

# A MOISTURE CONTROL SYSTEM

## for Animal Feed Production

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***AT LAST! A moisture control system for animal feed production that really works and delivers a good return on investment.***

If you were to ask feed mill managers what aspect of their process causes them the most frustration and was the most difficult to control what would the answer be? We *have* asked and the answer from a sizeable majority of managers was their inability to consistently control finished product moisture effectively. So what are the problems?

The raw materials used in this industry have unpredictable moisture levels as a result of the effects of weather on crops. Materials such as wheatfeed may be converted without strict moisture control other than to stay below a maximum contracted level. The moisture in materials can vary significantly during storage and when materials are blended together and processed the finished product moisture content can vary by anything up to 6% and will typically range from 9% to 14%. The variation in finished product moisture levels will depend heavily upon the formulated levels of individual materials used.

At almost every point in the milling process the moisture content of a batch of material will be different. Changes will be introduced by the grinding process, the addition of liquids such as molasses, water and steam, the heating action of conditioning, extruding and the cooling process. Even if the moisture at the start of the process was known it is almost impossible to predict the end result in a conventional plant accurately.

Where moisture enhancement or correction is attempted the vagaries of the process almost inevitably mean that a significant element of safety has to be built in, particularly during periods of hot and damp weather which introduces yet another variable. Excess moisture can result in press blocks, poor physical quality or mouldy, sticky product in storage on the customer's farm.

If moisture content is to be controlled effectively it must be on a batch by batch basis and there needs to be a reliable, repeatable means of accurately determining the moisture content of the blended feed. This will enable water to be added accurately, if required, which should deliver the required end result with minimal operational or quality problems.

When moisture content is controlled effectively it will release previously unrealisable pockets of profitability which will gravitate to the bottom right hand corner of the accounts!

Historically, there have been two moisture measurement

methods used in feed milling: capacitance and infra red. Both of these methods rely heavily upon the characteristics of the raw materials in the formulation to produce an effective calibration. Whilst it is relatively easy to calibrate the instruments used in both methods for individual raw materials, the very nature of the feed trade with its variable sources of materials, the wide variety of formulations and the inevitable changes, even for one species, render these both impractical, and ineffective.

At Datastor we have been actively working to find a solution to the problem of poor moisture control in animal feed production for over ten years. Moisture control is also fundamental to a wide cross section of industry where the effect of tightly controlling product moisture content on production efficiency and financial performance would also be dramatic. As a supplier serving the plant control and information management needs of customers from a spectrum of industries Datastor gets a broad view of technical developments in measurement which has allowed us to identify the enabling technology which MoistureScan from Doescher and Doescher provides.

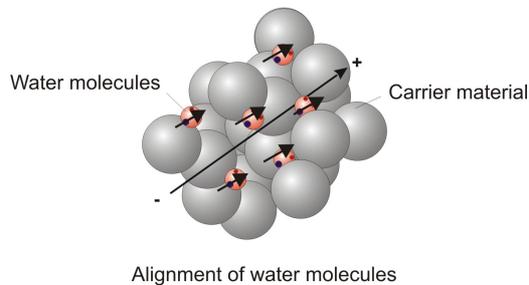
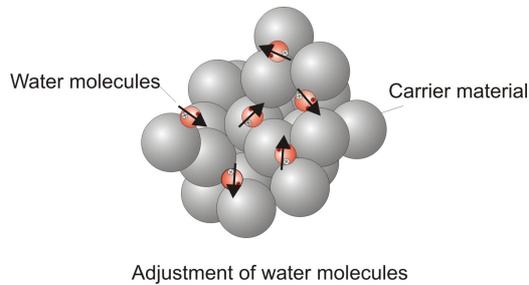


'MoistureScan', a patent applied for industrial moisture measurement instrument, from German manufacturer Doescher and Doescher now provides the means to measure the moisture content of feed accurately within the process flow and enable us to use this measurement for accurate closed loop control of moisture. MoistureScan uses a unique micro wave based measurement technique which works independently of temperature, colour, density, weight, surface structure, texture or bed depth. Measurements are taken rapidly, up to 30 per second, and significant penetration of the product stream is achieved over a large sensor head to ensure

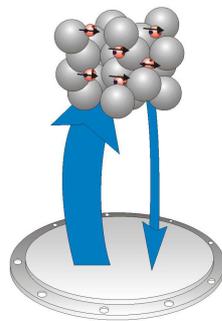
that each measurement is representative of the product moisture content overall. The sensor head is flat, non-intrusive, and can easily be integrated into the product flow

### MoistureScan's Unique Physical measurement principle

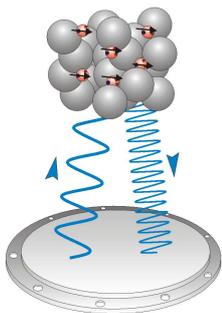
Water molecules are strong dipoles. When an electromagnetic field is projected into the product flow, the disordered water molecules in the product adjust themselves to align with the field's polarity.



If the field changes its polarity rapidly, only the water molecules can follow this change in direction as they are small and have a strong dipole property. This movement requires energy, which is drawn from the electromagnetic field. This loss of energy, which depends on the number of water molecules, is detected and measured.

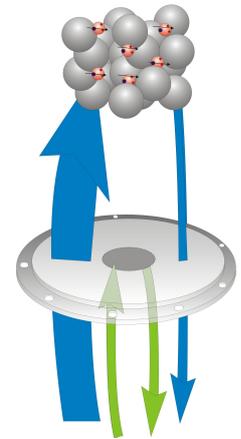


The number of water molecules in the volume of sample measured however may vary as density changes due to different product heights passing over the sensor head or due to compression of the product. These variations in density lead to a change in the propagation speed of the electromagnetic waves emitted from the sensor head. This change in propagation speed is detected and compensated for. This measuring technique therefore allows for the determination of the moisture content of a given material which is independent of its density.



*'... the technology provides a significant improvement in the predictability of product moisture content which should deliver an attractive return on investment ...'*

The SensorHead has been developed to enable environmental influences such as temperature to be eliminated completely. To achieve this a reference measurement section and a reference resonator has been incorporated into the sensor unit. This is the first time that this technique has been applied to microwave measurement technology. The system delivers precision measurement, repeatability and long term stability even under extreme temperature conditions.



MoistureScan technology has been applied successfully in a variety of manufacturing processes in Europe from the manufacture of wood pellets to moisture measurement in pet food and coffee.



The proof of the pudding, however, is in the eating and Datastor together with a major European animal feed manufacturer has now undertaken a pilot project to prove that the technology works in animal feed and delivers the benefits. The pilot project covered the development of calibration methodology as well as the measurement of moisture in meals and pellets and the closed loop control of water additions. Results show that the technology provides a significant improvement in the predictability of product moisture content which should deliver an attractive return on investment.

### Moisture Manager 4000

Datastor has now developed 'Moisture Manager 4000', a product designed to deliver the benefits of in-line moisture control based upon the Doescher technology in a package which interfaces with feed mill control systems to synchronise control parameters and report on actual levels achieved on a batch by batch basis.

The product includes the MoistureScan equipment and provides continuous monitoring of performance and trending together with remote diagnostic facilities. Moisture Manager 4000 can be integrated with Datastor PC 4000 Feed Mill Control Systems providing seamless operation and reporting.