Standardized Box Quality Control

Mechanical and Electrical Engineering
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Abstract

The goal of the project is to develop a bench prototype that automates the manual inspection of EPS boxes. The system has three stages, namely stacking[1], vision[2], flipping[3] and compression[4]. The stacking unit provides a vertical delay for the boxes from the main conveyor belt by utilizing a timing belt mechanism. The vision system utilizes two cameras to inspect both sides of the box for defects. An L-shaped pneumatic cylinder flips the box with the help of the conveyor. On a secondary conveyor a compression load is applied on the box using an electric linear actuator with displacement and pressure sensors. If the box passes the compression test, it's transported to the packaging stage; otherwise, it's ejected and properly disposed. The HMI gives the operator the functionality to change quality control standards and view statistical data. The system is intended to replace the manual labor performed by QC personnel.

Quality Control System

- PLC Control Logics 5563
- Keyence CV/X252AT Image controller
- Panel View Plus 1500
- LCD touch screen
- Allen Bradley Ethernet switch
- Input/output DC and Analog cards

Stacker [1]

- ANSI chain/sprocket #35 with attachments
- L- Series Timing Belt/Pulleys
- ¼ hp DC electric motor
- ½" Fully Keyed 1045 Steel Shafts

Vision [2]

- Keyence CV – X252 Camera
- LED Round Flash

Flipping [3]

- L-Shaped Flipping Arm
- Pneumatic Cylinder
- Proximity Sensor

Compression [4]

- Linear Electric Actuator
- Omega Load Cell
- Displacement Sensor
- Non-rotating pneumatic Cylinders

2016