How Often Should I Recalibrate My Accelerometer?

By Mike Dillon, TMS Calibration Team Leader

We are frequently asked this question either in phone conversations or online discussion forums. For what seems like a simple question, we have both a simple, if unsatisfying answer ("It depends"), and a more thorough analysis upon what 'it depends'. In short, how often you recalibrate an accelerometer depends on balancing the risk of not calibrating against the cost of calibrating.

The Costs of Recalibration

First, the cost of recalibration is relatively low for an organization that invests in an automated calibration system. These systems can perform a globally standardized calibration in as little as 60 seconds, apply pass/fail criteria, automatically store the data, and generate a report.

Organizations that perform 60 and over calibrations per year frequently justify the investment in a calibration system, and those with fewer can acquire outsourced services from an accredited laboratory. In either case, the cost for doing so is justified by the risk of not doing so.

The Risk of Not Calibrating

When we think of risk, we think of it first as defining the risk, then assessing the risk and finally risk management.

Define the Risk

First we define what the hypothetical risk event is: In this case, we will say – "My accelerometer was damaged when it fell from the table, and the damage is such that it will adversely affect the sensing of the data I collect with it."

Risk Assessment

Risk is assessed in two dimensions: the probability of an event occurring and the impact of the event if it does occur.
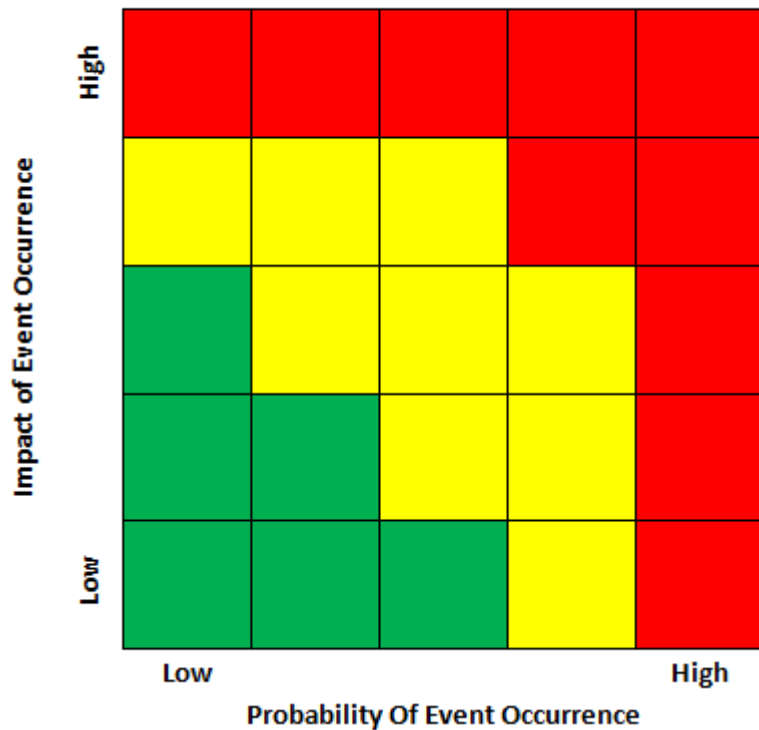
Probability of the Risk Event

First we ask – what is the percent probability that the accelerometer was damaged? To answer this absolutely, we would drop an accelerometer from that height many times and calibrate it each time to see if it was damaged. Perhaps it is not too practical to know this absolutely.

Impact of the Risk Event

What we may know better (at least qualitatively, not quantitatively) is the impact on our operations if the accelerometer is damaged in the way we described in the risk event definition. This depends greatly on the next use of the sensor. Will it be used to monitor or test a newly modified product? If monitoring a product, do we rely upon the data to provide human safety? If testing, will the data be used to make design changes that are not easily reversed? These are high-impact situations. A low-impact situation would be if I were to use it for my daughter's 6th grade science project. Often, this risk is plotted visually on a classic '5x5' matrix to visualize it.

Risk Management

Now that the risk event has been defined and evaluated (either quantitatively or qualitatively), we can evaluate our options for managing the risk.

Many options are available, but the most obvious option in our case (a damaged accelerometer) is to either calibrate the sensor or ignore the fact that it fell from the table. Calibrating an accelerometer on a modern calibration system can be performed in less than 60 seconds.

This 60-second investment eliminates any of the risk associated with the accelerometer, and is typically considered a small investment when held next to the costs discussed earlier involving safety and high-value test articles.

In addition, the total risk associated with not recalibrating is cumulative with other risk events. One commonly considered risk event is "My test results may be called into question because my instrumentation was not recalibrated in the last 12 months. This may force the organization to retake the test data."

So How Often Should I Recalibrate?

Once again, it depends upon the evaluation of the probability and impact of all the risk events to consider. While a periodic routine of every 12 months may seem reasonable, it might be reckless to ignore a particular risk event for that period of time.