A Journey Through The Specification Quagmire

Abstract

Transcat utilizes high performance instrumentation to provide high quality traceability for industry. Many of our assets operate at or near state-of-the-art, and the specifications can be quite impressive. Occasionally, the nuances of a specification might seem inconsequential at first glance, but can have substantive impact on actual results, and realizing the full potential of an asset can be costly and time-consuming. This paper relates several such cases, and illustrates our resolve to maintain optimum asset performance.

1. The Orchard

A full service calibration laboratory is an orchard of diverse high precision measurement capabilities (refer to Figure 1), ranging from purely physical size and weight (aka length and mass), to wholesale staples (DMM's, micrometers, pressure gauges, etc.), and on to more esoteric or sensory influences (time, temperature, luminance, air flow…).

OEM's offer wide ranging traceability implements and instrumentation rootstock to bolster the variety of the measurement orchard.

The calibration orchard manager retains skilled work hands to best utilize these 'Implements of Metrological Husbandry' (aka Calibration Standards) to ensure that the customer's fruit is delivered timely and unblemished, and with appropriate heritage and pedigree (e.g., traceability and calibration certificate).

2. Prime Rootstock

Not all orchard applications require prime rootstock, but some popular cultivars perform near state-of-the-art and require the most specialized OEM offerings available.

Select OEM progenies target these specialized applications boasting pedigreed high performance specifications.

While such trophy incarnations often do plenty to enhance yield, identifying the pertinent and sometimes elusive specifications applicable to the orchard manager's target crop is often perplexing.

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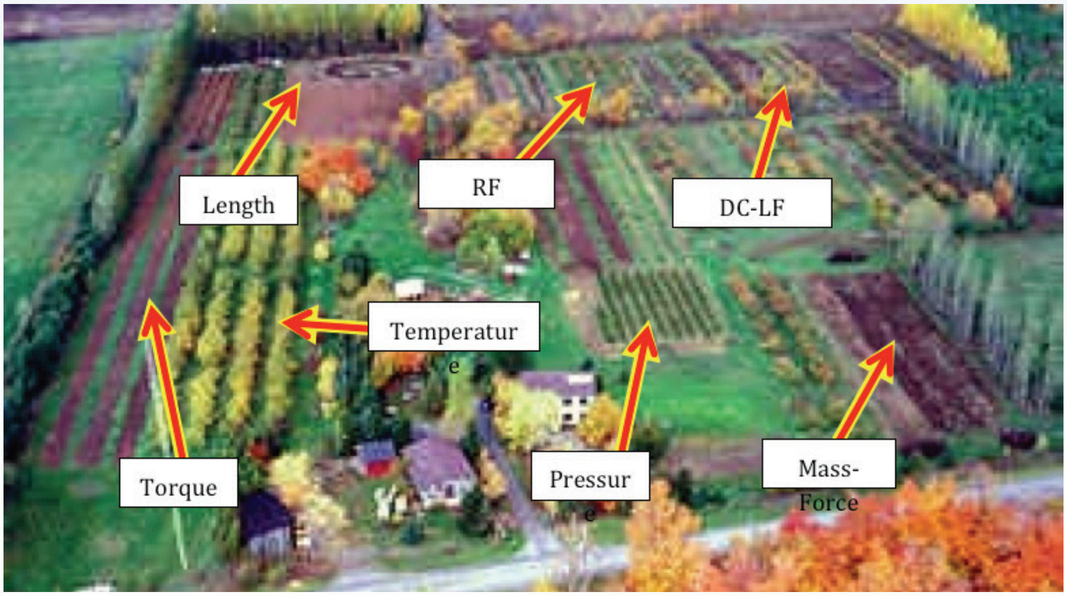
Figure 1. Laboratory Application Orchard



As OEM's squeeze the last juicy drops of performance from their flagship creations, complicated user constraints sometimes materialize in the shadowy fine-print of written specification. And occasionally a few of the more critical limitations never make their way to print.

Properly identifying these ethereal specifications and permuting their impact on the yield of the target crop sometimes reveals facets with significant logistical implication, or training and procedural impact that can be difficult or costly to implement.

3. Lemons (Only a Few Examples)

3.1 Torque Wrenches

Routine torque calibrations depend highly on operator technique. OEM specifications and reference materials typically do not make clear the impact this can have on accuracy.

3.2 SPRT Temperature

The Reliability of resistive temperature measurements using PRT's and SPRT's is often linked to the resistance stability at the triple point of water, RTPW. But RTPW stability must be increased by a factor of roughly 3:1 to predict stability at 660°C. And it can be tricky distinguishing between real changes in RTPW and variability in the measurement process.

3.3 Deadweight Testers

OEM specifications for industrial deadweight testers (generally those with pressure values marked on the weights) are typically vague, if even published, regarding the significance of the operating environment. Improperly accounting for these influences can result in errors greater than 30 times the advertised rating.

3.4 Electronic Deadweight Testers

A modern transducer-based digital pressure calibrator is marketed as an electronic deadweight tester. The OEM sales literature boasts "deadweight tester performance" and "stability over time of a conventional deadweight tester".

3.4.1 Unregulated

These electronic deadweight testers are not bestowed with dynamic regulation capability as is fundamental to conventional deadweight testers. The absence of pressure regulation with the electronic deadweight tester leads to substantive inefficiencies while the operator waits for adiabatic influences to subside.

3.4.2 Long Term Stability

Conventional deadweight testers routinely achieve long-term stability near 0.001% of reading per year. No modern transducer consistently achieves this level of long term stability.

3.4.3 Efficiency

In practical applications, a modestly experienced technician with rudimentary training can operate a conventional deadweight tester more efficiently than an electronic deadweight tester.

3.5 Pneumatic Pressure Calibrator

The marketing flyer for a digital pneumatic pressure calibrator praises the benefits of the instrument's autozero feature, announcing a very high degree of long term stability.

3.5.1 Gauge Mode

In gauge mode operation this feature seems to serve its advertised purpose, but the transducer is a fixed absolute sensor and the gauge mode zero is a short-term function due to fluctuations in barometric pressure. Since the automated zeroing occurs each time the instrument is vented, it has no impact on long term stability.

3.5.2 Absolute Mode

In absolute mode operation the situation is quite the different. Achieving the advertised long term stability requires frequent "comparison with barometric reference" which must have very high accuracy. Reference barometers of sufficient accuracy and stability are uncommon, expensive, and have their own traceability maintenance requirements.

4. Lemonade

From these lemons we craft a flavorful lemonade: our high performance calibration process that yields accurate, efficient, and dependable dissemination of traceability.

Our recipe:

- Carefully separate and identify the vital specification slices
- Blend thoroughly with broad experience and technical expertise
- Sweeten to taste with focused training and targeted procedures
- Sample for consistency and conformance
- Serve and enjoy with confidence!

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