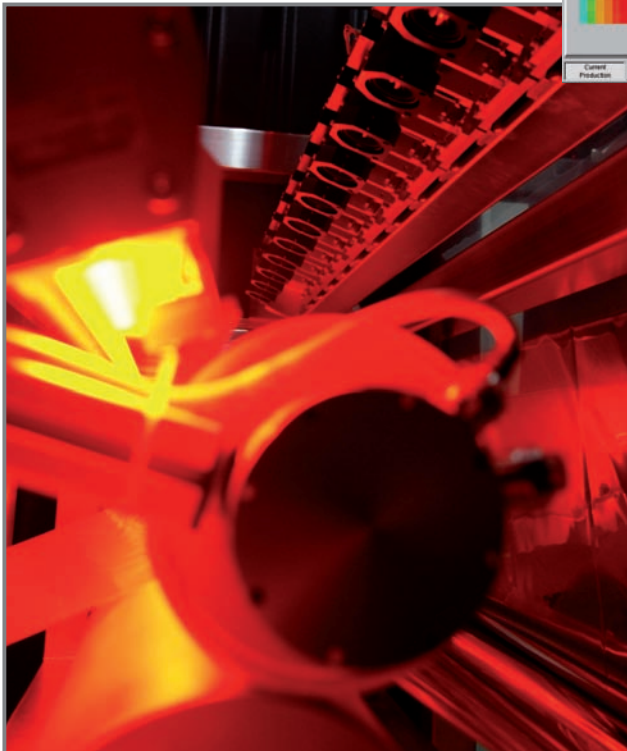
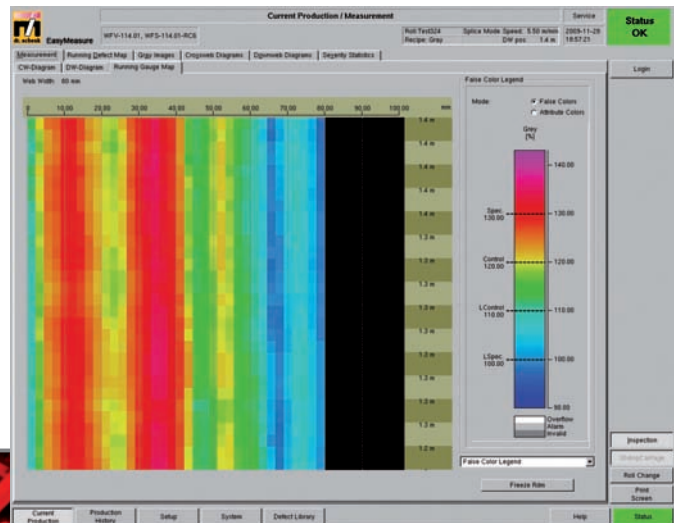


## Monitoring of Properties for Web Material

### Innovative Solutions for

- Quality Control
- Data Collection
- Process Control
- Process Optimization

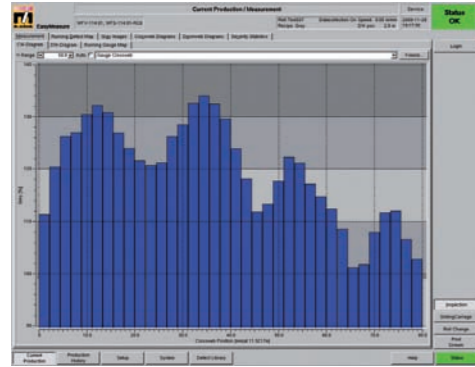


### Monitoring of

- Opacity
- Reflectance
- Gammage
- Porosity
- Formation
- Fluorescence

### EasyMeasure for full width web monitoring

Dr. Schenk offers all-in-one quality assurance and process control systems for the production of web materials. EasyMeasure can be combined with the surface inspection system EasyInspect thus offering for the first time beneficial material monitoring tasks together with high resolution defect detection.



- In-line monitoring of web properties, using existing EasyInspect modules
- 100 % coverage of the web material
- Allows immediate feedback for process optimization
- Measurement without radioactive radiation
- Industry proven design, without moving parts
- Operator-friendly visualization and real time 2D map

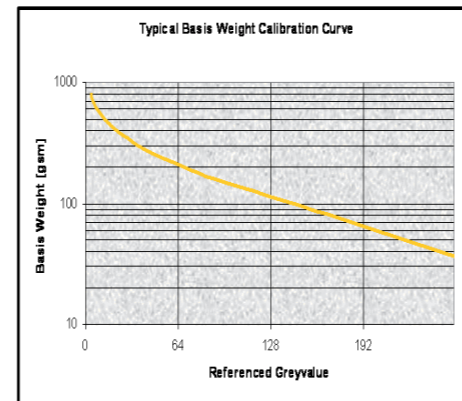
*Histogram of a film property*

### Grammage Monitoring

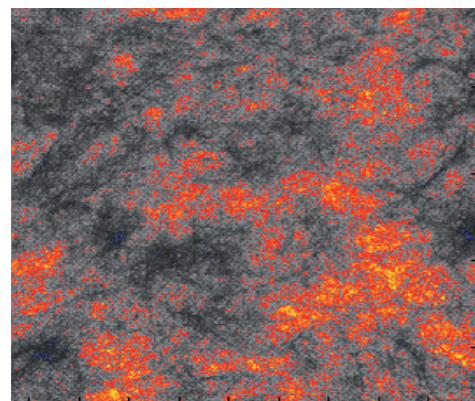
The web based industry uses grammage to show the robustness of a product. With EasyMeasure manufacturers can automatically monitor the consistent grammage of the product, viewing in-line 100% of the material. By using the gray scale factors retrieved from Dr. Schenk's EasyMeasure system, the grammage of a material can be calibrated to the gray scale average per square area of material.

Grammage is used to identify the density of paper expressed in terms of grams per square meter; to give an example: typical office paper has 80 g/m<sup>2</sup>.

*Grammage calibration curve*



### Porosity Monitoring



Porosity is a film property which is a key factor in the production of Battery Separation Foils (BSF) for Li-Ion batteries. A uniform porosity distribution will avoid local thermal stress when charging and discharging the battery. This will lead to a most homogenous performance of the Li-cells and guarantees outmost efficiency of the battery.

The porosity monitoring function of EasyMeasure allows for the first time to qualify material according to performance specific properties of the BSF.

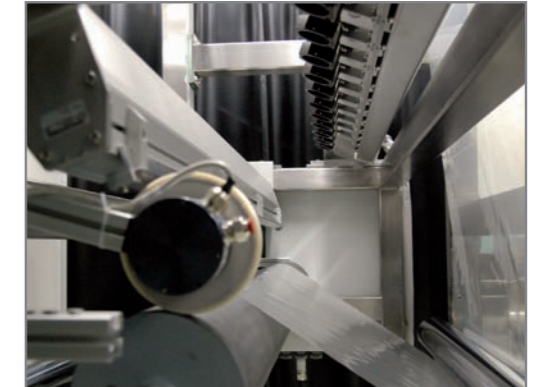
*Porosity map monitored with EasyMeasure*

### Opacity / Optical Density / Reflectivity Monitoring

Opacity is the amount of light transmission through a material, whereas reflectivity is the amount of light reflected from a material.

Alternatively to opacity, the amount of transmitted light through the material can be expressed as optical density which provides a linear correlation to the actual thickness particularly for homogeneous materials such as plastic or metalized films.

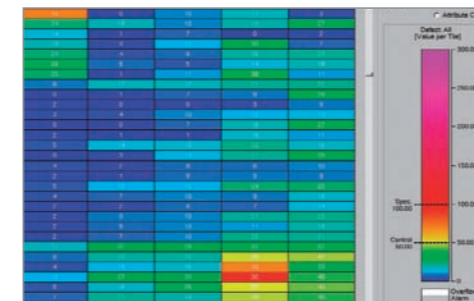
Dr. Schenk's EasyMeasure uses an optical set-up for camera and illumination which takes into consideration existing written standards to calibrate a given level of opacity in any material.



*Plastic film measured for opacity*

### Formation / Uniformity Monitoring

Formation describes the short term variations of fiber dispersion in paper or non-woven products. Uniformity is a similar term used in the plastic industry. For example, a standard paper bag will have more blotchiness than a piece of fine stationery paper and thus will have a poorer formation.



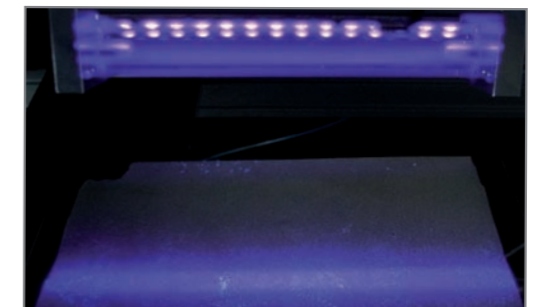
Dr. Schenk's EasyMeasure automatically calculates the product's short term variability as well as the long term variations. The machine operator now has the luxury of using in-line measurements to run the process and must no longer rely on the measurement approximations of off-line tests.

*Formation monitoring map*

### Fluorescence Monitoring

Fluorescence monitoring takes advantage of the fact that some materials naturally fluoresce. When exposed to UV light, atoms or molecules in the material become excited and emit light at a certain frequency. Starch particles, for example, glow bright blue under UV light.

When it comes to verify coating properties on web, fluorescent particles can be added into the coating material as a tracer. With applying EasyMeasure the distribution of the fluorescent particles is then monitored in order to control the homogeneity of the coating on the base material.



*Use of UV Illumination for fluorescence monitoring*



*Dr. Schenk's modern production site*

Dr. Schenk GmbH, established in 1985, is an innovative high-tech company based in Munich, Germany. For the third decade now, the range of products and services offered by Dr. Schenk comprises comprehensive solutions for automated quality assurance and production process monitoring for the flat glass, film and foil, converting, paper, solar, optical media and semiconductor industries. In these areas Dr. Schenk continues to set new standards for the inspection of surfaces through the utilization of the latest technical advances in optics and electronics.

The company's primary objective is to achieve complete satisfaction of our customers on a long-term basis. This vision is realized by a perfect synergy between innovative solutions and practical ideas. Global sales and service facilities ensure local support, technical service, training and consulting at any phase of a project. From modular standard units to complex and highly customized systems – Dr. Schenk's high performance test and inspection products have precision in focus!

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