

Section 1 Foreword

The EVOTest program applies to all kinds of material testing machine such as Electron Control Universal Testing Machine, (Servo control) Oil Pressure Universal Testing Machine, (Screen display) Oil Pressure Universal Testing Machine, (Screen display with displacement) Oil Pressure Universal Testing Machine, (Proportion control) Oil Pressure Universal Testing Machine, that are differed from its configuration files. The program of different configuration files has different way of operating; this enchriridion has incorporated all possible ways of use.

Section 2 Characteristic of the program

1. The program could be configured four different load sensors at most, users could switch the sensor in the four if needed, the MFS of the load sensor is in the range of 50kN to 2000kN.
2. The program could be configured eight elongation sensors (extensometer) at most, users could switch the sensor in the eight if needed.
3. The Program has open framework, which supports different database modules of testing. The initialization of the program incorporates the testing method of GB228-87, GB228-2010, GB7314-87 etc. That could be added if needed.
4. The program could display the load value, the load peak in scaled and non-scaled mode, $\pm 1\%$ of the display value (no lower than 20% of the MFS of the scale) in precision when in scaled mode, and $\pm 0.5\%$ of the MFS in precision when in non-scaled mode.
5. The program could display the elongation value, the elongation peak in scaled and non-scaled mode, $\pm 1\%$ of the display value (no lower than 20% of the MFS of the scale) in precision when in scaled mode, and $\pm 0.5\%$ of the MFS in precision when in non-scaled mode.
6. Automatically records load/time, elongation/time, load/elongation, load/displacement curve, frequently specimen.
7. Automatically calculates the mechanical performance of the material according to testing curve, the result could be manually modified.
8. Automatically saved the data and the curve of the test, the data is managed by database.

Section 1 Environment of circulate

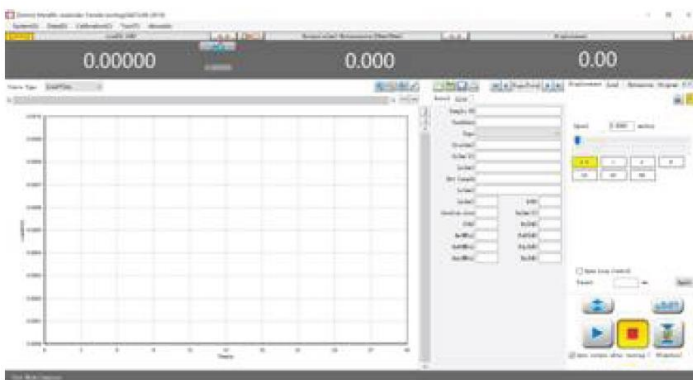
Hardware demand: Pentium MMX200 CPU/128M Memory or more, SVGA Color Display (800*600 Resolving Power or more), Mouse, Printer

Operating System: English Windows XP/10/11

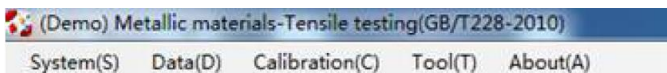
Section 2 Startup



On the desktop of your computer, double-click the icon **EVOTest**, the interface of the desktop shows below: The diagram of the startup menu of the EVOTest shows below:



Section 3 Main faceplate



The main faceplate which always on the top of the screen is the control center of the program, it manages all the other function faceplates of the program.

Detail explains:

1.System(S):

1.1 **Tensile or compress:** Switch test control mode for tension or compress 1.2 **Select load sensor:** Choose a different range of load sensor; 1.3 **Select Extension Sensor:** Select an extension sensor from extensometer and large extension; 1.4 **System settings:** 1.4.1 Test: click the test button the software will appear the following interface:



“**Stop While Destroy**” means the test will stop according to the following two analyzing conditions, one is the load exceeded 10% of the full range, the other is load drop exceeded 20% of the peak force (Of course, customers can fill in the blanks based on the actual situations)

Section 4 Main faceplate

“**Test Record Frequency (Hz)**” means software acquisition frequency

“**Auto replaced to next specimen**” means replaced next specimen after 5 seconds(Of course, customers can fill in the blanks based on the actual situations) When all parameters are set up, click OK to save it or click Cancel

1.4.2 System: click the system button the software will appear the following interface:

“**Stop While Destroy**” means the test will stop according to the following two analyzing conditions, one is the load exceeded 10% of the full range, the other is load drop exceeded 20% of the peak force (Of course, customers can fill in the blanks based on the actual situations)

“**Test Record Frequency(Hz)**” means software acquisition frequency

“**Auto replaced to next specimen**” means replaced next specimen after 5 seconds(Of course, customers can fill in the blanks based on the actual situations) When all parameters are set up, click OK to save it or click Cancel.

1.4.2 System: click the system button the software will appear the following interface:

1.4.3 Speed: click the speed button the software will appear the following interface:



In this module customer can set different loading speed according to the actual situation.

1.4.4 “Disp. mode”: if you used extensometer, please select all conditions, and fill in corrected parameters.

1.4.5 “Print”: Software provides 4 kinds of printing method.

2.Data(D):

2.1 “Choose Test Method”: customer can choose different test method according to the test.

2.2 “Input”: Create a new test.

2.3 “Open”: Open the recorded data.

2.4 “Save”: Save a completed test.

2.5 “Delete”: Delete save a completed test.

2.6 “Open analyze panel(F11)”: Used to reanalyze the data again.

2.7 “Analyze settings”: customer can fill in corrected parameters according to the actual situation.

2.8 “Save As Text File”: Save the test data as text file.

3.Calibration(C):

3.1 Calibrate Load: Calibrate load sensor

3.2 Calibrate Extensometer: Calibrate extensometer

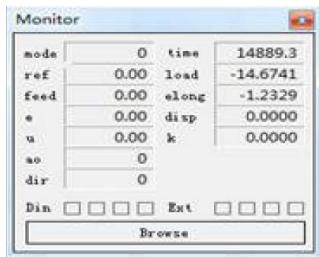
3.3 Calibrate Displacement: Calibrate motion detector

3.4 Calibrate Large Extension: Calibrate large extension sensor

3.5 Controller settings: This module contains a lot of controller parameters, some are empirical values, some need to be calculated according to the actual.

4.Tool (T):

4.1 Monitor(F12): Real-time control monitor as



following interface:

4.2 Load Protect Record: Can view the overload record.

5.About(T) :

5.1 About: Check the program's version etc.

5.2 Register: Check the state of register of the program

or register again.

6.Status bar: Departed to three parts as the left part, the middle part and the right part, the left part displays the curve of control, the middle part displays experimental data, and the right part displays the speed of the load, extension and displacement etc.

Section 5 Load and elongation display board

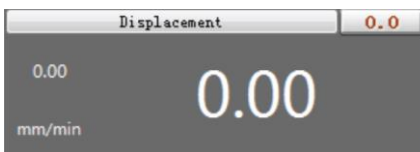


Load: Automatic stipulations of an agreement;  **(Load peak display):** Automatically cleared when the testing starts; **Elongation value display:** Automatic stipulations of an agreement; **Switched rule:** When in the beginning of the testing, it should be selected Extension-Extensometer or Extension-Displacement, if no extensometer is used, the button  should be pressed down and turned yellow, if the button be pressed down, the elongation would be replaced by the displacement, else the elongation would be measured by Extensometer.

Clear button  : Clear the current display value  this button can clear all before a test.

Section 6 Displacement display board

The board does not exist in the display machine.



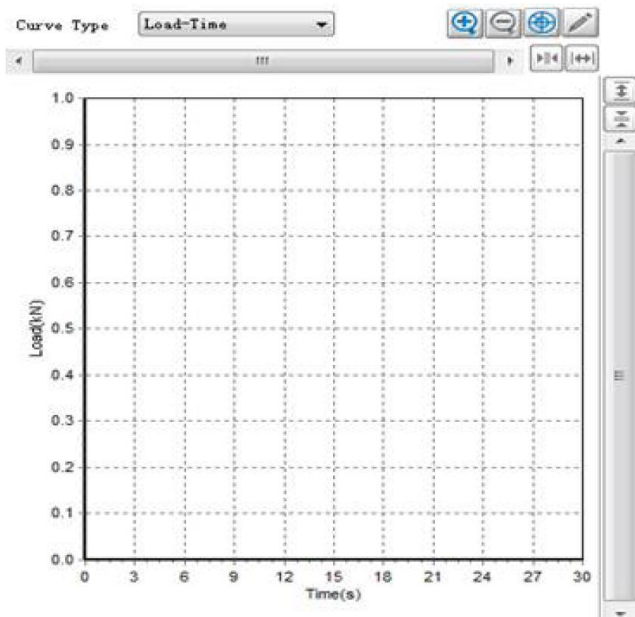
Displacement: Displays the displacement value

Piston position: Only displays in hydraulic pressure servo machine

Manual control direction: Only displays in electronic machine.

Section 7 Curve display board

The curve display board would display the curve when in testing, display the history curve when in browsing data; and display the result of curve analysis when in analysis mode

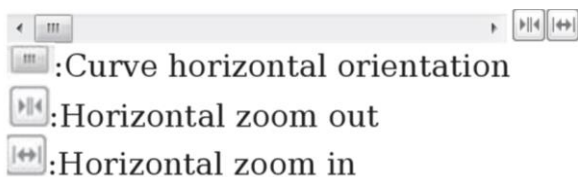


1. **Curve type:** The program would record six different types of curves: Load-Time, Elongation-Time, Load- Elongation, Load-Displacement, Stress-Strain, Load- Strain, these could be switched displaying here

2. Curve analysis tools:

	Drag point: When the curve display board is under the analysis mode, clicks the left button of the mouse to pitch on the points of the curve, and drag them moving;
	Blow up curve display: When the tool be selected, selects a area on the curve analysis board by the mouse, the area would be blew up when the mouse button be released;
	Reduce curve display: when presses the icon, the curve would be reduced by one scale;
	Reveal line: When clicks the left button of the mouse, there would be a red line indicates the linearity of the curve;

3. The scroll bar:



Section 8 Control board

1. Control mode switch card



Displacement: Closed loop (open loop) displacement control mode; **Load:** Closed loop load control mode

Extension: Closed loop elongation control mode; **Tensile:** Typical metal tensile program control mode

2. Control

buttons board

The control buttons board has two states: testing control state and move control state, the button  used to switch the two states **Testing control mode:**



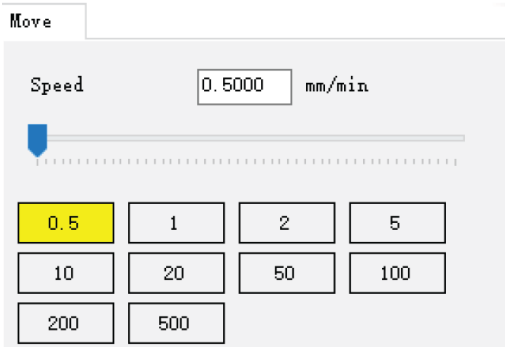
: To control the start of the testing; : To control the stop of the testing; **1 Move control mode:**



To control the piston or the beam moves up; : To control the piston or the beam moves down;

: To stop the movement of the piston or the beam; : To reset the position of the piston or the beam;

: Presses the button, selects the second card, switch to servo output



board; The board shows the speed of beam up and down.

Section 9 Data board

1. Data board

The data board displays all information of the test, which is differ in the interface of the different testing method, for example, the picture shows above is the data board of Metallic materials- Tensile testing at ambient temperature (GB/T 228-2010)

Steel number	Sample ID
TestDate	Customer
Tester	Type
Size (mm)	So (mm ²)
Lo (mm)	Ext length
Lc (mm)	Lu (mm)
A (%)	Section size
Su (mm ²)	Z (%)
Fm (kN)	Rm (MPa)
FeH (kN)	ReH (MPa)
FeL (kN)	ReL (MPa)
Fp (kN)	Rp (MPa)
Ft (kN)	Rt (MPa)
E (GPa)	Yield ratio

2. Data Tools



Create a new data board to save originality information of the testing, it usually be done before the testing start

1. Lookup the history data of the testing; Rogatory condition

On the left-top of the interface, there have a list box of rogatory condition, the diagram shows below, customer can choose a rogatory condition, such as steel number, to find a history data.

Search Condition

- Steel number
- Sample ID
- TestDate
- Customer
- Tester
- Type
- Size (mm)
- So (mm²)
- Lo (mm)
- Ext length
- Lc (mm)
- Lu (mm)
- A (%)
- Section size
- Su (mm²)
- Z (%)
- Fm (kN)
- Rm (MPa)
- FeH (kN)
- ReH (MPa)
- FeL (kN)
- ReL (MPa)
- Fp (kN)
- Rp (MPa)
- Ft (kN)
- Rt (MPa)
- E (GPa)
- Yield ratio

2. Search Range

Search range is a period. Customer can search all history data during this period.



Search Range

From

To

3. Details of the record

On the right-bottom of the window there displays the details of the rogatory record, the diagram shows below:

Steel number 123	Sample ID 123
TestDate 2017-03-	Customer 1
Tester 2	Type Circle
Size (mm) 20	So (mm2) 314.16
Lo (mm) 20	Ext length
Lc (mm) 40	Lu (mm)
A (%)	Section size
Su (mm ²) 0.00	Z (%) 100
F _n (kN) 0.02	R _m (MPa) 0
F _{eH} (kN) /	R _{eH} (MPa) 0
F _{eL} (kN) 0.01	R _{eL} (MPa) 0

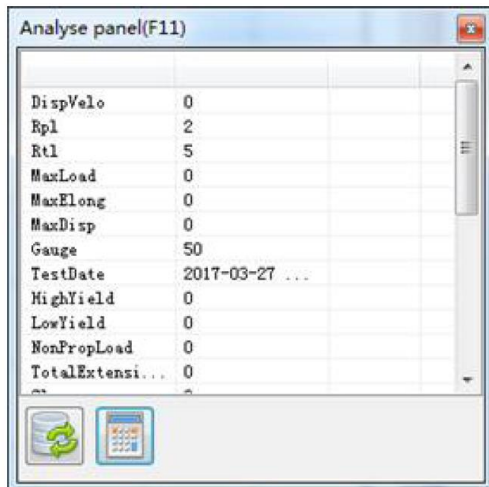


: Save the current testing data to database;



4. : Print out the testing data, there has two printout mode of the program, one is common mode, the other is Excel mode, the details about the two modes would be explained in the latter part.

Section 10 Analysis board



Analyse panel(F11)

DispVelo	0
Rpl	2
Rtl	5
MaxLoad	0
MaxElong	0
MaxDisp	0
Gauge	50
TestDate	2017-03-27 ...
HighYield	0
LowYield	0
NonPropLoad	0
TotalExtensi...	0

At the bottom of the panel, there are two icons: a green circular arrow and a calculator icon.

The analysis board shows above, this board would exist in the analysis mode of the program. Clicks the analysis button on the toolbar or selects the “Analysis Mode” option in the Menu to switch to the analysis mode.

Generally, under circumstance, while experiment be over, the system will analyze the test curve right away, and fill analysis as a result in the analysis board and the curve board but does not need the customer handicraft intervention.

If automatic analysis inaccuracy, so, the customer can change analysis method, then carry on to the curve again. The analytical method is set by the customer at the analysis before. If the customer wants to change the analytical method, can click the analytical tool [the analysis option] button, will appear the analytical constitution window (as follows diagram). Customer can accord to the kind of the specimen to select a specific analysis method. After analysis complete, the physics function parameter of the material test will mark out on the curve.

3 Choose analytical method

Choose analytical method. Different analytical method to analyze the test sometimes has great analytical result

Section 11 Analysis board

Before Choices the analysis method, please carefully consult the standard of related. The testing method sometimes needs to adopt the analytical method. Non reasonable analytical method will cause mistake of analysis result.

Debug parameter window

Under general circumstance, the customer should not change these parameters. Press [F10] key will open the debug parameter window.

Stop while load > mfs *	1.05		
Load over control threshold	0.50	(0-1)	
Displacement over control threshold	10.00	(0-10000)	
Extension over control threshold	1.00	(0-10000)	
Output protection threshold	3		
Gain	0.50		
Invalid Region	0.00		
Directional valve close delay	0	(s)	
Displacement gain	8.510C	(um/p)	
Limitation of output swp	500000	(Hz)	
	P	I	D
Load (Compress)	5.00	0.40	0.10
Load (Tensile)	1.00	0.40	0.10
Extension	1.00	0.40	0.10
Displacement	1.00	0.40	0.10

Backup Recovery OK

Step 1 Select a testing method

While preparing to start a test, choose the testing method at the data board first. as the diagram shows below, click the tool column up" the data plank" button side of bottom pull the arrowhead, win election the item of choose the accommodation at the on-trial type the row watch that appear. Such as the diagram, we choose" the metals material indoor temperature pulls to stretch to experiment (GB/T228-2010)".

Step 2 Create testing information

1. Input bases on templet

Customer fills some related information of the test in [the templet importation] page such as testing batch number, testing serial number, testing date, tester, specimen shape and size, So (cross section area), Lo, etc., the diagram shows below:

The customer can also open directly the templet document keeping in the right side list, but no need input the importation of the test one by one more again; Click the templet name with the mouse, so, the contents of the templet will directly fill in. After filling the information, click button [keep the templet] on the right side of the page, the data fill will save for another templet document.

2. Batch of input

When the testing information is filled, switch the window to [input a batch of specimens] page next (the diagram shows as follows): Click the button [New], copy the templet data to the data buffer area.

Click the button [Batch new], to copy the data to the data buffer area in batches.

Step 3 modification of information

Double-click the table of the data buffer area and change the information as needed. There has option [Lock column index] on the window, which is used when there has too many columns of the table that could not display on interface, lock some columns to make them display always. That is usually used when changing the information.

Step 4 Confirm information

This step is to save the information in the data buffer area to the program. When the information is created, click the button [OK], the information would be saved to the database of the program, as the diagram shows below, the information would display on the data board of the program:

Detail List

Steel number 123	Sample ID 123
TestDate 2017-03	Customer 10
Tester 10	Type Circle
Size (mm) 20	So (mm ²) 314.16
Lo (mm) 20	Ext length
Lc (mm) 40	Lu (mm)
A (%)	Section size
Su (mm ²) 0.00	Z (%) 100
Fm (kN)	Rm (MPa)
FeH (kN)	ReH (MPa)
Upper yield force	ReL (MPa)
Fp (kN)	Rp (MPa)
Ft (kN)	Rt (MPa)
E (GPa)	Yield ratio

Step 5 Select a testing control mode

Select testing control method from the control board. The control mode could be selected as simplex one, such as “Disp. mode” or “Load mode”, or complex one, such as “Tensile mode”. In the step 6 we will take the “Tensile mode” as example to detail

Step 6 parameter of the control

The interface of “Tensile mode” on the control board as the diagram shows below:

Load Extension Program Tensile Test

123

- Elastic range
- Stress control: tighten speed 3.00 mm/min, st...
- Plastic range
- Displacement control: speed 5.00 mm/min
- Separation range

The wizard would lead you configuring parameter step by step, directly according to the show of the window of each step.

Step 7 Start test

Check back the steps before; if they are all correct, then the test could be started. Click the button [Start] on the control board, start the test.

Step 8 End test

If the test meets one of these conditions, the program will stop the test:

1. Manually stop the test by clicking the button [Stop]
2. Over loading protect
3. The specimen meets the broken condition.

Step 9 Save testing data

When the test is accomplished, the program would analyze the testing curve based on the analytical method and then save the result of analysis to the database automatically.

Step 10 Artificial analysis of testing curve

If the result of the automatically analysis doesn't meet actual need, the program could also support artificial analysis function.

The general process of data analysis details:

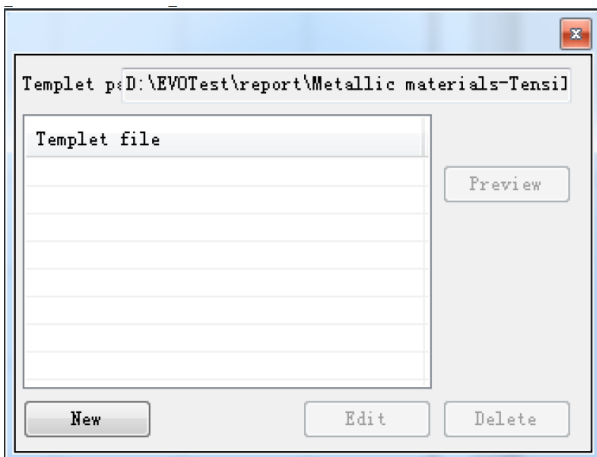
1. Click the toolbar of the program with the mouse, switch the program to the [analysis mode]
2. The program will show automatically [the analysis board], because we want to analyze load- extensometer curve, so will switch the curve display to the load extensometer on the curve board
3. Generally, we still adopt the automatic analytical method first. Press the auto analysis button on the analysis board with the mouse, the program will analyze the curve automatically, and order each marking on the curve, at the same time at [the analysis board] list the position that each marking order and show the related information and show the analysis result at [the data board].
4. If the automatically analysis result doesn't meet actual need, take these steps to artificial revise: The step of the artificially define symbolize the point is:
 - 4.1. Click the button  on the curve analysis toolbar, the mouse will switch to cross cursor
 - 4.2. In needing to define the curve of symbolize the point or the neighborhood click the mouse, the mouse cross would automatically be adsorbed to the curve
 - 4.3. Click the right key of single shot mouse at the position, will appear order define menu, select a corresponding name in the menu, to define this order as a symbolize the point, at the same time, the reference information of the point will display on the analysis board

Step 11 Print out the data

If the testing result needs to be print out, there has two print out modes in the program; those are common mode and Excel mode.

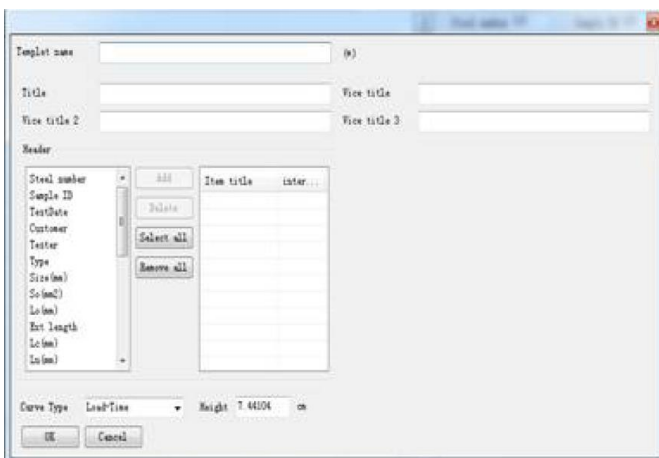
1. Common print out mode

Click the button on toolbar of the data board, open the print templet selects window, the diagram shows below:



Select one templet file in the report templet window Click the button [Print] to print out the data.

Edit report templet: Click the button [Edit], or click the button [New] to create a new report templet file, the pop-up window shows below:



The window is a new report templet editor, on which the customers could edit the report templet neatly as they want. The next is the detailed introduce of the editor:

1. Optional items

On the left-top of the window, there lists all basal items of the test, if the report contains the item, select it here, and add it to report templet.

2. Report title

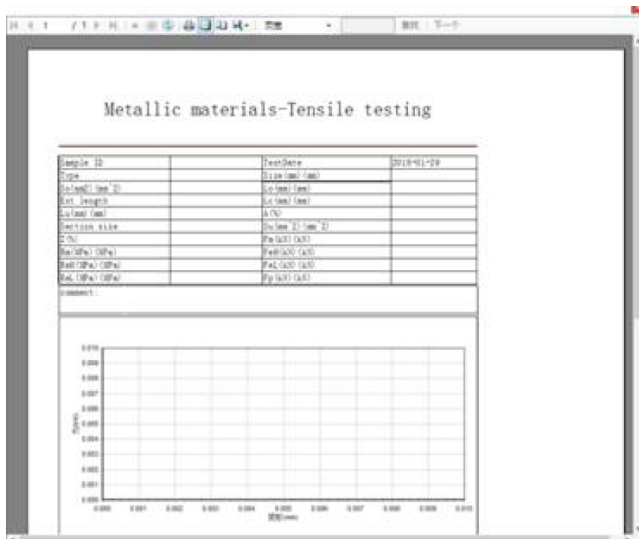
On the center of the window, there have “Title” and “Sub title” input field, the diagram shows below:

Title: used to be inputted header of the report; **Vice Title:** used to be inputted subhead of the report; **3. Report Curve** On the bottom of the window, there have “Curve Type” check box, the diagram of the window shows below:

If it is checked, that means the test curve could be print out; **Type:** the print curve's type, which could be selected as Load-Elongation, Stress-Strain, Load-Time, Load-Displacement, Elongation-Time, and Load-strain; **Height:** the height of the print curve

As the diagram shows below, we have set an example of a report here, click the button [OK] on the right of the window, the report templet could be save as a “.mrt” file;

Click the button [Preview] on the right of the window, the report templet shows as the diagram below



Templet name (w)

Title Vice title

Vice title 2 Vice title 3

Title: used to be inputted header of the report; **Vice Title:** used to be inputted subhead of the report; **3. Report**

Curve On the bottom of the window, there have “Curve Type” check box, the diagram of the window shows below:

Curve Type ☒ Load-Time ☐ Height cm

If it is checked, that means the test curve could be print out; **Type:** the print curve’s type, which could be selected as Load-Elongation, Stress-Strain, Load-Time, Load-Displacement, Elongation-Time, and Load-strain; **Height:** the height of the print curve

5. Example

As the diagram shows below, we have set an example of a report here, click the button [OK] on the right of the window, the report templet could be save as a “.mrt” file;

Templet name (w)

Title Vice title

Vice title 2 Vice title 3

LOGO

Header

Sample ID	TestDate	TestType	TestDate
Type	Type	Type	Type
Size	Size	Size	Size
Ext length	Ext length	Ext length	Ext length
La	La	La	La
APR	APR	APR	APR
Section size	Section size	Section size	Section size
Da	Da	Da	Da

Curve Type ☒ Load-Extension ☐ Height cm

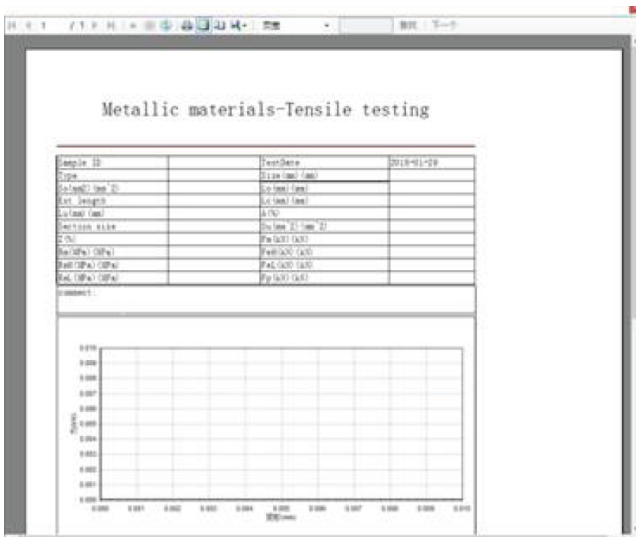
Use in "Load-Extension" curve

Print marker/plots by ☐ ☐ ☐

Print line ☐ ☐ ☐

OK Cancel

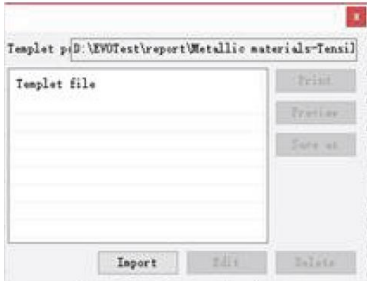
Click the button [Preview] on the right of the window, the report templet shows as the diagram below



Section 12 Print in Excel

There has two printout mode of the program, one is common mode, the other is Excel mode. If the test data would be print in Excel mode, the computer should have been installed the Microsoft Excel.

As the diagram shows below, when the test is completed, switch to the data board, right click the button , select “Print in Excel”; then left click the same button , the following interface will appear:



If template has been done in advanced, click “import”to import the corresponding template. Then click “Print”to print the template.