

Why Moisture Measurement is Crucial in Powder & Bulk Solids Operations

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Moisture is important in any manufacturing process, but when it comes to powder & bulk solid processing, excess moisture can ruin products. And what is worse than a wasted effort? Economical losses and decreased productivity. Adrian Fordham from [MoistTech Corp](#) tells us more.

With continuous online moisture measurement, manufacturing/processing plants will find huge money savings. From savings in transportation due to weight of excess moisture, to savings in water usage for dust suppression and clean-up, plants also reduce the amount of wear and tear on equipment due to the dust and ash build-up and prevent blockages on the conveyor resulting in shutting down the boiler.

Benefits of moisture measurement and control include:

- Reduce dryer usage and energy costs
- Properly control the infeed and dryer exit
- High-quality product through instant accurate moisture control
- Consistency of final product
- 100 percent product inspection
- Dust and fire elimination
- Reduce purchase costs from water weight
- Plant production efficiency monitoring

- Blended monitoring for control of moisture and resin
- Reduce downtime

Near Infrared Technology and Moisture Control Although the discovery of near-infrared (NIR) is attributed to William Herschel in the late 19th century, the first industrial application was not until the 1950s. NIR spectroscopy and imaging are fast and nondestructive analytical techniques that provide chemical and physical information of virtually any matrix. NIR can tell us things about a product in a similar way to visible light. When light hits a product, it will interact in various ways. Transmitted light will pass through the product while backscattered light will reflect from the product. Light will also be absorbed by the product. Absorption is the key to the most effective moisture measurement analysis technique.

Moisture measurement is extremely important during mineral processing from mining to the final product. Moisture measurement is critical in all aspects of the mining process. Thus, mining companies are constantly adjusting moisture to maintain the quality of their product. Testing moisture content throughout the process also provides mineral manufacturers cost savings in energy and fuel costs, as well as having less product waste. With continuous NIR online moisture testing, manufacturers can monitor moisture levels which they in-turn, can precisely control their dryers to optimize the production process with minimum energy requirements.

Ideally, a moisture control system should be able to accurately detect moisture in raw materials, preferably at different stages of the manufacturing process, be easy to maintain, and tough enough to withstand the harsh, abrasive nature of the raw materials and the mixer environment.

Controlling the Ash Residue

In some manufacturing facilities, controlling the ash residue is a critical concern of plant operators. After combustion, the ash residue that is left is sprayed with water to reduce dust and odors which is then transported to landfills/moonfuls. However, too much or too little moisture can create several problems for some manufacturing plants.

Managing the ash residue in a waste-to-recycling application is an important step for many reasons at incineration facilities around the world: from minimizing the possibility of ash dust inhalation and ingestion of employees, to preventing ash being absorbed into the environment, as well as lowering transportation costs due to weight. With NIR moisture sensors, operators will be able to instantly and continuously measure ash moisture and control these problems.

Preventing airborne dust and controlling weight of the ash, it is recommended that a sensor is installed after combustion and moisture spray. From past installations and depending on the matrix of the ash, the optimum moisture range is 15 to 18 percent with a target of 15 percent for control of dust and weight of the ash. The moisture content lowest point is 12 to 14 percent before the ash becomes airborne, and above 25 percent moisture the ash turns into mud that contains surface moisture (liquid) making it heavy and expensive to haul away.

Advances in real-time sensing, data collection, and data analysis and interpretation helps to determine the characteristics of the materials prior to processing providing process efficiency and optimization. Regular measurements of moisture in most manufacturing lines remains a necessity for control of drying, thereby reducing treatment costs.

Additionally, small variations and excess moisture in mixes in some applications can result clumping affecting quality and consistencies. A product that is too dry can result in excess dust. Measuring moisture prior to crushing can control particle size and provide dust suppression. During the drying stage, in-process measurements ensure optimization and elimination of over-drying, which can lead to product that is out of specification, degradation, and an excess of dust.

With continuous online moisture measurement, manufacturing plants will find significant money savings: from savings in transportation due to weight of excess moisture, to savings in water usage for dust suppression and clean-up. Plants also reduce the amount of wear and tear on equipment due to the dust and ash build-up and prevent blockages on the conveyor resulting in shutting down the boiler.

The Benefits of a Moisture Measurement System

As mentioned previously, manufacturers can see multiple benefits with a moisture measurement and control system, including:

- Reduce dryer usage and energy costs
- Proper control of the infeed and dryer exit
- Better quality of final product
- Consistency of final product
- 100 percent product inspection
- Dust and fire elimination
- Reduce purchase costs from water weight

Immediate ROI is seen with the installation of a moisture measurement system as the plant controllers can instantaneously notice the reduced waste and energy usage, and over increase in product quality.

When looking at moisture measurement systems, be sure to evaluate features that will be most beneficial to your operation. The best ones to look for are:

- One-time calibration: Pre-calibrating the sensor to be ready to read your specific application.
- Multiple applications can be read: The moisture measurement system can remember up to 50 different applications and measurements, so you can easily switch back and forth to allow the machine to acknowledge a new product is being read.
- Immediate results: The sensor produces hundreds of readings per second to allow the user to have immediate access to the product moisture content, allowing for increased or decreased dryer control.
- All equipment included: Everything needed to operate the sensor is included and the software can be installed on an unlimited number of devices, allowing for better access throughout the process.
- State-of-the-art technology: Continually researched and updated technology allows for the most accurate results in the moisture measurement industry.

- 30-day performance guarantee: See results or send it back – plain and simple.
- Installation: Ideal for installations on chain and screw conveyors.

Typical accuracy with a NIR sensor is about ± 0.2 percent for ash moisture applications with a moisture range of 0 to 30 percent moisture. The sensor should be installed several inches above the conveyor belt. Once installed operators can continuously monitor the process and control the moisture content either manually or automatically. For monitoring and control, the sensor(s) can be directly connected to the users PLC or any laptop. In addition, look for instrumentation that can monitor the system even with small gaps in product flow and is unaffected by ambient light without impacting the accuracy.