ACELABS SYNCRO GROUP

BED

In **partnership** with CUGHER

Vision System for Edge Detection in Flat Glass

BED (Broken Edges Detector) is an advanced machine vision system specifically designed to inspect the edges of flat glass panels, typically used in automotive and home appliance manufacturing. Its primary function is to identify any broken corners, edge chips, or grinding anomalies before the glass progresses to the next production phases, such as printing or bending.

OPERATING PRINCIPLE

As a glass panel approaches the inspection area, its presence is detected by a sensor positioned before the rollers. At this point, the green LED backlight is activated and the line scan camera starts acquiring a continuous image of the glass edge. Synchronization with an encoder guarantees high-precision acquisition.

MAIN FEATURES

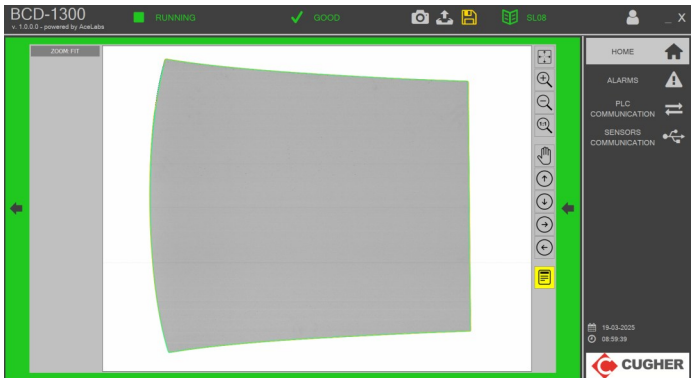
The image is analyzed in real-time by dedicated software that identifies any structural anomalies along the edges, including missing glass material, broken corners, and local inconsistencies in edge grinding. If a defect is detected, it is graphically highlighted on the screen and the inspection result ("GOOD" or "NO GOOD") is sent to the line PLC. Defective glass can then be diverted to a manual inspection station without interrupting production flow.

The types of defects the system detects include:

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

TECHNICAL CHARACTERISTICS

The **BED** system is equipped with an 8192-pixel monochrome line scan camera (GigE interface), providing an optical resolution of approximately 0.17 mm per pixel (6 pixels per mm). This setup allows detection of small defects such as chips with diameters of around 0.3 mm or broken corners involving minor geometric loss.
The illumination system uses high-efficiency green LEDs in transmission mode, which maximizes contrast for edge defects without being influenced by surface contamination or coatings.



SOFTWARE FEATURES

The **BED** system is managed through a dedicated software interface designed for real-time inspection and intuitive operation. At its core is a visual dashboard that displays the acquired image of the glass edge along with any detected defects, clearly highlighted through colored overlays. Operators can easily pan and zoom within the image to examine specific areas in detail, allowing immediate verification of defect type and location.

A powerful **recipe management system** allows users to create and load inspection profiles based on the specific glass type. During recipe setup, a reference image is captured and analyzed through an automatic training process that sets detection parameters such as defect area, edge width thresholds, and sensitivity levels. This ensures optimal configuration without requiring manual tuning.

MAIN FEATURES

Recipes can be edited, duplicated, or deleted from within the software, with access control to restrict changes to authorized personnel. Advanced users can manually adjust key parameters, but in most cases, default settings generated by the training process provide reliable detection performance.

DETECTED DEFECTS AND LIMITS

The **BED** system is engineered to detect a range of edge-related defects with high precision, including:

Broken corners: Areas where a portion of the glass corner is missing.

Edge chips: Small fragments missing along the glass edge.

Grinding anomalies: Variations in the edge's ground width, indicating potential processing issues.

The detection capabilities are influenced by the system's optical resolution, which is determined by the camera's pixel density and the field of view (FOV). In the standard configuration, the system employs an 8192-pixel line scan camera, achieving a resolution of approximately 0.17 mm per pixel (around 6 pixels/mm). This resolution allows for the reliable detection of defects such as:

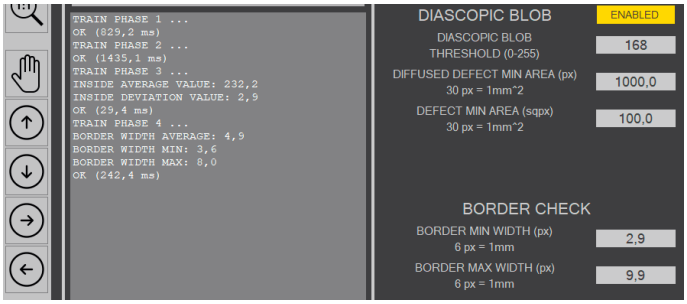
Edge chips: Down to a diameter of ~0.3 mm.

Broken corners: With a geometric loss of ≥0.5 mm.

Grinding width deviations: Detectable when exceeding ±1 pixel from set thresholds.

However, it's important to note that the effective resolution can vary depending on the width of the glass panels being inspected. Wider glass formats increase the FOV, which can lead to a decrease in the system's resolution if the same camera is used. To maintain consistent detection capabilities across different glass sizes, the system can be configured with cameras of varying resolutions or by adjusting the optical setup accordingly. This ensures that even with larger glass widths, the system maintains the necessary resolution to detect the specified defects reliably.

In summary, while the **BED** system is capable of detecting minute defects with high accuracy, the actual detection limits are contingent upon the specific configuration and the dimensions of the glass being inspected. Proper system setup and calibration are essential to ensure optimal performance across various glass sizes.



INTEGRATION AND INSTALLATION

The system is delivered as a compact, fully enclosed cabinet that includes all required components: camera, backlight, sensor interface, power supply, and electronics. It is designed to be installed directly on the production line, typically just downstream of the washer, where the glass is clean and free of debris.

Standard mechanical and electrical interfaces allow seamless integration with Cugher or third-party conveyor systems. Installation space requirements depend on the glass width and conveyor configuration, and custom cabinet sizes are available on request.

OPTIONAL FEATURES

The **BED** platform can be optionally extended with:

- **Integration with surface inspection systems** (e.g. GQVS) for complete glass quality control
- **Logging and archiving of images** and defect metadata for traceability
- **Remote diagnostic** interface for service support
- **Extended recipe** and production report management
- **Defect-based sorting** or rejection logic connected to actuators or stackers