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Zwick / Materials Testing

testXpert®
the first test software to think as it works

FP257 2.1098.102

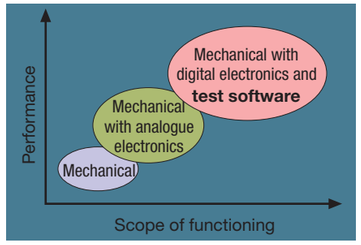
testXpert® – the first test software to think as it works

From mechanics to software
The mechanics determined the scope of performance and function of test machines for many years by loading specimen and displaying the test data. Everything else, from preparation of the test via the machine control to determination of results, was the operator's task.

Although the analogue measurement and performance electronics of the 70ies improved the possibilities of test sequence control and test data recording, it also brought with it additional tasks for the operator. They He/she had to

* make all settings
* control and monitor the test sequence
* evaluate the recorded curves, or convert the saved maximum value, and
* transfer the evaluations to the test report.

The increasing use of high performance and low price computer systems in the 80ies increased the possibilities for the entire all test systems. The scope of performance and function increased considerably. This created the requirement for increased flexibility but, at the same timesimultaneously, being simple to use.

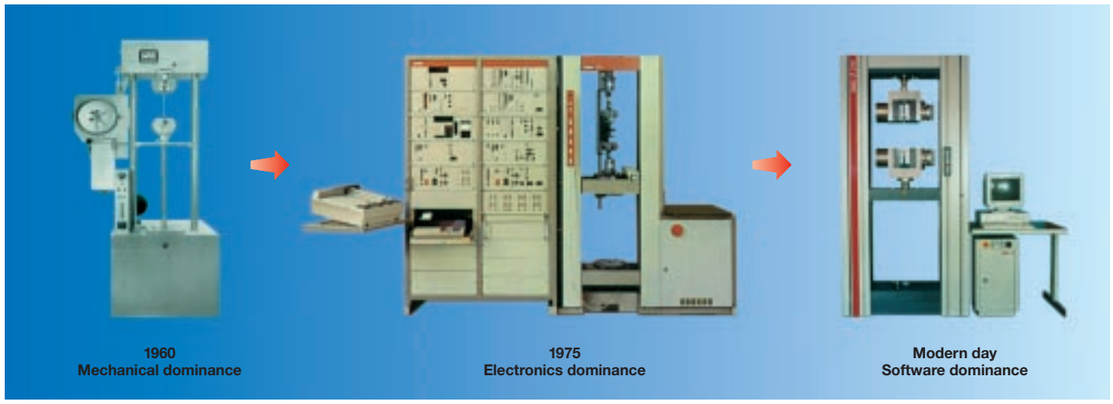


Modern test software considerably increases performance and scope of function of test machines.

The Zwick solution - *testXpert*®
Zwick reacted quickly inplenty of time with respect to this challenge and invested approximately 100 man-years in the development of an absolutely new test software. *testXpert*®, successfully in use since mid-1996

* solves the conflict between maximum flexibility and most simple usability.
* replaces the numerous operating and control elements of earlier systems with a keyboard and screen
* accepts a number of additional functions, especially those where data should be saved, processed and displayed in different manners
* saves predefined sequences and settings, and runs them as often as you want and, at the same time, highly reproducible
* considerably increases the performance of the test machine and its components through optimum use of their technical-physical capabilities
* documents the entire test inclusive of the respective test conditions, and
* fulfills the requirements of ISO 9000ff and other quality standards,such as GMP, etc.
* creates new quality in materials testing

From operator to user
In the past the user was little more than the test machine's **servant**. They had to transpose the test job to machine settings, control and monitor the test sequence, and determine the test results from the displayed test data.
testXpert® makes them a true **user** of the machine. *testXpert*® takes over all "servant" functions. And with quick reactions, tirelessly and reproducible. The user only transfers the test job to *testXpert*®, starts the test and receives the test results in the required form. Where necessary, *testXpert*® provides support in the form of saved expert knowledge and help functions.
The user is relieved of ever repeating and tiring tasks. They can concentrate on their testing tasks, and distribution and evaluation of test results.



Development in test machine manufacture depicts the transition of mechanical to software dominance. However, only the combination of precision mechanics, powerful electronics and intelligent software acting together brings an optimum of performance and flexibility.

testXpert® – The universal test software, flexible and ergonomic

***testXpert*® – What's that?**
testXpert® is the universal test software for materials, components and functions testing. It's applicational range goes from Zwick materials testing machines (tensile, compression, flexure and universal testing machines) to hardness maschinentesters, pendulum impact testers, extrusion plastometers, automatic test systems, etc. right up to modernising of test machines in a variety of makes and models.

Duties and functions
testXpert® controls and monitors:

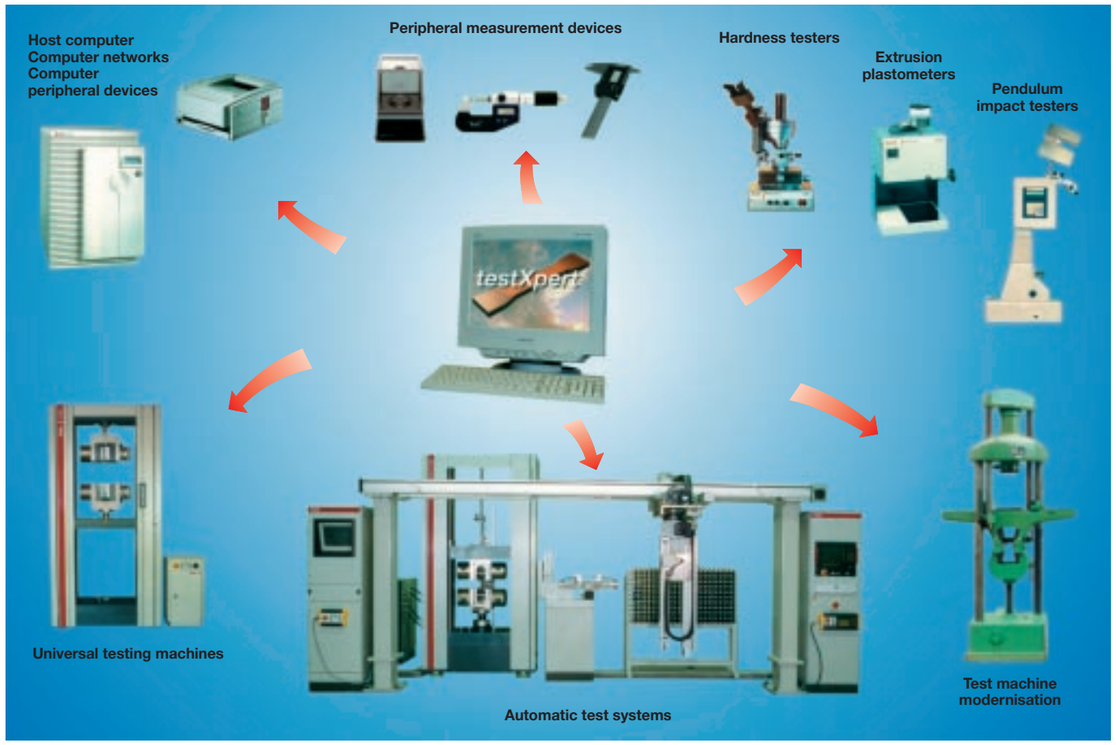
* verification and re-equipping the test machine
* preparation of the test or test series
* carrying out the test
* evaluation and documentation
* data management, and
* quality management

testXpert® supports the user for all tasks with software wizards and editors, explanatory pictures and video sequences, situation specific user tips, warnings, error messages and online help.

Software design
testXpert® has been designed object orientated in the programming language Visual C++ under operating systems Windows 95 and NT to meet with the requirements of current and future directions of computer sciences. Thus using the performance capabilities of these 32-Bit operating systems to an optimum.

This is also valid for data exchange between *testXpert*® and other user software for these operating systems, such as Microsoft Excel, Word and Access.

Hardware requirements
testXpert® runs on all trade PCs.
A special interface is not required for connection of a PC to a Zwick test machine. *testXpert*® is supplied with a connection cable that is plugged into the PC's serial interface. The connecting cable's plug contains an integrated electronics unit that guarantees rapid signal transfer free of interference. As no intervention whatsoever with the PC is necessary at standard installation, the CE conformity remains unchallenged.



The *testXpert*® test software is used for different types of test machines. It also communicates with peripheral measurement devices and other computer systems.

The *testXpert*® conzept – The universal test software, flexible and ergonomic

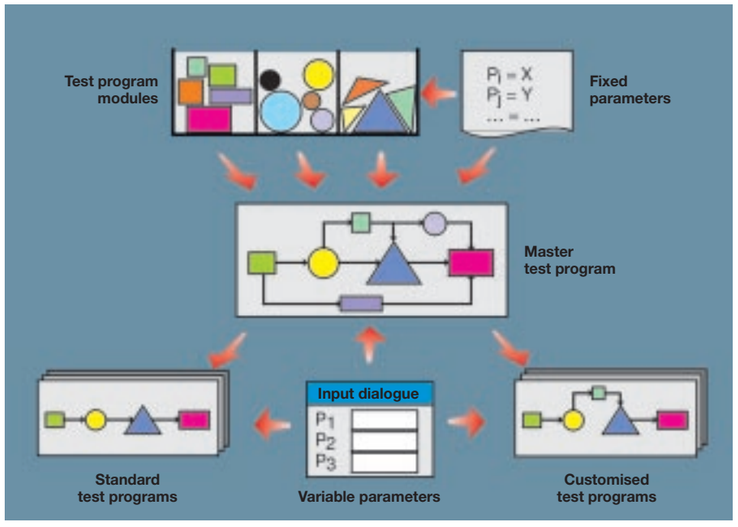
Future orientated concept
The *testXpert*® test software uses the advantages of the object orientated programming with respect to a clear grouping in tasks and functions. Structure and contents are determined by the Zwick applications and software know-how. The concept is therefore a guarantee for highest flexibility, functional safety as well as simple usability.
testXpert® is distinguished through:
* uniform basis software for all applications
* modular system for test programs
* user support through software tools.

Uniform basis software
testXpert works with a single and uniform basis software for all applications. The software takes over the data, user and test program management, as well as the communication with the test machine and other peripheral systems. The advantage of this solution is that updating, refreshing, etc. of different program packages, which is prone to errors, is reduced to a bare minimum.

Modular system
The test programs are compiled by Zwick from a selection of several hundred software modules. The modules are sub-divided into classes such as test parameters, test sequence phases, etc. They are continuously actualised and expanded with respect to new states of knowledge and any necessary supplementations. This makes *testXpert*® an intelligent software, and thus enables realisation of not only test programs strictly to test standards but also test programs related to practical applications. Thanks to the numerous possibilities of this system, *testXpert*® can be put to universal use for a wide applicational spectrum and for a variety of test machines.

Guaranteed reliability Test programs
The test programs compiled by Zwick stipulate how tests are to be run. Their base is selected software modules which are linked to one another and are pre-configured through fixed parameters, depending upon the functions required of them. Thus the user receives a ”test template” from Zwick in which they only have to enter variable parameters. The potential for user errors is drastically reduced, the preparatory work done by Zwick is a guarantee for highest reliability.
There are three variations available for a wide range of requirements:
* Master test programs
* Standard test programs, and
* Customised test programs

They are selected to the following criteria:



Master test programs consist of selected software modules which are linked together and pre-configured by fixed parameters, depending on the test category required. Only variable parameters must be entered or changed to perform a test. Tailor-made standard test programs for standardised tests, and customised test programs for individual tests are derived from master test programs.

Master test programs
Cover a certain category of tests. They are predestined for tests which change frequently or for complex tests. The following can be done with little extra work or previous knowledge, and with the help of software wizards
* test programs can be compiled and edited
* desktop layouts can be customised, and
* task specific test reports (protocols) can be compiled

Intelligent software wizards guide you quickly and decisively through all menus, and carry out consistency tests simultaneously.

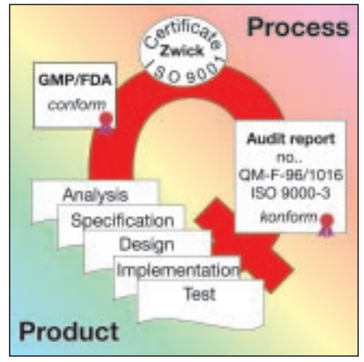
Standard test programs
Are optimal for standardised testing of large series with constant test requirements. They are
* intuitive, and can be used with only a few entries
* tailor made for the respective application, and
* orientated to everyday use, and
* value for money

Customised test programs
Are individual solutions for special test tasks, the functions and sequences of which are specified by the user. There are two possibilities for creating them.
* Zwick supplies the suitable master test program, and the user compiles their own customised test programs with the help of a software wizard.
* Zwick compiles these customised test programs to the user’s specification and order.

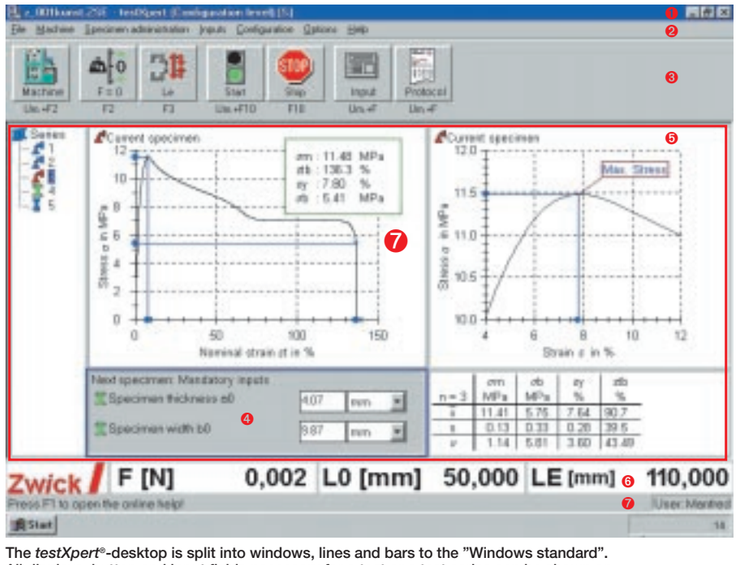
testXpert® – Added advantages for the user

Software tools
The software tools (wizards, editors, macro language) support the user in a variety of ways
* at adjusting test programs to the respective test tasks
* at layout of the desktop and protocols
* at management of test series with subseries and test data
* at compilation of statistics and analyses, and
* at archiving.

International quality standards
If a software product is to comply with international quality standards, each and every version must be transparent and archived for 10 years.The *testXpert*® test software fulfils these requirements and *testXpert*® also enables quality management to international standards such as ISO 9000, the guidelines of the Food & Drugs Administration (FDA, USA) and Good Manufacturing Practise (GMP) etc., and makes their processes certifiable.
The entire *testXpert*® test software development process and its components are diligently documented and archived, from the source code, through to the software tools used for each and every version. This is valid for each phase, from analysis, through specification, design and implementation, and up to the test.
Conformity to the standard DIN EN ISO 9000-3 for development of *testXpert*® has been confirmed via audit report no. QM-F-96/1016.
The Zwick quality management was certified for the first time in 1993 to DIN EN ISO 9001.



The *testXpert*® test software fulfills the highest international quality standards. This is true of the end product, as well as for the entire process of product development.



The *testXpert*®-desktop is split into windows, lines and bars to the ”Windows standard”. All displays, button and input fields necessary for a test or a test series can be shown on one screen page.

Simplest operation
Operation is reduced to one-button operation, i.e.activating the start button, for standard applications. This is possible because *testXpert*® – the first test software to think as it works – automatically records the test data, and using this information, controls and monitors the test sequence, and determines and documents the test results.

Multimedial testing
testXpert® supports the user not only with ”help” videos. It can perform multimedial tests for the first time. Visual and acoustic information from the test arrangement and test sequence is recorded and digitally saved synchronously to the respective measured values via a camera (every day or special industrial video camera). This catapults test evaluation into a new dimension that is so significant that it has its own chapter in this publication (page 13).

Test standards – Expert system
This data base integrated in *testXpert*® allows the user to find the test program that they want, quickly and easily. Regardless of whether their search criteria used is the material to be tested, the type of test or a test standard.

Safety in detail:
Windows software is normally used in offices. However, *testXpert*® takes over an additional and especially critical task: monitoring and controlling machines. Machine damage and potential danger to persons must be ruled out. That’s why *testXpert*® doesn’t use any overlapping windows in the test mode to avoid hiding important displays or key fields.

❶ Title bar
❷ Menu line
❸ Toolbar with selectable button fields for frequently used functions
❹ Partial window for displays or entries
❺ The main window, can be split horizontally and vertically into partial windows. The size of the partial window can be changed in reciprocal dependency (by shifting the separation line with the PC mouse)
❻ Display bar (for real and derived measurement quantities)
❼ Message bar for user remarks

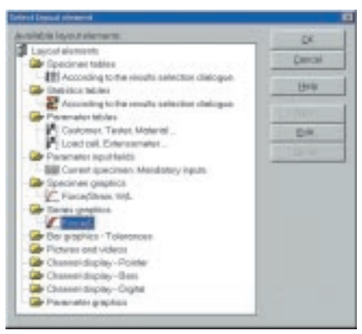
testXpert® – Employ master test programs to utilise the latitude around the test

A master test program covers a whole category of similar (test standard) tests. Standard test programs are generated from the master test program according to the relevant test standards. For example, we currently have 35 standard test programs derived from the ”General compression and flexure test” master test program. These derived programs are related to single national and international standards in this category of test. Zwick’s target is to illustrate all common test standards in standard test programs.

Master test programs can also be used for compiling customised test programs to enable individual tests such as a company’s own test standards to be carried out.

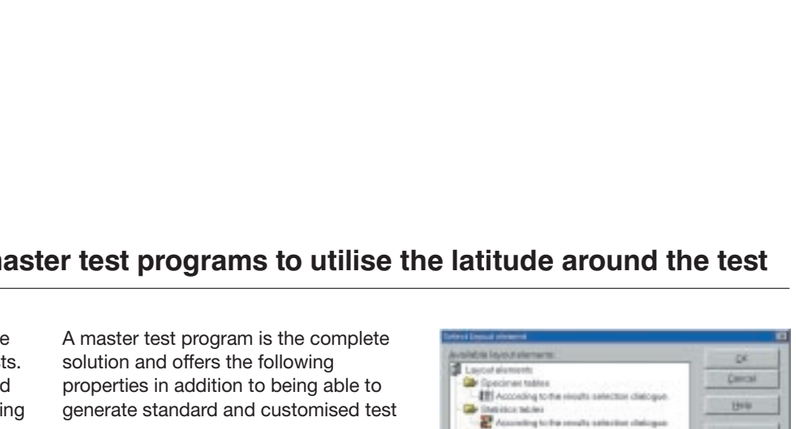
A master test program is the complete solution and offers the following properties in addition to being able to generate standard and customised test programs:

* Wizards for:
  - export interfaces
  - data base linking
  - protocol compilation
  - creating measurement and formula channels
  - additional evaluations
* Graphical protocol editor for free styling of the protocol layout
* test series management
* comprehensive statistics functions
* individual adjustment of the test programs up to ”One-button operation”

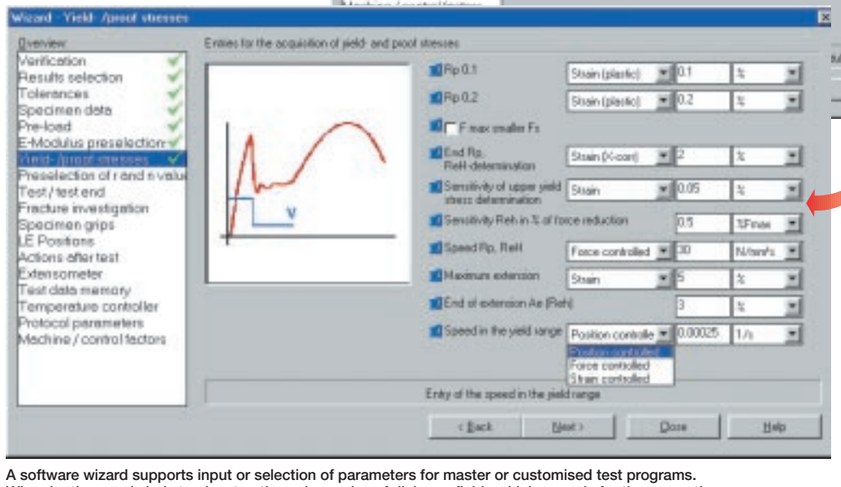


The optimum desktop layout can be customised for each application. The respective layouts are saved and can be called-up at any time.

A master test program offers the advantage of being able to compile standard or customised test programs from a basis of thoroughly tried and tested software modules quickly and reliably.



All parameter groups are shown in list field ”Overview”. The groups already edited are marked with a ”check” symbol.



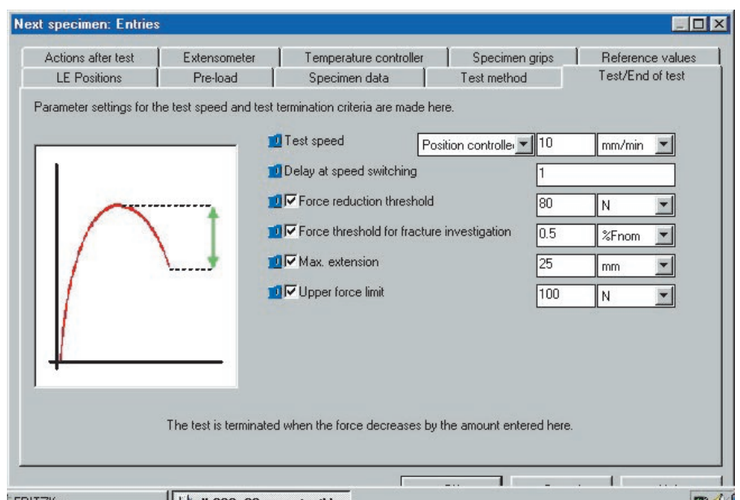
Type and units of parameters are selected from preselected variations.

A software wizard supports input or selection of parameters for master or customised test programs. Whereby the user is led step by step through a series of dialogue fields which are only for the respective applications.

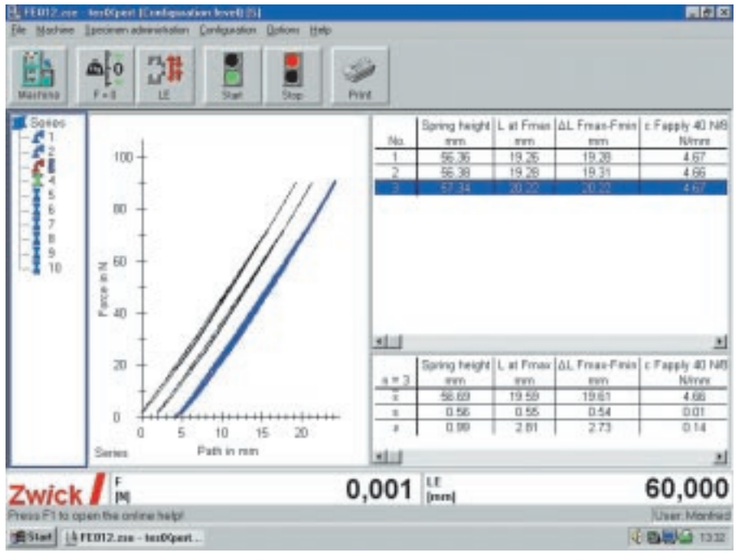
testXpert® – Standard test programs for testing quickly and without much effort

Standard test programs are the answer for tests to test standards which are frequently carried out in large series and with few changing requirements. You can enter the test directly without any effort of your own.

Standard test programs
* guides the operator through all preparatory stages up to the start of test
* shows the entered organisations data (job no., type of material, etc.), and single data inputs of a specimen
* allows data input for the next test
* shows the determined values after the test



The parameters for standard test programs are entered or selected via register dialogue fields.



The standard test programs reduce the test machine operation to one button operation. The screen masks are prepared so that all important settings and results can be seen at a glance.

Further advantages of standard test programs are:
* Simplest operation
  - machine control via one button operation
  - rapid and intuitive handling
  - ideal for PC beginners
* Clear overview of displays
  - clear and easily legible information (even from a distance) on the running force, travel and time values
  - automatic scaling
  - large display for fatigue free working
* Clear menus contain all required preselection and result parameters
* Two screen layouts for switching between
  - series layout with series graphics, statistics table, results table and information on the series
  - test layout with single graphics and graphical marking of the results
* Prepared standard protocol contains graphics, test results and valuable additional information
* Online help on the respective test sequence can be activated at any time

Prepare the test simply, quickly and safely with *testXpert*®

Automatic acceptance of system data
Different test tasks require different test machines with different and, usually, interchangeable components. Their specific properties are characterised by the system data (nominal force, travel, speed range, mounting height, calibration factors, etc.). Organisatory data also belongs to the above, e. g. the series number or the date of the last calibration.

testXpert® accepts this data automatically directly following program start
* for the necessary settings
* for determination of safety limit values
* for correct measurement signal evaluation

Furthermore *testXpert*® checks whether or not
* the test can be carried out with this configuration
* all settings have been made
* the data has changed for the current test

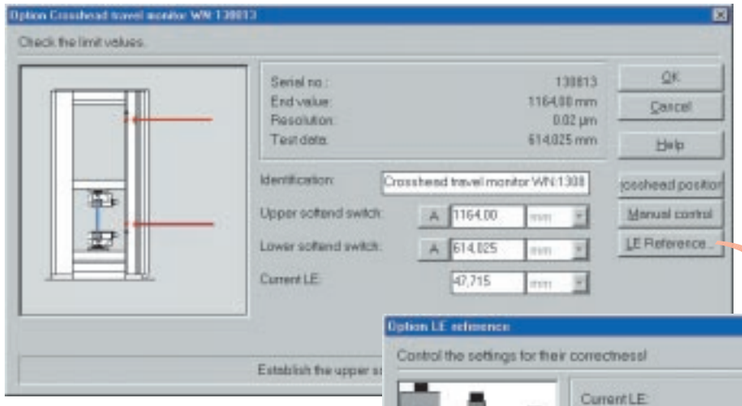
Traceability
The system data is saved together with other test data. Thus you can trace back with which test machine, configuration and settings the tests were carried out which is required by ISO 9000ff.

User's advantages
System data must no longer be entered manually, or be taken over from predefined files. Any sources of error linked to this method are ruled out. Verification is simple, quick and safe.

Video support
Video sequences are an invaluable support, they demonstrate, independent of any language, visually how, for example, a test machine can be commissioned, specimen holders can be changed or which individual protocols can be created.

Complex user tasks such as changing specimen grips are depicted in easy to understand video sequences.

Only two steps to testing
Preparation of a test series requires only two steps:
* call-up the test program foreseen for the required application
* entries or selection of variable parameters



The positions of the, software monitored, crosshead travel limit switches are entered directly. Alternatively, the current position of the crosshead can be automatically accepted by clicking at the button field <A>.

The Grip to grip separation can be entered manually or automatically with a reference movement of the crosshead.

Perform tests – precise, exactly reproducible and highly informative with *testXpert*®

One button operation and automatic test sequence
Usually only two actions, except for specimen feed and removal, are required for a test:
* enter the individual specimen data (e.g. cross-sectional area data).
* start the test

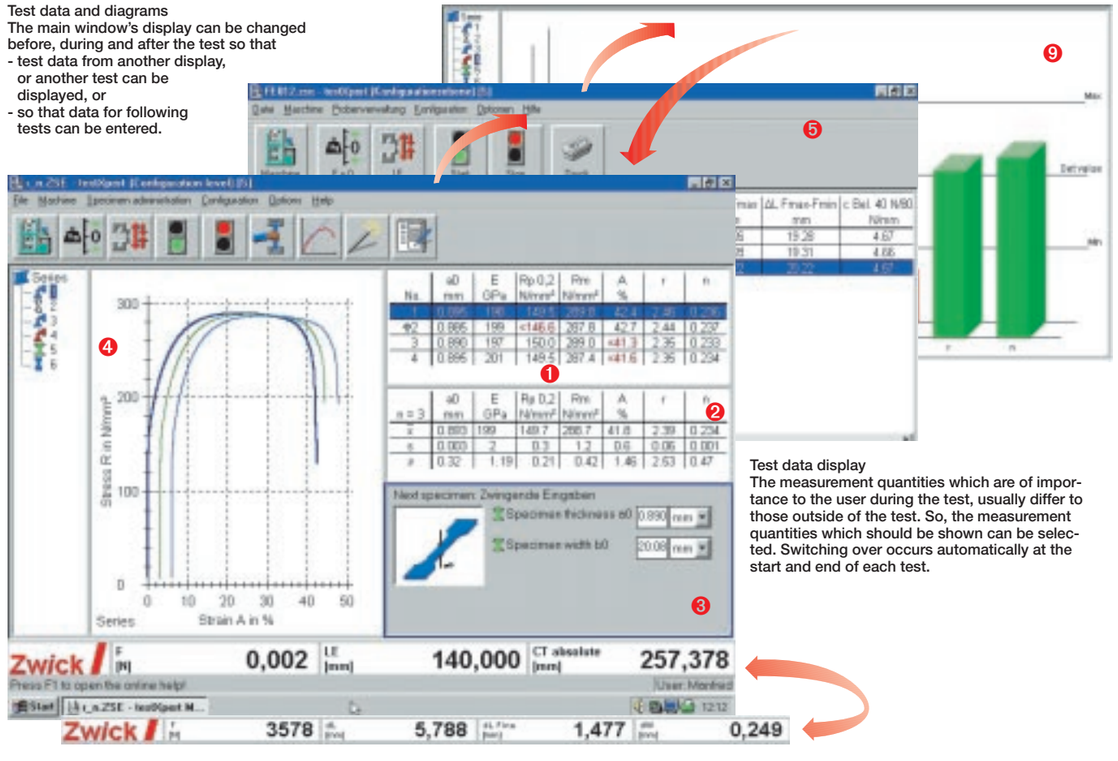
The test itself, controlled and monitored by *testXpert*®, runs entirely automatically. Should settings deviate from preselections, should safety limit values or time limits be reached, or should user actions be necessary, the start is denied or aborted. A warning or error message, or a user remark is then generated.

Optimum user information
All displays necessary for carrying out a test and a test series, can be grouped together in a clear and concise manner in one single screen setting. See below
* input fields for specimen specific test parameters
* curve diagram (single or multiple curves)
* tables for test results
* tables for result statistics

The main window can be swapped for added information
A test's data can be displayed and distributed on several main window pages (see table on page 9). You can even swap windows while a test is in progress. This offers advantages, especially for research and training, as the same test can be observed from different viewpoints, so it can be analysed to an optimum.

Efficient specimen management with a powerful series management
The specimen list at the left hand edge of each main window shows the current status of the test graphically. The test, the data of which is displayed and/or should be entered, is selected at the click of a mouse. The icons indicating the status can be indexed with a running number, a selected test parameter or a test result. A test series can be interrupted at any time and can be recommenced at a later moment in time, or it can be expanded. A test's data can be deleted entirely, or for evaluation only and can be reactivated as required.

Test data and diagrams
The main window's display can be changed before, during and after the test so that
- test data from another display, or another test can be displayed, or
- so that data for following tests can be entered.

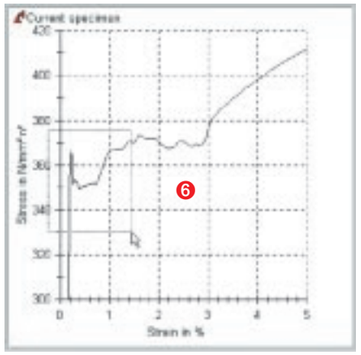


Test data display
The measurement quantities which are of importance to the user during the test, usually differ to those outside of the test. So, the measurement quantities which should be shown can be selected. Switching over occurs automatically at the start and end of each test.

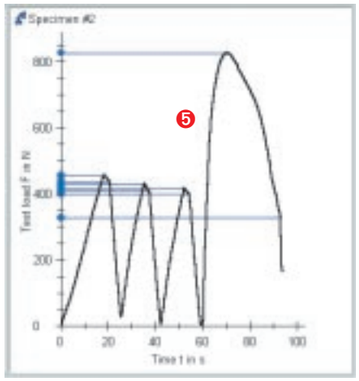
testXpert® presents measurement and process data in a variety of ways

Variable screen and protocol displays	Example no.
Lists and tables – (S + P)[1]	
* Test results (values, etc.)	❶
* Test parameters (specimen data, settings)	
* Process data (events, set values, etc.)	
* Sort data (running no., ID, legends)	
* Statistical data	❷
* Freely selectable data (test job, configuration, etc.)	
* Input fields (S)	
- specimen data (cross-section data, length, etc.)	❸
- settings (gauge lengths, etc.)	
Curve diagrams (S + P)[1]	
* Multi-curve diagrams (test series)	
- selectively in different colours or line styles	❹
- selectively with automatic zero-point offset	
- selectively with, or only as an average curve	
* One curve diagrams (test)	
- selectively with curve points and evaluation help lines for selected characteristics	❺
- sectional magnification with PC mouse freely selectable	❻
- curve follow with crosswires and test data display	
- selectively with automatic labelling of selected curve points	❼ (page 5)
- selectively with labelling field with selected results	
- as XY or XY1Y2 diagram	❽
* Free assignment of measurement quantities to coordinates	
* Coordinates with fixed or automaticaly optimised end values	
* Coordinates scaled selectively linearly or logarithmically	
* Selectively with display of the tolerance limits or curves	
Histogram (S + P)[1]	
* For selected result data	
* Selectively with upper and lower set value limits	❾
Parameter graphics (S + P)[1]	
* Sequence of selected parameters and results for test series	❿
Test data, large display (S)[1]	
* Selectively analogue (round display) or digital	

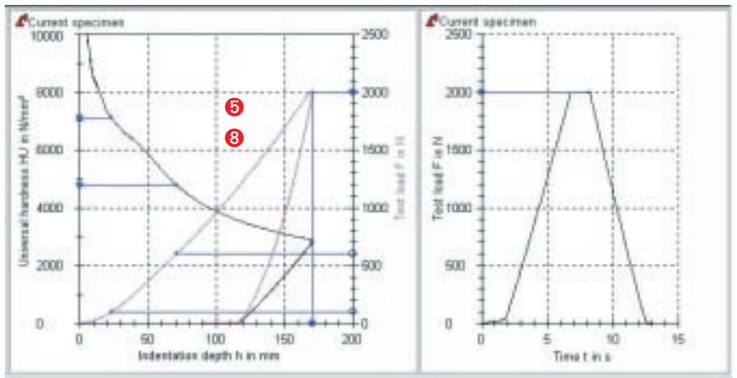
[1] = S = Screen, P = Protokoll



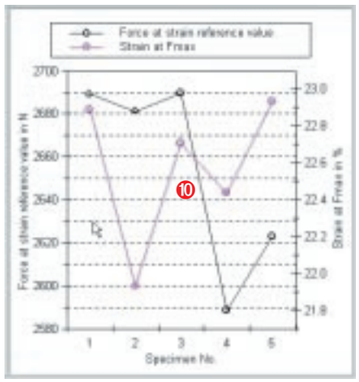
The PC mouse can be used to mark a section of a single curve diagram which can then be magnified to the size of the respective partial window.



The curve points and the respective evaluation reference lines can be displayed in the curve diagram for selected results.



The universal hardness is derived from the directly measured quantities test load and indentation depth. It can therefore be defined as a virtual measurement quantity, thus enabling its sequence to be displayed, dependent upon another measurement quantity.



This view depicts the sequence of parameters or results over a test series.

Evaluate and document – Modern in use and application with *testXpert*®

From test data to protocol
The test machine's test data is recorded, standardised, saved and evaluated immediately
* for test sequence monitoring and control
* for display on screen, and
* for display and saving of preselected test results

A protocol is printed after each test or test series according to the preselections in the test program.

Individual protocol styling
Each standard test program already contains a predefined test protocol that can be used straight away, you only have to select thee results which are to be output with the protocol.

Any individually styled protocols with company own logos, lists, tables, texts and diagrams can be created with master test programs, or with the optional protocol editor. A protocol wizard and a protocol editor support the user in creating protocols.

The layout elements for the protocol and screen are almost identical, they can, however, be configured differently. The results table on the screen can, for example, only display the results which are important for releasing the test, while the results table in the protocol can contain additional data.

Data saving for further use
Depending upon the preselection in the test program, not only all data, but also only selected result data from a test or test series can be saved. Saving of all data offers the possibility of tracing the origin of the result data up to configuration and settings for the test machine. The standardised measurement data, i.e. the data converted to its basic units and free of any tare values can be repeatedly displayed in the simulation mode and can also be evaluated to other criteria.

TestLab

Test report

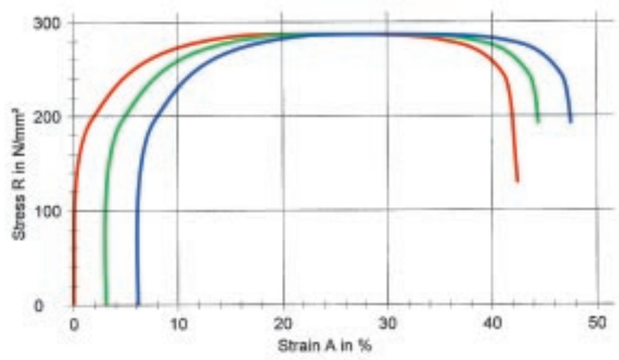
Test data:

Customer	: Chassis Laboratory	Specimen grips	: Hydraulic grips 8594.01.00
Material	: Deep drawn metals	Load cell	: 250 kN
Test standard	: DIN EN 10002 T1/ISO 10275	Extensometer	: Macro extensometer
Tester	: Pullman		

Results:

Nr	a0 mm	E GPa	Rp 0,2 N/mm²	Rm N/mm²	F Break N	F max kN	Ag %	A %	r	n
1	0,895	198	149,5	289,8	723,01	5,2	22,9	42,4	2,46	0,236
∅2	0,885	199	<146,6	287,8	856,43	5,1	22,4	42,7	2,44	0,237
3	0,890	197	150,0	289,0	1003,50	5,2	<21,9	<41,3	2,35	0,233
4	0,895	201	149,5	287,4	437,25	5,2	22,7	<41,6	2,35	0,234

Series graphics:



Statistics:

n = 3	a0 mm	E GPa	Rp 0,2 N/mm²	Rm N/mm²	F Break N	F max kN	Ag %	A %	r	n
x	0,893	199	149,7	288,7	721,25	5,2	22,5	41,8	2,39	0,234
s	0,003	2	0,3	1,2	283,13	0,0	0,5	0,6	0,06	0,001
v	0,32	1,19	0,21	0,42	39,26	0,50	2,25	1,46	2,53	0,47
min.	0,890	197	149,5	287,4	437,25	5,2	21,9	41,3	2,35	0,233
max.	0,895	201	150,0	289,8	1003,50	5,2	22,9	42,4	2,46	0,236

Example of a test results protocol with company logo, lists with header data, result tables, multi-curve diagram and statistics table.

Enter the era of multimedial testing with *testXpert*®

More information on the test
The characteristic curves and values derived from the force/extension measurement only describe the specimen or component behaviour abstractly. Observations, which quite often offer important additional information made by the tester during test, can only be saved as a written commentary.

testXpert® offers for the first time the possibility of multimedial testing, which brings with it, extra information and considerably more advantages for the user. This type of testing enables additional observations and procedures to be saved synchronously with the test data.

Record the test sequence in its entirity
The test arrangement or an especially interesting part of it, is observed simultaneously to the force/travel measurement with a camera and/or microphone. The recorded pictures and acoustics are digitalised immediately, and are saved synchronously to the test data and thus, they can also be evaluated.

The visual recording, e. g. via a video camera, shows when, how and where the specimen necks-in, kinks, changes colour, or whether it cracks and the crack lengthens. Acoustic events (crackling, cracking) can be recorded via a microphone.

The following projects are in planning for the future:
* microscopic recordings detect changes in the micro range that cannot be seen with the naked eye.
* endoscopic recordings offer an internal view of otherwise inaccessible hollow bodies.
* thermo-cameras make thermic developments visible during specimen loading.

Visual and acoustic information is also recorded, digitalised and stored synchronously to the force and extension values during multi-media tests.

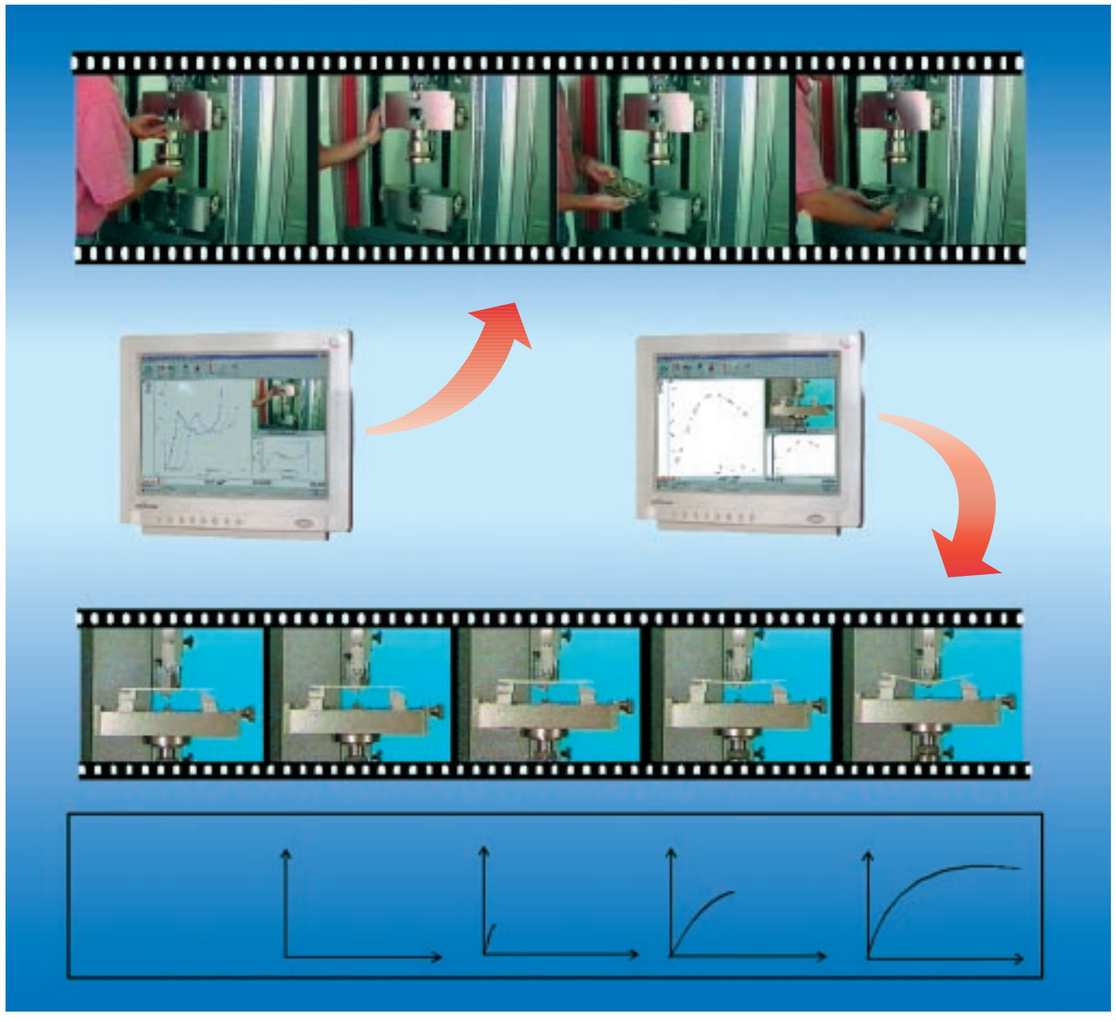
Advantages for the user
Ever increasing international cooperation, new partnerships with sub-contractors, as well as added risks caused by ever tighter product liability laws place increased demands on test technology. It's becoming ever more important to be able to reconstruct tests in their entirity.

The stored test data and video pictures can be displayed after the test at any moment in time and as often as required; even in steps from measurement point to measurement point.

Series graphics
Diagram with all of the test series curves. The selected test is shown with a thicker curve.

Single graphics
Diagram with the curve of the selected test. The crosswires show the curve point belonging to the video picture.

Multimedial testing opens new dimensions



Synchronous picture and test data recording
"Live" Video recordings of the test synchronously document the result sequence in pictures and data.

Documentation of setup and performance
On site video recordings document the test setup. Thus guaranteeing traceability and proof of test means according to the valid QS guidelines.

Visualising the assistance
A growing number of video clips show everything necessary for making machine settings and for re-equipping machines. Handling of software functions is explained via tutorial programs which show the necessary procedure(s) step by step on the PC monitor, e. g. how to create customised test protocols.

testXpert® – good in detail

Example
Obtaining legends for the graphics

testXpert® offers the possibility of displaying the test curves and the respective numerical values of the results in the same colour or type of lines.
This enables the curve, with the corresponding values in the results table, to be noticed at a glance whether it is in colour or black and white.

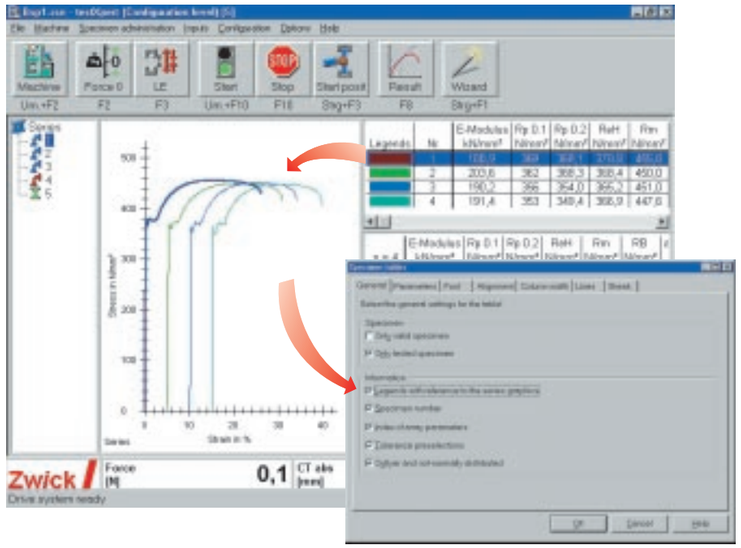
Example
Online assistance in testXpert

testXpert® offers the user support through two types of assistance:
- general assistance
- assistance with the loaded master test program

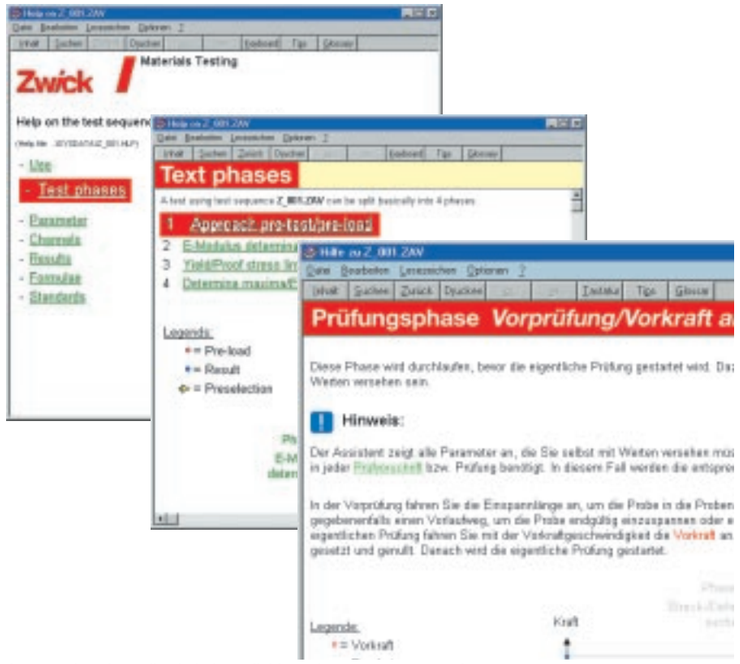
General assistance contains information on basic settings required for carrying out the test, e.g. test machine configuration, definition of the specimen, etc.

Assistance with the master test program supplies explanations on the test sequence, special parameters, interpretation of determined results, and much more.

testXpert® assistance has find functions similar to those of the assistance in standard Windows programs, this is a quick answer to a current question which is frequently asked.
In addition, numerous tips on themes such as ”Subsequent evaluation of a specimen using another grip to grip separation” (simulation with altered specimen parameters).



The legends to the graphics can be selected in the specimen table's settings mask.
The test series is then depicted in coloured assignment of results and graphics.



A comprehensive online help is available to the user as an operating support.

testXpert® test software – An abbreviated overview

Functions and performance	with standard test programs	with master test programs
Test machine verification/re-equipping		
* utomatic recording of test machine system data (self identification)	●	●
* Automatic determination and monitoring of the safety limit values	●	●
* Video sequence support for equipping/re-equipping the test machine	●	●
* Positioning the moving crosshead or the working piston	●	●
* Automatic reference drive for determination of the grip to grip separation	●	●
Prepare the test or test series		
* Compiling and changing, or adapting test programs with a test sequence wizard	–	●
* Compiling or altering protocols with a protocol wizard	Option	●
* Compiling or altering protocols with a protocol editor	Option	●
* Interface definition for export of measurement and test data with a data transfer wizard	Option	●
* Free styling of the desktop with a desktop editor (toolbar, main and partial window and display bar)	Option	●
* Modification of parameters, results, test sequence functions, etc.	–	●
* Compiling customised parameters, results, test sequence functions, etc. with macro language	–	●
* Definition of statistics, outlyer tests, etc.	●	
Run a test		
* Running of display of selected true and calculated test data, changes automatically for the time during and outside of a running test	●	●
* Automatic approach of the preselected grip to grip separation or start position	●	●
* Automatic zero-point – and sensitivity control	●	●
* Input dialogues, result and graphical test data displays in different types of display can be distributed over several main window sides	–	●
* Input dialogues, result and graphical test data displays, fixed preselection as application specific distributed over 2 main window sides	●	
* Display of single diagram curves with evaluation help lines and result measurement points	●	●
* Video recording kit with video capture card Miro DC30 and corresponding software	–	Option
Administration and data management		
* User administration (access rights, user profile, etc.)	●	●
* Master data management	●	●
* Test standard data base (selection of test programs to test standards, materials etc.)	●	●
* Management of test program result files	●	●
* Protocol, channel and result editors	–	●
* Upload/Download functions for data transfer in networks	Option	Option
* QDA/QCC Link (Quality Data Analysis, Quality Control Card)	Option	Option
Other performances		
* Comprehensive online help with video sequences	●	●
* Simple transfer of data and graphics via Windows clipboard	●	●
* Direct link of office standard applications	●	●

System prerequisites	
PC Hardware	Personal computer (PC) with Pentium processor (or better) At least 16 MByte RAM for Windows 95, at least 32 MByte RAM for Windows NT At least 200 MByte of free hard disk memory Colour monitor with resolution of at least 800x 600 Pixel (SVGA)
PC Software	Operating system Windows 95 or Windows NT, version 4.0 or better