



## Issue 31: Bud's Take on Calibration

I was recently walking a shop floor and the operations manager was pointing out all the updates and modifications they recently had completed. The pride and joy was clearly the lathe they acquired. I was told that no expense was spared to cut a new section of concrete, buffered from surrounding vibrations and balanced, a thing of beauty.



**Figure 1: Example of Lathe**

I noticed that all the tools also appeared to be in great condition. I then looked a little closer and noticed that the tools were overdue for calibration. My mind began to race as



**Figure 2: Tool set with calibration stickers.**

I pondered how I bring this up without sounding mean, but it needed to be said, "I know your lathe will make parts exactly how you set it up, but how do you know your set-up is correct with uncalibrated tools?"

### **TS16949 & ISO 9001**

If you are a TS16949 or ISO 9001 company I am sure you are familiar with section 7.6 Control of monitoring and measuring equipment. For those who are not, it states that *the organization shall determine the monitoring and measurement to be undertaken and the monitoring and measuring equipment needed to provide evidence of conformity of product to determine requirements.*

It goes on to say *the organization shall establish processes to ensure that the monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements.*

Both of these requirements are directly out of the ISO/TS16949 manual. A key to these two statements is the word "shall." In this technical specification the word "shall" indicated a direct requirement.

Just for clarification, this does not mean every piece of equipment needs to be calibrated. It is giving the organization the onus to determine what needs to be calibrated. Once determined it gives clear requirements that a process to maintain and track must be in place.

### **Other Certifications:**

If you look at other certifications that exist, they all have a calibration requirement. The EASA Accreditation program and the major bearing manufacturers that offer a certificate program or training stress the importance of calibration.

In the bearing world we deal with thousandths of an inch (or mm.) In failure analysis, one of the first questions application engineers are trained to ask is what were your shaft and housing fits? Followed by were your measuring tools calibrated?

If tools are not calibrated, it becomes impossible to discuss true measurements, we are now discussing opinions of a measurement. Rear Admiral Grace Hopper sums up this issue, "One accurate measurement is worth a thousand expert opinions."

### **An Inch is Exactly 25.4 mm?**

The answer is not always. Prior to 1930 the inch was 25.4000508 mm at 68°F. In 1930 the British Standards adopted the "exactly 25.4" and in 1933 the American Standard adopted this "exactly 25.4" standard. I found it interesting that the United States has not adopted this in relation to survey miles. Therefore, every surveyed mile is off by approximately 1/8 inch. These fun facts can be found in the National Bureau of Standards.

### **Calibration is Important:**

Calibration has been around since the early days of trade; it was a rational way of determining value of what you are trading based on weight or length. Imagine if you were a trader of gold or silver and your buyers scale was off by 1/100 of an ounce. Over time this small amount could result in a large sum of money.

Translate this to our equipment. Each component has a required tolerance. When you start stacking tolerances, one or two components being off "just a little" can result in equipment failure and extended down time.

### **Conclusion:**

This articles objective was to build an understanding of how important calibration is. The accuracy and capabilities of our measuring devices has no validity unless the tools are calibrated. It is important that you determine which tools need to be calibrated and set up a system that ensures these tools are maintained and kept up to date.

All primary tools need to be precise and accurate because we all know "close only counts in horseshoes and hand grenades."

If you have any questions, comments, ideas for future topics please feel free to contact me directly at [bud@midpointbearing.com](mailto:bud@midpointbearing.com)



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