CAPSULE
INSPECTION MACHINE

CES - 150
We have been providing users with Hard Capsules with excellent quality to comply with their needs and satisfaction. We have recently developed Inspection Machine combining computer image processing technique and CCD line sensor camera to capsule rectification-transfer mechanism which has already obtained high appreciation for Capsule Filling Machine and Sealing Machine that can cope with unmanned operation. This is small type of machine and makes it possible to systematize with filling machine and has established quality assurance system to match unmanned production line and cGMP and achieved broadly saving of energy.

- **Small type and direct connection with Capsule Filling Machine**
  The machine which has 58cm(width)×65cm(depth)and 0.38m$^2$ of installation dimension is so compact that it can be directly connected with filling machine in exclusive filling room and makes it possible to control filling machine by defective ratio detected.

- **High speedy-and accurate-inspecting operation**
  By adoption of many lines rotary type rectification, 155,000 capsules/hour of normal speed can be guaranteed. By inspection in rectification of capsule and stopped turning, high inspection accuracy without dead angle can be obtained.

- **Unmanned and long-time operation**
  As mild capsule supply and stable inspection accuracy is obtained by capsule rectification-transfer mechanism that has achieved the good results from filling machine and sealing machine, unmanned operation has become possible.
① **Rectification**

Rectification of capsules is made by many lines rotary rectification equipment. By rectifying, inspection accuracy and high speed image processing has become possible, which is superior in stability and reliability.

② **Light and camera**

Capsules rectified are transferred to inspection drum which turns intermittently at high speed. By parallel lighting with two line type fiber lights based on halogen source of light and using three CCD line sensor cameras with 2048 PEL, high accurate and reliable inspection without dead angle can be made.

③ **Inspection (our own method)**

During slight stop of inspection drum, make capsules turn 2.2 revolutions and inspect all round and sides without dead angle. Camera scans at high speed of about 500 times with homogenous sensitivity and at fixed focus distance and inputs high accurate image.
4 Discharge of defective capsules
Defective capsules are discharged from inspection drum turning intermittently by pressed air. As discharge is made at stopping of intermittent turning in 0.2 seconds by one circle, defective capsules can only be discharged exactly.

5 Touch panel
Graphic panel is equipped as standard and current operation and inspection can be checked by camera, row at real time.

6 Discharge of good quality capsules
Good quality capsules of which inspection has been finished can only be discharged from inspection drum. Connection with collecting container becomes possible, and at the same time when unmanned control operation can be done from filling till selection/from inspection till collecting, capsules of which quality is guaranteed can only be transferred to the next process.
**Inspection method**

1. Three cameras inspect nine capsules in one row.
2. Camera can scan about 500 times at high speed and inputs their images as information.
3. As capsules are rectified and then inspected, judgement level can be set up regardless of color difference of cap and body and imprinted capsules. And no extra equipment and operation is needed for circumferentially imprinted capsules and rectified imprinted capsules, and high inspection accuracy is obtained.
4. Capsules are inspected by being divided into eight to long diametricwise. This block can be set up in optional width and as judgement standard level is separately set up, precise inspection can be made and as its result, good quality capsules receiving ratio has been enhanced to more than 99.9%.
5. Defective part of capsule is judged synthetically at such four inspection level as upper level and lower level along wave shape of capsules, shaftwise variation and turningwise variation. Either good quality capsule or defective capsule is judged by one capsule in comparison with judgement level previously set up and inspection threshold. As processing image of capsules judged as defective capsules is monitored, validation is easy.
6. Imprinted capsules are masked in part of imprinting letters but as the number of elementary particles inside mask is counted separately, blur of imprinted letters and defect in imprinting area can be detected by setting up the upper and lower limit.

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**Specifications**

- **Overall dimensions:**
  - Machine itself: 580mm (width) × 650mm (depth) × 2,195mm (height)
  - Control box: 900mm (width) × 700mm (depth) × 1,911mm (height)
  - Height includes that of hopper.
  - [Excluded cooler and light beacon]
- **Gross weight:**
  - Machine itself: 600kg
  - Control box: 400kg
- **Capacity:**
  - Capsule size 0 – 103,000 capsules/hour
  - Capsule size 1～5 – 155,000 capsule/hour
- **Inspection items and accuracy:**
  - Foreign materials (larger than 100 microns), Stain (larger than 100 microns), Mashed, Dents, Splits, Holes, Edges, Double cap, Telescoped, Unjoined, Scrapes, Short caps or bodies and Long caps or bodies, Nonimprinted and etc. can be detected.
- **Attached equipment:**
  - Electric source: 3 phase 200V ± 10% 50/60Hz 4.0kVA
  - Vacuum: 20kPa 3.0m³/min
  - Compressed air: 0.5MPa 0.7m³/min
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