

Universal Testing Machines

Servohydraulic Testing Machines IBMT4 Series

 Force: 600 - 2000 kN



Since 1970
Made in Spain (EU)

www.ibertest.com



INTRODUCTION

These machines are designed for tensile tests on metallic and non-metallic specimens.

Additionally can be complemented with optional devices for other type of tests as Compression, Bending, Folding, Punching, Penetration, Shear, etc.

MAIN FRAME

Single test space frame, comprised by a base plate, four over dimensioned columns and one upper closing crosshead.

Columns-crosshead preload fixation system

Manufactured according to Standards EN 10002-2; ASTM E4, ISO 7500-1; DIN 51221 and BS1610.

With double-acting hydraulic piston mounted over the upper crosshead, guided by columns, aligned to the upper tensile gripping head.

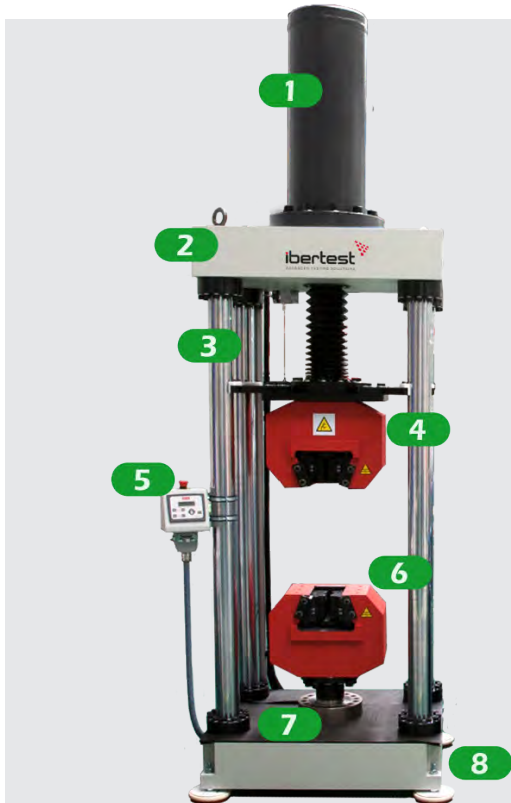
The lower tensile gripping head is serial mounted with the load cell over the base plate.



Anti-rotation system guided by columns



IBMT4-1000-MD2W Testing machine



Identification

- 1. Piston shaft:** high stroke to allow several samples dimensions tests
- 2. Fixed upper crosshead:** designed to provide high test frame stiffness
- 3. 4 chromed high stiffness columns:** to assure rigidity, optimum load sharing and axiality
- 4. Upper Hydraulic gripping head:** with wedge closing system
- 5. UCRB Remote control:** for jaws operation and piston positioning.
- 6. Lower gripping head:** serial mounted with the load cell
- 7. Load cell:** high accuracy, low profile
- 8. Lower plate frame:** machined steel base of the testing frame, supporting the weight of the assembly and closing the testing frame at the bottom

LOAD MEASUREMENT

By means of an universal full bridge strain gage load cell mounted on the lower base

Robust design: to withstand eventual overloads.

High accuracy to assure machine's Class 0,5 (ISO 7500-1) from 1 to 100% of its nominal capacity.

High repeatability and linearity

Additional load cells can be installed, to increase the load measuring capacity and/or for special apps. By means of an universal full bridge strain gage load cell mounted on the lower base

Self recognition system for load cells. Allows control to get auto configured according to capacity and calibration of mounted load cell. Time effective and safety improving (avoids overloads)



DISPLACEMENT MEASUREMENT

By means of wire draw linear position transducer with 1 micron resolution

For controlling piston position, automatic return to start position and stroke control (mm/min).

Once the test is ended, piston returns to initial fixed position to be ready for the next tests, which is really useful for serial/repetitive tests.

This feature can be deactivated using WinTest32 software.



HYDRAULIC SYSTEM

Load application is made by means of a hydraulic piston, located in the upper part of IBMT4 machine frame. To generate the pressure, a servo-hydraulic power unit, is comprised.

The electric drive motor pump generates pressure in the hydraulic system and flow is regulated by a servo valve or a high performance servo distributor. The high pressure power unit is tight fitted and pollution-proof, with very low noise.

Regulating the flow of hydraulic fluid (and hence the charging rate) is performed by means of a high performance servovalve mounted on a manifold (hydraulic distributors).

The power pack assembly, manifold and servovalve is located inside of a work desk and rests on a set of four bumpers which prevent the transmission of vibrations to the frame.

The oil flow in the circuit is restricted through the manifold and the servovalve, increasing oil temperature. The temperature is monitored by a thermostat which activates the system if necessary.

It is also necessary to use clean oil free of water and particles. To achieve this, the circuit incorporates oil filters with interchangeable cartridge for necessary replacements.

The working desk is made with aluminum fully paneled in painted steel sheet with epoxy finish for high corrosion resistance.



ELECTRONIC CONTROL SYSTEM

Closed-loop control the speed of load application, commanded by an microprocessed electronic module, model MD2

The module is installed in the operating frame of the machine and its operation is completely independent of the computer that connects via USB 2.0 or Ethernet.

Thus, the user can, if desired, replace the computer on their own without intervention of Service Technical Assistance IBERTEST without adjustments or recalibrate the machine.

The software acquires WINTEST32 these real-time data for graphing, calculations, sample results, etc..

CLOSE LOOP CONTROL

Signals coming from different transducers (load cell, encoder, extensometer, etc) are compared with the command value, defined previously on the test parameter via software. The error of the comparison is sent to the servomotor to be corrected, closing the control loop.

The frequency of this loop is 1 kHz (1000 times per second) with MD2 module. (higher frequencies on request).

Close loop control can be defined against any reading channel (load, position or strain).

TRANSDUCERS AUTOMATIC RECOGNITION

When connecting a load cell or an extensometer, the MD2 module automatically collects its data calibration (linearization, measuring range, units, etc..)

These data are stored in a built-in transducer connector EEPROM memory, which allows the exchange of cells or transducers without losing the calibration data.

The maximum resolution obtainable in each transducer is $\pm 180,000$ points on each channel.

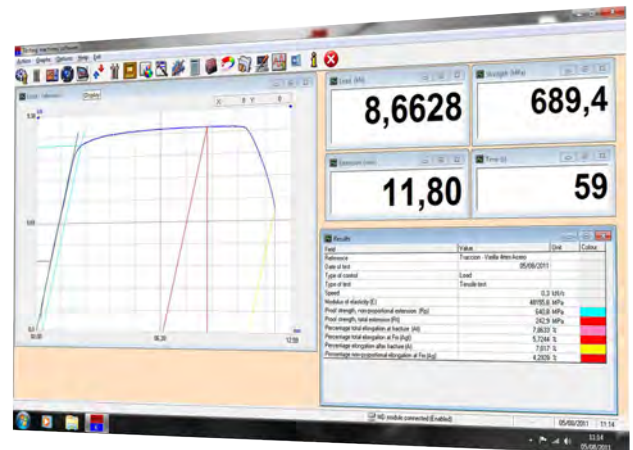
NEW: ALL in One touch PC interface

New user interface, with embedded touch screen PC, modern, easier and with improved performances.

A real alternative to conventional table top PC's, combining compact CPU design with TFT touch-screen, with all the performances of traditional desktop PC systems.

The PC "All in One" saves laboratory space and offers a good working position, both WinTest32 software as testing fixtures.

This system is directly fitted to testing frame with an orientable support, reducing space requirements and offers an ergonomic working position for machine operation as well as for testing devices management. With integrated WiFi connectivity, as well as multiple USB ports to connect optional accessories (keyboard, mouse, USB memories), etc.



STANDARD TENSILE GRIPPING HEADS

The machine most common tensile gripping-heads, have hydraulic closing system and interchangeable wedge-type jaws.



Hydraulic tensile gripping heads

Due to applied initial clamping force, these wedge type grips are also suitable for testing metallic and non metallic specimens even with high surface hardness.

Gripping heads are supplied with several sets of interchangeable jaws for round and prismatic specimens testing.



DEVICES FOR BENDING AND COMPRESSION TESTS

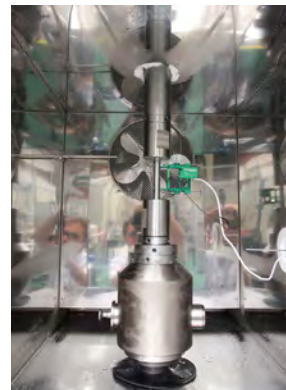
Compression plates and bending test devices, can be directly placed over the gripping heads, minimizing devices change time.



Compression plate mounted on hydraulic grip

Other tensile devices (optional)

The wedge lock system of the heads allows direct or indirect mounting of many other tensile devices:



Devices and furnace for high temperature tensiles tests



Tensile of headed specimens



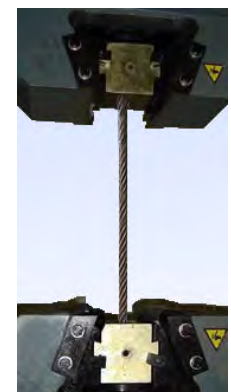
UCRB: Remote Control for opening/closing jaws and piston positioning

Includes a remote control unit UCRB for initial positioning of piston and independent jaws opening and closing of gripping head.

Remote control units with improved performance are also available.



Chain tensile tests



Wire strand specimen tests

Servohydraulic Testing Machines - IBMT4 Series

TABLE OF MODELS AND CHARACTERISTICS

MODEL	IBMT4-600	IBMT4-1000	IBMT4 -1500	IBMT4-2000
Maximum load	600 kN	1000 kN	1500 kN	2000 kN
Class	1 o 0,5 according to ISO 7500-1			
Measurement range	From 1% to 100 % of the load cell nominal capacity (autoscale)			
Load resolution	5 digits with floating comma			
Load cell	Universal strain-gage load cell (tension-compression). Additional load cells can be installed			
Load cell repeatability	Best or equal to $\pm 0,05$ %			
Piston stroke	600 mm	600 mm	700 mm	800 mm
Free distance (between columns)	600 x 400 mm	700 x 400 mm	800 x 400 mm	800 x 500 mm
Max.distance between standard tensile gripping heads	700 mm	820 mm	1100 mm	1150 mm
Max. distance between standard compression plates	400 mm	500 mm	500 mm	500 mm
Piston displacement speed	100 mm/min	75 mm/min	50 mm/min	50 mm/min
Displacement resolution	0.001 mm (1 μ m)			
Testing frame dimensions: (width x depth x height)	850 x 620 x 2950 mm	980 x 800 x 3200 mm	1160 x 800 x 3950 mm	1200 x 900 x 4350 mm
Testing frame approx. weight	2600 kg	4550 kg	6900 kg	9050 kg
Total power consumption	11 kW	11 kW	12 kW	15 kW
Power supply	Tensión trifásica 380 V más neutro y tierra, 50/60 Hz (a especificar).			

IBERTEST reserves the right to modify the specifications described without prior notice.

ELECTRONIC DIGITAL MODULES

CONTROL SYSTEMS

MD CONTROL UNITS . MODULAR SYSTEM

Electronic controller units MD are specially designed for data acquisition and close loop control of testing instruments.

Measuring transducers are plugged to the MD module and the measurement is exported to the computer via USB or Ethernet.

The IBERTEST software WinTest32 makes data collection and shows real-time for drawing graphs and test results calculation.

This new system, based in external modules, substitutes the old electronic cards mounted into the computer, improving the performance, reliability and data acquisition speed.

Due to the external module configuration, the computer can be fast and easily changed by any other suitable PC or laptop, without need to make adjustments or calibrations.

This is very useful in case of eventual breakdown of the computer, or when obsolete computer needs to be changed.

MD2 MODULAR CONTROL UNIT, FOR STATIC TESTS

MD2 unit has been designed for **static** machines. The MD2 can be used either in electromechanical or servohydraulic machines.

The MD2 unit has the following input channels:

- Load channel. With a resolution of ± 180.000 steps. For the connection of a load cell or pressure transducer.
- X-Head position channel. For connecting a digital incremental position transducer (encoder) or a resolver (encoder emulator) or position transducers (SSI, draw wire linear transducers, etc.)
- 2 Bus extension slots for data acquisition cards "plug-in" type, for connection of further load cells, extensometers, LVDTs, position transducers, etc.

The MD2 unit comprises an analogical $\pm 10V$ drive channel for a servovalve (hydraulic machines) or a servomotor (electromechanical machines).

MD2 features a high quality build-in electrical safety box, dustproof, ensuring the perfect state of the internal electronics.

This compact box allows to integrate the module within the frame of the machine itself (TESTCOM model) or within the electric panel of the machine (machines EUROTEST, IBMT4, UMIB, IBMU4).



The transducers comprises connector-plugs with built-chip EEPROM memory.

The transducer calibration data (unit of measure, range, zero position, linearization, etc.) are stored in the EEPROM memory. Thus, the transducer is automatically recognized as input channel when plugged to the by MD

Electronic digital modules MD

PID CONTROL

The MD module uses PID (proportional-integral-derivative) for control loop feedback of the application of force to the test specimen.

The PID controller calculates an error value as the difference between the measured process variable (force, position or strain) and the desired setpoint.

The three signals coming from the PID are combined to generate a new command signal, which is sent to the servovalve or servomotor to eliminate the deviation as fast as possible and assuring the stability of the process.

The process of detection, evaluation and new signal generation is repeated again and again. The time consumed is the **closed loop control** time and the lower the time, the faster the controller.

3 CONTROL OPTIONS

MD electronics allows to close the control loop with the applied load (control in kN/s) or with the position (control in mm/s) or with the material deformation (control in mm/s):

1. Load control

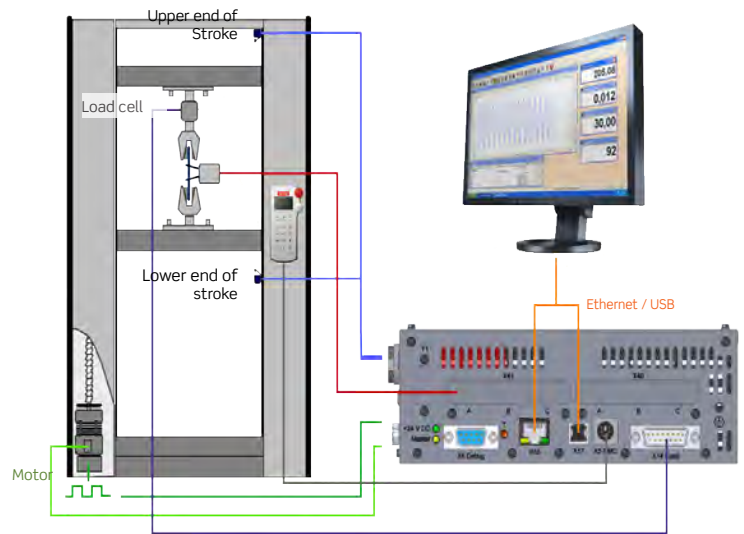
The MD module receives the signal from the load cell and compares this feedback value with the command value (N/s or kN/s).

2. Position control

The MD module receives the signal from machine's position transducer (encoder, resolver, LVDT, etc.) and compares this feedback value with the command value (mm/min).

3. Strain control

The MD module receives the signal from machine's deformation transducer (extensometer) and compares this feedback value with the command value (mm/s or mm/min)



Scheme of load control for electromechanical testing machines



Built-in MD2 module in a Testcom machine

APPLICATIONS OF EACH TYPE OF CONTROL

Load control is normally used on low load resistance tests materials which undergo deformation just before fracture, such as concrete, cement, ceramics, rocks, adhesives, etc. as well as in metals test on material elastic zone.

Position control is used in materials with high deformation, as rubers, elastomers, etc as well as on metals after elastic range.

Strain control is used in fracture tests and for research applications.

AUTOMATIC AND PROGRAMMABLE CONTROL CHANGE.





The IBERTEST WinTest32 testing software allows to define several criteria for changing control automatically (defined variation in the slope of the graphic, certain value of strength, load, position or deformation).

This feature is used in several applications as in metals testing, to allow the control change among behaviour regions of the material (change from elastic to plastic behaviour)



Remote control unit UCRD-6 (Optional)

Specifications of MD2 and MD22 modules, for static and dynamic tests

MODULE	MD2	MD22
Front View		
Rear View		
Application purposes	Static tests	
Microprocessor	CPU 800 MHz	
Channels	Up to 4	
Resolution	± 180.000 steps per channel	
Max sampling frequency	1 kHz 1000 reading per sec per channel	
Sincronization	All channels fully synchronous and simultaneous	
Closing loop time	1 milisecond (1000 times per second)	
Drive interface	$\pm 10V$ -Command-Output (generated with ± 15 Bit resolution) I/O's and relays for safety functions	
Expansion possibilities	Up to 8 modules can be connected. 32 total synchronous channels	
PC communication	USB 2.0 full speed and/or Ethernet 10 / 100 Mbit	
Digital Inputs (24 V)	8	
Digital outputs (24 V)	8	
Serial sensor interface	COM1 (internal)	
Debug interface	COM2: 115 kB	
Slot for safety shield	YES	
Power supply	DC 24 V	
Remote control option	YES	NO

HAND-HELD REMOTE UNIT

UCRD-6

Features

1. Operation via function keys and digital control pad *DIGIPOTI*, for scrolling, data input and menu navigation.
 2. OLED graphics display 128 x 64 dots.
 3. Dimensions: L 25 x W 65 x H 202 mm
- Keys UP/DOWN /STOP for crosshead or actuator movement. More accurate movements are possible using the digital control pad *DIGIPOTI*.
4. Selection of operation mode: via remote control unit or via software.
 5. The UCRD-6 has a magnetic back and therefore can be placed at an ergonomic position.

Advanced features

The UCRD-6 unit can perform several simple predefined tests without need of a computer or additional software:

- › Tensile of metallic materials
- › General tension/compression test
- › Bending
- › Tear test for elastomeres
- › Brazilian concrete test
- › Cycles

Test configuration

- › Pre-load value and speed to reach preload
- › Maximum stress speed within elastic range.
- › Maximum extension speed within yield range.

Sample definition

- › Thickness, width, diameter, initial section (S_0), gauge length (l_0), parallel length (l_c)

Available type of control

- › Load - Position
- › Load-Extension-Position (only with extensometer)
- › Control mode change during testing

The UCRD-6 can detect end of elastic range, end of yield and breakage, with the following criteria:

- › Defined values: Mpa, kN/mm², kN, N
- › Relative drop in relation to F_m : %
- › Absolute drop: N, kN



WINTEST32 SOFTWARE

FOR MATERIALS TESTING

Introduction

32-bit software pack, running under Windows™, specially developed by IBERTEST to be used in universal testing machines.

Thanks to its flexibility and power, you can easily customize software WinTest32, to every need.

Indeed, the system allows user to configure tests according to the major international standards for engineering materials (UNE, ASTM, ISO, ... etc). However, for a small supplement, IBERTEST can adapt WinTest32 software to special needs or for your laboratory.

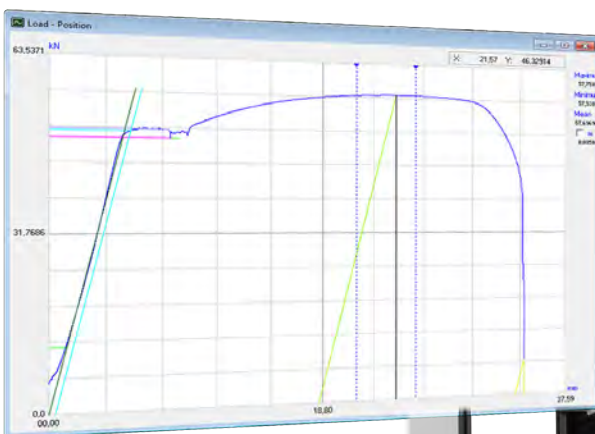
During design phase of WinTest32 software, IBERTEST paid special attention to the ease of use, so the program can be handled even by users with little experience in computers.

The WinTest32 control screen provides toolbar and intuitive menu for quickly identify available actions, to select and configure test parameters without consulting the manual.

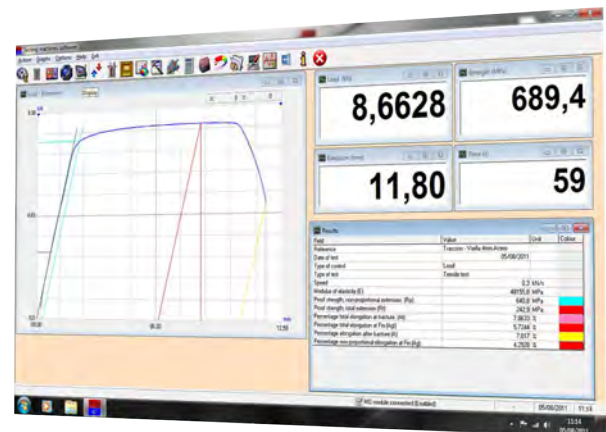


The software shows the user available options and its possible settings at each time, guiding user step by step interactively through test configuration.

Thus, WinTest32 helps user to optimize processes when using materials testing machine, getting the best performance both in the execution of the test and in the results analysis.



Initial control screen



Screen of test results



Using WINTEST32 on a Tocu Screen "All in One"

WINTEST32 SOFTWARE PROVIDES COMPLETE CONTROL BEFORE, DURING AND AFTER THE EXECUTION OF THE TEST.

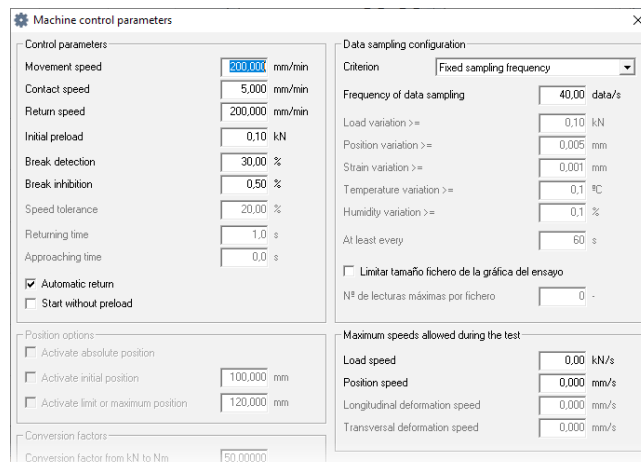
1. PRE-TEST CONFIGURATION

To configure tests at your convenience, the software offers many options, such as:

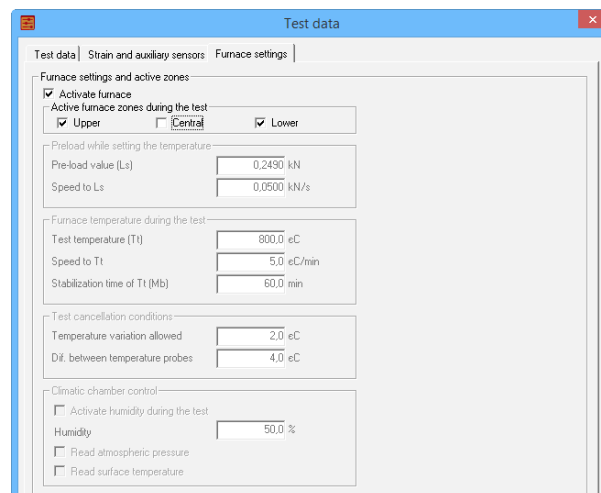
- › *Setting-up of the machine:* Establishment of safety limits, speed of movements, preload, automatic return, etc.
- › *Users management,* with custom options for each user. Provides system security and prevents unauthorized use.
- › Type of test to perform: Tensile, compression, bending, cycles, etc. The settings change automatically according to the chosen type of test.
- › Working method: *preconfigured* by IBERTEST (according to a Standard Test) or *free configuration* according to the criteria of the user (always within the physical and mechanical limitations of the machine, testing devices and sensors).
- › *Individual or serial testing.* Serial tests are well suited for example, repetitive tests with machines intended for Production Quality Control.
- › Select the type of automatic control in *stroke, load or strain* (with appropriate optional transducers)
- › Activation of *additional sensors* placed on the machine or in the specimen, such as strain gauges, temperature sensors, etc. ¹
- › Select the type of *diagram* (load-time, load-stroke, load-strain, etc.) for the *graphical representation* of the test.
- › *Results to display* on screen (in real time) or in the report (after the validation of the test).
- › Automatic execution of calculations derived from the test results (strength, elastic modules, etc.) by means of a software integrated *programmable calculator*.
- › Design of *test reports*, fully customizable. Test reporting is essential for laboratories subjected to Good Laboratory Practices (GLP), or Quality Assurance Systems, as per ISO-EN 17025.

And many more options.

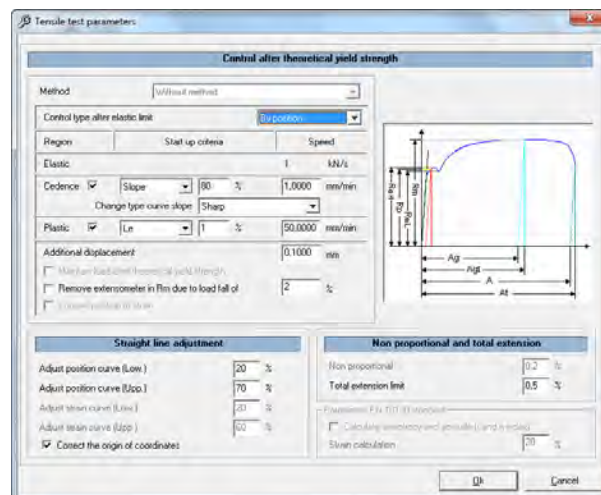
(1): For sensors previously installed into the system.



Testing machine setting-up



Configuration of Tests



Auxiliary window "traction parameters" Available when selecting a tensile test.

2. SPECIMENS IDENTIFICATION

By means of window: "Specimen Parameters", user has multiple options to label specimens.

- › Name of test / specimen / sample, origin, batch, client, auto-numbering, date, etc.
- › Test material, geometry of the specimen (length, width, diameter), mass, density, etc..
- › Free text. For adding any important info not reflected above.

3. TEST DEVELOPMENT

The program performs tests automatically, according to the method and parameters previously introduced in the test configuration.

For test monitoring, PC screen shows, in real time, following features:

- › Graphical representation: XY charts of load-stroke, load-strain, stroke-strain, etc.
- › Instant numerical values, obtained by the sensors connected to the system (position, load, strain, etc).
- › Real-time execution and presentation, of the results of the calculations pre-programmed by the user with the integrated programmable calculator.

If something goes wrong, the user can stop the test at any time during its execution.

4. TEST RESULTS: ANALYSIS AND MANAGEMENT

Once test is completed, results and the graphical representation are shown in the screen. If user rejects the test, results won't be stored. Before validating the test, you can perform following actions:

- › Select and expand areas of the graph (zoom).
- › Change the type of XY chart.
- › Location and search for singular points of the chart.

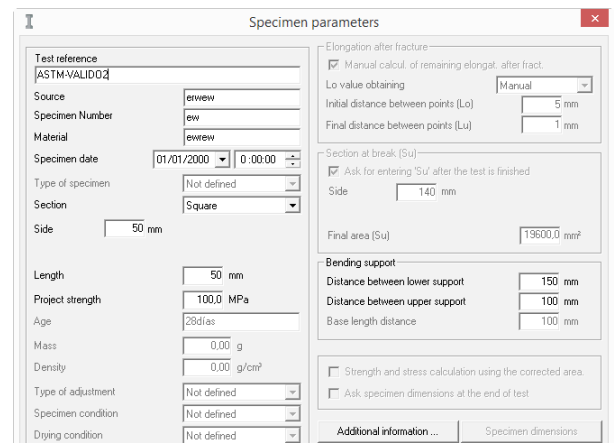
The statistical program allows you to compare several tests including consecutive superimpose curves, create 2D and 3D bar and lines diagrams, create bmp images, etc.

The output files can be converted to XML, ASCII or CSV formats to be exported to other systems such as Excel, LIMS, etc.

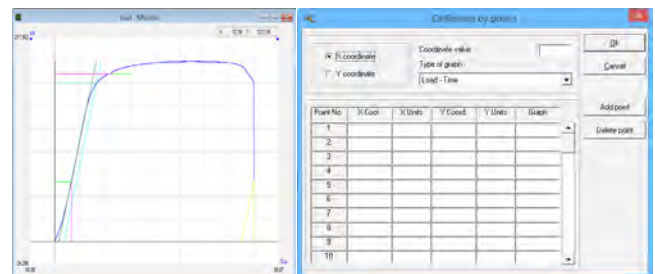
TEST SIMULATION MODULE

Additional module that allows to recover machine parameters (real tests) and reuse on other computers. Being able to simulate once again the test as if performed in real time, without the need for connection to the machine. Main characteristics:

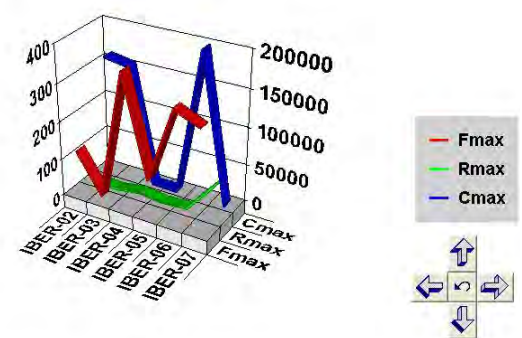
- › Test recovery from network or local
- › Real test simulation
- › Graph visualization on real time
- › Calculation of test parameters
- › Generación de informes



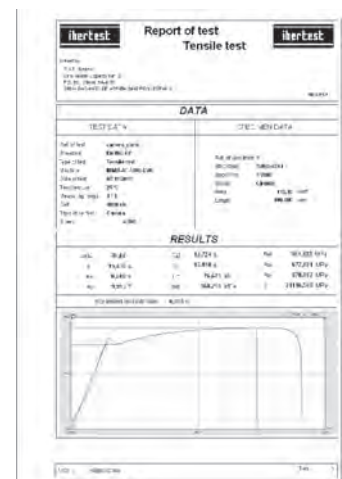
Setting parameters for the test specimen



Location of significant points on the graph of the test



Test comparison - 3D representation



Example of a test report

Main Features

Operating system	WinTest32 works with all Microsoft™ Windows® (32 and 64 bits) operating systems and shares common features with other Windows® programs (system of menus, toolbars, file management, sizing of windows, colors, etc..)
Help functions (usability).	<p>The icon toolbar can be displayed as reduced version, including only the more common features and larger icons.</p> <p>The program is compatible with touch screen computers.</p> <p>The F1 key activates the help window. Help support includes a complete user manual for each application.</p>
Type of tests	Tensile, compression, flexure (one or two load points), bending, extrusion, penetration, shear, etc., on metallic and nonmetallic materials.
Test models	<p>WinTest32 comprises test models according to most commonly used standards (EN, ASTM, ISO, etc..). The user can configurate similar test models.</p> <p>Under request, we can make modifications to configure your WinTest32 software to your special needs (consult additional cost)</p>
Cyclical testing	<p>WinTest32 allows to create cyclic tests, with rising, keeping or falling of the load applied to the specimen. The change of slope or ramp can be done in response to load, stroke or both figures inclusive.</p> <p>When necessary, the slope changes may be accompanied by the control mode (load or stroke) changes.</p>
Serial testing	<p>Possibility of grouping several tests together, in series and subseries.</p> <p>It is possible to obtain statistical information of the grouped tests parameters.</p>
Multi-frame control	Management of up to six testing zones, in alternately way, using the same PC and the same software. The software shows the available test zones to selecting.
Measurement channels	<p>Simultaneous representation of several measurement channels at once.</p> <p>WinTest can manage up to 16 channels (both deformation or auxiliars). The channels can be configured by the user. To use all features offered by WinTest32, you may need additional hardware.</p>
Calculator programming	<p>The system integrates a programmable formula calculator.</p> <p>In this way, you can combine parameters of the specimen with results or values obtained during the test, in order to obtain derivatives results (modules, strength, unit conversion, etc.) in real time.</p>
File management	Test results automatically recorded on hard disk, and the configuration of the machine at the time of their execution. These tests can be recovered for further analysis.
Data exportation	The output files can be exported in XML, ASCII or CSV and Excel format (csv or xls), allowing these files to be imported for most of the programs, word processors and spreadsheets on the market.
Statistics	<p>Incorporates the possibility of performing statistical analysis on tests previously recorded on hard disk.</p> <p>The statistics can be displayed as graphs, histograms, level with Gaussian distribution, charts, dimensional comparison (both tapes and volumes), test curves comparison by superimposing them on a diagram of coordinates, etc.</p>

"TECHNICAL SUPPORT HAS NEVER BEEN EASIER"

TELEDIAGNOSIS is a remote diagnostic service and maintenance support, available for all IBERTEST equipment and testing machines equipped with data acquisition system by computer.

The immediate attention of TELEDIAGNOSIS service for customers located worldwide, minimizes downtimes and avoids delays in the work of laboratory, while reducing or eliminating the overhead of moving the IBERTEST technicians.

To run TELEDIAGNOSIS a link program is used which establishes a remote connection to control the computer of the machine, quick and safe, ensuring IBERTEST services even at facilities with distant locations.

Thereby, an easy and effective intervention from our Technical Service is possible regardless of the location of the machine, as long as an access to INTERNET is available.

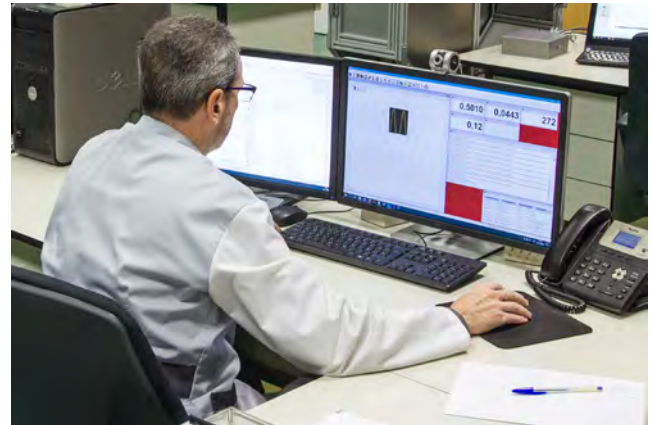
Even on those occasions when the Technical Service must act "in situ", the TELEDIAGNOSIS is helpful to clearly identify the problem in advance and improve first-visit resolution rates.

During a TELEDIAGNOSIS session, the following actions can be performed:

- › **Software revision and correction.** IBERTEST technicians can inspect the software file system, looking for wrong configurations, lost files and directories, corrupted files, viruses or others. Once the errors are detected, only the appropriate libraries and changes are transferred, without reinstalling complete programs.
- › **Remote handling.** IBERTEST technicians can operate the remote machine in real time to perform maneuvers, tests of mechanical movement, installation of testing transducers and accessories, verification of electrical and electronic systems, on/off alarm and security systems, etc.
- › **Videoconference.** Through webcam a videoconference between client and our technicians can be maintained, thus we can get visual-information about the correct operation of the machine's mechanical and hydraulic systems. Also, by written or voice messages, it is possible to exchange views and comments, and give appropriate instructions to the user, when necessary, to perform some physical action in the machine.
- › **Updates.** The software can be easily updated to its latest version, which allows enjoying the advantages resulting from the continuing work of review and program development.
- › **Factory reset.** All machines have a backup, stored in our servers in Madrid, which allows you to restore the original configurations when necessary.

TELEDIAGNOSIS

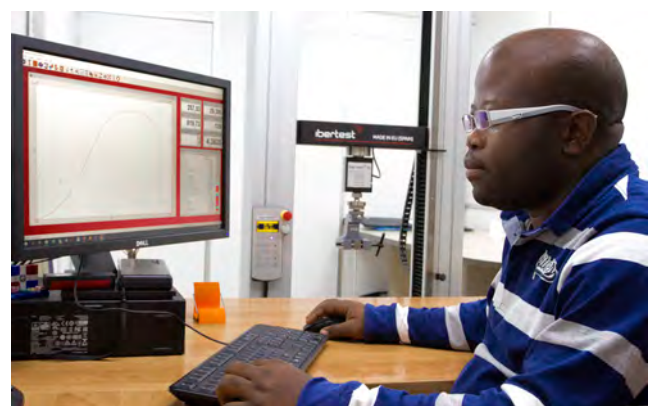
REMOTE DIAGNOSIS SERVICE



IBERTEST Spain - Madrid Technical Services



Real time TELEDIAGNOSIS link



End-user laboratory (anywhere in the world)

Remote diagnostic service by TELEDIAGNOSIS is free during the first year and during the warranty period.

After the guarantee period, many of our customers require the Annual Telediagnosis Pass, which covers interventions of up to 5 hours a year.

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ibertest



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