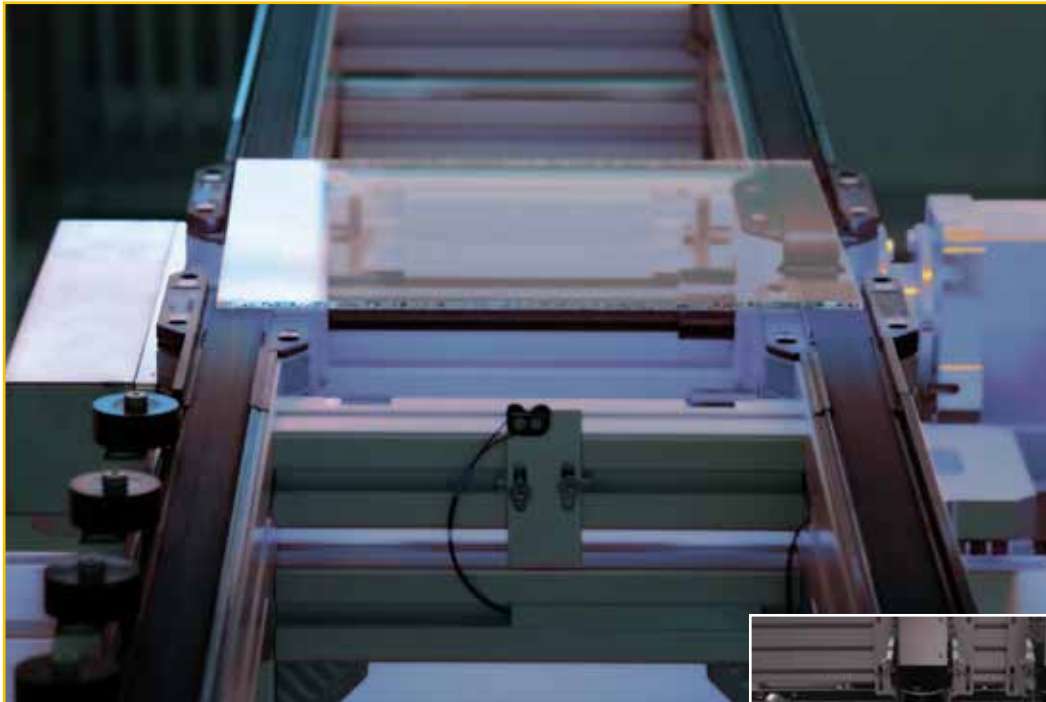


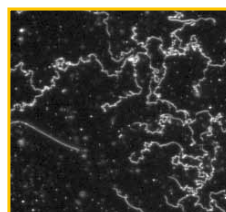
Glass Inspect



**In-Line Quality & Process Control
for Coated Flat Glass**



**Industry Proven Inspection
Solutions for Manufacturers
of Architectural, Automotive,
Display and Solar Glass**



QUALITY SOLUTIONS FOR COATED GLASS

INTRODUCTION

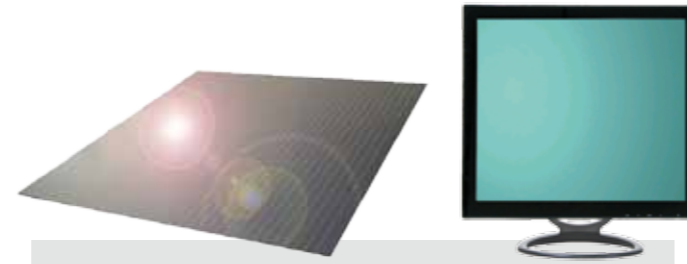
Coated glass has become more and more important for a growing number of high tech applications, such as TCO or Molybdenum and antireflective coatings for the PV industry, ITO coatings for display glass or Low-E coating in the architectural and automotive industry.

These materials are applied as coatings thanks to their physical characteristics, such as electrical conductivity, high transparency and their ability to partly reflect infrared and ultraviolet rays while allowing visible light to pass. Furthermore, some of these coatings have the advantage of a superior hardness and durability and therefore serve as ideal cover material for sensitive layers.

QUALITY CHALLENGES OF COATED GLASS

In sputtering or vaporisation processes the coating layers are deposited microscopically thin onto the glass substrates. To guarantee high electrical conductivity, the coating layers must be deposited without any defects, contaminations or unacceptable thickness variations (see gray scale images on the right for typical glass coating defect types). Therefore, manufacturers increasingly introduce optical vision systems that specialize on the inspection of coated material.

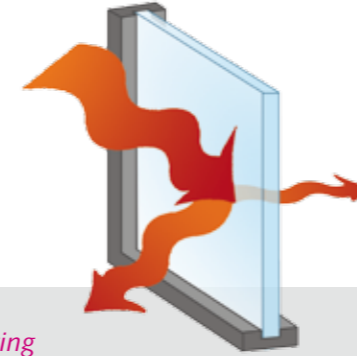
GlassInspect detects defects and irregularities that occur in coating layers and on the glass substrate while being processed. The innovative optical set-up and its image processing and visualization software have been adapted to the specific requirements of coated glass. Proven as highly reliable, GlassInspect convinces many glass and coating manufacturers worldwide.



ITO / TCO & AR Coatings on glass substrates displays and thin film solar modules

Zinc-Oxide (ZnO), Indium-Tin-Oxide (ITO) and transparent conductive oxides (TCO) are used as coating in the display industry and for thin film solar modules. These materials guarantee a high electrical conductivity while being transparent. Local discontinuities and thickness variations of the coating will reduce the flow of the electricity and have to be avoided.

Furthermore, antireflective coatings (AR) are applied to the solar glass substrates to increase the amount of incoming sun light. Missing AR coating results in a reduced cell efficiency.



Low-E & sunstop coating for architectural and automotive glass

Low emissivity (Low-E) coatings are used e.g. in thermal / insulation windows to stop radiant heat and light rays of certain wavelengths to penetrate the glass. Defects in the coating layer, like stain, voids or scratches, will not necessarily reduce the functionality of the entire glass pane. For these applications the cosmetic aspect is of far higher relevance. Coating thickness variations and contaminations can result in glass discolorations which distract the view. In the case of coatings for automotive glass, such defects can even put the traffic safety at risk as they cause dangerous stray light.



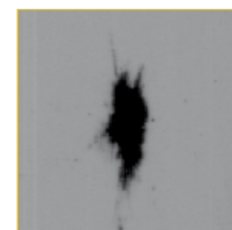
Electrochromic glass panes - Switchable radiation control for architectural & automotive applications

Electrochromic coatings allow to change the light and heat transmission of a glass pane in buildings and automotive applications. They allow the adaptation of glazing characteristics in terms of energy saving and user comfort.

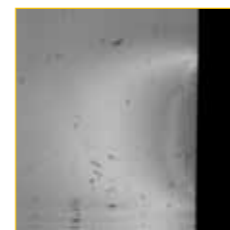
Even small defects in the various coating layers may cause large cosmetic and also functional problems of the glass. The optical inspection throughout the individual production steps allows to sort out defective glass panes and helps to stabilize the production flow and to optimize the process parameters.

Glass Inspect

TYPICAL DEFECTS ON COATED GLASS



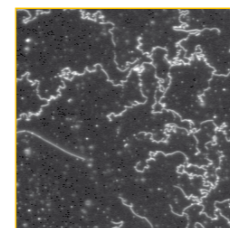
Inclusion



Coating burn



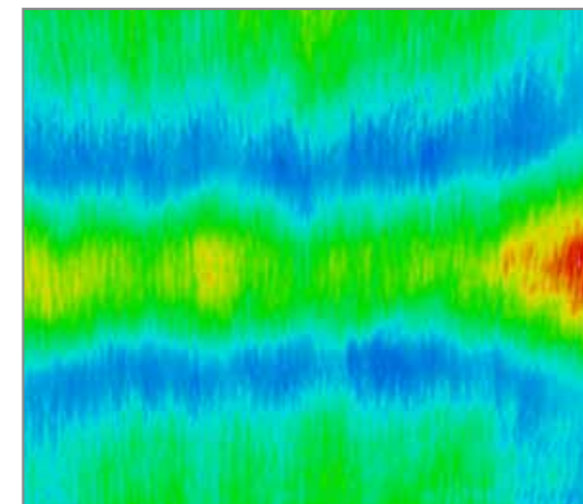
Pinhole



Arcing

Glass Measure

COATING HOMOGENEITY MONITORING



KEY FEATURES AT A GLANCE

- Advanced camera technology for highest contrast sensitivity and optimized resolution
- Reliable and accurate classification of coating defects
- High defect sensitivity with bright-field and dark-field channels
- Easy integration into production lines
- Ideally adjusted to coating lines while using modular components for an optimal price / performance ratio
- User-friendly interfaces according to SEMI standards
- Measurement of mechanical properties, like surface flatness, deformation or panel size
- Monitoring of pane properties, like coating thickness, color variation, haze or surface topology



Your Reliable Partner



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 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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