KPM

WE CRAFT ASSURANCE

Paper Web Moisture and Coatings Measurement

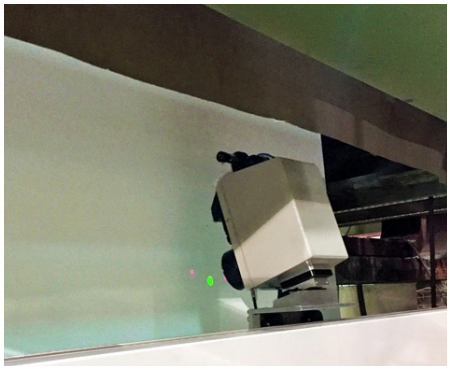
APPLICATION BRIEF

Paper is one of our most environmentally-friendly products, with 2/3 being recycled and most of the remaining raw material coming from a renewable resource: trees. From note paper to paper cups, tags, tapes, labels and more, paper is the most widely-used wrapping, writing, printing and packaging material in the world.

Paper converting is the process that transforms mill produced paper into usable manufactured products. Converting is where a continuous thin sheet of a material (web) is processed (converted) into another form. For example: to make a book, paper may be coated, printed, cut, glued and bound all in a continuous process.

Converting companies producing high-quality paper must achieve flat and level sheets. If the top and bottom of a paper sheet are at different moisture levels, the sides expand or contract, resulting in edge curl. Curl then causes malfunctions (jamming) in the subsequent printing, slitting and packaging operations that delays production, increases scrap and reduces efficiency. Monitoring and controlling the moisture content to maintain flatness and eliminating edge curl is critical throughout this process.

SUMMARY OF THE PAPER CONVERTING PROCESS



Re-Moisturizers: Paper can gain or lose moisture based on the surrounding humidity when in transit or storage. Many converters also measure the incoming paper stock prior to coating the paper. Correct moisture levels ensure that the coating will be properly applied to the paper substrate, and corrections can be made to moisture levels to optimize the converting process. Re-moisturizers can be used if the paper moisture is too low, and they can be roll, steam, disk, spray or another implementation technique. Roll re-moisturizers can be optimized by adjusting applicator roll speed, gap and skew. Steam re-moisturizers are adjusted by increasing the volume of steam applied to the paper. Disk re-moisturizers can be adjusted by water volume or disk rotation speed. Spray re-moisturizers are controlled by water volume or the number of micro-sprays applied per second. No matter which technique is used, a key step in the process is to monitor and measure moisture levels.

Dryer Control: Dryers are heated cylinders that drive off moisture and can be convection, radiant, infrared or another technique. Paper moisture can be controlled by adjusting the web speed as it passes through the dryer or adjusting the temperature of the dryer. Typically, web speed adjustment is the preferred method as dryer temperature control can be slower to respond.

Water-Based Coatings: Converters employ different applicators for water-based coatings dependent on their needs. These applicators can be roll, spray, doctor blades, dip, air knives, and other techniques. These coatings will have a fixed liquid/solids ratio depending on the product. The wet end water based coating can be measured based on the moisture absorption in the Near Infrared (NIR) region of the light spectrum. This measurement will provide the amount of dry end coating deposited on the paper after the dryer, and the measurements are taken in engineering units such a #/ream, GSM, mils or other.

PROCESS SENSORS® CORPORATION

a KPM brand

QUALITY PARAMETERS AND MEASURING POINTS

The Guardian-HD Web Profiling Analyzer is a near-infrared (NIR) sensor that can be used to control the converting process including characterizing incoming raw material, re-moisturizing stations, coating or drying, ultimately reducing costs and optimizing process efficiency. Paper is cellulose-based and hydroscopic (moisture absorbent). The moisture in paper is usually between 3 and 6% moisture in its finished state depending on surrounding humidity. It is costly to either add or remove moisture in the converting process, so the more accurate the measurements and controls, the more efficiency gained. Measurement and control of coat weight thickness on paper reduces waste and improves coating uniformity.

For the ultimate in process monitoring, the Guardian-HD Web Profiling System supplies a cross direction (CD) zoned web profile and machine direction trend for system operation. The color-coded CD profile visually displays in-spec product as green zones, alerts in yellow and red alarms. This is often connected to a color-coded stack light with annunciator to alert operators when product is in the alarm condition. Machine Direction Trends allows troublesome zones to be diagnosed and corrected.

In a fixed installation, stand-alone PSC moisture sensors are usually mounted in the center of the web or in series on the left, right and center of the web. This is of great value to the converter, but does leave some areas of the web unmonitored that could result in undetected problems down the line.

VALUE AND QUALITY

Implementation of PSC on-line moisture sensors and the Guardian-HD Web Profiling System for moisture measurement speeds start up, increases production output, reduces scrap and allows for data archiving by roll or production run for traceability. Data archiving via Ethernet allows production lots to be associated with modifications to unit operations, setups, operators or work shifts, for quality control purposes.

Without an on-line measurement system, the line must be started, a sample collected and sent to the factory laboratory for analysis, then system adjustments can be done. This manual process is then repeated until the line is running efficiently. With an on-line system this process is done in real-time resulting in increased efficiency and cost savings.

The Guardian-HD Web Profiling Series is a rugged and world-class analyzer to measure moisture, coat weight, adhesive thickness, and web temperature for all paper, film, and web-converting processes.

GUARDIAN-HD WEB PROFILING SERIES ANALYZER

- Rugged, sealed industrial frame and linear actuator withstands hot and humid environments common with paper and converting processes
- Automatic edge detection senses roll width to streamline set-up processes, and realigns to accommodate web drift
- Configurations available to monitor and control multiple Guardian-HD systems simultaneously
- Easily connect to closed-loop control systems or local alarms

GUARDIAN-HD NIR MEASUREMENTS

Moisture Range:	Min 0.1%, Max 95%
Coatings Range:	Min 0.1 GSM, Max 250 GSM
Moisture Accuracy:	±0.1%
Coatings Accuracy:	±0.1 gr/m
Repeatability:	±0.1%

Scan here to learn more about the Guardian-HD Web Profiling Series Analyzer

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