

On-Line Total Volatiles Measurement in Tobacco



- ▶ **NEW!** TM710eV model for total volatiles measurement
- ▶ Reduce instrument calibration burden
- ▶ Reduce QC testing and validation to save labour
- ▶ Measurement based upon meaningful chemical-physical models

At last, an on-line instrument measurement that measures what your oven reference method measures

As all tobacco processors know, testing tobacco moisture content is a critical requirement in the industry. But, the reality has been that any on-line measuring system be it infrared, microwave or capacitance is measuring moisture and that is not what a gravimetric test of weight loss on drying delivers. Tobacco is a complex material and during primary processing will often have constituents added such as humectants, flavourings and other dressings. Tobaccos such as Virginia and Oriental contain inherent sugars and all contain other volatile materials. In the traditional oven tests used in the industry (varying from 16 hours at 100°C to 3 hours at 105°C and some rapid methods at even higher temperature), both moisture and these volatile constituents are driven off and the weight loss seen on drying more accurately is described as total or oven volatiles.

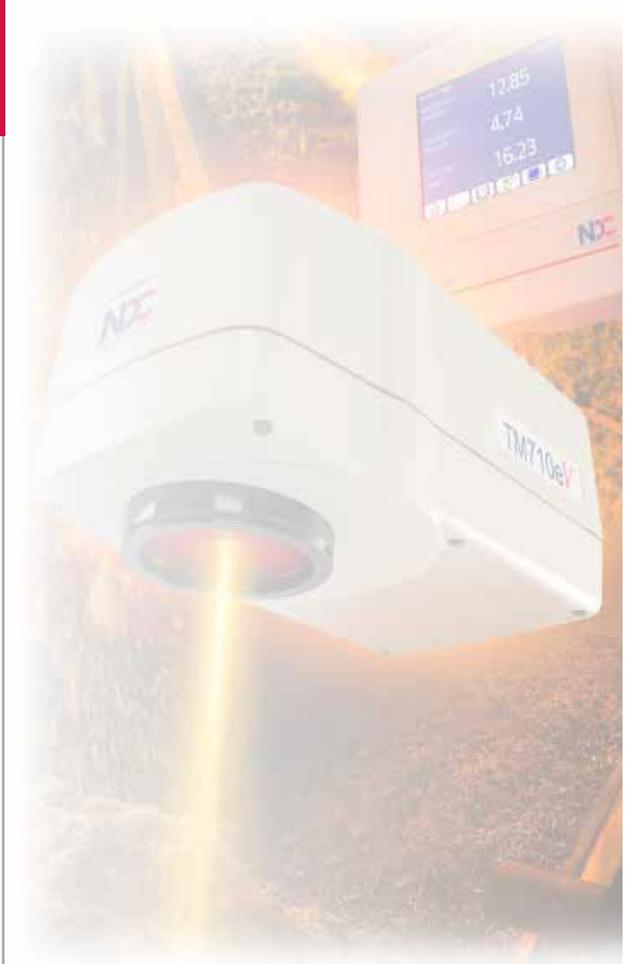
Traditional infrared instruments and microwave instruments measure water content using wavelengths selectively absorbed by moisture in both cases. This has resulted in additional calibration work for users as each product, with possibly different volatiles, gives different results with the oven test—perhaps independently of water content. Instruments calibrated to water only, will not see these additional volatiles that flash off in the oven test.

Total Volatiles measurement delivers excellent performance particularly on traditionally tough tobacco applications

The TM710eV gauge Total Volatiles algorithm ensures excellent performance across the entire GLT and Primary processing operation. The biggest benefits will be seen on leaf and strips tobacco where often single grades are being measured and the differences between the various tobaccos are therefore accentuated. The other benefit of the new measurement is its ability to compensate for the lack of equilibration in tobacco moisture which would otherwise affect an infrared measurement which is biased towards the product surface. For example, different tobaccos absorb moisture at different rates, so this feature is essential for consistent performance at the exit of the DCC.

On cut tobaccos, the improvements are less evident as the blend is well homogenised. But there are differences even with these materials as different blends will usually have different dressings and flavours which will be flashed off in the oven in addition to moisture. Key measurement locations include:

- ▶ **Primary:** Exit DCC/DCCC, Burley Toaster, final blends and all intermediate stages of processing
- ▶ **GLT:** All stages of leaf processing, but in particular after re-ordering pre baling



NDC Technologies Total Volatiles measurement is based on meaningful chemical-physical models

NDC Technologies has had a long and fruitful collaboration and experience working with the tobacco industry over the last 40 plus years. As such, we appreciate the complexity of the product and the impact of crop year changes in tobacco chemistry. We also recognise that simple measurement models for filter wheel instruments and the recently introduced so called “full spectrum gauges” with calibrations based upon potentially limited sample sets, will never deliver long-term calibration robustness for measurements on-line.

For this reason, considerable time was devoted to developing the Total Volatiles measurement to ensure this robustness and long-term success in its application. Tobacco types from around the world, including burley, flue cured, oriental, sun cured to name the majors and single grades particularly for flue cures in strips/leaf form were included in the analysis. Also cut tobacco blends with and without dressings and flavourings, and with and without DIET/expanded tobacco inclusions, were used in this work to develop a measurement that took the best of the NDC TM710e capability to measure water content but also added wavelengths specific to those volatile components lost in the tobacco oven test. These typically include volatile alcohols, glycols and similar compounds.

The result is that NDC Technologies can proudly announce the **TM710eV** gauge as a proven on-line measurement of Total Volatiles. This new gauge will stand up to the test of time giving excellent performance year after year with a significantly reduced calibration maintenance burden. The TM710eV now directly measures what is measured by the end user Gravimetric oven test.

Calibration plots in Figures 1a and 1b respectively show the comparison of the performance of the original and well-established TM710e moisture/water measurement and the TM710eV Total Volatiles measurement on strips/leaf tobacco of different grades and types. The single calibration of the TM710eV gauge is clearly offering a huge saving in calibration setup, calibration validation and maintenance—all important in the modern resource limited factories in the world today. Tests on cut tobacco blend were similarly impressive as shown in Figures 2a and 2b.

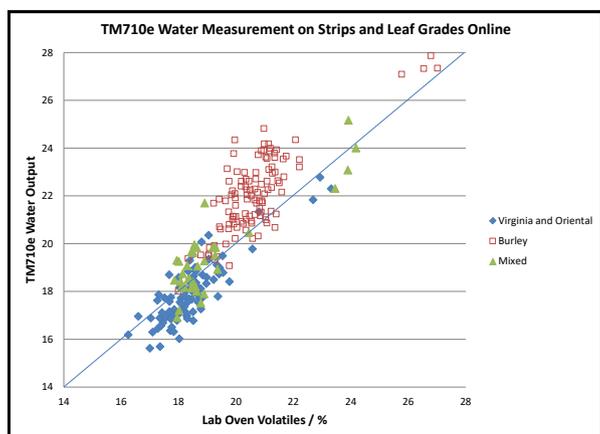


Figure 1a TM710e performance on strips/leaf tobacco

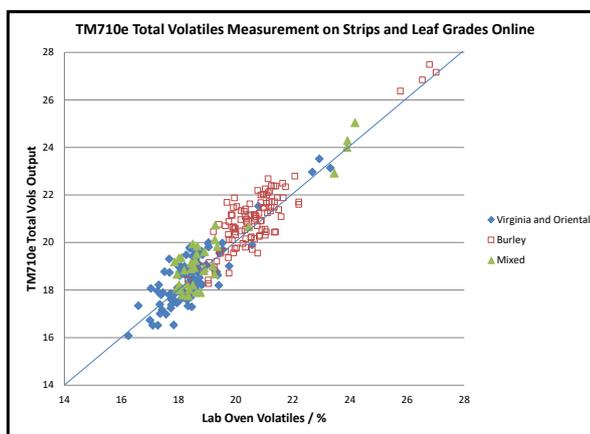


Figure 1b TM710eV performance on strips/leaf tobacco

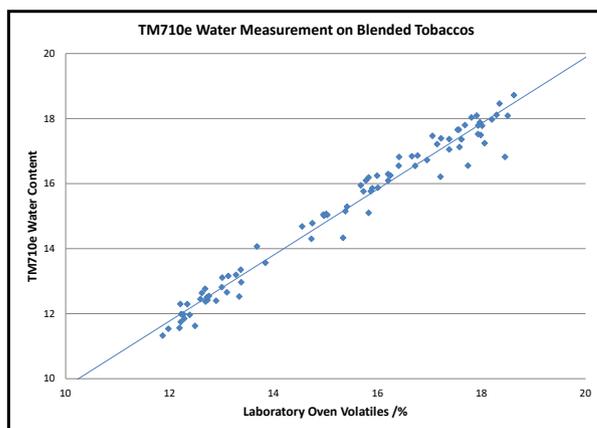


Figure 2a TM710e performance on cut blend tobacco

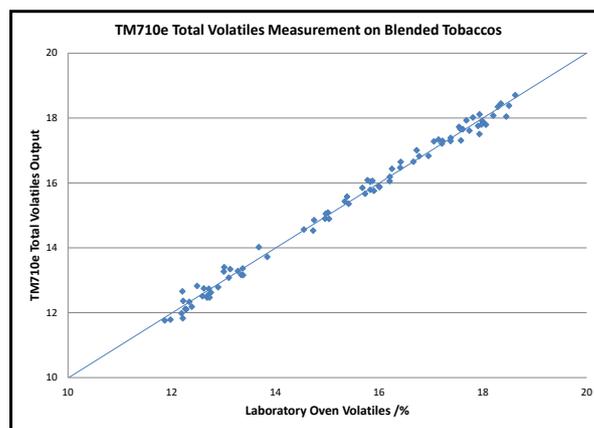


Figure 2b TM710eV performance on cut blend tobacco

Company overview

Combining industry-best performance and reliability with a global support structure

NDC Technologies, headquartered in Irwindale, California, designs, develops and produces a wide range of process measurement and control instrumentation for a broad scope of manufacturing industries.

NDC has manufacturing facilities in California, Dayton, Ohio and Maldon, UK, with centers of excellence at each of these locations including Loncin, Belgium. In addition, there are direct sales and support facilities in China, Japan, France, Germany and Italy. There is also a highly trained network of Sales and Service distribution channels in more than 60 countries around the world.

NDC Technologies is structured to serve its key industry segments with two distinct business units:

► Food, Bulk and Packaging

In packaging, NDC provides basis weight, thickness, coat weight and moisture measurement and control systems for a diverse array of applications in the converting and film extrusion industries and also provides solutions for customers in nonwovens and calendering.

For the food and bulk industries, NDC delivers both on-line and at-process analyzers for the measurement of key constituents such as moisture, fat, oil and protein. NDC's broad spectrum of measurement solutions are used in the food, chemicals, minerals building materials, pharmaceutical and tobacco industries.

► Cable, Metals and Tubing

In the steel and aluminium industries, NDC offers advanced solutions for the measurement of thickness, width, flatness, edge shape, coatings, and length and speed of sheet and long casted products.

NDC serves the wire, cable, fiber optic, pipe and tube industries with a broad portfolio of on-line and off-line measurement and control solutions for the dimensional monitoring of diameter, ovality, wall thickness, eccentricity, length and speed, and other parameters.



NDC Technologies is represented in over 60 countries worldwide. www.ndc.com

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