Meeting market needs in all fields

PES is proud to welcome Carl Zeiss MicroImaging GmbH back to its pages. We catch up with Product Manager Chris Hellwig who discusses how the company are supporting high quality in manufacturing – from the lab to the production line.

When measuring surface properties like spectral reflectance and transmission at fast moving and dynamic mass production lines, the requirements concerning the optical heads differ dramatically from lab-scale or pilot production lines.

While the Optical Sensor Systems department of Carl Zeiss MicroImaging (OSS) has been developing and improving applications for its fab proven inline metrology systems, optical measuring heads have increasingly become the focus of attention during the last couple of years.

Knowledge of the spectral reflectance and transmittance as well as derived results like colour metrics or layer thickness is a vital requirement to stabilise production quality, cost and output. Evaluating a sample in an at-line quality lab requires fundamental knowledge of the measuring instrument and the processes used to produce the sample. In in-line metrology additional challenges have to be addressed. The process integration including the PLC, MES and database connections has to be done. Most thin film PV fabs produce their products in continuous flow. Thus the sample not only moves in the conveyor transport direction. Due to the characteristics of existing conveyor systems the sample vibrates, resulting in distance variations between the substrate surface and the optical measuring head. Traditional measuring geometries are sensitive to these distance variations, resulting in some uncertainties.

Additionally there is a strong need in the market to measure haze. The haze reflection is needed as a direct functional measured value representing the roughness or surface texture of the sample. Haze is needed to calculate the layer thickness in multilayer systems too.

To stabilise production and to lower the costs it is necessary to evaluate the outcome of each production step as close as possible to the associated process station. As the coating is applied in vacuum chambers there is a need to measure the spectral transmittance and reflectance even in the vacuum chamber near the sputter targets. Optical measuring heads have to work reliably in these harsh temperature conditions.

OSS supports customers with a broad range of spectral metrology solutions. This includes stand-alone spectrometer systems for quality labs up to complete integrated and automated in-line process control systems. As a result, Carl Zeiss MicroImaging - OSS developed three new optical sensor heads to meet the market needs in all fields.

The new optical measuring head OMK ECLIPSE is the latest generation probe for the measurement of diffuse reflection. A novel, patented double beam design facilitating permanent synchronous internal referencing, guarantees reliable and reproducible results unaffected by movement, rotation, vibration or temperature changes. The measuring principle ensures carefree, long-term operation in various production environments. The OMK ECLIPSE can be combined with the family of MCS 600 or CORONA PLUS Remote spectrometer systems.

The OMK ECLIPSE
The OPTOPLEX systems can be equipped with a new, vacuum compatible, distance measuring integration sphere. This enables the measurement of spectral reflectance even in the coating chamber. Not only is the stability against vibrations improved dramatically, but the substrate thickness can also be changed without the need to realign the optical measuring head. Even 2-lid and 3-lid IGUs as well as single lids can be measured at the same station without realigning the measurement heads. This shortens the time needed to align a production line.

As our optical measurement heads are utilised in process control systems, long uptimes and short maintenance times are mandatory. They are designed and built to function in harsh production environments. One example is the redundant internal illumination bulb we use to minimise downtimes. One advantage of developing and testing equipment inside the Carl Zeiss Group is the full access to test centres with all the expertise to prove and improve the quality and reliability of our products.

Our systems have been widely known and used in the glass industry for nearly 20 years. Learn more about our systems, the parameters we are able to measure and the possible combinations with our online product configurator at www.inline-metrology.com.

For more information, please visit: www.zeiss.de/spectral

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About the company
Carl Zeiss MicroImaging GmbH, is a 100 per cent owned subsidiary of Carl Zeiss AG.

The Optical Sensor Systems and the Materials Microscopy business units are parts of the Industrial division which, along with the BioScience division, belongs to Carl Zeiss Microimaging. Both business units offer solutions for a wide variety of applications in the solar industry.

In order to record and control the complex process stages involved in glass and solar cell production, precise and fast in-line and at-line measurements are required.

These systems are designed for quality and process control for applications in production of solar glass, architectural glass and solar cells.

Carl Zeiss Optical Sensor Systems offers complete instrument systems which allow the non-contact and non-destructive measurements of spectral transmittance/reflectance and the determination of color values, layer thickness and sheet resistance.

High quality and safety are also guaranteed under extreme ambient conditions or in vacuum. The measured results are provided immediately and are available for process optimization and archiving.

The ZEISS spectrometers from the proven line of MCS 600 or CORONA PLUS systems combine modern UV-VIS-NIR diode array technology with precise optical design and fast, high-resolution electronics. Speed, robustness and reliability number among their outstanding features. The diode array spectrometers offer high measuring accuracy, excellent wavelength stability and reproducibility of the measured results. Their modular design also permits the systems to be subsequently expanded with further measuring points. Via standard interfaces and appropriate protocols, the software enables communication with other systems and databases or integration into existing solutions.
The implementation of complex measuring systems for advanced technologies requires in-depth process knowledge and extremely short development times. To achieve this, the entire innovation potential of Carl Zeiss is available to our customers.

We offer
- High-speed measurement of spectral transmittance/reflectance, color values and sheet resistance: In-line or At-line
- Extremely robust: non-contact/non-destructive measurements
- Easy integration into existing process lines

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