

Model WAW-1000E Computer Control Electro-Hydraulic Servo Universal Testing Machine



Applications:

Model WAW-1000E computer control electro-hydraulic servo universal testing machine is a superior version

UTM. It is suitable to test various metallic & non-metallic materials for tension, compression, bending and shearing strength. It can be capable of testing the characters of materials on physical & technology properties.

Equipped with the computer & Software & printer, it can display, record, process and print the test results, and

control test procedures as the set program and can draw test curves automatically in real time. The machine

complies with ASTM, DIN, ISO standards. It is simple, easy to operate and widely used in works, laboratories

and high schools for material properties research and quality control.

Applied Standard:

- Load meets or exceeds the following standards: ASTM E4, ISO7500-1, EN 10002-2, BS1610, DIN 51221.
- Strain measurement meets or exceeds the following standards: ASTM E83, ISO 9513, BS 3846 and EN

10002-4

- Safety: This machine shall conform to all relevant European CE Health and Safety Directives EN 50081-1, 580081-1, 73/23/EEC, EN 61010-1
- ISO6892: DIN EN 10002-1, JIS Z2241, BS-18, ASTM E8: Metallic Material-Tensile Testing at Ambient Temperature.
- ASTM A370: Standard Test Methods and Definitions for Mechanical Testing of Steel Products

Load Frame



- Compact design with rigid four-column & two-lead screw construction.
- Dual workspace design: upper for tension test (expandable for peel & tear test etc), lower for compression, bending and shearing tests, which is quite convenient for different kinds of tests.
- The frames all incorporate human factor consideration in the design to ensure safety, improve testing efficiency, and reduce operator weariness.
- Cylinder mounted at the bottom of the machine to guarantee the working gravity.
- Test space can be extended according to the length & elongation of specimen and related test requirements.

Crosshead

The design of open front hydraulic wedge grips makes the exchange of inserts and specimen loading easier. Tensile grips are embedded into upper fixed and lower movable crosshead to keep maximum strength. Lower movable crosshead motor-driven by roller chain provides the exceptional ease of operation.

Safeguard

◇ Overload protection: When the testing load is over 2%-5% of Max. Load, the system will unload.

- ◇ Stroke protection: When the ram arrives at the upper limited position, the motor of oil pump will stop.
- ◇ Multiple protection functions: oil actuator overflow protection, oil pump over-current protection, hydraulic oil overheat protection, overload protection and filter protection.

Hydraulic power pack



- Variable pressure hydraulic power supply provides pressure on demand, reducing heat generation, increasing oil life & eliminating the need for water cooling.
- Double control mode, manual control & PC servo control model. For manual control model, hydraulic pack is for manually loading and clamping specimen hydraulically for high efficiency of test, While test data & curves can displayed on PC, manual control mode is especially suitable for the batch broken load tests on the large scale of specimens; For PC servo control mode, all can be controlled & processed by PC automatically, closed-loop servo control of position, load, stress & strain increasing test efficiency & meeting the data consistency between collection and analysis.
- The pumping units are designed to be located in the lab with lower noise level within 65dBa.
- The oil pump, as the core heart of the oil source, is the power source of the hydraulic system. MARZOCCHI pumps from Italy and the NACHI pumps from Japan are commonly used.

The two oil pumps are high pressure gear pump, with low noise and steady performance.

Servo valve



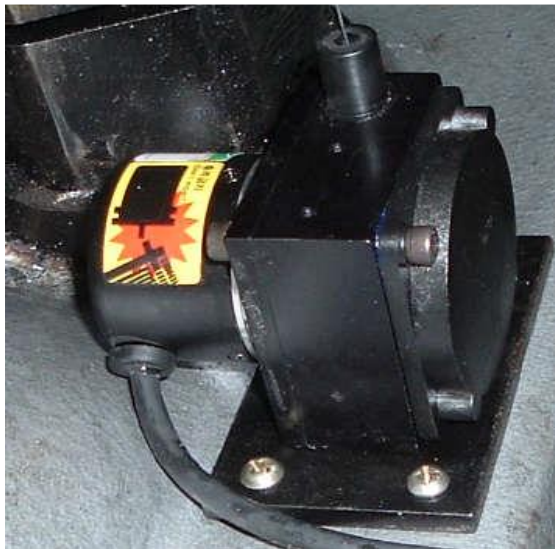
The servo valve is an important core part, whose flow rate can be controlled through measuring & control system to realize the precise closed loop control for loading and unloading;

Load measurement:



TE has accumulated great experience in selection of superior core loading weight system in terms of materials, design, construction technology and especially performance & accuracy. Cooperating with top-quality brands from Germany & USA, TE made a special custom design with shielding function so that it can be optimized match with measuring & control system for most accurate test results. The readability can be from 2% to 100% of the rated capacity. Calibration within 0.5% accuracy can be carried out as per ASTM E4, ISO7500-1, EN 10002-2, BS1610, DIN 51221 standards. This special load cell provides excellent immunity to impact and side forces, rugged & low-profile measuring body with strictly symmetrical design is optimally suited to ensure high endurance strength. Excellent linearity guarantees highly precise measurement, additional mechanical protection of the strain gage area. It can be set for protections of 105% over range protection, over load capacity of 150% without permanent zero shift and over load projection of 300% of the rated capacity without mechanical damage. This meets the stringent Weights and Measures requirements throughout Europe and the USA.

Position measurement



Wire drawing type encoder is used for measuring the displacement of actuator. High precision encoder is applied corresponding with controller request.

Deformation measurement:

High precision electrical strain gauged extensometer will be applied for deformation measurement. Also, being the exclusive agent of Epsilon extensometers in China, we are also experienced in providing suitable clip-on deformation measurement solutions and non-contact deformation measurement solutions like video

extensometer and laser extensometer even under special environment such as furnace, environment chamber etc.

Standard configuration



Model 3542-050M-020-ST(Optional)



3543 Optional



Electronics and Control Part:

Self-developed & most advanced PCIE card for testing machine realizes the functions of real time data collection, communication, measuring and control etc. according to related ASTM, ISO standards. It can be inserted PCI slot of computer and connected with testing machine by data cable, then above functions can be done easily. Effective sampling rate can be up to 50Hz, in addition, the different versions for sampling rate of

200Hz, 500Hz and 10 kHz are available as options to meet special test requirements.



- Remote control box is attached on the column for operating in hands for close/open of grip and up/down movement of crosshead.



Patent technology of TE:



Calibration of load and extensometer by Electrical way and provide you a quick convenient way. No necessary to calibrate the load and extensometer by calibrators. Do the calibration whenever you need.

Technical specification

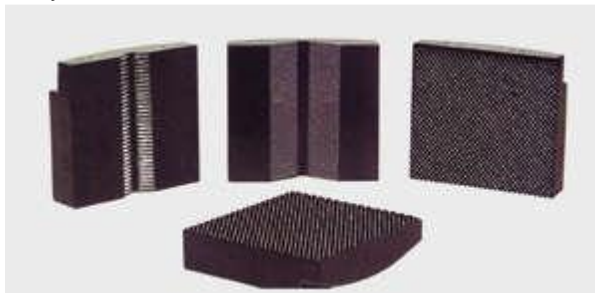
Model	WAW-1000E
Max. Load(kN)	1000
Load measuring range	2~100%F.S. (0.2/0.4~100%F.S optional)
Load accuracy (%)	±1
Deformation measuring range	2~100%F.S. (0.2/0.4~100%F.S optional)
Deformation accuracy (%)	±1
Displacement position(mm)	0.001
Test loading speed(mm/min)	0.5-50 (0.01-50 if configured with EDC220 controller & Moog servo valve)
Max. Crosshead moving speed (mm/min)	200
Stress control range	1~60(N/mm ²)S-1

Strain control range	0.00025/s~0.0025/s
Tensile space ₁ (mm)	750
Compression space(mm)	620
Piston stroke(mm)	250
Column Distance(mm)	570
Column Diameter(mm)	90
Working table size(mm)	650x800
Flat jaw (mm)	0-40
Round jaw(mm)	Φ20-Φ60
Jaw length(mm)	110
Jaw width(mm)	110
Platen size(mm)	Φ148x40
Bending span(mm)	50-500
Roller diameter (mm)	Φ50
Roller length (mm)	160
Bending depth (mm)	180
Net weight (kg)	3500
Max. height ₂ (mm)	2750
Dimension of load frame ₃ (mm)	900X650X2500
Size of power pack(mm)	550x550x1410
Oil tank volume(L)	110
Oil pressure (MPa)	26
Footprint (L x W)	1600x1600
Gross weight (kg)	3700
Shipping dimension (mm)	2700x1160x1100 1540x980x1725
Power supply	3PH, 380VAC, 50H, 5kW

- Notes: 1. Tensile space excludes 100mm piston stroke;
 2. Max. Height includes 250mm piston stroke;
 3. The height of load frame excludes piston stroke

Standard Accessories:

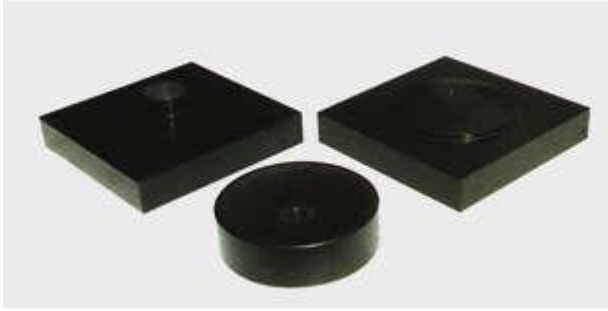
1. Hydraulic tensile fixture



2. Flexure/Bending fixture



3. Compression fixture

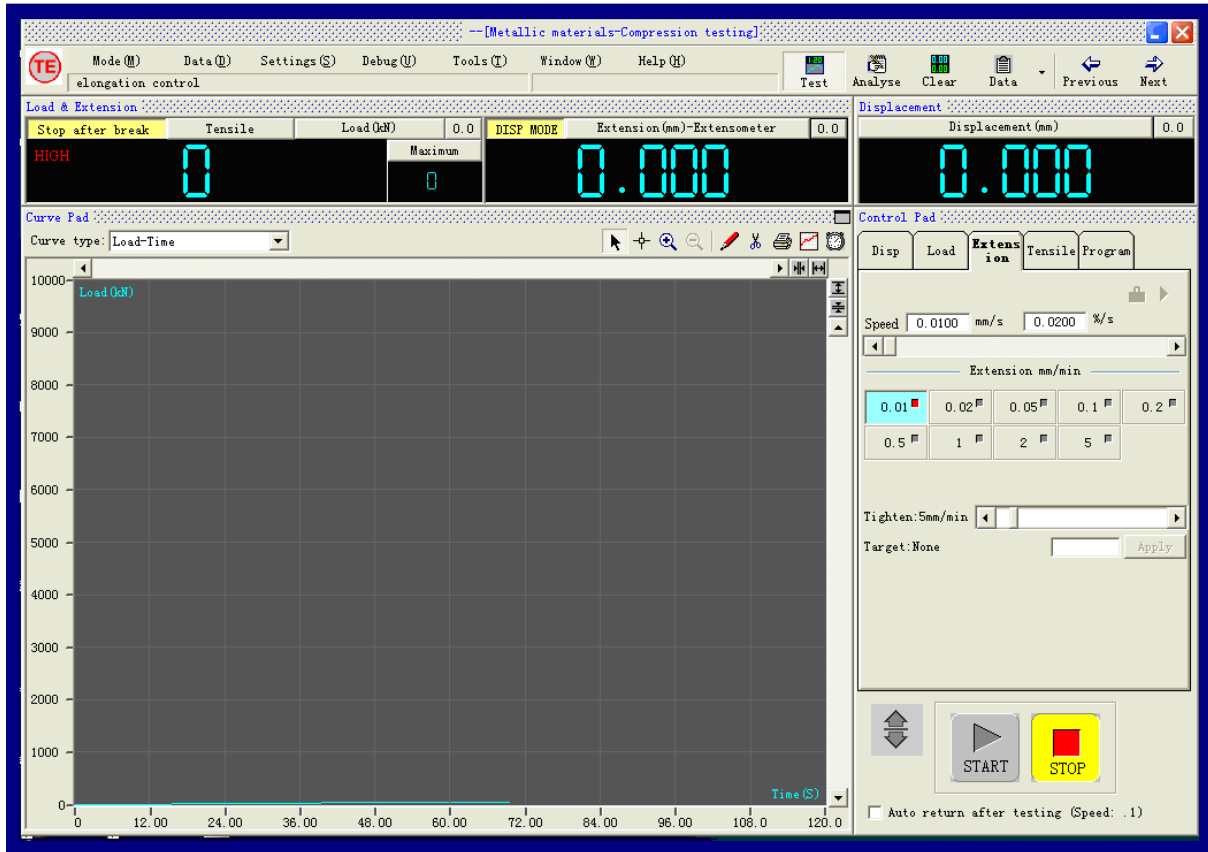


4. Computer system with English version software (19in LCD) 1 set For software please see ANNEX-1



ANNEX-1: Software Introduction **Features of Measuring & Control Software** **1. Application & Features:**

TE software refers to the software characteristics of the top manufacturers of testing machine in the world and proposals of various testing requirements from the end users, and combines all the advantages of former versions of software with lots of new features as following. Optimized software structure makes the testing operation easy, convenient and powerful.



- ✧ Integrated full digital electro-hydraulic servo close-loop control, data processing with data analysis
- ✧ Possess multi kinds of full digital close-loop control modes, such as test load, displacement, stress and strain. Different control modes can be switched each other freely and smoothly.
- ✧ Enjoy strong “programming” function of integrated test procedures, programmable steps can be up to 100 steps, and it can be also extended to complete the compilation of arbitrary complicated and control mode switch test procedures.
- ✧ Software design aims to rapidity and convenience of test operation. Also adopt special design method to meet batch technology tests.
- ✧ Software is managed by multi levels, and expert user can use all system parameters, which combined the flexibility of software usage and safety & reliability of the system.
- ✧ Automatic data processing, processing method complies with multi international standards, such as ISO6892-1998, EN10002-1:2001 and ASTM
- ✧ Multi international units are adopted, such as SI, metric system unit and British measurement, etc.
- ✧ Maintain multi language conversion interface, so the system can be applied under conditions of various kinds of languages conveniently (Customized)
- ✧ Possess function of manual data processing, which fits to various kinds of complicated data processing for customer.
- ✧ Offer test reports, which can be stored, printed and re-analyzed.
- ✧ Test data is stored as the form of “text mode”, and any general commercial data processing software can reprocess test data.
- ✧ Rich & perfect assorted test curves

✧ Possess the function of integrated document operating system, for example, test report, test parameter, system parameters can be stored as the form of “text mode”.

✧ Compatible with different commercial printers

✧ Control system is based on software system, so upgrade is easy.

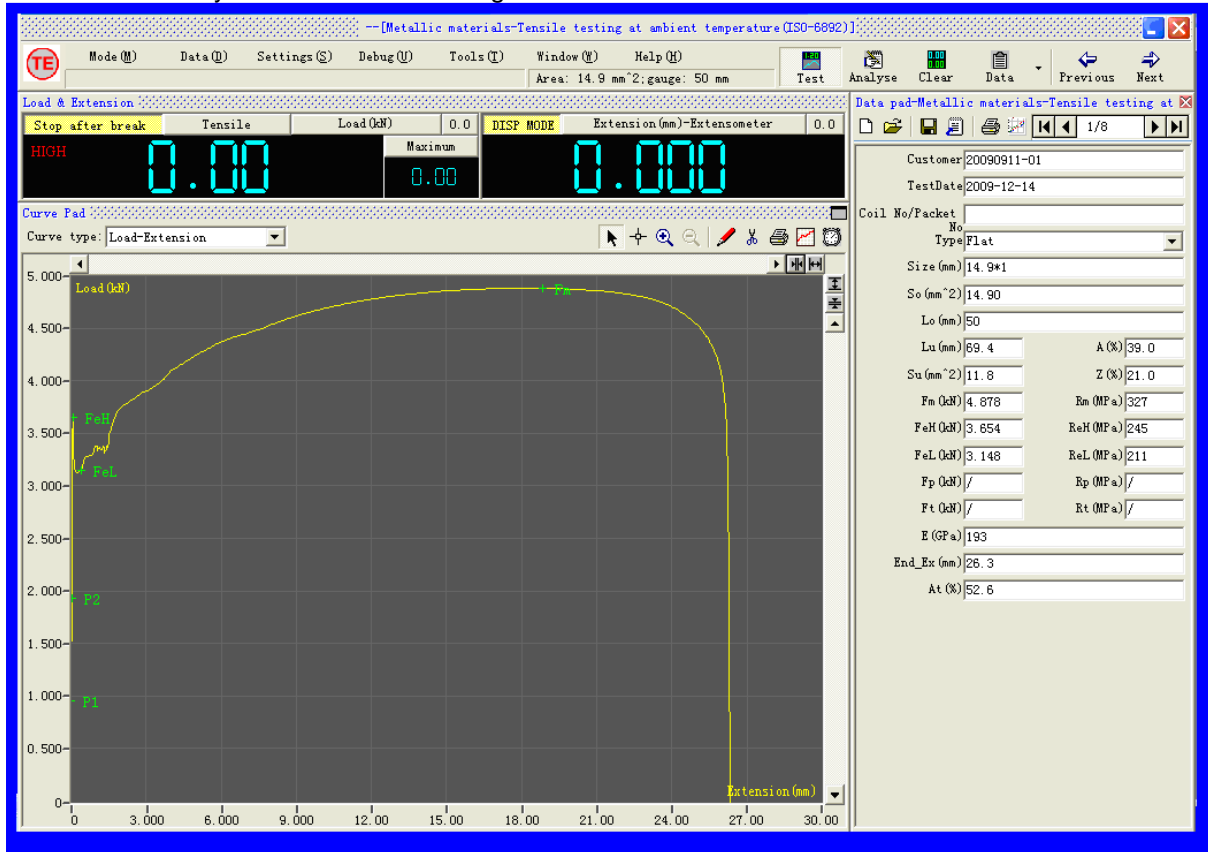
2. Software & hardware configuration

This software is used along with special PCI/ISA electro-hydraulic servo measuring & control card.

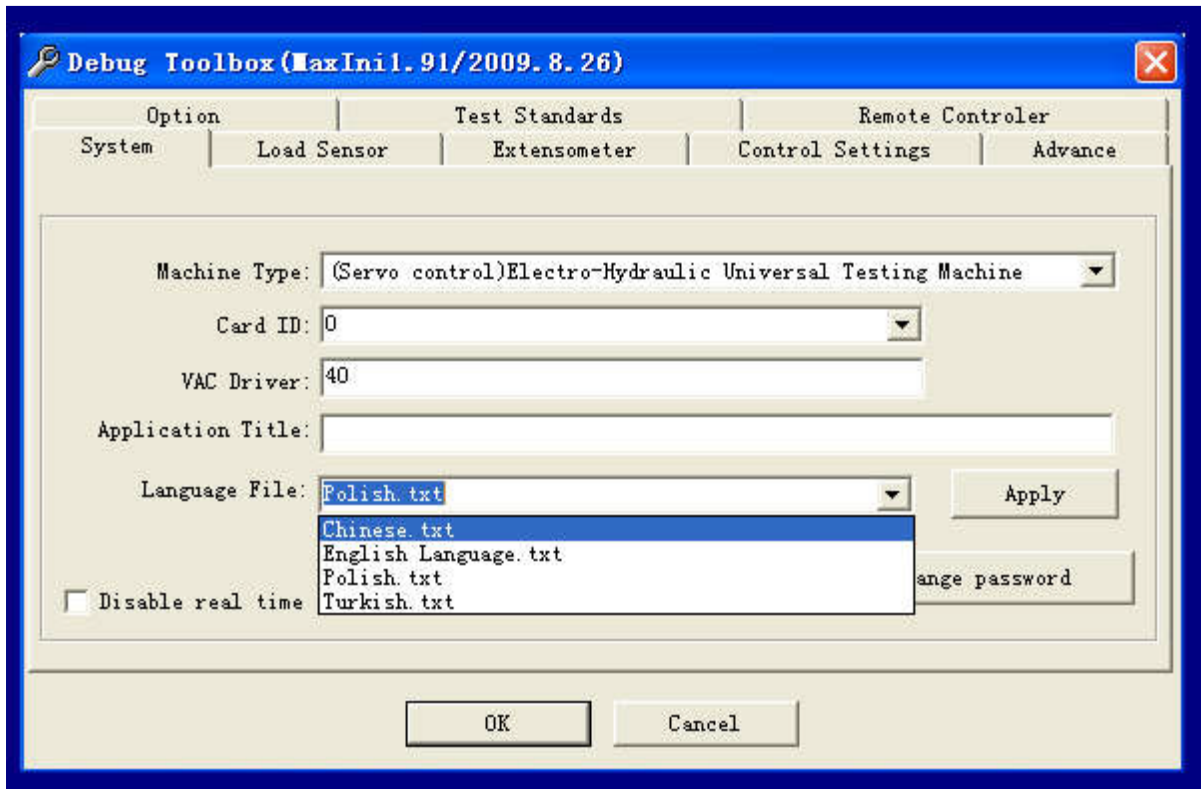
Various kinds of commercial printer and driving programs

3. Interfaces of software:

Various kinds of hydraulic universal testing machine



The control modes, test data and curves can be displayed in real time in the main interface and can be shifted at any time.

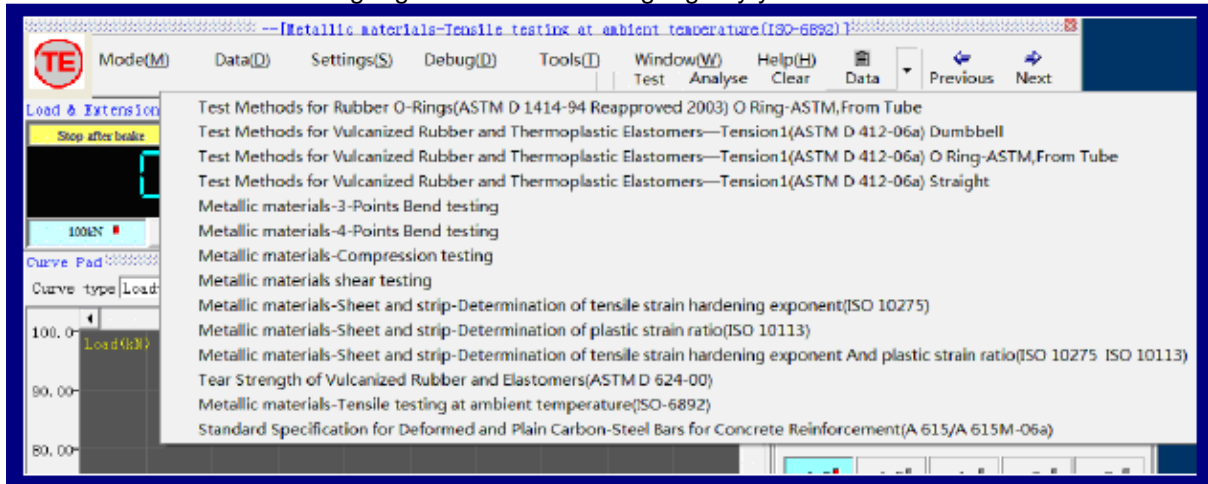


The deep-seated parameters of software are contained in Debug Toolbox

Multi-language function:

With the flexible language edited function, it can support multi-language such as English, Chinese etc. and you

can translate the software language into the native language by yourself.



Software supports all kinds of popular testing standards i.e. ISO, ASTM, BS EN, DIN, JIS, GB etc.

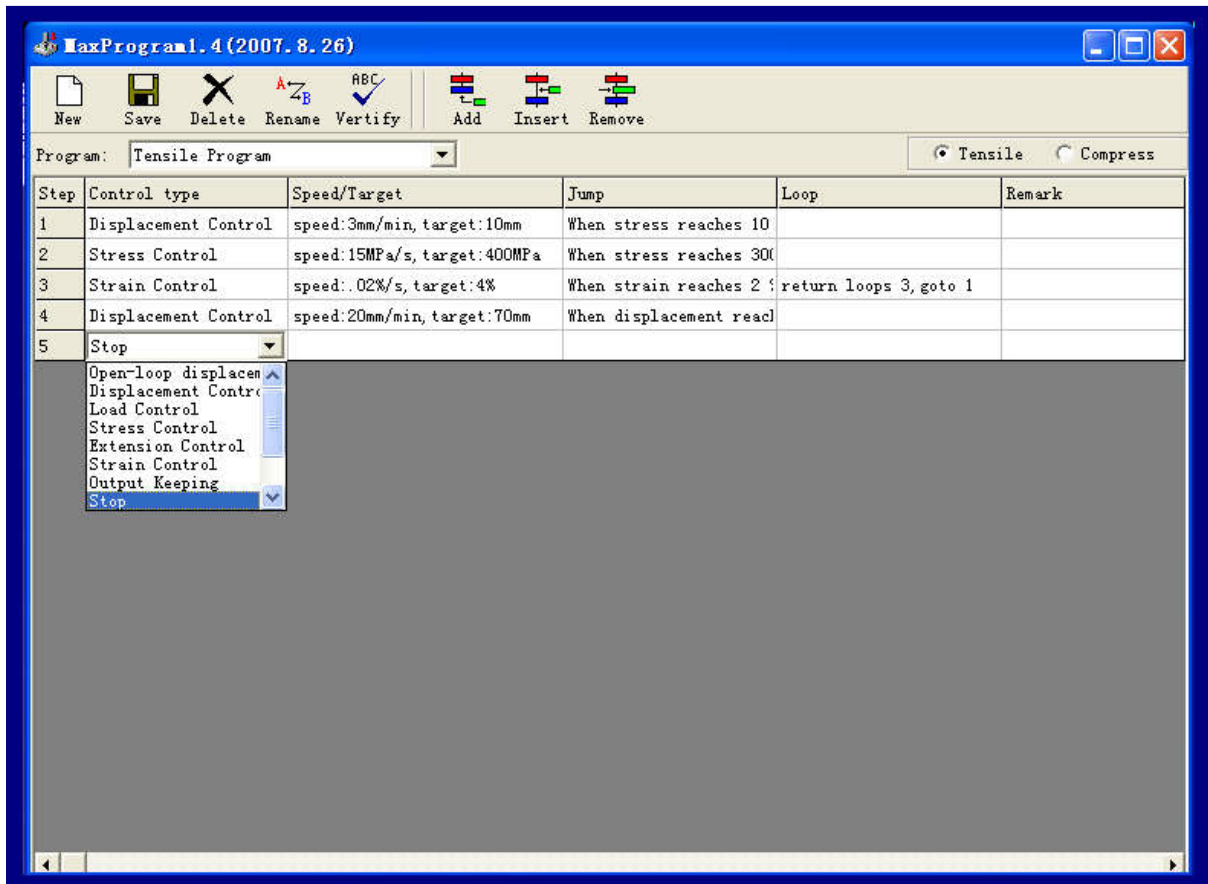


Test Systems Quality Control and Laboratory Instruments

Users can modify and add own testing standards and methods.

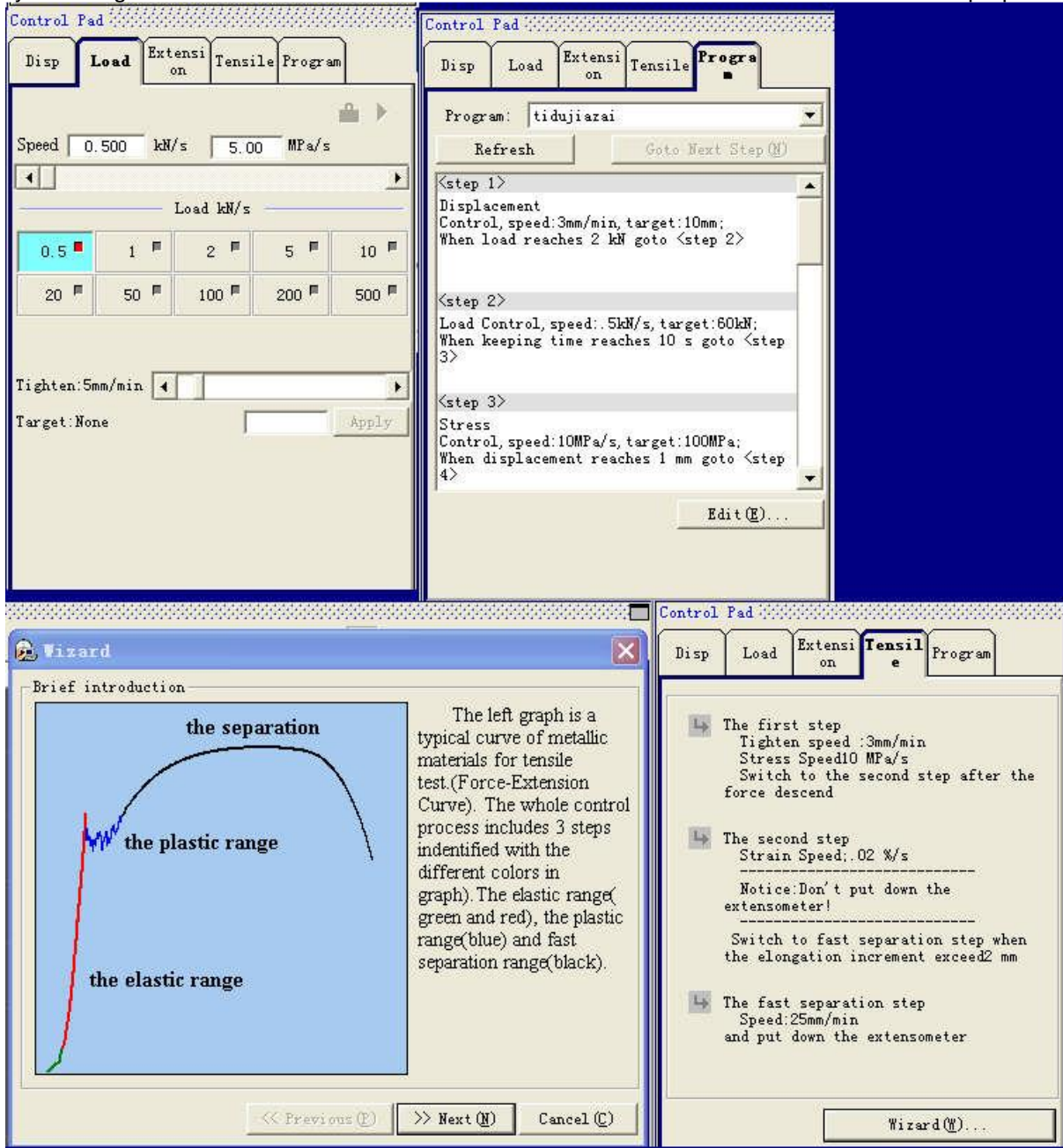
The screenshot shows the 'Test Standard Creator 3.0' application window. A context menu is open over the table, listing options such as 'Modify Standard Caption and ID...', 'Copy Current Standard for Creating New Standard...', and 'Delete Current Standard'. The table below contains the following data:

	Tooltips	Formula	Decimal	Key...	Vis...	I	
10	Self2	2			False	1	
11	Self3	3			True	1	
12	Self4	4			True	1	
13	Self5	5			True	1	
14	Self6	6			True	1	
15	Self7	7			True	1	
16	Self8	8			True	1	
17	Self9	9			True	1	
18	Self10	10			True	1	
19	Self11	11			True	1	
20	Self12	12			True	1	
21	Self13	13			True	1	
22	Self14	14			True	1	
23	Self15	15			True	1	
24	Fbc	Fbc (kN)			True	1	
25	Rbc	Rbc (MPa)			True	1	
26	Fsc	Fsc (kN)	[Fbc]*1000/[Area]	200, 5, 1	MaxY	True	1
27	Rsc	Rsc (MPa)	[Fsc]*1000/[Area]	200, 5, 1	QFY	True	1
28	Fpc	Fpc (kN)			Poi...	True	1
29	Rpc	Rpc (MPa)	[Fpc]*1000/[Area]	200, 5, 1		True	1
30	Ftc	Ftc (kN)			Poi...	True	1
31	Rtc	Rtc (MPa)	[Ftc]*1000/[Area]	200, 5, 1		True	1
32	Slope				Slope	False	1
33	Ec	Ec (GPa)	[Slope]*[Gauge]/[Area]	0, 0.01, 0.01		True	1
34	TestFlag				Tes...	False	1



MaxProgram Editor possesses of multiple full digital control modes, i.e Displacement control, Stress (Load) control, Strain (Deformation) control, Low cycle control. User can edit the most complex and logical procedure

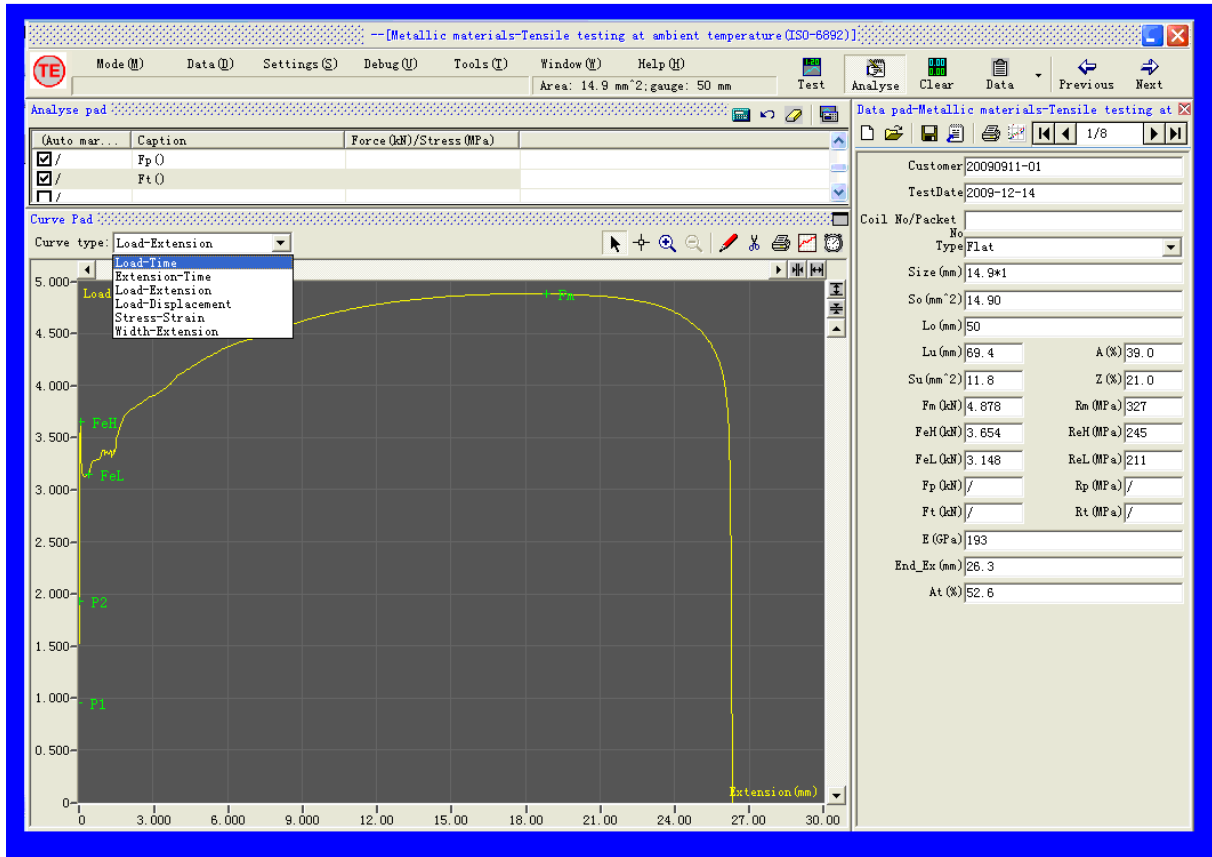
by MaxProgram Editor. The combination of above functions can meet all kinds of routine test purpose.



The screenshot displays the MaxProgram Editor interface, which is used for configuring test programs. It consists of several windows:

- Control Pad (Left):** This window allows users to set test parameters. It includes tabs for 'Disp', 'Load', 'Extensi on', 'Tensile', and 'Program'. Under the 'Load' tab, there are input fields for 'Speed' (0.500 kN/s and 5.00 MPa/s) and a grid of 'Load kN/s' values (0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500). It also features a 'Tighten: 5mm/min' slider and a 'Target: None' field with an 'Apply' button.
- Control Pad (Right):** This window shows the 'Program' configuration for a test named 'tiduji azai'. It includes a 'Refresh' button and a 'Goto Next Step (N)' button. The program is divided into three steps:
 - <step 1>**: Displacement Control, speed: 3mm/min, target: 10mm; When load reaches 2 kN goto <step 2>
 - <step 2>**: Load Control, speed: .5kN/s, target: 60kN; When keeping time reaches 10 s goto <step 3>
 - <step 3>**: Stress Control, speed: 10MPa/s, target: 100MPa; When displacement reaches 1 mm goto <step 4>
- Wizard (Bottom Left):** This window provides a 'Brief introduction' to the test process. It features a graph of a Force-Extension Curve with three distinct regions:
 - the elastic range:** The initial linear portion of the curve, colored red and green.
 - the plastic range:** The region where permanent deformation occurs, colored blue.
 - the separation:** The final peak of the curve where the material fractures, colored black.
- Wizard (Bottom Right):** This window provides detailed instructions for each step of the test:
 - The first step:** Tighten speed : 3mm/min, Stress Speed 10 MPa/s. Switch to the second step after the force descend.
 - The second step:** Strain Speed: .02 %/s. Notice: Don't put down the extensometer! Switch to fast separation step when the elongation increment exceed 2 mm.
 - The fast separation step:** Speed: 25mm/min and put down the extensometer.

Through the Tensile Program Editor, user can setup test steps according to the requirements of standards.



Multiple curves function in real time display including Load-Extension, Load-Displacement, Stress-Strain, Load-Time, Extension-Time, and Width-Extension. Characteristic points such as Elastic Modulus, Yield points, Rp, Rm etc. can be marked on the curves, for a highlighted and visual observation.



Test Systems Quality Control and Laboratory Instruments

Test result can be obtained automatically and also it can be got from the test curves manually.

The screenshot shows two overlapping windows from a software application. The background window is titled "Stat & Print in Excel" and contains a table for selecting records to print. The foreground window is titled "Excel locate" and is used for selecting specific data items to include in the report.

Stat & Print in Excel

select records to stat and print: (check) Select All Clear Report Template: Print (P)

SampleID	TestDate	Operator	Type	Size (mm)	So (mm ²)
<input checked="" type="checkbox"/> 31132	2009-11-6				

Report Template:
ASTM E 132-04 Poisson Ratio.rdf
metal Tensile ISO6982.rdf
n,r value iso 10275 & iso 10113.rdf
Pricoat Compression.rdf
spring compression.rdf
structure compression.rdf

Excel locate ---C:\Program Files\MaxTest\Report\structure compressio...

Item	horizo...	vertical	horizo...	vertic...
<input type="checkbox"/> SampleID				
<input type="checkbox"/> TestDate				
<input type="checkbox"/> Operator				
<input type="checkbox"/> Type				
<input type="checkbox"/> Size (mm)				
<input type="checkbox"/> So (mm ²)				
<input type="checkbox"/> Lo (mm)				
<input type="checkbox"/> Fbc (kN)				
<input type="checkbox"/> Rbc (MPa)				
<input type="checkbox"/> Fsc (kN)				
<input type="checkbox"/> Rsc (MPa)				
<input type="checkbox"/> Fpc (kN)				
<input type="checkbox"/> Rpc (MPa)				
<input type="checkbox"/> Ftc (kN)				
<input type="checkbox"/> Rtc (MPa)				

horizontal location: vertical location:

multi-record option
horizontal incremental change: vertical incremental change: Modify selected rows

TE software contains all kinds of Report Templates. Customer can design various testing reports according to

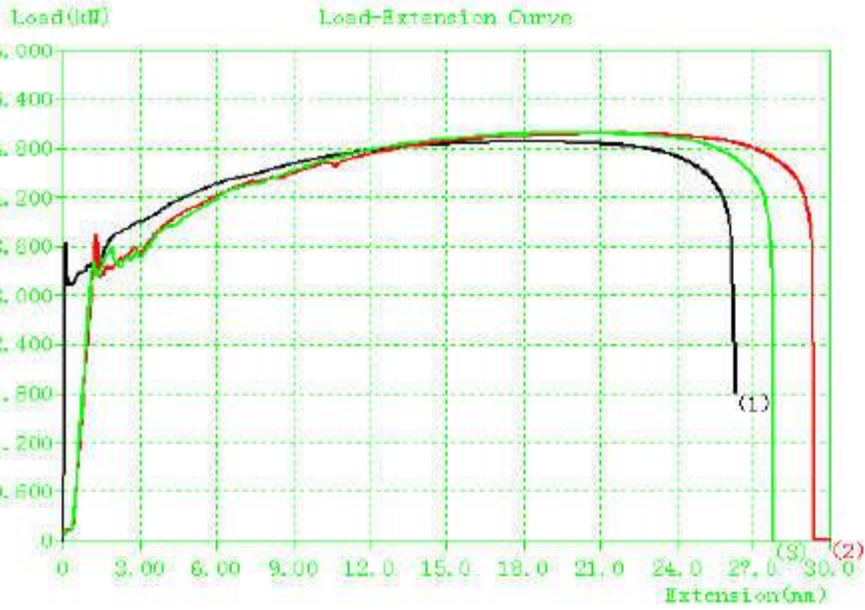


the requirements. Test result and curve can be printed in Excel or the auto-creating report template.

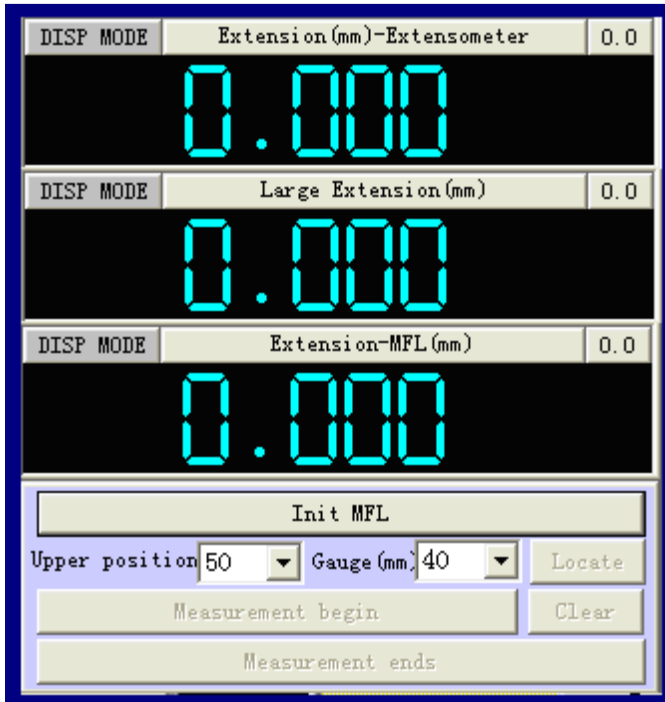
Metallic materials -- Tensile testing at ambient temperature

ISO 6892 : 1998

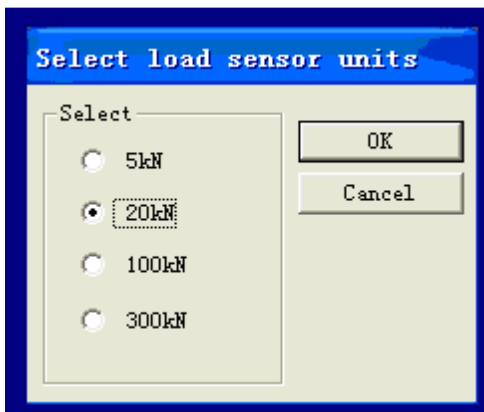
TestDate	2009-9-11	Operator	LW					
Temperature	20℃	Size(mm)	14.9*1					
Lo(mm)	50	So(mm ²)	14.9					
PrintID	SampleID	Rm(MPa)	ReH(Mpa)	ReL(MPa)	Rp(MPa)	E(GPa)	A(%)	Z(%)
1	QD01	327	245	210	233	193	39	21
2	QD02	334	251	223	234	198	42	23
3	QD03	335	240	229	228	205	38	27
4								
Max value		335	251	229	234	205	42	27
Min value		327	240	210	228	193	38	21
Average value		332	245.3333	220.6667	231.6667	198.6667	39.6667	23.667



Print Date: 2009-12-8



Beside the clip-on Extensometer, TE software supports Long Travel Extensometer, Full Automatic Extensometer, video Extensometer, laser Extensometer, and it can be added eight Extensometers at most.



TE software supports four load cells.