

# USE CASE

## AUTOMATED COUNTING OF PISTON RINGS USING AI-BASED MACHINE VISION



### CLIENT/INDUSTRY BACKGROUND

The client is a front-line automotive components manufacturer, specializing in the production of piston rings in high carbon high alloy steels and nodular iron.

Piston rings maintain gas compression between the piston and the cylinder wall. They seal the cylinder so that combustion gas generated at the time of ignition does not leak into the opening between the piston and the cylinder.

### PROBLEMS

- Due to the large production volume of piston rings, it becomes difficult to count the number of rings and avoid SKU mismatch
- Counting the piston ring is very time consuming and hence leads to longer TTM(Time To Market)

### PROBLEM IMPLICATIONS

- An improper number of piston rings may cause gases to enter from the combustion chamber to the crankcase
- The absence of oil ring(s) causes the oil in the crankcase to enter into the combustion chamber
- Improper inspection will result in inventory count mismatch etc

## CLIENT REQUIREMENTS

To automate the process of counting the number of piston rings, with the help of machine vision to achieve accuracy and reduce the cycle time up to 10-12 seconds.

### SETUP



## CURRENT PROCESS

The defects are being inspected by operators manually.

- The piston rings are very thin in size (0.29 - 0.33 mm) causing errors in counting.
- The inspection is detailed oriented, causing labor fatigue
- To count every 100 piston rings takes 60 seconds

## BUSINESS IMPACT

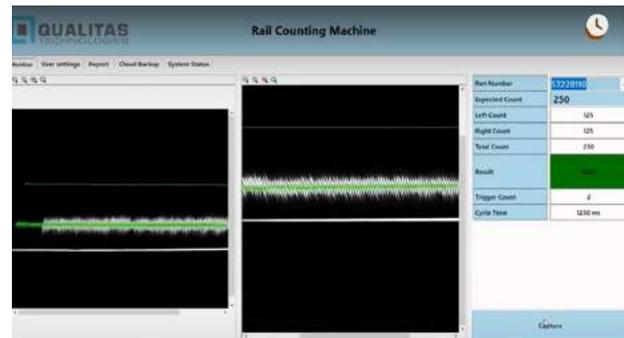
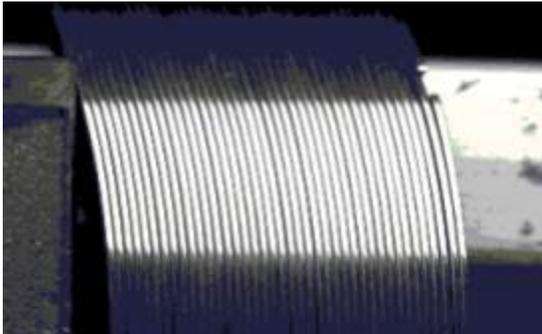
1. Increase in cost of quality (COQ)
2. Increased cost for additional labor and training
3. Improper traceability of counting errors

## SOLUTION USING MACHINE VISION AND AI

A camera or set of cameras with red lights is set up to identify the number of piston rings. Images are captured and sent to the software (Qualitas EagleEye® Platform) cloud where the training is done using DL methodologies. Once the program is trained, real-time part counting takes place, based on which the results are sent to PLC to take action.

## IMAGES

### QEP(QUALITAS EAGLE-EYE® PLATFORM)ANNOTATED IMAGES



## CONCLUSION

POC(Proof Of Concept) is conducted and the following conclusion was observed:

1. Counting time is reduced up to 1 second
2. The Inspection cycle time is reduced up to 10 seconds, which is 1/10th of the manual inspection time
3. SKU mismatch can be easily overcome



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