

Bearing Cage Defect Identification



Client


Since their inception in 1986, with over 1700 employees, our client is the largest manufacturer of precision bearing cages in the organized sector in India in terms of capacity and operations and amongst the leading manufacturers of precision bearing cages in the world with a market share of approximately 5% to 6% in the organized segment of the global brass, steel, polyamide bearing cages in terms of revenue.

Problem Faced

- The inspection of surface defects that could be present on bearing cages and also to classify them as processed and unprocessed based on the presence and absence of chamfer.
- This resulted in the deteriorated quality of the manufactured products because of human involvement. To get rid of the time consumption and achieve better accuracy, automation is something our client was looking for.
- The proposed system was to be installed in a quality assessment room integrated with a rotary bench setup. The diameter of bearing cages varied over a wide range. Achieving a depth of 80mm with a single camera, lens and fix working distance was another challenge.

Technology introduced by Qualitas Technologies

AI is a powerful technology that has the capacity to solve a number of industrial problems. DNN, which is a subset of AI, can be successfully used to train a machine according to user requirements. Provided a very strong algorithm and vast training set, AI can emerge as the best-suited technology for inspecting the surface anomalies for quality checking purposes. The conventional system, which mostly uses a pattern-matching type of algorithm, when deployed in actual line conditions, fails to deliver 100% accuracy. In an AI-based system, defects are labelled and trained. Based on training, a threshold value is set for that particular defect. When a new image is captured and processed, if the extracted feature crosses the preset threshold, it is identified as a defect.



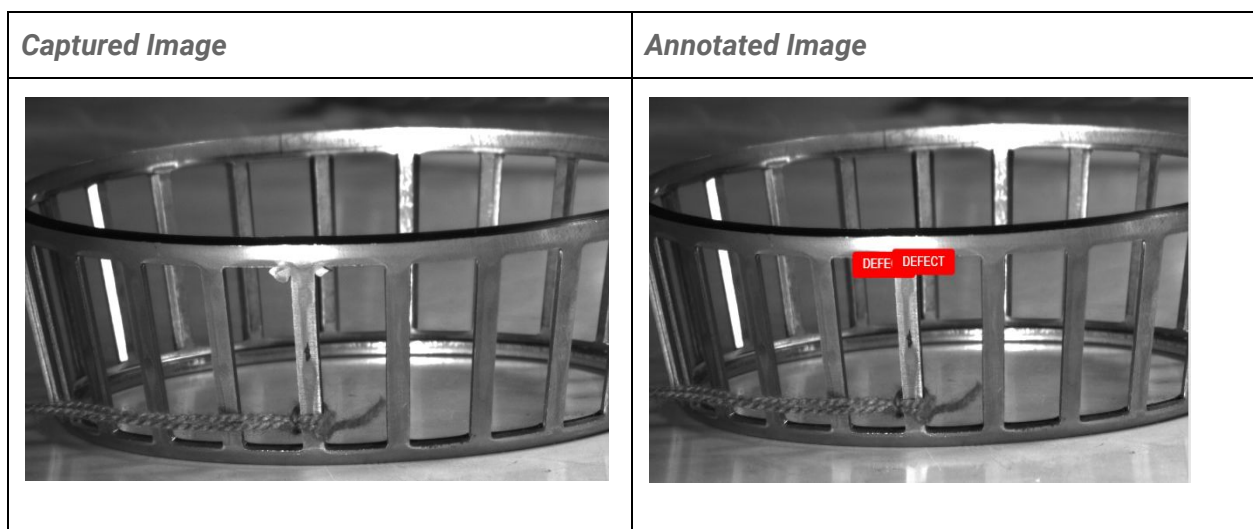
Solution

An AI / DNN based solution typically follows the below steps.

Image acquisition > Image training (includes image segregation) > Model deployment and testing.

Since the customer had a rotary bench setup, we decided to integrate our system with the same setup. An area scan camera was placed on the top looking down at the object at an angle. The acquired image set was labelled and trained for extracting the features. After the system got trained for all the available inspection datasets, the model was ready for deployment. After checking the accuracy, fine-tuning was done if needed, to improve accuracy.

Images



Results

2 cameras have been sent, one for inspecting the surface defects and others to inspect the presence and absence of chamfer.

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