UTM-TT Series
ELECTRONIC TORSION TESTING MACHINE
SOFTWARE MANUAL

www.insize.com

Content

Chapter 1. Brief Introduction

1. Foreword

Thanks for trusting our production

- ✧ Our company owns the intellectual property right, any unit and individual are forbidden to take passage, copy, imitate the content, picture, form and so on for profit, or else our company will consider it as infringement and reserves the right to take further measure.
- ✧ As there are different customized machine with different mode and standard, we not ensure every software includes all the function in the manual and every software is the same as the manual.
- ✧ This manual is edited at the starting of development of software, the content may changing as the developing of software, especially for the unusual customized machine, there will be some difference. Corrected points will not notice, please understanding.
- ✧ Important clause: this manual is not able to be considered as the foundation for any requirement, The interpretation right of the user manual belongs to our company.
- ✧ After sales service: If you encounter any difficulties or equipment malfunctions during the use of the equipment, you can quickly contact our company. To ensure that our company can solve your difficulties as soon as possible, we hope you can submit a service request to our company in writing.
- ✧ Although we have done our best, omissions and errors are still inevitable. We sincerely welcome criticism and correction from our users.

Agreement:

This manual is used for electronic torsion testing machine, electro-hydraulic servo torsion testing machine, screen displayed hydraulic pressure torsion testing machine and so on. Different machine with different interface and function. If there is special function for specific machine, we add square bracket after titles to label content for type of machine.

For example: for detail :【control panel【torsion】】

Torsion	Electronic torsion testing machine

Different interface for different standard, it includes standard and project mode, this manual is edited in testing mode, we will take square bracket to mark it, they are short as following table.

Standard	Parameter is set unified, test according to different standard.
Project	Parameter is set for individual program, test according to different program.

Different interface for different control mode, it includes simple and classic mode, this manual is edited in simple mode, we will take square bracket to mark some difference, they are short as following table.

Classic	Select close loop of rotating angle, torque, torsional angle and its speed.
Simple	Set close loop in project.

2. Main function of software

FastTest series torsion test and control software V1.2 is short

for FastTest, it is mainly used in various type of torsion testing machine to test with variety of mental, nonmetal, composite material and constructional element.

3. Running environment

3.1. Hardware configuration of compute

CPU: 2.0HZ, internal storage: 1G, hard disk: 50G, including higher configuration.

3.2. Operation system of computer

Windows XP, Window7, Windows8, Windows10 and multiple of operation system.

4. Technique feature

4.1. One machine is configured with 4 torque torquesensor at most, changed as need at anytime.

4.2. One machine is configured with 4 torsional angle sensor (torsional angle meter) at most, changed as need at anytime.

4.3. Programmer of machine adopt open structure database, including GB/T 10128-2007, GBT 20998.13-199996 and so on, special test standard is able to be customized.

4.4. Torque and its peak value are displayed in whole course, min. Resolution is able to be set as required. Auto self calibration and certification, resolution is not changed in whole course.

4.5. Torsional angle and its peak value are displayed in whole course, min. Resolution is able to be set as required. Auto self calibration and certification, resolution is not changed in whole course.

4.6. Record torque-time, torsional angle-time, rotating angle-time,

stress-time, strain-time, torque-torsional angle, torque-rotating angle, stress-strain and curves at the same time, check and switch at any time, take sample at high speed.

4.7. It adopt human-computer interactive to analyze torque performance of specimen, it auto calculate elastic modulus, yield strength, plastic extension stress and so on(analyzed different data to different standard). workers correct result after auto analyzing in order to improve accuracy.

4.8. Data is managed in database with auto saving data and curve.

4.9. Variety of printing joint to print required report.

4.10. FastTest includes other useful software, such configure toolbox, programmer and so on, with variety of function(including introduction of them).

4.11. It contains data joint for networking with enterprise and lab.

4.12. Closed controllingconstant-rate-stress, constant-rate-strain, constant-rate-rotating angle, retention of rotating angle, torque and so on.

4.13. Adjusting load with PID controlling algorithm, constant controlling error is less than 1%, kept pressure controlling error is less than 0.5%.

4.14. Supplying programmer if it is required

Chapter 2. Installation and Operation

1. Installation and unload

1.1. Installation

1.1.1 Click “Install” for relative type of machine by disk of installation files.

1.1.2 The following is installation window, it will default install to directory “D:\Program\Files\FastTest”, do not change installation directory unless it is necessary

1.1.3 Choose “Next step” in window of installation is ready, installation guide will start to copy files to hard disk.

1.1.4 Process of copying will spend a period of time, hint window of installation successful will showed at the last.

1.1.5 There will appear program [FastTest] in [start] of Windows, it will also appear on the desktop, clicking either of it will start the program.

1.2. Unload

1.2.1 Clicking [start] → [all program]→ [unload] to unload.

1.2.2 Choosing [add/delete program] in control panel, selecting FastTest in the list, then clicking [unload] to unload FastTest.

1.3. List of documents

Program will installed in D:\Program Files\FastTest under defaulting, there will include the following files.

No.	Name of file	explain
1	FastTest.exe	Main program
2	FastTest.ini	Configuration file

3	FastTest.mdb	Database
4	FastDebug.exe	Configuration toolbox
5	FastProgram.exe	Programmer
6	SED.dll	Dynamic connecting library of outer card
7	STC.dll	Dynamic connecting library of inter card
8	Net.dll	Dynamic connecting library of network
9	Languagefolder	Folder of language

Note: please make sure whether the files are exist or not if there is unusual condition, if there is lost, please backup the software firstly, then install it again.

2. Start

2.1. Turn on the power supply of computer

2.2. Turn on the power supply of controller. Turn on the power supply of controller.

2.3. Turn on the power supply of main machine

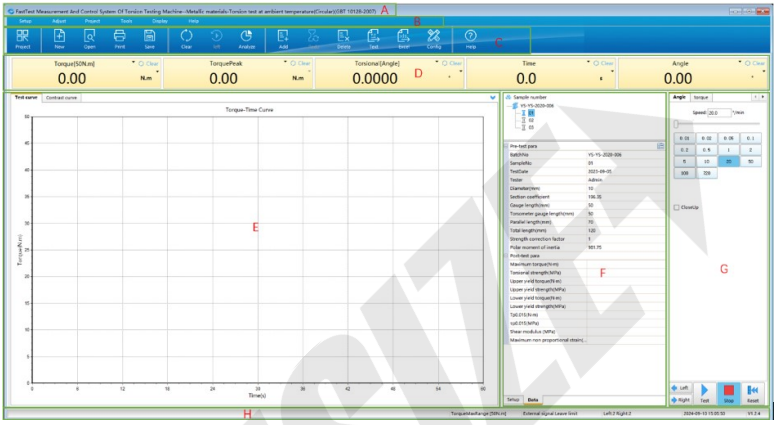
2.4. Start the software, there is 2 way of starting it:

✧ Double click shortcut icon FastTest on desktop

✧ Select [start]→[all program]→[computer control torsion testing system]→[FastTest]

The following chapter will introduce every function module, although there is change of appearance, the core function will not changed.

Chapter 3. Function Introduction of Interface



Main window is control center, there are 8 parts, such as system set, calibration and verification, display set, test select, condition, result and other information.

A Title column

B Menu column

C Tool column

D Display column

E Curve column

F Data column

G Control column

H Status column

F unction of main window:

1.Title column

Displaying current name of machine and test program.

2. Menu column

Menu bar includes “Setup”, “Adjust”, “Project”, “Tools” and “Help”.

These items are used to modify parameters of test system: details refers to [chapter 4 setting of system parameter]

3. Tool column

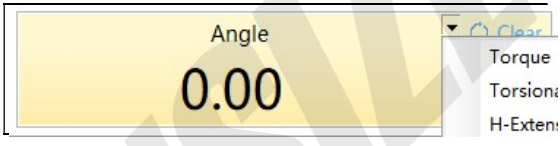
It includes common options directly, with options for different machine.

- ✧ Standard/Project: choose test standard.
- ✧ New: set up new data.
- ✧ Find: check out history data according to find condition
- ✧ Print: there are simple report, batch processed report, office report, choose as needed. Details refer to[chapter 7 use and make of report]
- ✧ Save: any data modifying by user.
- ✧ Clear: zero clearing all data of panels.
- ✧ Analyze: it is used for manual analyzing test results
- ✧ Redo: do this test record again.
- ✧ Config: set functional button or not.
- ✧ Help: simple instruction of software.
- ✧ Text: leading out original data to text file(optional closed).
- ✧ Excel: leading out original data to Excel file(optional closed).
- ✧ Delete: delete this record(deleted record is able to recovered).

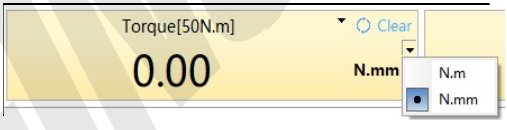
4. Display column

Display column is used to display data, display columns is able to added or delete(there are 5 at most) (Enter to “display” page of editing project of project mode to add/delete display windows (5 windows at most)), switch channel, unit of decimal, unit and so on among displaying windows.

Shifting channels of display column: click arrow of title column(or right click the tile), choose needed item in display channel in the menu, as following picture:

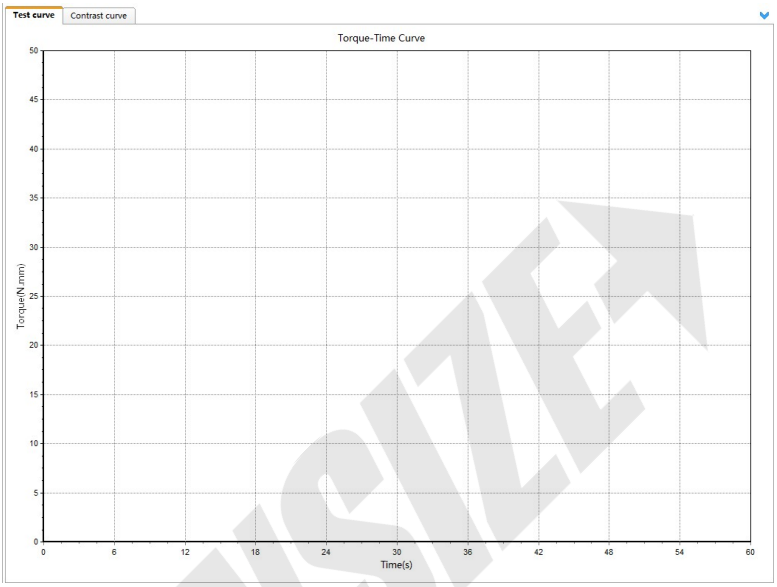


Shifting unit of display window: click unit or down arrow, choose needed unit in the menu, as following picture:



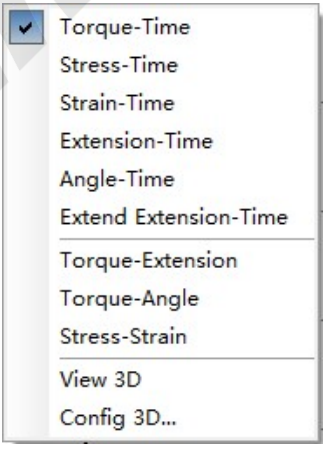
Shifting decimal units: right click display area, choose needed units in the menu, as following picture:

5. Curve column



Displaying real time test curve in test process

1.1. Type of curve: right click outside the curve column to choose needed type for observing, as following picture:



5.2. Tool column of curve: it includes observe, manage(default hidden, click arrow at top right-hand corner to unfold them).

From left to right they are accommodate, recover, print, save as BMP, set of coordinate, save file about rigidity of steel frame, guideline, button of tool column.

Shortcut key usually default not displayed, click arrow at top right-hand corner to unfold.

Fit	Click it to zoom in entire curve to most proper for observing.
Initial	Recover value of coordinate of curve.
Print	Print curve of current type: only print curve that different from report printing.
BMP	Displayed curve is saved as BMP format.
Axis	Precise set for relative curve
Stiffness	Saving files about rigidity correction of loading frame
Lines	Auxiliary line is set for specific request
Analyze	Open data analyzing interface, check details refer to chapter 6 and 7.
Config	Button above are able to be selected to display or not(except accommodate)

5.3. Page of curve type: including testing curve, multiple curve, batch of curve(this function is set in curve page by clicking “set” to “system parameter”)

Testing page displays current or history single curve about relative data, multiple curve displays different type of curves for observing and analyzing, batch of curve displays current group of

testing curve.

5.4.Shortcut function:

Move: left or right moving curve by pressing right button in curve area.

Zoom: pointing to some point, rolling mouse wheel to zoom in or out this area of curve.

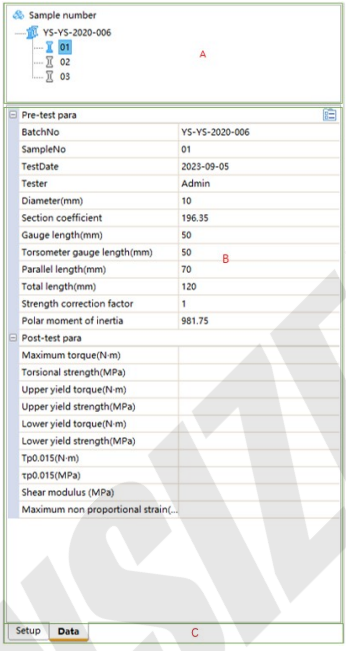
Restore: double click to restore proper curve。

Note: shortcut key is able to be used when button is not chosen in tool column.

6. Data column

Data is the core of measuring system, as testing procedure is according to data, parameter of specimen display data of specimen, data of measuring, analyzing of data.

Selected testing project will be recognized default project when program started. Please select the correct testing project if the selected project is not suitable, select different testing project will display different test parameter with different test standard.



A:Records of number: shifting number of specimen to check test result.

B:Display set items, parameter, content of processing control.

C:Shift displayed content in B area.

6.1.Set items

Common set includes entrance totorque of curve, condition of taking down torsional angle meter, condition of stopping.

6.2.Parameter of specimen

Data center of entire test, including display of parameter before and after test, statistic of parameter.

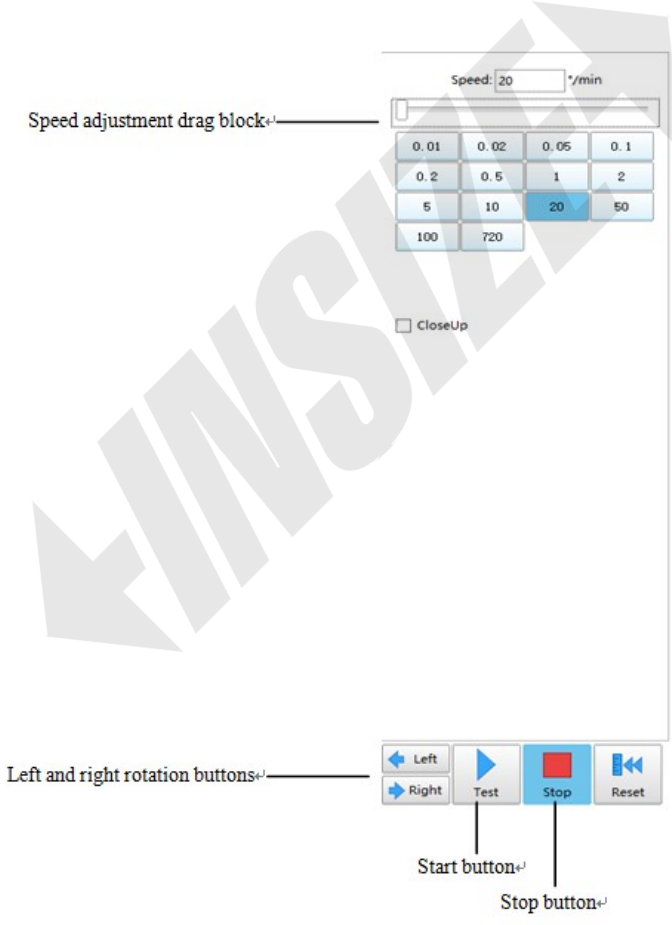
6.3.Controlling procedure[simple]

Controlling procedure is display only in simple edition, displayed content according to set program in processing control.。

7. Control column

It is control center of entire software, please choose correct button carefully to avoid accident, the following is introduction of function:

7.1. Control panel(simple)



7.1.1 Control button

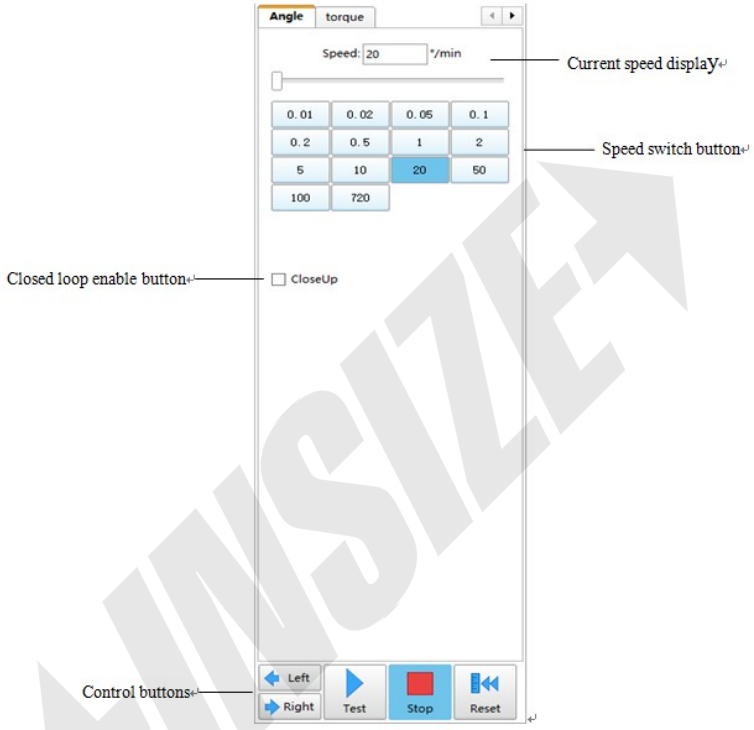
Function	Introduction
 Before selected  After selected	Left button: after selected, it will rotate to left at set speed (for adjust position).
 Before selected  After selected	Right button: after selected, it will rotate to right at set speed.
 Before selected  After selected	Reset button: after selected, it will auto stop when it return to rotating angle is 0 at set speed.
 Before selected  After selected	Test button: after selected, loading at set speed.
 Before selected  After selected	Stop button: after selected, speed is 0, it will not move.

For torsion testing machine, there is only left and right directions, running condition is either testing or adjusting position, so there are testing condition and non testing condition, in order to distinguish.

Left and right rotating button are used under non testing condition, test/stop button are used under testing condition, saving data and curve must be under testing condition.

7.2.Control panel(classic)

7.2.2 Control panel 【torsion】



7.2.2.1 Mode switch button

The system contains constant speed-rotating angle, constant speed-torque, constant speed-torsional angle control mode, there is programmer for editing program for relative testing.

- ✧ Rotating angel: close loop (open loop) rotating angle control mode.
- ✧ Torque: close loop torque control mode(select start or not in configuration toolbox)
- ✧ Torsional angle: close loop torsional angle control mode(select

start or not in configuration toolbox)

✧ Program control: editing program control mode, customize testing procedure, editing testing method for different standard with different material.

7.2.2.2 Current speed display

Display current speed, changing as adjusted by shortcut button and switch bar of speed, supporting manual inputting at the same.

7.2.2.3 Speed slide bar

Adjusting speed by sliding the block(adjusting scale between current speed shortcut button and next speed shortcut button, please switch the shortcut button for different scale)

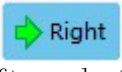
7.2.2.4 Speed shortcut button

Select controlling speed as required

7.2.2.5 Close loop control

Software closed loop will auto start the mode after starting, set keeping aim and keeping time at the same time.

7.2.2.6 Control button

Function		Introduction
 Before selected	 After selected	Left rotating button: after selected, machine willrotate to left at set speed(used for adjusting position).
 Before selected	 After selected	Right rotating button: after selected, machine will right rotate to left at set speed(used for adjusting position).

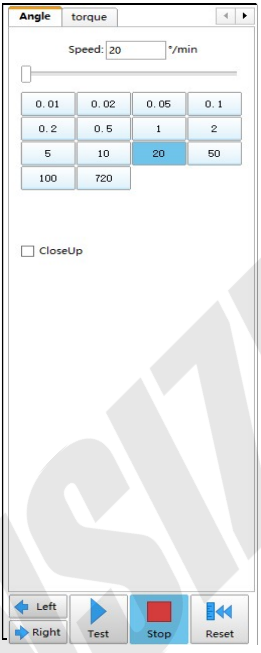
Function	Introduction
 Before selected  After selected	Test button: after selected, machine start testing at set loading speed.
 Before selected  After selected	Stop button: after selected, speed is 0, machine will not move.
 Before selected  After selected	Return button: after selected, machine will auto return at set speed, it will auto stop after returning to 0 of rotating angle.

For torsion testing machine, there is only left and right directions, running condition is either testing or adjusting position, so there are testing condition and non testing condition, in order to distinguish them.

Clicking “left rotate” and “right rotate” button will auto switch to interface of go up and down speed, it will carry out default speed, if you selected “hint before running” in system parameter, the current speed is able to be corrected to less than before.

Testing machine will load and draw curves after clicking “test” button.

7.2.3 Close loop control mode



It will load at proper loading speed after starting close loop control mode, software will auto close loop control with PID algorithm, which control load rate in stable range of error.

Please input keeping aim vale if it is required, please check the option of keeping time and keeping value when keeping aim value for certain period is required, click “apply” after checking the keeping value is correct. The system will load at constant loading parameter, and stop when set test complete.

Note: close loop control requires stable rigidity, rigidity of machine is not enough at first, please choose rotating angle load, turning to close loop control after it reaches to certain value of

torque, so there are pre fasten torque and pre fasten speed, the values are set as required.

8. Condition column

It is at the bottom of entire program, displaying main parameter and working condition of system, including operation condition hint, scale of sensor, gauge length of torsional angle meter, outer command, network condition, speed of rotating to left and right and time.

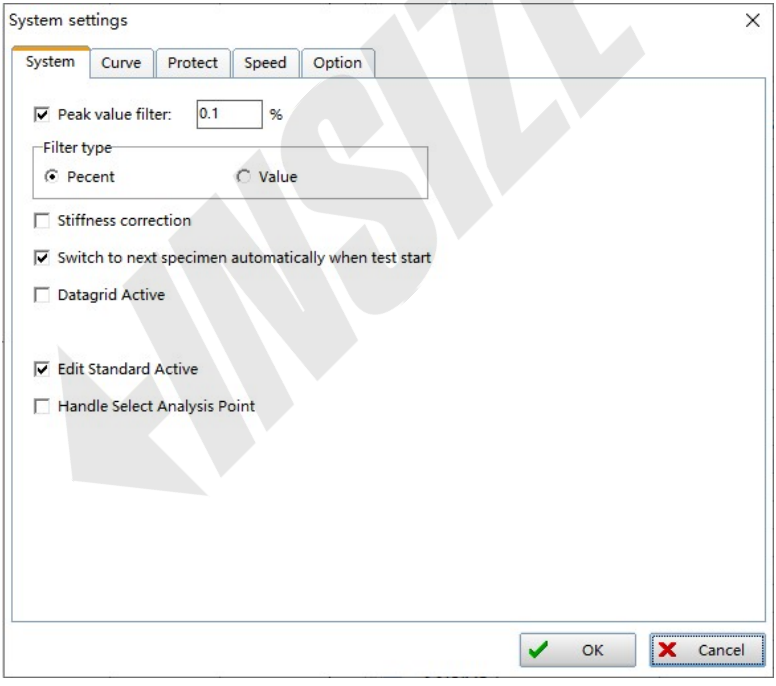
Chapter 4. Set of System Parameter

1. Set

1.1. Parameter of system

Click sub-menu system parameter of main menu “Set”, dialog box of identity authentication pops up, after inputting correct code, system window will show by multiple pages, including system, curve, protect, speed, option and so on.。

1.1.1 System



✧ Peak value filter

There will be wave for gathering signal if testing machine is interrupted by magnetic field, electronic field and large

equipment, such as waving of torque, rotating angle signal. Filter is adopted to avoid interference, type of filter are percentage of Max.range and torque value mode.

- ✧ Stiffness correction:

  This parameter is used with “Stiffness” button in tool column of curve panel.

  Method: clicking “start” button, clicking “rigidity” button until press plate to sensor to full scale, then check the option “correct rigidity”, please reset software to complete this operation.
- ✧ It will auto switch to next specimen when test start。
- ✧ Display data list: adding a page in data panel to display test result.
- ✧ Start channel voltage output: after starting it, adding voltage module in controller.
- ✧ Start standard correct: correct standard content in data panel.
- ✧ Manual select displayed feature point: feature point will not be auto marked after test complete when select it, check the option in analyze panel--feature point -- display if it is necessary.
- ✧ Unload type:

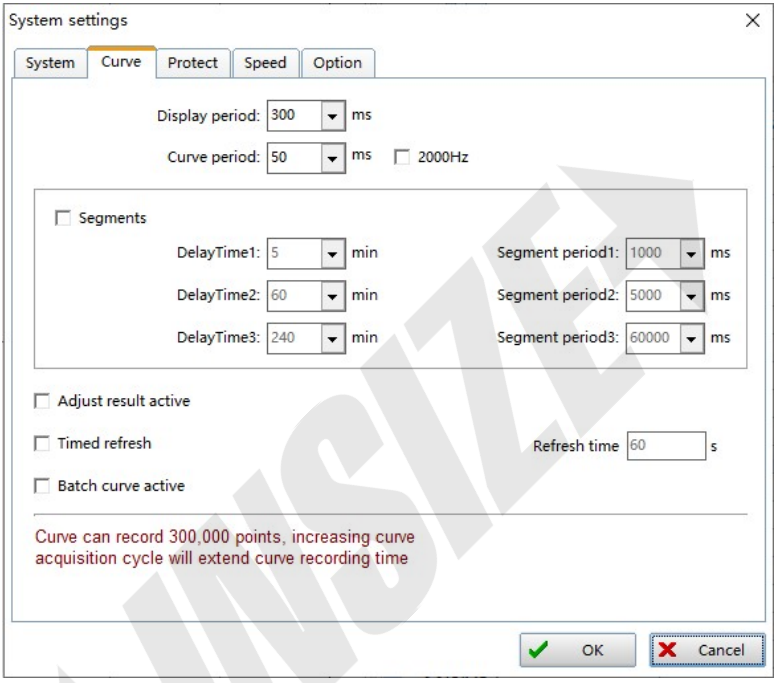
  Different unload type for different condition.

  1、【Auto unload】 Open valve to unload when torque is less than set value.

  2、【Manual unload】 click “Unload” to unload.

  3、【Unload at once】 open unload value at once after clicking “right rotate”.

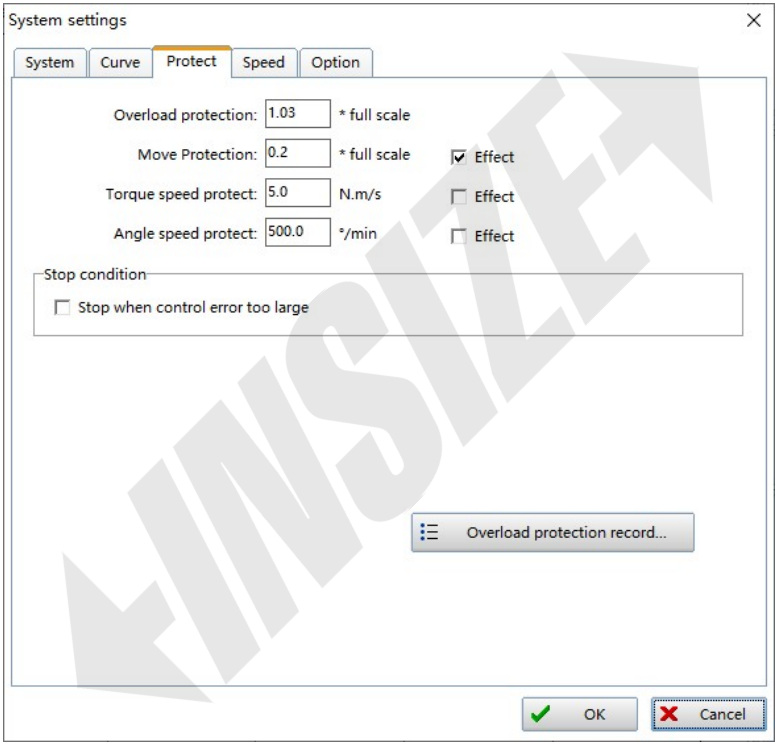
1.1.2 Curve



- ✧ Displaying refresh period: “Display board” will refreshed accord to set period. Its default set is 300ms, refresh period ensure it is comfortable to observe by eyes.
- ✧ Curve gathering period: “Curve board” will record accord to set period. its default set is 50ms, gathering period should not set too small, or else, many points will be recorded repeatedly and occupy too much system resource.
- ✧ Segments gathering : set subsection sampling period according to real condition.

- Refresh at regular time: curve will be refreshed according to set time after starting it, the period will not take effect.
- Batch curve: batch curve will be checked after it starts.

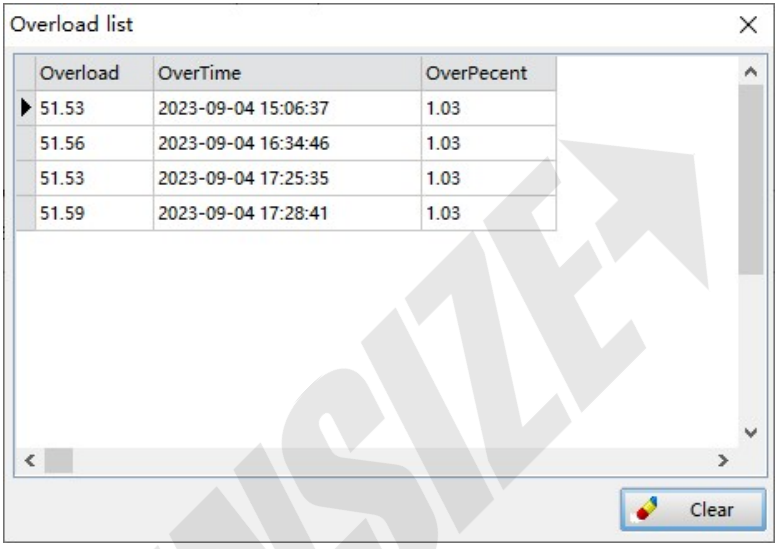
1.1.3 Project



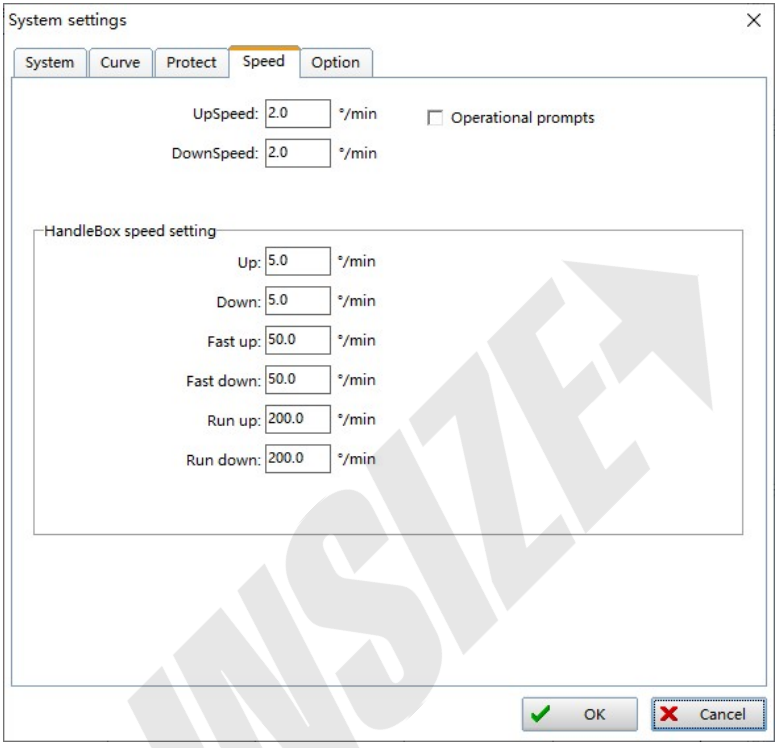
- Overload protect: default as 1.03 times of full scale.
- Move protection: protect when adjusting position of crossbeam.
- Rorque speed protect: permitted highest load speed.
- Rotating angle speed protect: permitted highest displacement speed.
- Stop condition: stop when real control value is too much

different from displayed value.

✧ Overload protection record (record times and time of overload).

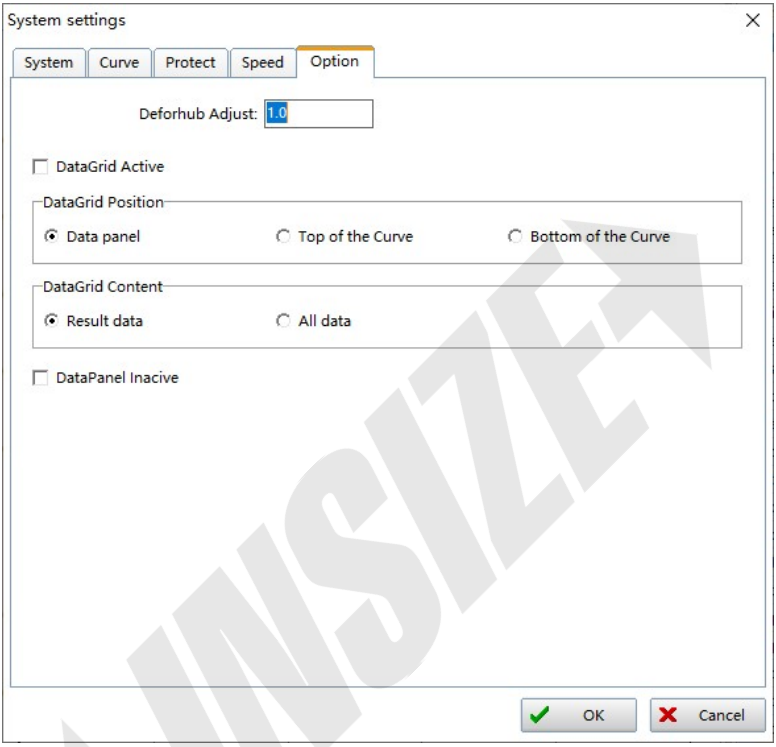


1.1.4 Speed



- ✧ Left rotate speed:it goes at default speed when click button “left”.
- ✧ Right rotate speed:it goes at default speed when click button “right”
- ✧ Operational prompts: hint window of default speed which is correctable pops up after click “left” or “right”.
- ✧ HandleBox speed setting: set is the same as configuration toolbox.

1.1.5 Option

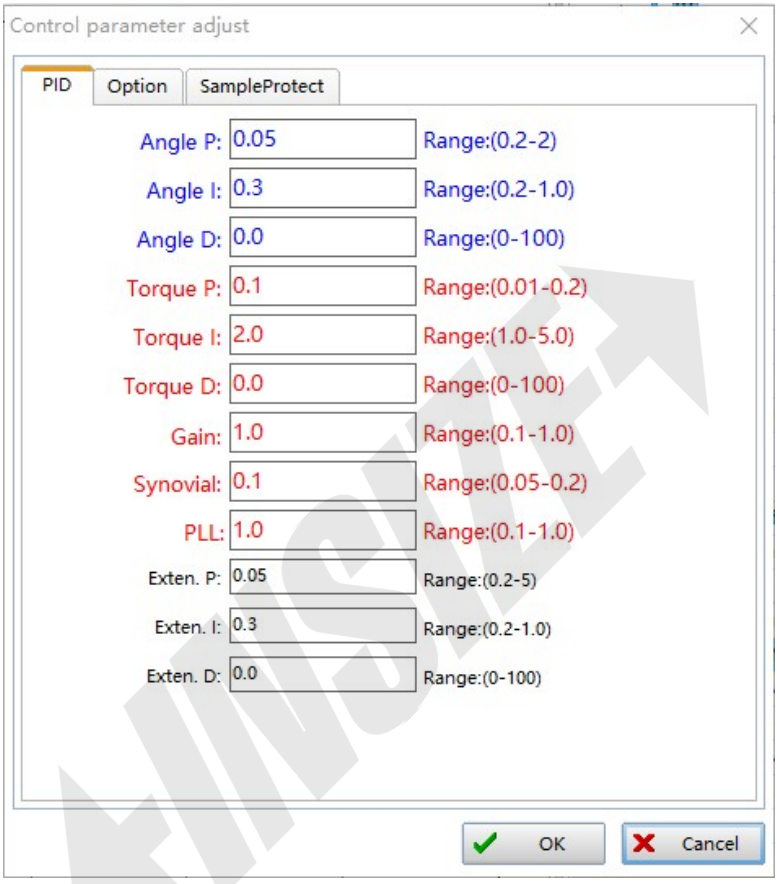


In order to keep pace of value of gathering device with value displayed on software, calculated a coefficient to input to avoid error.

1.2.Adjust parameter

1.2.1 PID parameter

There is a adjusting scale for every control mode for close loop control, workers can adjust according to scale(only for large rigidity material). pressing enter to take effect after correct it.



1.2.2 Option

- ✧ Close loop deceleration control: if select it, torque will gradually load when torque will reach to aim value, it will enter to keeping period after passing deceleration time(the bigger the smoothness is, the bigger the radian displayed on curve).
- ✧ Max. Value of single step: Max. Difference value of 2 control signal, increase it if the PID response too slow, reduce it if there is a shake.

1.2. Source of torsional angle

Set source of torsional angle is same as system parameter and displayed window.

1.3. Exit

Exit system

2. Calibration

2.1. Calibration and verification of torque sensor

Enter into calibration interface, refer to chapter 5【1Torque sensor Calibration]】for details

2.2. Calibration and verification of axial torsional angle

Enter into calibration interface, refer to chapter 5 【3. torsional angle Calibration】
for details.

2.3. Calibration of rotating angle

Enter into calibration interface, refer to chapter 5 【4. rotating calibration】 for details.

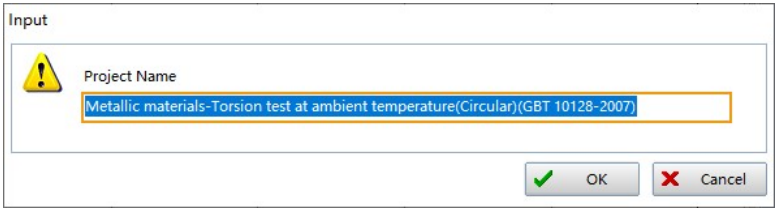
3. Project

Program is used to synthesize test programs with frequently used set and operation for completing test by convenient and brief operation.

Program process:

3.1. New

Guide about inputting name of program, for example: inputting name: torsion testing of metal material at room temperature, click “enter” will auto come to interface about editing program.

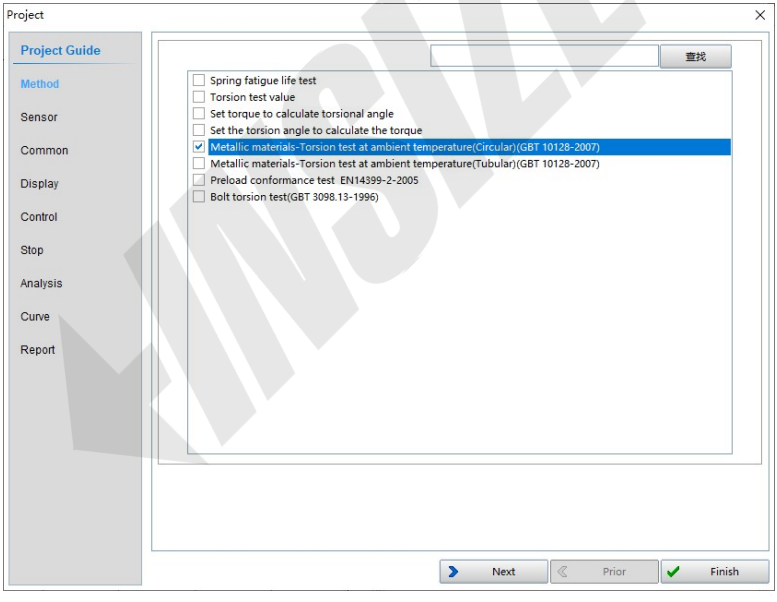


3.2.Edit

It will show all parameter of test, set according to guide step by step.

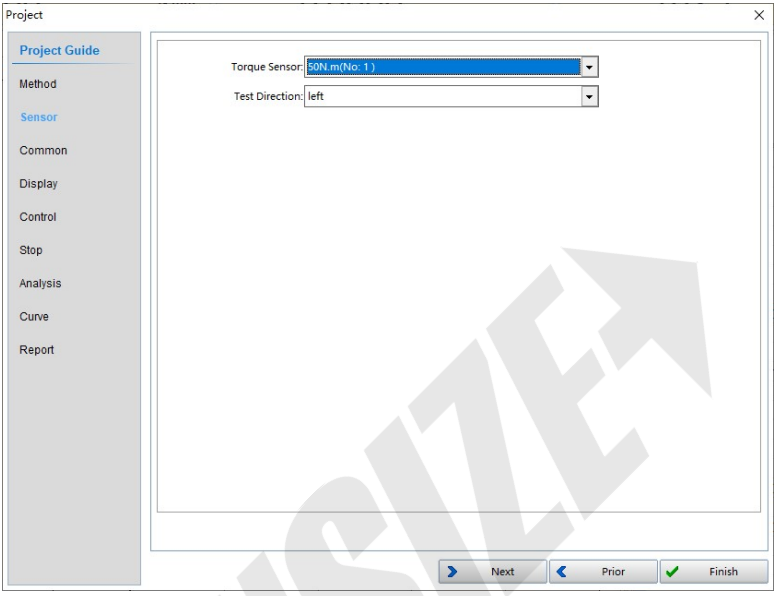
First : test standard

Choose required standard of this program, as following picture.



Second sensor:

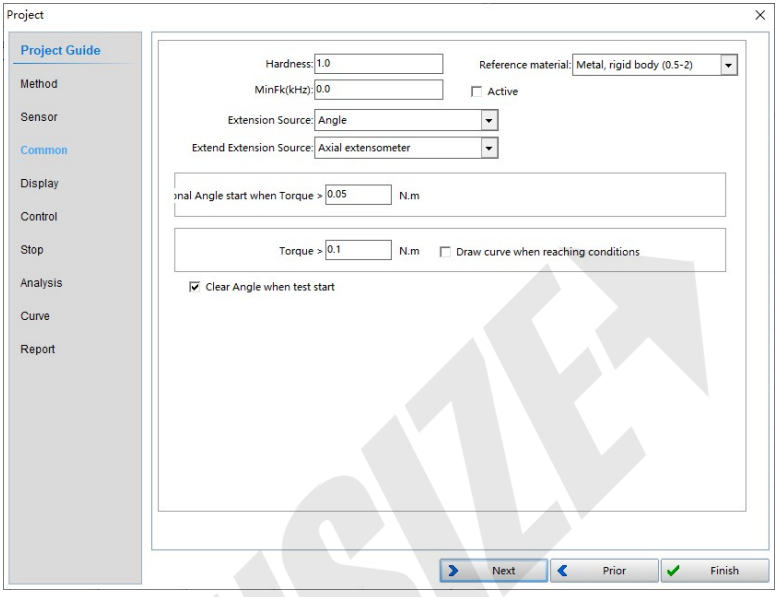
Set for sensor, torsional angle, as the following picture.



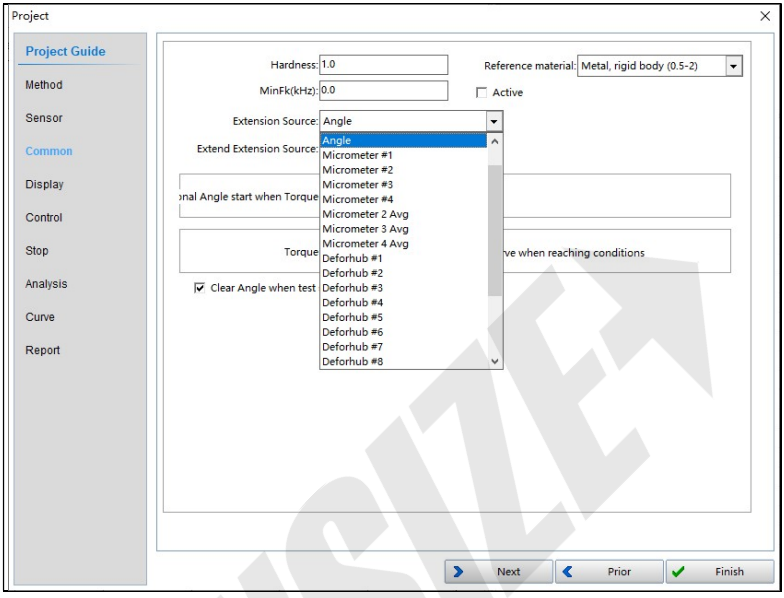
- ✧ Torque Sensor: set according to assembled sensor for load, different number indicates different scale of sensors.
- ✧ Torsional angle: set according to assembled torsional angle meter, different number indicates different range of sensors.

Test Direction: direction of operation is according to torque.

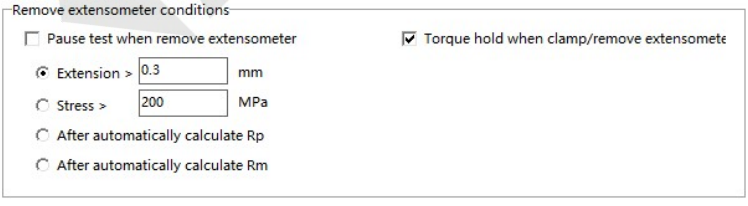
Third: common:

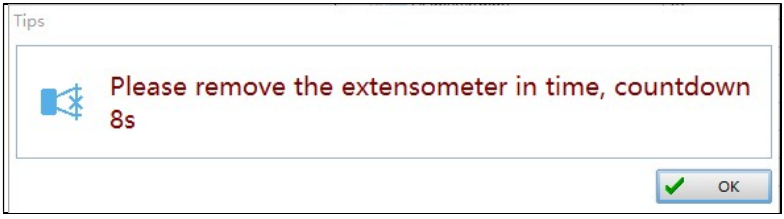


- ✧ Rigidity: close loop PID parameter is different for different material. The coefficient of rigidity is used to make the PID steady.
- ✧ Source of torsional angle: choosing torsional angle meter of axial direction, rotating angle and so on.
- ✧ Extended source of torsional angle: as last item.



✧ Pause test when remove torsional angle meter: once selected this function, software will auto hint that torsional angle meter should be taken down, enough time will spend to taking down by pausing test at the same time, click “Enter” after taking down to go on.

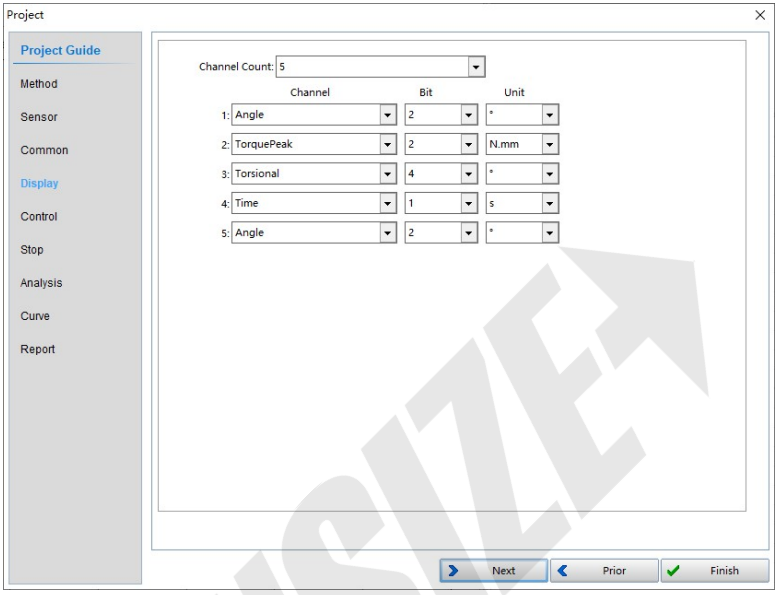




- ✧ Torque hold when clamp torsional angle meter(programmer):whether to keep torque when clipping on torsional angle meter in program control mode(keep rotating if not start torque kept).
- ✧ Remove torsional angle meter conditions: there are deformation, stress, Rp auto-calculated, Rm auto-calculated. It will auto take down after choosing one of them. The first three items are used in regular test, last item Rm is used to calculated Agt after taking down torsional angle meter until Max. Torque .
- ✧ Starting of torsional angle: if source of torsional angle is “rotating angle”, torsional angle channel is collected after torque is larger than set value.
- ✧ Drawing curve when reaching conditions: start to draw curve after torque is larger than set value.

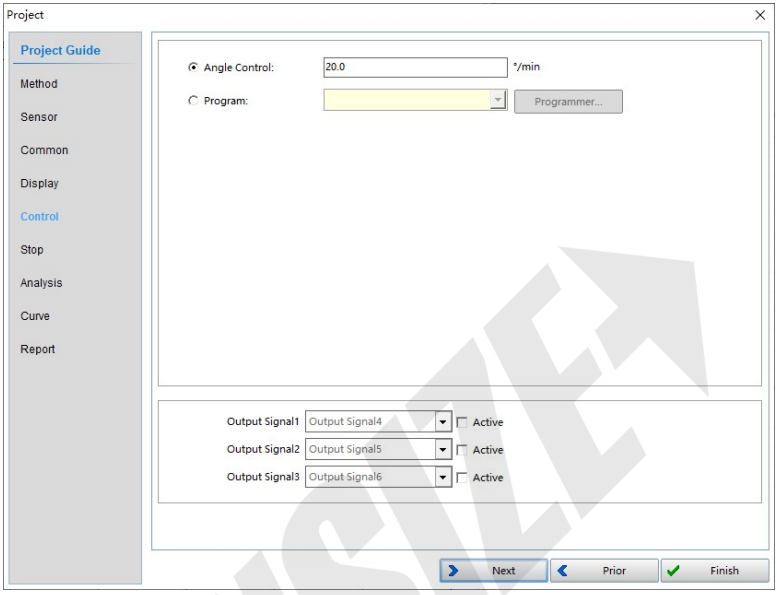
Forth: display

Set test interface, such as quantity of column, name of channel, precision and unit, number of windows is 5 at most.



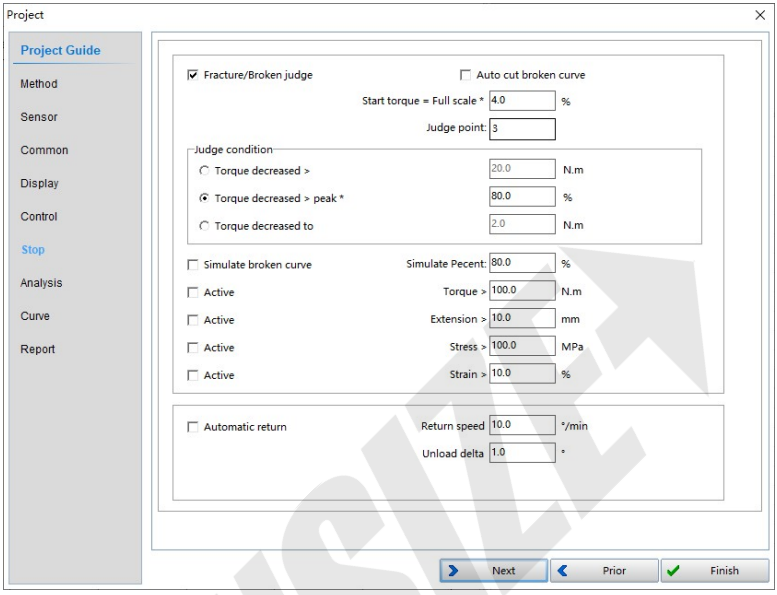
Fifth: control

Including 2 types of mode,: rotating angle control(open loop), program editing (program control).



Sixth: Stop

There are 5 options for auto stop after test finished, they are able to be chosen at the same time, breaking is considered as the most used condition for judgement, as following picture:

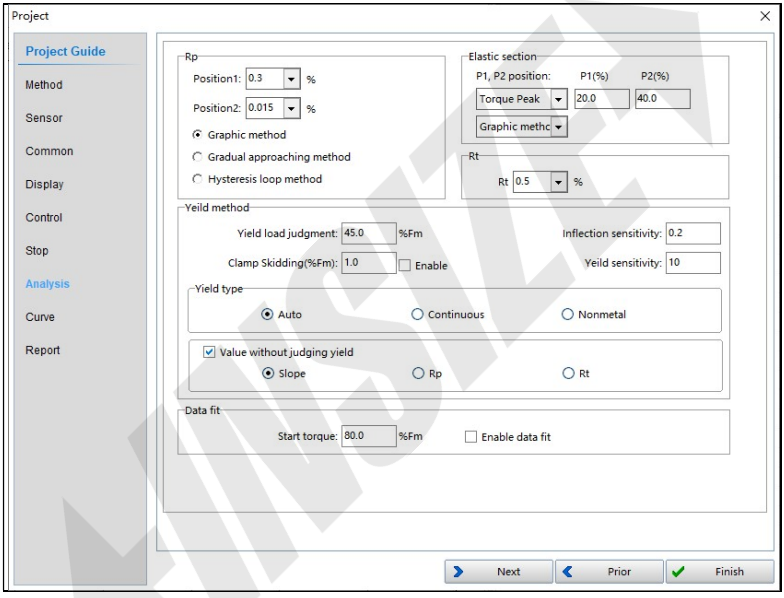


- ✧ Fracture/Broken judge: breaking judgment:it will auto stop testing when it meets the judging condition for breaking. Firstly it is according to rate of range of torque of right rotating and the current scale to judge it, its feature is torque is slow and right rotating, it is used in compression testing or to test with high toughness material, secondly it is according to suddenly range of right rotating torque, it is mainly used in torsion testing, its feature is torque right rotate suddenly at the moment of breaking. Note: one of these conditions is satisfied, test is completed.
- ✧ Curve after auto fracture to breaking: it will auto shear off the curve after breaking and stop if select this option.
- ✧ Other condition of stop: set according to real condition

✧ Auto return: it will auto return to original position after test stop.

Seventh: Analysis

Analyzing different parameter according different standard, as following picture:



（1）Required plastic strength

Position 1 and position 2 is collecting point for calculating Rp in software, for example, position 1 is 0.2%, then it is Rp0.2.

✧ Graphic method: calculating method if elastic segment is shown obviously.

✧ Gradual approaching method,hysteresis loop method: calculated method if elastic segment is not shown obviously.

（2）Elastic section:

P1, P2(force-deformation curve) should be taken from elastic segment(before yielding), adjusting percentage of 2 points properly according curve, value of 2 points is related to value of Rp, elasticity modulus.

- ✧ Torque Peak: evaluating it according to percentage of Max. torque(common method).
- ✧ Strain: evaluating it according to percentage of Max.strain(method for plastic).

(3) Yield method

Start point of judgement: software judges until loading exceeds set value, it will not judge yielding if set value is too large.

Inflection sensitivity: there must be slope change as elastic segment to yielding segment, set range of value between 0.1 and 1, the larger the more sensitivity.

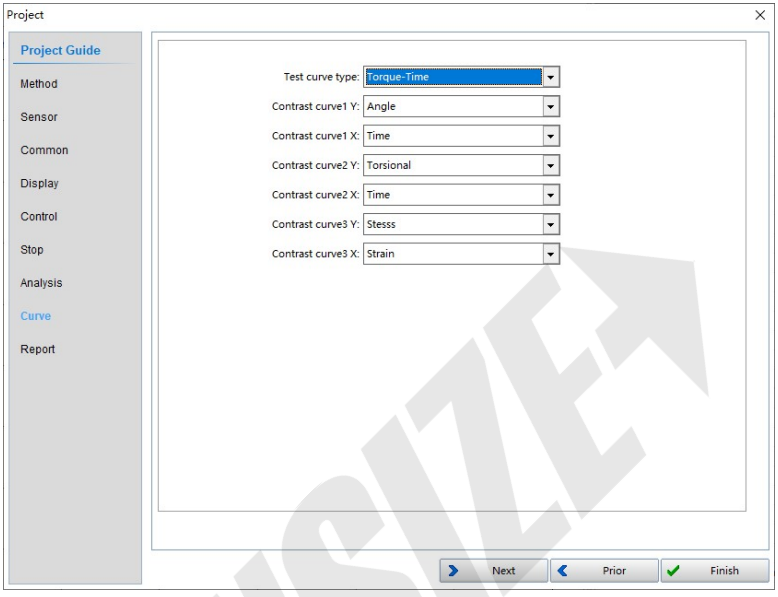
Yield sensitivity: it will take effect as exceeding starting point of judging yield, set range of value between 2 and 20, the smaller the more sensitivity.

(4) Multiple curve fitting

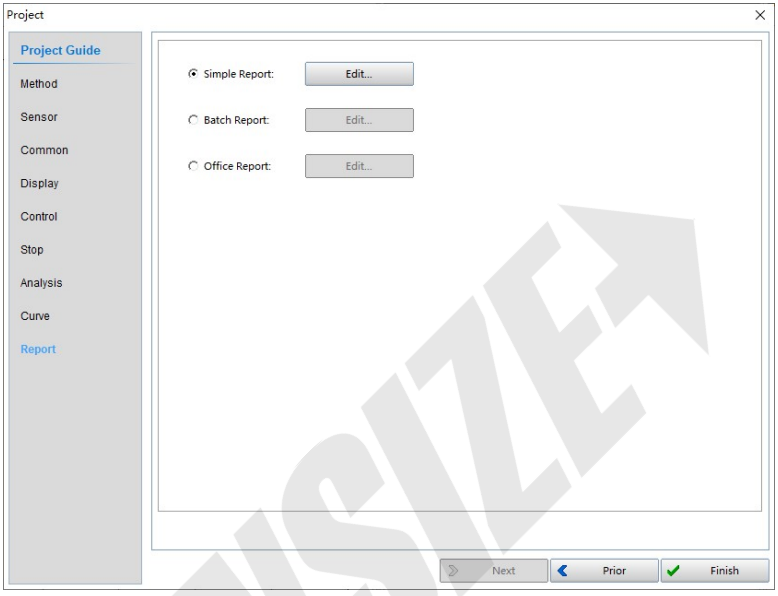
It will fit for a new curve at the set point, judging Max. Torque-extensibility according to standard.

Eighth:curve

Test curve and default type of curve for comparing curve, as following picture:


Project
Project Guide
Method
Sensor
Common
Display
Control
Stop
Analysis
Curve
Report
Test curve type:
Torque-Time
Contrast curve1 Y:
Angle
Contrast curve1 X:
Time
Contrast curve2 Y:
Torsional
Contrast curve2 X:
Time
Contrast curve3 Y:
Stesss
Contrast curve3 X:
Strain
Next
Prior
Finish

Ninth:report



Report format are simple report, batch report, office report, click “Edit” to design it.Details refer to 【chapter 7 use and make of report】。

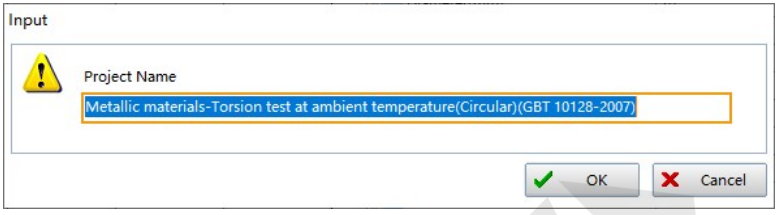
Click “Finish” to complete program and exit.

3.3.Delete

Click “Delete” to delete this program, as following picture:

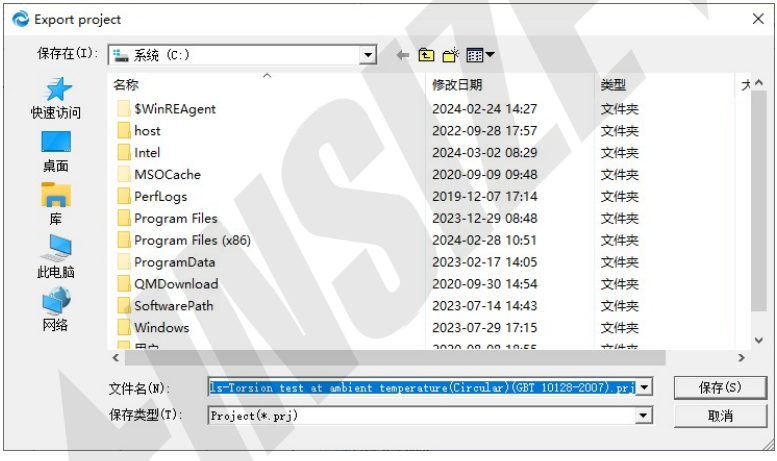
3.4. Rename

Rename selected program, as following picture



3.5. Export

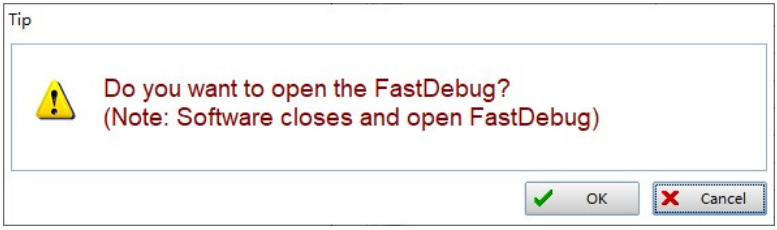
Leading out selected program as following picture



4. Tools

4.1. FastDebug

Click the “FastDebug” button to open the FastDebug to configure parameter, details refer to 【Appendix 1 configration toolbox】.

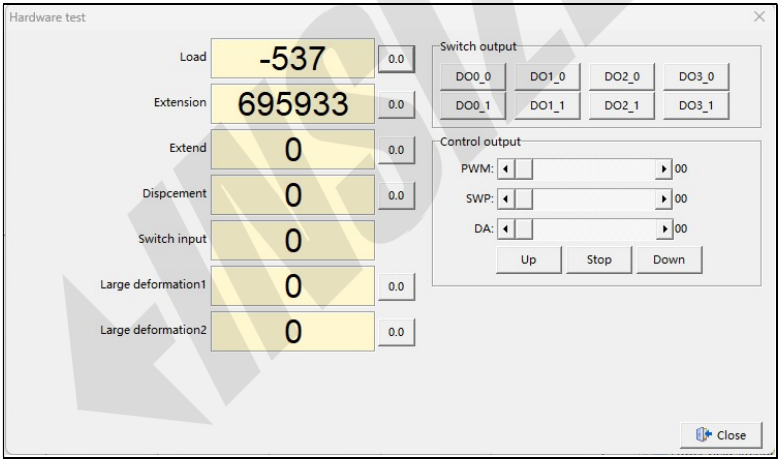


4.2. Playback test

It will auto playback test gathering progress after clicking it.

4.3. Hardware Test

It is tool to adjust gathering card/controller, sensor, torsional angle meter, Please contact factory to adjust them.



4.4. Save

Backup parameter files of software.

4.5. Load parameter

Leading in parameter to software.

4.6. Saving parameter into SED controller

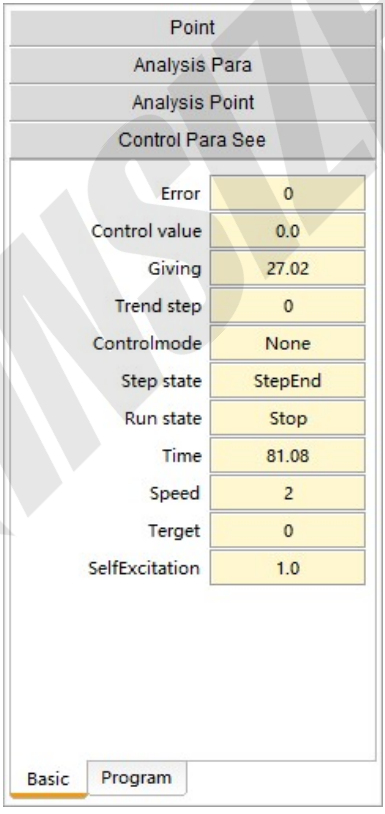
Important parameter saved into SED outer controller is able recover from controller, even if software is damaged.

4.7. Lead in parameter from SED controller

Leading in parameter to software.

4.8. Control Observation

Control and observe window collects relative and sampling parameter for users and debugging.



5. Help

5.1. About

Edition of software and register information of controller.

5.2. Help

Introduction of software(PDF format).

Chapter 5. Calibration and Verification

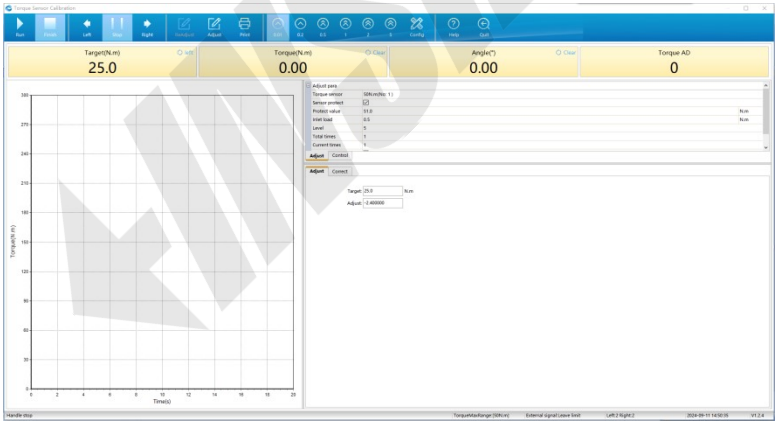
Note: this introduction is edited according to simple edition, the difference of simple and classic edition is only the position of controlling button, their procedure is similar to each other, so there is single introduction for them.:

1. Calibration of torque sensor

1.1. Preparation for calibration

- ✧ Check whether connect line for sensor correctly connected.
- ✧ Place calibration apparatus.
- ✧ Click calibration button in tool column to enter into interface.

1.2. Torque SensorCalibration



1.2.1 Select calibrated sensor(please make sure selected sensor in software is matched with assembled on machine).

1.2.2 Set grade, times, speed(high and low) and so on of calibration.

1.3.Calibration

1.3.1 Decide whether zero clearing is necessary.

1.3.2 Click start to open loop running with initial control quantity.

1.3.3 System will auto run at high speed when current value exceed curve starting value.

1.3.4 System will auto run at low speed when current value is approach calibrated value.

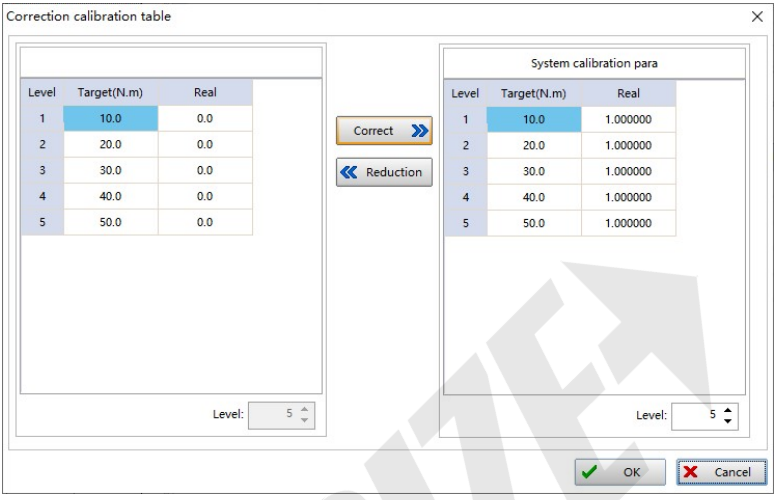
1.3.5 It collect data as value of calibration apparatus reaches to set calibrated value by press collecting button or space key, then auto move to next calibrated value, if current value is earlier collected, click previous calibrated value to collect it again.

1.3.6 If all the calibrated value is not finished, please repeat the 3th step.

1.3.7 Correction list will auto pop up when calibrated value is finished, details about correction list refers to 【4、correction list】.

1.4.Torque sensor Inspect list

Correction list will pop up when calibration/verification is finished, click “Correct” to enter into the list in tool column before next verification.



"Calibration process of verified result" is current result in correction list, "System calibration para" is the calibration list used in current sensor system. Clicking "correct" button, then click "enter" to finish. Pressing "Cancel" if result is not write into system.

2. Torque Sensor Inspect

Verification process is the same as calibration. Please refer to calibration.

Note:

2.1. Calibration value should be set progressive increased and less than the range.

2.2. Verification apparatus is precise, please take good care of it. Be careful when carry out testing, taking the proper specimen instead of verifying instrument to loading, keeping press, unloading as imitating for the first time, using instrument after practised.

2.3. Do not modify parameter in this item avoiding consequences.

Please backup the parameter at first, copy it if there is hardware accident and other accident that is able to be solved by copying.

2.4. Calibration is able to be run again if there is deviation.

3. Calibration of torsional angle meter

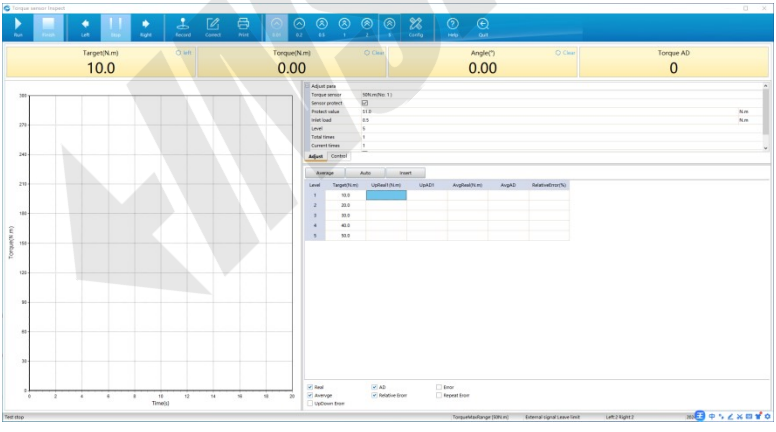
Calibration of torsional angle meter is the same as torque, please refer to that.

4. Rotating angle calibration

4.1. Preparation

- ✧ Check connecting line and channel of sensor.
- ✧ Place apparatus correctly.
- ✧ Click calibration button to enter into the interface.

4.2. Torque sensor Inspect

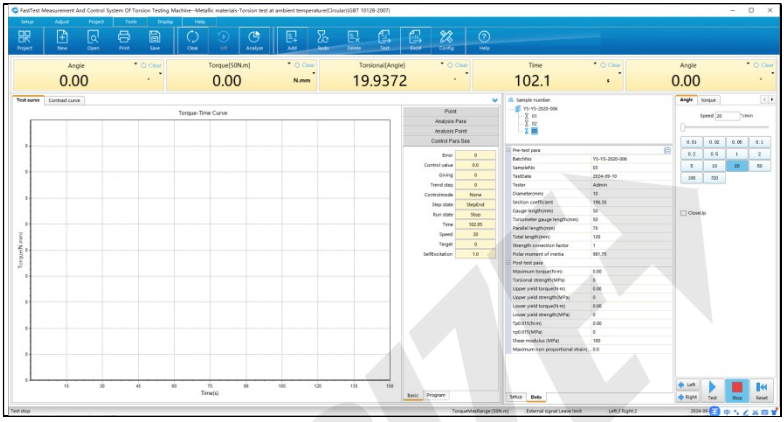


4.2.1 Zero clearing displacement, place calibration apparatus.

4.2.2 Inputting calibrated value in text frame.

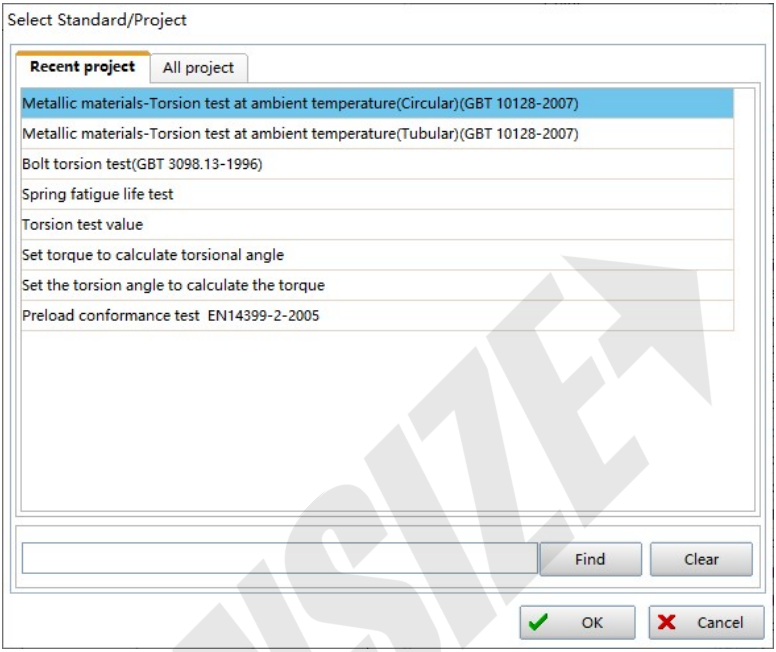
4.2.3 Set proper speed, then click start, click calibration button until reach to set value.

Chapter 6. Test Process

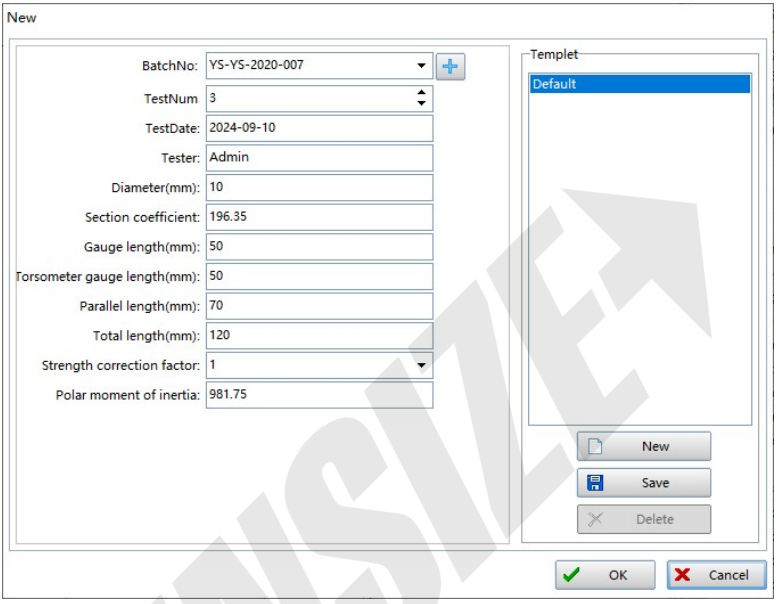


1. Test standard

Select proper test standard/program.


Select Standard/Project
Recent project
All project
Metallic materials-Torsion test at ambient temperature(Circular)(GBT 10128-2007)
Metallic materials-Torsion test at ambient temperature(Tubular)(GBT 10128-2007)
Bolt torsion test(GBT 3098.13-1996)
Spring fatigue life test
Torsion test value
Set torque to calculate torsional angle
Set the torsion angle to calculate the torque
Preload conformance test EN14399-2-2005
Find
Clear
OK
Cancel

2. New



New test interface pops up when clicking "New" in tool column.

It will display test parameter of last time, please input information of specimen.

If the specification of specimen is single, please click "new" to set new template for saving its parameter, clicking name of the template at right side to export information next time.

The information of test is also saved as default if new template is not set.

3. Specimen

Upper clamping specimen, adjusting crossbeam to proper position, zero clearing load sensor, lower clamping specimen, clip on torsional angle (optional).

4. Start test

Under .【project】mode, it will stop in pre set mode, under 【standard】 mode, workers manual select control mode and speed, and press [test] button to start, please pay attention to the testing procedure in order to interfere the test avoiding accident.

5. Test finished.

System stop under the following circumstances:

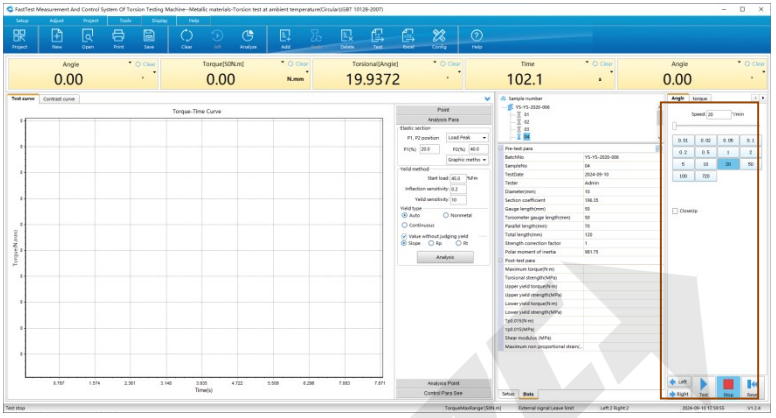
- ✧ Manual operation by press “Stop” button.
- ✧ Overload protect.
- ✧ System stop condition.

6. Result saving

Result is auto save and analyze after test completed. Corrected data should be saved by clicking “save” button.

7. Data analyzing

Software auto analyzes test curve by drawing feature of curve and displaying result after test completed, manual analyzing is admitted if auto not precise.



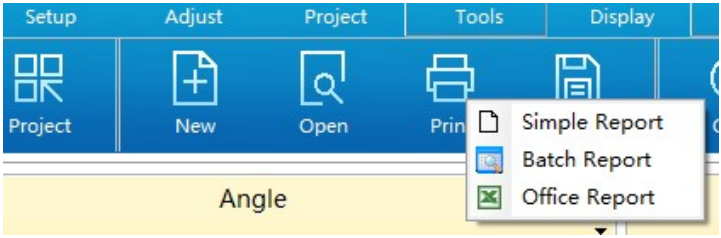
Click “Analyze” in tool column to open or close it

Analyzing shortcuts in the board, click “Analysis” after modifying parameter for recalculating.

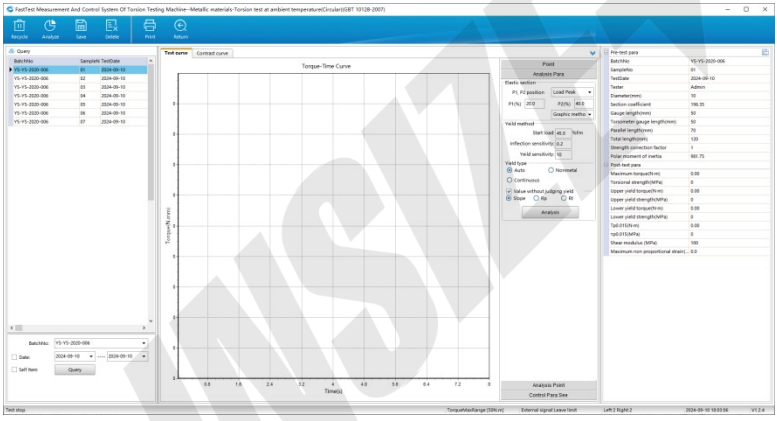
Select “feature point” option to choose analyzed parameter if the result is not satisfying, manual choosing point or choosing by mouse in curve, clicking left button of mouse to analyze parameter again.

8. Print report

System supplies 3 kinds of printing: simple report, batch report and Office report, click “Print” in tool column to make it. Details refer to 【chapter 7 report】

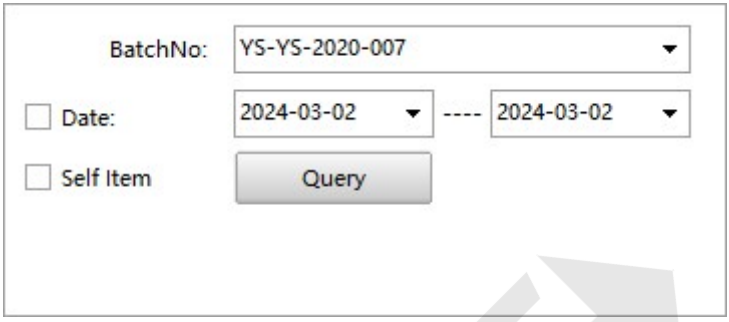


9. Find



There are 4 zones, A find condition, B found list, C curve display, D data display.

Software default displays current number, find history record according to conditions at the bottom, find conditions are number, test date, custom item, asfollowing:

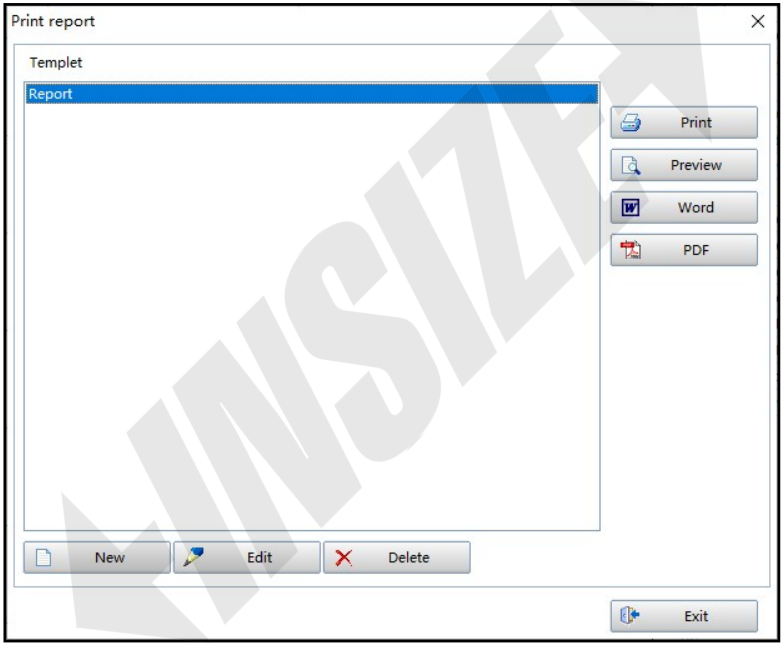


- Operation: according to certain found requirement, the relative result will be displayed in list, the curve and data will be displayed if some item of data is selected.
- Delete: select necessary test data in found result, click “delete” button to delete.
- Recycle: deleted item is able to recovered
- Print: print the last selected data for simple report, print all data of found result for batch report and Office report.
- Return: selected data return to test interface

Chapter 7.Report

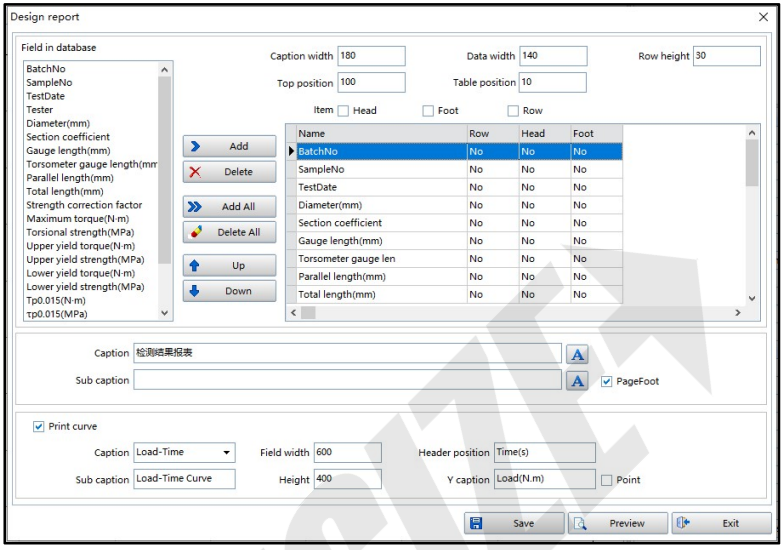
3 type of printing in software, simple report, batch report and Office report.

1.Simple report



Every test standard is relative to default simple report, click “edit” and “new” to edit new template for new requirement.

Editing interface includes add and delete data, choosing type of curve, headline, size of form and so on.



1.1.Data field

There are many data field, select as required, then click “add” to add it.

1.2.Selected list

Clicking “delete” to delete data field, clicking “up” and “down” to adjust position for printing.

2 data fields are default to printed in one line, if the length is too big(more than 18 number and letter), it is able to be placed in one single line, by check “banner” option to realize it.

1.3.Headline

There are headline and subtitle, there will be no title if not input it.

1.4.Curve

There are data and curve in report, customer decide to print

curve or not. Type of curve must be selected, there are torque-torsional angle, stress-strain, torque-time and other 8 type of curve.

1.5.Feature point

Feature point is displayed feature of material, such as lower yield point, Max torque and so on.

1.6.Output

Simple report is able to be printed directly, word report and PDE report should be saved as word document and PDE document.

2.Batch report

Batch report is similar to simple report, except that simple report is used to print for single specimen.

3.Office report

Note: Office report should be linked to Office software, it supports Office 2003, Office 2007 and other Office edition.

Office report is divided into 3 parts, number, name of template and editing function.

3.1.Number area

All the numbers are displayed and default should be printed with check mark, manual removing check mark of unnecessary number.

3.2.Name of template

One test standard support multiple Excel report templates.

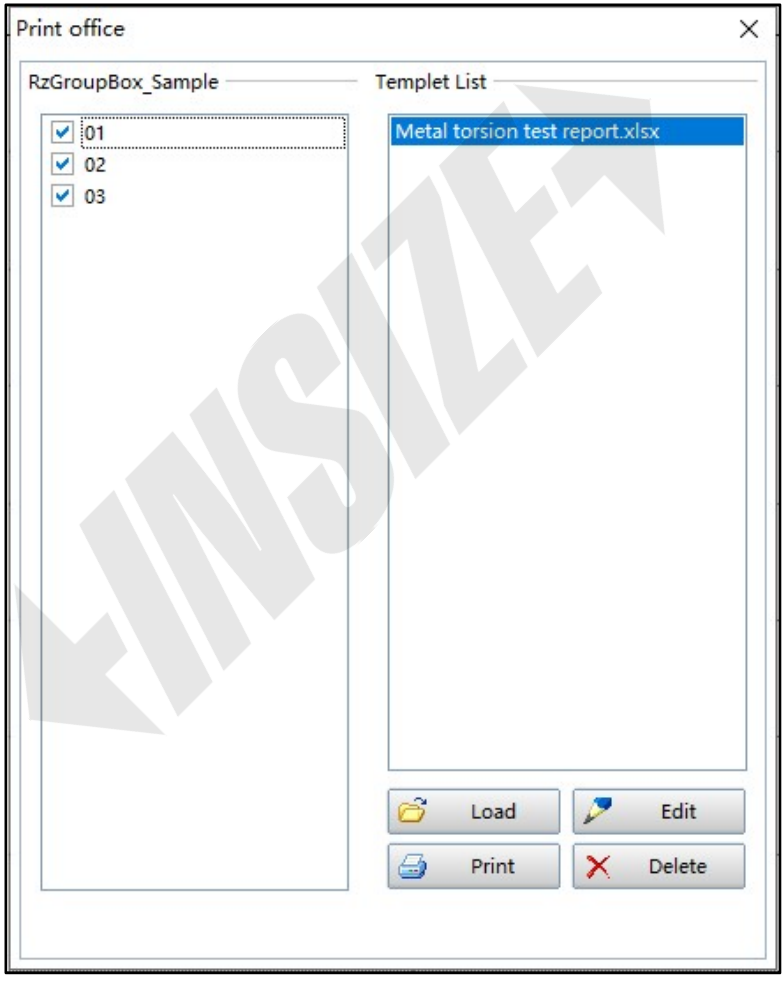
3.3.Editing function

✧ Lead: lead in outer edited Excel template:

✧ Edit: edited Excel report should be linked to software. Details

refer to 【4、Excel report】.

- ✧ Print: outputting data to Excel report for printing and saving copy.
- ✧ Delete: delete selected report template.



3.4.Excel report

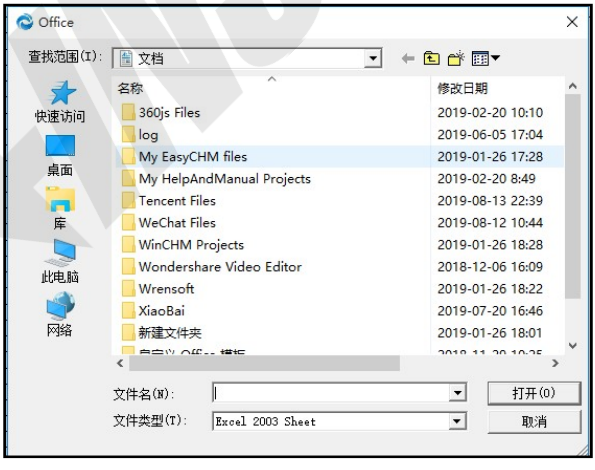
3.4.1 Making report template

Firstly, create a new Excel form, and input type of result, as the following graph:

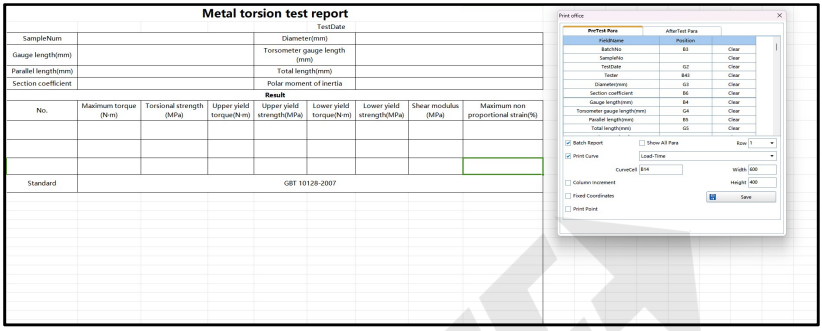
Metal torsion test report							
			TestDate				
			Diameter(mm)				
			Torsometer gauge length (mm)				
			Total length(mm)				
			Polar moment of inertia				
Result							
Maximum torque (N·m)	Torsional strength (MPa)	Upper yield torque(N·m)	Upper yield strength(MPa)	Lower yield torque(N·m)	Lower yield strength(MPa)	Shear modulus (MPa)	Maximum non proportional strain(%)
GBT 10128-2007							

3.4.2 Lead in report

Clink “lead” to open “office lead in checkbox”, select template, lead the template to software.



3.4.3 Edit



Click “edit”, Excel report and editing interface of software, we name it as Excel select area and software editing area.

★ Function of button in software editing area.

✧ Parameter before test: parameter input before test.

✧ Parameter after test: parameter calculated after test.

✧ Display all parameter: it will parameter calculated after test if there is no need to distinguish parameter before or after test.

✧ Increment in line:spaced number is between the 1 record and the 2 one in batch reports, select 1 of increment in line means there is no spaced number(for example: line 1is the the 1th result, line 2 is the 2nd result),, Selecting 2 of increment in line means there is a spaced number between 2 results(for example: line 1 is the1th result, line 2 is 2nd result).

✧ Batch report: if the option of batch report is not selected, Excel report will print 1test result in a page of report(parameter before test, parameter after test, display all parameter, increment in line will disappear).

✧ Print curve: make sure whether print curve or not.

✧ Position of curve: spot curve in Excel report

✧ Width, height: size of curve in Excel report

✧ No adaptive in coordinate of curve: not adjust size of curve according to its real size in coordinate.

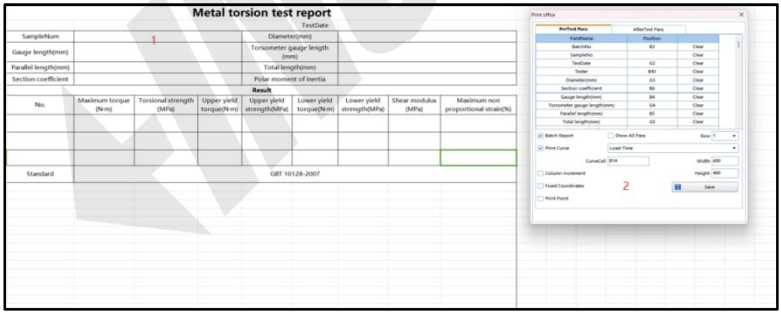
✧ Print feature point: drawing feature point in curve, such as Max. Torque, up/down yield torque, elastic period.

★ Relative and spot for software and Excel

Firstly, select required cell in "Excel select area", then double click position column behind the relative field in "software edit area", the relation is completed.

For example: in the following graph, select ① in "Excel select area", and then double click ② in "software edit area", the field "number" is related to c3.

If the relation is wrong, click "delete" after relative field of "software edit area", then select again.



Appendix 1. Configuration Toolbox

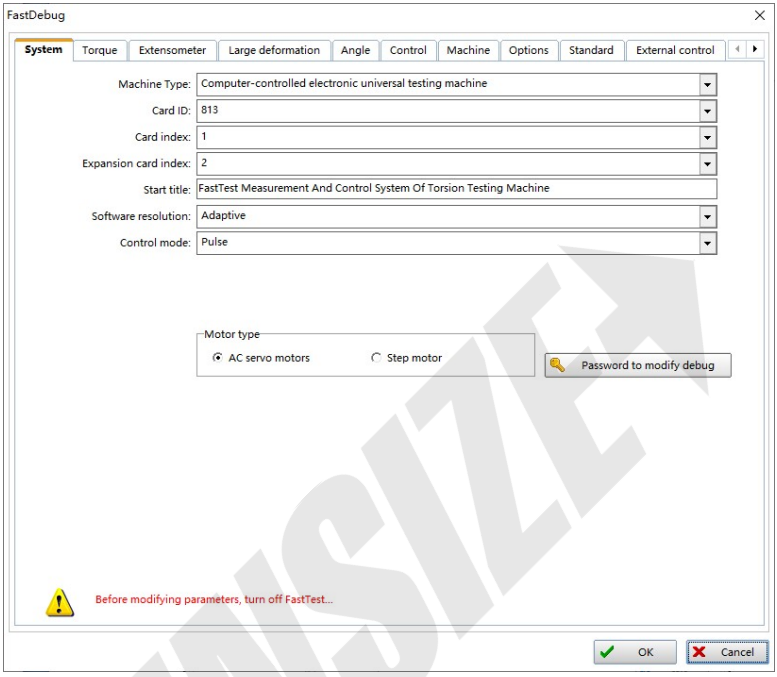
[Configuration toolbox] is used to adjust program for torsion testing machine FastTest.exe. It can configure the program according to real condition of machine and requirement of customer.

[Configuration toolbox]is installed as FastTest.exe is installed, it in the same content of FastTest.exe(usually in the content D:\Program\FastTest), click the name of program to start it, workers should input code (original code is 123456, it is able to be changed.)before starting to avoid accident changing parameter.

Program adopts multi pages, it contains system, torque sensor, torsional angle meter, large deformation, rotating angle, control, main parameter, option, test standard, outer control, language and so on.

1.System

- ✧ Type:FastTest support multiple system, such as screen display torsion testing machine, electronic torsion testing machine, it auto recognize type according to data card.
- ✧ Sign of card: it default as “0” without gathering card or controller, software will auto recognize it after connecting card or controller.:
- ✧ Index of card:index in computer for card.
- ✧ Resolution of software: there are 2 type: 1366*768, self-adaption of size of screen.



2. Torque sensor

There are 4 sensors is able to be installed at most. Workers can add and delete information of list for sensor, including

- ✧ Number: select proper sensor.
- ✧ Max. Scale: set according to sensor of testing machine, its unit is N.m
- ✧ Min. Resolution: Max.value is able to be set to 1/1000000
- ✧ Sensibility: parameter of sensor according to introduction of sensor.
- ✧ Coefficient of verification: linearity coefficient of sensor for verification.

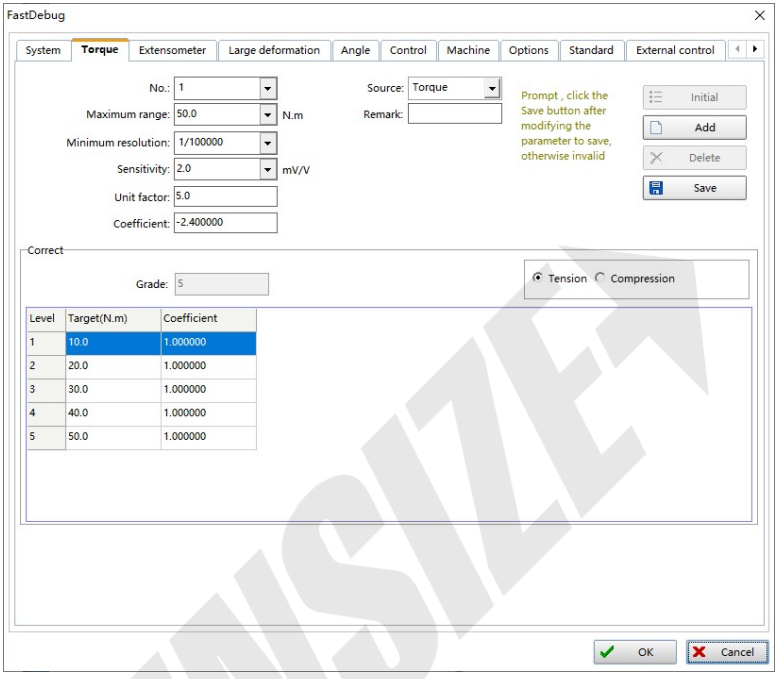
- ✧ Source of channel: generally, it is load channel, it also is able to be changed to other channel
- ✧ Multiple group sensor:

  Add: clicking “add”, Max.No. Will auto plus 1, it will not more than 4.

  Delete: deleting order must be start from first group, the No. will minus 1, it will not less than 1.

  Save: please click “save” after adding or deleting parameter of sensor, or else it does not take effect, software will change the colour of value to hint.

  Initialization:clicking “initialize” after setting scale and sensibility of sensor to initialize it(only adjustment for the first time).



3. Torsional angle meter

✧ Axial direction meter

It is the same as the set of torque sensor, it is installed 4 at most.

✧ Extended torsional angle meter

It is used to measuring axial or cross direction angle, it is the same as the set of sensor.

4. Large deformation

Selecting single or double encoder addording to large

deformation and torsional angle meter.

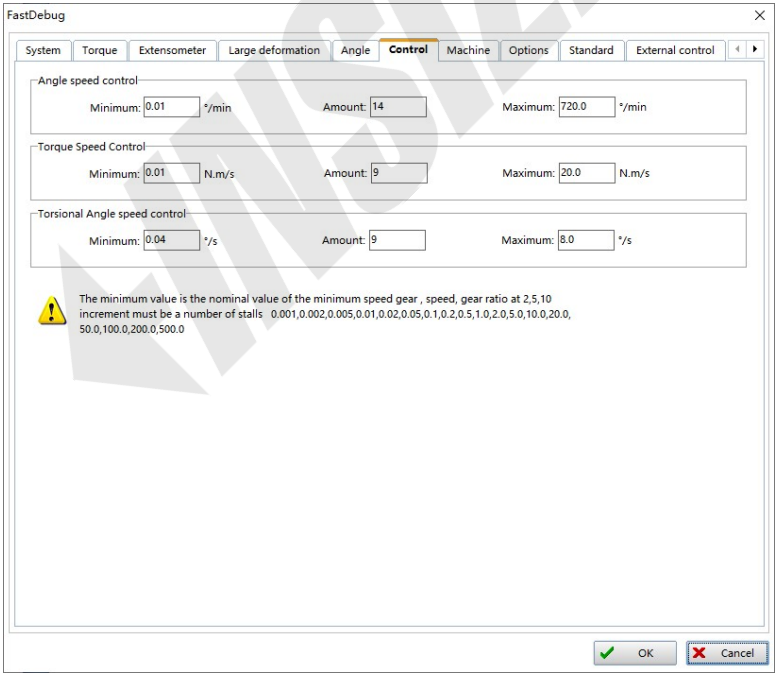
5. Rotating angle

Gain calibration: linearity coefficient of sensor for rotating angle.

Start mimetic rotating angle: calculate rotating angle according speed(for electronic torsion testing machine)

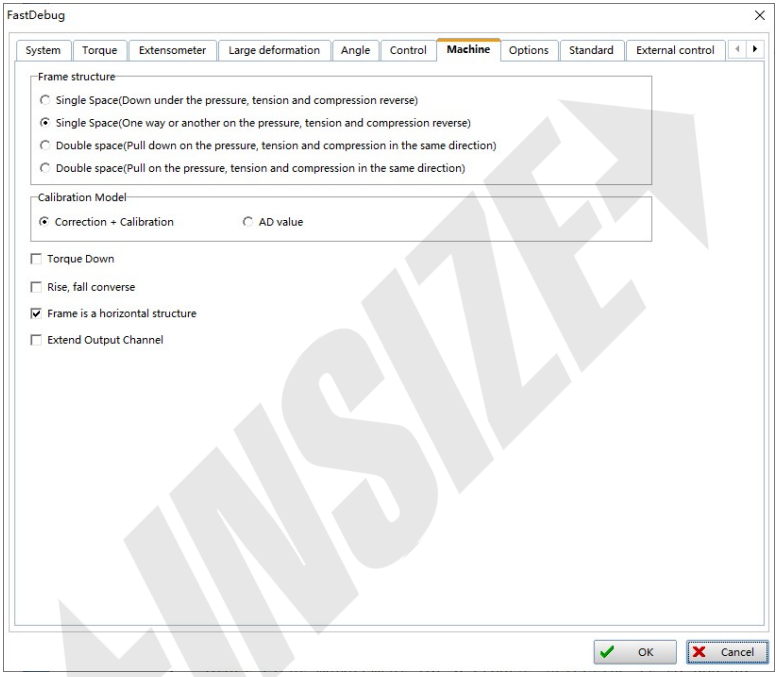
6. Control

Set range and gear of rotating angle, torque, speed of torsional angle (gear adding according time of 1, 2, 5, 10)



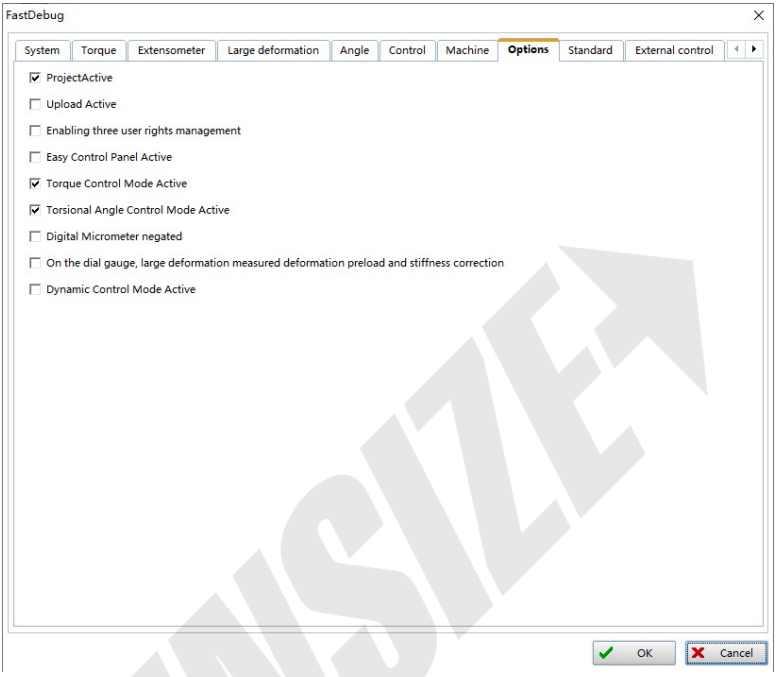
7. Parameter

This page will changed according to type of main machine.

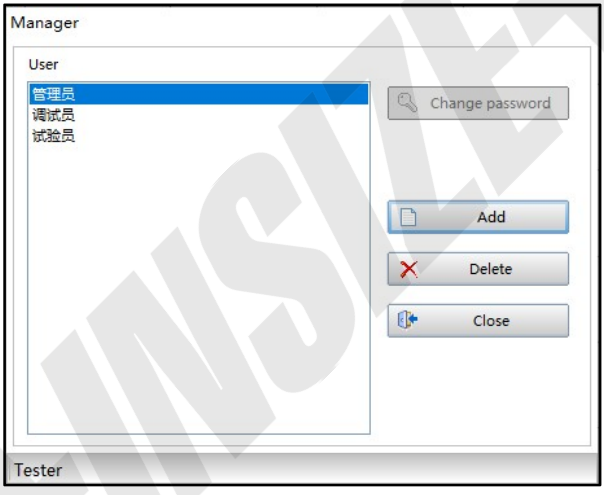


✧ Calibration mode: there are 2 type: calibration and correcting, AD code, please change it according usual.

1. Option



- ✧ Start project: starting 【project】 mode in software.(every project set different project for different testing)
- ✧ Start data upload:selecting it to upload and network with factory for data connection.
- ✧ Start right management for 3 grades: selecting it to pop up dialog window of inputting user name, code as following graph, and editing content in tool column.



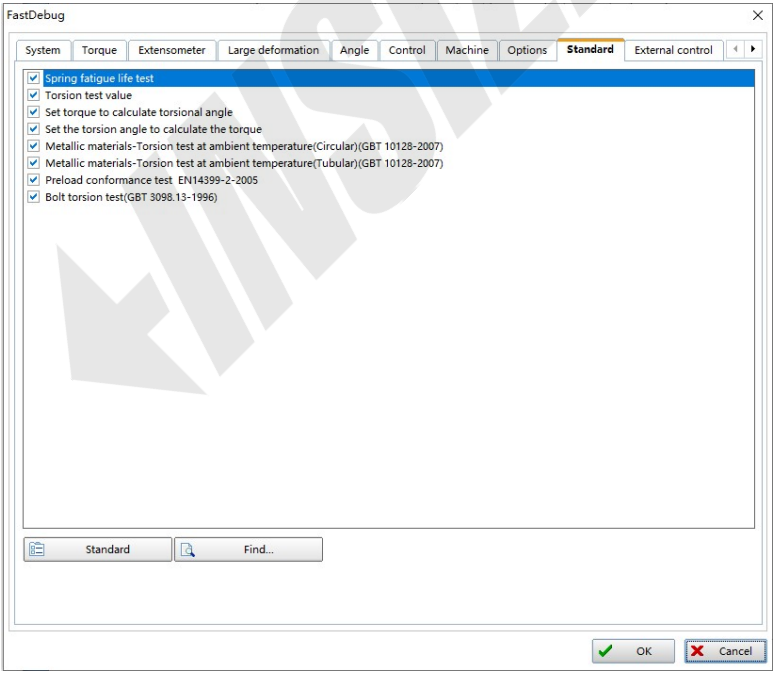
- ✧ Start simple control: it is used to distinguish control mode of simple and classic.
- ✧ Start torque control mode::there will exist torque control mode in software.
- ✧ Start torsional angle control mode: there will exist torque control mode in software.
- ✧ Digital display dial indicator take inverse: gathering torsional angle take the inverse if the source is dial

indicator.

✧ Correcting the pre torque and rigidity measured by large deformation and dial indicator: if torsional angle is measured by dial indicator and large deformation, data is recorded when torque is larger than pre torque.

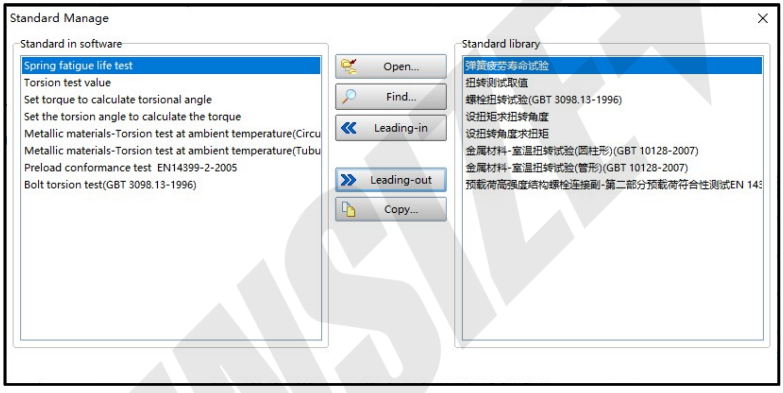
8. Test standard

There are all standards for program FastTest, some are not necessary for every custom, delete the mark to not display.



9. Standard

There are lead in and export for standard, completed test result is able be lead in the current system, result in the software also is able to be exported.



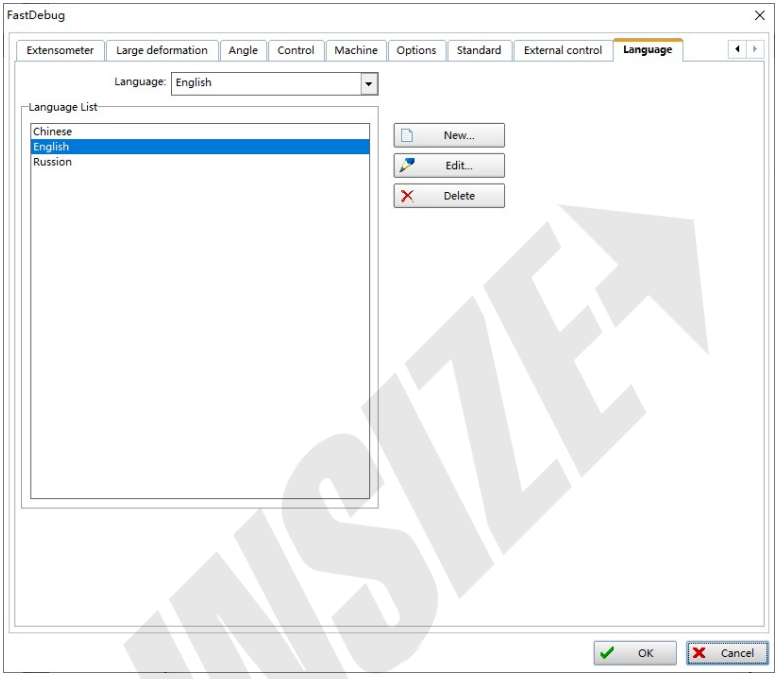
10. Outer control

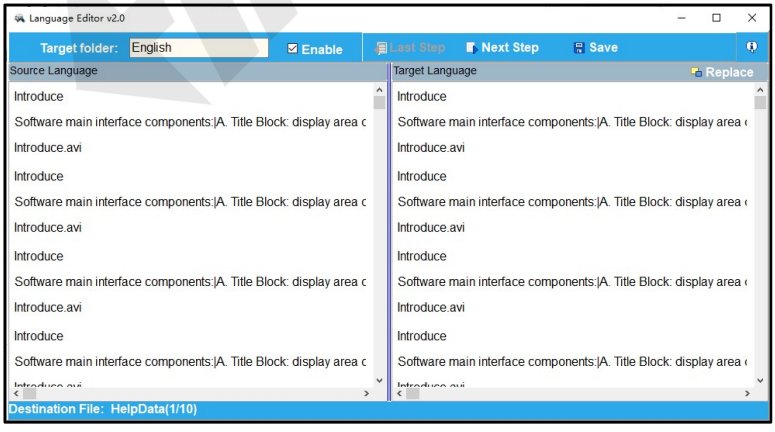
Outer switch input signal and start of handle box is able used in software, there are 4 handle box is not able used, only one handle box is able to be used at the same time, outer input signal is able to be defined.

11. Language

It can set and switch mode of language, language is able to be new built and edit.

Note: new language is not used at once, it must be edited or translated, and set in the programmer to take it effect.


FastDebug
Extensometer
Large deformation
Angle
Control
Machine
Options
Standard
External control
Language
Language: English
Language List
Chinese
English
Russion
New...
Edit...
Delete
OK
Cancel


Language Editor v2.0
Target folder: English
Enable
Last Step
Next Step
Save
Source Language
Target Language
Replace
Introduce
Software main interface components:|A. Title Block: display area c
Introduce.avi
Destination File: HelpData(1/10)

Appendix 2. Program Editor

1. Usage

It is used to edit complex program, for example: multiple grade voltage protect, cycling control, variety of control mode combined and so on.

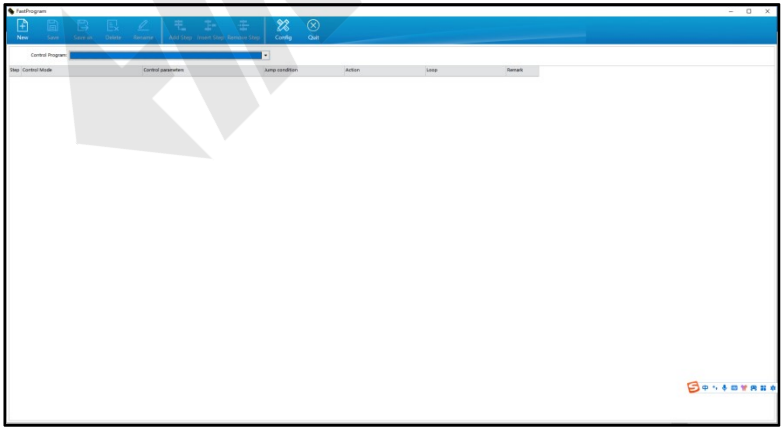
2. Program executing

Choosing program control mode in control panel, select edited program, press “Start” button to start test, program will be carried out with highlight hint of current procedure.

Generally speaking: software will auto carry out test, worker can click [next] to complete the procedure ahead.

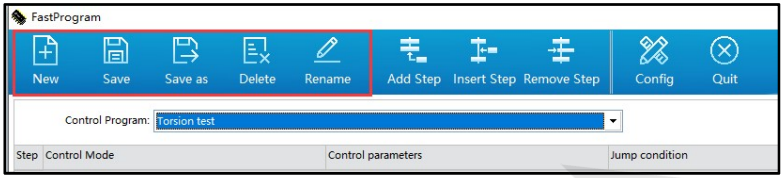
3. Program editing

Click “Programmer” button at stop condition of machine, the interface as following:



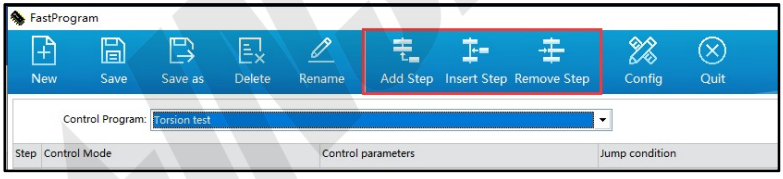
3.1.Function button

3.1.1 New/delete program

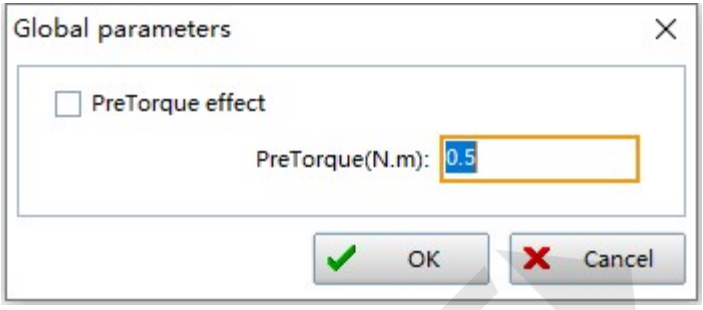


- New: inputting useful name for new program(only alphabet, number and combination of them).
- Rename: rename program
- Delete:delete selected program.
- Save: save edited program.
- Save as: save copy of selected program as new

3.1.2 Editing program



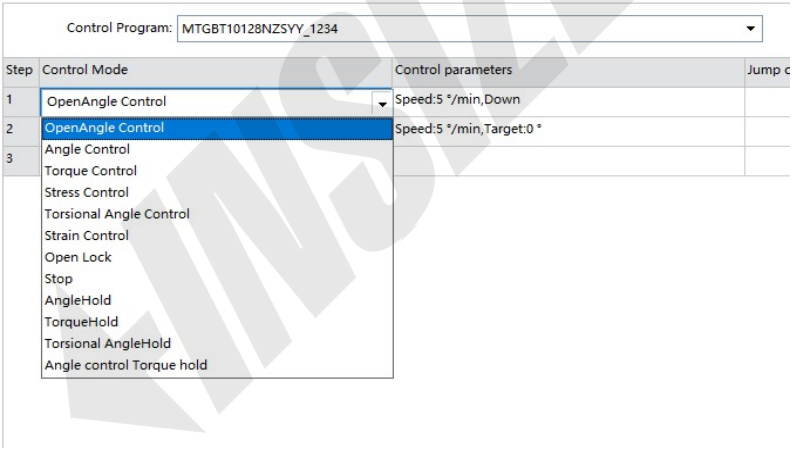
- Add step: add a new program
- Remove step:delete selected program.
- Insert step: add a new program before selected program.
- Config: set pre-stress, force, stress, deformation, strain and other control mode after first step, whether display pre-stress speed.

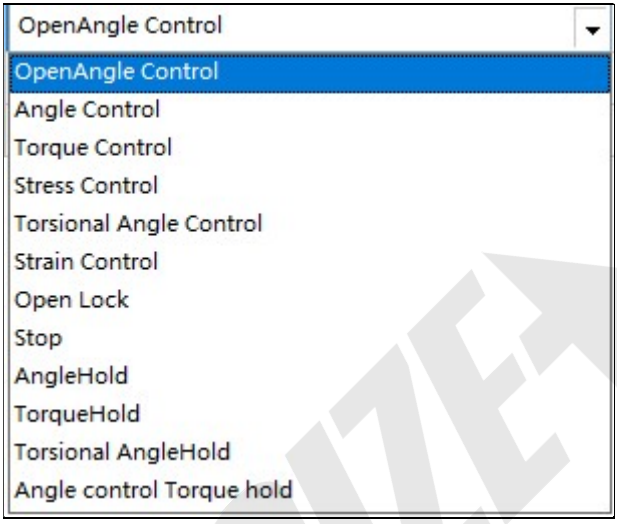


3.2.Content of edited program

3.2.1 Set control mode

Click control mode list, there is pull-down list.



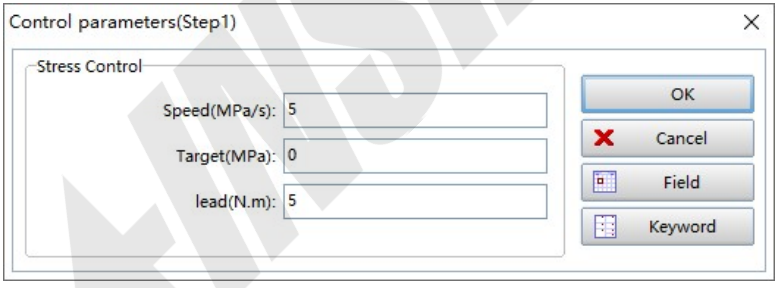


- Open loop Control: absolute value of control speed is real speed, positive and negative of speed is the direction of displacement, positive is loading direction, negative is unloading direction.
- Rotating angle Control: set value of rotating angle as control target, close loop control at set speed.
- Torque Control: set value of torque as control target with close loop control at set speed.
- Stress Control: set value of stress as control target with close loop control at set speed.
- Torsional angle Control: set value of deformation as control target with close loop control at set speed.
- Strain Control: set value of strain as control target with close loop control at set speed.
- Open loop locked: it also called output locked without control parameter, switch to next step according to last step control, it is suitable for condition close loop can not control.

- ✧ Stop: stop test.
- ✧ Rotating angle hold: keeping value of angle shifting from last step.
- ✧ Torque hold: keeping value of torque shifting from last step.
- ✧ Torsional angle hold: keeping value of shifting last step.
- ✧ Rotating angle control torque hold: kept when reach to set torque at rotating angle speed.
- ✧ Open unload: unload at once.

Note: keep rotating angel, keep torque and keep torsional angle, the 3 control mode is suitable for undetermined keeping aim(keep the value as switching).

3.2.2 Setting of control parameter



Click edited control parameter, parameter window pops up, parameter content changed as changing of control mode, parameters are speed, target and pre-load speed.

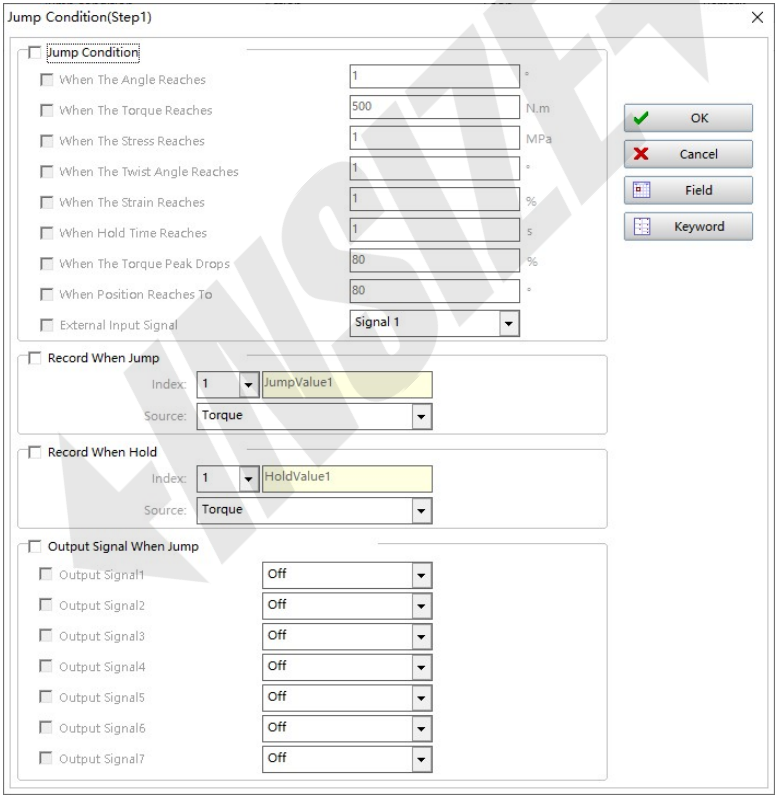
- ✧ Speed: speed of current mode.
- ✧ Target: keeping target of current mode(inputting number, field, key word, arithmetic including field, key word, number).
- ✧ Prespeed: displacement speed before reaching to pre-load,

please refer to 【1.2、editing program】

✧ Field: click “field” to link to content of parameter, target is changed as parameter changed.

✧ Keyword: click “key word” to links to temporary field coming from last step(field coming from skipping report and keeping report in skipping condition).

3.2.3 Set adjust condition



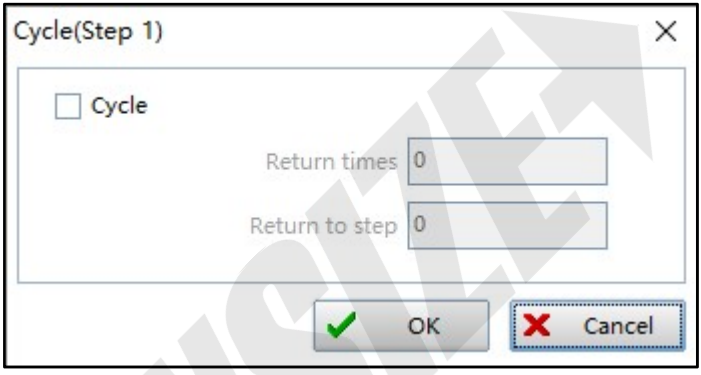
Click edited procedure in skipping condition line, skipping condition set window pops up, set condition after choose “Jump

Condition", including displacement, force, deformation, time and so on, choose one or more.

✧ Field: the same as Field in control parameter.

✧ Keyword: the same as Field in control parameter.

3.2.4 Cycling set



If set cycling function, it will skip to head of program to cycling until completing times of cycle, then skip out to next step.

3.2.5 Instruction of setting

Click instruction line of edited procedure, instruction window pops up, inputting simple instruction.

Note: last step of editing program must be stop.

Appendix 3. Common Problem and Solution

1. Installation

No.	Information	Solution
1	System file is outdated, please restart.	Please reset
2	Some DLL file is used by other program, it is not able to be refresh.	Close other used program, or ignore it.

2. Start

No.	Information	Solution
1	Can not find some DLL file or other file	1) Check this file and copy it to the content (D:\Program File\FastTest), (D:\Program Files\FastTest); 2) Reset the program, select “repair”.
2	Software is outdated, please log on again.	1) Check the date of computer and correct it if it is not correct. 2) System date of log on is outdated, inquire supplier for new code of logging. 3) Note: do not install program by yourself, the parameter may be lost, please connect the supplier for new installation file.

3.Operation

No.	Problem	Reason and Solution
1	Value of torque and torsional angle is 0.	1) Check the wire of sensor and sensor 2) turn off the power and on again, reset the controller.
2	Curve is no longer recorded after for a period.	Time is too long to past the default limit. Please change the frequency of recording in system set of menu.
3	Auto analyzing result is wrong.	Check the set of analyzing is correct or not, then if auto analyzing is not proper, please manual analyzing.
4	There is no value of torque	1) Check the connecting wire of sensor, 2) Check the sensor is damaged or not. 3) Check controller is damaged or not.
5	Value of torque is not stable, connecting shielding wire is not the solution	1) The sensor wire is not connected. 2) The wire of sensor is connected not enough or short circuit. 3) Sensor is damaged. 4) Controller is damaged.
6	Left rotating to full scale of torque	1) The sensor wire is not connected. 2) The wire of sensor is connected not enough or short circuit. 3) Sensor is damaged.
7	There is no value of torsional angle.	1) Not select torsional angle meter for source of torsional angle. 2) Wire of torsional angle meter is damaged. 3) Wire of torsional angle meter is connected not enough and short circuit. 4) Torsional angle meter is damaged.

		5) Controller is damaged.
8	Value of torsional angle is not stable	1) Wire of torsional angle meter is connected not enough and short circuit. 2) Torsional angle meter is damaged. 3) Outer interfering
9	Rotating angle is unusual.	1) Wire of encoder is not connected correctly. 2) Wire of encoder is not connected. 3) Encoder is damaged. 4) Encoder is drain electrode, resistance should be connected. 5) Controller is damaged.
10	Software does not stop as breaking of specimen	1) Breaking judgement is not selected. 2) Max. torque is too small as breaking to reach to the condition of breaking.
11	No data	1) Not select breaking judgement, Max. torque is too small as breaking to reach to the condition of breaking. 2) Not input parameter and information of information. 3) Not clicking start button. 4) Not new built for specimen to cover the data of last data of specimen.
13	Correcting curve of rigidity(torsional angle -time)	1) Two press plate are pressed each other to full scale, click button “save rigidity” → “set” → “system parameter” to correct rigidity. 2) Then pressing plates again, torsional angle is nearly to 0, the correcting of rigidity is completed.
14	Value encoder is not change(value change to single direction)	1) Wire is not connected correctly. 2) Source of torsional of angel selects torsional angle of crossbeam, controller mode selects pulse.

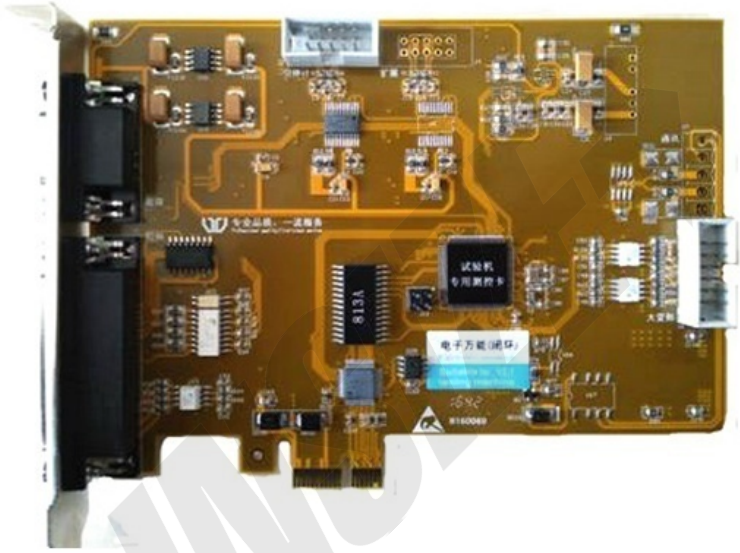
15	Yield strength	1) Generally yield strength is down yield strength, 2) torque is necessary for calculating yield. 3) If yield point is not obviously, selecting Rp0.2 instead. 4) Judging ReH, ReL, Rp, Rt should be in yielding period, if ReH, Rt are not in the yielding period, judging start point of yield is not reasonable. If Rp, Rt are not in the yielding period, P1,P2 of the target point of elastic period is not set reasonable.
16	Difference of extensibility and elongation	1） Extensibility: the rate between elongation and original length for torque of specimen with single axial tension. 2） Elongation: extensibility of tension strength for relative loading, it is the special value of extensibility.
17	Coefficient of calibration for torque is not able to be changed.	1) Forgot to click “save” →“enter” to change the configuration toolbox. 2) Coefficient of correct is changed to original value firstly, then carry out calibration, original value is “1”.
18	There is no curve or curve is too small at starting.	1) Specimen slides 2) Clicking “proper” in curve panel of tool column.
19	When is the torsional angle meter must be used.	1) There is strain and torsional angle controlling in testing procedure. 2) The data about elastic period is required existing in result.
20	When is the torsional angle meter not must be used.	Only calculating ReH, ReL, Rm of yielding.

21	Rp0.2 is calculated not correctly.	1) Value of torque is correctly or not. 2) Torsional angle from meter is correctly or not. 3) Torsional angle meter is clamped well or not(sliding or not). 4) P1, P2 in torque --torsional angle curve is selected correctly or not. 5) Zero clearing or not when cylinder of hydraulic testing machine raised
22	Left rotating is as usual, right rotating of return is not as usual.	1) Clicking right and left rotate, stop in turns for several times. 2) Taking apart of digital valve to check out there is foreign matter or not. 3) Change a new digital valve.
23	Torsional angle is increased as test starting, torque is not increased.	1) Specimen in the jaw slide. 2) Torsional angel is too large.
24	After moving machine, torque and torsional angle is not displayed in software	Check torque and torsional angel is as usual on the hardware, or else install the hardware again.
25	There is no torsional angel after installing controller.	1) Check the wire connecting 2) Check the hock is connected to encoder. 3) Change controller.
26	Value of torque is negative in software.	Select opposite value in calibration of sensor.

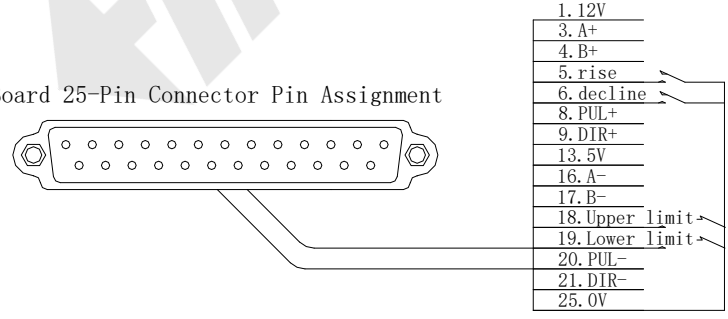
27	Restore software after restoring the computer	1) Restore software by driver of software. 2) Copying backup file to installation content to cover it.

Appendix 5Inner Measuring and Testing Card

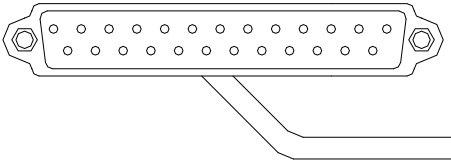
1. STC813A Wire Connection 【torsion】



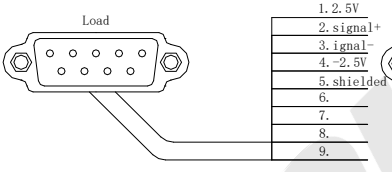
Board 25-Pin Connector Pin Assignment



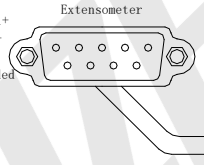
25-Pin Connector Pin Assignment
for Large-Deformation Flexible Cable



1. 5V
2. A1+
3. B1+
4. 0V
5.
6. 5V
7. A2+
8. B2+
9. 0V



1. 2. 5V
2. signal+
3. ignal-
4. -2. 5V
5. shielded
6.
7.
8.
9.



1. 2. 5V
2. signal+
3. signal-
4. -2. 5V
5. shielded
6.
7.
8.
9.