

KD AUTOMATION GOCATOR® SCANS AND MONITORS FOR CORRECT ADHESIVE VOLUME ON ENGINE PARTS



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KD Automation is a custom machine builder and solutions provider located in Jackson, Wisconsin.

The Application

Form-in-Place Gasket (FIPG) is a versatile sealing technique that deploys a mostly silicone (they can sometimes be blended with metals like silver, aluminum and nickel for conductivity purposes) bead on a metal surface to act as an adhesive and sealant to keep moisture, light, debris, and other kinds of interference out and to keep liquids, gases, and electronic components safely contained inside the sealed assembly.

In this application, Form-In-Place-Gasket (FIPG) is applied to ensure the desired adhesion is achieved on fuel injector magnet stacks.

The Challenge

Most bead dispensing systems are equipped with flow meters or shot meters to measure the total volume of the material dispensed. However, this method cannot accurately identify the volume of adhesive applied, nor to what precise location. In this case, KD Automation's customer had an existing dispensing system that was open loop, and to ensure the quality of the glue joint the adhesive material had to be overapplied. This caused seepage around the exterior edges of the assembled components, which then had to be manually removed.

With the short dry times, temperature sensitivity, and sticky composition of the adhesive bead, inline non-contact optical inspection was identified as the most suitable solution for quality control of the dispensing process.

2D vision solutions were quickly eliminated as an option because they are based on contrast (i.e., color or intensity difference), and can only provide limited information about the adhesive (i.e., the bead's width, but not its volume). In addition, 2D solutions are heavily impacted by part color and ambient lighting, which can cause a high false reject rate in real production environments.

3D vision on the other hand provided the necessary height map information to accurately measure the volume of the adhesive bead. 3D is also contrast invariant and can handle a wide variety of surface materials, from opaque to translucent glues.





The Solution

The goal in creating the adhesive monitoring system for the customer was to leverage factory automation and vision technology to increase productivity, reduce waste, and eliminate unnecessary labour costs. Using the Gocator® 2130 3D laser profiler, KD Automation created a system that allowed their customer to monitor and manage the volume and placement of adhesive—therefore eliminating waste, increasing production yield, and gaining the application knowledge to change and adapt the company's manufacturing processes to real-time requirements.

Specifically, this monitoring system measures the volume of adhesive applied between the fuel injector magnet stacks. The volume, or total amount of adhesive applied, is then automatically adjusted in real-time based on environmental influences such as temperature variation. The Gocator® sensor communicates the measured volume directly to a PLC, which then controls the flow of adhesive and the robot sequence. The only reason this system works is due to Gocator's inherent ability to provide high-resolution 3D volumetric data of the adhesive bead.

The Gocator® Advantage

- Factory pre-calibrated and ready to measure out of the box
- Easy to use web browser user interface with point and click functionality
- Sensor generates high resolution 3D height map data for precision volumetric measurement
- Contrast-invariant, handles a wide range of material types from opaque to translucent glues
- Built-in measurement tools (e.g., Surface Track) and PLC protocols to solve a complete inspection task

Before the use of Gocator, the customer had to over dispense the adhesive in order to ensure a quality glue joint and then manually clean off the excess adhesive. Now with Gocator the customer measures a master part once every hour to ensure the sensor has not drifted. With this method, the customer can say with 100% confidence that the dispensed amount is within specification limits for every joint. They now have the ability to improve quality and reduce labor, operational supplies, and material consumption.

"Gocator provided this automated assembly machine the ability to perform quality control in-process. The end result of that real-time evaluation is we are able to achieve 0% scrap rate. We are now able to identify non-conforming outliers prior to finished assembly, which can be re-worked. With the help of the customer and Gocator, we were able to create a pseudo closed-loop control of the glue dispensing. This is a truly innovative utilization of current industrial control automation."

Jeremy Witt, Sales / Co-Owner – KD Automation

The Result

By monitoring and managing the actual volume of the adhesive applied to each part using the Gocator® 2130 laser profiler, the system developed by KD Automation eliminates (1) all waste of adhesive material, and (2) additional labor for part inspection and rework, while assuring 100% quality parts are produced.

As a result, product development is empowered to specify the bead in a manner that is directly related to its functionality, and manufacturing engineering is empowered to better control and optimize the expensive dispensing process.

The Benefits of Factory Automation with KD Automation Systems:

- Experienced 100% reduction in wasted adhesives
- 50% increase in production capacity
- 50% reduction in labor
- 100% reduction in scrap parts due to adhesive overflow



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