OPTIMIZATION OF MULTIHEAD WEIGHING PROCESS

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The multihead automatic combination weighers are used to provide accurate weights at high speed. To minimize giveaway, greater accuracy is desired, especially for valuable products (Keraita & Kim, 2007). It is currently the most used method for many kinds of products, also including those with heterogeneous characteristics.

In international regulations the control of mean lot effective content is usually accomplished from a test, and the variability control is fixed depending on the number of non-consistent units found related to the maximum error shatfall in weight tolerated in the package (Barreiro, González, & Salucrú, 1998). There are at least two types of situations involving the occurrence of assignable causes in this process. The first, the output of one stream (or a few streams) has shifted off target. The second, the output of all streams has shifted off target (Montgomery, 2009).

To illustrate the packaging process in multi-head weighers consider the provision of feeders and hoppers in a weighing automatic Multi- head combination. In this paper a processor with sixteen weighing channels around a feeder loop is studied; each channel is equipped with a line feeder, a preliminary hopper (HP) and a weighing hopper (WH). The product is dispensed through the feed loop for each of the preliminary hopper through the feed line (Figure 1). When a certain amount of product is provided to the preliminary hopper the feeders stopped, and the content of the preliminary hopper is moved to the weighing hoppers. The products are weighed and are used in the combining process to achieve the target value. The products of selected hoppers are released to the packaging machine through discharge pipes. Then new products are supplied in empty hoppers and so continuous operation until reaching the desired amount of production.

This research proposes a set of strategies to optimize the packaging process in multi-head weighers, by combining weights algorithms seek to reduce the variability in the selection of the final weight to a desired nominal value. Proposed strategies are considered, compliance limit weight, the quantity of product supplied to the hoppers and the number of combination elements (k) before selecting the final weight. This research provides a comparative analysis of the different strategies proposed combination observing the final packed weight for different elements (k) and the total variability in the product. A Multi-head weigher of sixteen hoppers is studied. The study involved creating a simulator to find the best place to fill it to reduce the variability of the total process (Figure 2 to Figure 5).

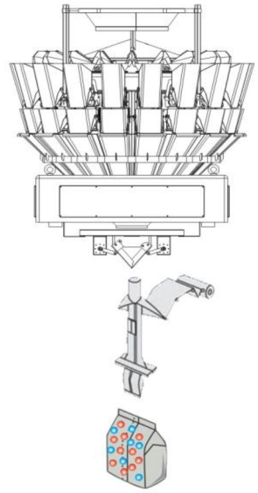

Figure 1. Automatic combination weigher

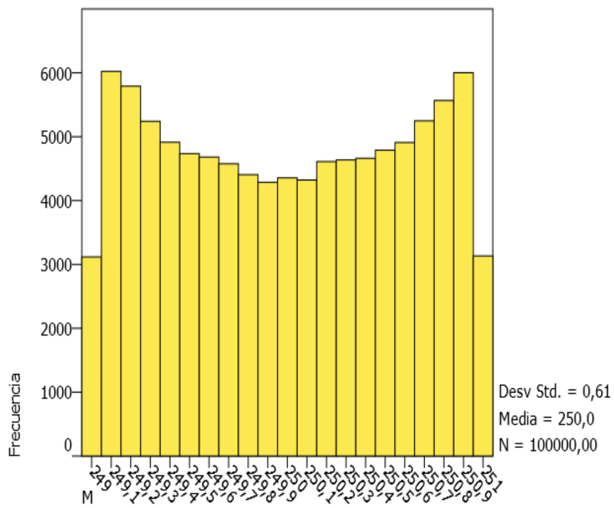

Figure 2. Histogram of Strategy 1

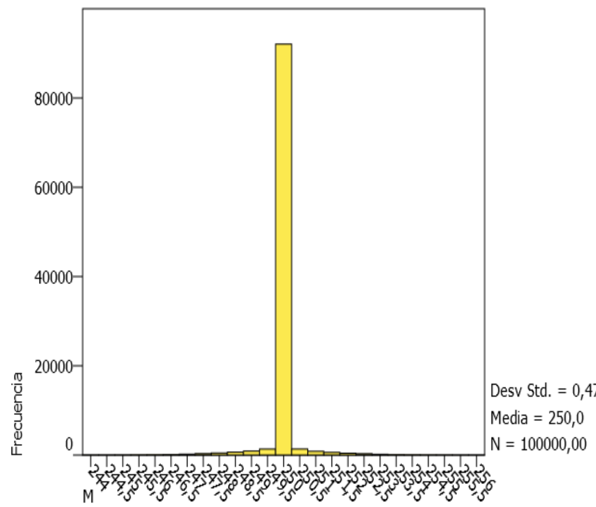

Figure 3. Histogram of Strategy 2

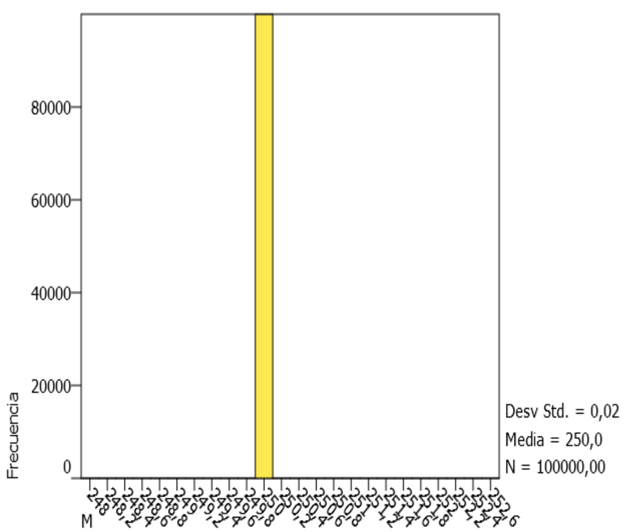

Figure 4. Histogram of Strategy 3

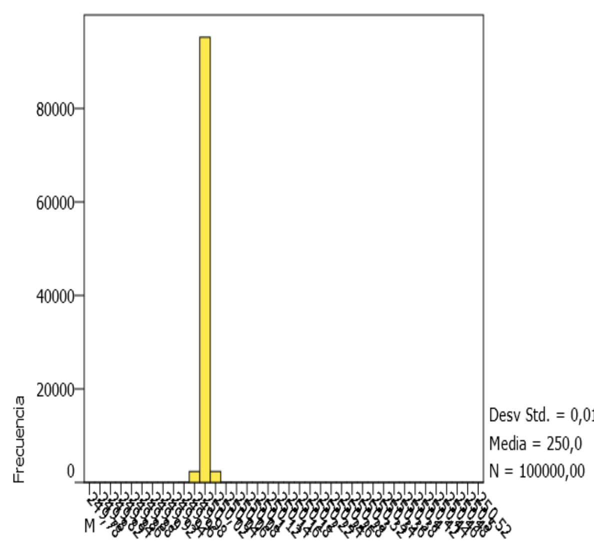

Figure 5. Histogram of Strategy 4