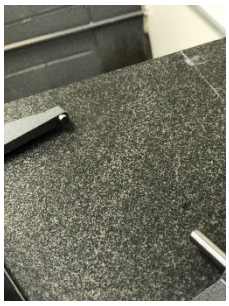
The Micrometer Setting Standard: A very special, yet misunderstood precision instrument!

By Patrick Jester, JD – Compliance Manager, Michelli Weighing & Measurement

Outside Diameter Micrometers, (O.D. Mics) are precision measurement instruments used to measure the outside diameter or width of objects. O.D. Mics are commonly used in manufacturing and machining facilities to ensure that component parts are machined to precise specifications and tolerances.

O.D. Mics come in many sizes, usually in 1-inch increments from Zero to 80 inches, and metric sizes as well. O.D. Mics, beginning at 1 to 2-inch size are supplied with a device known as a Micrometer Setting Standard. (Standard) A Standard is a precision, single point, length measurement instrument specifically designed so the O.D. Mic operator can set it (the O.D. Mic) to zero.

Why is this important?

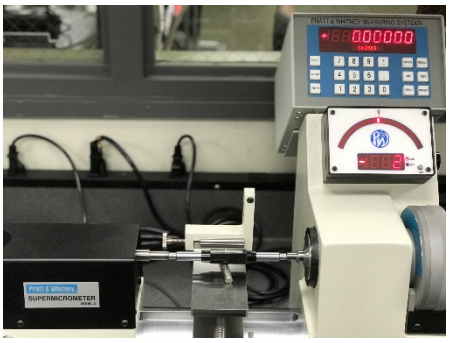


While metals are physically classified as solids, they have elastic properties that cause them to expand and contract with temperature changes. Most O.D. Mics have two flat metallic surfaces called measuring faces that are brought against and wrung to the opposing surfaces of the item being measured. One of the measuring faces is on the end of the part called the spindle, which screws in and out opening the jaw of the O.D. Mic. The other Measuring Face is on a surface called the anvil which is stationary facing the spindle. Depending on the severity of temperature change, an O.D. Mic can change in length by tens of micro-inches. Therefore, a Standard is required to adjust an O.D. Mic returning it to zero.

An O.D. Mic is adjusted by placing the appropriate size Standard, corresponding to the zero of the O.D. Mic between the spindle flat and the anvil flat, then running the spindle closed on the flat surfaces of the Standard. If the zero indication on the Thimble of the O.D. Mic lands on the zero indication of the Sleeve Scale, zero is set. If the zero on the Thimble does not align with that of the Sleeve Scale, the Sleeve Scale must be realigned using a tool called a spanner wrench supplied with the O.D. Mic.

Misunderstanding the Standard

Many end users of O.D. Mics misunderstand what these standards truly are. One such misunderstanding is the belief that an O.D. Mic doesn't need to be calibrated by a metrology laboratory if the user has a Standard that is certified. The problem with this theory is that an O.D. Mic is precision treaded and measures by increasing and decreasing graduations of up to 10 micro-inch divisions. While a standard may be a certified with accuracies exceeding that of the O.D. Mic, it is only certified for its single physical length. A Standard cannot characterize



any of the other calibration factors. An O.D. Mic is calibrated by measurement of its linearity, flatness and parallelism, as well as the zero setting by inter-comparison with various high-precision calibration standards that are themselves certified and metrologically traceable. These factors are difficult, if not impossible to measure without the use of high-precision, specialized instruments used by metrology laboratories.

In conclusion, an O.D. Mic is a precision measurement device which should be calibrated often. A micrometer setting standard is only used to set Zero prior to using a micrometer. It is not the proper tool for calibration of an O.D. Mic. Proper calibration of an O.D. Mic and its Setting Standard should be performed by a metrology laboratory, under controlled conditions, using a variety of certified calibration standards. These certified standards should be traceable to SI Units through a National Metrological Institute (NMI), such as the National Institute of Standards and Technology (NIST).

For more information on the proper use, care and calibration of your precision measurement instruments, contact one of our weighing and measurement professionals at Michelli Weighing & Measurement, or visit us online at www.Michelli.com today!