GQVS

In **partnership** with

CUGHER

Glass Quality Vision System

GQVS is an automated system for quality inspection of glass, applicable to both raw glass sheets and finished glass products after cutting and grinding. The same system can also be used to assess the quality of other transparent materials such as polycarbonate, as well as tinted or coated glass.

OPERATING PRINCIPLE

GQVS employs ultra-high-resolution linear cameras capable of capturing images of the glass with exceptional detail. The system is also equipped with a set of illuminators specifically designed for optimal defect detection.

MAIN FEATURES

This system, typically installed downstream of the washing machine, is designed to scan the entire surface of the glass and detect any defects in the raw material.

Utilizing a specialized optical technology, the system inspects both raw and cut/ground glass. By employing alternating light source patterns, it can identify all types of defects, even the most subtle. During the setup phase, the quality manager can define the sensitivity level for each defect type.

The types of defects the system detects include:

- Seeds (air bubbles)
- Stones
- Adesion Chips
- Tin inclusions
- Glass Scratches
- Coating Scratches
- Edge Chips (after grinding)
- Over grinding
- Broken glass
- Contamination
- Water drops
- Wet edges

INSTALLATION

The system can be installed at the center of the precision conveyor, provided there is adequate open space to accommodate the cameras and illuminators. The system is offered in four standard sizes commonly used by automotive glass manufacturers: 1000 mm (for sidelites lines or home appliance), 1300 mm (for backlites lines), 2000 mm (for standard windshields lines), and 2600 mm (for large windshields lines). Custom sizes are also available upon request.
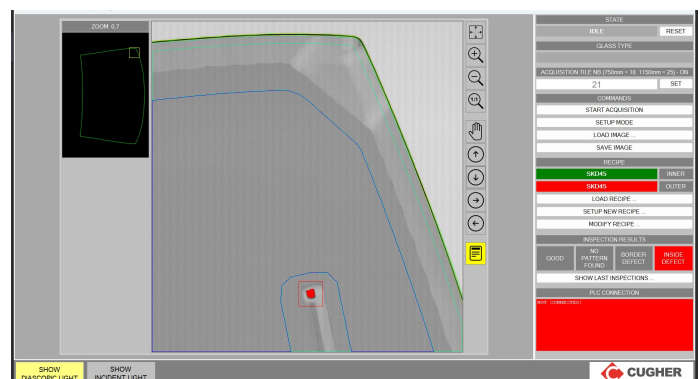
The inspection system offers a resolution of up to 60µm for 1000 mm glass, 80µm (0.08 mm/pixel) for 1300 mm glass, 122µm (0.122 mm/pixel) for 2000 mm glass, and 135µm (0.135 mm/pixel) for 2200 mm glass (on the long-edge leading).

Different sensitivity zones can be defined across the glass surface, allowing for higher sensitivity in areas such as the center, compared to the edges. All regions of the glass are inspected and compared against the tolerances specified in the glass inspection recipe.

The proposed solution utilizes a high-resolution monochromatic linear camera with 16,384 pixels. The camera captures one line at a time, "scanning" the glass as it moves along the conveyor. The full image of the glass is acquired within a few seconds, depending on the conveyor speed and the glass dimensions.

An innovative lighting system is strategically positioned to provide optimal illumination for the camera.

MAIN FEATURES

Defective areas, along with the captured image, will be displayed on a PC monitor and, optionally, on a 42" high-resolution display. The reference image used during the recipe creation phase can be overlaid for comparison.

The operator can navigate the entire glass surface and, if necessary, zoom in on specific areas to analyze image details more closely.

The software will display the detected defects, highlighting the corresponding areas on the monitor.

Following this, the glass can be diverted to a visual inspection station where the operator performs an additional check without stopping the production line.

This is a non-destructive inspection, conducted immediately after the washing cycle and just before the printing process.

As an optional feature, a separate software package with metrology algorithms can be integrated to measure external glass dimensions such as width, height, radii, and more.

Typical Defect (data related to 1000 mm wide glass)

Defects	Detection Limits
Scratch	0,06 mm x 0,25 mm
Bubble and Stone	0,13 mm Ø
Scratches	0,06 mm x 0,25 mm
Adhesion Chip	0,13 mm Ø
Broken Glass	Yes
Shiners	(*)
Chips	0,13 mm Ø

Typical Defect (data related to 2000 mm wide glass)

Defects	Detection Limits
Scratch	0,12 mm x 0,5 mm
Bubble and Stone	0,25 mm Ø
Scratches	0,12 mm x 0,5 mm
Adhesion Chip	0,25 mm Ø
Broken Glass	Yes
Shiners	(*)
Chips	0,25 mm Ø

(*)= Shiners: The system can detect Large Grinding voids or significant shiners. To perform a perfect shine edge detection, it will be necessary to verify the edges of the glass with a camera located on the X axes of the glass (looking at the glass edge).