Introduction

The following series of web pages presents an overview of ultrasonic measurement of fasteners. 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.

There are many difficulties inherent in good ultrasonic technique. Hopefully this report will mention all of them and provide an understanding of good measurement practice.

The ASTM has a Standard Practice called Measuring the Change in Length of Fasteners Using the Ultrasonic Pulse Echo Technique. (ASTM E1685-95). This procedure is highly recommended and provides additional details of this process not covered in these pages.

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