ACCURACY, REPEATABILITY, RESOLUTION & CALIBRATION OPTIONS

1. Accuracy, resolution, and repeatability are the three key capabilities used to measure a weighing system's overall weighing performance.

Accuracy is how close the reading on a scale's indicator is to the actual weight placed on the scale. Accuracy is generally important for all weighing applications, but it is especially important in legal for trade applications. A scale's accuracy is usually calculated by loading the scale with certified weights.

Repeatability is a scale's ability to display same weight reading each time the same weight is placed on the scale. It is especially important for batching and filling applications, when a desired accuracy cannot be achieved, and the batch or filling operation requires the same amount of a material be used for each batch. Repeatability and accuracy go hand in hand. You can have a repeatable system that is not accurate, but you cannot have an accurate system unless it is repeatable.

The following factors can influence the accuracy and repeatability of a weighing system.

- Load Cell and Instrument performance (can influence accuracy and repeatability)
- Load Cell capacity (must be selected based on actual dead load, live load and performance requirements)
- Load Point design (this is the mechanical mechanism for transferring the load to the load cell)
- Tank and Vessel Design (can influence accuracy and repeatability)
- Piping Design (Live-to-Dead Connections can influence accuracy and repeatability)
- Calibration (the method of calibration can influence accuracy)
- Environmental Factors: Wind, Seismic Forces, Temperature, Vibration
- Operational / Process Factors

Resolution is the smallest weight change that the weighing systems digital instrumentation can detect. Resolution is measured in increment size, which is determined by the capabilities of the load cells and digital indicator. A digital weight indicator may be able to display a very small increment size, such as 0.01 lb [5g]; however, that does not mean the system is accurate to 0.01 lb [5g]. Resolution is primarily determined by the weight indicator's electronic circuitry, not the sensor or the scale. Many of today's industrial indicators can resolve a load cell's signal into 1,000,000 internal divisions and can actually display 100,000 divisions. The displayed resolution is determined by how the indicator is configured. But displaying an increment size does not make a scale accurate to that increment.

2. Calibration Options

Calibrating *with* a simulated weight signal This is a quick calibration technique that replaces the output produced by the load cell/s and does NOT take into account the systems mechanical characteristics It relies heavily on the accuracy of the printed data for each load cell and the inputting of this data to a simulator.

Calibrating *with* test weights The system can accurately be calibrated when utilizing certified weights equal to 80 to 100 percent of the rated capacity It is time consuming, labor intensive, and has potential health and safety issues. The load distribution may be unrealistic and any mechanical binding will be calibrated into the system at the tested weight and temperature. Test weights must be cleaned to minimize contamination and the scale must be emptied to provide a zero reference point. Unfortunately it is widely utilized with weights equal to 10 or 20 percent of the scales capacity, which opens up the potential for greater errors at medium to high weight readings.

Calibrating *without* test weights using Hardy's C2® Provides fast, reliable, safe, and easy calibration of the process weighing system. It will notify you of any mis-wiring. During the verification phase (testing with a small test weight), C2 will indicate any system binding issues. The scale does not require it to be empty since it relies on a single reference point and there is no contamination from test weights, or heavy labor issues to deal with from handling heavy test weights.