Calibration Cycles Can Be Based on Time or Use

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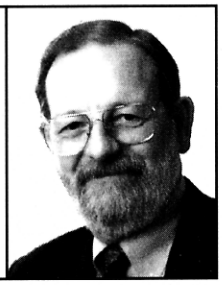

Questions are frequently asked regarding how often gages and testing instruments should be calibrated. Most users assume there is a standard somewhere that spells out how often each type of commonly used inspection equipment should be calibrated. That is not the case, as no such guidance exists.

Quality system guidelines, such as those of ISO 9000 and QS 9000, state that a calibration frequency must be established for all measuring equipment, but the determination of what those frequencies are is left to the judgement of the user.

The fundamental concept behind establishing a calibration frequency for any given instrument is that it should be of such length or duration that the instrument is never found to be out of specification. The reason for this is; if an instrument is found to be out of specification when it is calibrated, some amount of product inspected using that particular instrument may have been wrongfully accepted or rejected. Some quality systems require the user to track down and reinspect all product inspected since the instrument's previous calibration since there is no way of determining when the instrument became nonconforming.

Establishing Your Cycles

Calibration cycles can be set based on an elapsed time or on the number of times used. As an example, you can establish the rule, as many do, that all gages and instruments will be calibrated on a one-year cycle. This is obviously an elapsed time calibration cycle. Alternatively, you can establish the rule that instruments are to be calibrated after a specified number of uses. Nothing states that only one of these methods can be used within a given system. Some instruments' calibration cycles can be set based on elapsed time and others can be established based on use.

The easiest method for setting calibration frequency is to base it on elapsed time. However, this can make the total cost of calibration higher than if use is adopted as the basis for setting calibration cycles. This is because most activities eventually follow the 80/20 rule. In a quality assurance system this means that 80% of a company's inspection will be performed with 20% of the instruments owned by the company. This indicates that the 20% of most frequently used instruments should be calibrated more frequently than the less frequently used 80%. If all instruments are calibrated on the same elapsed time basis, it stands to reason that the 20% of the instruments most frequently used may be calibrated too infrequently to be safe and/or the 80% less frequently used may be calibrated much more frequently than is necessary to maintain the instruments' integrity.

All thorough quality systems require each instrument to have a unique identification number that should be affixed to the instrument. Each instrument must also have a tag either on the instrument or its storage container that identifies "last calibration" and "next calibration." As stated earlier, presently this is usually a date, but it can be a number of uses. Take, for instance, a threaded GO ring gage. Time does not wear them; usage wears them. Therefore, usage is the most practical way to establish their calibration cycle. Keeping track of elapsed time is easier than keeping track of usage, but if you agree that wear and not time effects an instrument's calibration, then tracking usage makes more sense.

Some companies have tags on a drawer or container where the gage stays when it is not in use. After each use the number of parts inspected is listed on the gage's tag. The tag also has on it the calibration cycle for that particular gage. If, for instance, the calibration cycle for a ring gage is set at 100 pieces, every time that gage is used the number of pieces inspected is added to the tag and when the number of pieces inspected reaches or exceeds 100 pieces, the gage is calibrated.

#RG-2520-GO3A-03
1/4-20 3A GO Ring Gage

Last Calibration: 01/07/99

Calibrate after 100 uses:

Uses:	Total Uses:
24	24
12	36
10	46

This kind of system will have the 20% most frequently used gages calibrated maybe four or five times per year and the 80% that are less frequently used may only be calibrated every two to three years. For many instruments used in the fastener industry, calibration cycles established based on usage are actually more logical than those based strictly on elapsed time. In quality systems where calibration cycles are set based on elapsed time it is not uncommon for calibration services to be instructed to calibrate instruments that were not used since their last calibration. Even though this makes no sense, it must be done if that is the requirement of the quality system's documentation.

Optimization

To optimize calibration cycles, the user must refine them over time. If a gage is ever found to be out of specification when it is calibrated, its cycle should be shortened to assure that it will not go out of specification before its next scheduled calibration. If, over time, a gage stays within tolerance over many, many cycles, it is reasonable to extend the cycle time in the future. That extension can be either time or uses depending on how the calibration cycle has been originally set up.

It is perfectly acceptable for some instruments, such as personal calipers and micrometers, that are used daily, to be set up based on time and other instruments such as ring and plug gages setup on use. The important thing is that the user must follow the calibration plan established in their quality assurance documentation.

I believe the best, most cost efficient calibration systems use a mixture of elapsed time and usage cycles depending on the instrument. It takes time to establish a calibration system with optimum calibration cycles, but the cost savings over a period of years can be substantial. **FTI**

__Greenslade & Company, Inc.__ is a supplier of gages, tooling and equipment. __Joe Greenslade__ is a regular contributor to this magazine. He has been active in the fastener industry since 1970 and has held positions with major fastener makers.