

**ibertest**

Materials Testing Engineering



## ***Compression Testing Machines MEH LC MD2 W Series***



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## COMPRESSION TESTING MACHINES MEH LC MD2W SERIES

### Features

The testing machines MEH LC series have been designed and manufactured to meet all the requirements of standards UNE-EN 12390-4 and EN 722-1, paying special attention to the following characteristics:

- › Rigidity and stability of the test.
- › Ball-socket joint with autoblock system
- › Load axiality.
- › Self-aligning and upper plate locking.
- › Hardness, flatness and parallelism of the compression plates.

IBERTEST guarantees in writing, strict compliance with requirements of EN 12390-4 standard.

Each machine comes with a certificate issued by our Department of Metrology, conducted with calibrated equipment traceable to international standards.

IBERTEST guarantees **class 0,5 or 1**, as per ISO 7500-1 and EN 12390, in all MEH LC machines.

### Applications

Using the suitable device (see optional accessories), and according to the maximum load capacity, the MEH LC machines allow to perform, among others, the following testings:

- › Compression strength of concrete, on cylindrical and cubic specimens, as per EN 12390-4, ISO 4012, ASTM C39, ASTM C683, etc.
- › Compression strength of bricks, precast concrete blocks and structural building materials, as per EN 772-1
- › Compression strength of stones and rocks (natural or artificial)
- › Compression elasticity of concrete: **YOUNG MODULUS and/or POISSON COEFFICIENT determination** (using additional optional software and devices)
- › Flexural strength, with one or two loading points, of concrete prismatic specimens, according to EN 12390-5, ISO 4013, ASTM C78, ASTM C293, ASTM C683, etc.
- › Indirect tensile of paving blocks, as per EN 1338.
- › Indirect tensile strength (Brazilian test) of concrete cylindrical specimens, as per EN 12390-6, ISO 4108, ASTM C496, etc.



MEH LC 2000 MD2 W - with WinTest32 software and desktop PC computer



Compression elasticity of concrete.  
Young Modulus and Poisson Coefficient determination



Flexural strength of concrete as per UNE-EN 12390-5



Indirect tensile of paver-bricks, as EN 1338



Indirect tensile (Brazilian test) as per EN 12390-6



### Testing frame description

**1 - Upper frame-plate** made in solid steel.

**2 - Upper compression plate.** Made in ground hardened steel. Hardness of contact surfaces is more than 550 HV30. This plate has a specially designed ball-socket joint, with lubricating oil and autolocking system.

**3 - Preloaded steel columns**

**4 - Test zone with safety screen.** Made of impact-proof polycarbonate. The front door comprises a magnetic safety-switch.

**5 - Shelf for collection and spill of debris:** To properly evacuate tested specimen remains.

**6 - Lower compression plate.** The lower plate has centering marks for specimens correct placement. The distance between compression plates is 340 mm, adjustable by inserting optional spacer blocks (see accessories).

**7 - Piston-sleeve assembly.** With mobile flanges system, which allows to accurate centring of piston on the axis of the machine. The piston is solid steel, conveniently rectified. The perfect alignment of the piston is checked on each machine by means of a multi-component force transducer based in 4 strain-gauges, as specified in EN 12390-4

**8 - Lower frame-plate.** In thick solid steel, which houses the piston-sleeve assembly.

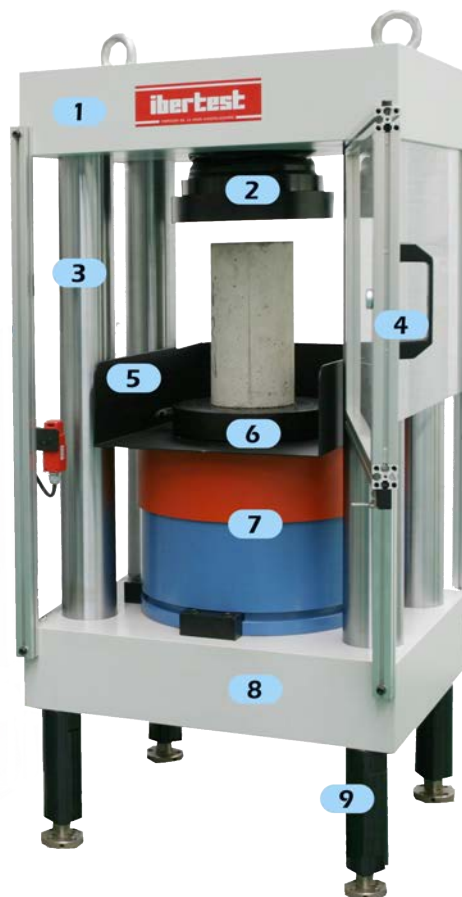
**9 - Levelling feet.**

**10 - "All in One" computer, with touch-screen and WinTest32 software for test management.**

**11 - Command desktop.** With main switch and push-button for emergency stop. The hydraulic unit is located inside the desktop and includes.

- › High performance servo-valve with close-loop control, allows excellent control of the load rate, even when unloading. This accurate control allows the user for making elasticity test with precision and confidence.
- › Watertight oil tank with filter cover, drain valve, filling tap and oil level indicator.
- › Fast-unload electro-valve, non-return suction filter, safety relief valve, hoses and high pressure racords.

**12 - Electric board.** The electric board is located on the side of the desktop frame, the box comprises the ELECTRONIC MODULE MD2 and the motherboard for manoeuvres control



**Optional equipment:**  
**SPACER BLOCKS**

Spacer blocks are placed over the loading piston of the machine, under the lower compression plate, and are necessary in case of testing specimens under 300 mm height (see configuration table ).

They are made of steel, 50 mm thick (100 mm also available), and feature self-centering system to the piston and to the lower compression plate.



**RECTANGULAR COMPRESSION PLATES 450 X 300 MM**

**NOTE:** This option must be specified in the purchase order, to be mounted in our factory.

The rectangular plates can enhance test surface available to test other elements such as concrete blocks, bricks, vaults, etc).

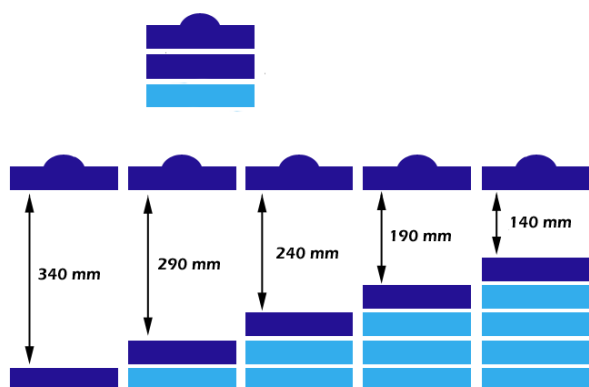


These plates fulfill all the requirements of the standards EN 12390-4 and EN 772-1. They have trim marks in diagonal and circular, to locate any type of test specimen perfectly. The upper plate has ball and socket joint.

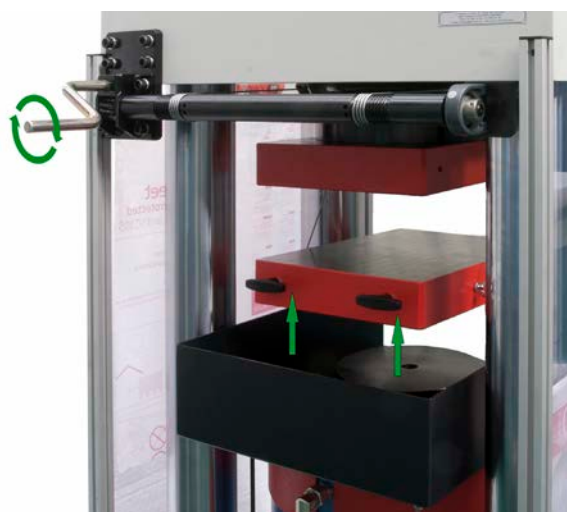
**LIFTING DEVICE FOR LOWER COMPRESSION PLATE**

A crank-handle system, located in the rear of the frame, allows to lift the heavy lower compression-plate for introduce or withdraw the spacer blocks under the plate.

**Assembly scheme for blocks spacers**



SPECIMEN HEIGHT	REQUIRED SPACERS
200 mm	2
150 mm	3
100 mm	4



## Models and specifications

MODEL	MEH-2000 LC	MEH-3000 LC
Maximum capacity	2000 kN	3000 kN
Testing frame	High rigidity: Maximum frame deformation < 1 mm at full load.	
Columns	4 chrome-plated preloaded columns	
Free distance between columns	420 x 200 mm	475 x 250 mm
Electrical end of stroke	Included in standard supply	
Cylindrical plates Standard supplied	Tempered, grounded steel. Hardness upper than 550 HV30 as per UNE-EN 12390-4	
Cylindrical plates dimensions	Ø 290 x 50 mm thickness	Ø 320 x 70 mm thickness
Rectangular plates * (Optional)	Tempered, ground and hardness upper than 550 HV30 as per UNE-EN 12390-4	
Rectangular plates dimensions *	450 x 300 x 50 mm thickness	450 x 300 x 70 mm thickness
Distance between plates	340 mm. Adjustable by inserting spacer blocks (optional)	
Flatness tolerance	Less or equal 0.03 mm, as per EN 12390-4	
Roughness	Between 0.4 and 3.2 µm as per standards ISO/R 468 and UNE-EN 12390-4	
Piston stroke	60 mm	60 mm
Ball and socket joint	Autolock type, oil lubricated, as per EN-12390-4	
Testing frame dimensions (mm)	550 x 550 x 1400 (h) mm	590 x 590 x 1425 (h) mm
Testing frame weight	1400 kg	1500 kg
Control desktop dimensions	500 x 500 x 1200 (h) mm	760 x 650 x 1650 (h) mm
Control desktop weight	170 kg	200 kg

(\*): The optional rectangular plates are mounted instead of the cylindrical plates supplied as standard

### MD CONTROL ELECTRONIC

Modular and computer independent electronic system. Based on last generation microprocessors and designed specifically for closed loop control and data reading on high performance testing solutions.

Maximum performance in accurate and real time variables reading, close loop control and data sending to external processing on WINTEST software.

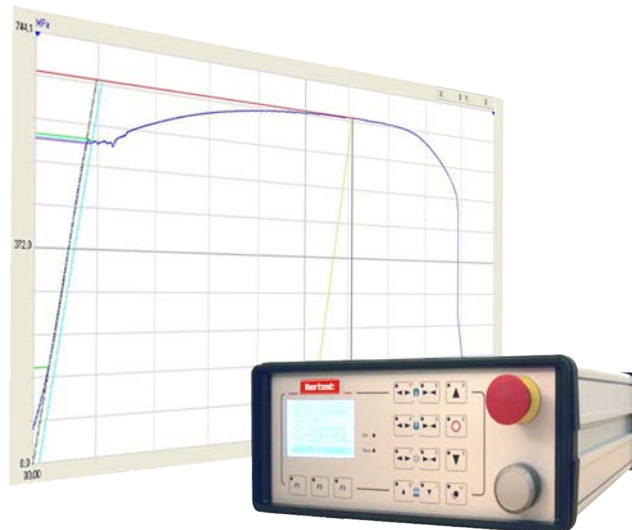
The MD system replaces the conventional PC-internal control boards. It widely improves control performance, reliability (not subject to PC failures) and data acquisition speed.

Data received from transducers is sent via full speed USB (or Ethernet) connection to a computer to be processed by the WINTEST 32. The information received by WINTEST software is managed in real time to perform graphics, calculate formulas and show test results.

Due to PC independent and external configuration, the computer provided with the machine can be easily replaced.

Highly useful when computer fails due to hardware (component) or software (virus) problems.

Machine configuration, calibration, transducers information, etc won't be affected as all the information is stored in the MD module.



External table top configuration with front panel. Models MD22 y MD58



MD2 module, bulk-in configuration. With protective case to be placed in machines' electric area.  
o en el cuadro eléctrico de la máquina de ensayos



MD2 module, placed in the base housing of a TESTCOM machine



External table top configuration, without front panel. Optional for MD2 and MD5

## 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):

### Load control

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

### 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*).

### Deformation 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*).

### Deviation correction

The error (deviation between command and feedback) is processed with a PID

The three signals coming from the PID are combined to generate a new command signal, sent to the servo-valve or servomotor to eliminate, in the minimum possible time and with estabity, the deviation.

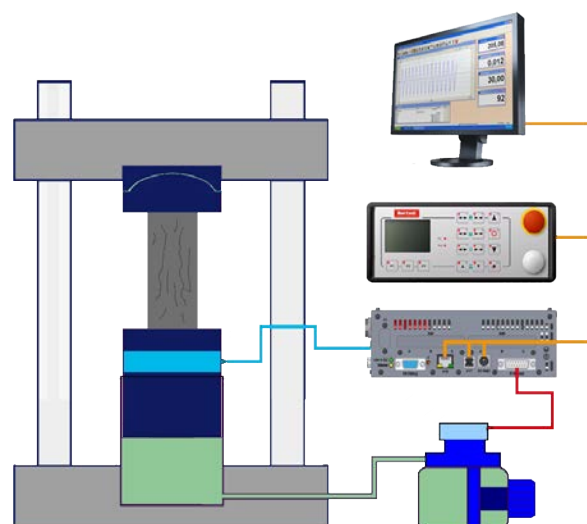
The time used in this process (detection, evaluation and new signal generation is called, closed loop control time.

### Applications of each type of control

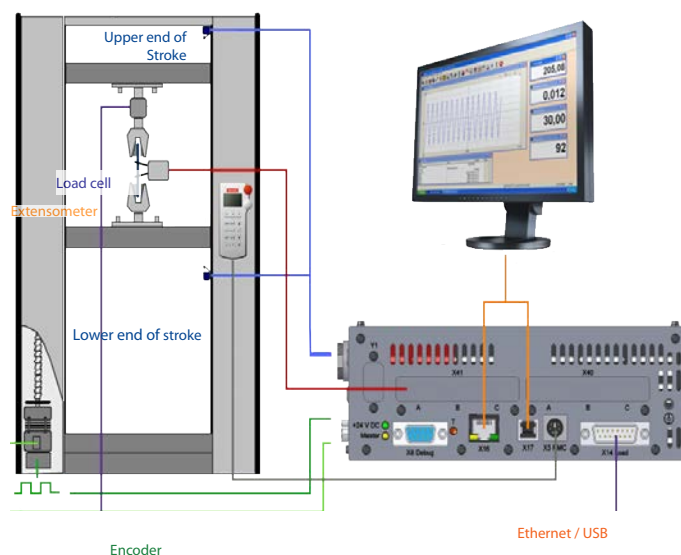
**Load control** is normally used on low load resistance tests materials which undergo deformation just before fracture, such as concrete, cement, ceramics, rocks, adhesives, etc. as well as in metals test on material elastic zone.

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

**Deformation control** is used in fracture tests and for research applications.



Scheme of load control for servo-hydraulic testing machines










### Automatic control change

WINTEST 32 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). Widely used in several applications as in metals testing to allow the control change among materials regions (elastic to plastic)



## MD VERSIONs and Specifications

MODULE	MD2	MD22	MD5	MD58
Front View				
Rear View				
Aplication	Static tests		Static and Dynamic Tests	
Microprocessor	CPU 133 MHz		CPU 800 MHz Control: DSP 32 bit	
Channels	Up to 4		Up to 8	
Resolution	± 180.000 steps per channel			
Max sampling fere- quency	1 kHz 1000 reading per sec per channel		5 kHz 5000 reading per sec per channel	
Sincronization	All channels fully synchronous and simultaneous			
Closing loop time	1 milisecond (1000 times per second)		0,2 milisecond (5000 times per second)	
Drive interface	±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		Up to 32 modules can be connected. 256 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		AC.100 – 250 V	
Remote control UCRD-7	YES	NO	YES	NO



**UCRD-7 ADVANCED REMOTE CONTROL UNIT**

**Basic features**

- 1. Actuator movement:** Piston or crosshead  
Via Up /Down keys or with the Digi-Poti for accurate positioning
- 2. Intermediate crosshead movement:**  
For electro-hydraulic machines ( with piston +mobile crosshead).
- 3. Control START / STOP:**  
Activates MD module control
- 4. Grips opening and closing:**  
Upper/lower grips independent operation
- 5. Extensometer positioning**  
For automatic versions
- 6. Emergency stop:**  
According to CE mark requirements
- 7. LCD graphics display of 128 x 64**

**Advanced features**

The UCRD-7 is not only a remote controller, aside its benefits related with ergonomic test preparation, grips operation and accurate movement, it has the capability of **carrying out test independently**.

Without the need of a computer and software, several test can be configured and executed directly on the UCRD-7

- › General Tension/Compression
- › Tensile test over metals
- › Bending
- › Shear
- › Tear
- › Brazilian
- › Cycles

**Example: Tensile test over metals**
**Results showed/calculated by UCRD-7 :**

- › Original cross-sectional area of the gauge length
- › Tensile strength
- › Percentage elongation at maximum load (Fm)
- › Load at fracture
- › Percentage elongation at fracture load (Fb)
- › Young's modulus (only with extensometer)
- › Proof stress points: 3 points (only with extensometer)
- › Proof stress point at total elong(only with extensometer)
- › Upper/lower yield stress
- › Percentage reduction of area after fracture
- › Percentage elongation after fracture

**Type of available control :**

- › Load - Position
- › Load-Extension-Position (only with extensometer)

**Control change between materials ranges**

With the following criteria, end of elastic range, end of yield range and breakage can be detected.

- › Defined values: Mpa, kN/mm<sup>2</sup>, kN, N
- › Relative drop in relation to Fm: %
- › Absolute drop: N, kN

**Sample definition:**

- › Thickness, widthness, diameter, initial section(So), gauge length (lo), parallel length (lc)

**Test configuration:**

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

# 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.

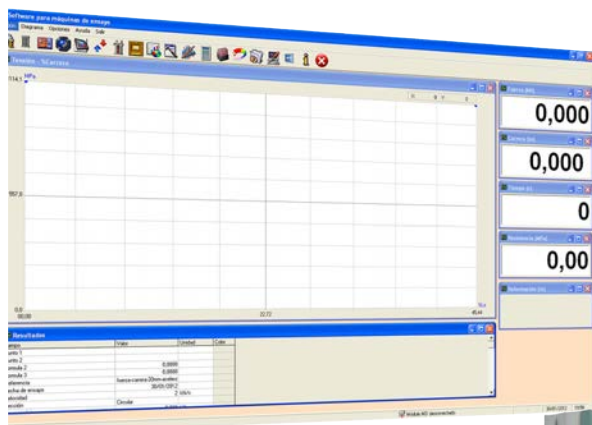
During design phase of WinTest32 software, IBERTEST paid special attention to the ease of use, so the program can be handled even by users with little experience in computers.

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

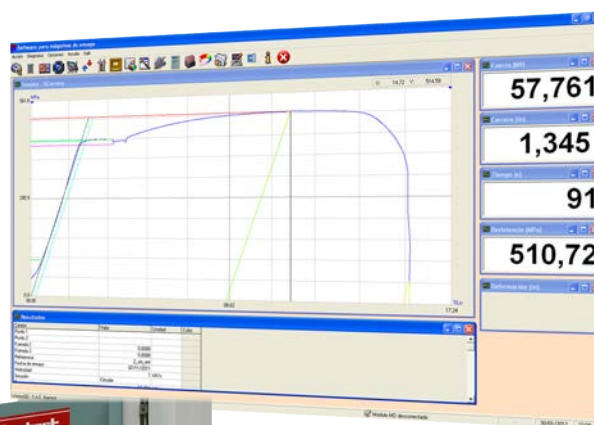


The software shows the user available options and its possible settings at each time, guiding user step by step interactively through test configuration.

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



Management Software on a PC WinTest32 "All in One" touchscreen

WinTest32 software provides complete control *before, during* and *after* the execution of the test.

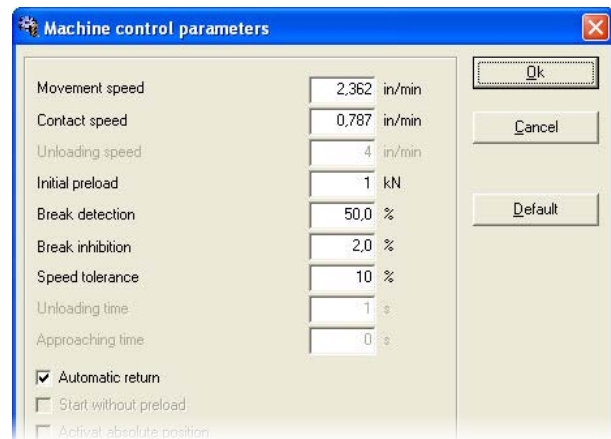
### 1. PRE-TEST CONFIGURATION

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

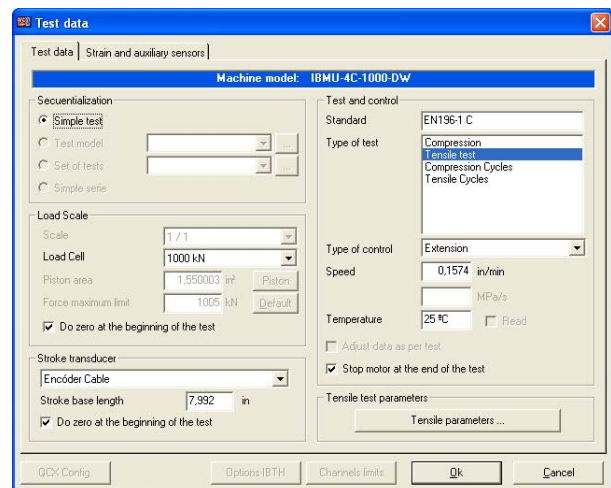
- › **Setting-up of the machine:** Establishment of safety limits, speed of movements, preload, automatic return, etc.
- › **Users management,** with custom options for each operatuser. Provides system security and prevents unauthorized use.
- › Type of test to perform: Tensile, compression, bending, 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.<sup>1</sup>
- › 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.

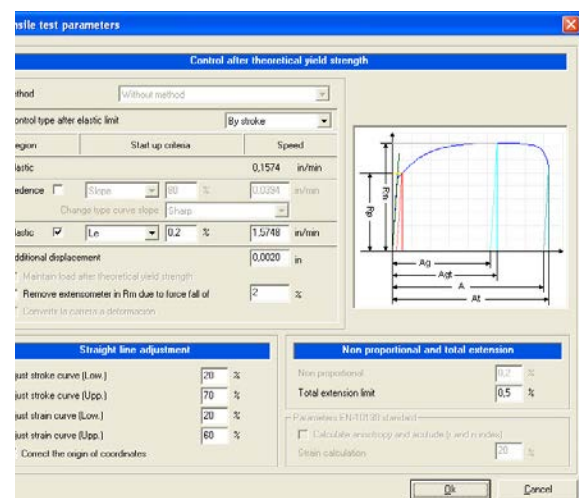
(1): For sensors previously installed into the system.



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.

Some parameters are involved in automatic calculations of test results, while others only will appear in the report (and / or screen of results) as useful background information to aid you in your analysis.

## 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 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.

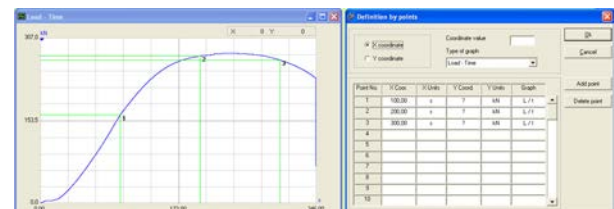
Once test is completed, results and the graphical representation are shown in the screen. If user rejects the test, results won't be stored. Before validating the test, you can perform following actions:

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

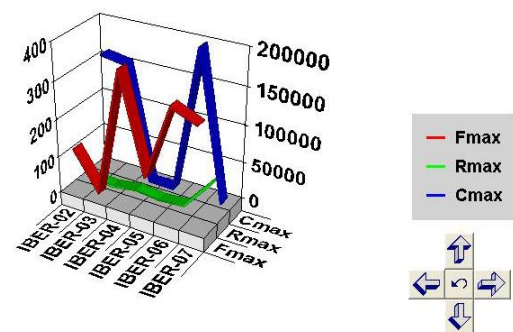
The statistical program allows you to compare several tests including consecutive superimpose curves, create 2D and 3D bar and lines diagrams, create bmp images, etc.

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

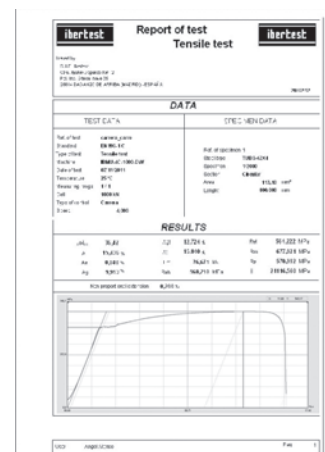
Setting parameters for the test piece



Location of significant points on the graph of the test



Test comparison - 3D representation



Example of a test report



**Main Features**

<b>Operating system.</b>	WinTest32 works with all Microsoft™ Windows® (32 and 64 bits) operating systems (XP, Vista, Windows 7), and shares common features with other Windows® programs (system of menus, toolbars, file management, sizing of windows, colors, etc..)
<b>Help functions (usability).</b>	<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>
<b>Type of tests</b>	Tensile, compression, flexure (one or two load points), bending, extrusion, penetration, shear, etc., on metallic and nonmetallic materials.
<b>Test models</b>	<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>
<b>Cyclical testing</b>	<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>
<b>Serial testing</b>	<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>
<b>Multi-frame control</b>	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.
<b>Measurement channels</b>	<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>
<b>Calculator programming</b>	<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>
<b>File management</b>	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.
<b>Data exportation</b>	The output files can be exported in Excel format (csv or xls), allowing these files to be imported for most of the programs, word processors and spreadsheets on the market.
<b>Statistics</b>	<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>

**TELEDIAGNOSIS (Optional Service)**

TELEDIAGNOSIS is a remote diagnostic service and maintenance support, available for all IBERTEST testing machines equipped with the "W" system for control, programming and data-acquisition by means of computer.

To run TELEDIAGNOSIS a link program is used which establishes a remote connection to the control computer of the machine

When connected, our technicians are able to take control of the testing machine, as if they were in front of it, to act on the problem quickly and effectively, without displacements to your laboratory.

So, intervention from our Technical Service is possible regardless of the location of the machine, as long as an access to a fast Internet (ADSL or similar) is available..

Even on those occasions when the Technical Service must act "in situ", the TELEDIAGNOSIS is helpful to clearly identify the problem and choose the best solution to fix it.

In short, the immediate attention of TELEDIAGNOSIS service minimizes downtimes and avoids delays in the work of laboratory, while reducing or eliminating the overhead of moving the IBERTEST technicians.

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

- › **Software correction and review:** IBERTEST technicians can inspect the file system software WINTEST32 test, wrong configurations, lost files and directories, corrupted files by viruses, etc. Once detected errors, only the appropriate libraries and changes are transferred, without reinstalling complete programs..
- › **Remote handling:** IBERTEST technicians can handle 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:** Via web-cam a videoconference between client and our technicians can be maintained, thus we can get invaluable 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 WINTEST32 software can be easily updated to its latest version (as long as the computer are able to support it). This allows enjoying the advantages resulting from the continuing work of review and program development.



*IBERTEST Spain - Madrid Technical Services*



*Real time TELEDIAGNOSIS link*



*Laboratory of the end-user (anywhere in the world)*