

## TCS – tableware control system

### Tableware inspection machine for tumbler, stemware and pressed products with up to 14 cameras

- ◆ for the inspection of tumbler, stemware and pressed products
- ◆ for the inspection of round articles and articles with special shapes
- ◆ with an inspection speed up to 180 articles per minute

### Installation, Operation, Service:

- ◆ easy installation on an existing conveying belt in a short time
- ◆ supply also with own conveying belt and discharge unit
- ◆ connection to different line control systems and different data acquisition systems possible
- ◆ image evaluation with commercially available hardware

### New software

- ◆ with new intuitive operated user interface
- ◆ many new software algorithms for an inspection result in an optimum way



### Technical data:

© Machine dimensions: 2900 x 925 x 2250mm (W x D x H)

## TCS – tableware control system



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## Optical inspection of tableware glass

- for the inspection of tumbler, stemware and pressed products
- independent from the rotation position of the objects to be inspected
- exact measurement with telecentric lenses
- 360° inspection area



- + detection of all known side wall defects using shine through method
- + detection of mouth defects, cracks and form deviations in the mouth area
- + detection of a deformed stem or irregularities in connection points
- + detection of bottom and base plate defects for tumbler and stemware

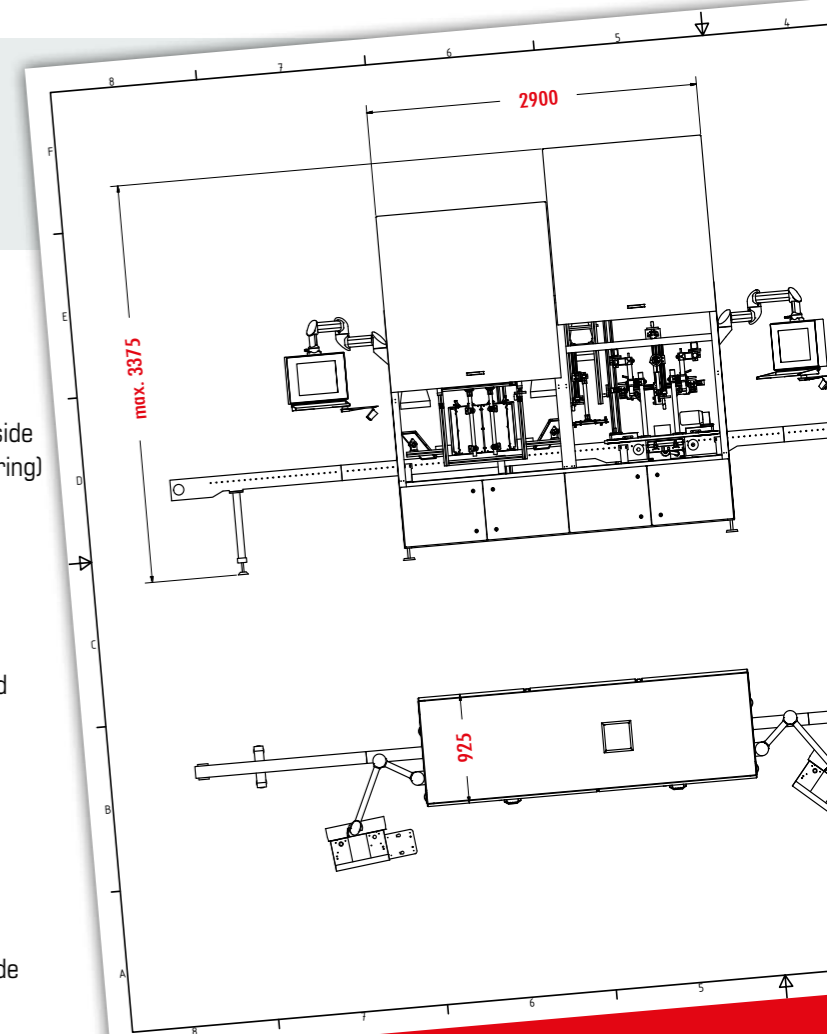
**All inspections for tableware in one compact machine**



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# Tableware inspection machine for tumbler, stemware and pressed products with up to 14 cameras

Exact and contact-free measurement of the articles by using telecentric lenses



**Take in Operation:**  
Easy installation on an existing conveying belt, supply also with own conveying belt and discharge unit



**Optical features:**

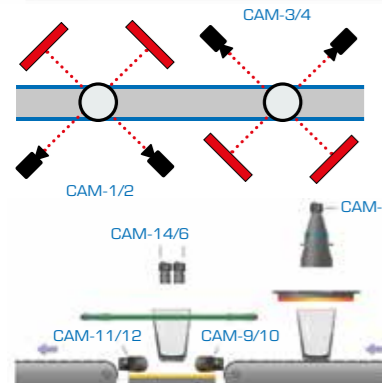
- + using up to 14 high resolution CCD cameras
- + telecentric lens for exactness in mouth measurement
- + long life LED flash light sources especially for cosmetic defects
- + telecentric lenses for exactness in dimensions and symmetric from side
- + using a special light source for finding cosmetic defects (e.g. mould ring)
- + logos or engravings will be detected by the software automatically
- + inspection machine is checked by self-testing functions

**Inspection characteristics:**

- + automatic detection and differentiation between logos / engravings and real defects
- + all detections and measurements will be done by a contact-free method
- + inspection independent from changing light conditions and glass colors
- + differentiation between shadows and real defects
- + detection of: *fold, body rings, checks, blisters, glass pieces, ovality, stem & connection point defect, ...*

**Operation and evaluation:**

- + new intuitive operated user interface with clear icons to display defect types
- + inspection parameters can be changed during running automatic mode
- + operator can individually set and save the parameters
- + individually changeable limits for the defect size to reject articles
- + for dimensional measurements the operator can easily enter the limit from the drawing
- + simple and quickly adjustable software through automatic adaption of the inspection zones in nearly all parts of the article
- + multiple statistic evaluation of the last hours and the complete production



**Camera 1-4:**  
telecentric lenses for high accuracy in dimensional and symmetrical measurements

**Camera 9-12:**  
are for inspection of base plate or of tumbler-bottom from below for defect types „unsteada“ and OCMI.

**Camera 13:**  
for stem and connection point takes pictures like this



**Optional Camera 14:**  
optional additional camera it is possible to take a second bottom picture, this bottom picture work as dark field inspection for save detecting of glass splinters



**Camera 5:**  
telecentric lenses for exact dimensional rim measurement minimum effort to calibrate the system

**Camera 6-8:**  
using normal lenses to inspect the bottom and base plate of tableware glass for an effective manufactured size

**Detection of all known side wall defects**

with up to 5 cameras from the side

**typical defects:**

1. defect in- and outside of the handle
  2. defect inside the stem
  3. fold in the sidewall
  4. peaks in the glass
  5. crack
  6. blister
- and many more...

**Detection of mouth defects**

with one camera from top

**typical defects:**

1. unfilled mouth
  2. large pip
  3. notch
  4. broken rims
  5. sugar rim
  6. fold in the rim area
  7. chipped rim
  8. cracked rim
- and many more...

**Detection of defects and deformations in the bottom and base plate**

with 4 cameras from the side and 3 cameras from top

**typical defects:**

1. deformed base plates
  2. glass pieces outside
  3. deformed shape(e.g. tea plates)
  4. inclined cup
  5. offset in stem
  6. deformed stem
  7. folds in the bottom
- and many more...

**The shapes and sizes and colors of the tableware**  
The inspection machine is designed to inspect round articles and articles with special shapes as well as clear and colored glass

