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Choosing a Calibration Interval

By John Ulrich
Director of Metrology

2845 Tobey Drive | Indianapolis, IN 46219
TE 317.487.2378 | FAX 317.487.2375 | FREE 888.701.2378
www.tangentlabs.com

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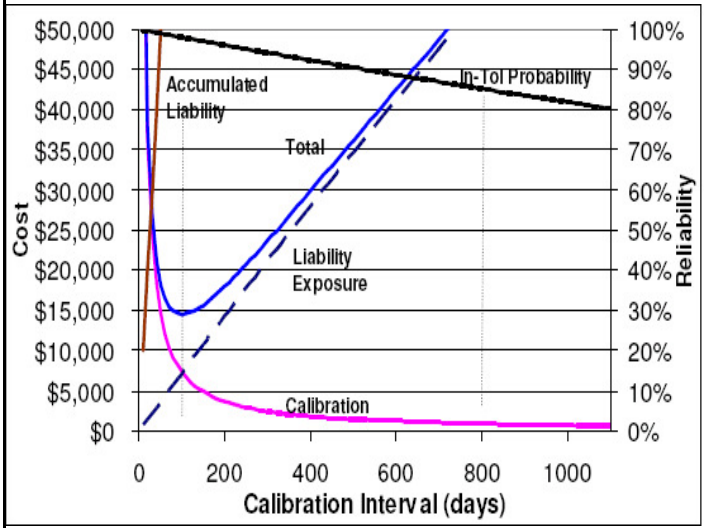

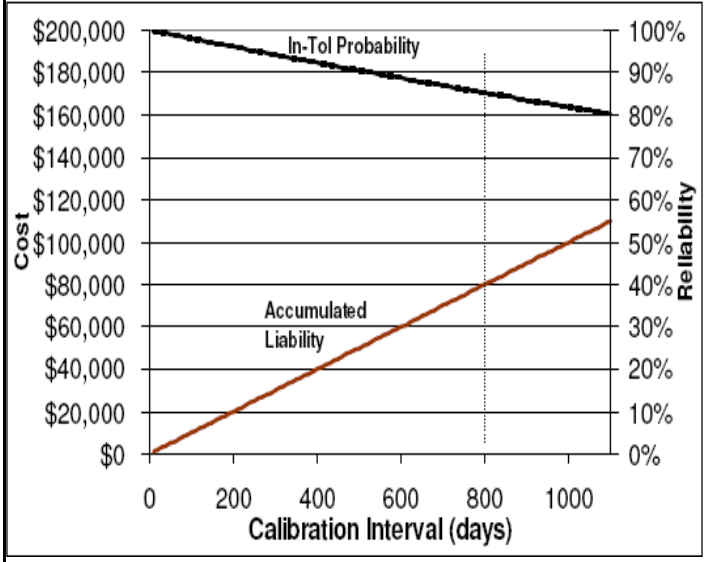

Calibration Intermission

In a perfect world where someone had unlimited resources, every piece of equipment would be calibrated once a day. All functions, all ranges would be checked and you would be able to see if a gage was drifting before it failed. Anyone who works in quality knows that a failed gage can mean hours and hours of paperwork doing a reverse traceability analysis to see what products and processes could have been adversely affected. This slows down current processes and creates extra work, both of which are undesirable in an already busy workplace.

While you can't prevent a gage from failing calibration, you can however change the interval you apply to each gage. On one hand you don't want to pay for excessive unnecessary calibrations, but on the other you don't want to let your interval get stretched to the point where your gage can possibly fail. The balance you find can sometimes take a while to surface. The word used in metrology to get the most out of each calibration is called calibration interval "optimization"…In other words, choosing the longest possible interval without fear of a failed calibration.

Calibration is Insurance

If we ask most people who deal with calibration what the typical interval for gages should be, you'll probably hear them say '1 year'. Although this is a very popular calibration interval, there is absolutely no good reason for it. It becomes a typical interval because most facilities only want to pay for calibration once a year and it's easy to include it as part of a budget proposal. After all, calibration is simply a form of periodic insurance that a gage is operating within specified tolerances. If you have enough calibration history with a gage, it can also be a true characterization of the

actual performance not just based on manufacturer's tolerances. If manufacturers of these instruments were interested in helping you achieve maximum optimization, they would provide you with far more published intervals and accuracies. Usually the accuracy published isn't even associated with a specified interval. So how are you to choose what interval to apply? The answer lies in another word used frequently in metrology, 'reliability'.

Reliability

NCSL's RP-1 document defines reliability as the probability that the unit under test and measurement standard will remain in-tolerance throughout the established interval. There are many detailed scientific methods to evaluate reliability. Here we will look at the basics.

In any manufacturing or process risk analysis, there is always a battle of two goals…one goal is that quality doesn't suffer, and the other goal is to minimize calibration and testing costs. These are seemingly direct conflict with one another. If your client specifies how often they want your equipment calibrated and it is part of the contract you devise, then there is no analysis needed. But for the majority of quality and metrology people, they have to rely on their knowledge of each of their gages and how they typically perform to choose an interval. For instance, you probably don't have the same interval for your scales as you do your mass sets. Why? Because as long as the mass is handled with gloves and is cleaned and kept in a tempered climate, it probably isn't going to change over a period of some years. However, the scale uses mechanical and electrical components that wear down and can change over time. Same goes for any gage that depends on the end user, the climate it's kept in, the leads used, and how the unit is handled. These are all things that affect the reliability. Even in the dimensional world things like gage blocks, plugs, rings, squares, surface plates all get used in sometimes less than optimal environments or for excessive testing which lends them to become less reliable over time. You have to choose an interval that takes this into account. Sometimes calibrating a gage more frequently in the beginning is the best way to prove its reliability. With more data and history, you can show through a statistical analysis how the gage is trending and make the argument for longer intervals. Without that data, it's kind of up in the air as to how you arrived at your number. As probability trends downward due to longer intervals, the cost associated with a future failed condition trends upward. One way to combat this is through periodic 'in-service' checks.

Check it Out

A great way to help provide assurance and reliability during a long calibration interval is to perform these checks regularly. While it's not an A2LA accredited calibration, an in-service check can simply be weighing a couple of masses on a scale right before it's used. Anything you can use to check an instrument on a schedule between calibrations is acceptable. The goal is to keep record of the checks and when you start to see a drifting trend, you can catch it before it becomes an out of tolerance condition. When drift is seen, the unit should be immediately sent in for calibration. This prevents its use on products and processes that can lead to unintended loss of time and money.