

USE CASE

SURFACE INSPECTION OF PISTON RINGS



CLIENT/INDUSTRY BACKGROUND

Our client is an innovative and diversified global supplier of quality products, trusted brands, and creative solutions to manufacturers of automotive, light commercial, heavy-duty and off-highway vehicles, as well as in power generation,

aerospace, marine, rail, and industrial equipment.

Piston rings keep up gas pressure between the cylinder and the chamber divider. Piston rings seal the chamber with the goal that burning gas created at the time of ignition doesn't spill into the opening between the cylinder and the chamber.

PROBLEMS

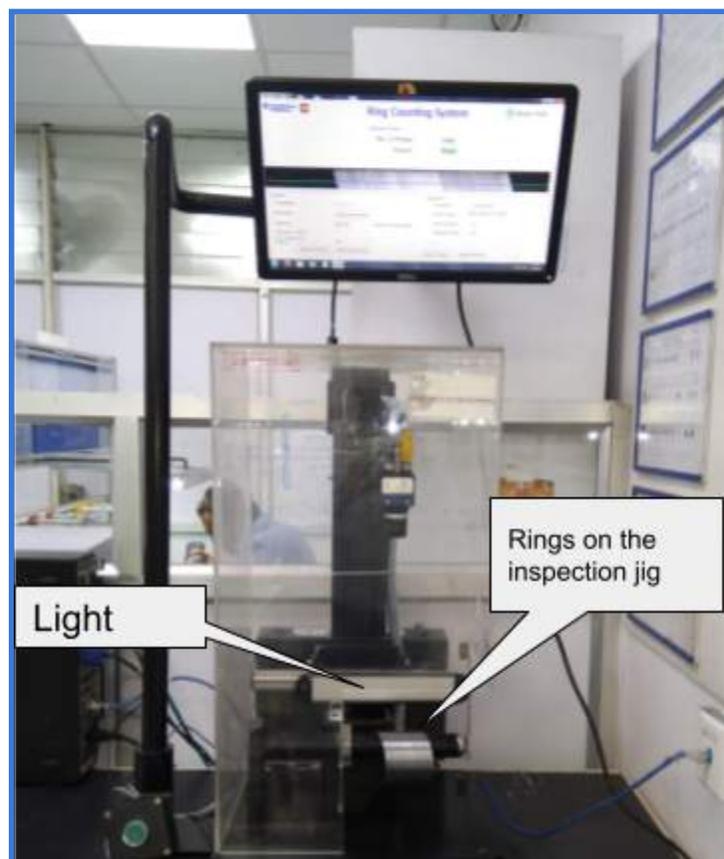
- Uneven paint on the surface of the piston rings is not being identified with accuracy
- Other surface defects are very small and hard to find while inspection and thus affecting the quality of the rings

PROBLEM IMPLICATIONS

- Bad quality of product will increase the dissatisfied customers
- Colors are indicators of the type of rings. Non-painted rings would be difficult for users to identify the ring type.
- Surface defects may cause a leak of oil from crankcase to combustion chamber

CLIENT REQUIREMENTS

- To automate the process of identifying the missing color and surface defects on colored rings present on the inspection jig with the help of machine vision
- To reduce the false acceptance rate and inspection cycle time



SETUP

CURRENT PROCESS

The inspection is being done manually. It is labor-intensive and time-consuming.

BUSINESS IMPACT

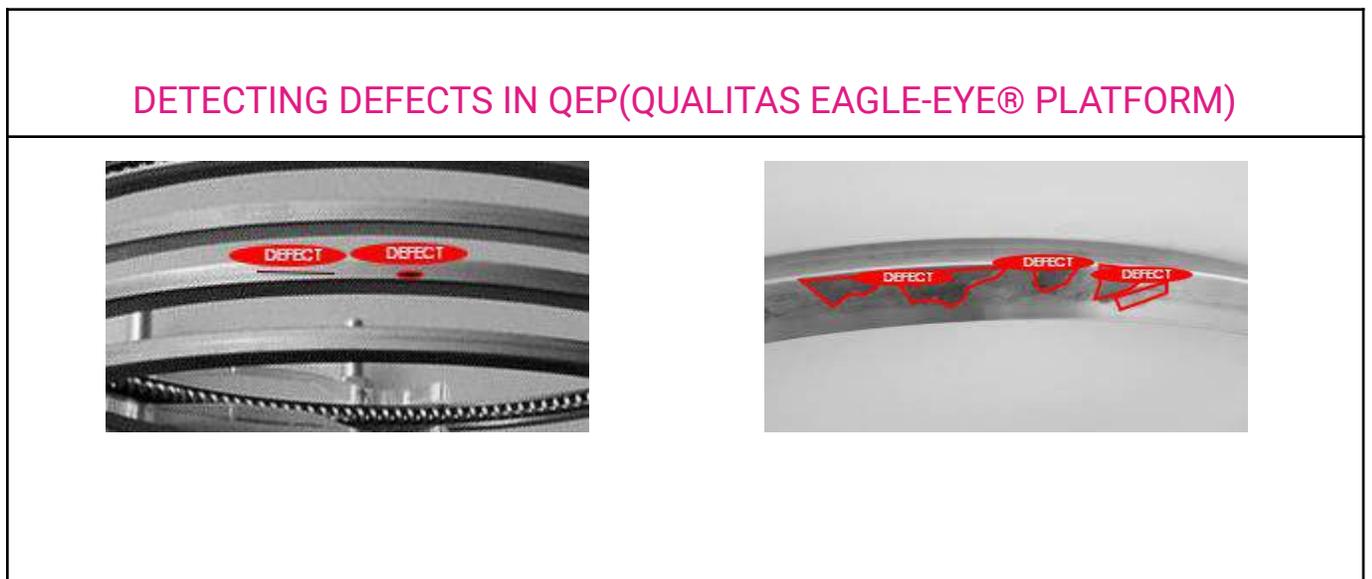
1. Returning and reshipping cost if the defective products were sent to the client
2. Increase in cost of defects
3. Increase in inventory management
4. Increase in cost of quality and labor training

SOLUTION USING MACHINE VISION AND AI

A camera or set of cameras with a specialized lens and appropriate illumination (red lights in this case) is set up to identify the defects on the rings. Images are captured and sent to the software ([Qualitas EagleEye® Platform](#)) cloud where the training is done using the DL algorithm. Once the program is trained, real-time defect detection takes place, based on which the results are sent to PLC to take action.

Here the **Anomaly detection tool** is used to identify the defects.

IMAGES



CONCLUSION

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

1. The accuracy of identifying the defective rings is increased to ~98%
2. False acceptance reduced to ~ 1%
3. Observed labor and quality cost is reduced by 60%



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