



Wild Polska Sp. z o.o. · MARCINKOWO 127 · PL-11-700 MRĄGOWO

Test Report

SMART SORT Sorting device MODEL MK 128

Place of test : Wild Polska Sp. z o.o.
11-700 Mrągowo

Date of test : 28-31.10.2024

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Technical data:

- Technology: color camera Eagle Eye™ Bionic 2.0
- Lightening : lamp technology - LED
- Working width of a conveyor belt: 626 mm
- Number of nozzles : 128
- Types of sorting identification parameters: color, shape, size
- Theoretical maximum device throughput: 2000kg/h



28.10.2024

Device assembly, technical work, calibration, preparation for testing

29.10.2024

Presentation of device , introduction to the technology, description of the acceptance and rejection rules used by the device and how it "learns".

Assumptions: device needs to be calibrated for each kind of sorted material to learn what is acceptable and what is not acceptable, both sorting materials and foreign bodies / deviations needs to be presented for cameras and software. The more photos are taken (indicated standard effective number is 1000), the more effective the device is – I terms of recognition of deviations as in recognition of a fruit pieces.

First test with papaya cubes 10x10 (~3kg) with device initially calibrated – mainly on foreign bodies recognition not on a "good" material

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Sąd Rejonowy w Olsztynie,
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Kapitał zakładowy 191 000 PLN

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Foreign bodies (14 pcs) : brown glass 1pc., black gum 2pcs., orange plastic, mineral stones 3 pcs different materials, grains 4pcs., cherry stones 2pcs, plum stone 1 pc.



Results:

11 foreign bodies has been detected

1 foreign body – grain was stuck to the conveyor belt

Orange plastic was not detected

Volume of out sorted material constituted about 1/4 -1/5 of the amount of raw material, what was not satisfactory.

In next step there has been done around 100 more pictures of papaya cubes mixed with wide library of foreign bodies, device has “learned “ how to recognize fruits and non-fruit pieces to improve sorting process and reduce loses of good material.

30.10.2024

Second test with papaya cubes 10x10 (~10kg)

Foreign bodies (19 pcs): brown glass 1pc., transparent glass 1pc, orange plastic 3pcs., metal chip 1pc., transparent foil 1pc., pea 1pc., yellow foil, 1 pc., black gum 2 pcs., blue rubber 1 pc, twig 1pc, carton 1 pc, mineral stone 1 pc., piece of a mango stone 1 pc., wooden splinter 1pc., grains 2 pcs.



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Materials has been sorted twice with the same foreign bodies load , because due to external conditions – high temperature and humidity some of foreign bodies stuck to the conveyor belt (carton , mango stone piece, foil)

All 19 pcs of foreign bodies has been detected.

Volume of out sorted material constituted around 0,5%



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Third test – Strawberry uncalibrated 15kg

Foreign bodies (17pcs): metal chip 1pc., blue foil 1pc, red foil 1pc, red plastic 3 pcs.(different materials), cherry stone 2 pcs, cherry fruits 2 pcs, papaya fruits 2 pcs, snail shell 1 pc, pea 1pc., twig 1 pc., mineral stone 1pc., grain 1pc.



All foreign bodies has been out sorted except of blue foil and red plastic, which stuck to the conveyor belt (out sorted in the repeat of test)
Volume of out sorted material constituted around 0,5%

Fourth test – Strawberry uncalibrated 15 kg

Foreign bodies (17pcs): metal chip 1pc., blue foil 1pc, red foil 1pc, red plastic 3 pcs.(different materials), cherry stone 2 pcs, snail shell 1 pc, pea 1pc., twigs 2 pcs., mineral stone 1pc., grain 1pc., transparent plastic 1pc., blue gum, brown glass 1pc., transparent glass 1pc



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All foreign bodies have been detected (effectiveness 100%)

Volume of out sorted material constituted around 0,5% - this mass includes also bigger fruits which didn't go through physical barrier of crossbar with air nozzles.

Final conclusions and remarks

1. To sort frozen fruits device needs to work in special conditions in terms of temperature and humidity. Ambient temperature and high humidity definitely makes the sorting process more difficult and disrupts it (the raw material sticks to the line's parts, foreign bodies stick to the transport belt and fruit).
Tests were conducted in standard production condition of Wild Polska without any special preparation of environment.
2. Preparation of sorting program for each type of raw material requires precise "teaching" of the machine what is acceptable and what is a defect / foreign body and should be out sorted. The more pictures are taken the greater the efficiency of the device. The program must be written on a computer with very high parameters. As we have seen, this is a time-consuming process. However invested time may guarantee high level of performance. One day we managed to test a 10x10mm papaya cube (programming time



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~6 -7hrs), the next an uncalibrated strawberry (programing time ~ 6 -7hrs),. Effect of test was satisfying in terms of detected foreign bodies and reduction of out sorted mass – even though it was based on 10% of indicated effectiveness scans number.

We see as a great advantage possibility of detect foreign bodies with high level of similarity to the fruit – like an orange plastic piece in papaya or red plastic and foil in strawberry as well as transparent foil and plastic.

3. In effective sorting, it is important to set the appropriate height of the air nozzle bar. For each type of fruit, this height must be adjusted. In the presented device, this height is adjusted manually with use of wrenches. With large portfolio of assortment "manual" adjustment of the bar height is impractical and we highlight this as a point for improvement. This kind of design would not have our acceptance. The precise adjustment of the cross bar setting also affects the amount of sorted material, because fruit pieces of a size different from the standard were occasionally sorted after hitting the bar.
4. Design of device - as all - requires improvements in terms of food safety and hygienic design (open screws, unsafe connections, metal parts , which could cause secondary impurity of raw material). The version of machine which was tested may not be easily cleaned with water.
In order to be used in industrial sorting of frozen fruit, it would have to be properly adapted in terms of construction and facilitation of wet cleaning (covers, hygienic connections, screw protection, etc.).