An online formation analysis function is the latest add-on to ABB's web imaging system

**OPTIMIZE PRODUCT QUALITY AND YIELD**

Constant online monitoring of optical formation is a key for optimizing the production quality and yield of a paper or board machine. It also enables cost-savings through optimal use of right ingredients and process parameters. Correlation between optical formation and end-product quality has been well established for many product categories ranging from uncoated print paper to heavy linerboard grades.

The difficulties in traditional optical formation measurement arise from the lack of a well-established industrial calibration scheme. Traditional optical formation measurements have been comparable only within certain opacity range, thus needing 'ad-hoc' calibration between grade groups. Without a standardized calibration procedure the reliability and interpretation of measurement values has been problematic.

**INDIVIDUAL SENSITIVITY**

The challenge of stabilizing illumination conditions for a longer term has also hindered the success of on-line measurements. On systems consisting of several cameras the comparability of the values from one camera to another has required very exact focusing and alignment of each of the cameras. And still, there are always individual sensitivity characteristics for every CCD- or CMOS-element ever produced. A time-standing measurement would clearly be independent of absolute intensity values.

Optical formation has been long characterized, for example, with standard deviation of intensity values. The variance has sometimes been calculated from within a certain frequency band to target a selected scale of formation. Floc-based analysis on the other hand divides formation images into flocs and voids based on the intensity values. All of these approaches are vulnerable to changes in paper opacity and/or illumination changes.

ABB has introduced a formation analysis function to its Web Imaging system. It can image the paper web with constant intervals. Each formation image covers a relatively large area of the web, typically more than 0.25 m². Using these sequential formation images the Formation Analysis module calculates a value describing the uniformity of formation. This value is not influenced by the dynamic range of the intensity values, but is based on the analysis of the fine scale structure of optical formation.

The structure and spatial properties of formation are not dependent on absolute intensity values. Analysis of spatial properties reveals the uniformity of formation directly, whereas intensity variation based measures describe the range and distribution of intensity values, not necessarily related to uniformity of formation.

Uniform formation has even and uniform fine scale
properties without large flocs. Unevenly distributed heavy flocs predict poor end-product quality on several paper applications from printing to packaging products. ABB’s Formation Analysis is comparable over time and product grades despite opacity changes. It is repeatable and well-suited for laboratory analysis.

The plug-in-ready system welcomes new measurements with a comprehensive set of multi-purpose graphical user-interfaces and data warehousing. As with all other measurements the Formation Analysis results are displayed on on-line trends and profiles. A constant flow of formation images can be viewed on a dedicated display together with a plot of numerical formation values. PPI

Antti Saarela is a design engineer, websurface imaging, ABB, Helsinki.

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