Moisture in Wood Chips

PROZESS TECHNOLOGIE

APPLICATION NOTES

Detector: Reveal NIR process analyzer (Near Infrared spectrometer 1550–1950 nm)
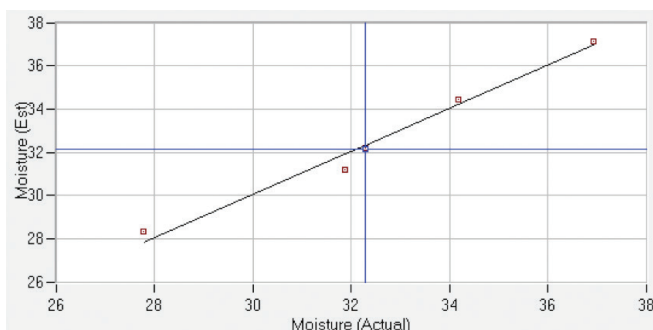
HIGHLIGHTS

- Millisecond measurement times
- Internal referencing, wavelength and linearity validation for stable, continuous operation
- WiFi, Ethernet, OPC, ModBus, Ethernet/IP communications standard
- Hazardous area enclosure options
- Various sampling options

REGRESSION ANALYSIS

Summary

The ability to measure moisture in wood chips, in real-time, offers significant advantages compared to offline analyses, such as loss-on-drying/ gravimetric analysis, including savings in time, money, and resources. The amount of moisture in wood chips directly affects several chemical and physical properties including cooking process optimization, pulp yield, reduction of Kappa number variations, dimensional changes to the wood, and can play an important role in determining appropriate market values for wood being sold (green ton v. dry ton).

Moisture Analysis

The Prozess Reveal NIR analyzer was used to evaluate the moisture content in wood chips. *Figure 1* illustrates the raw, spectral data of the wood, and shows a strong moisture peak near 1930 nm. The pre-processed spectral data was combined with the moisture content values produced by the loss-on-drying method. The regression model generated from this data is shown in *Figure 2*. This model revealed a strong correlation (R^2>0.98) with the loss-on-drying moisture values, with a standard error of prediction of 0.4%.
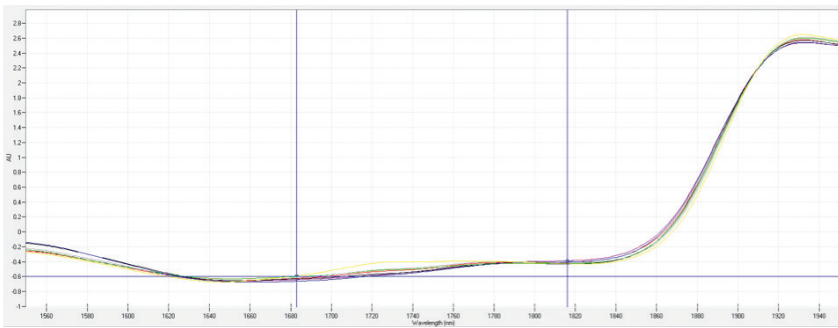
Figure 1: Wood chip samples after data processing demonstrate a strong moisture peak near 1930 nm.
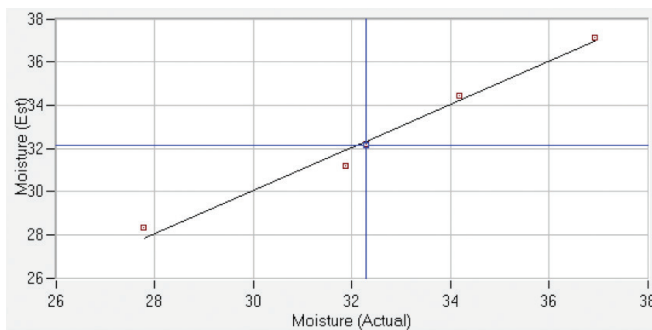
Figure 2: Simple linear regression (of moisture peak at 1930 nm) indicates strong correlation (R^2>0.98) to reported moisture concentration over the tested range with a standard predictive error of ±0.4%.

Reveal

The Prozess Technologie Reveal NIR instrument provides millisecond measurements, a variety of sample interfaces, and rugged system designs for the manufacturing environment, enabling users to acquire data in real-time, and make modifications during their process to ensure proper quality control and efficiency.

The Reveal contains integrated light sources and dispersive spectrometers utilizing linear diode array detectors, with no moving parts for high throughput and maximum stability. The Reveal contains automated internal hardware for lamp referencing and for wavelength and photometric linearity validation, all of which can be performed at user-defined intervals. Standard communications in the system include WiFi, Ethernet, OPC, ModBus and Ethernet/IP for upstream and downstream interface with distributed control systems, computers, or tablets. Sampling options range from flow cells with selectable path lengths, to measuring heads that mate to sight glasses in vessels, to fiber probes for contact or non-contact measurement in various insertion points.

Prozess provides a myriad of engineering solutions to integrate into customers' process streams. Hazardous area enclosures, additional analog and digital inputs and outputs, and sample head integration are just a few of Prozess' competencies to ensure a turnkey and trouble-free implementation. With high stability and genuine real-time measurement, the Reveal is a dependable device for monitoring moisture content in both continuous and batch processes.

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