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Quality Control in the Production of High-Quality Plastic Parts

Vietnamese plastics manufacturer uses Sartorius Mark 3 moisture analyzers for fast, simple and highly accurate measurement of the moisture content of polymer resins during production and receipt of goods.

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Abstract

The customer, Tien Phong Plastic JSC, a leading Vietnamese manufacturer of plastic parts, was seeking an option for the precise, fast and simple measurement of moisture levels in plastic granules during receipt of goods and production. The aim was to meet the highest quality standards whilst maintaining cost-efficiency.

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The Customer

The company Tien Phong Plastic JSC, which is based in Hai Phong City in Vietnam, is a highly visible brand name and one of the leading manufacturers of plastics products in Vietnam.

The brand stands for a high-quality and diverse product range combined with reliable maintenance and warranty services. Tien Phong products include pipes and connections made from UPVC and HDPE. With three production sites in Hai Phong, Binh Duong and Vientiane (Laos), the company has an annual production volume of up to 75 tonnes.



Requirement

Moisture content is an important parameter in the production of plastic parts. It is decisive in ensuring the correct material properties of the finished plastic part. In particular for products, such as those manufactured by Tien Phong, in which consistent quality is the top priority, monitoring of the moisture content in the starting material is essential. If the moisture content in the starting material is too high, processing problems may occur during injection molding and reduce the quality of the final product. Typical problems include surface streaking, formation of burrs and poor mechanical properties. For this reason, hot air dryers are used to remove any residual moisture from the material. Without an accurate starting value, however, the granules are dried according to approximate guideline values and based on experience. In many cases, this leads to the granules being dried excessively, and in some cases technically important plasticizers and additives may also be dried out as well as the water.

This may result in altered flow properties and reduced durability and elasticity. Essentially both moist and overly dry granules can cause quality problems and may lead to rejected products, scrappage, complaints or even contractual penalties.

In addition, it is desirable to avoid unnecessary drying in order to reduce energy costs. Against this backdrop, the measurement of moisture content during incoming goods checks is also important, in order, for example, to be able to refuse acceptance of goods with excessively high moisture content. In order to be able to defend the analysis results in the event of disputes, it is essential that measurements are performed in accordance with the applicable standard. The ASTM standard 6980 used in the plastics industry stipulates the use of coulometric Karl-Fischer titration as the applicable standard method. However, this complex wet-chemical method uses toxic, potentially teratogenic chemicals, which means that it can only be performed by specialist personnel and specific safety precautions must be taken. Tien Phong would like to avoid using this method.

As a supplier, Tien Phong is also subject to supplier certification procedures and would thus like to be able to offer its customers comprehensive quality management in accordance with the principles of TQM (Total Quality Management) and the standard ISO2001:2008. To this end, traceability of products and corresponding documentation are essential.



Simple operation combined with fast and highly accurate measurement results impress users.



The plastic granules are filled directly into the sample pan without any preparation. A single press of a button starts the measurement process.

Tien Phong therefore required an alternative solution for the fast, simple and highly precise measurement of moisture levels in polymer resins, directly during production and during receipt of goods, which does not require the involvement of laboratory personnel. The method should provide results in accordance with the ASTM standard 6980 and should include options for secure documentation to ensure traceability.

Solution

Tien Phong opted to use the Sartorius Mark 3 moisture analyzer, which functions based on the thermogravimetric method (drying difference). Thanks to its highly accurate weighing system, the Mark 3 moisture analyzer fulfills the stringent requirements for accurate moisture measurements in plastics, with a readability of up to 0.001% and accuracy of up to 0.005% (50 ppm).

A crucial factor in the purchasing decision, however, was the fact that the Sartorius solution was immediately ready for use.



Excerpts from the product range. Comprehensive quality management is essential for high-quality plastic parts.



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Thanks to its extensive experience, Sartorius has already determined the correct setting parameters for over 10,000 different polymers available on the market. The method for all the types of plastics processed at Tien Phong can thus be selected directly on the device. These parameters, which are determined individually for each material, ensure that the measuring method complies with the ASTM standard 6980. The results determined will therefore pass any objective test and are internationally comparable.

Tien Phong was also especially impressed by how easy the device was to use. After a brief training session, production employees are able to measure moisture content themselves, directly on the injection molding machines. Moreover the method does not involve any toxic chemicals at all. The granules are simply poured into the device's sample pan, which is tared in advance, and the hood closed. The measurement process starts and ends automatically. The result is displayed after only around 10 minutes. For documentation purposes, all measurement results are printed out on the integrated printer and also saved on the device. Should problems occur during processing or with the final product, the moisture content of the granules during processing can be traced at any time.

Thank to the Mark 3 moisture analyzer, Tien Phong has been able to further increase the quality of its products; laboratory and energy costs for drying the granules have been greatly reduced; and the number of rejects and complaints has fallen. The new, comprehensive quality concept is also impressing international customers. As well as improving cost-efficiency, the investment is also improving the company's image amongst customers and in turn increasing the number of incoming orders.

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