# UTM Upgrades

Our machine controller and software combines to add PC based data capture and test analysis to existing universal test machines from Tinius Olsen, Riehle, Baldwin, Amsler and Satec. Our modular design enables you to replace your XY Plotter now and to add full automation as your budget or needs justify.

MTest starts by replacing your load indicator and XY Plotter with a PC.

Our controller works with a PC to capture load and strain data and to generate test reports that are easy to produce and customizable. We offer three levels depending on your needs:

- LEVEL 1 – Continue with manual mode using PC based data acquisition and software test analysis. Replace obsolete XY recorders and indicators with Level 1.
- LEVEL 2 - Automate tests by upgrading your analog servocontroller.
- LEVEL 3 - Upgrade your manual machine to automated mode by adding a hydraulic pump, servovalve, and LEVEL 2 Controller.

TestResources brings PC control, data acquisition, analysis and report generation to manual hydraulic machines. We make a manual machine produce tests like never before. With our MTest software interface, we match up to virtually any machine regardless of age, manufacturer or application. Ideal for

- ***Production Testing***
- ***Product Development***
- ***Quality Control***
- ***University Classroom***
- ***Flex Tests***
- ***Compression Testing***
- ***Tensile Testing***
- ***Research***

1. Improve Productivity with automated test setups, analysis, and reporting processes. Also improve reliability.

2. Lower Costs of testing, data storage and information management with inexpensive PC technology.

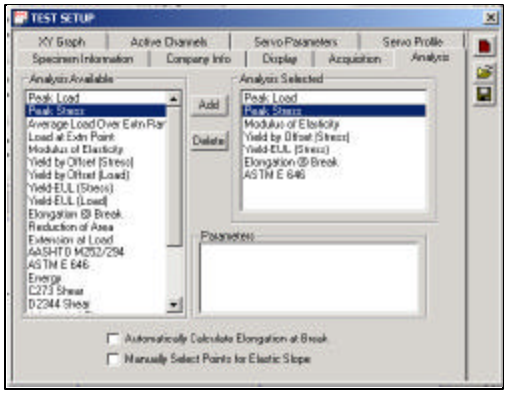
3. Improve Quality of testing by reducing human errors, improved measurement accuracy and ability to do new tests.

## All MTest Packages Feature:

- Easy to Learn
- Analysis Software
- Windows 95, 98, NT, and 2000.
- Reports include statistics.
- Calibration by 3rd party calibrators – lowers costs.
- English, Metric & SI units.
- Load accuracy to E4.
- Exports ASCII data to popular spreadsheet programs
- Save and reanalyze data over a network
- Use any printer.
- Customize your reports
- Field installable or local calibrator

## Test Analysis Software Included

MTest performs ASTM standard tests and enables the creation of internal custom test methods. Once developed, a test procedure can be saved and recalled repeatedly. Client controlled password protection ensures new test methods are locked and protected. TRI offers a wide variety of analysis methods to cover an array of applications, and new methods are always added, so consult us for the most recent list. Our latest product includes almost 25 analyses.




| ***Analysis*** | **Description** |
|---|---|
| *Peak Load* | Greatest Load during test |
| *Peak Stress* | Peak Load divided by specimen area. |
| *Load at Extension Point* | Load value at a user specified extension point. |
| *Modulus of Elasticity* | Slope of the Stress - Strain curve in the elastic region. |
| *Elongation @ Break* | Elongation at fracture including elastic & plastic deformation of specimen. |
| *Reduction of Area* | Final Area divided by Original Area. |
| *Extension at Load* | Elongation at the specified Load. |
| *Energy* | Calculation of the area under the Load-Displacement curve. |
| *Yield Strength by Offset(Stress)* | Stress at the point on the Stress-Strain curve where Modulus Line, offset by user specified amount in the Strain direction, intercepts the curve. |
| *Yield Strength by Offset(Load)* | Load at the point on the Load-Strain curve where the Modulus Line, offset by a user specified amount in the Strain direction, intercepts the curve. |
| *Yield-EUL(Stress)* | Stress at the point on the Stress-Strain curve where a line drawn parallel to the Stress axis offset by a user specified amount in the Strain direction intercepts the curve. |
| *Yield-EUL(Load)* | Load at the point on the Load-Strain curve where a line drawn parallel to the Load axis and offset by a user specified amount in the Strain direction intercepts the curve. |

Test analyses are included covering ASTM E646 K & n, ASTM C273 Shear, ASTM D2344 Shear, Johnson's Apparent Elastic Limit, ASTM E1290 CTOP, and Poisson's Ratio.

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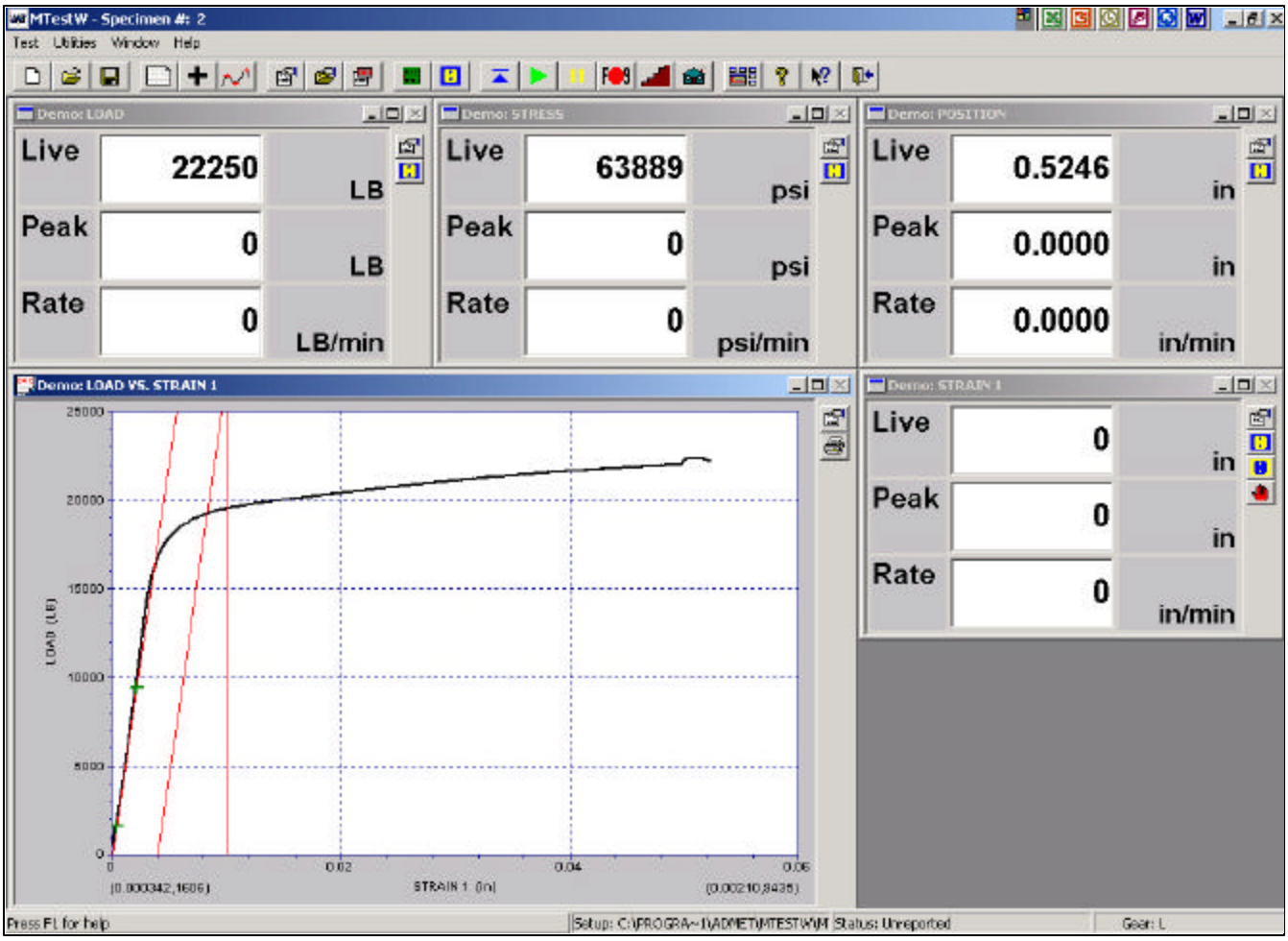
## Easy to Use Interface

Our interface has evolved over years of use and become known for simplicity and ease of use. Large digital displays show both live and peak values. Units are displayed and easy to change from English to SI (Metric). The graph is a real time plot with auto-zoom. All the commonly operated commands are on the top bar and with a little training, you can be running tests in minutes.




## All levels include:

**Data Export**

Store test results in ASCII comma delimited file format and then import data into spreadsheets and databases such as MS Excel, MS Access, Lotus, dBase and other commercial spreadsheet and database programs. Integrate mechanical test results with results of other test apparatus into a single test report.

**Re-analyze Test Data**

Change Setup parameters, labels, specimen information, X-Y variables and re-analyze saved data.

**User Definable Password Control**

Password protection is user definable which means you are free to hire your local calibration service provider. No special or additional software is required to calibrate your system.

**Engineering Units**

Include lb/in, kg/cm, kN/mm and N/mm units. Position and Strain values can be reported as inches, mm or cm; Strain can be inches/inch, mm/mm, or cm/cm, or percent (%). If your operator wants to run tests in pounds and inches, use those units and still report in the client's choice of units.

**Raw Data Storage for Multiple Usage**

Raw data can be saved automatically or manually after each test so that stored tests can be redisplayed, recalculated, reprinted and replotted in the future. A copy of MTEST enables remote users to call up data and results, including graphs. This can be especially helpful when questions arise about some material that was tested last week, last month or last year. Just load it into MTEST and see the same results away from the machine.

**Single or Batch Test Runs**

Save results to a single file or a multiple test results (MTR) file – your choice. Single results file includes the header information, user defined display fields, specimen geometry, specimen dimensions, results of analyses selected, and the X-Y graph. A series of tests can be stored in a Multiple Test Results file for later printing or ASCII conversion.

**Statistics**

High, Low, Mean, Standard Deviation and +/- 3 Sigma are calculated and displayed on MTR files. Printing Single or Multiple Results can be immediate after the test or later. A statistical summary for each calculated test parameter is provided on test reports where three or more samples are tested.

**Real Time Graphs & Analysis**

"Real-time" displays of test curves occur as the test progresses and the live display automatically re-scales. At the conclusion of the test, the chosen analyses are run, such as Young's Modulus, % Offset Yield and Extension Under Load (EUL) with lines displayed on the screen plot and printed on the X-Y graph.

**Specimen Geometries**

Flat, Round, Cylinder, Cube, Hex, Pipe, Tube, Beam Center, Beam 3 (or 4) point, CTOD Clevis and Area geometries allow for stress calculations. At test completion a Pop-Up window opens to allow the final gauge length and/or area to be entered.

**Multiple Calibrations**

Five load transducer and five extensometer calibrations can be active at one time. Each consists of two to five calibration points. Low ranges on high capacity testing machines are then possible. If more calibrations are required, an infinite number of files can be saved to disk.

**Networking**

A remote MTest program can re-analyze, print or export data. This includes the ability to redraw X-Y plots and graphs using different axis and values. When used over a network, post-test analyses, reports etc can be done remotely, freeing up the machine operator.

**Extensometer Removal**

The strain reading can be "Frozen" via mouse click or function key, enabling removal of the extensometer prior to sample break – for those cases where that is necessary. If Strain control is active, the system automatically reverts to Position control for finalization of the test.

## Full Automated Mode

When a frame has a servovalve, it requires a Level 2 upgrade. To add a servovalve, we offer a level 3 – otherwise most upgrades are level 1. If your machine has a dial indicator you are working with a level 1 machine.

**Control Modes**

There are three automatic modes included 1) Monotonic, 2) Cyclic and 3) Segmented. Position, Strain and Load Rate control are then user selectable. Each mode has separate 'tuning' variables that allow the installer or user to tune the machine and optimize its performance. That allows a system to be set up to match test requirements.

**Monotonic Control**

Apply a controlled ramp rate to the specimen at the user specified rate until the specimen breaks or the operator stops the test. Test rate can be based upon the Load, Position, or Strain value. A user defined stepped function allows you to move the machine to a Load, Position or Strain value, then STEP it to another, another and then another - as many times as desired. This is particularly helpful where fixtures need to be adjusted at points during the test (e.g. applying a side load to a specimen once a certain amount of compression has occurred).

**Cyclic Control**

Load, Position, and Strain control rate variables can to be intermixed with Load, Position and Strain -Cyclic limits and repeated. Use a Position rate to move the machine to a specified upper load limit is reached. Then move the machine in the opposite direction using position control until a lower load limit is achieved. Then repeat as many times you choose – making low frequency fatigue testing possible. Note limitations are based on the testing machine itself and rate of data acquisition.

**Segmented Control**

Mix multiple rates and targets using the load, strain and position values. Stepped functions, including holds, can be quickly and easily defined and implemented. You can, for example, load the specimen at a load rate until a strain value is achieved, then maintain control at the selected strain value for a specified time duration. At the end of the timed segment, control can return to load or any of the other control variables. This capability makes even complex control simple to implement.

## Take the Next Step. Evaluate our software.

The first step towards upgrading is to define whether you seek to add data gathering, analysis and report generation or whether you want full automated test control from a PC. A new upgrade provides the opportunity to optimize your system, taking advantage of your years of experience with the machine. TestResources strives to deliver both flexible yet easy-to-use, cost effective solutions. We also offer free phone support and in-house and on-site training to help you get the most out of your investment.

| Level 1 – Software and Data Capture | Level 2 –Control Replacement | Level 3 –Machine Upgrade |
|---|---|---|
| Adds digital data capture and software analysis to manual UTM's. | Replaces controls on machines with existing hydraulic pump and servovalve. | Add or replace servovalve, hydraulic pump and apply Level 2 Control package. |
| Electronic Enclosure with Channels for<br>o Load<br>o Extensometer (e.g. Epsilon)<br>o Encloder | Same as Level 1 plus<br>o servovalve driver<br>o Closed loop load, strain and position rate control when transducers are available. | Same as Level 2 |
| MTest Software Package – all analyses included. Manual Included. | Same as Level 1 with control activated. | Same as Level 2 |
| **Options**<br>o LVDT Extensometer Channel<br>o Pressure Transducer with Cable<br>o Load Transducer with Cable<br>o Extensometers & Fixtures<br>o Encoder for table position readout<br>o Installation & Training<br>o Calibration Services | **Options same as Level 1 plus**:<br>o Operator Control Station (ON/OFF, AUTO/MANUAL, ESTOP, LCD Display) | **Options same as Level 2** |

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