Accuracy and Repeatability in Weighing Systems
Factors

- Accuracy and repeatability of weighing installations can be negatively affected by three factors:
  - Mechanical Interference
  - Improper Balancing
  - Improper Calibration
Mechanical Interference

An independent, isolated vessel with no connection to any other vessel or adjacent structure provides the most accurate results for a weight measurement system, such as floor scales and truck scales.

When a vessel has physical connections to other vessels or structures it will affect accuracy because the connecting structures will bear some of the weight, so the load cells or strain gages will NOT see all of the changes in weight.

An example: If a person is standing on a bathroom scale, and a second person puts a hand on the first person’s shoulder, it will affect the weight the bathroom scale indicates.
Mechanical Interference

Some typical causes of error related to connecting structures and, where applicable, methods for reducing the errors follow:

- Catwalk
- Hidden load bearing members
- Vessel goes through roof
- Tripper conveyors or deck plating
- Rigid piping connection between vessel and another adjacent structure.
Mechanical Interference

Possible mechanical issues

- Small mechanical pipes without flexible connection will cause problems.

- All conduit connection should be flexible.

- All flex connections should be flexible with the pipe not touching.

- The kick plate must not be touching the tank at all.
Mechanical Interference

Any mechanical binding will cause a weighing error. This pipe can act like a lever, it should have a pipe hanger and flex. The kick plate must not be touching the tank at all.
Mechanical Interference

Small mechanical pipes without flexible connection will cause problems
Improper Balancing

• Improper balancing of a tank will result in uneven weight distribution on the legs.

• Uneven weight distribution will reduce the accuracy of the weight measurement because a tank can spread all or most of its weight on three legs and the other legs will not see changes in weight.

• Typically, if a tank is not balanced, one or more legs will not see weight until the tank gets heavy enough to press the leg into the foundation. This causes non-linear, non-repeatable weight indication.
Improper Balancing

• The process to properly balance a tank is accomplished by shimming the tank.
• To shim the tank, the tank must be able to be loosened and raised while shims are added and load cell output measurements are taken.
• This process is repeated until the output of all load cells is the same.
• The more level the foundation, the less shimming is required.
Improper Calibration

- Improper calibration can negatively affect readings because the change in strain is converted by a ratio to produce the weight output. If the ratio is incorrect, the readings will be incorrect.
Improper Calibration

To prevent Improper Calibration:

– Record starting “Counts”
– Add or remove material from vessel
– Record new “Counts”
– Enter amount of weight change into controller.
– Record amount of material in vessel using engineering units.
– Zero the vessel when it has been emptied.