

M Controller

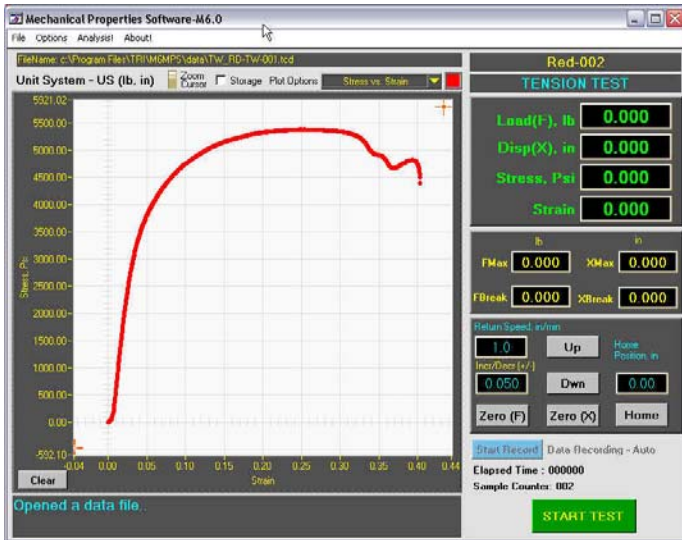
The M Controller is a constant speed controller that serves several standard tensile and compression tests needs.

It operates as a standalone (no PC needed) controller that controls a simple ramp to failure or a ramp to static load. At the conclusion of the test it displays peak load and deflection information.

With optional M Plus software, the system becomes computer programmed with single or multiple steps made possible with the addition of a Windows based PC. It programs the machine, captures, displays, plots and analyzes real time load, (optionally) strain and position data.



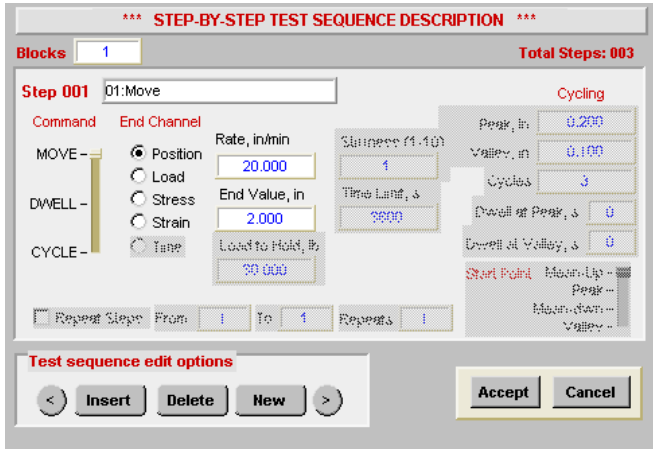
M Plus Machine Control, Measurement, and Analysis Software - Optional



Test Setup panels enable the operator to store and report test details and parameters such as project ID, sample descriptions (material, composition, batch, manufacturer, conditioning), test and machine description, operator and customer info and company contact details. The user can define Sample ID, Test Details, and Test Sequence.

Sample details including Geometry, Diameter, Inner Diameter, Width and Depth, Cross sectional Area, and Gauge Length.

Test Sequence – enter blocks, steps, commands including move, dwell and cycle, End Channels, Rate, End Value, Sample stiffness, Time Limit, Cycling mode, and start point.



Data Capture with Manual or Auto Recording - record when the test starts and stops recording when test stops, or when the user chooses. File name starts with the assignment file name then the prefix and followed by sample counter. Data export is available for either latest data file or any previous data files. Data export can be made to a *Text* file or *Excel* file.

Exported data contains test description as recorded in assignment file and time, load and displacement data in columns:

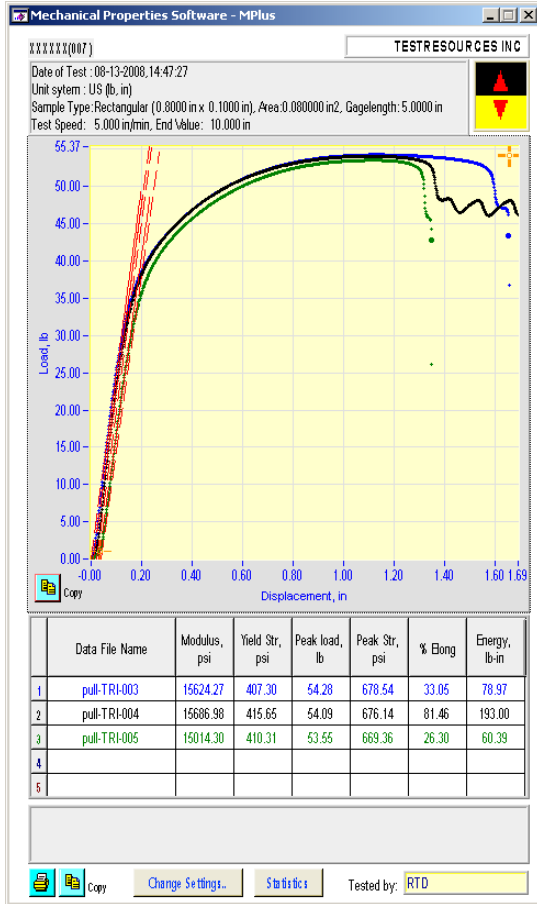
Assignment File : c:\Program Files\TRIM6MPS\data\TW_RD-TW-001.msdc

| SI No. | DataFile | c/s Area in ² | Yield Load lb | Peak Load lb | Yield Stress psi | Yield Strain |
|--------|-------------------|-----------------------------|------------------|-----------------|---------------------|--------------|
| 1 | TW_RD-TW-000.msdc | 0.0034 | 14.04 | 18.11 | 4106.43 | 0.05 |
| 2 | TW_RD-TW-001.msdc | 0.0034 | 13.83 | 18.41 | 4044.15 | 0.06 |
| 3 | TW_RD-TW-002.msdc | 0.0034 | 13.48 | 17.92 | 3940.35 | 0.06 |
| | Average | | 13.78 | 18.15 | 4030.31 | 0.06 |
| | Std.Dev | | 0.29 | 0.25 | 83.9 | 0 |
| | Maximum | | 14.04 | 18.41 | 4106.43 | 0.06 |
| | Minimum | | 13.48 | 17.92 | 3940.35 | 0.05 |

Typical Test Analysis

Multiple parameters are extracted and calculated from test data to provide materials property data such as modulus, yield point, and percent elongation. Modulus is computed between two user-defined points in terms of load on the test data, and the core deflection is computed from user-defined percentage deformation point. These two settings are to be done in *settings* panel of the report sheet. These settings are saved to configuration file, each time you change these parameters. A report sheet is generated based on settings saved on configuration file. Load versus displacement graph is displayed along with modulus line, user-defined core deflection line and actual core-deflection line generated by analyzing the data as per common mechanical properties. Extracted results are tabulated below the graph.

- ✓ Modulus
- Yield Stress
- Peak Load
- Peak Stress
- % Elongation
- Energy
- Yield Strain
- Disp at load
- Load @ break
- Disp @ break
- Disp@Peak load
- Load @ % def'n
- Strength @ % def'n
- Breaking Strength
- Max Strain
- Operator



A statistical analysis is performed for the multiple files that compute average, standard deviation and maximum and minimum of all the result parameters. A text file is generated for statistical data.

pull-TRI_stat.txt - WordPad

Customer: XXXXX
 Operator: MP
 Company Info: Test Resources Inc
 680, Industrial Circle South
 Shakopee, MN 55379, USA
 Email: support@testresources.com

Unit system: US (lb, in)
 Sample Type: Rectangular (0.8000 in x 0.1000 in)
 Area: 0.080000 in²
 GageLength: 5.0000 in
 Test Speed: 5.000 in/min
 End Value: 10.000 in

| S/No. | DataFile | c/s Area in ² | YieldLoad lb | PeakLoad lb | YieldStress psi | YieldStrain | Modulus psi | Peak Stress psi | %Elongation % | |
|---------|------------------|--------------------------|--------------|-------------|-----------------|-------------|-------------|-----------------|---------------|--------|
| 1 | pull-TRI-003.msd | 0.0800 | 32.58 | 54.28 | 407.30 | 0.03 | 15624.27 | 678.54 | 33.05 | 43.426 |
| 2 | pull-TRI-004.msd | 0.0800 | 33.25 | 54.09 | 415.65 | 0.03 | 15686.98 | 676.14 | 81.46 | 43.273 |
| 3 | pull-TRI-005.msd | 0.0800 | 32.83 | 53.55 | 410.31 | 0.04 | 15014.30 | 669.36 | 26.30 | 42.839 |
| Average | | | 32.89 | 53.97 | 411.09 | 0.03 | 15441.85 | 674.68 | 46.94 | 43 |
| Std.Dev | | | 0.34 | 0.38 | 4.23 | 0.00 | 371.60 | 4.76 | 30.09 | 0 |
| Maximum | | | 33.25 | 54.28 | 415.65 | 0.04 | 15686.98 | 678.54 | 81.46 | 43 |
| Minimum | | | 32.58 | 53.55 | 407.30 | 0.03 | 15014.30 | 669.36 | 26.30 | 42 |

For Help, press F1

User Based Programmable mode

Some users seek to control the machine via their own control software. The machine firmware is programmable by a remote PC via connection via serial port (RS232) cable. The machine settings can be sent to the M controller and test data acquired with a user developed serial interface program (e.g. Winwedge, hyperterminal and other programs).

Communication Commands between PC and M Controller

| Command | Description | Example | Result |
|---------|--------------------------------|---------|-----------------------------------|
| R | Begin Test | R\$ | Same as Start key |
| E | Return to zero position (home) | E\$ | Same as Return key (to 0.00) |
| H | Stop Machine | H\$ | Same as Stop key |
| 0 | Rezeros load cell and position | 0\$ | Same as 0 key (0.0N; 0.00mm) |
| 01 | Rezero position value | 01\$ | 2.0N ; 0.00 mm |
| 02 | Rezero load cell value | 02\$ | 0.0N ; 7.00 mm |
| A | Actual readings | A\$ | Force; Displacement |
| M | Last readings (max values) | M\$ | Fmax ; Xmax |
| N | Read nominal load | N\$ | 2000 (Load cell = 2000N) |
| B | Last readings (peak break) | B\$ | Fbreak ; Xbreak |
| Reset | Hard reset | Reset\$ | Resets system |
| Vxxx | Set speed | V100\$ | V=100mm/min |
| Lxxx | Set end position for test | L100\$ | X=100mm |
| Xxxx | Move to position | X20\$ | 20 mm in up position |
| S | Ask for status | S\$ | Machine condition inquiry |
| Fxxx | Set force limit in test | F200\$ | FlimitS=200N |
| Dxxx | Set load dropoff to end test | D20\$ | Fdelta=20N |
| Pxxx | Set F0 or preload | P0.4\$ | F0=0.4N |
| Jxxx | Set return speed | J200\$ | VR=200 mm per minute |
| G | Read configuration file | G\$ | Send configuration data |
| C | Write configuration data block | C\$ | Receive configuration data |
| K1 | Set Constant Load control mode | K1\$ | Switch to load control (static) |
| K0 | Return machine to normal mode | K0\$ | Set machine to speed control mode |
| Qxxx | Set constant force level | Q200\$ | Force level = 200N |
| T | Read software version number | T\$ | HEX-3.65 12.2001 |