NB-T100 ultrasonic axial force tester

Bolt fasteners are a kind of key parts that are the most widely used in major equipment such as Aero-engine, gas turbine, ship and other major equipment. The initial pre-tightening state of bolts has a significant impact on the safety and reliability of the equipment.

Figure 1: Physical diagram of the measuring instrument

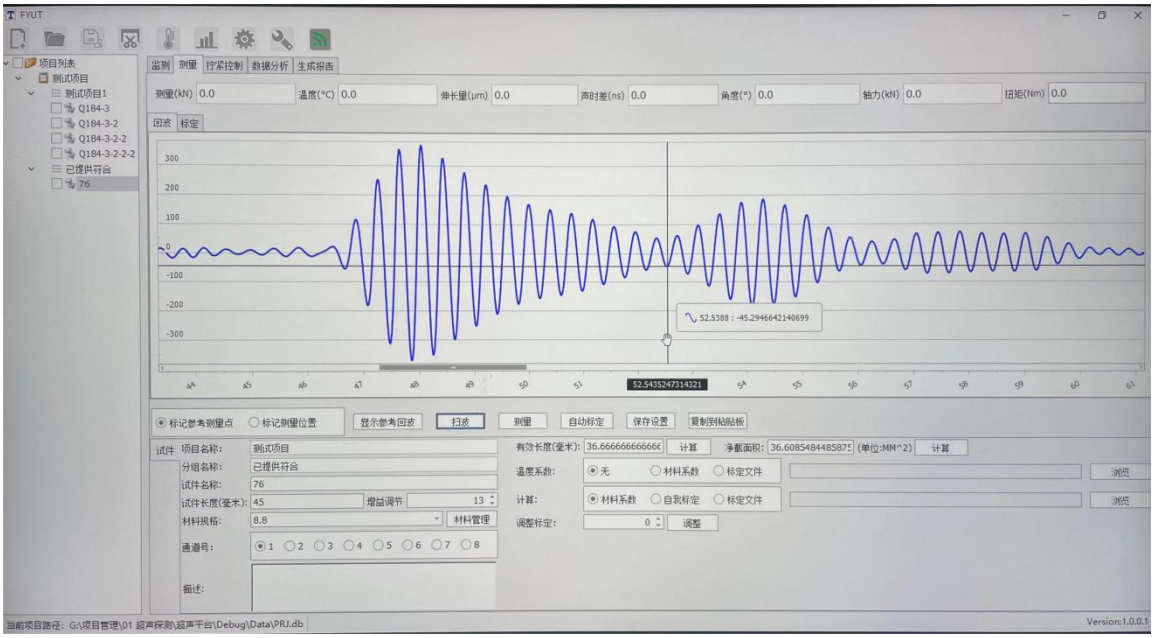


Figure 2: Main interface of the measurement system

Extreme stress state under high temperature conditions will lead to bolt deformation, fracture and loosening, which will seriously affect the safety of equipment. Bolt stress monitoring has become a weak link in the health monitoring of the connection system.

NB-T ultrasonic axial force measuring instrument introduction

NB-T is a bolt preload measuring instrument with independent intellectual property rights.

Since its inception, NB-T has been widely used in wind power, high-speed rail, automobile, aviation, aerospace and other fields. It has become the necessary equipment for the development of high-strength fastening system and the development of bolt assembly process. In the product development stage, ensure the design preload and monitor it in the product operation stage.

Operational principle:

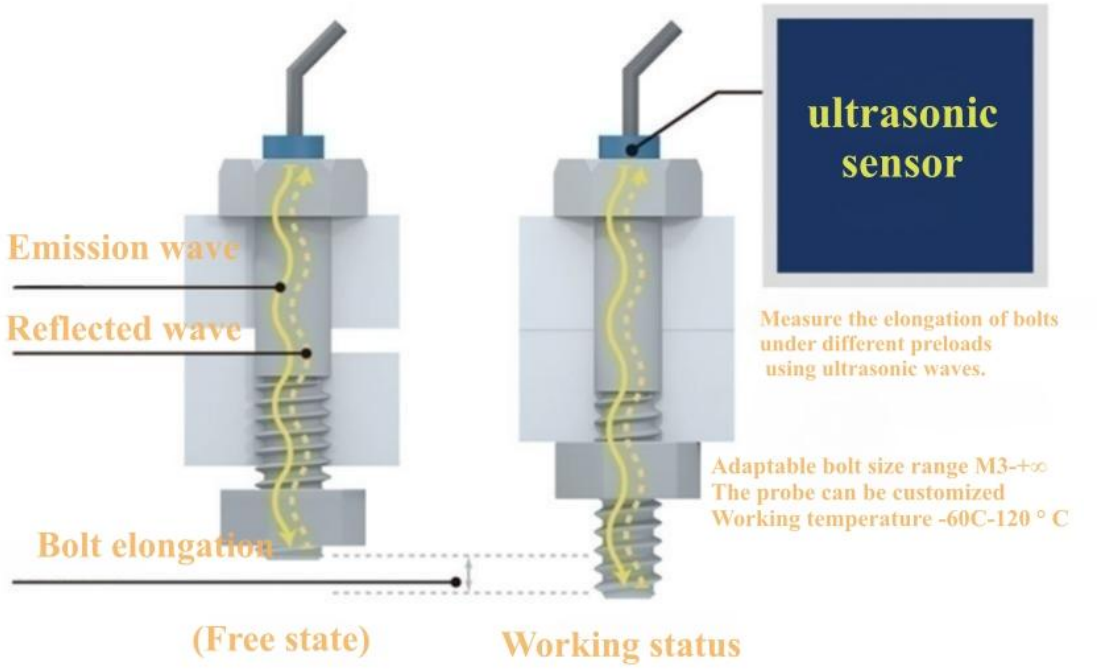
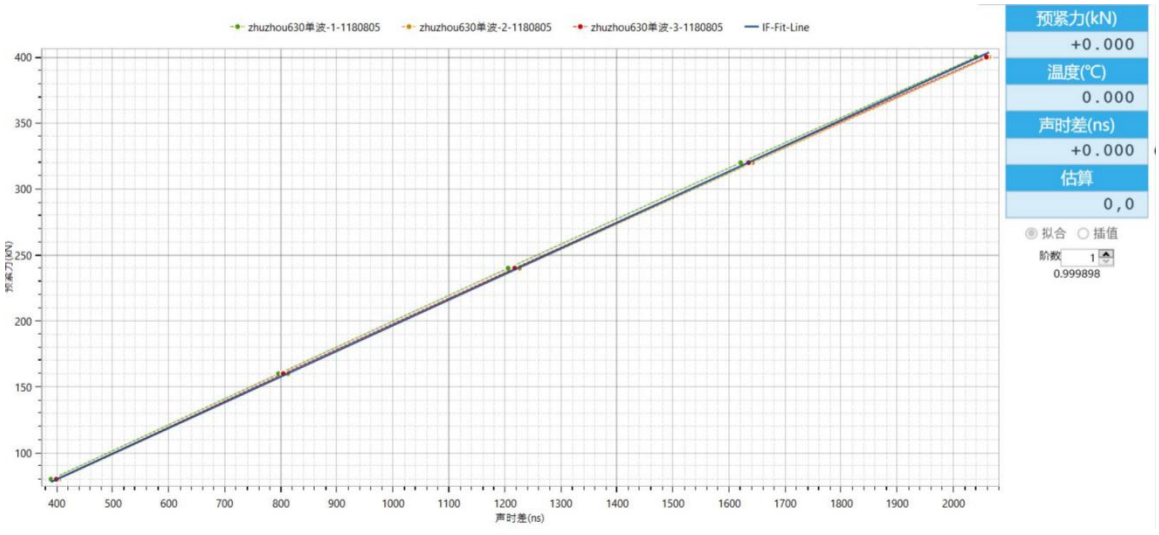


Figure 3: Ultrasonic sensor measures the bolt elongation



The ultrasonic wave measurement technology of bolt axial force is based on the principle of ultrasonic wave velocity changing with the change of stress state. When the ultrasonic wave travels through the bolt, its propagation velocity decreases with the increasing stress acting on the bolt, and they show a linear relationship. When the stress is applied to the bolt, the ultrasonic wave velocity change and the elongation of the bolt are superimposed, and the time consumed

for the ultrasonic wave to enter from one end of the bolt and return at the other end will increase. The stress measurement technology using ultrasonic wave is based on this principle, to measure the change of time by some means, and to build a quantitative relationship model of acoustic time-temperature-axial force. Thus the bolt shaft force.

When the bolt is in service state, the bolt shaft force will change due to the working load. The residual shaft force of the bolt is one of the important indicators to evaluate the effectiveness of thread fastening design.

By conducting precise sound timing and temperature measurement, this instrument achieves non-damage and high-precision measurement of bolt pretension. The instrument has high measurement accuracy and simple operation, and can be used in the detection and monitoring of fastener load in many fields such as aerospace, rail transit, energy and power.

Functional characteristics:

High-sensitivity and weak signal transduction and receiving technology;
Using high-performance filtering, echo intelligent capture, recognition, tracking and other technologies
Real-time measurement and uncalculation of pretension force and temperature can be completed automatically
The axial force and elongation of the fasteners can be measured dynamically or statically.
Powerful hardware and graphical software can make the user on the same equipment is very simple complete installation, acquisition, observation, storage and analysis of instantaneous signal operations such as input torque, thread torque, head support torque, clamp force, displacement, friction coefficient, ultrasonic axial force and stretching, angle, speed, fracture, yield point and axial force attenuation.

Main performance parameters (Can be customized):

- Number of channels: 4 / 8 / 16 / 32 / 64 channels are optional;
- Pulse emission voltage: 20-300V adjustable, 1V step;
- Emission pulse width: 50-1000ns continuous adjustable, step 10ns;
- Measuring frequency: 2 KHz;
- A / D Frequency and accuracy: 100 MHz, 8 bits;
- Gain: 110dB,0.1dB in total steps;
- Operating frequency: 0.5 MHz-25 MHz;
- Vertical linear error: 3%;
- Temperature measurement accuracy: 0.5°C
- Horizontal linear error: 1 ‰;
- Stress measurement error: <5%;
- Scope of application: coating type / patch type

Bolt adaptation

Test wide range:

Can test M3 above the bolt, super alloy, titanium alloy, stainless steel and other bolt materials

NB-T can be customized according to the customer's special process requirements and special construction methods

Fully support the friction coefficient tester, torque wrench with digital output, bending moment, shear force calibration table

Extensive compatibility:

Fully support the torque-turn Angle, axial force-friction coefficient, ultrasonic elongation axial force tightening experimental system widely used in China, Europe, the United States, Japan, South Korea and other countries.

Application industry: Automotive, aviation, aerospace, high-speed rail and new energy industries

Intimate service:

According to the complexity and diversity of the ultrasonic system used by the enterprise, the ultrasonic system supplier shall have the following on-site service capabilities:

- Determination of the bolt torsion and pull relationship;
- Determination of the bolt-set fastening process;
- Determination of the tensioning process of the flange group;
- Determination of the working load;
- Bolt calibration, testing, analysis and field technical support and other package of standard services;
- Customized development according to the needs of the enterprise, such as: customized probe, lengthened test cable length, customized coated intelligent bolt.