OVERFILL AND PACKAGE WEIGHT CONTROL

BY EVAN J. MILLER

Learn how we deploy our manufacturing intelligence platform, Gainseeker® Suite to ensure compliance while minimizing product give-away.

Label Compliance

Minimize Product Give-away

Hertzler Systems Inc.®

Quick and Substantial ROI
Label Compliance
Minimize Product Give-Away

Hertzler Systems Inc.®

Manufacturing Intelligence Platform

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Considerations for Setting Up a Net Content Controls System

- Decide where to focus your improvement efforts. You may find it better to direct your efforts to a high volume but inexpensive product, rather than a very low volume but expensive product. Similarly, you may wish to focus on the weight of the most expensive ingredient in the product. Factors to consider include:

  - Cost of raw materials
  - Volume of production
  - Financial impact of priorities

- What questions do you want to ask of the data?

- Establish a hierarchy of your process, and decide at which level in the hierarchy you want to establish the GainSeeker Product Standard. Setting the Standard at a higher level makes it easier to look across a wider range of production, but risks mixing processes. Setting it at a lower level makes it easier to keep processes separate, but can create artificial silos of data. For example, a new SKU may be used when the line shifts from putting a red cap on a bottle to a black cap. In that case the new cap doesn't constitute a new process even though it is probably a wholly new SKU. A typical hierarchy might be:

  - Product family
  - Product type (for each family)
  - Packaging type or size
  - SKU

Consider how you might tie into existing information systems and leverage information about material costs and production volumes.

- Are net contents determined by a piece weight or by a simple weight/volume? Controlling piece weight is much more complicated than controlling a simple weight because the pieces make the overall package weight shift in discrete steps. Examples of piece weight might be cookies in a package, or large pickles in a jar. Simple weights, like the amount of a liquid in a bottle, are typically much easier to measure.

- Controlling piece weight typically involves tighter control of upstream weights and processes, including weights of all the component parts. Other factors may also come into play, such as moisture or fat content. It may also require resetting the label claim weight based on what is actually possible.

- Data collection may have to factor the tare weight of the individual package into the process, if the variation of packages is significant.

- Decide on what alerts you want to receive, and establish a reaction plan for each alert. For example, how will you respond to MAV violations? Do they require supervisor sign-off?

Considerations for Setting Up a Net Content Controls System

Typical System Designs

A typical net content management system includes the following:

- Set up GainSeeker Standards so that
    - Specification = Label Weight
    - Individual Limit = MAV
    - Target / Nominal of the Specification = Target

- Consider calculating and storing the percent overfill for each work order (or whatever you use as a foundational unit of measure) as a data record in GainSeeker.

- Store the data at the smallest reasonable increment. In other words, store percent overfill per work order, or shift, or day. You can always combine smaller subsets of data into larger time periods, but it is much harder to break apart larger sets of data into smaller increments if you don't have the granularity of data.

- Integrate to your business system to extract production volume information based on work order (or other unit). Multiply this production volume data by the Percent Overfill to arrive at an amount (measured in weight or volume) of give away.

- Integrate to your business system to extract material costs. Multiple this cost value by the amount of give away to arrive at a dollar value of the give away.

- Make sure your business system can support the granularity of data that you want to report on.

How Net Contents Are Regulated

The US Department of Commerce, through the National Institute of Standards and Technology (NIST), publishes the definitive guide for testing net contents of packaged goods sold in the United States. NIST Handbook 133, "Checking the Net Contents of Packaged Goods", is regularly revised and updated.

The Handbook requires that the net quantity of contents statement must be accurate, but allows for reasonable variations. The guiding paragraph states:

> The net quantity of content statement must be "accurate," but reasonable variations are permitted. Variations in package contents may be a result of deviations in filling. The limits for acceptable variation are based on current good manufacturing practices in the weighing, measuring, and packaging process. The first requirement is that accuracy is applied to the average net contents of the packages in the lot. The second requirement is applied to negative errors in individual packages. These requirements apply simultaneously to the inspection of all lots of packages except as specified in Section 1.2.5 "Exceptions to the Average and Individual Package Requirements."

The Handbook recognizes that some variation in filling processes is inevitable, and provides guidelines for acceptable variation. These guidelines take the form of two requirements for compliance:

1. In an inspection lot, the average of all of the packages must be at least equal to the label claim on the package.

2. No individual package may be underfilled by more than the Maximum Allowable Variation (MAV).

These requirements may be visualized as follows:

How Net Contents Are Regulated
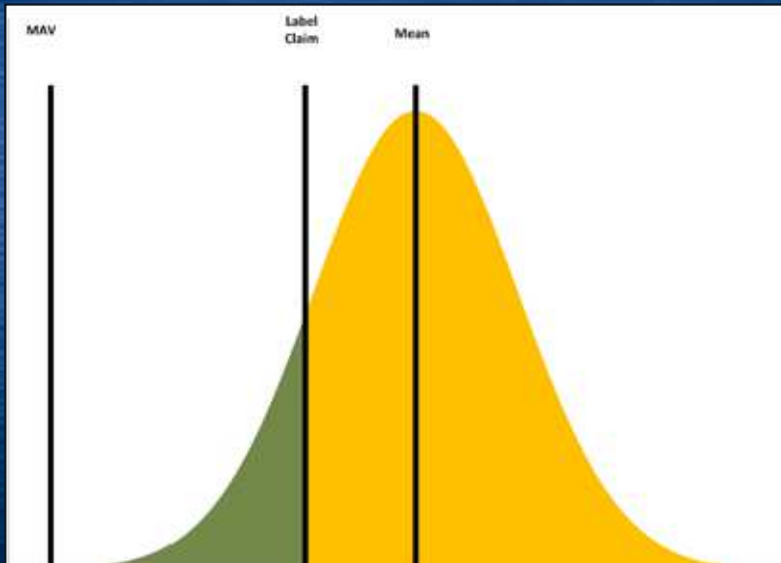
The Mean (M) must be above Label Claim (Label), and no individual value (represented by the Green band) may be below the MAV. Note that the x-axis is the weight or volume of individual packages, and the y-axis represents the counts of packages in each size.

Finally, the Handbook turns over the problem of overfill to the manufacturer: "This handbook does not specify limits of overfilling, which are usually controlled by the packer."

As long as the Mean is above the Label Claim, anything to the right of the Label Claim (the yellow band above the Mean line) is overfill. Overfill represents profits that are given away to customers. Some overfill is unavoidable, simply because of the requirements of NIST 133. But the tighter the band, and the closer the Mean to the Label Claim, the less overfill.

Resources:

• NIST 133 Handbook (US Government Publication, last accessed 11 Nov 2017)

Three-step Process to Reduce Overfill

Reducing Overfill

The process of optimizing contents and meeting the requirements of NIST-133 is deceptively simple, and it requires addressing the two requirements in reverse order, in three steps.

Step 1: Make better use of real-time, actionable intelligence to bring the process into statistical control

Production or Quality staff weigh product samples at regular intervals and plot the data in real-time on statistical process control charts. This information gives operators and supervisors immediate statistically-based feedback when processes shift or become unstable.

This technique works for both underfill and overfill. If a process change is detected, the statistical alarms will sound and give operators the information they need to act promptly and return the process to its controlled state.

This means that operators can take immediate corrective action long before packages are underfilled or overfilled. It brings the process into statistical control so that you can take the second step in confidence.

In step 1 we collect real-time data and make sure the process is stable and predictable. The Mean (M) must be above Label Claim (Label), and no individual value (represented by the Green area) may be below the MAV. Everything above the Mean and in the yellow area is giveaway.
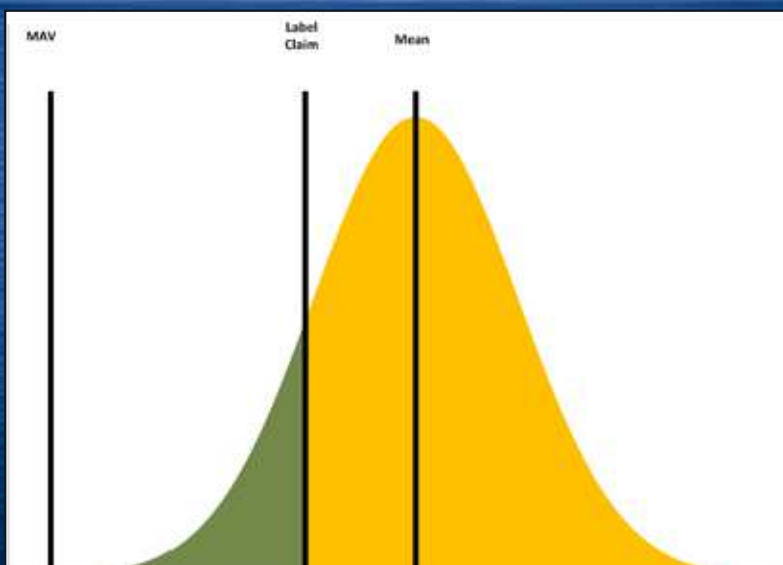
MAV = Maximum Allowable Variation Label Claim = Volume or Weight stated on package Mean = Average of any production lot

Three-step Process to Reduce Overfill

Step 2: Tighten the process through continuous improvement

Making better use of real-time actionable information can have a profound impact on both risk management and material use. What's more, the information that your team has collected for monitoring the fill operation in real-time is a valuable corporate asset and has value long after the current batch of product is sealed and out the door.

Here is how it works: while weight data is collected for trend and real-time analysis, we can tag the data with relevant descriptive information. For example, we might collect information about the product type, material supplier, ambient temperatures or humidity, shift, and operator.
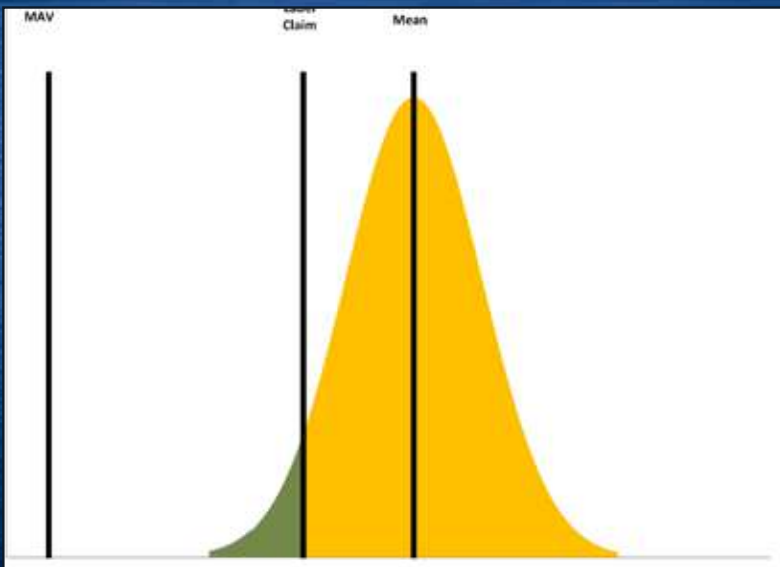
Tighten the process through continuous improvement.

In step 2, we review the data and address underlying causes of variation.

The result is a tighter process.

This descriptive information helps us to better understand the Who, What, When, Where, Why, and How of the actual weight measurements. Wherever possible, we minimize the cost of this tag information by integration with other business systems, bar codes, RFID, and so forth.

Three-step Process to Reduce Overfill

Once we have acquired this rich matrix of information, we can slice and dice it using GainSeeker's automated Variation Wizard. This wizard points your staff to relationships of the inputs (the context) and the outputs (the weight). Using these tools, your team should be able to begin eliminating sources of underlying variation. This pulls the tails of the distribution towards the center and increases the height of the curve.

Step 3: Shift the process

By this point, you've learned a lot about your process. You know it is stable and predictable, and you've identified and eliminated the underlying causes of variation wherever possible. Now you can shift the mean of the process closer to the label weight.

You can do so with confidence because you have the knowledge to support your decisions. You'll know you can meet your label claim and minimize overfill and product giveaway.
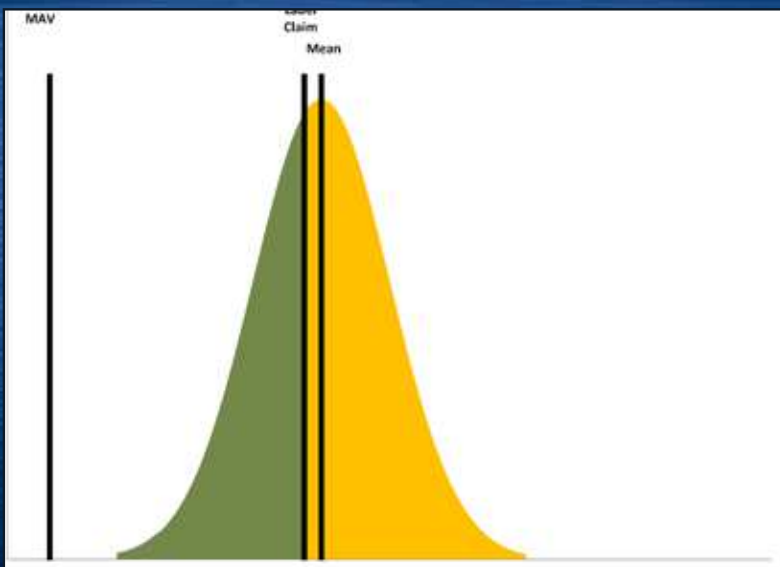
Shift the process closer to Label Claim.

Making better use of real-time actionable information can have a profound impact on both risk management and material use. What's more, the information that your team has collected for monitoring the fill operation in real-time is a valuable corporate asset and has value long after the current batch of product is sealed and out the door.

Why Check Weigh Systems are Insufficient

Many packers have built their Net Contents management effort around sophisticated, state-of-the-art check weigh systems. These systems are good at ensuring compliance, but they are based on an incomplete and inadequate philosophy.

Most check weigh systems are based on some kind of specification, usually MAV and Label Weight. Individual units are kicked out when they weigh below or above some preset target. Typically, these systems do not look at trends or provide knowledge to continuous improvement teams that can lead to optimized fill weights. Rather than giving packers actionable knowledge, they encourage users to "play it safe", which usually results in leaving significant amounts of money in the package. This value means a great deal to the packer, and is negligible to the consumer. No good will is lost by ensuring tighter compliance to the Label Claim.

The good news is that by making better use of real-time, actionable information, packers can have it both ways. They can "play it safe" and at the same time optimize their material resources.

Summary

There are well established, time-tested methods that enable the manufacturer to scientifically optimize their business process to ensure compliance AND minimize product give away. The Overfill and Package Weight Control Ebook summarizes those methods and describes a process to reduce product give away by the scientific management of product overfill. Reducing your waste and saving you money is our goal.

OVERFILL AND PACKAGE
WEIGHT CONTROL

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