

CASE STUDY

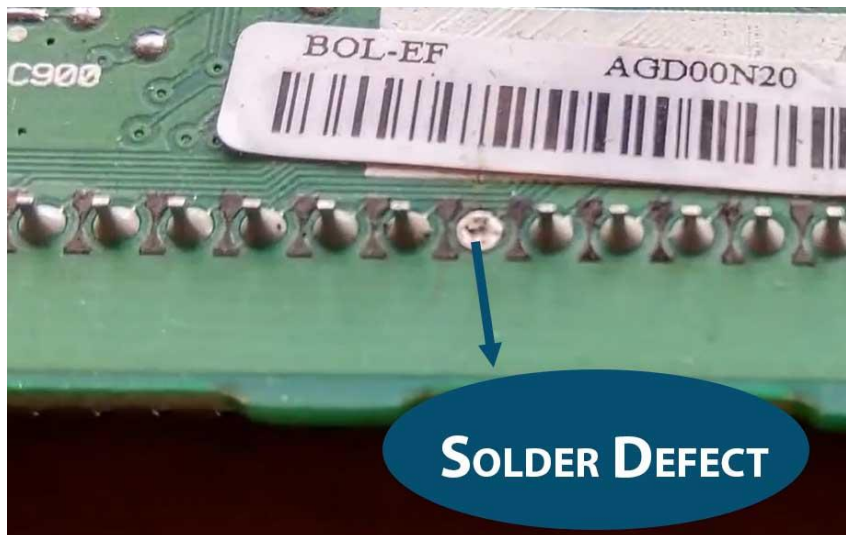
3D INSPECTION OF SOLDERING PASTE USING AN AI-BASED MACHINE VISION SYSTEM

CLIENT/INDUSTRY BACKGROUND

Our client is an American global automotive electronics supplier and Fortune 500 company established in 2000. They are composed of multiple businesses that design, engineer, and manufacture vehicle cockpit electronics products and connected car services for a diversified customer base, including all of the major automakers worldwide.

CLIENT'S PROBLEMS

There is no automation in place. Due to this, the **false acceptance rate** of defective soldering was **8-10 percent**.



PROBLEM IMPLICATIONS

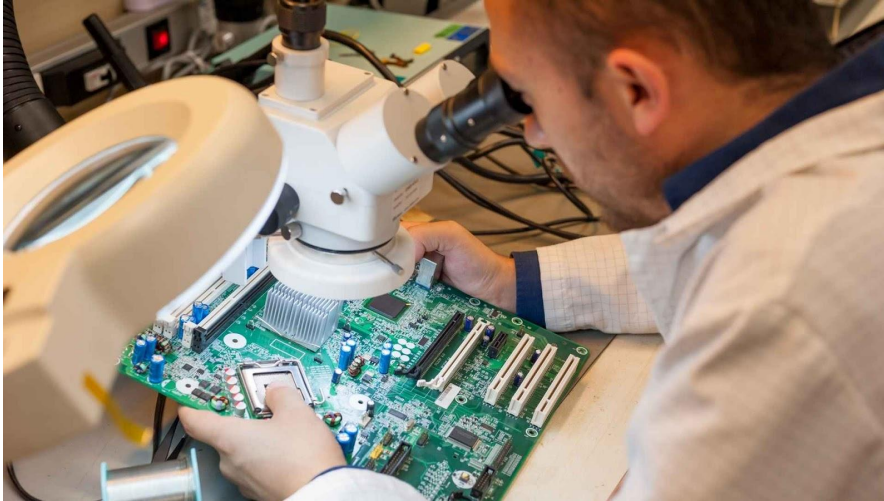
1. Circuits may break/disconnect easily due to thin/weak soldering.
2. **Quality and performance** of the manufactured PCBs decrease with the increased number of soldering defects.

CLIENT REQUIREMENTS

1. To **automate the solder paste inspection** to reduce/eliminate the false acceptance rate.

CURRENT PROCESS

15 operators across 15 stations are deployed to visually inspect the assembled circuit boards with the help of microscopes. The defective boards are placed in a bin to be sent for rework.



BUSINESS IMPACT

1. Undetected solder defects can cause serious problems like short joints may **burn an IC or two**
2. **High product recalls and warranty claims** are the major repercussions of defective solderings

SOLUTION USING MACHINE VISION

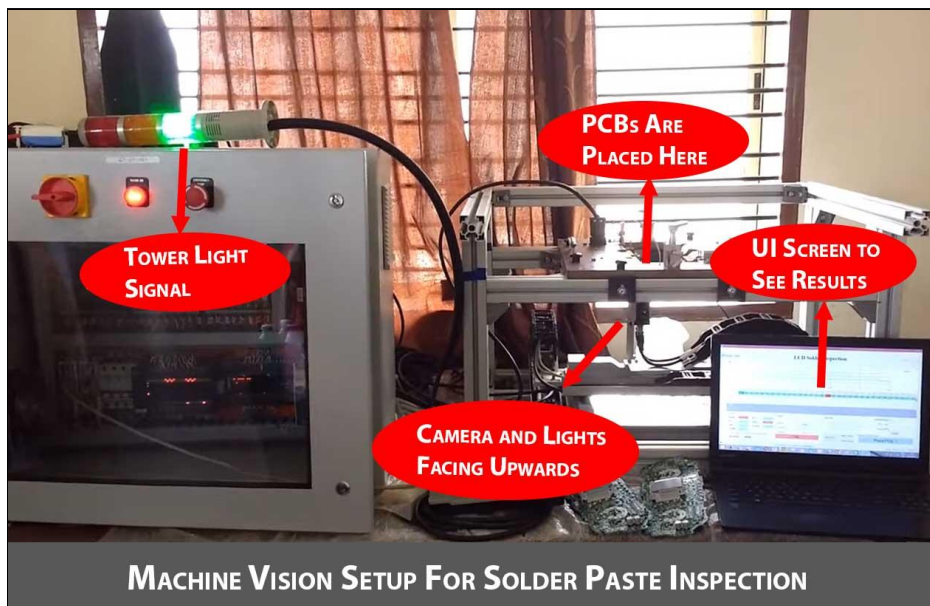
A solution was developed to acquire the images of the PCB and inspect all areas to identify the solder paste defects using a pre-trained surface anomaly deep learning module.



[Watch Video](#)

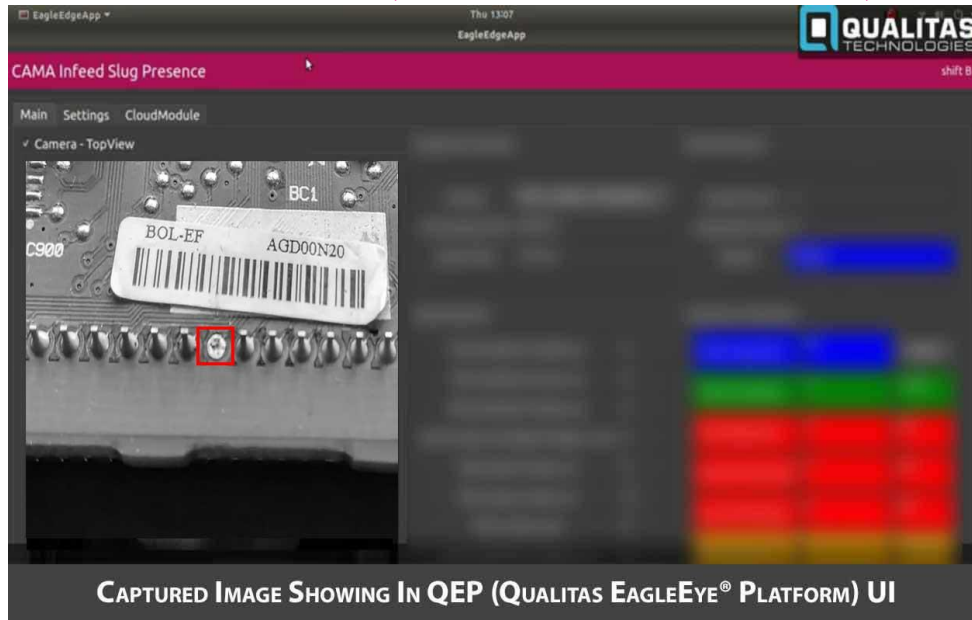
SETUP

A tabletop setup was installed at the inspection station with a camera and lights at the bottom. A 15 FPS 3d camera with a 16 mm lens was used to adequately magnify the feature (solder) size as the working distance was maintained to be 30 mm. Here the camera is moving and the PCBs are stationary. Image acquisition triggers at the different coordinates to capture the complete PCB to check each soldering.



IMAGES

DETECTING DEFECTS IN QEP(QUALITAS EAGLE-EYE® PLATFORM)



CONCLUSION

With the deployed machine vision solution, the following observations were made -

1. The accuracy of identifying soldering defects was 98 percent.
2. A human took 20 secs to inspect the one PCB. Through automation 1 PCB can be inspected every 10 secs.



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