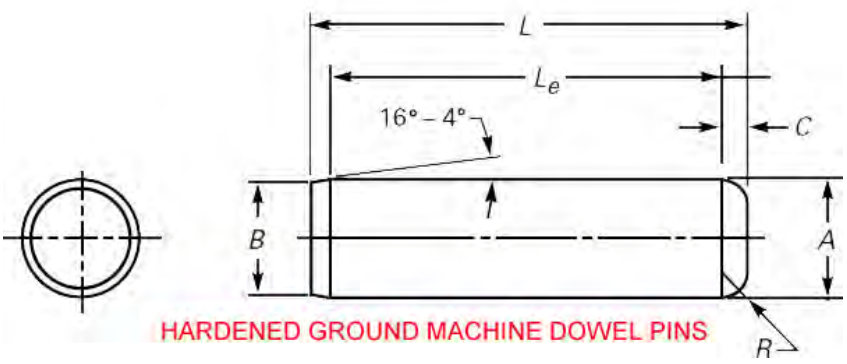
Measuring Dowel Pins isn't as Easy as You Might Think

by Larry Borowski

We've recently had several calls requesting help on how to properly measure dowel pins. Requests like these usually stem from some type of measurement discrepancy between pin manufacturers, distributors, and end users. Others understand the complexity, and are seeking out a qualified inspection lab that can perform the proper measurements.

At a quick glance most people assume that a dowel pin should be very easy to inspect because the basic dimensions are a simple diameter and a simple length. This assumption is in error because of the fact that the standard total tolerance on dowel pins is only .0002 inches (two "tenths" or two ten thousanths of an inch). Good measuring practice requires that you use a measuring instrument having a resolution that can read



HARDENED GROUND MACHINE DOWEL PINS

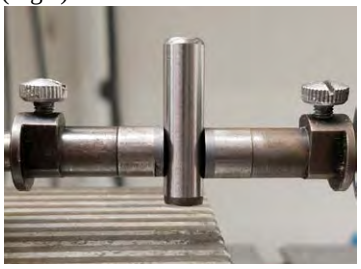
10 times better than the tolerance of the part being measured. In other words, since dowel pins have a .0002" tolerance, the instrument used to measure that precise should have a resolution of .000020" (Twenty millionths of an inch). This practice is suggested so that you have enough increments to be able to clearly determine if the measurement is inside or outside of the required specification.

The most practical instrument set up to measure dowel pins accurately is what is called a Bench Micrometer, ULM (Universal Linear Measurement) Machine, Supermic, etc. They go by many names, but are similar enough where resolution can be adjusted between .000001" and .000020".

You cannot use a standard micrometer, caliper, or digital indicator to measure dowel pins accurately. The most practical instrument set up to measure dowel pins accurately is what is called a Bench Micrometer, ULM (Universal Linear Measurement) Machine(Fig 1-2), Supermic, etc. They go by many names, but are similar enough where resolution can be adjusted between .000001" and .000020"(Fig 3). This equipment normally also has the ability to adjust anvil pressure, which helps with repeatability when measuring down to these tight tolerances. Measuring surfaces are flat contact points where parallelism can be controlled and monitored as necessary. Most equipment like this can also be fitted with a data export cable so that readings can be sent directly into a spreadsheet or other similar database program. This equipment can cost many thousands of dollars depending on options and accessories.

(Fig 1)

(Fig 2)



(Fig 3)

Another important consideration when measuring with these close tolerances is the environment in which the measurements are made. If a supplier and purchaser of dowel pins measure the same pins with the same instruments, but do the measurements in rooms differing in temperature of 10 degrees or more, they may obtain different values. For this reason it is recommended that all suppliers and purchasers of dowel pins should make acceptance measurements of dowel pin diameters in calibration environments. That is in a room having a temperature of 68 degrees with a maximum of 50% relative humidity. The pins should be left in this area for 2 to 24 hrs so that they can stabilize or "normalize" to that temperature prior to measurement.

This seems like a lot of expense and trouble to measure a simple dowel pin, but the facts remain that in products having a total tolerance of only .0002 inches, this kind of care is required to obtain accurate measurements that will correlate between two or more parties.

It appears that many suppliers of dowel pins have not taken this kind of care in measuring these products in the past. To measure dowel pins accurately and repeatability this is the kind of equipment and procedures which need to be used. As long as instruments of insufficient resolution without pressure control are used in uncontrolled environments, dowel pin measurement controversies will continue to arise for suppliers.