

Xtreme Bolting Services, Inc.



Bolt Load Verification Service

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BOLT LOAD VERIFICATION

Ultrasonic Bolt Load Verification from Xtreme Bolting Services eliminates the guesswork in proper clamping pressure. Ultrasonic Verification instantly provides accurate, digitized read-out of the true bolt load.

This system allows the technician to adjust and verify the correct specified clamping pressure to every bolt. Internal algorithms compensate for material and temperature changes and ensure a consistent load to each bolt. The simple operation and accurate calibration make it a must for dependable bolt load verification.

With accuracy rivaling that of strain-gages, our Ultrasonic Bolt Meter defines the state of the art in the measurement of the actual clamp load produced by tightening a threaded fastener. Using this method, we can measure fastener elongation or the resulting load, very accurately in fasteners of virtually any material from 1/2 inch to over 50 feet in length.



Lightweight Portable Measurement

Designed for mobility, this compact system weighs less than 5 pounds with its batteries in place. Its rugged design is suitable in any plant environment and has a continuous operating time of up to 30 hours from 4 'C' cell alkaline batteries, or can be run via line power of 100 - 240 VAC 50 to 60 Hz. Our portable unit features large, function keys for rapid set-up and ease of operation.

Instant and Accurate Verification

Xtreme Bolting's Ultrasonic Bolt Load Verification ensures fast and reliable data for accurate analysis and reporting. Xtreme Bolting offers the most accurate method of determining the stress or load on bolts possible. Our Ultrasonic Bolt Load Verification utilizes state-of-the-art monitoring equipment and the most skilled technicians in the field. We can provide you with instant digital readings that allow for the proper and precise adjustments to specified clamping pressure.

Norbar USM-3 Ultrasonic Bolt Meter

In some bolting applications, the variations in friction or joint geometry are such that measurement of applied torque alone can not obtain the required accuracy in controlling the actual clamping force produced by the threaded fastener. Or, it may be required that this clamping force be monitored over the service life of the fastener. In these situations, ultrasonic measurement of the clamping force has proven to be the most reliable and cost effective solution.





Measuring the Load

Ultrasonic measurement of clamping load is made possible by using a predictable decrease in the velocity of sound within the body of the fastener as the tensile load is increased. By introducing a sonic pulse at one end of the fastener, and accurately measuring the time required for the echo to return from the opposite end, the "ultrasonic length" of the fastener is determined. The change in this ultrasonic length, as the fastener is tightened, is used by the Norbar USM-3 System to calculate and display actual clamping force produced by the fastener. The USM-3 uses state of the art hardware and software to achieve these measurements with maximum automation, and minimizes the need for operator interpretation. Offering digital recordation and transmission of data, as well as calibrated analog signal output the USM provides a complete system for measurement, recordation, and control of fastener tension in the most demanding applications.

The measurement is achieved by determining the change in the transit time, of an ultrasonic shock wave along the length of the fastener as the fastener is tightened by any method. The on-board microcomputer automatically interprets this time measurement to display the elongation or load in the fastener. Through the use of high speed digital signal processing and automated diagnostics, the USM-3 minimizes the requirements for extensive operator training.

Ultrasonic measurement provides a very precise method of determining the elongation of a fastener due to tightening. This elongation is proportional to the load force exerted on the fastener. Load force on a fastener is of critical interest for many applications. Normally there is enough tolerance that the torque applied can be used to determine the fastener load. Torque would be a perfect method of measuring fastener load except for the uncertainty of the friction. Friction, both under the head, and in the threaded portion, absorbs the vast majority of the applied force. Thus, a small change in the friction causes a large change in the applied load. Ultrasonic measurement is not effected by friction. When the elongation of a fastener is measured, the stress in the fastener is being measured, which is directly proportional to load.

Norbar has a good description of how Ultrasonic Bolt Load Verification works starting at the following website location: <http://www.norbar-usa.com/USMInfo/require.html>.



PHYSICAL DESCRIPTION

Size: 9.4" W X 7.1" H X 2.1" D
(239mm x 180mm x 53mm)

Weight: 4.95 lbs (2.25 Kg) with batteries.

Keypad: Membrane switch with tactile keys.

Display: 1/4 VGA 320x240 pixels with EL Back-light
Viewable area 3.9" x 3"
(99.8mm x 76.2mm)

Case: Sealed Aluminum.

Battery Power 4 "C" Cells

Optional Line power: 100 - 240 VAC 50 to 60 Hz

Operating Temperature: 32°F to 122°F / 0 to 50°C

Automatic Compensation for Temperature Of Fastener

Calibration: Automatic verification of system calibration
Field verification of bolt material calibration constants

Data Output RS232 I/O
USB converter available.
0 to 10 V Analog Output

ULTRASONIC SPECIFICATIONS

Resolution: 0.00001 inch (0.0001mm)

General: Pitch catch, pulse echo measurement modes.
Automatic peak signal and phase selection.

Pulser: 160 volt push / pull tone burst
Selectable burst width.
Selectable frequencies 1, 2.25, 5, 7.5, 10 MHz.

Receiver: Low noise preamplifier.
Automatic gain control.
Automatic waveform and signal diagnostic display

Timing: Resolution to 0.1nsecs

Memory: 32 megabit non-volatile.
8000 bolts, 40,000 measurements.

