

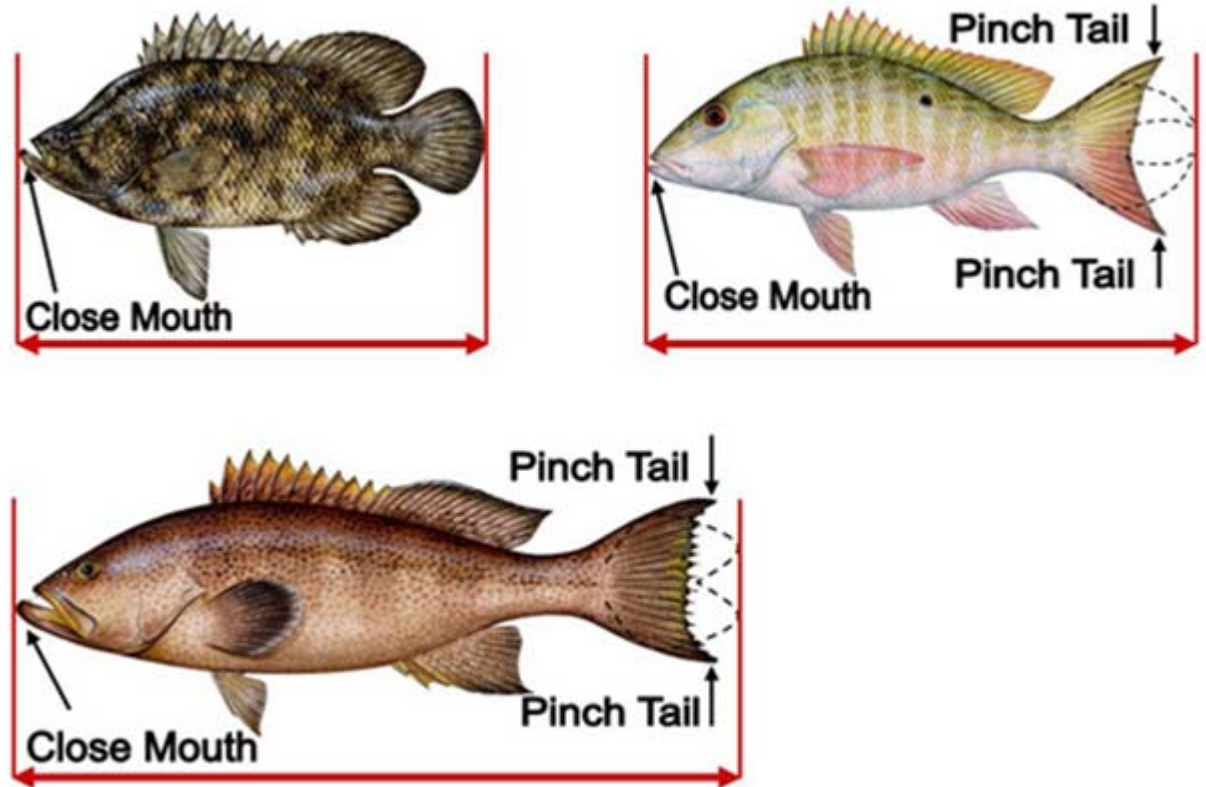
Calibration, Standardization and Verification

Will the real calibration please stand up?

By: Tim Osborne

How to Measure Fish . . .

According to the Department of Natural Resources fish are measured the following way:



How to Measure Crabs . . .

According to the Department of Natural Resources crabs are measured the following way:



Accurate & Honest Weights



To keep the fishermen in check . . .of course

Measurement

- VIM (ISO Guide 99 clause 2.1 - process of experimentally obtaining one or more **quantity values that can reasonably be attributed to a quantity**
 - NOTE 2 Measurement implies comparison of quantities and includes counting of entities.
 - NOTE 3 Measurement presupposes a description of the quantity commensurate with the intended use of a **measurement result, a measurement procedure, and a calibrated measuring system operating according to the** specified measurement procedure, including the measurement conditions.

Calibration

- VIM (ISO Guide 99 clause 2.39 - operation that, under specified conditions, in a first step, establishes a relation between the **quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties** and, in a second step, uses this information to establish a relation for obtaining a **measurement result from an indication**

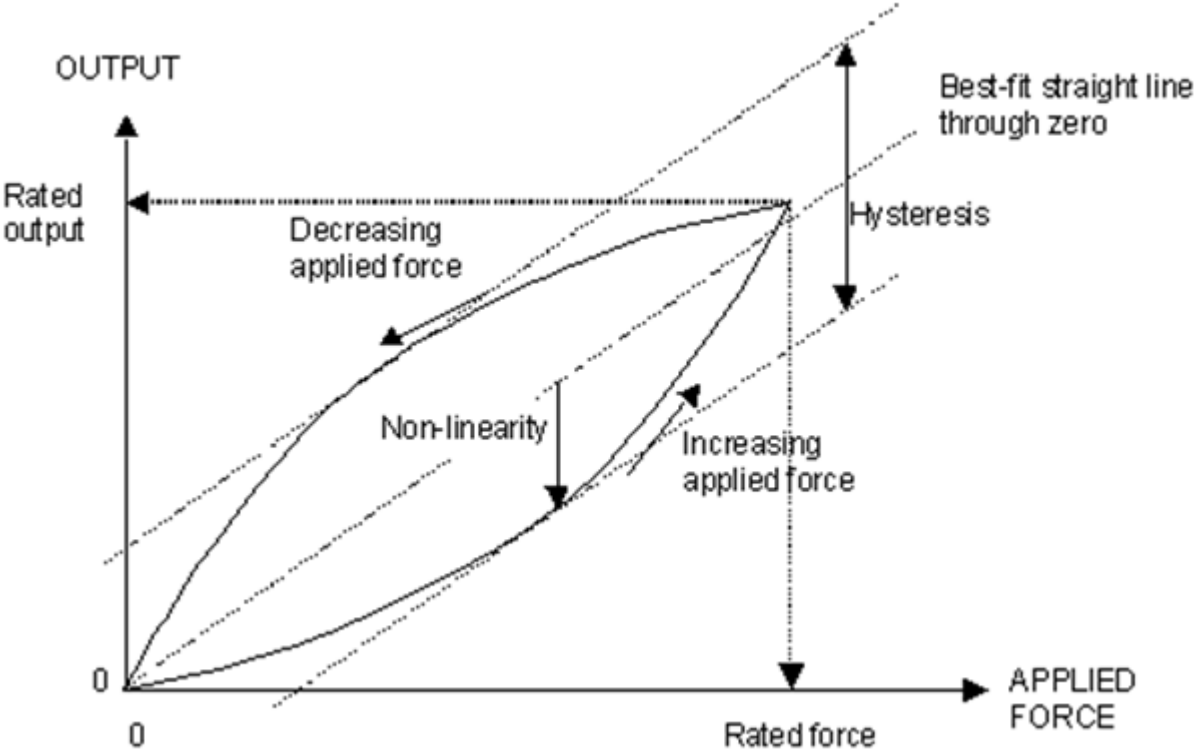
Verification

- VIM (ISO Guide 99 clause 2.44 - provision of objective evidence that a given item fulfils specified requirements.
- **It is only performed after a calibration is completed**

Balance



Hysteresis & Linearity of Scale



What is the Dividing Line Between a Test and a Calibration

Calibration

- Used to establish a relationship between a reference standard and the item under test. The item under test will be used to evaluate the satisfactory performance of a product.

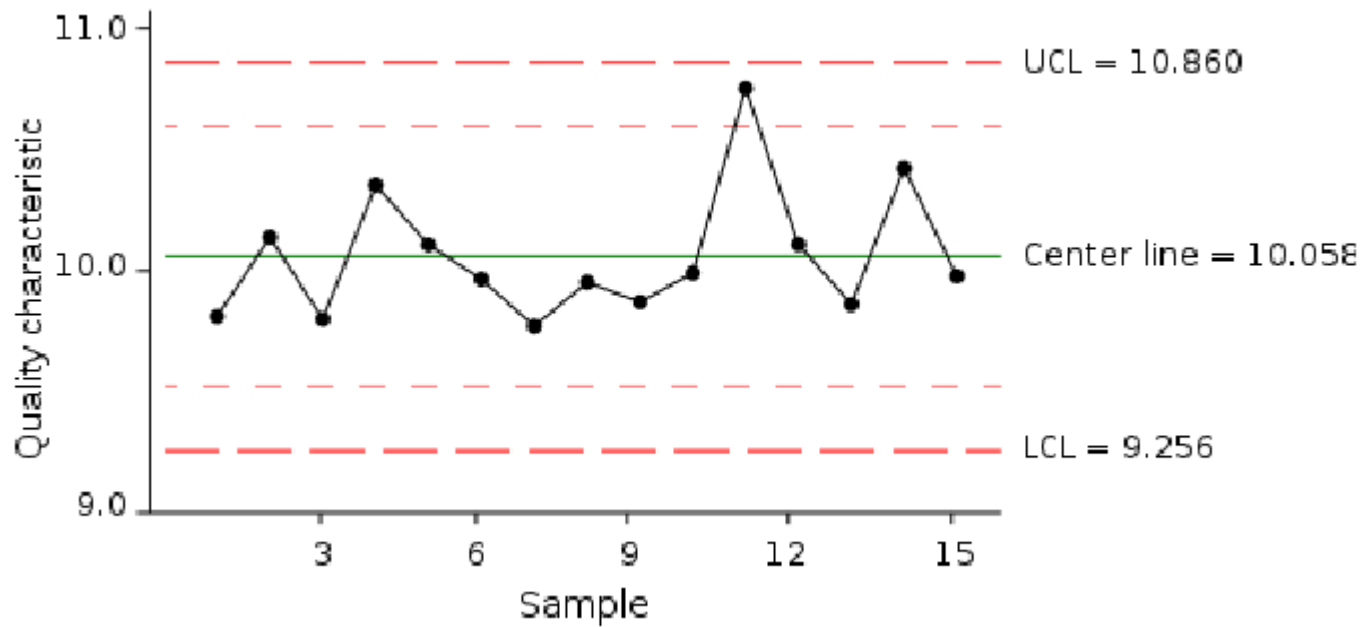
Test

- Evaluation of the end product

Measurement



Control Chart – The Rock



Standardization: You really are calibrating and verifying!

Rule of Thumb: If the contributor is less than 25% in magnitude of the Largest contributor, then it is not significant.

Component	Contributor	U (k = 1)
Ua	Repeatability	4
Ub	Scale Calibration	1
	RSS	4.123

Ub only adds 0.123

If $U_b = 0.4$ (10% of U_a);
Ub adds only 0.019

Significant Contributors in Uncertainty

A Calibration Laboratory's Approach