Bluewrist Case Study

Inline Vehicle Roof Weld Inspection

Our Client

Our automotive-manufacturing client required a solution to address groove-weld defects during the vehicle-roof manufacturing process. Specific issues included weld spatter, burn through, and missed welds. A previous weld inspection system using a 2D inspection station hadn't worked, and the client was using a manual visual inspection process to identify places where work needed to be redone.

The Challenge

Roof welding is a critical safety process because it provides structural integrity and is an important component of the vehicle's occupant safety cage in the event of an accident. Manufacturing vehicle roofs is a complex task involving heavy metal parts along four sides of the part, which results in a three-meter inspection length. Many of the defects are small, often no more than 0.5mm, but the manual inspection was only able to consistently and effectively detect problems that were 3 mm and larger. This situation resulted in errors being passed down the production line.

Additionally, car body positioning on the skid carriers does not always stop at the same location. The Bluewrist system includes robot path correction, allowing the client to compensate for or eliminate process variation of up to 10 mm in car position for scanning, making the solution more cost-effective because no fixtures, pins, sensors, or additional equipment is needed to eliminate the process variation.

The Solution

We developed a solution using an UR 10 collaborative robot mounted upside down on a gantry, together with a laser profiler camera. The inspection station operates alongside quality assurance staff to perform the groove weld inspection using our 3D vision inspection algorithm.

As the vehicle body enters the inspection area, the robot scans the roof welds while staff sequentially check the welds. The weld is scanned at 200 mm intervals at a speed of 150 mm per second and then processed in real-time, a process that is carried out

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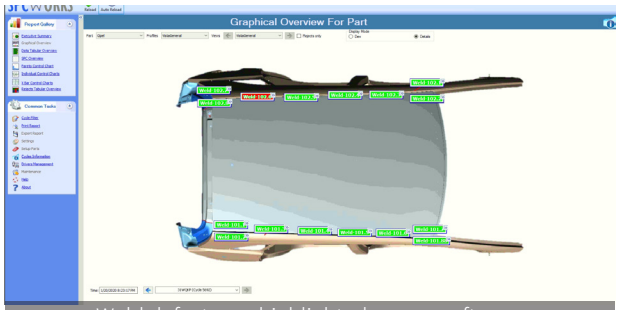
a total of eight times on each side of the roof.

After each weld is scanned, the data is sent to the

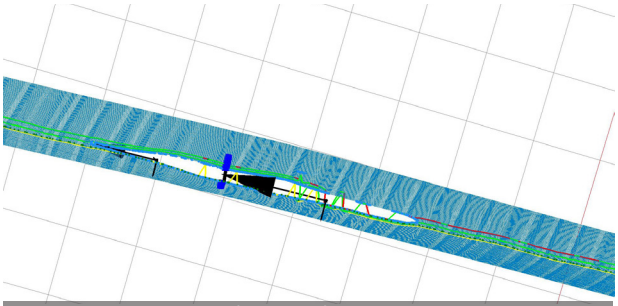


Weld defects are highlighted on our software

SPCWorks database so that data can be analyzed progressively in parallel fashion, thereby reducing the overall processing time required. The entire process can be completed in 34–36 seconds.

Once the scanning process is complete, the assembly line diverges based on the results of the inspection. If the scan shows the component is produced correctly, a QR code is printed on to the car body, and the PLC is then triggered to send the body along the production line to continue the assembly process. If the welding does not pass the quality assurance stage, a QR is still printed on the vehicle, but the body is sent to the rework station.

Photo of actual weld defect - skipped weld



Point loud of weld defect - skipped weld

The Result

With the solution we designed, our SPCWorks software can display the inspection results and pinpoint the location of any defects for quality assurance staff to facilitate remedial work. The system is capable of handling 33 cars every hour (800 a day) and provides accurate and consistent results, ensuring all vehicle bodies are produced to more exacting standards.

Contact Bluewrist Today!

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