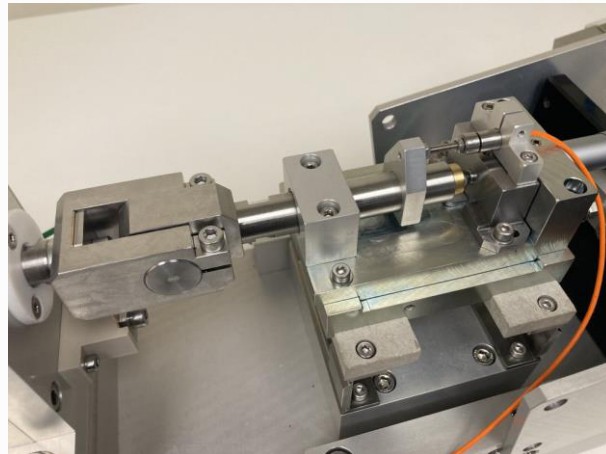
Capacitance Probe for:

- Displacement Measurement

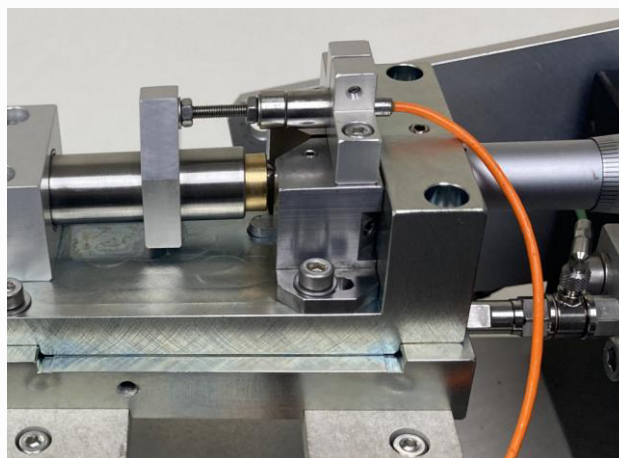
## Parallel Motion Fretting

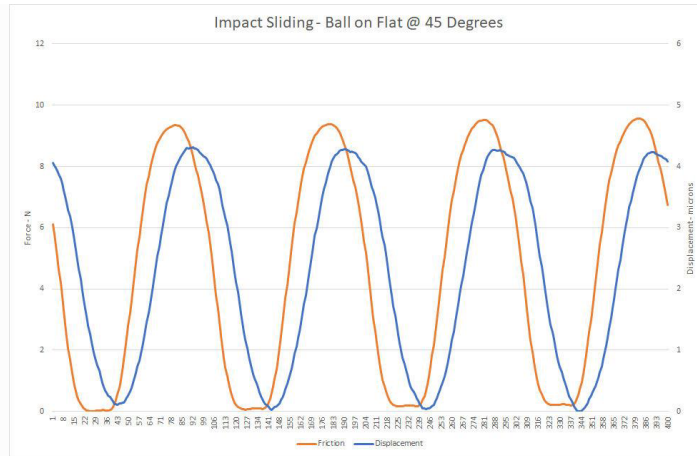


## Hertzian Fretting

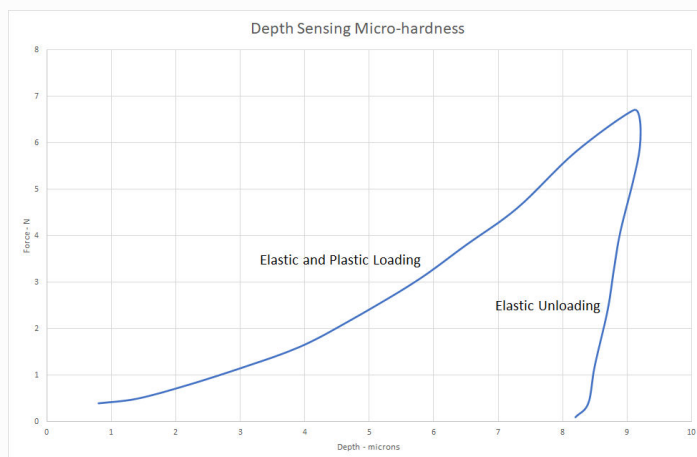
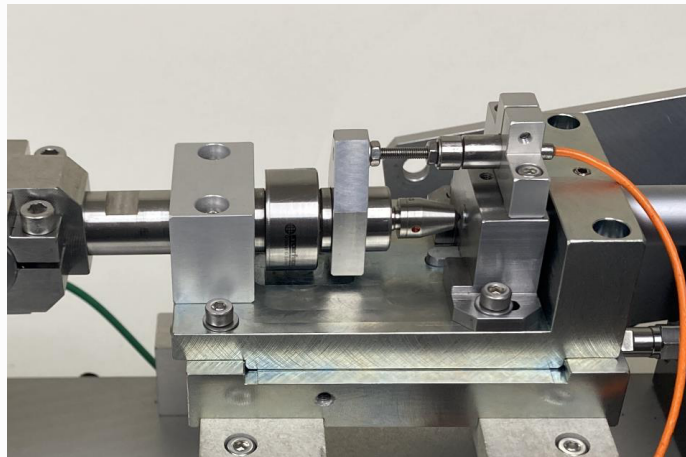


## Impact Fretting





## Depth Sensing Micro-hardness



# TE 44 DRY & LUBRICATED RECIPROCATING SLIDING & FRETTING MACHINE

## Technical Specification

Type of Contact - Fretting/Sliding:	Ball/Flat Flat/Flat Line/Flat
Type of Movement:	Sine, Square and Triangular
Type of Contact - Impact Fretting:	Ball/Flat @ 45 degree Impact Angle
Type of Contact - Hertzian Fretting:	Ball/Flat
Type of Contact - Diamond Indenter:	Depth Sensing Micro-hardness (Vickers)
Displacement Control:	Adaptive control of amplitude and mid-stroke position
Actuator:	Piezocomposite Stack
Maximum Stroke:	100 $\mu\text{m}$
Stiffness:	60 N/ $\mu\text{m}$
Resonant Frequency:	15 kHz
Maximum Force:	12,000 N
Maximum Tensile Force:	1,500 N
Amplifier:	1000 volt
Load Range:	5 to 1000 N
Loading Rate:	50 N/s
Temperature Range:	Ambient to 200°C - Fretting/Sliding Only
Heating Power:	200 W
Temperature Sensor:	k-type thermocouple
Friction Force:	+/-500 N Maximum
Stroke - continuously variable:	0 to 100 microns
Resolution:	+/-0.2 microns
Maximum Frequency:	500 Hz
Minimum Frequency:	1 Hz
Frequency Range:	Continuously variable: 1 Hz to 100 Hz
Maximum stroke at 100 Hz:	30 $\mu\text{m}$
Maximum stroke at 50 Hz:	60 $\mu\text{m}$
Maximum stroke at 20 Hz:	100 $\mu\text{m}$

Stroke Measurement:	Capacitance Probe
Full-scale Range:	0 to 1 mm
Resolution:	0.2 $\mu\text{m}$
High Speed Interface:	USB
Resolution:	16 bit
Number of Input Channels:	6
Maximum Data Rate:	Six channels at 50 kHz
Low Speed Interface:	USB
Resolution:	12 bit
Number of Input Channels:	1 to 8
Number of Output Channels:	1 to 4
Maximum Data Rate:	10 Hz

### **Controlled Parameters**

Frequency  
Waveform  
Stroke  
Mid-stroke Position  
Load  
Temperature  
Test Duration

### **Measured Parameters**

Frequency  
Stroke Displacement  
Load  
Friction  
Temperature  
Depth Sensing (Micro-hardness)