Solar Inspect

dr. schenk

Quality Assurance & Process Control for Thin-Film Solar Modules

Reliable Quality Assurance & Process Control Throughout Solar Module Production

www.drschenk.com

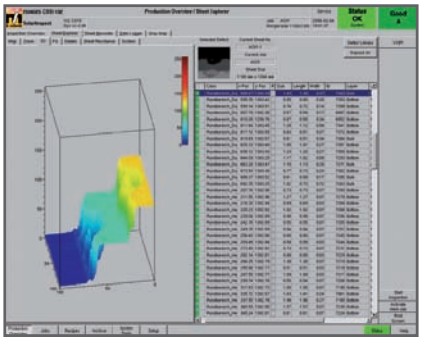
Solar Inspect

Metrology Solutions for Solar Panels

Metrology systems play an important part when it comes to the optimization of the production process to improve yield and maximize the output quality. The Dr. Schenk SolarInspect series has been designed to fulfill the special requirements throughout the production of thin-film solar modules. These turnkey vision systems offer reliable quality control throughout the running production process. In addition, continuous monitoring of the production process allows timely corrective action to be taken when process deviations appear.

Fully integrated after relevant production steps, the SolarInspect systems detect, pinpoint and accurately classify defects or irregularities on the surfaces and edges from the incoming glass at the front-end through to the finished solar module at the back-end. The user-friendly graphical interface provides clear diagrams and analyzing tools, displaying detailed defect information together with high-resolution images.

With the additional SolarMeasure options from Dr. Schenk, customers can evaluate and correlate metrology data from indirect (optical) and direct (electrical) tests along the line and perceive an early feedback and a comprehensive overview of the entire manufacturing process.



Intuitive visualization software for process control - Panel Explorer with defect image

SolarInspect – Outstanding Features

- Innovative and modular optical setup – low cost of ownership
- Turnkey vision systems optimized for specific process step needs
- Customized solution for all types and sizes of solar modules
- Repeatable detection and classification
- User-friendly quality and analyzing tools
- Easy integration into new and existing lines
- Industry-proven design

Solar Measure *Metrology Options for Front-End and Back-End*

- Microscope Station
- Electrical Insulation Tester
- Shunt Repair Station
- TCO Tester
- I-V Curve Tracer

Monitoring of:

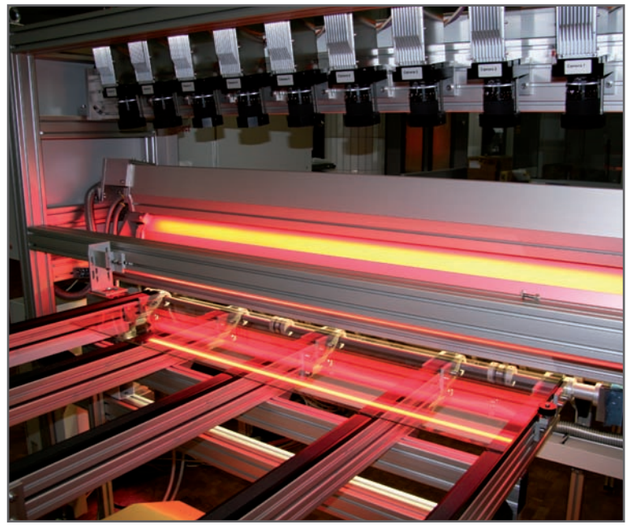
- Layer Thickness
- Haze

Measurement of:

- Dimension
- Resistivity
- Warpage
- Drill Holes
- Edge Deletion Depth

Your Reliable Partner

Solar Inspect ▶ Proves Your Quality Throughout The Production Process



- Defect Detection for Incoming Bare Glass including Edges
- Defect Detection for Coated Glass (TCO, Molybdenum) including Edges
- Inspection of Layer Deposition and Homogeneity
- Inspection of Chemical Steps
- Inspection of Structuring / Laser Scribing (e.g. Overscribes, Underscribes)

Reliable Inspection and Monitoring of Front-End Production Processes

The use of quality control systems at the front-end prevents defective solar panels from cycling on to further process stations. This saves real money, as panels which would be rejected in the final quality check, can be sorted out before costs for the subsequent processing occur. Additionally, inspection systems can help to optimize the coating and scribing processes, in order to achieve optimal module performance at the best possible yield.

Pinhole

Ablation in Layer over P1

Underscribe

Glass Defect: Edge Chip

Scratch in Glass Substrate

Bubble in Substrate Glass

Layer Defect

Overscribe at P3

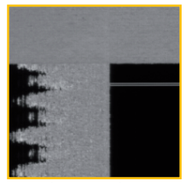
dr. schenk ▶ **Your Reliable Partner**

Solar Inspect ▶ Proves Your Quality Throughout The Production Process

Reliable Inspection and Monitoring of Back-End Production Processes

Panels arriving at the back-end are already valuable, semi-finished products. The visual in-line control at the back-end primarily benefits the production within preset process windows. With every production step towards the line end, the costs per processed panel increase. Therefore, material defects occurring at the back-end stage usually cost a lot of money and need to be detected reliably. Line operators receive instant access to possible causes and can take immediate counteraction to prevent further damage.

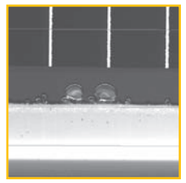
At the back-end, lamination and edge sealing are the production steps most crucial to guarantee a long life-time required from today's solar modules. They are therefore in special focus of quality and process control solutions.



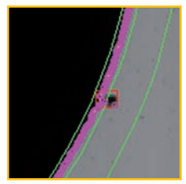
Residue at Edge Deletion

Position Control for Contacts

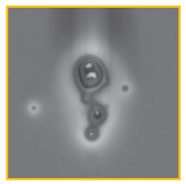
Bubbles in Butyl Sealing



Lamination Bubbles in Edge Area



Glass Edge Defect at Drill Hole



Pinholes in Anti-Reflective Coating

Lamination Foil Trimming Defect

Assembly Check (Junction Box)

- Inspection of Layer Residue and Measurement of Edge Deletion Depth
- Cell I-V Curve Measurement
- Drill Hole Inspection
- Inspection of Contact Bars
- Edge Sealing Defect Detection
- Inspection of Back/Cover Glass (e.g. Defects in and Homogeneity of AR Coating)
- Lamination Defects
- Position Check for Assembly Parts
- Cosmetic Defects of Finished Modules
- ... and many more

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 to the solar, flat glass, film and foil, converting, paper, 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!

For more information and contact:
www.drschenk.com

Germany
Phone: +49-89-85695-0
Fax: +49-89-85695-200

USA
Phone: +1-651-730-4090
Fax: +1-651-730-1955

Korea
Phone: +82-2-527-1633
Fax: +82-2-527-1635

Taiwan
Phone: +886-2-2920-7899
Fax: +886-2-2920-8198

Hong Kong
Phone: +852-2425-1860
Fax: +852-2425-6775

China - Beijing
Phone: +86-10-6503-2159
Fax: +86-10-6503-2161

China - Shanghai
Phone: +86-21-58366-700
Fax: +86-21-58366-701

For further regional sales & service representatives please refer to www.drschenk.com

Dr. Schenk GmbH
Industriemesstechnik

Einsteinstrasse 37 (Martinsried)
82152 Planegg
Germany