

APPLICATION NOTES

IMPACT Solutions for the Automotive Industry BEARING INSPECTIONS

THE PROBLEM

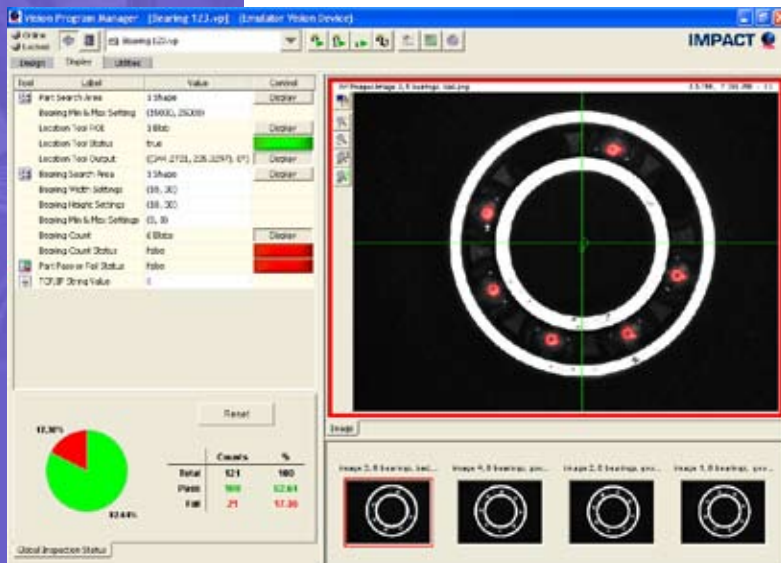
Bearing assemblies are critical components of motors used in everything from devices smaller than miniature computer disk drives to machines larger than overhead construction cranes. The bearing manufacturing industry is extremely competitive. Mechanical ball feeders, tubes, pushers, and dividers malfunction occasionally, and bearing raceway diameter and ball bearing sizes can be out of tolerance. In the bearing assembly manufacturing process, test spins and other mechanical checks will often pass even if a ball is missing. Human visual inspections are sometimes deployed, but these tests are not 100% repeatable and are prone to error.

Customer satisfaction and retention are critical. If bearing assemblies are delivered incomplete so that they cannot bear the specified load, the results can be catastrophic.



OUR SOLUTION

PPT VISION specializes in high-volume, high-speed, precise visual inspection technology. Inspecting 100% of the bearing assemblies ensures that the correct number of bearings is present and evenly spaced around the raceways, and that the bearing cage is correctly attached, thus holding the assembly to its specifications. IMPACT cameras are available in a variety of camera resolutions and, coupled with a wide selection of lighting and optics, can be configured to inspect bearing assemblies in multiple designs and dimensions that are made of various materials.



This application example shows an image of a steel bearing assembly captured using an IMPACT A20 smart camera and a 3-inch diffused Red LED ring light. The application requires the vision system to measure the inner and outer diameters of the bearing raceway and to verify that the correct number of bearings is present. The **Blob tool** in IMPACT Vision Program Manager (VPM) locates the center of the assembly so regions of interest can be placed precisely to perform the required inspections. A **Circle Gauge** tool is used to measure the diameters and the concentricity of the rings. The **Morphology Close** tool, one of several pre-processing tools available in VPM, is used to merge the adjacent white pixels around each bearing to form a solid white object. This improves the bearing's appearance and thus count robustness by eliminating unwanted image noise that may cause

false detections. A second **Blob** tool is used to count the number of bearings. **Pass/Fail** and **Discrete Output** tools are used to make a global decision about whether a part passes or fails the final inspection, and to communicate with the machine to reject failing parts accordingly.

Using VPM's built-in runtime display panel, the operator can view, at a single glance, a full-size image of the bearing assembly with a real-time graphic overlay of the inspection results, an image buffer showing the results of the last four part inspections, a user-configurable inspection results table, and a chart showing the current production yield.