New paths in mobile hardness testing

Extensive fields of application
The Krautkramer TIV sets new standards in mobile hardness testing: tests are not only independent of the test position and direction of testing but in this case also of the test object’s material and mass or geometry. Consequently the TIV opens up a large variety of new application fields which were previously not open to portable hardness testers.

Some application examples
Examples of possible application areas for the TIV hardness tester are as follows:
- Heat treat shops – easy and fast determination of surface hardness, no calibration required
- Aviation – on-site hardness testing on thin-walled components and on different alloys without any additional calibration
- Manufacturers of coils – at last reliable mobile hardness testing on sheet metal
- Testing companies – on-site measurement by means of a universal, portable unit
- Research institutes, labs, and training companies – "view through the diamond": observation of the indentation process, and measurement control

Specifications and Accessories

Test method
"Through Indenter Viewing": optical hardness testing method according to Vickers under test load; with an optical system including CCD camera for the automatic or manual determination of diagonal lengths through the diamond; optical control of the diamond indentation by means of display image.

Probes
Hand-held probe TIV 105; test load 5 kgf (50 N),
Hand-held probe TIV 101; test load 1 kgf (10 N),
sizes approx. 220 mm x 52 mm / 8.7" x 2.0" (L x dia.)

Materials tested
Static load application enables hardness testing on the most different materials without any additional calibration, e.g.: steel, nonferrous metals, carbide metals, ceramics, glass, plastics

Range of measurement
Depends on the probe;
for TIV 105: approx. 100 HV – 1000 HV,
for TIV 101: approx. 30 HV – 500 HV

Display
1/4 VGA color TFT display, 5.7" visible range;
115.2 mm x 76.8 mm / 4.5" x 3.0",
240 x 320 pixels, backlight

Dialog languages
For example: German, English, French

Battery charge indicator
Low-Batt indicator, instrument switchoff with undervoltage

Operating system
WinCE

Interfaces
RS 232 bidirectional, Ethernet 10 Mbits

Housing
Injection-molded plastics

Temperature ranges
Operation: -0°C to +32°C F to 122°F
Storage: -20°C to +70°C / -4° F to 158°F

Weight
Approx. 1.4 kg / 3.1 lb

Size
78 mm x 215 mm x 180 mm / 3.1" x 8.5" x 7.1" (H x W x D)

Test attachments
Carrying case, diamond cleansing cloth, hardness reference blocks with certificate, battery-driven grinding set for surface treatment, printer cable, different test supports and probe attachments, application software UltraDAT
Mobile hardness testing - with the special view

The method
Innovative Krautkramer technology ensures another step forward in mobile hardness testing: the TIV method (Through Indenter Viewing), based on hardness testing according to Vickers, makes it possible to "see through" the Vickers diamond by means of special optics. The hardness is measured under load; as soon as the test load is reached, the image of the test indentation is transferred and evaluated directly, automatically, and quickly.

Yet another benefit: you can use the TIV to measure even very thin test objects, such as coils or sheet metal and metal foils, on which stationary or mobile hardness testers have previously failed, without any problem. Consequently, hardness testing becomes independent not only of the material but also of the mass and geometry of the test object. This means that the TIV opens up new application fields for mobile hardness testing.

The advantages – your benefit
The TIV hardness tester can be used irrespective of the material – without any additional calibration. You can use the same instrument to measure the hardness of all sorts of materials without any reference specimens and without any laborious settings: from steel and nonferrous metals through plastics, carbide metals, glass, and ceramics up to different coatings.

The static application of the test load reduces the vibration of the test object and therefore the influence of the test material's elastic properties on the test result.

The special instrument
The color LCD of the TIV hardness tester does not only show you the image of the diamond's indentation but also the directly displayed reading in the selected hardness scale. The graphic user interface shown on the display is adapted to the known Windows standard. In this way, you will swiftly have a good grasp of how the instrument should be operated, irrespective of if you want to configure, measure, evaluate, or store. The special extra: You do not need a mouse to select functions because the instrument has a touch screen capability using a pen. However, as an alternative, conventional pushbuttons are also available for most of the functions.

Measurement and evaluation: direct, automatic, fast

Another Krautkramer innovation
As the first portable instrument ever, the TIV does not determine the size of the indentation of the Vickers diamond, and consequently the hardness of the material, indirectly but directly: "Through Indenter Viewing" means that you can see the indentation of the Vickers diamond "grow" on the surface of the test object at the same time as the test load is applied – this is ensured by special optics and a CCD camera. As soon as the test load is reached, the indentation is automatically evaluated and transferred, which means that the diagonals are directly determined, without making a detour via a measuring microscope. Your benefits: the measurement is not only faster but also excludes subjective errors in the determination of diagonal lengths. Plus: by representation on the display, the TIV is the only hardness tester to enable direct control and immediate evaluation of the measurement quality. In addition, the image of the indentation enables direct recognition of the diamond's condition.

The easy operation
Three main menus make it easier for you to access the most important instrument functions – and you'll always reach your destination by just a few "screen clicks". Do you want to see your test series as a curve, histogram, or statistics? A click is all it takes. The conversion is just as easy for you by selecting another hardness scale. In the menu "Data", you can store your results plus image of the indentation in an easy and straightforward way.

The mobile practice
You can operate the TIV both with a mains connection and with standard cells, or by means of our rechargeable battery pack which allows changing inside the instrument. After a certain period of time, the display goes off, and it can be re-activated by simply touching the touch screen. An automatic switch-off function is triggered after any variable period of time – all data and settings are of course maintained.
Mobile hardness testing - with the special view

The method
Innovative Krautkramer technology ensures another step forward in mobile hardness testing; the TIV method (Through Indenter Viewing), based on hardness testing according to Vickers, makes it possible to “see through” the Vickers diamond by means of special optics. The hardness is measured under load; as soon as the test load is reached, the image of the test indentation is transferred and evaluated directly, automatically, and quickly.

The advantages – your benefit
The TIV hardness tester can be used irrespective of the material – without any additional calibration. You can use the same instrument to measure the hardness of all sorts of materials without any reference specimens and without any laborious settings: from steel and nonferrous metals through plastics, carbide metals, glass, and ceramics up to different coatings. The static application of the test load reduces the vibration of the test object and therefore the influence of the test material’s elastic properties on the test result.

Yet another benefit: you can use the TIV to measure even very thin test objects, such as coils or sheet metal and metal foils, on which stationary or mobile hardness testers have previously failed, without any problem. Consequently, hardness testing becomes independent not only of the material but also of the mass and geometry of the test object. This means that the TIV opens up new application fields for mobile hardness testing.

It goes without saying that all the advantages you already know from our proven hardness testers remain or were improved, e.g., direction independence, user friendliness, data management. Plus a lot more.

Measurement and evaluation: direct, automatic, fast

Another Krautkramer innovation
As the first portable instrument ever, the TIV does not determine the size of the indentation of the Vickers diamond, and consequently the hardness of the material, indirectly but directly: “Through Indenter Viewing” means that you can see the indentation of the Vickers diamond “grow” on the surface of the test object at the same time as the test load is applied – this is ensured by special optics and a CCD camera. As soon as the test load is reached, the indentation is automatically evaluated and transferred, which means that the diagonals are directly determined, without making a detour via a measuring microscope. Your benefits: the measurement is not only faster but also excludes subjective errors in the determination of diagonal lengths. Plus: by representation on the display, the TIV is the only hardness tester to enable direct control and immediate evaluation of the measurement quality. In addition, the image of the indentation enables direct recognition of the diamond’s condition.

The special instrument
The color LCD of the TIV hardness tester does not only show you the image of the diamond’s indentation but also the directly displayed reading in the selected hardness scale. The graphic user interface shown on the display is adapted to the known Windows standard. In this way, you will swiftly have a good grasp of how the instrument should be operated, irrespective of if you want to configure, measure, evaluate, or store. The special extra: You do not need a mouse to select functions because the instrument has a touch screen capability using a pen. However, as an alternative, conventional pushbuttons are also available for most of the functions.

The easy operation
Three main menus make it easier for you to access the most important instrument functions – and you’ll always reach your destination by just a few “screen clicks”. Do you want to see your test series as a curve, histogram, or statistics? A click is all it takes. The conversion is just as easy for you by selecting another hardness scale. In the menu “Data”, you can store your results plus image of the indentation in an easy and straightforward way.

The mobile practice
You can operate the TIV both with a mains connection and with standard cells, or by means of our rechargeable battery pack which allows changing inside the instrument. After a certain period of time, the display goes off, and it can be re-activated by simply touching the touch screen. An automatic switch-off function is triggered after any variable period of time – all data and settings are of course maintained.
New paths in mobile hardness testing

Extensive fields of application
The Krautkramer TIV sets new standards in mobile hardness testing: tests are not only independent of the test position and direction of testing but in this case also of the test object’s material and mass or geometry. Consequently the TIV opens up a large variety of new application fields which were previously not open to portable hardness testers.

Some application examples
Examples of possible application areas for the TIV hardness tester are as follows:
- Heat treat shops – easy and fast determination of surface hardness, no calibration required
- Aviation – on-site hardness testing on thin-walled components and on different alloys without any additional calibration
- Manufacturers of coils – at last reliable mobile hardness testing on sheet metal
- Testing companies – on-site measurement by means of a universal, portable unit
- Research institutes, labs, and training companies – “view through the diamond”: observation of the indentation process, and measurement control

Specifications and Accessories

Test method
"Through Indenter Viewing": optical hardness testing method according to Vickers under test load; with an optical system including CCD camera for the automatic or manual determination of diagonal lengths through the diamond; optical control of the diamond indentation by means of display image.

Probes
Hand-held probe TIV 105; test load 5 kgf (50 N), Hand-held probe TIV 101; test load 1 kgf (10 N), size approx. 220 mm x 52 mm / 8.7” x 2.0” (L x dia.)

Materials tested
Static load application enables hardness testing on the most different materials without any additional calibration, e.g.: steel, nonferrous metals, carbide metals, ceramics, glass, plastics

Range of measurement
Depends on the probe; for TIV 105: approx. 100 HV – 1000 HV, for TIV 101: approx. 30 HV – 500 HV

Display
1/4 VGA color TFT display, 5.7” visible range; 115.2 mm x 76.8 mm / 4.5” x 3.0”, 240 x 320 pixels, backlight

Dialog languages
For example: German, English, French

Conversion scales and resolution
HV (1.0); HB (1.0); HR (1.0/0.5/0.1); HRC (1.0/0.5/0.1); HRB (1.0/0.5/0.1); N/mm² (5.0)

Evaluation
Represented by a curve, histogram, or in tabular form, Calculation of statistical data, e.g.: average, standard deviation, range

Automatic instrument switchoff
After a freely selectable period of time with automatic storage of test data and instrument settings

Battery charge indicator
Low-Batt indicator, instrument switchoff with undervoltage

Operating system
WinCE

Interfaces
RS 232 bidirectional, Ethernet 10 Mbits

Housing
Injection-molded plastics

Temperature ranges
Operation: -0° C to +50° C / 32° F to 122° F Storage: -20° C to +70° C / -4° F to 158° F

Weight
Approx. 1.4 kg / 3.1 lb including MIC 20-BAT

Size
78 mm x 215 mm x 180 mm / 3.1” x 8.5” x 7.1” (H x W x D)

Test attachments
Test attachment for standard applications and measurements using a support

Other accessories
Carrying case, diamond cleaning cloth, hardness reference blocks with certificate, battery-driven grinding set for surface treatment, printer cable, different test supports and probe attachments, application software UltraDAT

We reserve the right to technical modifications without prior notice.

©2004 General Electric Company. All rights reserved.
(+1)-203-963-5004

GE Inspection Technologies
GEInspectionTechnologies.com

Krautkramer TIV
Optical Hardness Tester - Mobile and Direct

GEimagination at work