MAKING WAVES

Celebrating its 40th anniversary, Tews Elektronik offers ever faster and more accurate ways to determine moisture content in tobacco products.

TR Staff Report

Like many working parents, the Tews were delighted when they acquired their first microwave oven in the 1980s. The handy appliance made it a bit easier to combine demanding work schedules with domestic duties. But the purchase did more than reduce stress at dinner time; it also sparked innovation at the family business, Tews Elektronik, in Hamburg, Germany.

Thinking about the principle of microwave cooking, company founder Manfred Tews had an idea: If microwaves could be used to heat water molecules, perhaps they could also enable people to "look" inside a substance and find out its moisture content.

Needless to say, the ability to determine and control moisture content is essential for processors of tobacco, foods, pharmaceuticals and other products. Moisture content has implications for weight, the retention of freshness—that is, product quality—and the way in which a substance behaves during the manufacturing process.

Too much moisture in tobacco can create clumps, for example, making it difficult to distribute the fibers in the final product according to specification. Too little moisture, by contrast, makes the product brittle and susceptible to degradation.

In products that are valued on weight, knowing the share of weight accounted for by moisture will help traders avoid over- or underpayment. Depending on which side of the bargain you stand, you may prefer higher or lower levels of moisture in your product.

With a team of engineers, Manfred Tews set out to develop microwave moisture measurement technology. In 1989, they presented their first solution, the MW2300, to managers of tobacco factories in the Hamburg area—and left them speechless.

Until then, tobacco companies had relied on titration or drying ovens to determine moisture. Titration requires reagents, while ovens consume significant quantities of heat and energy. Both methods take time and render the samples useless for further processing.

The Tews method could deliver the same measurements within seconds while leaving the product intact. The electromagnetic field used was weaker than that generated by a modern mobile phone, which meant low energy consumption and no undesired heating of the product.

The MW2300 was also the company's first moisture meter to be unaffected by product densities, resulting in more accurate measurements than had previously been possible.

The new technology became the basis for generations of Tews machinery. It turned out to be effective not only for moisture measurement but also for density measurement. This was a welcome development, because the prevailing method for determining weight at the time, nucleonic measurement, was increasingly falling out of favor due to the regulatory hassles associated with handling radioactive materials.

The Tews method

Like most good engineering solutions, the Tews method owes its success to its simplicity.

Water molecules residing on the surface or in the pores of solid substances are dipoles, which are influenced by external electromagnetic fields. Dipoles change their orientation in response to changes in the polarity of the field while transforming the field's energy into heat.

By measuring the interaction between microwave fields and water molecules, microwave moisture meters can calculate the moisture value. The Tews moisture measuring method uses a resonator to generate a low-powered microwave field resonating characteristically within well-defined parameters.

Filling or covering the sensor with a product, such as tobacco, will change the resonance frequency and bandwidth. The degree of change depends largely on how much water the product contains.

The resonance readings are proportional to the moisture. Unlike some other technologies, microwave measurements are unaffected by product color or varying densities. The analyzers measure an aggregate value of core moisture and surface moisture. The method is also quick, allowing several thousands of readings to be taken and shown every second. Another advantage is that microwave meters must be calibrated only once.

Bluelines

While celebrating its 40th anniversary this year, Tews Elektronik is introducing its fourth generation of microwave moisture measuring equipment. The company has developed online systems for various sites in the primary and secondary departments. Its products are particularly useful for use after the conditioning and casing cylinders and dryers, and for weight control in cigarette making machines. But they can also measure moisture in whole tobacco bales and cartons, or the levels of plasticizer in filter tow.

Offered under the name Blueline Series, the latest generation of Tews machines features entirely new electronics and software, allowing for even faster and more accurate moisture measuring.

The company has gone to great lengths to make its equipment as user-friendly as possible. "People—especially younger people—like touch screens and interactive interfaces," says Andre Tews, son of Manfred Tews and executive manager of Tews Elektronik. "Previously, we used a DOS environment, which was very reliable but also limited. We can now offer interfaces in various languages, including Chinese and Japanese."

The advances in computer processing power have caused a shift in focus within Tews. "Our software department has grown to seven people from three in recent years," says Tews. "We now spend more time on developing software than we do on the hardware."

Tews is particularly proud of the company's second-generation MW4420 measuring station, which can measure both the moisture and density of cigarettes and cigar products.

Tews MW4420 helps tobacco manufacturers ensure that their cigarettes have the correct densities in the right places. Together with its moisture-measuring abilities, it is an ideal instrument for controlling the quality and cost of many different cigarettes.

According to Tews the MW4420 can be used for multifilters too, which require accurate cutting. The machine keeps track of minimum, maximum and average moisture and density values. Results such as mean values and standard deviation are shown graphically and can be printed if desired.

Data can be exported to a USB memory stick for further processing by external programs. The Ethernet port allows integration into an enterprise network.

Tews recently shipped the first MW4420 and is confident it will ship many more.

Just like manufacturers of microwave ovens made life easier for busy households, Tews aims to reduce the workload of its customers by making moisture measurements quick, accurate and hassle-free. TR

Executive manager Andre Tews with his company's MW4420 moisture and density measurement unit