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Checkweighers' Double Product Error and Improved Productivity

When using a checkweigher, you may have experienced a sudden occurrence of a double product error. Frequent double product error can decrease productivity. This paper will focus on the error and propose a solution.



[1] What is a double product error?

If two packs are on the weigh table at the same time, a double product error will occur and the system is forced to reject both packs since each individual weight cannot be determined. This is called a double product error (**Fig.1-1**). A common solution is to increase the speed of the checkweigher's conveyor to separate the packs (**Fig.1-2**), or to install a feeder controller which holds up closely-spaced packs to feed them at a fixed interval.





Fig. 1-2: Belt speed adjusted

However, even with such measures, many users still get double product errors everyday because spacing is easily disturbed while the pack is traveling on the conveyor or transferring to the next conveyor.

[2] Pitfalls of preventive measures

What kind of problems can be caused by a double product error? When a double product error occurs, the pack is evaluated as "unmeasurable" and rejected, even when the weight is within specifications. The rejected pack must be fed to the checkweigher again if you want to ship it. But in the meantime, chilled and frozen products may be wasted.

In order to prevent this from occurring, many checkweigher users may have set the belt speed of the checkweigher higher than the upstream conveyor. However, if the belt speed becomes faster, the pack will be on the scale for shorter time, which reduces weighing accuracy. Furthermore, because of the reduced accuracy, the user needs to increase filling volume to ensure that no packs fall below the specified minimum weight. Although the filling volume increased for this purpose may look subtle, it would come to hundreds or thousands of kilograms over the year.

[3] Enhanced productivity with SMF

Here we introduce Anritsu checkweigher's Smart Measurement Function (SMF). It has been developed to reduce double product errors as well as product giveaway while maintaining weighing accuracy.

Then, how does SMF work? A checkweigher processes weight signals while the weight is stable (Fig. 3-1). Conventional checkweighers use only one filter and are not capable of processing signals when signals become suddenly unstable due to double products, resulting in rejecting both packs. SMF, however, processes the weight signals of only a stable phase by using a shorter weighing interval filter (Fig.3-2). Even when two packs are on the scale at the same time, no weighing error occurs.









Now, take a close look at the effect of SMF. We conducted an experiment using a bag of cereal (Fig. 3-4), whose contents move easily in the bag and accuracy fluctuates a lot. The weight of the cereal is 44.87 g.

First, we set the belt speed to 50 m/min and fed the pack 10,000 times. No double product error occurred. Next, we decreased the belt speed to 40 m/min and fed 10,000 time using SMF and then another 10,000 times without using SMF to see how much SMF saves material waste. We calculated "production loss" — a double product error involves possible product waste — and "raw material saving" by the formula shown in Fig. 3-1. "Raw material saving effect" was determined by adding production loss to raw material saving. The results of the experiment are shown in Table 3-1.





Fig. 3-3: Calculation

Fig. 3-4: Cereal

Experiment	Condition		Weighing	Double	Production	Raw material	Raw material
	Belt speed	SMF	accuracy (3σ) [g]	product (piece)	loss (1) [g]	saving (2) [g]	saving effect (1+2) [g] _{Note2}
(A)	50 m/min	OFF	0.14	0			
(B)	40 m/min	OFF	0.06	30	-1346.1	800	-546.10
(C)	40 m/min	ON	0.10 _{Note1}	1	-44.87	400	355.13

Table 3-1: Experiment result

Note 1: Even when SMF is on, weighing accuracy will not decrease if double product does not occur.

Note 2: Raw material saving effect will not be seen if the amount of raw materials fed in the upstream filling machine is not reduced.

In (B), where belt speed was low and SMF was not used, double product error occurred 30 times. Although its weighing accuracy was much higher than (A), the raw material saving effect was only -546.10g. On the other hand, in (C), where SMF was used, double product error occurred only once, and weighing accuracy became higher than (A), resulting in the raw material saving effect of 355.13g. Consequently, production efficiency of (C) is much higher than that of (A).

[4] Conclusion

SMF helps you minimize double product error and improve productivity. SMF may not produce large effect when the product's position is less likely to be disturbed or the product weights are widely varied. However, with the increase of ready meal product production due to the changes in lifestyles and eating patterns, many food companies are expected to expand their product range. SMF will be your useful tool if you have a problem of double product error with a particular product in the feature.