Case study Void Fill Solution



SUMMARY

1. CHALLENGE

- · Decreased efficiency of packaging work due to high dependence on manual labor
- \cdot Challenge in measuring the void of the packaging box accurately
- Increased the cost burden as when the volume of the packaging box grows

3. RESULTS

- ·Accurately calculates the void of the packaging box
- · Fills the void of the box with an appropriate amount of cushioning material
- · Improves cushioning material use efficiency leading to a significant cost saving
- Short cycle times (min. 2 sec. including processing, It can be changed depending on the operating environment.)
- · ROI within 6 months (1 production line)
- *Customer's requirement

2. SOLUTION

Software



- 3D measurement algorithm
- Box size recognition algorithm
- Graphical User Interface (GUI)
- Recipe tool for custom setting
- · Hardware: 3D scanner & PC



_ CHALLENGE

1. BACKGROUND

Efforts to build an automated packing system & Challenge in calculating the appropriate amount of cushioning material

With more than a 50% market share, Korea's largest logistics service company is modernizing its operating system and leading various logistics businesses by introducing an automated packing system using cutting-edge IT technology. For example, it was less efficient to fill the void with the cushioning material in the product box packaging stage, as it was performed manually. The company tried to change the system to an automated one to increase production efficiency. It was challenging to accurately calculate the appropriate amount of cushioning material to fill the packaging box's void.

2. CHALLENGE

Product protection in the packaging box by filling with a cushioning material

When packing a product in a box, filling the empty space inside the box with cushioning material is necessary to limit product movement inside the box during shipping that can cause damage and protect the products. The packers carefully check the size and type of the box and its shape and put an appropriate amount of cushioning material in the box.

Necessary to calculate the volume of the void of the box accurately

However, since the existing product packaging operation has relied on manual work, the packaging operation had to be efficient. It is difficult to accurately measure the volume of the box's void, excluding the space occupied by goods, so it was challenging to sufficiently fill the empty internal space with cushioning material. Also, as the box's volume increases, more packers are required, which adds to the cost burden.

Accurately measure the volume of the box's void through CMES Void Fill Solution

CMES Void Fill Solution offers more efficiency in coping with critical problems in the packaging process by accurately measuring the volume of the empty inner space in a box containing a product.

SOLUTION

1. PACKAGE COMPONENTS

1) Software PATENT

- ·3D measurement algorithm
- Box size recognition algorithm



Graphical User Interface (GUI)



Recipe tool for custom setting

2. OPERATION SETTING

- Measurable box thickness: Min. 2.5mm
- · Height between the sensor and the bottom of the product box to be measured: 700mm(Medium box), 1,250mm(Large box)
- Sensor post is installed considering its material and location to measure the box's void accurately
- · Prevents laser reflection by removing obstructions from conveyor rollers and box guides



2) Hardware

- · 3D scanner & PC
- * 3D vision application model differs by box size i.e. Box sizes used in mass production line

Box size (W.D.H)	3D SCANNER MODEL
Min 195/ 180/ 135	Photoneo M
Max 310/ 235/ 210	
Min 275/ 170/ 120	Photoneo L
Max 480/ 360/ 295	

3. WORKFLOW



- ① The barcode reader scans the barcode on the packaging box, and the barcode data is transmitted to the PLC.
- 2 The box information (type, loaded goods) from the barcode data is transferred from the PLC to the vision PC.
- ③ When the 3D vision sensor located above the packaging box receives the capture trigger signal from the vision PC, it scans the inside of the packaging box containing the product to measure the box's void accurately.
- 0 The measured 3D scanned data is transmitted to the Vision PC.
- 5 Vision PC transmits the measured volume data of the box's void to PLC.
- ⁽⁶⁾ PLC calculates the amount of cushioning material based on the transmitted data and transfers the result to the filling machine.

4. FUNCTIONS

1) 3D measurement algorithm

•Accurately measures the volume of the box's void by dividing the area inside the packaging box •Able to set the grid level suitable for various cushioning material sizes







[Grid 20]

2) Box size recognition algorithm

· Able to identify the size of the boxes delivered from the conveyor belt

3) Graphical User Interface (GUI)

• Able to immediately check the measurement status of the packaging box's void through the graphical user interface, thus improving convenience for the operator.

5. ADVANTAGES

• High accuracy with a solution that integrates high-resolution 3D vision sensors, and software in combination with vision algorithms (Error 10% *)

- ·Short cycle times (min. 2 sec. including processing, It can be changed depending on the operating environment.)
- · Improves the measurement limitation issues according to the material of the existing loaded product
- · Accurately calculates the void of boxes loaded with products of various materials
- \cdot Calculates the box void of different sized packaging boxes with one 3D scanner
- · Patented solution (products packaging device and packaging method)

* Customer's requirement

__ RESULTS

Previously, a certain number of packers got involved in the void filling of the packaging box. The manual operation had limitations in production efficiency because putting an appropriate amount of cushioning material was highly challenging, and it was also challenging to calculate the box's void volume. However, with CMES Void Fill solution, the box's void can be accurately measured, leading to the use of an appropriate amount of cushioning material. So, filling the void with appropriate cushioning material becomes easy and fast. Also, we expect a cost reduction effect by improving the efficiency of using the cushioning material.

-packing engineer -

Global logistics company applies the solution in mass production lines.

The client deploys CMES Void Fill Solution in mass production lines for the contract logistics businesses which provide services to a global health food company having an Asian logistics hub in Incheon and the largest healthcare goods company in Korea.

Improved cushioning material use efficiency & high price competitiveness

Void Fill Solution allows the adjustment of the cycle time requested by the customer to align with the overall process speed. The solution enables the packaging process to realize the full automation by calculating the appropriate amount of cushioning material according to the packaging box. The solution results in a high cost-saving effect with improved cushioning material use efficiency and price competitiveness within six months of ROI(For one mass production line).





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