NEWAGE® MT90 Series
Microhardness Traverse Testing System

The NEWAGE® MT90 Series is an automatic microhardness testing system that uses the Rockwell method for the hardness result. Hardness is measured based on the depth of penetration rather than using an optical system to determine hardness based on the impression diameter. A key advantage of the MT90 Series is the very fast testing cycle- test reliability is greater than traditional microhardness testers also since there is no interpretation of the impression required. Operators no longer need to maintain such a high skill level. Mounted samples no longer need the same high level of preparation.

In comparison to automated optical microhardness testers, the MT90 Series is less dependent on surface conditions. There are no difficulties with dark spots or varying light levels on the sample that can easily mislead the optical interpretation of the actual impression edge. The MT90 is often used to test etched parts or on surfaces prepared with 400 grit- much less finishing is required than traditional optical systems.

Case depth analysis is also considerably easier using the MT90 Series. Operators can easily and quickly setup complicated staggered traverse procedures with our graphical setup utility. A traverse will follow the same steps automatically. Performing a traverse is so fast that it can be used for process control. The operator starts with a point-and-shoot procedure and the MT90 does the rest. Setting up multiple specimens is a simple point-and-shoot. Locate the starting point and the traverse direction on each sample and start the test. Up to 24 traverses can be setup as part of a single procedure.

The MT90 Series' electronic console and test head perform the Rockwell type test and provide the direct readout and the result output. The console provides various functions which can be used in the manual mode to test parts in the non-traverse model. The test head applies the preload (minor load) and major load during the test cycle. The console performs the start, motion and stop and receives the signal from the transducer that measures the diamond indenter penetration. The test head may be supplied with single or dual loads.

Features

- Uses Rockwell Test Method
- Easy to Setup, Operate and Maintain
- Manual Mode and Traverse Modes
- Requires Minimal Sample Preparation
- Simple Traverse Setup
- Multiple Traverse Capabability
  - Up to 24 Traverses for a single procedure
- Statistical Analysis
- Comprehensive Data Management

Shown: MT90 Series microhardness tester with X-Y table and printer operating on an older-style computer system

Specifications

Test Method:	Rockwell, penetration depth
Test Cycle:	Automatic with 1000 gf load
Time per Cycle:	7-9 seconds
Positioning:	Motorized X-Y positioning
	Better than 0.00025"
Penetration Depth:	Better than 0.001" resolution
Video:	CCD video with 20-140X magnification
Scale:	HRC with scale conversion
Operating Temp:	50°F to 120°F
	10°C to 49°C
Warranty:	1 year

Quality Assured.

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Hardness Testing

The NEWAGE® MT90 System is a modular and cost-effective solution for applications requiring advanced microhardness testing functionality such as complex case depth traverses. The MT90 System starts with a Newage MT90 microhardness tester with video camera, combined with our software, personal computer and any required accessories, such as a motorized X-Y-Z axis positioning table.

The MT90 System uses a video camera connected to a personal computer to view and optically measure test impressions made by a microhardness tester. The software and camera operate independently from the tester they are connected to. The personal computer does not need to control any of the mechanical or electronic functions of the tester, although the software may be setup to control the tester and any associated accessories such as a motorized positioning table.

The MT90 System software complements the advanced video capabilities of the system by providing comprehensive test setup tools, including intelligent prompts and menus that guide the user through the test configuration process- from basic microhardness testing to sophisticated case depth profiling. Test configuration is intuitive and information is presented in a logical, step-by-step sequence. A variety of testing attributes are presented for your testing. Configuration is as simple as selecting options from a list. There is minimal text entry.

Once the test setup is configured, the MT90 System provides the user with a variety of on-screen navigation tools. For example, on-screen navigation with motorized positioning lets you select from four ways to direct movement of the test sample using an X-Y table. Navigation can use the computer mouse or a virtual joystick controlled from the computer display. Directional arrows on the display allow you to jog the position of the sample by 1µ (0.001mm) increments- ideal for stepping through traverse positions. Operators can be prompted during the test to enter specific information about the current test process. When the automatic measurement function is used, operator influence is eliminated.

The MT90 System's on-screen analysis is exceptional. A comprehensive display shows your hardness results, converted values and tolerances at a glance. You can measure total case depth in standard or full screen viewing mode or perform detailed image analysis such as grain sizing or crack length. Operators can even orient the traverse direction to each test part, on the screen, and within seconds. Viewing the impression and positive positioning of the filars from the displayed image is much easier and faster than having to use an eye piece.

The MT90 System supplies comprehensive data management tools and report generation capabilities. A variety of standard report formats are provided. Operators can capture images of the impression, plot overlays or multiple case curves for comparison, perform statistical calculations and general tabular and graphical reports- quickly and easily.

Configuration

Test Setup
The MT90 System software is file-based. All setup parameters such as hardness sale, tolerance limits, part information, etc. are created and saved with the individual file. Files are created in a .csv format. Each new file has a set of attributes that define the test file. These attributes include:

- Part Number
- Part Name
- Spec Order
- Heat Number
- Load Number
- Furnace Number
- Lab Number

You also have the ability to add "comments" to further define the test setup file.

Scale Selection and Conversion
During test setup you configure a primary and secondary scale. The primary scale is normally HRC. The secondary scale is any scale you would like to be able to convert your hardness result to. A menu is provided for scale setup.

Averaging
Averaging allows you to save averaged results for a group of tests rather than the results of each and every individual test result. You may specify the number of results that comprise a Group for which the averaging is performed. Options for averaging include: use all results, eliminate the highest and lowest result, eliminate the furthest result from the average, and eliminate if the standard deviation exceeds a user-defined value.
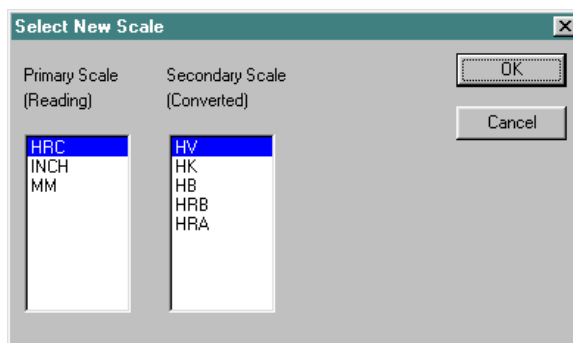
Shown: Select your primary and secondary scale. Results will be displayed in the primary scale. Conversions may be made to your secondary scales.
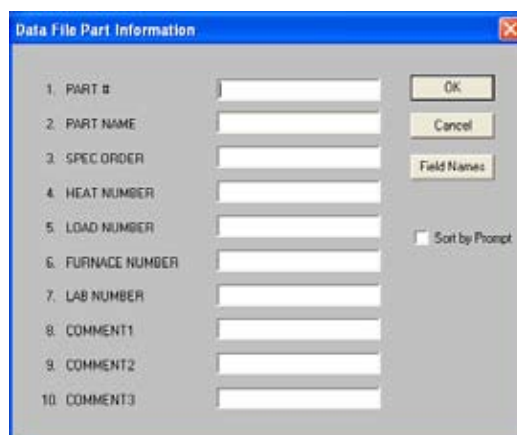
Shown: Intelligent prompts, menus, dialog boxes and list of values are intuitive and help make configuration and setup easy.

Shown: Case depth menus guide users through the setup process.

Tolerances

You may set tolerances for your test to provide warnings and indications on individual test results. Tolerance settings include: low tolerance limit, low tolerance warning, high tolerance limit and high tolerance warning. Tolerance limits can be set to produce an audible alarm and they can be setup to require the operator to acknowledge the tolerance condition.

Test Parameters

Menus are provided for selecting the load, time-at-load and the magnification for your camera. Loads are presented in both gf and N units of measure. Load time is presented in 5 second increments. Magnification is from 40X to 100X in 10X increments.

Round Correction

When the test setup load is greater than 1000 kgf a round correction factor may be specified. When selected, a prompt for round correction will be displayed after each test. Options are available for spherical and cylindrical specimens as well as concave and convex.

Operation

On-screen Navigation Tools

MT90 System operators frequently comment on the system's exceptional user friendliness. The on-screen navigational tools are intuitive and easy-to-use. As an example, a right click of the mouse automatically positions the sample from the cursor position to the center of the display- ideal for centering impressions, selecting a test position, or for just navigating across the display.

The on-screen arrow control keys can be used to jog the sample's position or stepping through traverse positions. You can select standard jog increments in metric or imperial units. Metric increments can be set as small as 1μ. You can even define your own increments. Additionally, tools such as the virtual joystick allow the operator to navigate around the surface of the sample quickly and controlling both speed and direction. Using predefined traverse sequences, the operator can automatically move around the test sample to preview test positions in a "dry run" mode, or perform the actual testing making measures of the test positions. You can have a user-defined Home position so you always have a reference position.

Options such as automatic focus are useful when making large traverses because the avoid repeated focus adjustment.

Inch/Millimeter Scale

This function requires the Inch/Millimeter optional add-on. If "inch" or "mm" is selected as the scale during a test setup, the tester will allow the operator to measure distances at any angle.

Automatic Focus

Requires the Automatic Focus add-on, when running traverses and making tests, the automatic focus functions works automatically when the "Prefocus" option is selected. Auto focus may also be controlled manually. The auto focus may be setup for coarse or fine focus.

Advanced Imaging

When the Image Capture option is selected, the SAVE function will permit you to capture the camera image without the program controls or buttons appearing. The image is saved as a .bmp file. The image may be magnified using the magnification controls (1X, 2X).

Shown: Test results are displayed showing the primary and secondary scale. Color is used to indicate the result status relative to the user-defined tolerance criterion.

Shown: Setup status indication shows your currently configured testing attributes.

Shown: On-screen softkeys are used for traverse setup, operation and reporting.
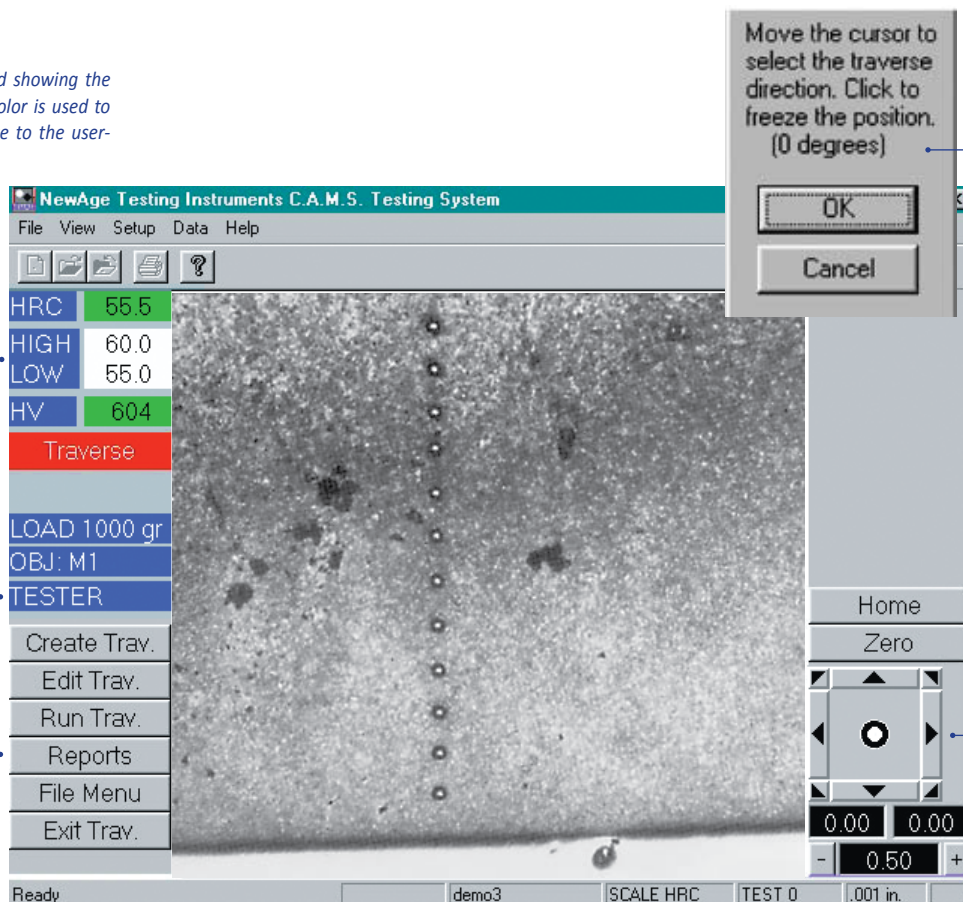
Shown: On-screen, intelligent prompts guide users through setup and operation.

Shown: Navigational tools, such as the virtual joystick, let you navigate the test part for fine positioning at the start point.

Shown: The main results display provides a variety of on-screen information and navigation tools.

Manual Traverse Option

During the traverse test routine and while the tests are being made, the operator is prompted to move to the origin and select the test direction and to rotate the turret to each point in sequence. Once all tests have been made, the operator is taken back through the same sequence of positions in order to read the impression diameters with prompting for each coordinate position.

Automatic Traverse Setup

You can setup an automatic traverse test when the MT 90 System has the optional automatic traverse and motorized X-Y table options. During setup, the user creates the test file and includes attributes such as traverse direction. Individual test points are also located on the displayed image by positioning the cursor in the traverse layout grid. Staggered traverses may also be created if the operator needs to position tests closer than the minimum allowable distance for a given load.

Multiple Traverse Mode

Operators may set up a second, third or additional traverse allowing multiple traverses to be performed. Up to 24 traverses may be configured as part of one procedure. The operator may also select a specific traverse within a multiple traverse procedure.

Effective Case Depth

The operator is prompted to enter the effective case hardness values to calculate the case depth. Up to three case hardness values may be entered for each test file. Each value may have its own effective case depth distance tolerance. Surface test and Core test values may also be established with an "offset" value that determines the distance from the traverse origin and with related hardness tolerances. Case Hardness setup options include User Defined, Nitride Case, Eht Case, Rht Case and Nht Case. The Eht, Rht and Nht Cases all calculate the case depths per ISO and DIN specifications.
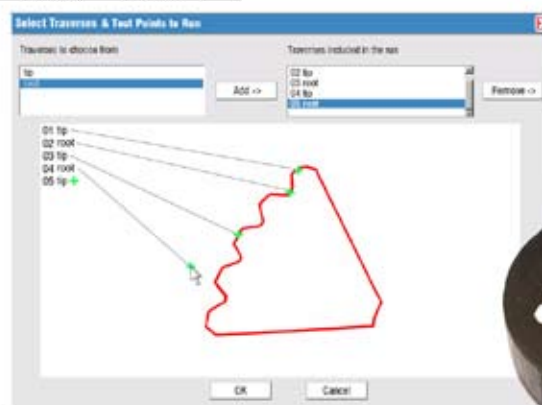
Mapping

The mapping function makes it easier for the operator to locate the beginning points for traverses when multiple traverses are carried out on one sample. If mapping is enabled, mapping starts after the operator selects which of the multiple traverses to include in the particular test sequence. The system prompts the operator whether to map the test sample. If mapping is required, the system rotates to low power and then directs the operator to clock on the edge to the right or left of the center of the screen using the mouse. The system proceeds to track the perimeter of the sample, create a red outline of the sample until the operator locks again. Next, the operator is requested to locate the position of the traverses. When the traverse testing is initiated, the system will automatically position the sample near the starting pint for each traverse. The operator only needs to exactly position the traverse origins and proceed with the testing.
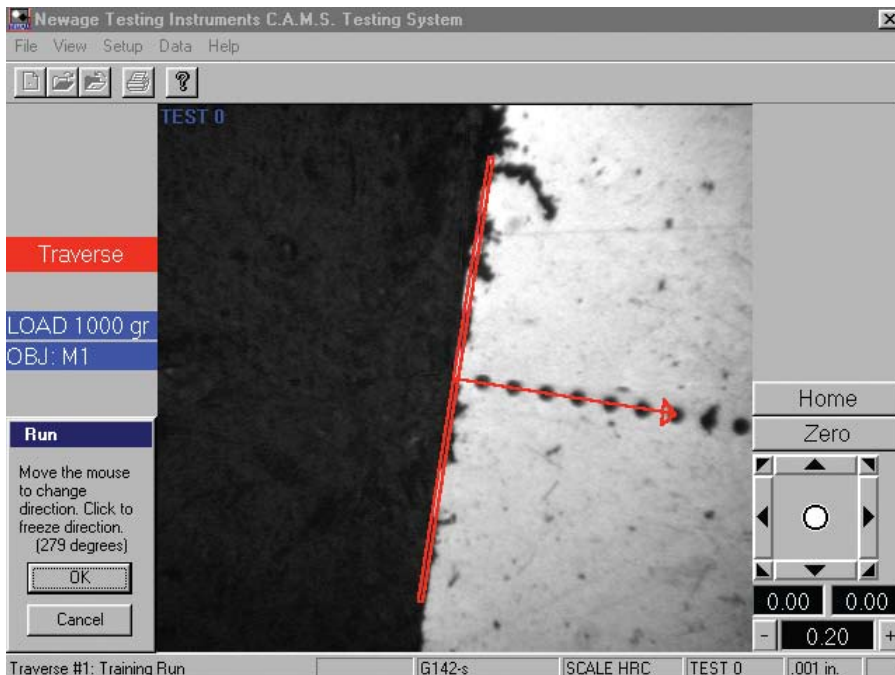
Shown: Performing a traverse is as simple as identifying your points and direction..
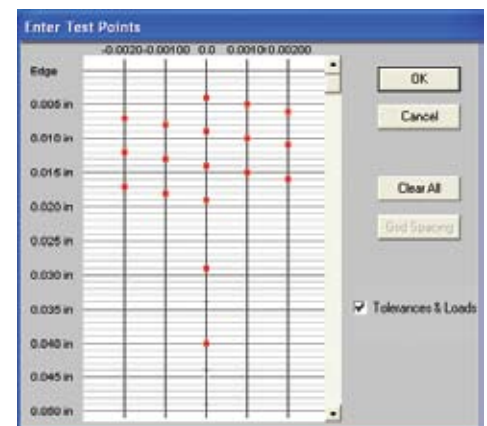
Shown: Using predefined traverse sequences, the operator can automatically move around the test sample to preview test positions in a "dry run" or "simulated" mode, or perform the actual testing.

Shown: Mapping lets your track the perimeter of your sample and helps locate the beginning points for traverses when multiple traverses are being performed on a sample.

Data Management and Reporting

The MT90 System features an assortment of reports and dsiplay views that help analyze your test data. There are seven different views that can be accessed via a menu: X-Bar and R Chart, Histogram, History Data, Tile, Auto Tile, Tool Bar and Status Bar.

A report view shows the data from the current test file as well as the associated histogram and X Bar/R Chart.

An on-screen statistics display shows a comprehensive statistical report for a range of user-defined results.

The display report is provided for each test result. If multiple traverses are setup under a traverse specification, then two pages will be reported for each curve.
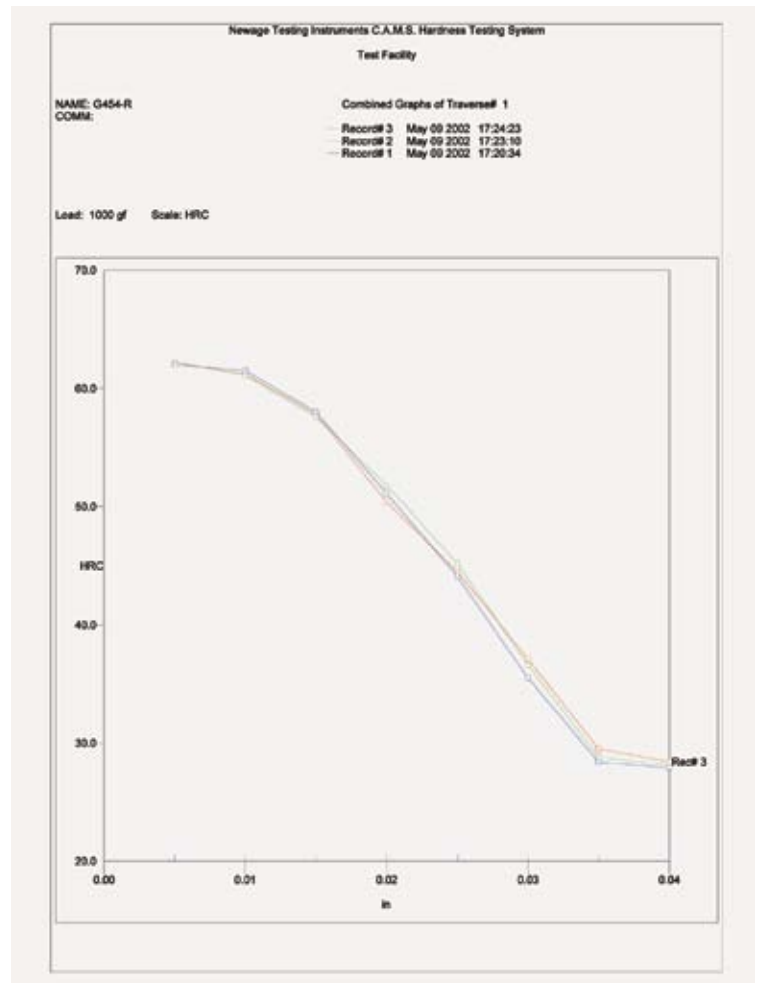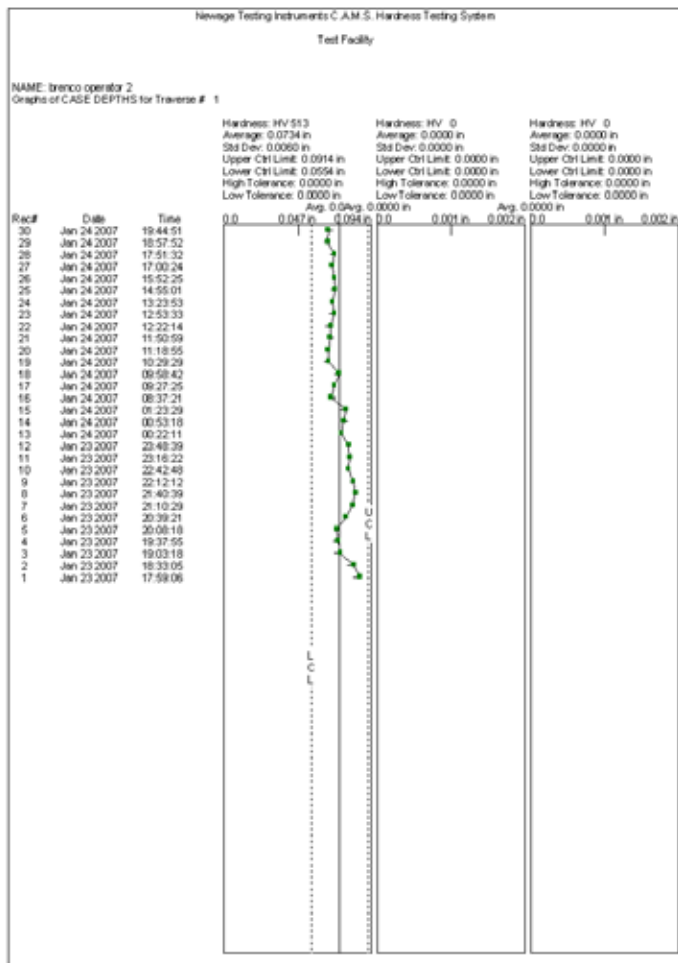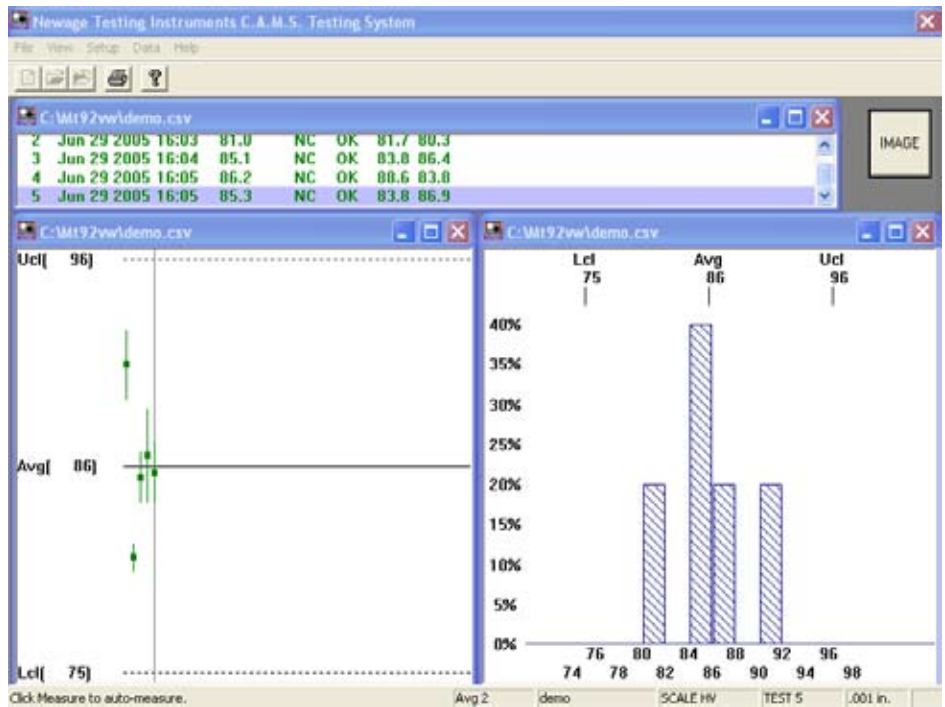
Shown: A wide array of reports are available and we can help customize report formats for your specific requirements. Operators can enter comments within a report, capture images in .bmp formats, and plot overlays for graphical comparisons.

Ordering

MT90 Series Systems

Model	Description
MT-90/ASW	Fully automatic MT90 Microhardness System, automatic X-Y, software
MT-90TS/C	Semi-automatic MT90 Microhardness System, manual X-Y, software
MT-90/500	Basic MT90 Microhardness Tester, 500 g load
MT-90/1000	Basic MT90 Microhardness Tester, 1000 g load
MT-90/5000	Basic MT90 Microhardness Tester, 5000 g load
C50011011	Dual major load option, for MT90 (500g and 1000g)

Options

Model	Description
MT90-GR	Special software for graphic traverses on welds
SA-0218	NewLite LED illumination system, for MT90 USB powered
SA-0221	NewLite LED illumination system, for MT90 110Vac powered
C50011101	Vibration isolation pads, set of 6

Bulbs for Scope

Model	Description
MT-327	Incandescent bulb, threaded-type (Optem style scope)
MT-201	Incandescent bulb, 2-pin, bayonet-type (Optem & Leice style scopes)
MT-202	Halogen bulb, push and turn with side knob-type (automotive) (old-style scope)

Minimum System Requirements

- Pentium® or Celeron® Processor minimum 1.7 GHz speed
- Windows® XP Pro or Windows 2000
- At least 1 PCI slot
- Two available serial ports
- USB 2.0
- VGA color monitor with "Direct Draw" video card
- Hard Disc Drive (250 Mb minimum)

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