Moisture Analysis of Materials in Fruit Gum Candy Production

The PMD300 series online moisture analyzer is the optimal solution for achieving the objectives of economizing on the use of corn starch and of improving energy efficiency by continuous online monitoring of the moisture content of materials.

Abstract

Originally applied primarily at pharmaceutical companies, the Process Analytical Technology (PAT) initiative of the U.S. Food and Drug Administration (FDA) is now becoming a widespread trend in the food industry for monitoring, controlling and documenting important parameters that are decisive for product quality and processes, the so-called CPPs (critical process parameters). As suggested in the PAT initiative, various sensors along with intelligent software for data acquisition and evaluation are used to monitor CPPs. As a result, this enables direct real-time monitoring and control of a process.

A key CCP is the moisture of a material as it has a major impact on product quality and the processability of an intermediate or final product, thus playing a major role in both the pharmaceutical sector and the food industry. Primarily in the food industry, where many different pourable or granular products are encountered as intermediate or final products, the moisture of materials determines their processability and shelf life, and is often decisive for their quality. If certain raw materials are too moist, they can stick together, forming clumps. This causes considerable difficulties both during storage and transportation. If materials are too dry, they cannot be sufficiently mixed or adequately further processed by mechanical means. Ultimately, the price of products or raw materials is often calculated based on their weight and this, in turn, depends on their moisture content.

Customer Requirements

In the production of gelatin-based confectionery, the so-called mogul technique is used in which an impression is made in a molding powder, such as corn starch, so that a fruit-flavored soft jelly gumdrop or gummy bear is molded. During this process, the mogul starch must be sufficiently stable for the molding process. This stability is achieved by adjusting the moisture and temperature of the molding starch, depending on the type of final product desired. In addition to these two parameters, the dwell time under defined storage conditions has a decisive impact on the product quality as this constitutes the final step in the product manufacturing process.

Depending on the type of final product, the degree of gelatinization in gelatin-based fruit drops is controlled by adjusting the moisture and temperature of the molding starch.

Corn starch is frequently used in such processes to manufacture gelatin-based candy, such as gummy bears. In this case, corn starch is reutilized several times to use this material as efficiently possible. The molding process alters the moisture content of corn starch as the gelatin mass transfers moisture to this substrate. To optimize the amount of corn starch employed in molding, this material is dried after the molding process and reused, in turn, as a raw material in the next molding process. However, drying requires considerable use of energy, on the one hand, and it is important to adjust the moisture of this material to the right target value, on the other hand, as this affects whether the molding process will function properly. Moreover, a quality attribute constituted by surface texture, such as sheen, is decisively impacted by the quality of the corn starch.

PMD300 Series – Online Process Analysis

- Measuring time < 1 second
- Non-destructive moisture analysis
- Ports for connection to a PC and a PLC
- Monitors, logs and optimizes industrial processes
- Wide choice of interfaces, accessories and options
Solution

The customer opted to use the Sartorius microwave resonance moisture analyzer from the PMD300 series for monitoring the starch drying process and for ensuring optimal molding. The advantage of this equipment solution is that it enables 100% monitoring of the corn starch employed, which enables the use of energy for drying to be optimally controlled. As a result, the online microwave resonance analyzer ensures consistent material moisture and thus consistently high product quality. As the analyzer continuously transmits the moisture values to a higher-level process logic controller, this makes it exceptionally easy for operators to control the amount of energy used during drying. In addition, the analyzer in the standard version can be configured to emit alert signals, such as activate signal LEDs if the moisture of a process exceeds the tolerance range limits, without having to implement any additional process control equipment. The analyzer can also be set to display the moisture reading to enable a machine operator to be alerted in due time so that he or she can intervene quickly in a process in progress as needed.

PMD300 series: analyzer featuring microwave resonance technology for online moisture control.

The online moisture analyzer enables non-destructive measurement and can be used to monitor and control process sequences.