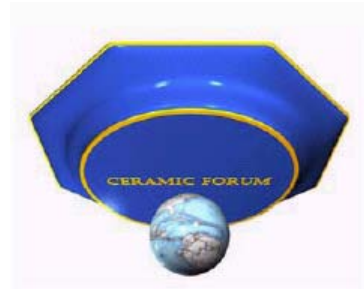


OPTOMACHINES

Control & Measuring Equipment Design and Manufacturing

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“OPTOmachine” for automatic sorting of flatware.

Introduction:

The equipment as described further is to sort glazed flatware in separate lines, sorting the defecting products from the good ones. The “OPTOmachine” is to record the number and kind of defects in each category, according to its following order. The decision of repairing, rejecting or to make the defected ware a second choice, etc., remains the decision of the person who makes a final inspection, to be done on the defecting ware only.

The “OPTOmachine “consists of:

The installation comprises:

- 2 inspection chambers, holding the vision technology, one to check the top, one for underneath.
- Mechanical handling equipment, transporting the ware under the inspection chambers and moving the articles to the good (O.K.) and defaulting (Not O.K.) transport belts.
- An offloading automatism before the entry of the “OPTOmachine”
- A plate stacking system for providing 2 belt conveyors with piles of plates. One belt conveyor for the O.K. plates and one for the Not O.K. plates.
- Electrical control cabinet incl. computer, screen and software.

The machine frame height is adjustable to existing conveyors height.

The main program comprises the following features:

- Selecting current reference, batch number, etc.
- Counting number of pieces controlled
- Viewing the current defect and synthesis of global production
- Setting up detection accuracy, threshold alerts on the different parameters.
- Making journals of the different defect results and alerts.
- Calculating the type of defaults, analysing in numbers and/or percentages, SPC.
- Data export to Excel.

Technical specification:

Defect detections:

- Black dots, grey dots, cracks, edge defaults (lack of material or grain), foot crack, foot grinding default, iron spots, chips...
- White grains, yellow stains, glaze defaults: sagging, discolouring, missing glaze, pin holes...
- Back stamp control (position, darkness...)

Geometrical control:

- Diameter.
- Height of rim
- Foot planarity
- Foot height
- Bottom shape (optional)

Products:

Plate's diameter from 140 to 320 mm, height from 10 to 50 mm.

Embossed/ relief plates and festooned plates with specific programming.

The equipment is dedicated to glazed plates, but can also check bisque fired (if strong enough for handling), uniformly coloured and glazed products.

- Round plates
- Symmetrical plates (quadrangles, hexagonal, octagonal...) can be checked to a certain extend, depending on the shape, (and basin must be round)
- Non symmetrical plates can not be controlled, except certain shapes (triangular plates with round basin are successfully checked at Rosenthal)

Output:

Typical: 600 to 700 p/h,

500 to 800 pieces / hour, depending on selected controls, options, dimension and resolution.

For Products over 250 mm and deep plates, the output is lower.

Maximum pile height: 30 cm

Quality control and specific conditions:

Experience shows that the equipment meets the requirements of most of the manufacturers. Resolution is to be adjusted to his exact requirements. Best adjustment is obtained with a witness batch of about 400 plates with defects for each reference.

Certain recursive defaults due to the process must be accepted. The equipment allows a “desensitisation” for this type of default.

As every control system, the equipment is characterized by the “wrong detection rate” (good plates sorted to the Not O.K. class) and the “leak rate” (% of not detected bad plates), both rates are strictly positive. Typically, the “leak rate” is lower than 1% of the production, sometimes 2%; the “wrong detection rate” varies depending on references from 3 to 10% of the production. Some “difficult” references may modify these rates.

Calibration and capability checking:

We advise customers to use a witness batch of plates with typical defaults, in order to verify the machine regularly. These plates must be handled with care to avoid scratches.

Plates must be clean and dry.

Most of fingerprints and scratches may be detected.

Machine must be installed in a clean area (no dust).

The equipment is supplied complete, including the standard tooling and limpets, and the ordered options.

The checking program is now multidimensional and automatically adapts its algorithm to the size of plate. The equipment is delivered with complete program for round products without relief and festoons. Specific programming for relief and festoons is available as option.