Application Note — QN-100 Moisture Measurement in Particle Board

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1. Purpose

This application note describes how the QN-100 near-infrared (NIR) moisture sensor is used to monitor and control moisture at critical stages of particle board, MDF, and OSB manufacture, and outlines the process background, target moisture levels, and measurement capability relevant to installation and use on a board line.

2. Background

Moisture content is critical throughout the particle board process. Manufacture starts with wet wood chips or logs at 40–65% moisture (wet basis; equivalent to roughly 60–130% dry basis), which are dried to below 5% moisture before grinding. Moisture is then added back as a carrier for the resin used to form the board. This drying and grinding process involves large amounts of energy, and carries both fire and explosion risk.

Moisture measurement at the green chip, refiner, and former/mat stages are critical control points in the process.

3. Why Moisture Control Matters

Optimising moisture content reduces fuel and energy costs and minimises waste and rework. It also determines the overall strength and durability of the board, and surface appearance and quality are governed by moisture distribution. Blows — localized delamination — are attributable in part to excessive steam build-up during the hot-press process, and can in some instances result in core separation.

4. Particleboard Manufacturing Process

Particleboard is a composite material that is less expensive and more uniform than solid wood. Although it is denser than wood, it is light and comparatively weak next to other fibre boards such as MDF and OSB.

4.1 Forming

The particleboard mix is fed into a former, with coarser particles forming the core and finer particles forming the surface layers, to produce an evenly distributed mat at the targeted weight.

4.2 Medium Density Fiberboard (MDF)

For MDF, resin, wax, and in some cases urea are added to the softened fibre, which is flash-dried while being conveyed pneumatically to a fibre bin. The fibre then passes through a grader and is laid out into a mat, which is consolidated at the forming pre-press.

4.3 Oriented Strand Board (OSB)

For OSB, wood is cut into strands ranging from approximately 3.5 to 6 inches in length and around 1 inch in width, and stored in wet bins. The strands are then dried, screened, and blended with a binder and wax before entering the former, where the mat is laid down. Moisture content and its distribution influence how well the OSB panel consolidates in the press.

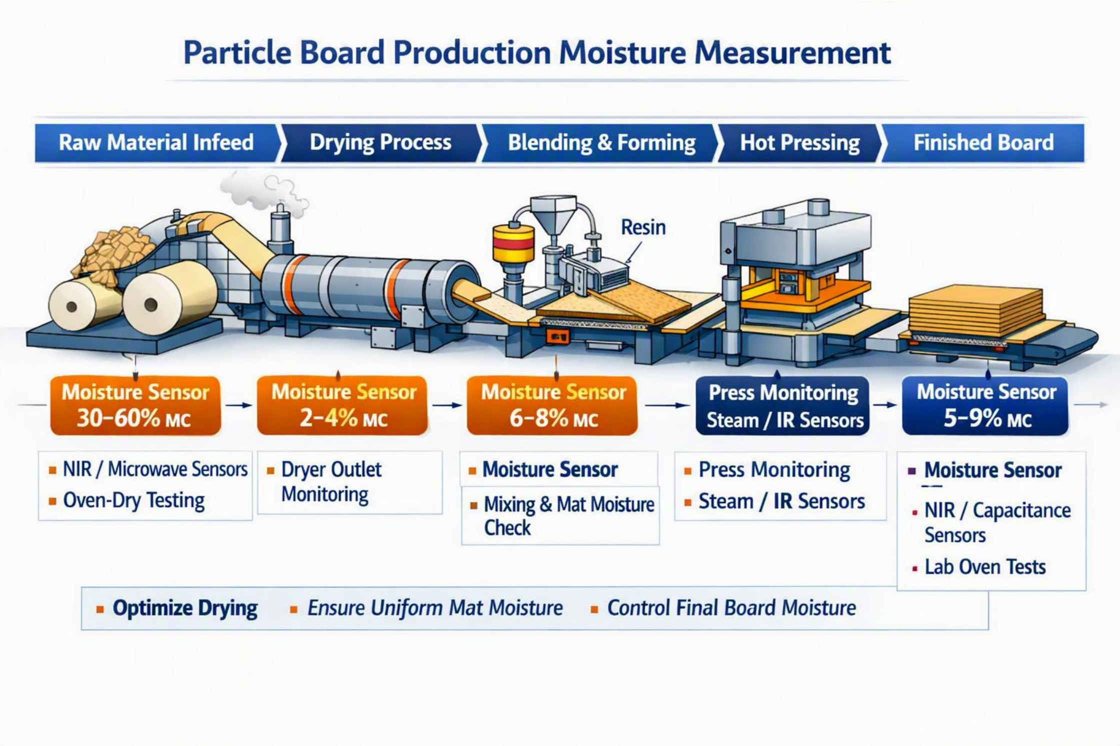

Figure 1: Particle board production — moisture measurement points

5. Target Moisture Levels by Process Stage

Stage	Ideal Moisture (%)	Effect if Too High	Effect if Too Low
Chips (before drying)	30 – 60%	Energy waste, uneven drying	Poor resin absorption
After drying	2 – 4%	Blisters, steam pockets	Brittle board
After blending	6 – 8%	Weak bond, uneven density	Poor cure

6. QN-100 Measurement Capability

The QN-100 NIR moisture sensor provides accurate, instantaneous moisture measurement at all of these process points. Readings are unaffected by mat height variation or dusty environments, and an ATEX Zone 22 certified version of the sensor is available for use in combustible dust atmospheres.

The QN-100 can also be used to measure melamine-formaldehyde, urea, or phenolic resins as they are blended, whether in small rapid blenders or large slow vats. Additional additives such as fire retardants may also be introduced at this stage. These adhesives and additives typically make up 4–10% of the finished board by weight.

7. 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

8. Approval

Role	Name / Signature	Date
Prepared by	Applications Engineering	July 2026
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