

CASE STUDY

INSPECTING LABELS USING OCR FOR TRACKING AND TRACING OF PHARMA PRODUCTS



CLIENT/INDUSTRY

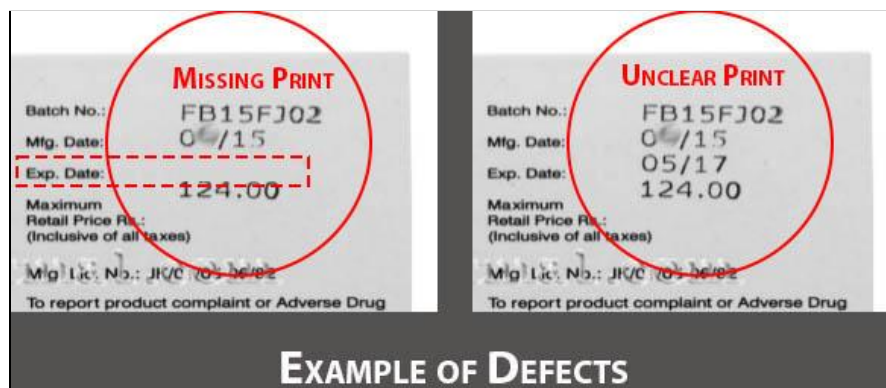
BACKGROUND

Our client is an Indian multinational pharmaceutical company that manufactures healthcare products and distributes them across countries and different corners of the world. It is one of the leading manufacturers of healthcare products promising the best quality of deliverables.

Labels of manufactured products contain the details of the products like batch number, manufacturing date, expiry date, and MRP. This information needs to get recorded for tracking and traceability.

CLIENT'S PROBLEMS

1. Incorrect **track and trace** of medicines/drugs in the supply chain - due to an older technology of the existing vision system, many false positives were observed while reading the printed labels
2. Preventing pharma products with **misprints** of MRP, Batch number, and Expiry date being produced at 140/min



PROBLEM IMPLICATIONS

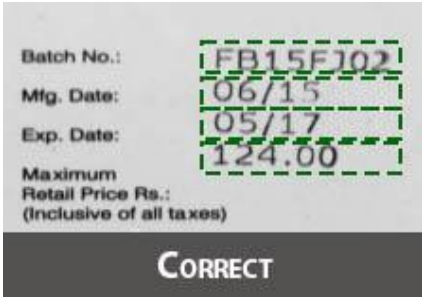

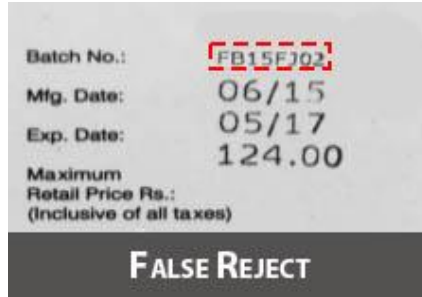
1. To prevent counterfeit products from entering the supply chain, end-to-end traceability is required. Without accurate recorded data of batches, traceability will be incorrect.
2. The retailers are penalized due to misprints in the MRPs, as per the government regulations.

CLIENT REQUIREMENTS

1. To establish accurate end-to-end traceability that happens in real time. This allows them to have clear visibility into the movement of products in the supply chain.
2. To be able to take appropriate measures on optimizing the medicines distribution using the data recorded by the vision system.

CURRENT PROCESS

The client is using rule-based systems to recognize the characters and record the data. A rule-based system ignores any variations in font size or type/style of the characters that are not already pretrained. As a result, the false negative rate was high due to the dynamicity of shape and size of the printed characters in an ideal medicine manufacturing scenario.

 <p>CORRECT</p>	 <p>FALSE ACCEPT</p>	 <p>FALSE REJECT</p>
<p><i>Same Rule With Different Outputs</i></p>		

BUSINESS IMPACT

1. Counterfeit products are entering into the supply chain due to which the brand image is getting hampered. As a result, there is a loss of revenue.
2. Increased returns and recalls rates due to the misprinted labeled product sent to the customers.
3. Reduced demand for medicines/drugs due to inaccurate data for demand and supply.

SOLUTION USING MACHINE VISION

AI and machine vision-based technologies will be used to automate the inspection process. With the help of 4I methodology which is Install, Instruct, Inspect and Improve the desired outputs were achieved -

Install:

An EagleEye camera (4 megapixels) with integrated lights (bar lights with white illumination) was set up in the moving production line of the labels to capture and identify the printed characters. The camera was positioned in such a way that the planes of the lens and label will be parallel to each other. The working distance should not be more than 35-45 cms. A macro lens was used to capture the details of the feature of interest (character size). The high-speed camera operates with 60 FPS to clearly capture the moving labels.

Instruct:

Using **AI-based OCR Module** from the Qualitas Library, the acquired images were trained for each character and font by performing annotation in Qualitas EagleEye® Software.

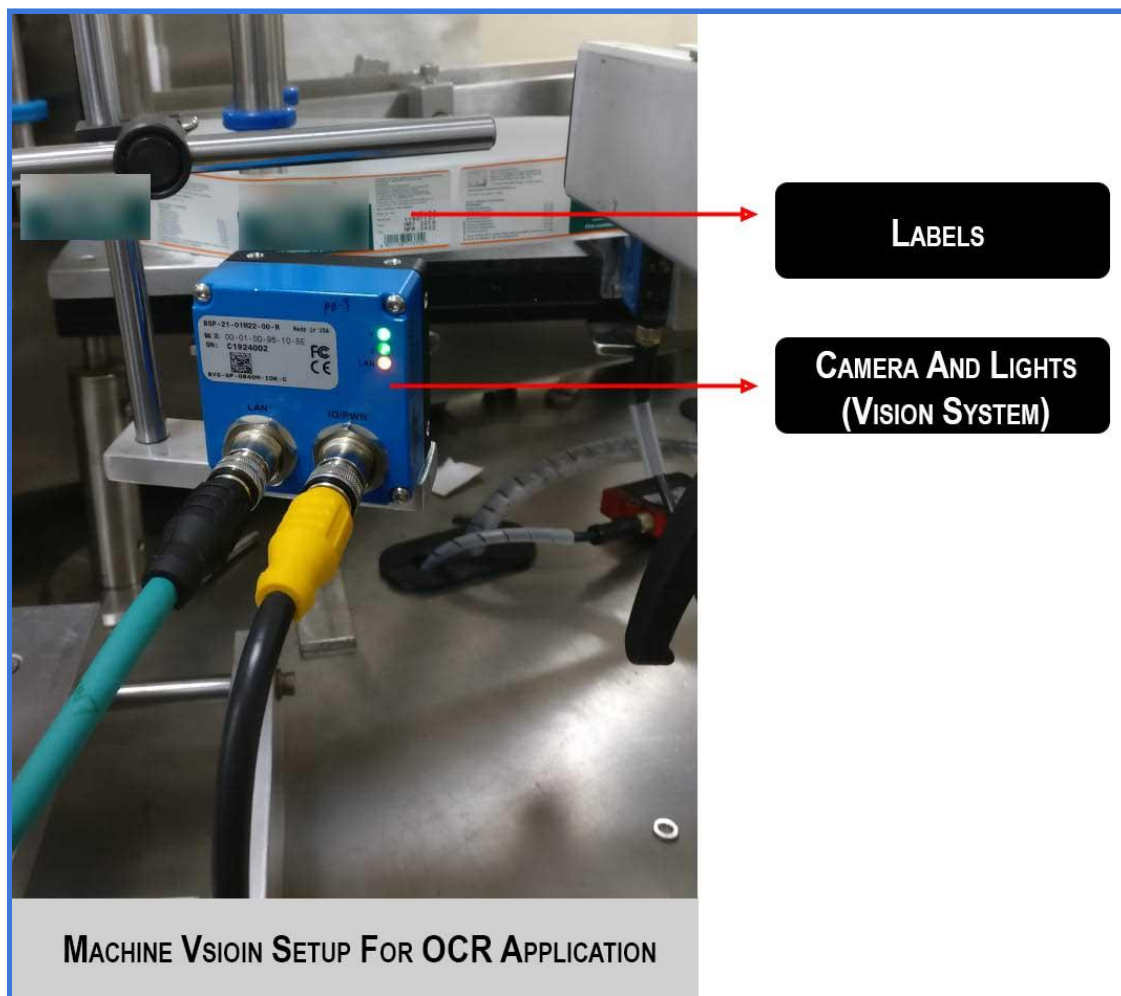
Inspect:

After the complete training, the system was deployed in the production line. The vision systems correctly identify the characters printed on the labels in the actual moving line

Improve:

Through Deep Learning (DL) programs, the machine vision system was trained to recognize all types of fonts and characters. The results were displayed on the UI in real-time. When the defective labels were identified the corresponding PLC signal was communicated to halt the line.

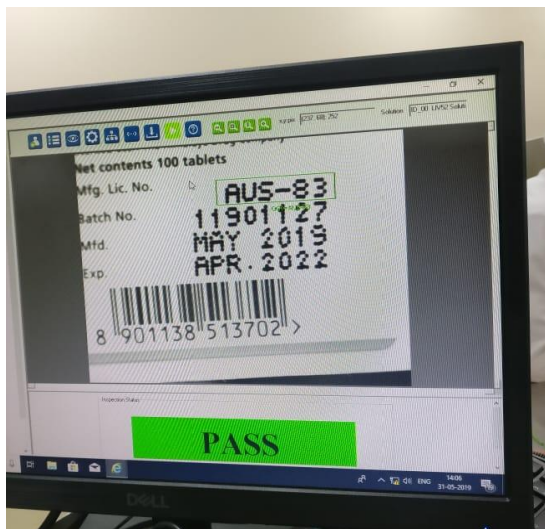
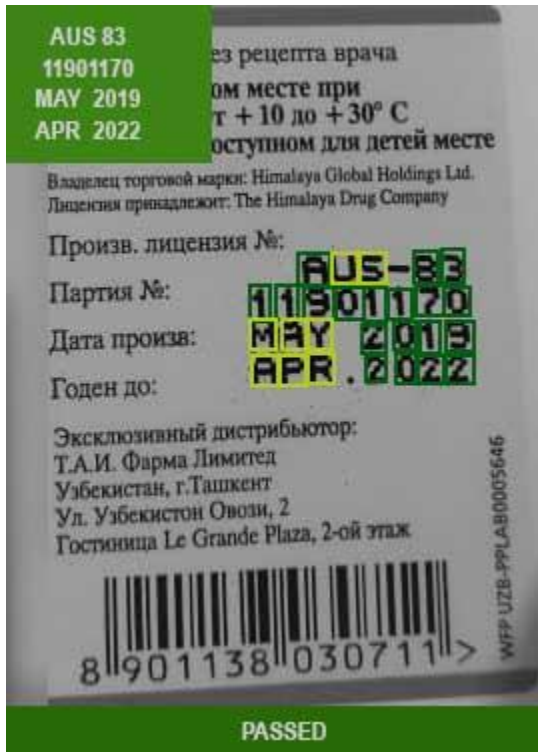
SETUP



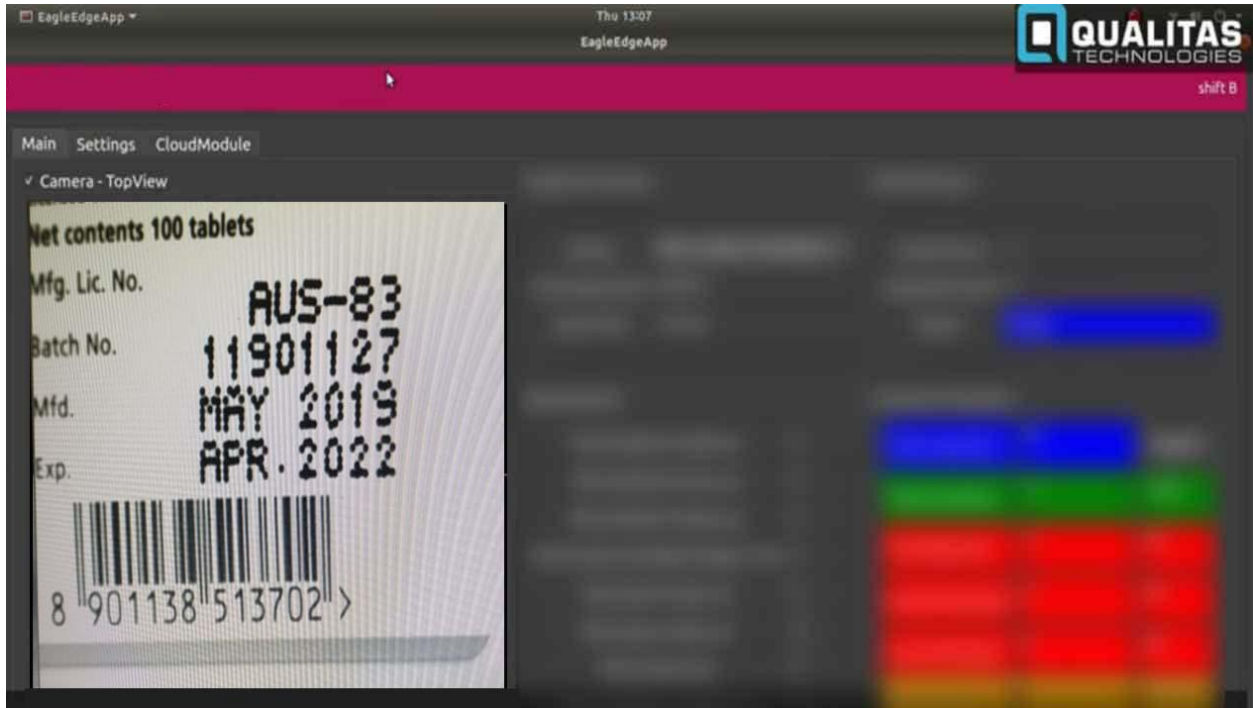
The above image shows the machine vision setup in the label production line for OCR application. A camera is placed in front of the moving labels to capture characters at a very high-speed of 60 meters/min.

IMAGES

Identifying Characters in QEP (Qualitas EagleEye® Platform)



The image shows the UI screen where the labels can be seen. Here the labels are being inspected using AI-based software to recognize printed characters.



CONCLUSION

With the Machine Vision System, all the labels were inspected and the following was observed -

1. The accuracy of the identification of characters was 100 percent. As a result, the data capturing of batch number, MRP, expiry date, etc. was improved to 100 percent.
2. Defective prints were removed from the production line to ensure only the products with correct information must be delivered.



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