Technical Publication PH017

Load Cell Calibration & Throughput Verification For all WeighBack Conveyors

This calibration method applies to all styles of WeighBack units, including:

- On-Machine Seasoning (OMS) WeighBack units
- WeighBack SA units (with built-in controls)
- WeighBack units (without built-in controls)

1. Install the Parameters within the Hardy Load Cell 4050 Controller and Map to PLC.

See **TechPub PH011** for configuring the Hardy 4050 controller.

2. Perform Load Cell Span and Zero Calibrations

To read accurate weights on the load cells, they must be correctly spanned (low and high) and zero'd. Figure PH017-1 below shows a typical Engineering-level setup screen used to perform these functions. The Low and High span functions ("Lo Cal" and "Hi Cal") *should* only be required during initial setup, but the "Tare Scale" function is a routine function performed by the operator as needed (perhaps as a frequently as once per shift). If the WeighBack is used in an OMS application, an additional "Tare Scale" button may also be present at each module position's operator screen and accessible at the operator level.

Each of these functions are pre-defined tasks within the Hardy controller. Once the controller and PLC are "mapped" (see **TechPub_PH011**) these functions are triggered via OIT screen buttons and inputs.

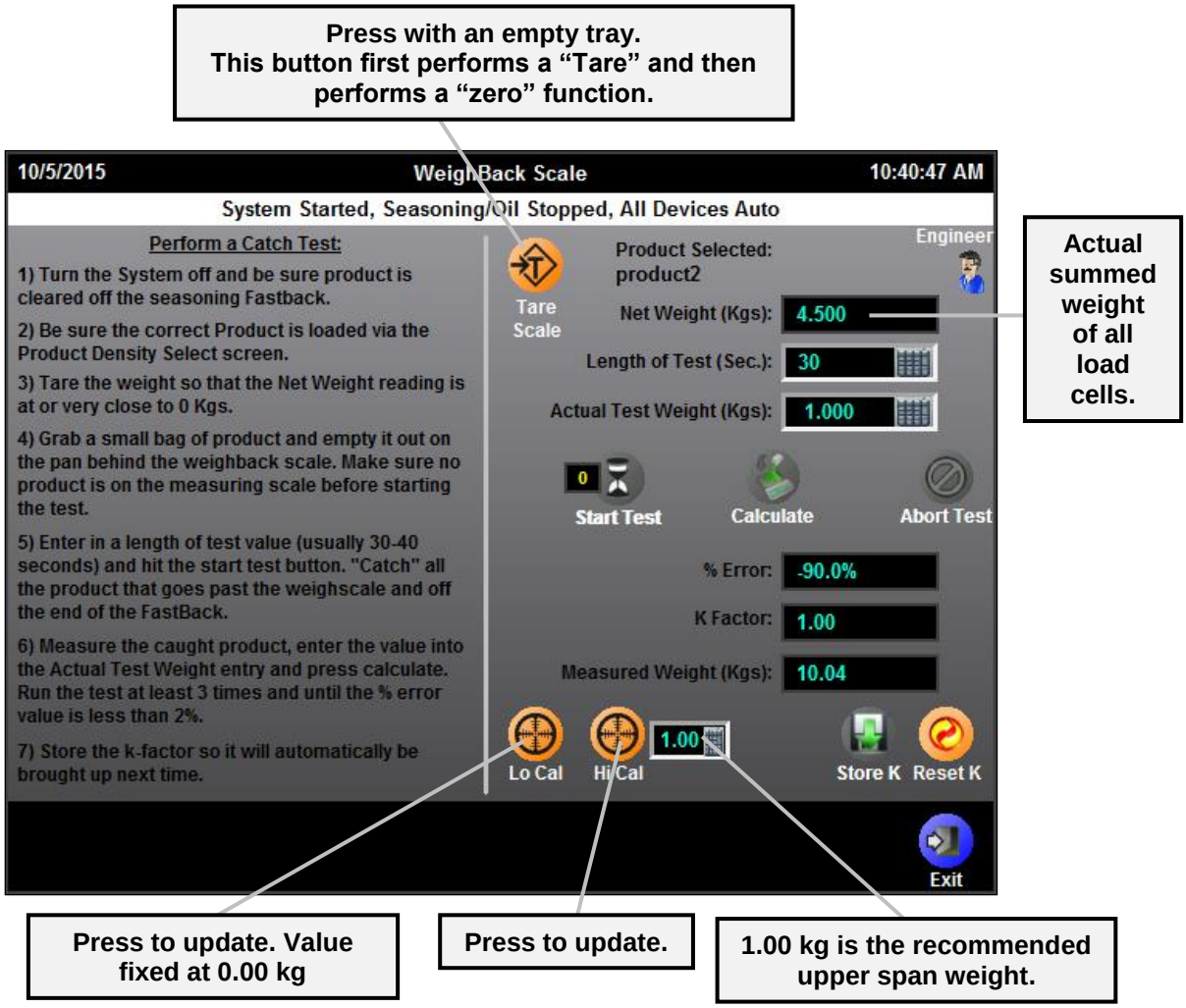

Figure PH017-1 – Typical Setup and Calibration Screen for WeighBack Systems

3. Perform Throughput Verification (Catch Test) and Calibration of Mass Flow

The WeighBack must be calibrated before it can calculate accurate kg/hr readings. To accomplish this, a throughput verification procedure must be performed on each WeighBack for every product, which has a unique travel rate that will be run on it. For best results, the actual product must be used under conditions representative of actual production. Additionally, the test should be performed with the anticipated normal production throughput (in kg/hr).

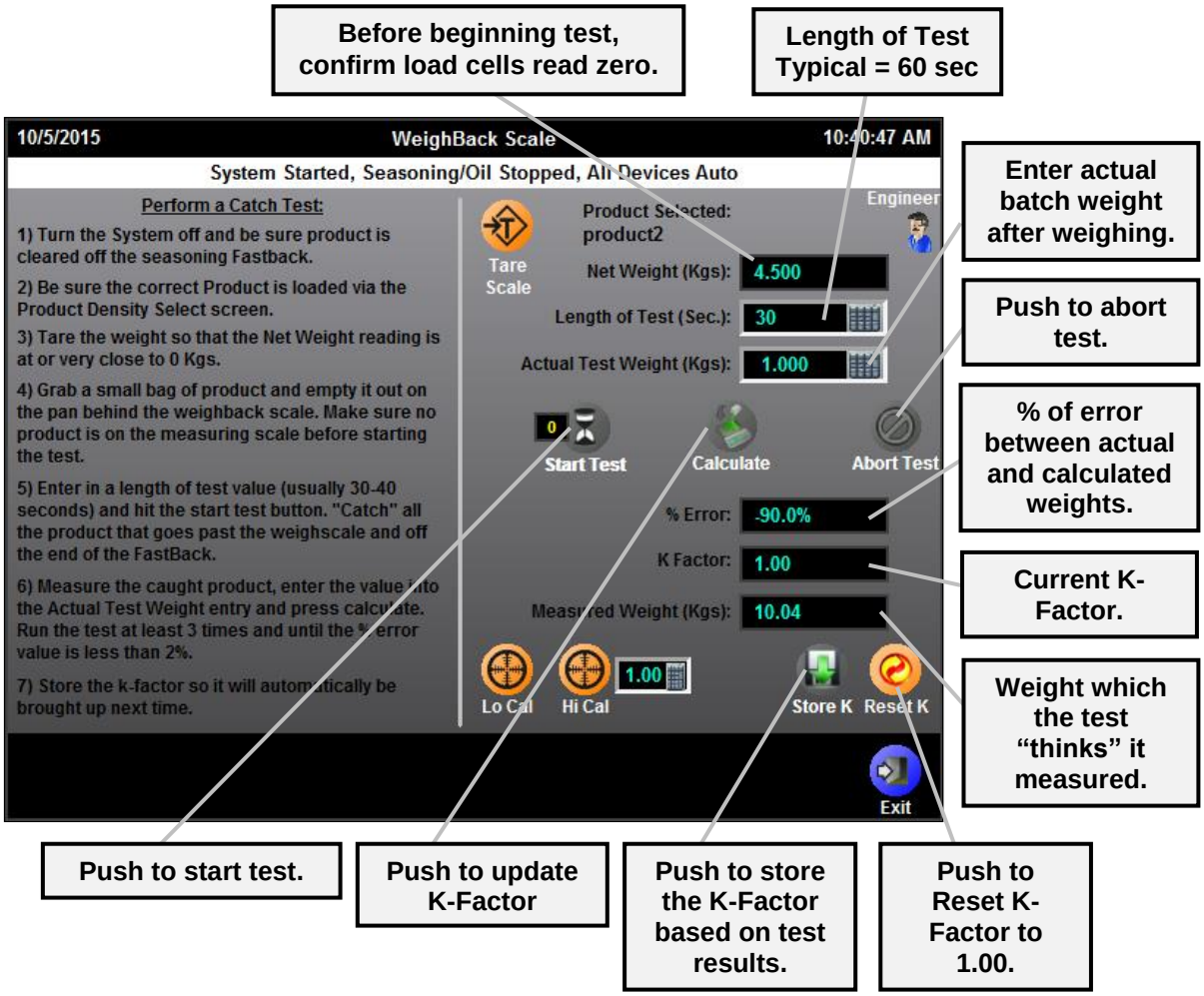

Figure PH017-2 – Typical Throughput Test Screen

To initiate a test, press "Start Test", and begin feeding (either by hand or via a manually controlled gate) and catching product. All of the product MUST traverse across the load cell tray prior to the test ending and all of the product that crossed the load cell tray must be collected for weight confirmation. Abort the test and re-run it, if all of the product does not exit the load cell prior to the test time expiring.

During the throughput calibration catch test, the PLC will sum the weight that passed over the load cell tray in a summing routine described below. During the test, the actual product that passes over the load cell tray must be collected and weighed. The weight value is input into the "Actual Test Weight" field. The ratio of the actual weight and the "Measured Weight" is then evaluated to determine the percent of error between the two values. If the error is greater than 2%, the K-Factor must be updated.

This catch test is to be repeated as needed until the "% Error" is less than 2%. This is typically accomplished within three consecutive tests.

Totalizing Throughput During a Catch Test

Regardless of the method used to feed product across the load cell tray during the catch test, the operator only has to set the test duration (n) in seconds and initiate the catch test to start the summing routine. The equation for summing the total weight of the product that passes through the system during a catch test is given by the formula below. The time interval between readings is assumed to be 250 msec. The working K-factor is used in this calculation. This yields the amount of product the system detected passing over the load cell tray during the test.

$$Wt_s = \frac{\sum[Wt_1 + WT_2 + \cdots + Wt_n](kg - \cancel{sec}/\cancel{tray})\ x\ TR\ (\cancel{m}/\cancel{min})\ x\ K}{TL\ (\cancel{m}/\cancel{tray})\ x\ 60\ (\cancel{sec}/\cancel{min})\ x\ SR}$$

Where:

Wt_s	= summed weight (kg)
Wt_1, Wt_2 …Wt_n	= instantaneous weight readings (kg) at 250 msec intervals
n	= catch test duration in seconds
TR	= travel rate (8.5 m/min is a reasonable default)
K	= working throughput calibration K-factor (1.00 = default), 0.25 ≤ K ≤ 4.00
TL	= effective tray length of the load cell tray (19.2 inches = 0.49m)
SR	= Samples / second = 4 (at a rate of once every 250 msec)

Updating the Working Throughput Calibration K-factor:

The operator needs to know the actual catch test amount in kilograms (kg). This is accomplished by weighing the product that passed through the system during the catch test.

Equations for updating the working throughput calibration K-factor following a catch test are as follows.

$$K_o = K$$

$$K = \frac{K_o \times Wt_a}{Wt_s}$$

Where:

K	= working throughput calibration K-factor
K_o	= old throughput calibration K-Factor
Wt_a	= actual weight (kg), (weight of the actual product used in the catch test)
Wt_s	= summed weight (kg), (as calculated above)

Rule of Thumb

- The number of grams weighed on the load cell tray is approximately equal to the same kg/hr equivalent.

  Example: The load cell tray is reading about 0.400 kg. This is 400 grams. This will translate into approximately 400 kg/hr throughput (+/- 10%).

  This is a coincidental correlation, which applies to the current design load cell tray of 0.49 m and running the OMS FastBack at 55 hz.

Revision Record

Revision Level	Date	By	Description
Revision 0	10/01/15	Ken Petri & Arlene Mason	• First Official publication of this TechPub • Covers ONLY Load Cell Calibration and Catch Test • Content removed from **SysPub PH071**