

Product inspection

High accuracy and speed inline checkweighing for industrial cheese making

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Introduction

Product weight is one of the most important quality parameters of consumer goods. From grocery items such as salad mix, nuts, and cheese; all the way to pharmaceutical and personal care products. Underweight product can lead to unsatisfied customers and considerable damage to a brand's reputation, while overweight product over time could reduce profitability for manufacturers. Inline checkweighers are widely used to continuously monitor product weights. In this application note, a unique inline checkweighing solution for industrial cheese manufacturers will be discussed in detail. For this application, only weighing and labeling of the product weight are needed, and rejection of under- or overweight products is not required.

Inline checkweighing

Inline checkweighers are an engineering solution that can be integrated directly into manufacturers' processing or packaging lines. A typical inline checkweigher system consists of a weigh frame that supports the entire system, infeed conveyor, weigh table, outfeed conveyor, reject device, electronic controller cabinet, and HMI (Human Machine Interface). The weighing accuracy depends on the line speed, the stability of the product on the weigh table, and environmental factors such as floor vibration and air flow in the surrounding area.

Industrial cheese manufacturing

Industrial cheese is produced in large quantities within a highly automated process compared to artisan cheese making, which is produced primarily by hand, in small batches, using as little mechanization as possible in the process. Industrial cheese is used as an ingredient for further food processing, such as fast-food chains, restaurants, or frozen meal producers. Pasteurized cheese making starts with fresh milk that is pasteurized to kill bacteria. Then cultures are added to help set the milk, which is subsequently churned, processed, and molded to produce different varieties of cheeses. The freshly made cheese is then transferred to a maturation or storage facility, where the moisture content of the cheese is closely monitored. Once the cheese is deemed ready, each cheese wheel or block of cheese is weighed and labeled before being shipped out to distributors or end users for further food processing. Traditionally, the wheel or block

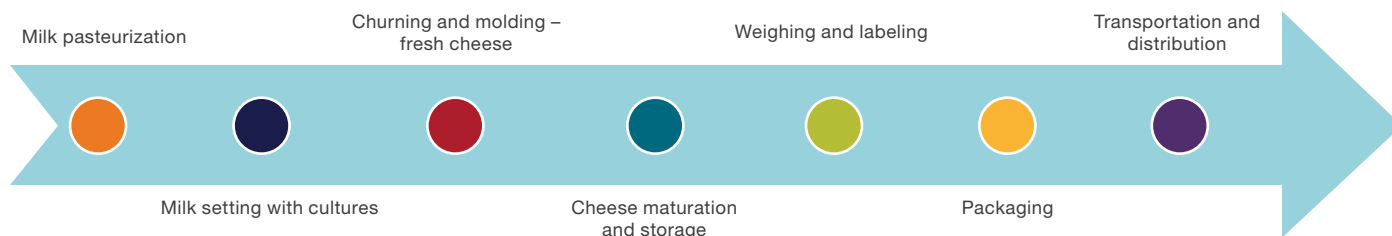


Figure 1. Industrial cheese making at a glance.

of cheese is weighed manually on a static scale, which is a labor intensive and time-consuming process. Whereas an inline checkweigher weighs each individual cheese product directly on the production line, saving valuable production time and labor costs.

Inline checkweighing is commonly used to provide weight information on the finished cheese products. The industrial cheese market generally does not require a controlled weight range since it is sold by a fixed value per unit weight. Therefore, no rejection of under- or overweight products is needed. However, precise measuring and labeling is still required in order for the final batch weight of the cheese to be calculated for accurate invoicing.

Thermo Scientific™ VersaWeigh™ (product number HB80NL) inline checkweigher is a unique offering that is certified by the European Measurement Instruments Directive (MID) for accurate weighing. This model is widely used by industrial

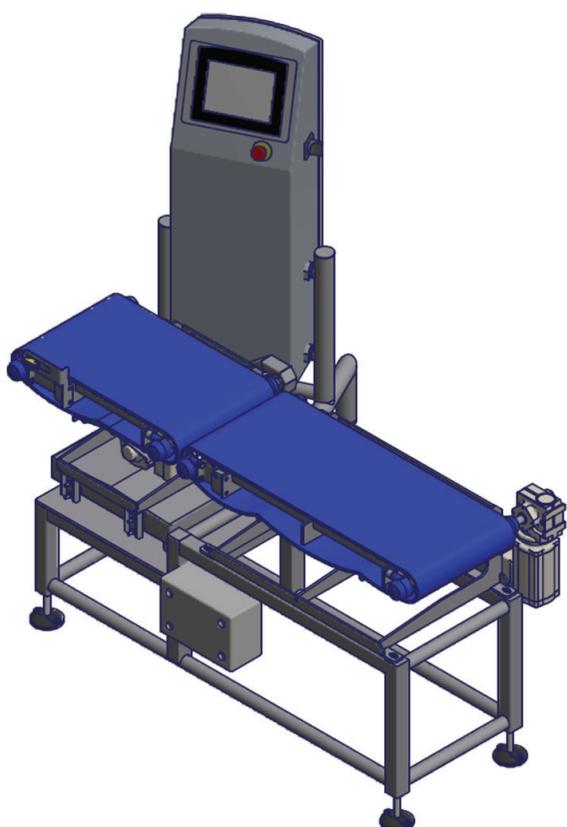
cheese manufacturers in Europe to automate their cheese weighing and labeling process. For industrial cheese making applications, wheels of cheese pass over the weigh table of the inline checkweigher at a rate of more than 4,000 units of cheese per hour. The VersaWeigh HB80NL has a weighing capacity of up to 30 kg per unit with ± 20 g accuracy. After the cheese passes over the weigh table, the weight is recorded, printed onto a label, and then attached to each unit of cheese. Multiple photo eyes are required in this process to determine the precise movement of the cheese product, ensuring the right label goes on the right product.

Challenges

There are several challenges associated with inline checkweighing for industrial cheese production.

Hygienic environment and contaminant control

The food industry has one of the highest hygienic standards in consumer good manufacturing. It is vital that manufacturers protect public safety by ensuring there are no physical or microbial contaminants present in their products. This will also help manufacturers to protect the reputation of their brands. Thermo Scientific™ inline checkweighers can be customized to comply with EHEDG (European Hygienic Engineering & Design Group) standards in Europe and Asia Pacific, as well as 3A sanitary standards to meet customer's hygienic requirements across the globe. Most processing areas within an industrial cheese production facility go through routine wash downs with hot water or harsh chemicals. Minimizing cleaning fluid buildup on processing equipment and instruments is essential to control microbial contaminant growth and avoid corroded machine parts that could potentially erode and lead to the introduction of physical contaminants over time. The VersaWeigh HB80NL was designed to minimize any flat, horizontal surfaces and slots to reduce buildup that can occur during the production or wash down processes. A few examples of these hygienic elements include rounded motors and foot design, as well as a solid support frame (no hollow tubing). It is always recommended to discuss application details with your product inspection manufacturer to ensure the correct system configuration is installed at each critical control point.





Weighing accuracy

Due to the high cost of industrial cheese per unit weight, precise weighing accuracy is needed to protect profitability of both manufacturers and their customers. Here are several factors to consider when operating inline checkweighers to achieve the highest accuracy:

- a. Select an inline checkweigher system with the optimum weighing capacity based upon the required product weight range
- b. Mechanical alignment of the equipment should allow for a smooth product transfer throughout the inline checkweigher system; from the production line outfeed onto the checkweigher infeed, over the weigh table, onto the checkweigher outfeed, and then to the reject system
- c. Sufficient weigh table length to ensure there is enough settling time of the product before weighing to minimize noise caused by product movement
- d. Sufficient distance (product pitch) between products to ensure ample weighing time per product without interference; there should never be more than one product on the weigh table at a time during the weighing process
- e. Routine calibration and preventative maintenance of the inline checkweigher
- f. Floor vibration
- g. Air flow around the checkweigher system
- h. Additional environmental factors such as adjacent processing equipment or accidental contact from operators or vehicles

Minimum maintenance

Industrial cheese manufacturers operate on a 24/7 schedule to meet increasing customer demand. Any downtime caused by equipment maintenance or repair is less than ideal. Parts breaking down over time is the number one cause of down time as most inline checkweigher systems do not have components that wear out such as O-rings or diaphragms. It is important for manufacturers to plan for preventative maintenance and stock spare parts.

Concerns of physical contaminants

Although industrial cheese producers practice the highest level of hygienic measures, unwanted physical contaminants can still make their way into the end products. This will inevitably lead to product rework or even a product recall, which could significantly damage a brand's reputation. For a complete end-of-line quality system, it is recommended to utilize an inline checkweigher in combination with either metal detector or X-ray inspection systems to screen the finished product for contaminants that may have been introduced during the production process.

Conclusion

Inline checkweighing is a key step to ensure the profitability of industrial cheese manufacturers and their customers. This same weighing and labeling application for inline checkweighers can also be applied in other industries such as bulk nuts and raw meat processing facilities.

 Learn more at thermofisher.com/checkweighing

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