

Statistical Analysis of Weight Measurement Data of a Counting Scale.

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Abstract

When the weight of the output units coming from any manufacturing process is known and, as a consequence of a high turnover, a big amount of them has to be counted, counting scales are commonly used with this purpose. Since the goal of counting scales is counting units, for a general case *their task should not be limited to weighing and dividing by the unitary weight*. On the contrary, *they must register and count the leaps on the reading* during the process. Otherwise, changes or small uncertainties on the unitary weight, nonlinearities of the sensor measurements, falling shaving material or any other accidental change of the final weight would be translated into a wrong result at the final count.

Depending on the application for which they are designed, counting scales may implement many different characteristics and abilities like: different-weight-units counting, very high or low maximal number of units, detection and correction of impulsive-disturbances, intelligent correction of the expected unit weight or, even, alarm function for detection of defective pieces. Each characteristic determines some aspects of the algorithm to be used.

This thesis has been worked out in the laboratories of the Hochschule für Technik, Wirtschaft und Gestaltung (HTWG) Konstanz and deals with an industrial counting scale located in these laboratories as a part of a common general project between the already mentioned HTWG Konstanz and the companies DigiSens AG and Georg Fischer AG. In this document, an statistical study of the measurements is carried out and a counting algorithm is developed that fits the characteristics of this concrete scale.

“- Cinq cent un millions six cent vingt-deux mille sept cent trente et un. Je suis sérieux, moi, je suis précis.

- Et que fais-tu de ces étoiles?”

A. de Saint-Exupéry, “Le Petit Prince”

*A mis sobrinos Javier e Inés.
A Salvi Ortolá, a Alejandro Calo, a Luis Valverde*

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Acronym list

HTWG Hochschule für Technik, Wirtschaft und Gestaltung

NSE non-stationarity estimator

PDF probability density function

UCL higher control limit

LCL lower control limit

CI confidence interval