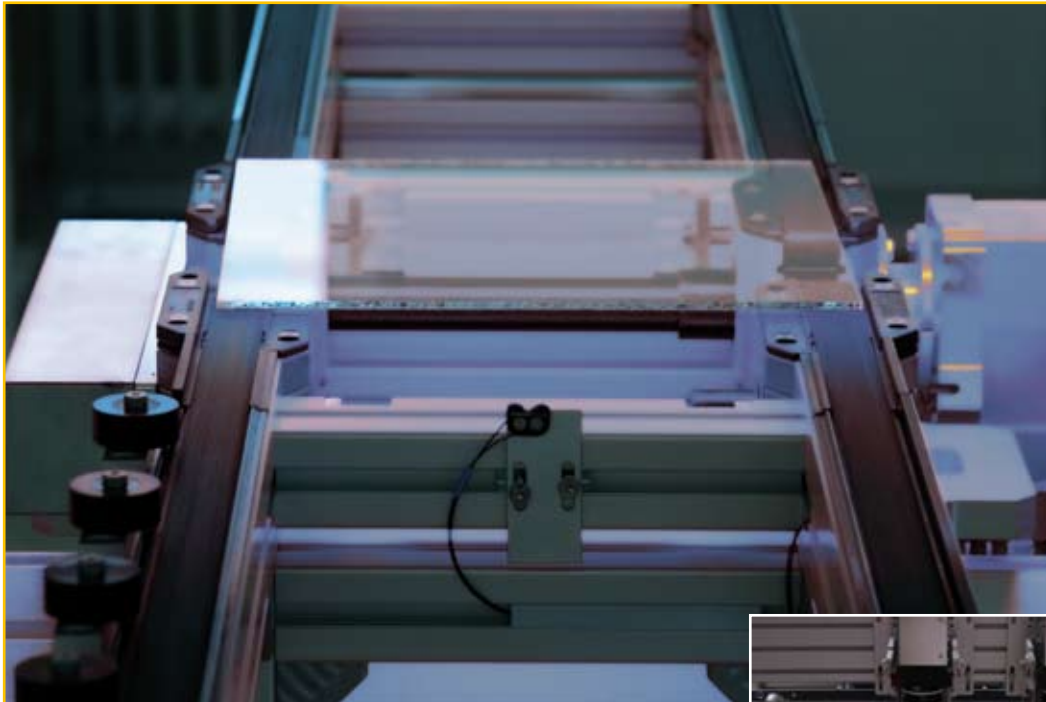


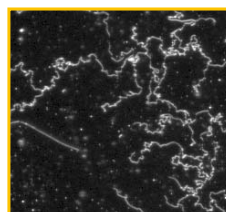
Glass Inspect



In-Line Quality & Process Control for Coated Flat Glass



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



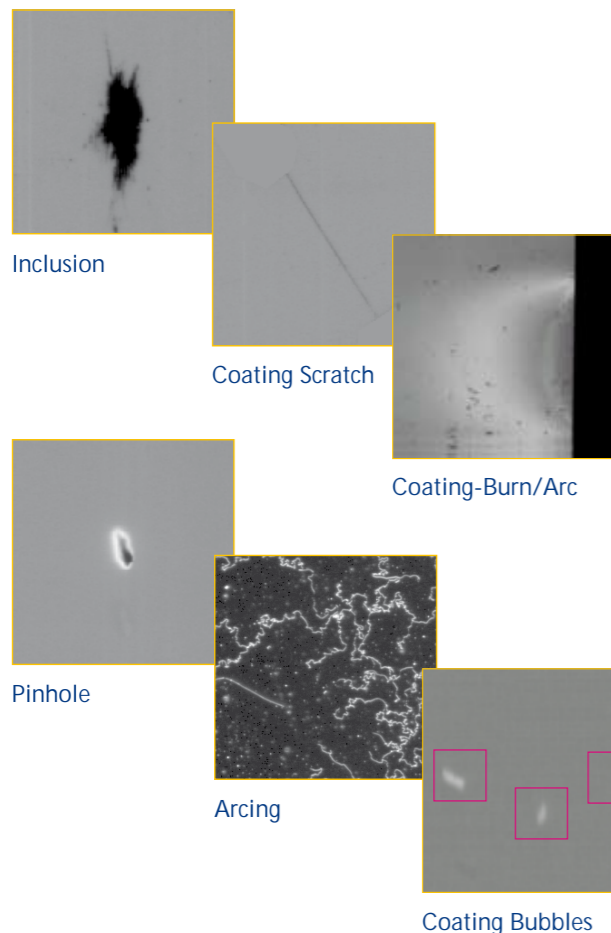
Coated glass

INTRODUCTION

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

TYPICAL DEFECTS ON COATED GLASS



TCO and AR Coatings on glass substrates for the production of thin film solar modules

Transparent conductive oxides (TCO) and other materials, e.g. molybdenum, serve as coating layers for thin film solar modules as they are highly conductive. Local discontinuities and thickness variations of the coating will reduce or stop the flow of the electricity and have to be avoided.

Furthermore, antireflective coatings (AR) are applied to glass substrates in the PV industry to increase the amount of incoming sun light. If the AR coating is missing or too thin at certain panel areas, the reflection of the light results in a reduced cell efficiency.

QUALITY CHALLENGES OF COATED GLASS

In sputtering or vaporisation processes the coating layers are deposited microscopically thin onto the glass substrates. To guarantee high electric conductivity and low resistivity, the coating layers must be deposited without any defects, contaminations or unacceptable thickness variations (see gray scale images on the left for typical 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 system's 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 by the following highlights:

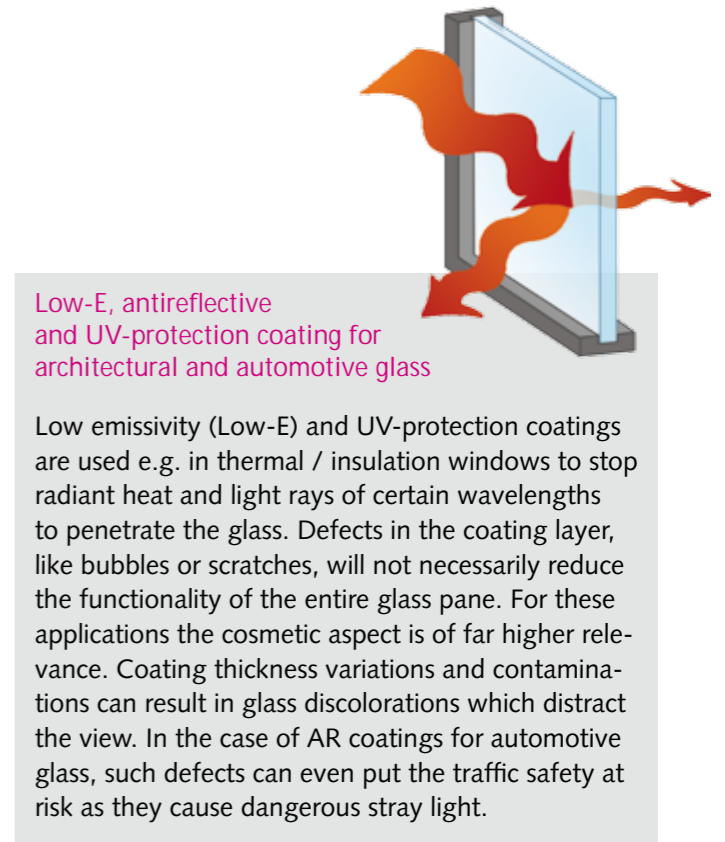
ITO Coating for the display industry - High electrical conductivity and full transparency

Zinc-Oxide (ZnO) and Indium-Tin-Oxide (ITO) are used as coating in the optical film and display industry. The characteristic of these materials guarantee a high electrical conductivity while being absolutely transparent.

Both aspects are crucial for displays such as LCD panels and touchscreens of phones, PDA's or digital cameras. Local defects and missing coating, e.g. in certain areas of a touchscreen, endangers the functionality of the display.

KEY FEATURES OF DR. SCHENK GLASSINSPECT

- 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
- Networking for further evaluation
- Measurement of optical and mechanical properties, like surface flatness, deformation or panel size



Low emissivity (Low-E) and UV-protection 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 bubbles 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 AR coatings for automotive glass, such defects can even put the traffic safety at risk as they cause dangerous stray light.





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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