

Online moisture analysis and control in food manufacturing

Moisture is a key process variable in the manufacture of most foods. Throughout the production process, from raw materials through to finished goods moisture can be either a help or a hindrance.

Moisture can be problematic. Incorrect and out-of-date information on moisture can result in poor plant operating decisions costing invaluable time and money. Typical problems experienced by food manufacturers due to poor moisture control include clogging of machinery, incorrect dosing or dispersing of moisture, plant down-time, increased reject material, product non-conformance, down-graded product, product payment penalties, decreased yield and volume production anomalies

Moisture can also be profitable. What would you say a 1 or 2% increase in yield would do to your bottom line? By tightly controlling moisture close to the maximum contractually allowable amount, yield increases can be realised.

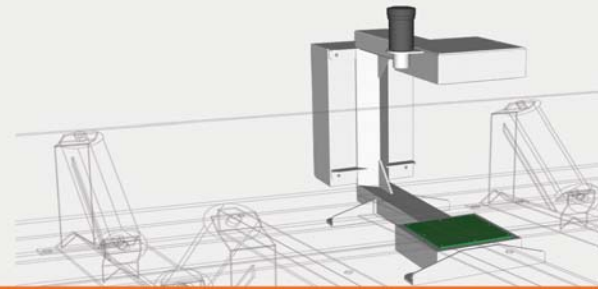
The starting point for successful moisture control in any system is having accurate, dependable online moisture monitoring capability. If you've got this, and your plant and quality control people have confidence in the system, you have the foundation for whole-of-process moisture optimization.

Moisture management specialist Callidan Instruments has a range of online moisture analysers specifically for food manufacturing. Using expertise gained in the minerals industry, Callidan has taken its successful microwave transmission technology and re-engineered it to meet the strict standards and challenging applications of the food industry. Models exist to measure moisture in most situations from the paddock to the plate.

Some examples of where MoistScan[®] online microwave moisture analysers are being used include in the production of snack foods and in the manufacture of processed cheese.

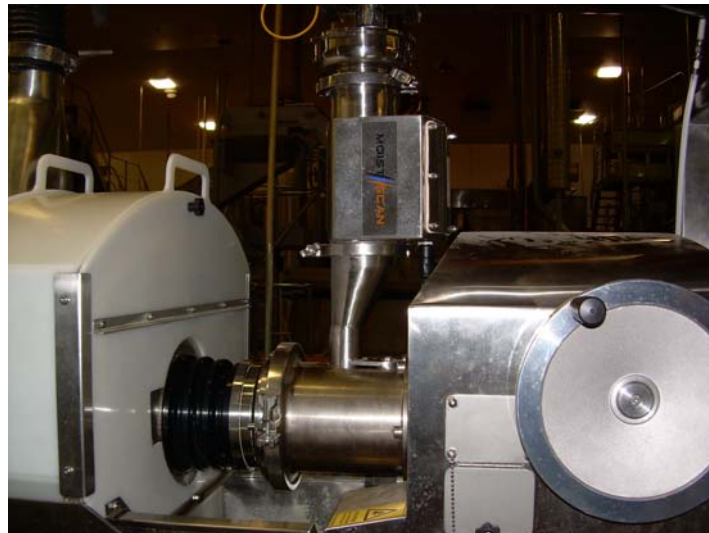
Moisture Control in Snack Foods

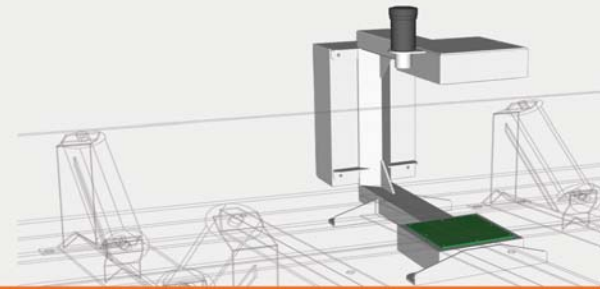
A major international snack food manufacturer has integrated MoistScan[®] analysers into several of their production lines. The batch process starts by taking raw material and adding moisture. The wet mix is then fed to a hopper where more water can be added. From the hopper the mixture is fed through a hydrator which is the final point in the process where moisture is added. Finally the mixture passes through the in-pipe moisture analyser before being extruded. Online microwave moisture analysers are installed at 4 critical monitoring points in the process. 2 analysers monitor the moisture in raw feeds. Combining this data with weigh scale data the total dry mass feed to the mixer is calculated and output via a 4-20mA signal to very precisely control the addition of water to the mixer (The



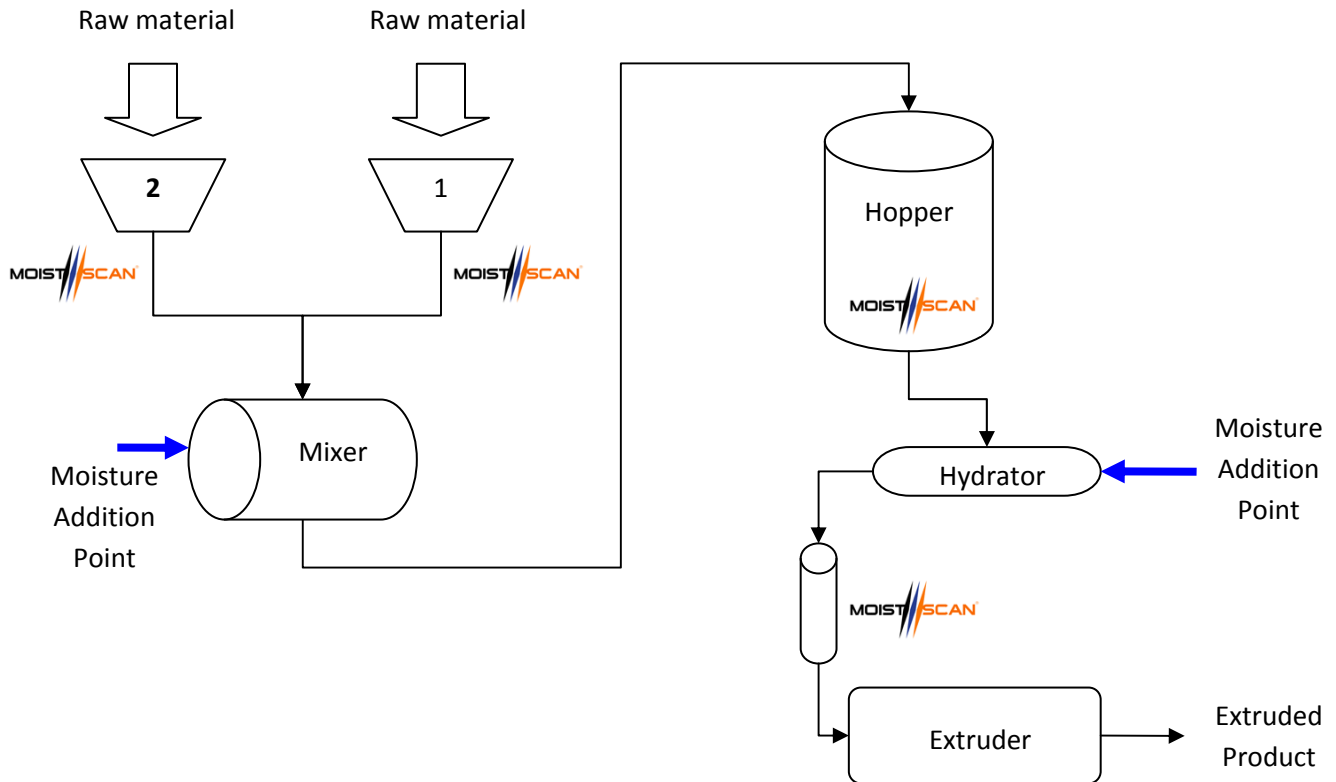
customer also uses that data as a cross check to ascertain whether their raw material supply is within specification with respect to maximum moisture percentage). Mixing occurs in batch mode. Once the batch achieves the desired mix consistency it is transported to a storage hopper. A 3rd moisture analyser is situated at the exit to the hopper feeding a hydrator. Again, this analyses in combination with a weigh scale, calculates dry mass feed to the hydrator. The final moisture analyser is situated in a pipe exiting the hydrator and feeding the extruder. Hence the inlet moisture and outlet moisture to the hydrator is known and from this information the temperature of the hydrator and the addition of moisture to the hydrator is automatically controlled. The result is a hydrated mixture of precise moisture content. If the water content of the feed mix to the extruder is too high the extruder produces “skinny” snacks which are rejected. Similarly if the moisture content is too low the extruder “clogs” and the operation stops.

In-pipe microwave moisture analyser on feed to extruder



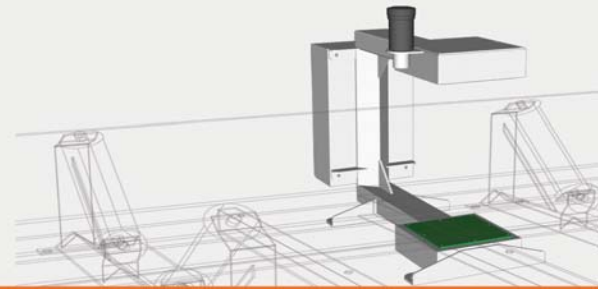


Process flow schematic



Moisture Control in Processed Cheese

Another example is controlling the moisture in processed cheese. A MoistScan® MA-700 in-pipe analyser and a ST-1000 have been installed at a large cheese manufacturing facility in the USA. The MA-700 is installed just after a steam cooker and the ST-1000 is installed on the final product which is cheese slices. Both instruments are linked into a PID controller to regulate the steam injectors to the cooker. Using the real time moisture data the moisture in the final product can be tightly controlled. This can mean big increases in yield.



MA-700 In-pipe analyser immediately downstream of steam injection cooker

Moisture Control in Syrups and Condensed Milks

The MA-700 in pipe analyser has also been used to tightly control moisture in the manufacture of chocolate syrups and condensed milk. A large international food processor has adopted MoistScan[®] online moisture analysis technology to exactly control the percentage of solids. By tightly controlling percentage of solids quality and yield can be improved.



MA-700 In-pipe analyser on condensed milk line