HDT-A| Servohydraulic dynamic testing machine | Table-top

Tabletop servohydraulic dynamic testing machine is ideal for for testing components and materials such as plastics, elastomers, aluminum, composites, steel, super alloys and more.

» High cycle fatigue
» Low cycle fatigue
» Advanced low cycle fatigue
» Fatigue crack growth
» Fracture toughness
» Crack propagation
» KIc, JIc
» Environmental testing
» Thermal mechanical fatigue

- The high-low cycle fatigue test can output sine wave, triangular wave, trapezoidal wave and other waveforms.
- With different fixtures, it can address the loading mode such as tension, compression, tension-compression.
- With additional devices, tests under high / low temperature, salt spray and corrosion are also supported.
- The closed-loop servo control system is composed of controller, servo valve, force transducer, displacement transducer and computer to realize PID control, and automatically measure test parameters such as force, displacement and deformation. The test process is all controlled by computer, which is an ideal cost-effective test system for scientific research institutes, metallurgical construction, national defense, colleges and universities, machinery manufacturing, transportation and other industries.

Load frame

- The machine is designed with closed-type structure, with high stiffness, backlash free, and excellent stability.
- The column surface is treated with high frequency hardening. Extra-high hardness ensures smooth guide, not easy to be scratched. The surface is chrome plated with super anti-rust ability.
- Crosshead lifting and lowering, and locking are hydraulically driven by the handle, flexible and convenient; the crosshead has a self-locking function to prevent sliding even shutdown.
- If hydraulic grips are equipped, the alignment fixture must be combined with high resolution force transducer to enhance system precision and test accuracy.
- Integrated T-slot base facilitate fixtures mounting to meet different tests.
- Integrated actuator beam features more compact, less joints, and better rigidity.

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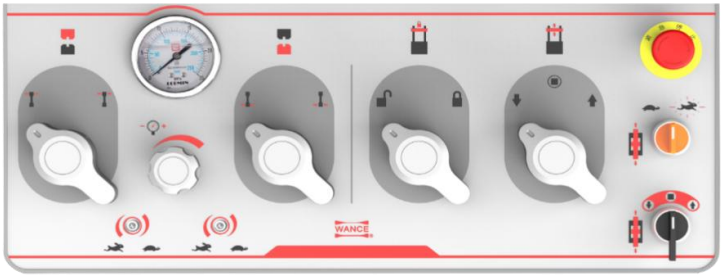
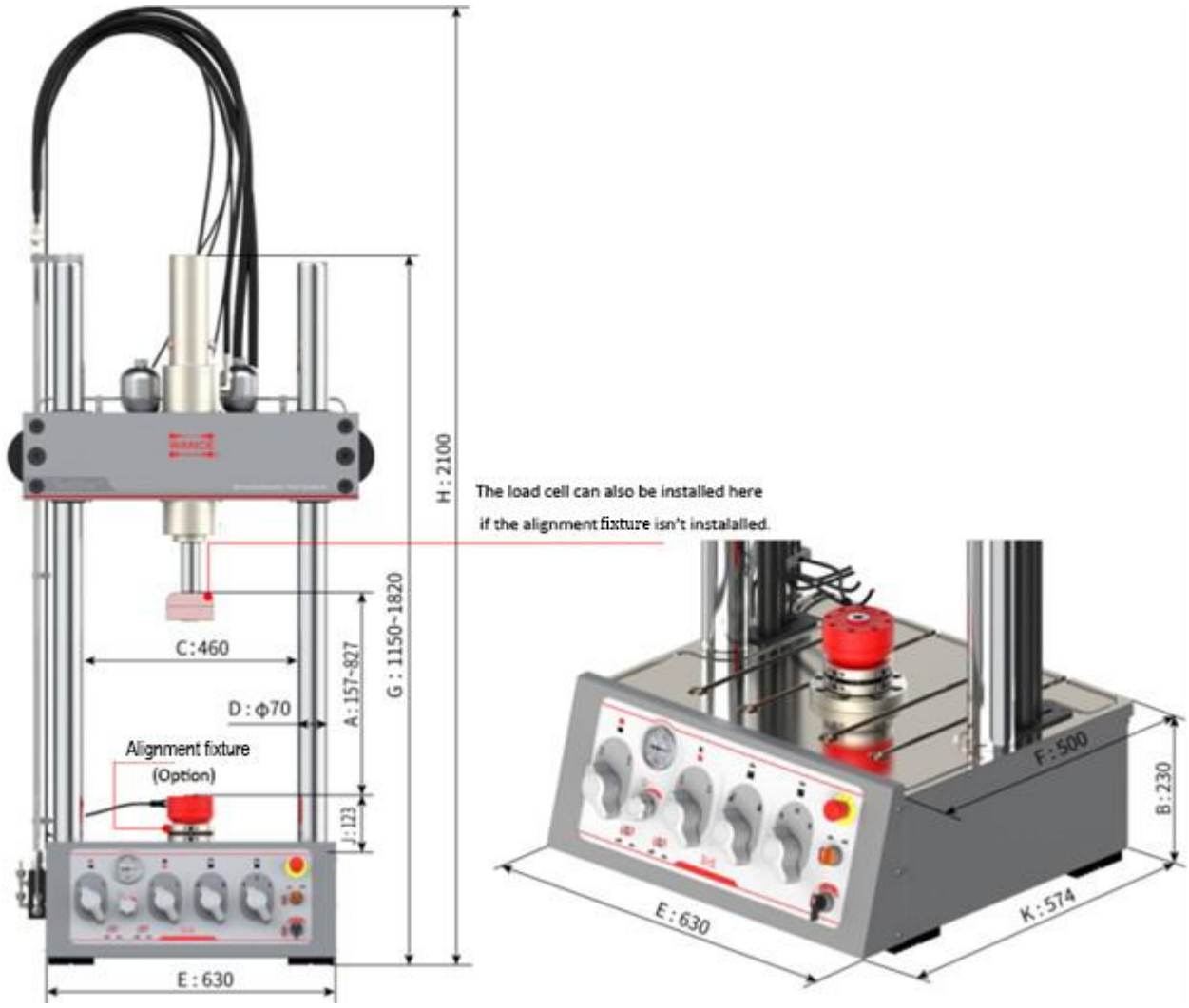
- Servo actuator adopts clearance seal, no high pressure seal ring, and seals hydraulic oil by minimal and ultra-high precision clearance. Piston runs smoothly with very low damping coefficient, no crawling phenomenon, smooth curve, and a very high response frequency.
- Intuitive centralized controls provides with easy-to-turn handles and clear, universally understood labeling.

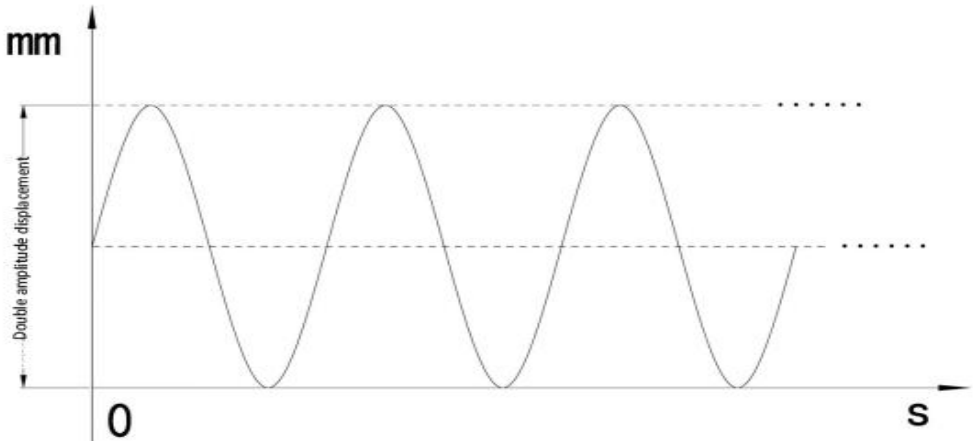


Parameters

Model	HDT503A	HDT104A	HDT254A
Force capacity (kN) (rated dynamic force)	5	10	25
Force measurement range (kN) (2%~100%FS)	0.1~5	0.2~10	0.5~25
Static force accuracy	±0.5%		
Dynamic force accuracy	±2%		
Actuator dynamic stroke (mm)	100		
Displacement range (mm)	0~100 (±50)		
Displacement resolution (mm)	0.001		
Displacement accuracy	⩽3mm, 0.015mm >3mm, ±0.5%FS		
Test frequency (Hz, Sine wave)	0.01~60		
Minimum vertical space A (mm)	157~827		
Base height B (mm)	230		
Column spacing C (mm)	460		
Column diameter D (mm)	70		
Base width E (mm)	630		
Work surface depth F (mm)	500		
Height to actuator top G (mm)	1150~1820		
Overall height H (mm)	2100		
Height of alignment fixture plus load cell (mm)	123		
Base depth K (mm)	574		
Frame stiffness (N/m)	3.5×10^8		
Machine weight (kg)	260		
Alignment	5%		

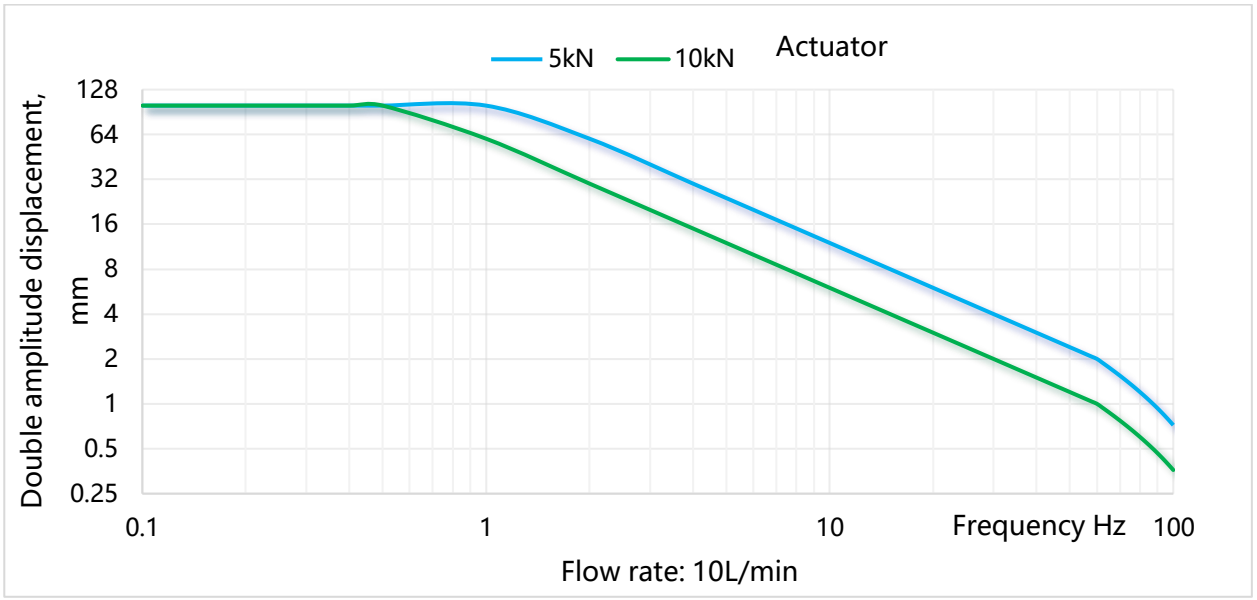


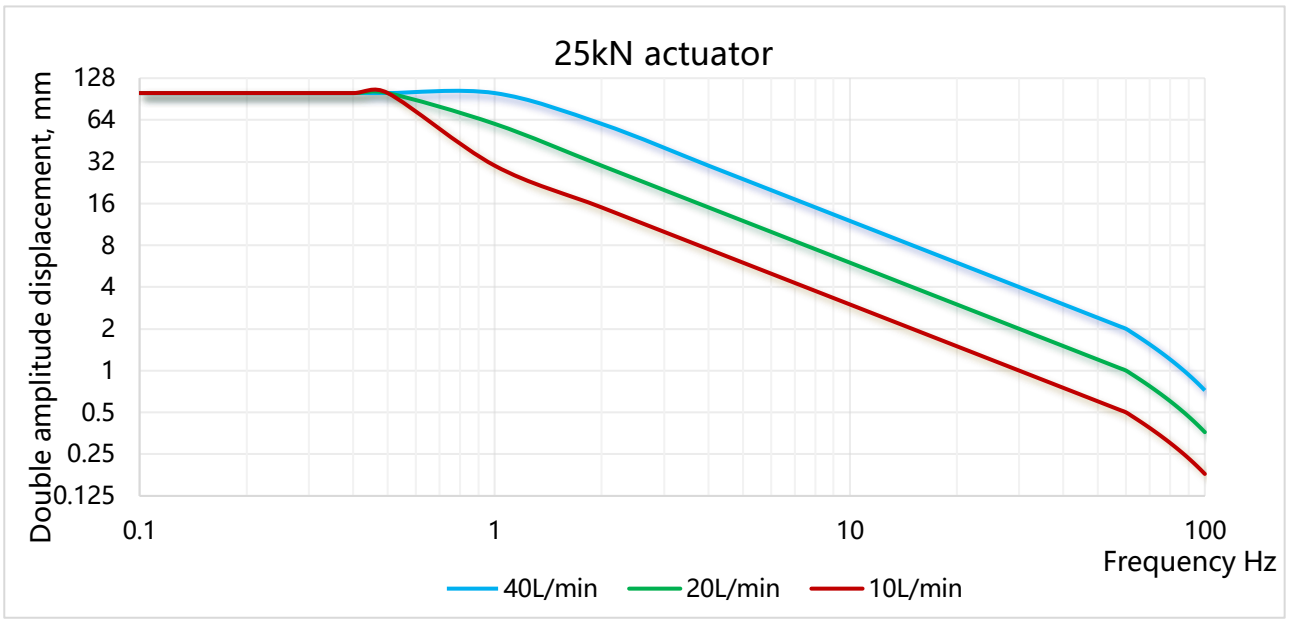
Amplitude frequency performance curves



Double amplitude displacement diagram

Double amplitude displacement: refers to the total displacement of the actuator during the test, i.e. the absolute value of the upper peak value reducing the lower peak value


5kN
10kN
Actuator
Double amplitude displacement, mm
128
64
32
16
8
4
2
1
0.5
0.25
0.1
1
10
Frequency Hz
100
Flow rate: 10L/min


25kN actuator
Double amplitude displacement, mm
128
64
32
16
8
4
2
1
0.5
0.25
0.125
0.1
1
10
100
Frequency Hz
40L/min
20L/min
10L/min

Standard accessories

Model	HDT503A	HDT104A	HDT254A
Force	5kN	10kN	25kN
Frame	Two columns structure, the actuator mounted on the top of machine; T-slot: M10		
Actuator	Max. force: ±5kN Rated pressure: 16Mpa	Max. force: ±10kN Rated pressure: 16Mpa	Max. force: ±25kN Rated pressure: 21Mpa
	Brand: WANCE Structure: Double outlet rod double action symmetrical structure Actuator stroke: 100mm Seal type: Clearance seal		
Servo valve	Brand: MOOG Model: G761 Flow rate: 10L/min Max. pressure: 31.5Mpa		Brand: MOOG Model: G761 Flow rate: 19L/ Max. pressure: 31.5Mpa
Displacement transducer	Brand: MTS Model: R Series Measurement range: 150mm Resolution: 1um		
Spoke-type load cell	±5Kn Sensitive: 1mV/V	±12.5kN Sensitive: 2mV/V	±25kN Sensitive: 2mV/V
	Brand: Interface Structure: Fatigue level spoke-type load cell Repeatability: ±0.02%FS Overload protection: 300%FS		
Alignment fixture (optional)	Adjust the alignment of the grips in eight directions to match the 25kN load cell.		
Hydraulic wedge grip (optional)	Vee jaws for round specimen: Φ5~Φ10mm; Φ10~Φ15mm Flat jaws for flat specimen: 0~8mm, width x height: 30×38mm Outside diameter: Φ126mm Height:163mm Unit weight: 9kg		
Intuitive, Centralized Controls	Control crosshead lifting and lowering Control hydraulic grips Control emergency stop and the movement of actuator		
Controller	Brand: German DOLI Model: EDC i50		
Computer	Brand: Lenovo, CPU: i7, RAM: 16G, HDD: 1T, display: 23.8″		
Maintenance tools	Allen wrench: 1.5-10mm, 1 set Allen wrench: 14mm, 1 set Allen wrench: 17mm, 1 set Allen wrench: 19mm, 1 set Phillips screwdriver and flat-head screwdriver: one for each Adjustable wrench: 10 inch, 1 set Needle nose pliers: 1 set (only for hydraulic grips)		

	Round head hook wrench: 45-50 2 pieces (only for hydraulic grips)
Flushing kit	Replace servo valve G761 when cleaning hydraulic power unit
Documents	Quality certificate, warranty card and manuals

Hydraulic power unit (10 L/min)

- Silent and compact design, servo motor drive, low noise; the speed of the servo motor can be set according to the flow requirements without wasting excess energy
- Touch screen control
- Able to be controlled by software
- Easy to open and maintain
- Wind cooling to guarantee long time tests with temperature below 55℃
- Safety protection: over-temperature, insufficient hydraulic oil, overpower, and test over, the motor will automatically turn off and alarm

Parameters

Model	HPU101
Rated flow rate(L/min)	10
Rated pressure (MPa)	16
Rated power(kW)	4
Tank volume(L)	25
Filter fineness(μm)	3
Noise(dB)	58
Net weight (kg)	150
Length (mm)	580
Width (mm)	580
Height (mm)	930

Accessories

Name	**Model:HPU101**	**QTY.**
Tank	Brand: WANCE Tank material: aluminum Tank volume:25L	1
Servo motor	Brand: FUJI Power:4kW	1
Oil pump	Brand: VOITH Flow rate:10L/min	1
Hydraulic service manifolds	Brand: WANCE Function: Integrated hydraulic components, filter, pressure control, pressure monitoring.	1

High pressure filter	Brand: LEEMIN Filter fineness:3μm	1
Cooler	Brand: HUCHENG Structure: fan cooler	1
Spare high pressure filter	Brand: LEEMIN	2

Hydraulic power unit (20 L/min, 40 L/min)

- Noise reduction design: motor and pump are completely immersed in hydraulic oil, so the noise was absorbed by oil. Special shock absorbing rubber is attached when the motor is mounted, to prevent vibration from transmitting to each other and reduce noise; fully enclosed structure once again reduces noise;
- Energy saving design: the variable displacement piston pump can automatically adjust the flow output according to the actual demand of the servo actuator, energy-saving and noise reduction;
- Touch screen control;
- Able to be controlled by software;
- Easy to open and maintain;
- Good cooling effect, can run for a long time and ensure that the oil temperature is controlled within 55℃;
- Wind cooling to grantee long time tests with temperature below 55℃;
- Safety protection: over-temperature, insufficient hydraulic oil, overpower, and test over, the motor will automatically turn off and alarm。

Parameters

Model	HPU201	HPU401
Rated flow rate(L/min)	20	40
Rated pressure (MPa)	21	21
Rated power(kW)	11	18.5
Tank volume(L)	200	200
Filter fineness(μm)	3	3
Noise(dB)	58	62
Net weight (kg)	340	350
Length (mm)	1370	1370
Width (mm)	780	780
Height (mm)	1155	1155

Accessories of HPU

Model	HPU201	HPU401	QTY.
Tank	Brand: WANCE Tank material: aluminum Tank volume:200L	Brand: WANCE Tank material: aluminum Tank volume:200L	1
Oil immersed motor	Brand: Italian HYLINCO Power:11kW	Brand: Italian HYLINCO Power:18.5kW	1
Oil Pump	Brand: REXROTH Flow rate:20L/min	Brand: REXROTH Flow rate:40L/min	1
Valve manifolds	Brand: WANC Function: Integrated hydraulic components, filter, pressure control, pressure monitoring.	Brand: WANCE Function: Integrated hydraulic components, filter, pressure control, pressure monitoring.	1
High pressure filter	Brand: LEEMIN Filter fineness:3μm	Brand: LEEMIN Filter fineness:3μm	1
Cooler	Brand: BAODE Structure: plate cooler	Brand: BAODE Structure: plate cooler	1
Spare high-pressure filter	Brand: LEEMIN The same as the original	Brand: LEEMIN The same as the original	2
Open-type cooling tower *	Brand: Guanglin Model: GL-10 Power consumption: 0.5kW Dimension: Φ980mm×1980mm Cable length: 10m	Brand: Guanglin Model: GL-10 Power consumption: 0.5kW Dimension: Φ980mm×1980mm Cable length: 10m	1
Chiller *	Brand: HAILINGKE Model: HL-3A Power:2.85kW Dimension:940(L)×555(W)×1060(H)mm Cable length: 10m	Brand: HAILINGKE Model: HL-5A Power:4.86kW Dimension:1045(L)×555(W)×1160(H)mm Cable length: 10m	1
Power cable	7m	7m	
Water pipe	10m	10m	
Hydraulic oil	200L, prepared by end user	200L, prepared by end user	
Sub-HPU	Especially for multiple machines. Each machine need one sub-HPU		1

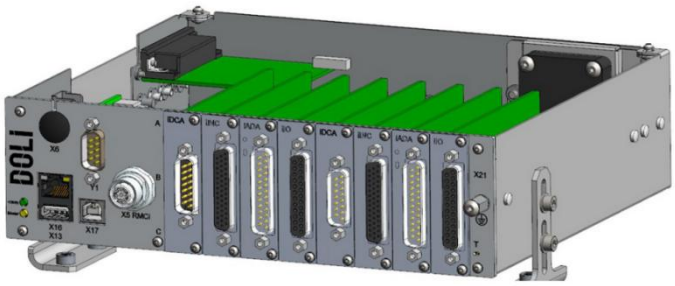
Remark: cooling tower or chiller, select one option only.

Controller

Model: EDC i50

Brand: Germany DOLI

Function:



- It has PIDF control, which can realize closed-loop control of force, displacement, deformation and other parameters, and the three control modes can be smoothly switched without disturbance. Automatic setting of initial PID parameters: dynamic response adaptive control system. The PID parameters can be automatically updated continuously, and the change of sample stiffness can be automatically compensated to ensure that the system runs in the best control state.
- Various test waveforms can be created: sine wave, triangular wave, square wave, oblique wave, sawtooth wave, random wave and various combination waves.
- Various test data can be collected: peak value, valley value, time, maximum value, minimum value, average value, and cycle data, fatigue data, etc. Data sampling and feedback frequency is not less than 10 kHz. The fully digital controller uses a VortexDX86 800 MHz processor for the control and data acquisition systems respectively. The control speed is 10 kHz, where 10 kHz is the control closed loop (position, load, strain) and 10 kHz is the stiffness control closed loop.
- With multiple parameter control: proportional, integral, differential (PID), delay (Lag), Feed forward (Feed) serial and parallel control.
- The signal resolution is up to ± 250,000 steps, and manual conversion is eliminated in the range of full scale use.
- It can be used independently: the test data is directly displayed on the EDC, the control instruction is input by the compound function key, and the basic data analysis and processing program installed in the EDC can output the tabular control and measurement data after connecting the printer, and there are a variety of embedded application software for users to choose.

Technical parameters

- Main processor: VortexDX86 800 MHz;
- Control frequency: 10kHz;
- PC communication interface: USB 2.0 Full speed or Ethernet 10/100Mbit;
- Encoder input channel: square wave max 32MHz, app.300kHz;
- SSI signal input: 300kHz;
- Digital input/output: 24V; Eight pcs;

- Serial sensor interface: COM1(built-in);
- Synchronous data acquisition and motion control: satisfactory;
- iSI bus expansion slot: 3;
- Load and strain resolution: ± 250,000 steps;
- Digital position, load and strain control, smooth transition between control modes without impact;
- The synchronous sampling and display data is 10kHz, enabling dynamic testing of trapezoidal, triangular and sinusoidal waves;
- Power amplifier with servo valve inside: 300mA.

Test software

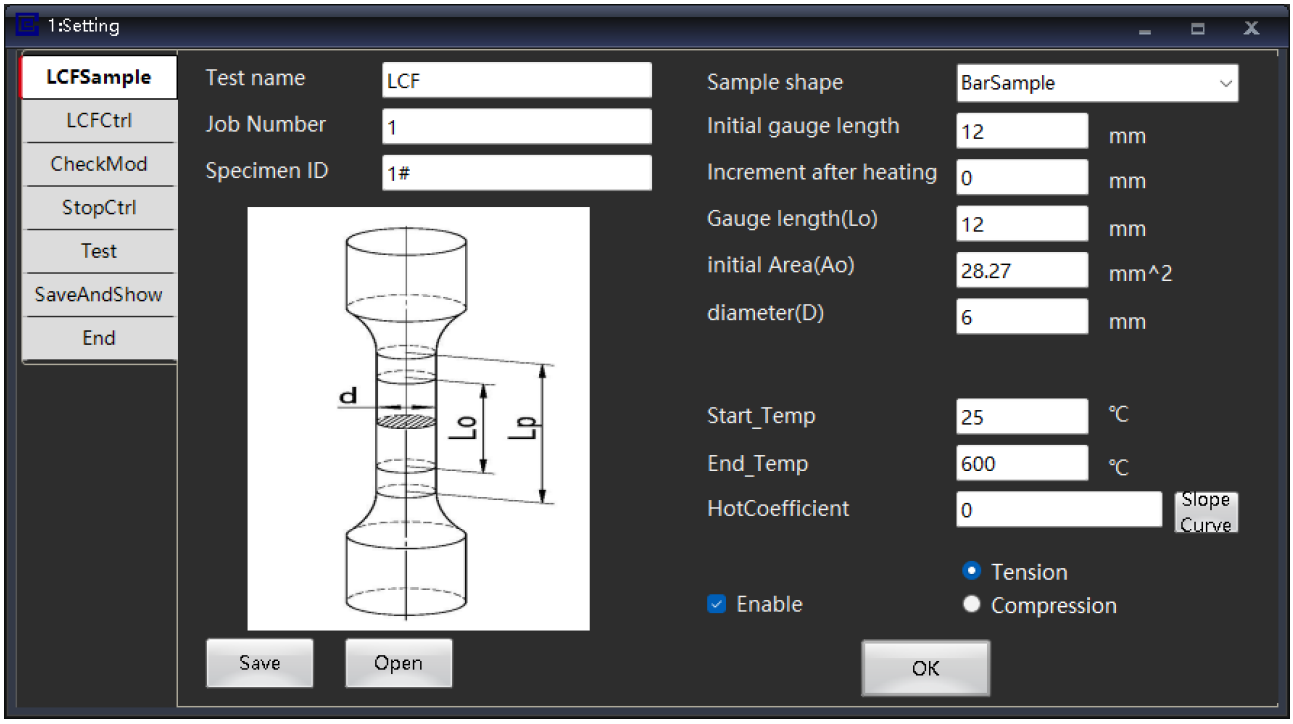
- TestCenterV1.0 is a multi-functional test software independently developed by WANCE. The software integrates various test standards and customer needs of various industries, and the test control and results are professionally reviewed by industry experts; the results are consistent with those of several internationally renowned fatigue testing machines.
- According to the test standard, built-in independent high-low cycle test plan, crack test plan, elastomer test plan, easy to operate.
- For environmental simulation working condition test, users can customize the test waveform, customize the test process, and coordinate the fatigue test with external equipment (such as high temperature furnace).
- For non-standard equipment, test plans and test reports can be customized according to user needs. Such as seismic support, shock absorber, multi-channel coordinated loading test.
- Software supports custom report templates, allowing multiple groups of test results to be exported and calculated (such as R resistance and fatigue life statistics reports).
- Multi-function curve function (stress/strain hysteresis curve, peak and valley value curve, cumulative curve) to meet customer needs.
- Support for experimenter permission Settings.
- Supports multi-channel coordination control.
- Support PLC communication, remote control of oil source, cooling device, etc.
- A variety of test control, can achieve dynamic, static, sweep frequency, superposition, displacement control force target and other operations.
- Multi-stage control of user-defined running parameters.
- Set the test conditions, and set the logical relationship of the test process in advance, such as the test end conditions, oil source stop conditions, etc.
- Single-window multi-curve interface, multi-window curve interface, convenient to observe the test status in the test.
- Curve coordinates can be freely defined, and real-time curves, peak-valley value curves, and crack growth rate curves of various data can be realized.

- Software supports data analysis such as fitting calculations/curves.
- Logs record every operation and error, helping you query error causes.
- Lifetime upgrade service.

The following software functions need supporting test accessories, such as extension meter, COD gauge, fixture, high temperature furnace, environmental box, etc.

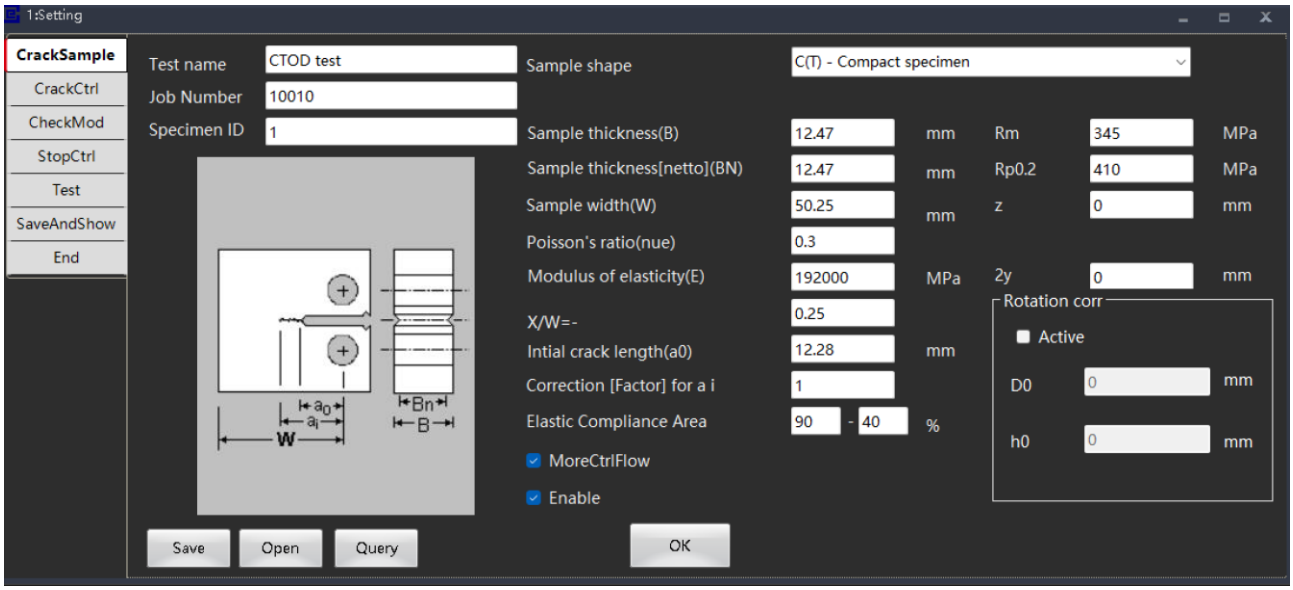
1) High-low cycle test module

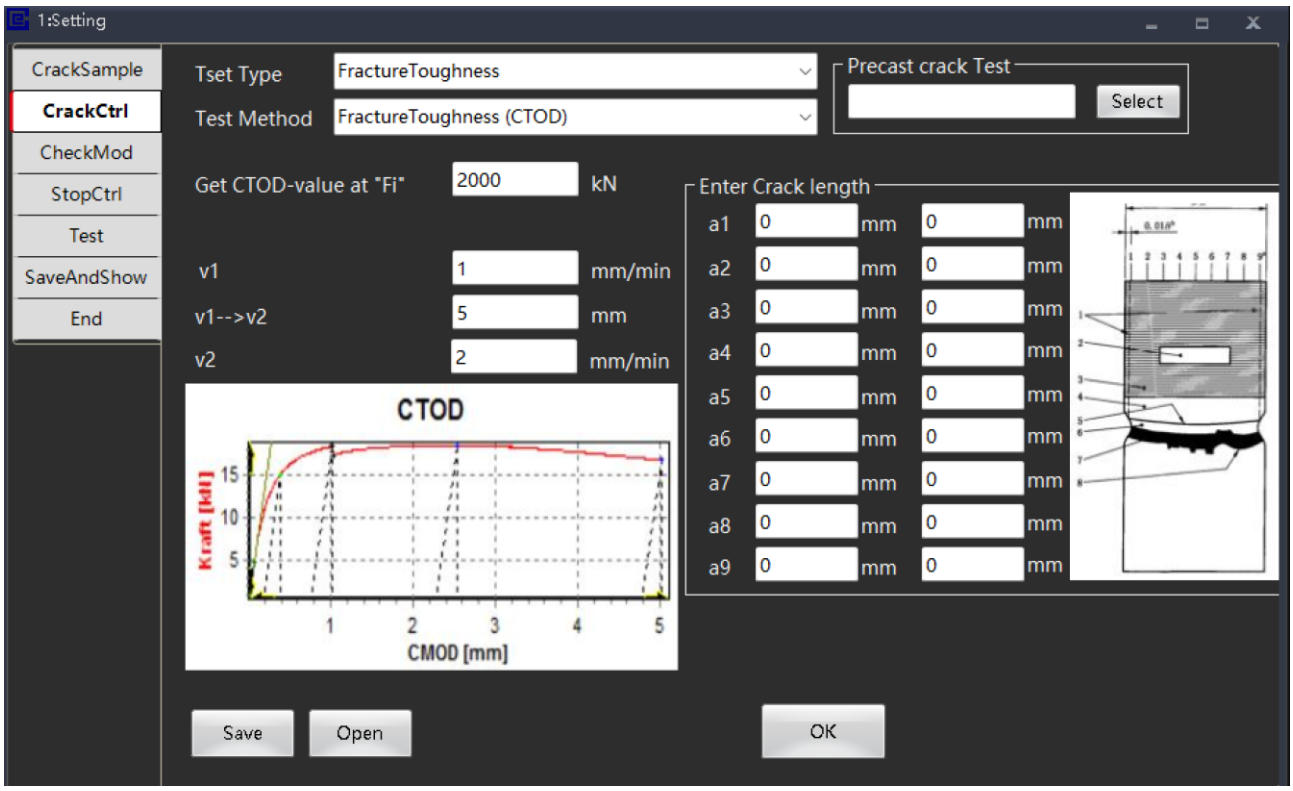
Meet the relevant standards of high-low cycle test (ISO 1099, ISO 12106, GBT 3075, GBT 5248, GBT 26077, ASTM E466, ASTM E606, etc.);

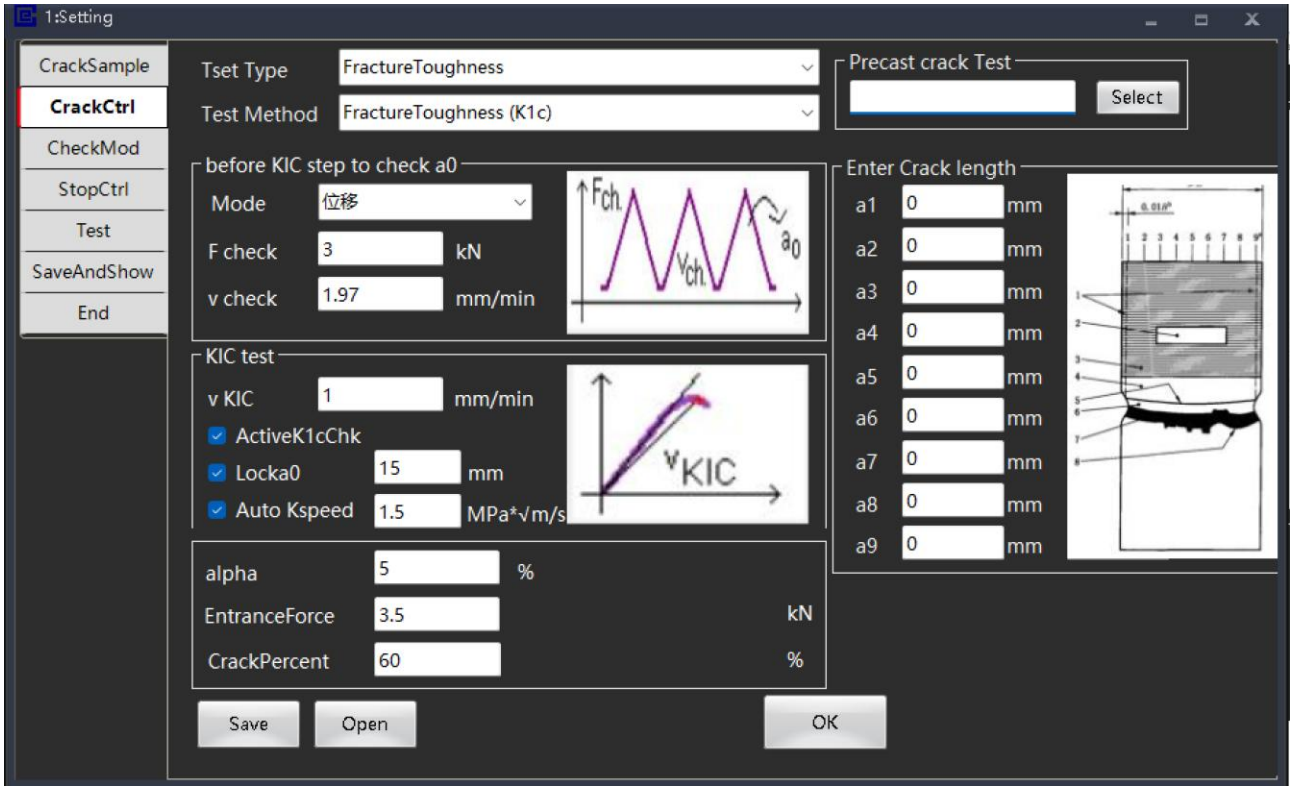


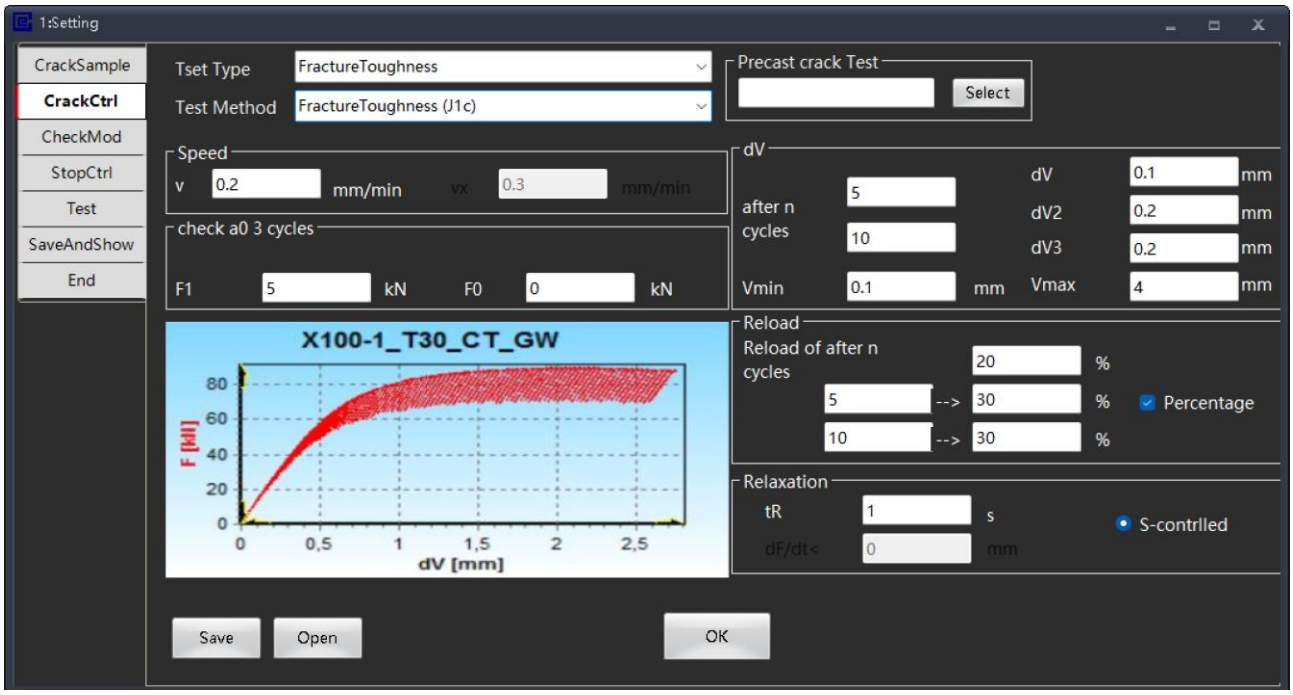
2) Fracture test module

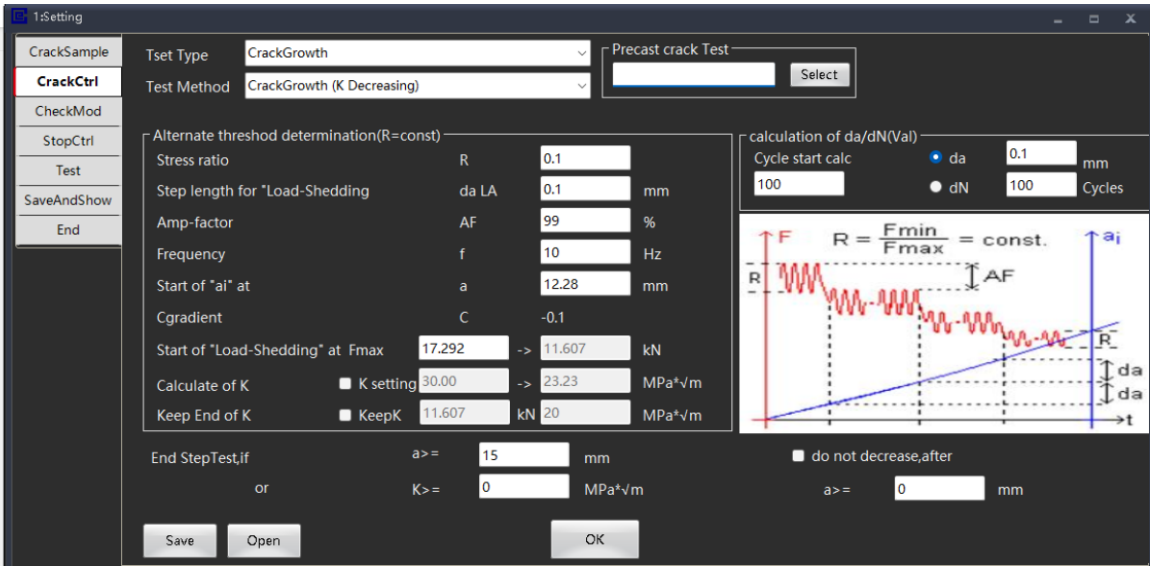
- Meet KIC test, CTOD test, JIC test, da/dN crack growth rate test related standards (ASTM E399, ASTM 1820, ISO12135, GB/T21143, etc.);
- Suitable for CT, SEB, MT and other sample shapes;
- Data result statistics module can generate R resistance curve;
- CTOD and JICC tests support multi-sample and single-sample methods.
- Crack growth test supports K-increasing, K-decreasing, and constant K.






1:Setting
CrackSample
CrackCtrl
CheckMod
StopCtrl
Test
SaveAndShow
End
Tset Type
FractureToughness
Test Method
FractureToughness (K1c)
Precast crack Test
Select
before KIC step to check a0
Mode
位移
F check
3
kN
v check
1.97
mm/min
Fch.
Vch.
a0
KIC test
v KIC
1
mm/min
ActiveK1cChk
Locka0
15
mm
Auto Kspeed
1.5
MPa*√m/s
vKIC
alpha
5
%
EntranceForce
3.5
kN
CrackPercent
60
%
Enter Crack length
a1 0 mm
a2 0 mm
a3 0 mm
a4 0 mm
a5 0 mm
a6 0 mm
a7 0 mm
a8 0 mm
a9 0 mm
Save
Open
OK


1:Setting
CrackSample
CrackCtrl
CheckMod
StopCtrl
Test
SaveAndShow
End
Tset Type
FractureToughness
Test Method
FractureToughness (J1c)
Precast crack Test
Select
Speed
v
0.2
mm/min
vx
0.3
mm/min
check a0 3 cycles
F1
5
kN
F0
0
kN
X100-1_T30_CT_GW
F [MI]
dV [mm]
dV
after n cycles
5
10
Vmin
0.1
mm
dV
0.1
mm
dV2
0.2
mm
dV3
0.2
mm
Vmax
4
mm
Reload
Reload of after n cycles
20
%
5 --> 30 %
10 --> 30 %
Percentage
Relaxation
tR
1
s
dF/dt<
0
mm
S-contrlled
Save
Open
OK

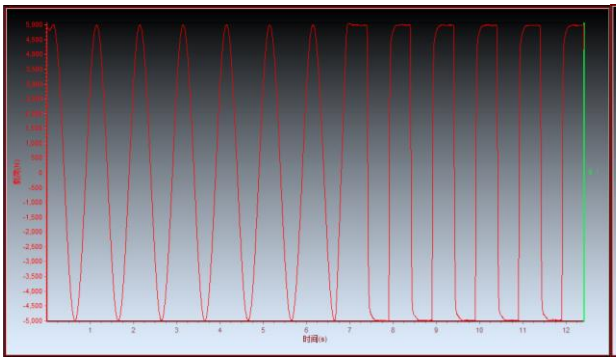


3) Elastomer test module

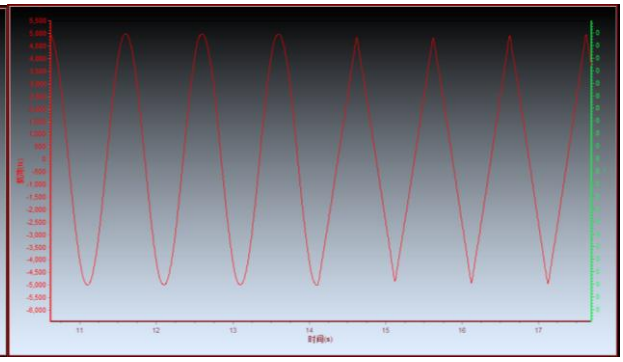
- Independent test program to improve customer operability;
- meet elastomer damping test standards;
- Variable amplitude, frequency conversion and other test actions can occur in the test;
- Full report on built-in elastomer.

4) Waveform combination action test

- Can be freely combined, there is no quantity limit;
- Free start test protection conditions to protect different waveforms;
- Can save the combination waveform setting scheme, easy to recall.



Sine wave + square wave



Sine wave + triangle wave

5) Custom waveform

Can input irregular waveform to realize simulation test, spectrum and other tests.