

# SOLUTIONS FOR THE AUTOMOTIVE GLASS INDUSTRY

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## Mirror Button and Rain Sensor Application



## PREMISE

Windshield complexity, in terms of value add components, is continuously growing and the changes in the products are driving research and development work for glass processing machines.

STAR' solutions for the application of components like the mirror button and the rain sensor on the automotive windshields are the answers to the challenges created by these kinds of requirements.

Custom-designed solutions provided by STAR fulfil market demand for flexibility, reliability and quality from high volume productions to the small batches typical in the after market production.

The systems are integrated with the rest of the production equipment: autoclave rack palletizing, bag furnace unloading, windshields conveying and stacking, complete the STAR's offer.



## STAR SYSTEM

The proposed solution consists of a turn key processing line to allow the following main operations:

- Windshields conveying
- Manual unloading
- Cullet container transferring
- Centering and heating regulation of the windshield
- Distribution, heating, pre-gluing, T° control and positioning of the mirror button (MB) on the windshield
- Windshields palletizing

- Final pressing and gluing of the MB
- Visual control and palletizing on autoclave racks
- Evacuation of W/S with incorrect positioned MB or RLS socket

Depending on customers demand and product specifications, different options can be selected:

### Layout:

- Robotic handling of glass and stationary machine to feed and apply MB and RDS
- Belt conveyor line and up-side down mounted robots to apply buttons and RDS

### Feeding systems for MB and RDS:

- MB & RDS pre-glued on trays
- MB & RDS in cartridges/heating slides
- MB & RDS prepared in line



### Gluing materials:

- PVB
- 3M
- Sotefa
- PU

### Heating technology:

- Resistance
- Induction

### Pincer change-model:

- Manual
- Automatic



## GLASSES AND SPECIFICATIONS

Length	(mm)	900-2300
Height	(mm)	400-1250
Camber	(mm)	0-380
Wrap angles	(deg)	60°
Thickness	(mm)	4-7
Weight	(Kg)	9-35
Cross Camber	(mm)	0-60
Radius of curvature	(mm)	120-0
Asymmetric bottom	(mm)	0-100
Glass temperature	(°C)	70-100
MB & RDS accuracy	(mm)	+/- 0,5
Cycle time	(sec)	10-14
Change over	(min)	0-10

## VISION ASSISTED PROCESS

The system is based on vision system for the location of the printing, the picking operation of components and the measurement of the application results.

### Printing area detection:

A vision system precisely locates the area where the MB & the RDS are applied.

According to the windshield model, this area shall be located by using one of these reference means:

- a uniform printed area where the mirror button is to be applied or a void in the printed background
- as above, but where the printed area is partially dotted

- reference printed marks near the upper glass edge
- the glass edge (no printed marks): no side reference is possible in this case, only the distance from the glass edge can be granted.

### Mirror button location:

This vision system must precisely locate the mirror button position on the feeding system before the picking by the robot.

The camera and the infrared lighting system are usually mounted on the hanging up robot itself.

### Measurement and checking:

The windshield with the MB and RDS applied is inspected by vision to detect:

- presence of MB
- presence of RDS
- Distance of MB & RDS in respect of printing
- Relative position of RDS in respect of MB

## AUTOMATIC GRIPPER CHANGE

The mirror button robots can change their tools automatically at model change.

Once the new batch model is inputted, the robots move to the tool changer units, release the previously used tools at a proper position and load a new tool at another indexed position.

The quick-change flange on the robot tool provides, besides a mechanical interface, both electrical and pneumatic connections.

The tool changer unit allows for 15 different tools to be stored at the same time: more than one tool type can share the same position provided that the operator loads the proper type prior to the changeover operation.

## OPERATOR INTERFACE

The HMI will allow the following:

- Mode selection (Stop/Man/Auto)
- Input of part program /job-code
- Manual command of each actuator by local desk board.

The HMI software is developed by STAR based on Visual Basic.

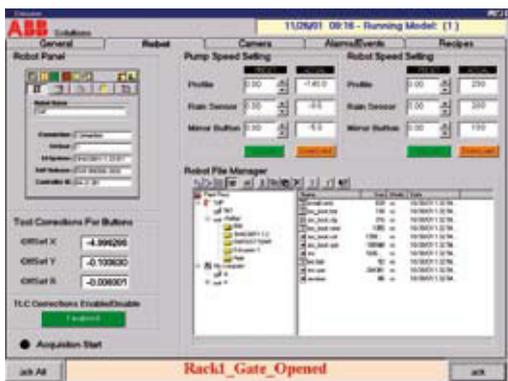
Here below some samples from the standard STAR HMI.

### General page



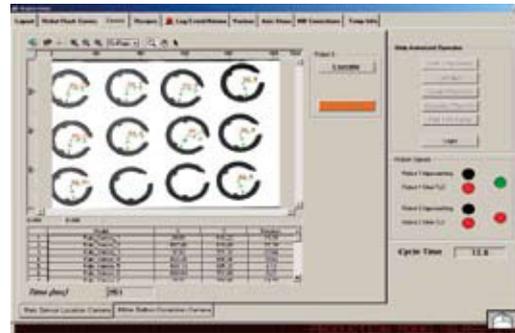
- display of processed parts
- reset functions
- machines status
- counters

### Robot page



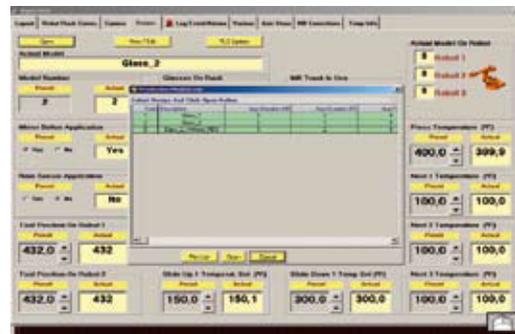
- robot panel display
- offset correction (x,y,rot) for MB & RDS
- TLC enabling/disabling
- Robot speed setting
- Robot file managing

### Vision page



- Real Time ('Live') image from the camera
- Reference (stored) camera pattern used to locate the actual pattern
- Camera correction
- Vision system commands

### Recipes Page



It provides the actual settings for the process and commands to store and recall settings related to a specific part

