Application Note — QN-100 Moisture Measurement in Tobacco

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1. Purpose

This application note describes how the QN-100 near-infrared (NIR) moisture sensor is used to monitor moisture throughout tobacco processing, from green leaf threshing to primary processing, and outlines process background, recommended measurement locations, and filter selection guidance relevant to installation and use on a tobacco line.

2. Background

Moisture content is critical throughout the tobacco process, from green leaf threshing to primary processing. It affects not only smoking quality, but also storage properties, "filling properties," tobacco wastage, and machinability.

3. Why Moisture Control Matters

Moisture control affects every stage of tobacco processing, and getting it wrong has direct consequences for quality, yield, and plant uptime.

- **Smoking quality.** Moisture content influences burn rate, flavour development, and the overall smoking characteristics of the finished product.
- **Storage properties.** Tobacco stored too wet is prone to mould growth, fermentation, and self-heating; tobacco stored too dry becomes brittle and prone to breakage and dust generation.
- **Filling properties.** Moisture content affects leaf density and expansion, which in turn determines filling power — the volume of blend needed to fill a cigarette to the correct weight.
- **Tobacco wastage.** Over-dry leaf fragments and generates fines during handling, increasing scrap; over-wet leaf adds cost through incorrect weight-based costing and increases spoilage risk.
- **Machinability.** Leaf that is too dry is prone to breakage and can cause blockages and stoppages on high-speed processing equipment; leaf that is too wet can stick, clump, and cut unevenly.

4. Green Leaf Threshing (GLT)

The Green Leaf Threshing process separates the lamina from the stem and grades both by colour, nicotine, and sugar content. Moisture levels are raised through the process so the leaf is pliable enough to cut, then lowered until the lamina and stem reach optimum moisture content for storage.

> *Target: a homogeneous moisture content of 10–12%, which eliminates spoilage and damage from over-brittle tobacco.*

5. Primary Processing Plant

In primary processing, different grades of tobacco are treated, blended, and cut into "rag" to achieve a homogeneous final blend with good filling power and minimal wastage. The various tobacco types follow different routes to the final blending cylinder, with treatments including conditioning, casing, toasting, re-ordering, rolling, cutting,

expansion, and drying. Nearly all of these treatments require the product to be at an optimum moisture content, either before or after treatment.

5.1 Process Lines

- **Air-cured lamina line (Burley):** DCC (Direct Cylinder Conditioning) → casing cylinder → toaster → re-orderer → leaf blender → cutter → dryer → final blender.
- **Flue-cured lamina line (Virginia):** DCC → leaf blender → cutter → dryer → final blender.
- **Stem line:** DCC → cutters → expansion → dryer → final blender.
- **Expanded tobacco:** DIET process → final blender.
- **Add-backs:** Reconstituted sheet process → final blender.

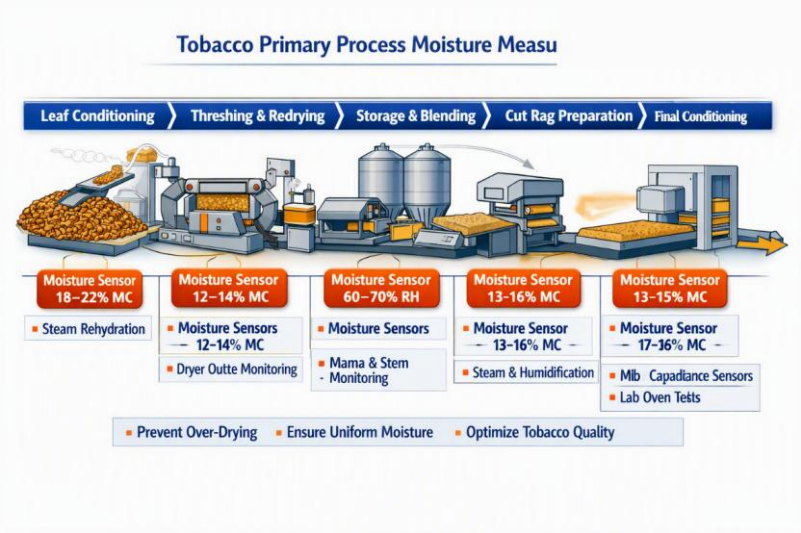

Figure 1: Tobacco primary processing — moisture measurement points

6. Recommended Measurement Locations

No.	Measurement Location
1	Exit strip conditioners — moisture distribution is very uneven here; measurement is recommended for trending purposes only
2	Exit stem conditioners
3	Exit lamina cutters
4	Exit cut lamina dryers
5	Exit stem rollers
6	Exit stem cutters
7	Exit stem expansion process (WTS)
8	DIET line
9	Reconstituted sheet
10	Shorts (reclaimed from scrap cigarettes in the manufacturing process)
11	Off-line in the laboratory, for fast results

7. Filter Selection for Tobacco Applications

Tobacco's variable particle size and moisture range make baseline stability a key factor in filter selection. For the Interpolated Baseline Correction (IBC) algorithm, Absorption Systems recommends a 2.10 µm second reference filter rather than a wider 2.18 µm alternative — this configuration has been evaluated specifically against tobacco process conditions and gives more consistent baseline tracking across the range of lamina, stem, and reconstituted sheet materials handled on a typical line.

8. Measurement Technology

The QN-100's NIR architecture applies filter sets selected for the specific material being measured, so filter selection is grounded in real operating conditions: variable particle size, changing moisture range, and surface variation.

Every QN-100 sensor measures using Interpolated Baseline Correction (IBC), Absorption Systems' algorithm for separating the true moisture signal from background noise caused by particle size, surface texture, and product-to-product variation. Rather than applying one fixed correction factor across a whole product range, IBC continuously recalculates the baseline from live reference readings, so it adapts to the product instead of assuming it stays constant. This gives:

- **More accurate readings across a wider moisture range.** Fixed-coefficient methods are typically tuned around one operating point and lose accuracy at the extremes; IBC holds up better as conditions move away from that point.
- **Fewer false readings from scatter effects.** Particle size, surface roughness, and packing density are a leading cause of baseline drift, and IBC is designed to track and correct for it.
- **Less time spent recalibrating.** Because the baseline adapts automatically, day-to-day and batch-to-batch variation is less likely to push readings out of tolerance.
- **Proven across applications.** Refined against real production conditions across a wide range of applications.

Revision History

Rev	Date	Description	Author
1.0	Jul 2026	Reissued in current Application Note format; content reviewed and restructured for clarity and technical accuracy	Applications Engineering

9. Approval

Role	Name / Signature	Date
Prepared by	Applications Engineering	July 2026
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