

cap  box

integrated cap treatment



GREEN  BOX  
more than answers

## Integrated Cap Treatment

**CapBox is a complete line of machines designed and manufactured by Green Box to deliver high quality closures and handle faster production rates and shorter cycle times.**

Cap production cycle times are getting shorter and shorter. Cap weight and thickness are also continuously decreasing. For these reasons it has become necessary to have highly efficient cooling of the closures and a comprehensive quality control system. Equipment can be provided as an integrated solution or separately for specialized specific functions.



The line consists of:

- ❶ **Cap Feeder:** cap conveyor system to Cap Cooler (with pneumatic feeding or with conveyors)
- ❷ **Cap Cooler:** cooling system
- ❸ **OTGV:** cap feeding and orienting system to the quality control unit
- ❹ **Cap Sorter:** cap quality control to detect and reject pieces not complying to technical specifications.
- ❺ **Box Shifter:** feeding system for multiple boxes

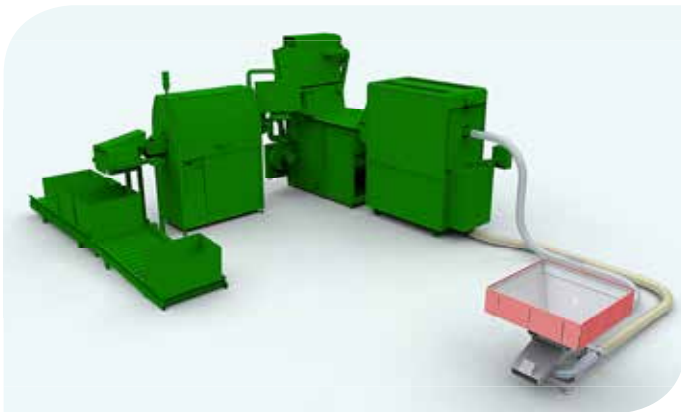
## 1

### Cap Feeding System

In order to feed the Cap Cooler, two systems are available:

- pneumatic conveying system
- conveyor belt system

#### Pneumatic Conveying System



##### Suitable for a 5 m distance, formed of:

- Collecting funnel to be installed under the mold. The funnel in stainless steel, coated with a special rubber
- Venturi injector
- High pressure fan
- Rigid or flexible antistatic piping suitable for the food industry (10 m in total)
- Control panel integrated in the Cap Cooler

#### Conveyor Belt System



##### Suitable for application with injection moulding machine:

- Horizontal and horizontal/inclined conveyor belts
- Collecting funnel to be installed under the mold
- Funnel in stainless steel
- Pneumatic diverter flap with chute to discharge the samples on the operator side
- Horizontal conveyor belt with possibility of reverse running operation

## 2

### Cooling Systems

**The Cap Cooler is a unit especially designed for cooling caps immediately after ejection from molding.**

The highly efficient cooling action of the Cap Cooler delivers caps at a temperature approximately 3°C higher than the ambient temperature. Cap Cooler produces uniform cooling of the complete cap, thus assuring regular shrinkage and constant quality of the products. Ovalization and deformation defects are therefore reduced to minimum. Two models are available: standard model and HF model suitable for capacity higher than 65000 ÷ 80000 (depending on the specifications of the closure).



#### Main Characteristics

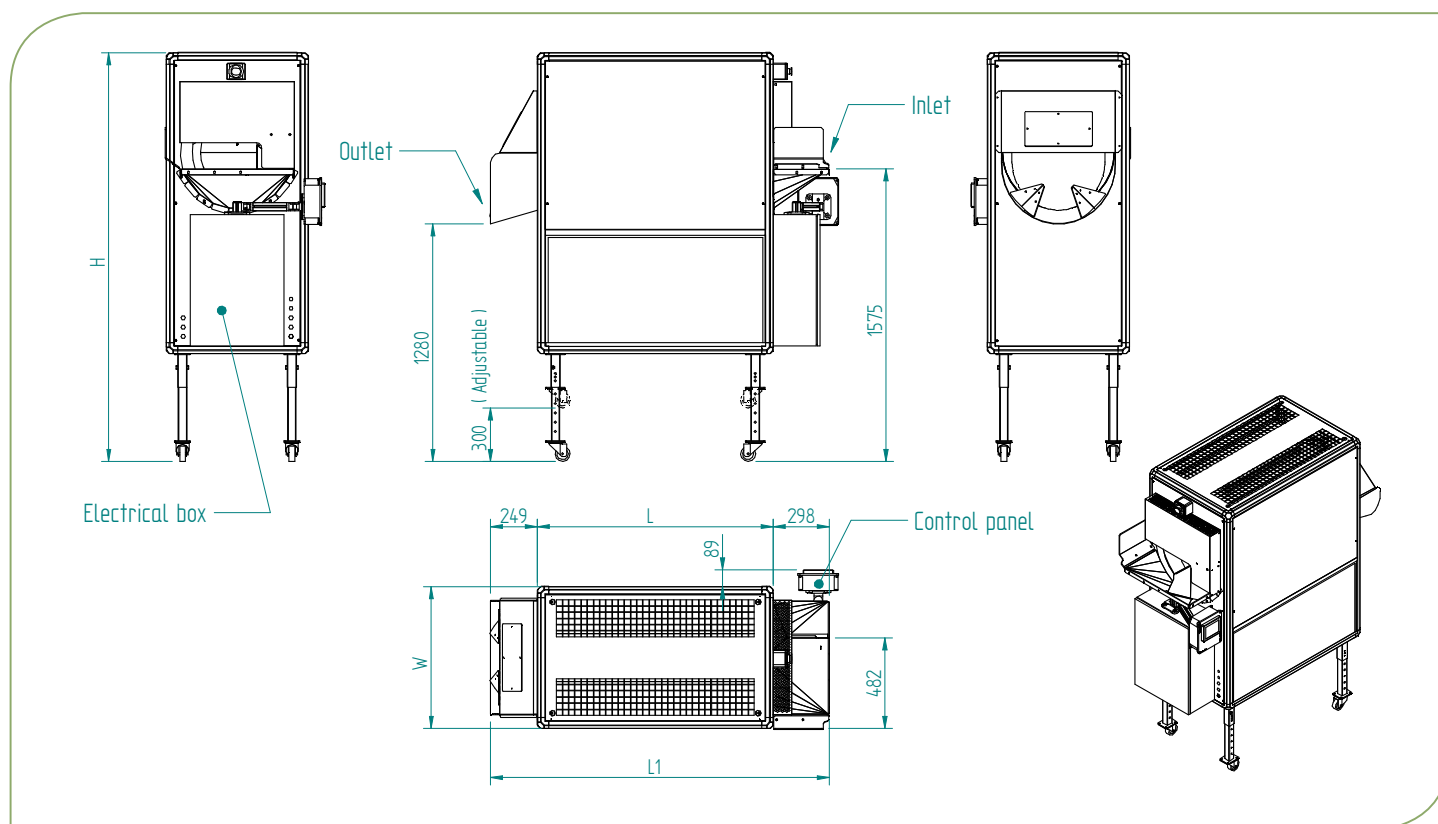
- Easy to install
- Little floor space required
- Low energy consumption
- Suitable and adjustable for different cap sizes
- Easy to adjust to different outputs
- All surfaces in contact with caps in stainless steel



Technical data		CAP COOLER standard version	CAP COOLER HFversion
Fan power	kW	3	4
Gearmotor power	kW	0.13	0.25
Noise level	dB(A)	<78	<78
Colour	RAL	9010 white	9010 white
Net weight	kg	225	300
Voltage	V -Hz	380 - 415V/3/50 Hz • 380 - 460V/3/60 Hz	380 - 415V/3/50 Hz • 380 - 460V/3/60 Hz
Dimensions (L-W-H)	mm	1257 - 757 - 1709	2000 - 757 - 1722
Dimensions (L1)	mm	~ 1804	~ 2547

### Available special versions

- Heat exchanger with chilled water connections for ambient temperature higher than 38°C. Heat exchanger grants constant temperature of the caps at the outlet even with large temperature variations inside the factory.
- H13 absolute filters



# orienting system

3

## Vertical Gravitational Orienting System

**This machine has been specifically designed to orient and introduce caps into the quality control system.**

The Gravitational Orienting System is designed to be installed downstream of the production line and in particular downstream of our Cap Cooler.

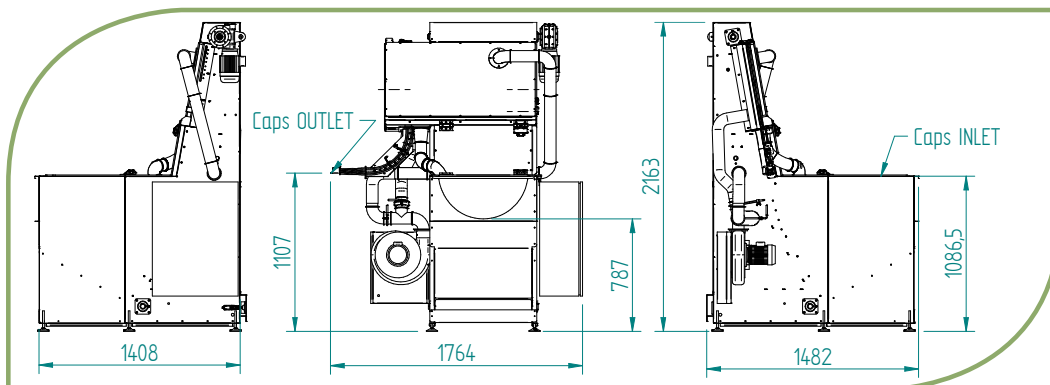
The unit is constructed of stainless steel and materials approved for food applications. It is suitable for closures with diameter between 25 and 38 mm and with height between 12 and 20 mm.

Special versions available on request for closures with different dimensions.



The unit is suitable for production up to 150000 pieces per hour approx and includes :

- Collecting Hopper
- Gravitational Sorter
- Feeding System to Quality Inspection Unit.



#### Technical data

Power of the feeding system blower	kW	0.55
Gearmotor power	kW	0.37
Volume of the collecting hopper	l	230
Required ground space	m <sup>2</sup>	2.6
Colour	RAL	9010 white
Net weight	kg	280
Voltage	V -Hz	380 - 415V/3/50 Hz 380 - 460V/3/60 Hz
Dimensions (L-W-H)	mm	1482 - 1764 - 2163

## Collecting Hopper

The collecting hopper must be placed at the outlet of the Cap Cooler. It works as reserve bin and it is very useful in the event of any short interruption during operation.

## Gravitational Sorter

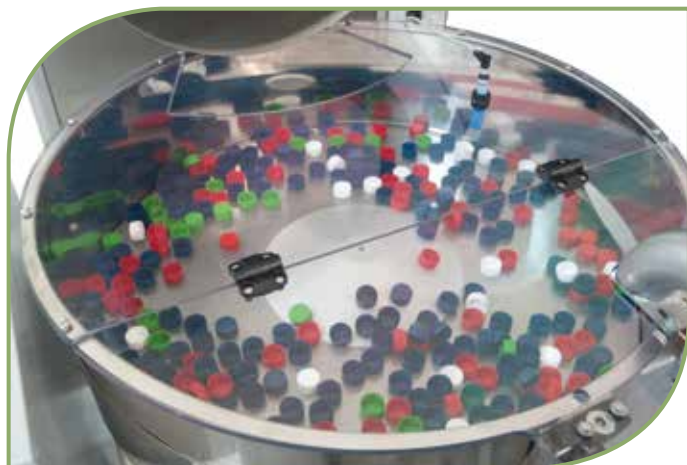
This is a special conveyor, which collects the closures at the bottom of the collecting hopper. The special conveyor moves the closures upwards till the position at which the closures, which are oriented in the wrong way, fall back into the collecting hopper. The closures which are correctly oriented come to the top of the conveyor.

## Feeding system to the Quality Control Unit

When the closures reach the upper part of the conveyor, a blower blows the closures to the outlet, which feeds them in an oriented way to the conveyor of the quality control system.

## Centrifugal Orienting System

The unit is suitable for production up to 50000 caps per hour.



## 4

### Free Standing Vision Sorting System for Precision Inspection of Plastic Closures

**100% inspection and sorting of plastic closures up to 3000 pieces per minute**

Caps are fed to the sorter oriented in single line. The conveyor and spacing unit have adjustable speed control and are able to present caps evenly spaced at 3000 pieces per minute. The precision spacing unit and tracking system ensures that the parts are presented to the cameras within less than 0.5 mm position variation in any direction, granting consistent inspection. The caps are inspected by the 6 camera system. Bad parts are blown off the belt by the Solenoid controlled Reject Mechanism.



#### Cap Sorter includes:

- Vacuum Conveyor
- Spacer
- Vision System with Multi-camera Assembly
- Touch Screen
- IO Control Interface
- Multi Blow Off

#### Features:

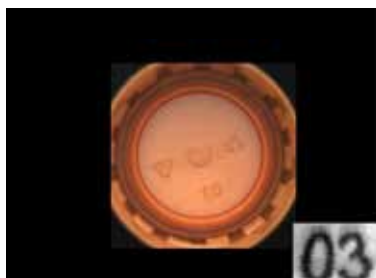
- User friendly interface
- Easy set-up
- High precision optics
- High accuracy and consistency
- Fully automatic self teaching algorithm
- Cavity reading
- Easy access for maintenance



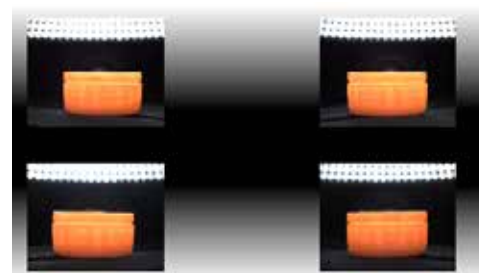


## High resolution All Surface Cap Inspection

Overhead Camera  
with cavity reading



4 x Side Camera  
Side & Internal Surface Inspection  
External Dimension Testing



## Modular

- Modular Analysis Components.
- Each module is easy to install (copy in the folder) and comes with:
  - Analysis to be performed
  - Procedure to configure the analysis
  - Report of the analysis



2 x Overhead Camera

## Smart

- No need to be an expert to configure it
- Self-Teaching: let the system inspect some caps and fully automatically it defines some internal threshold. The system detects the bad caps and discharges them from the calculations.
- No font Required: it is possible to teach the system how the digits are made by simply entering the digits you read into a virtual keyboard.



## Fast

- Runs analysis in parallel on 8 cores microprocessor
- Uses Halcon 12 vision libraries
- Intel 17 4TH GEN

## Latest technology

- Windows WPF user interface
- CAPS Sorting using Bayesian classifiers and support vector machines

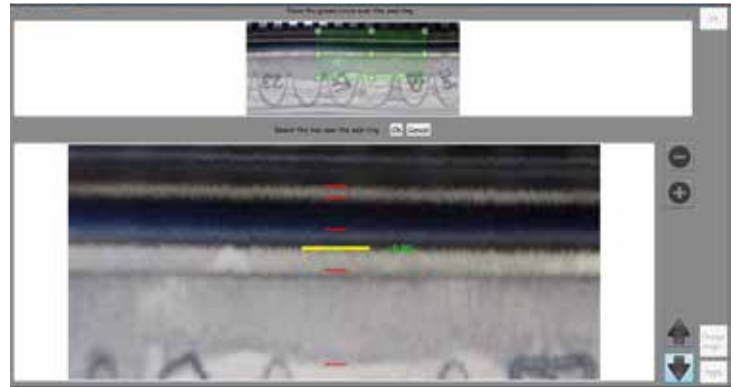
## Communication facilities

- Skype is pre-installed
- Camera, Microphone and Speakers are integrated into touch monitor
- Remote assistance through VNC or Teamviewer (optional)



## Precision Measurement

- PLC CYCLE SCAN OF 50  $\mu$ S (microseconds) permits to trigger cameras with 0.1 mm precision at 120 meters/min
- POLIZENE BARS reduce grip and deformation of caps entering the machine
- VACUUM CONVEYOR ensure grip
- SERVOMOTOR to move the conveyor



## Imaging

- One overhead camera for inspection of Base Inner, Side ring and Tamper Band Surface.
- One overhead camera for dimension measurements.
- Four cameras for side inspection of external wall and tamper band.
- Multi Camera also allows side dimension measurement.
- Therefore the multi camera provides extremely high capability for sorting of small vertical flashing and tamper band defects.

## Data Client

- The Data Report allows to get for each control module the last (N) detections of caps, a histogram also enables to connect the cavity number with the abnormal detection frequency of the cavity number
- An Extended report module (optional) allows to aggregate data for imprint, by type of defect or parameters defined by the customer (date, time, shift, production batch, mold, etc.)

## General Detection Specifications for all Types of Beverage Closures

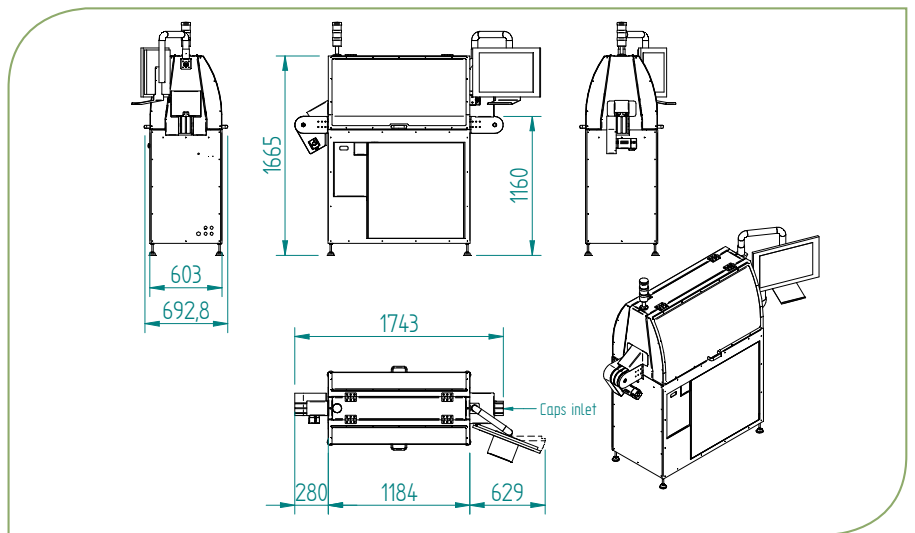
Moulding Defects	
Horizontal Flashing	x
Vertical Flashing	x (50 $\mu$ m)
Missing Flaps	x
Smileys (lifted tamper band)	x (50 $\mu$ m)
Deformation	x
Pulled Thread	x
Short Thread	x
Cracks	x
Contamination Internal	x
x(50 $\mu$ m)	x (50 $\mu$ m)
Colour Variation	x

Liner Defects > 100 m <sup>2</sup>	
Liner Void (under-fill)	x
Liner Flash (over-fill)	x
Clipped Liner	x
Misplaced Liner	x
Double Liner	x
Contamination	x

Dimension Testing • Accuracy • $\pm 25\mu$ m	
Outer Diameter	x
Seal Diameter	x
Ovality	x
Height	x
Tamper Band (width)	x
Bulge (width)	x
Knurling (width)	x

- Compact, efficient design
- Small footprint
- Low input power

Specification Sheet	
PC	Intel i7 8 cores platform
Data Storage	Solid State (no Hard Drive)
OS	Windows 8.1
Cameras	Fast USB
Illumination	Solid State Cool White
Rejection Mechanism	Blow Off Solenoid
Maximum Inspection Speed	3000 pieces per minute



## 5

### Feeding System for Multiple Boxes with Belt Conveyor

**Box Shifter is designed to handle automatically closure packing**

Considering boxes having dimensions 400 x 600 x 400 mm H, the solution for 7 boxes has a total length of 3.2 m and it is configured:

- Empty boxes zone (3 boxes): approx 1 m long
- Feeding zone: approx 0.5 m
- Inclined "free rolls" for 3 filled boxes: approx 1.6 m

The box shifter is controlled by PLC.



- Automatic box switch system with belt conveyor
- 3.2 m total length (available with different dimensions upon request)
- Buffer at the outlet of the inspection system to collect closures during box switching
- Automatic visual and acoustic alarm in case of problems during box switching





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