LINEAR RECIPROCATING TRIBOMETER

Materials, coatings and lubricants often encounter situations involving repeated back and forth (reciprocating) movements during operation. Such situations are seen in various applications ranging from automotive to biotribological environments. These contacts may see a range of operating conditions from low amplitude, high frequency reciprocations to high amplitude and low frequencies.

The Ducom Linear Reciprocating Tribometer is designed to allow users to characterize tribological performances of materials and lubricants in a wide range of operating conditions ranging from fretting wear conditions to large amplitude linear sliding conditions. It can effectively be used to study bulk materials, coatings, lubricants and additives. The Linear Reciprocating Tribometer can accommodate a variety of sample geometries to create point, line and area contacts. Customized sample holders can also be provided for tests requiring conformal contacts.

This system is computer controlled and includes a data acquisition software that can be used to acquire, view and report results.

FEATURES

- Fully automatic and computer controlled.
- Continuously variable stroke length
- Continuously variable frequency
- Options for humidity control
- Options for temperature control

Ball on Disk configuration with an elevated temperature stage
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Options
Numerous options are offered to enhance capability of basic tribometer. Some of the provisions are:

- **Lubrication cup** for lubricated wear and friction studies.
- **Environmental chamber** for controlled environment tests. (Not air-tight, suitable for inert, non toxic environments)
- **Humidity Controller** for controlled humidity tests (10 – 95% RH)
- **Low temperature stage** (-25 Deg C)
- **High temperature stage** (up to 400 Deg C)
- **Electrical Contact Resistance (ECR) measurement**
- **CCD based image acquisition system** for sample imaging and reporting
- **3D Optical Profilometer** for post test analysis

Machine control and data acquisition

WinDucom 2010 is a proprietary integrated machine control, data acquisition and post processing software. It has two modules:

**Machine control**
The Linear Reciprocating Tribometer uses the WinDucom software on a Windows operating system. The PC controls the test sequence on the machine based on the temperature and test duration, frequency and amplitude details entered by the user. Sample related information can be fed into the software at the start of the test for documentation and reporting purposes. The test starts automatically after the set temperature is reached (if temperature stage option is chosen) and continues till the lapse of the set duration.

**Data Acquisition System**
WinDucom acquires temperature, frictional force and coefficient of friction is calculated and displayed. The Data Acquisition System allows the flexibility to present the data in several ways. Graphs of individual test can be printed and results of up to four tests can be superimposed for comparative viewing using the CompariView module. Data can be exported to other software like MS-Excel in ASCII format.
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Post processing
Acquired data can be presented in several ways:
- View test results of any test run
- View parameters of up to 4 different tests together for comparison
- Export acquired data in ASCII to other software

Analysis
This module facilitates calculation of following parameters over any selected range:
- Average value of coefficient of friction and ECR (if ECR option is chosen)
- Standard deviation

Other utilities include:
- Computation of Hertzian contact stress.
- Estimation of Archard coefficient required for modeling in wear simulation

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Min</th>
<th>Max</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>mm</td>
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<tr>
<td>Frequency</td>
<td>Hz</td>
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</tr>
<tr>
<td>Load</td>
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<tr>
<td>Temperature</td>
<td>Deg C</td>
<td></td>
<td></td>
<td>Temperature control stage options available</td>
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<tr>
<td>Humidity</td>
<td>RH%</td>
<td>20</td>
<td>80</td>
<td>Requires humidity controller (optional)</td>
</tr>
</tbody>
</table>

*Note: maximum settings of stroke, load and frequency parameters may not be possible at the same time.

* Specifications subject to change without notice. Consult Ducom for details.
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Sample surface after testing.

Test graphs of four different samples for comparative evaluations.

Customized 3 station Linear Sliding Tribometer with elevated temperature test capabilities.

CompariView module allows comparisons of up to four test results in the same screen.

**Note:** The Photograph and specifications depicts the general class of machine. The actual machine may differ in appearance and specifications to accommodate our quest for continuous improvement and design considerations.
Other facilities and services by Ducom

**Contract Test Lab:**
Ducom is a preferred partner for tribological tests for several Fortune 500 companies as well as small industries and research labs. Our facilities include a variety of Tribometers, Mechanical Testers and Petro Testers at two locations: Bangalore (India) and Evanston, IL (USA). Contract testing on custom development testers are also offered. Ducom also offers the facility to video-witness tests—saving on costs involved with physically witnessing critical tests.

Ducom Test Facility has been in service since 1999, providing tribological testing facilities to academics and industries. Ducom ensures that customers get great value by offering these services on advanced tribometers that are regularly calibrated and checked for repeatability of their results. The test facility is run by experienced staff with more than five decades of cumulative testing experience in the field of tribological testing alone. Advantages of choosing Ducom Test Facility as your testing service provider:

- No capital investment on a tester
- No additional man-power requirement
- No maintenance and AMC costs
- No training requirement
- Excellent security - limited access facility and strongly enforced non-disclosure agreement
- Excellent reporting - test reported in accordance with applicable test standards

**About Ducom Instruments**
Ducom is a multi-faceted test instrument manufacturer. Instruments capabilities span macro, micro and nano scale characterization with installations in over 2000 labs worldwide. Ducom test instruments are trusted for their excellent repeatability, high technology and robust design.

A dedicated in-house Research & Development group works on development of new technologies and test methods to bring state-of-the-art characterization techniques to research labs and industries.

- Since 1978
- ISO 9001: 2008 Certified
- CE certified testers
- State-of-the-art R&D
- In-house CNC manufacturing
- In-house design, electronics & software

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