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**Optimum production processes thanks to inspection technologies for perfectly-curved and flawless windscreens in all vehicle types**

**Highest process reliability at every stage of automotive glass production**

Requirements for the quality of automotive glass are constantly increasing, but glass manufacturers are also under pressure to further improve their process efficiencies in order to retain a competitive edge on the global market. Fully-automated measuring and inspection systems that ensure 100% quality and maximum process efficiency at every stage of automotive glass production enable manufacturers to achieve just that, leaving their competitors behind. The systems also pave the way for Industry 4.0.

Modern cars use more and more glass: Glass surfaces are becoming larger with each new generation of cars and entire car roofs are now made of glass. The growing diversity of models also means an increased number of different glass panes. At the same time, the requirements for quality and suppliers are becoming ever higher – and this is by no means restricted to aesthetic aspects. Automotive glass must meet tough functional and safety requirements, which translate into highly complex production processes. The value of the glass increases with each of these process steps.

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## Optimum solutions for every process step

The manufacturing process for windscreens consists of various steps (cutting, grinding, printing, bending and laminating), each of which can lead to potential defects. Possible quality defects include raw glass defects (e.g. bubbles or stones), process errors (e.g. scratches and breakage, printing errors in screen and dot printing, optical defects such as transmitted and reflected distortion, and shape defects) and lamination defects (e.g. inclusions). To ensure efficient use of resources, defective material must be removed from the value chain as early as possible.

ISRA's comprehensive portfolio of high-performance measuring and inspection systems offers 100% quality control at every stage of the process. The systems are based on various patented methods, including cross/dark-field inspection for detecting scratches, stereo deflectometry for measuring shape and curvature, and moiré pattern for measuring optical distortions.

## Comprehensive and long-standing expertise in all areas of application

A crucial advantage of ISRA's systems is the fact that all components for the various process steps come from a single source. In addition to quality control, users benefit from service contracts spanning the entire product range, as well as reliable and long-standing partnerships with dedicated experts. Furthermore, the need for training is reduced to a minimum.

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The inspection systems are ideally suited to all applications, including sophisticated automotive glasses such as windscreens with integrated camera fields of vision. Process costs and the quality of the glass products can be optimized systematically.

#### **Reliably identifying serial defects in screen printing**

ISRA is continuously working to add to, expand and develop its product portfolio. Innovations include the PRINTSCAN system, which is used for the inline monitoring of screen printing processes. Potential serial defects are detected immediately and can be prevented based on the knowledge gained. The system uses an ISRA technology that has proven successful in many applications in the packaging industry and has now been made available for the automotive glass industry.

#### **Prepared for the future: reliably identifying distortion defects**

Based on patented stereo deflectometry, ISRA has developed a method that is ideal for assessing the reflection optics of windshields and rear and side windows. The new SCREENSCAN Reflected Distortion product allows measurement accuracy in the millidiopter range. Instead of the height of the surface, the system determines the local slope, ensuring highly precise calculation of glass curvature from all viewing angles and within usual cycle times. In addition to meeting the high requirements for multi-functional applications such as head-up displays, perfectly-curved windscreens ensure that the wipers work efficiently, providing a clear view free from streaks and dirt, including in the camera area of the windscreen.

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SCREENSCAN Reflected Distortion is certified by a major German car manufacturer.

### **Eliminating customer complaints with final quality inspection**

Full and comprehensive final control is guaranteed for the first time with the new SCREENSCAN Inspect solution. The system serves to eliminate all kinds of customer complaints by reliably detecting all distortion and cosmetic defects. In addition to the glass and printed area, the system now includes the ability to inspect the gray band of the windscreen, the camera's field of vision and the area of the ID number. One of the essential advantages of the solution lies in determining the optical quality of the camera's field of vision. A second operator station can be installed at any position in the line to provide technical assistance in manual cross-checks. Manufacturers today are required to assess the quality of their products – and an incorrect lower grading means financial losses. On the other hand, if the quality grade is too high for the actual product quality, manufacturers will face customer complaints. To solve this dilemma, the SCREENSCAN Inspect solution includes intelligent assistance systems that ensure precise and verifiable quality grading.

### **Customized solutions through collaborative partnerships**

In close cooperation with partners in the automotive and glass industry, ISRA relies on its extensive expertise in order to develop customer-specific solutions that meet all requirements. Thanks to their high reliability in detection and their practical design, they enable an efficient use of resources and easy commissioning. This allows for a

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quick return on investment and short amortization times. The systems comply with applicable standards such as DIN and ECE43. ISRA products are mentioned in various specifications in the automotive industry, which often demand that measurements are performed using ISRA or comparable systems.

#### **Industry 4.0 in the glass industry**

ISRA's systems make use of state-of-the-art information and communication technology at every stage of the process. The systems' integrated evaluation tools identify typical causes of defects. Aggregated, clearly-displayed information helps manufacturers to save costs by systematically optimizing production processes and making every stage more efficient. The goal is to ensure optimum delivery quality, high process efficiency and resource savings in the glass industry, while reaping the valuable benefits of Industry 4.0. The result: Automotive Glass Production 4.0.

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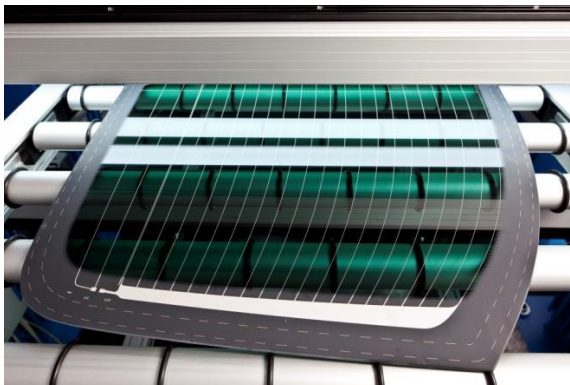
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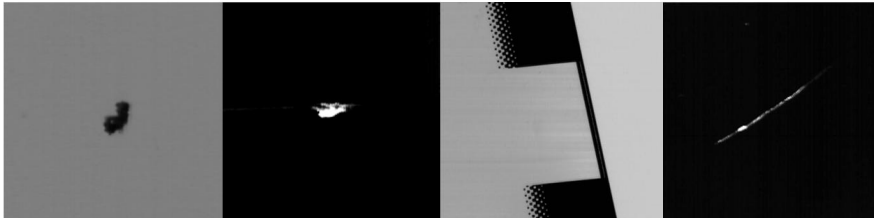
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**Images**



**617\_1.jpg**

PRINTSCAN enables the reliable inspection of printing on automotive glass.



**617\_2.jpg**

Typical production defects: inclusions, screen printing defects, macule and scratches in the screen print.

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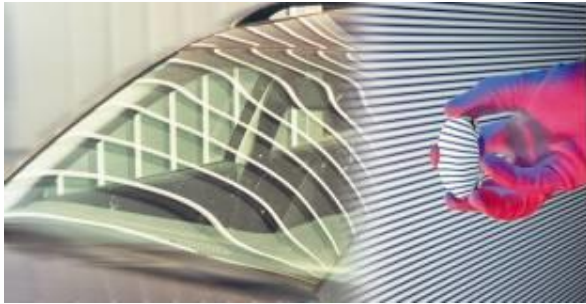
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**617\_3.jpg**

For the first time ever: objective and quantifiable assessment of aesthetic features of automotive glass, including inline – all thanks to SCREENSCAN RD (Reflected Distortion).



**617\_4.jpg**

Superior aesthetic results: SCREENSCAN RD reliably captures and assesses optical defects such as reflected distortion from any viewing angle.

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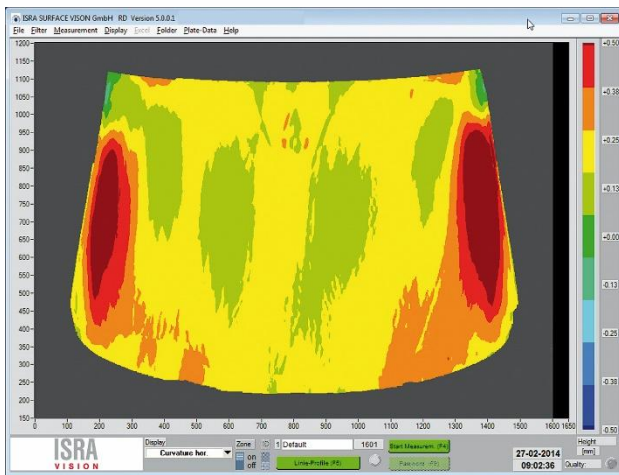
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**617\_5.jpg**

Display of measurement results for quick analysis.

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