LiTeM torsion fatigue testing machines run static and cyclic testing on dogbone or spring samples with the most suitable mounting system for the sample in question.

The torsion systems are designed to the client's specifications, and cover a range of torques from 0Nm to 400Nm. The tests may be run with feedback control of torque or angle. The actuator benches may be configured with vertical or horizontal actuator axes. The torsion meter is mounted on a longitudinal rail to facilitate setting up the test.

The preferred solution has the actuator directly coupled to the sample (direct drive), which is ideal for fatigue testing with very high numbers of cycles and high load application frequency, since the inertia of moving parts is minimized and backlash is effectively eliminated.

When very high torques and dynamic loads are required, the use of torque motors is the key to effective test systems.

**APPLICATIONS**

1. **STATIC YIELD/FAILURE TESTING**, for composite components, biological components, dental implants, etc.
2. **RIGIDITY TESTING** for single components and assemblies, composite products
3. **DYNAMIC TESTING** with sine, pulsed square wave with settable duty cycle or constant speed triangle wave (e.g. for characterization of suspensions/shock absorbers)
4. **CONSTANT AMPLITUDE FATIGUE TESTING** to characterize the life under cyclic/repeated loads for any type of component (Wöhler curves)
5. **CONSTANT AMPLITUDE BLOCK FATIGUE TESTING** for determining the Palmgren-Miner relation and the effective damage value
6. **VARIABLE AMPLITUDE FATIGUE TESTING** using the reproduction/simulation in the laboratory of real world load curves acquired on-site
7. **REPRODUCTION OF LOAD CURVES** defined by the user during the design phase

**TECHNICAL CHARACTERISTICS OF THE SYSTEM**

- Table Top system with horizontal actuator axis
- Electrodynamic motor with incremental rotary encoder and resolution of 8000 pulse/rev
- Torsion meter full scale 5Nm
- Maximum torque 2.5Nm
- The maximum load application frequency is 30Hz, depending on load and angle
- PID control loop closure: one thousand times a second
- Torque or angle feedback
**CONTROLLER**

RTC9001-S (standard) and RTC9001-P (pro) controllers are designed for easy and comprehensive control of structural mechanical tests, with full control of an actuator, a force channel, a displacement channel and an auxiliary ±10V channel. RTC9000 controllers have been proved to be ideal for static, dynamic and fatigue testing.

The controllers are developed and fabricated entirely by EnginLAB in order to render strength and fatigue testing easy to run, even for companies and laboratories with little or no experience in this area. The controller enables the actuator to easily run angle or torque controlled tests, with the option to concatenate load ramps or execute sine, triangle and square waves.

The RTC9000 controller family can control brushless or torque actuators with drives with ±10V analogue input for running torsional tests in both direct drive and gearmotor configurations.

**REAL TIME CONTROLLER**

**PROCESSOR**
- Dual-Core 667 MHz (PRO Version Dual-Core 1.33 GHz)

**TORQUE CHANNEL**
- ±10V, 16bit

**DISPLACEMENT CHANNEL**
- ±10V, 16bit

**AUX CHANNEL**
- ±10V, 16bit

**ENCODER**
- (8000 pulse/rev or more)

**PID OUTPUT VOLTAGE**

**PID LOOP CONTROL FREQUENCY**

**CONTROL SOFTWARE SPECIFICATIONS**

**CONTROL MODE:** LOAD – POSITION – AUX 1

**SETTINGS OF PID COEFFICIENTS**

**SIGNAL AMPLITUDE CONTROL**

**BUMPLESS CONTROL MODE CHANGE**

**WAVEFORM**:
- RAMP SETPOINT – SINE – TRIANGLE – SQUARE

**WAVEFORM:** USER DEFINED PROFILE

**CYCLE COUNTER**

**RECORDING VS. TIME - VS. CYCLE**

**DELTA DYNAMIC SENSOR VALUE DISPLAY**

**- SENSORS GRAPH VS. TIME**

**- XY GRAPH:** LOAD VS. POSITION - PID GRAPH VS. TIME

**EXPORT DATA:**
- TEXT FORMAT – EXCEL – GRAPH IMAGES

**GENERAL TECHNICAL SPECIFICATIONS**

**ACTUATOR MODEL**
- TRS-E from 2.5Nm to 400 Nm

**TORQUE SENSOR**
- From 5Nm to 500 Nm

**COUPLING MODE WITH THE SPECIMEN**
- Direct drive or with gear motor depending on the application

**MEASURE ACCURACY**
- 360°/8000 at least

**ROTATION SPEED (rpm)**
- From 0.001 to 200 depending on the application

**LOAD APPLICATION FREQUENCY**
- Up to 30 Hz

**SOFTWARE**
- RTC – E STD

**CONTROLLER**
- RTC 9001 - STD

**DIMENSIONS AXBXC (mm)**
- 900x400x300 (depending on the application)

**POWER SUPPLY**
- 230V Single phase supply or 280V three phase depending on the application

**DIMENSIONS**

<table>
<thead>
<tr>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>E (mm)</th>
<th>H (mm)</th>
<th>F (mm)</th>
<th>S (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>900</td>
<td>400</td>
<td>300 – 500</td>
<td>700</td>
<td>100 – 250</td>
<td>from 10 to 20</td>
<td>from 150 to 400</td>
</tr>
</tbody>
</table>

**DRC Srl**

sales and production
Via Montesicuro snc - 60131 Ancona (Italy)
Tel (+39) 071 80 36 077

**EnginLAB Srl**

research and development
Via Verità 3/a - 35131 Padova (Italy)
Tel (+39) 049 20 21 489

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**GENERAL INFORMATION**

info@litem.info

**SALES**

sales@litem.info

**TECHNICAL**

support@litem.info

www.litem.info