INDUSTRY APPLICATION:
BATTERY WELD INSPECTION

There is a growing demand for high-performance batteries, such as lithium-ion for mobile and stationary energy storage. Reliable manufacturing processes are essential during battery production as they prevent premature performance degradation or, in the worst case scenario, cell/battery explosion.

3D machine vision systems play a critical role in ensuring battery quality and minimal waste. In this feature application we'll focus on four key phases of battery weld inspection using 3D smart sensors.

Pre-welding gap & flush measurement

Challenge

Before the battery is welded, engineers need to detect the gap & flush of the battery shell and top cover. If the measurement is in excess of 0.5 mm (for gap) or 1 mm (for flush), it will be impossible to weld the shell and the top cover together.

Solution

Gocator® offers high-speed 3D laser profiling and a **built-in gap & flush tool** to solve this challenge. The typical system configuration involves a Gocator® 2330 multi-sensor network to achieve the required field of view.

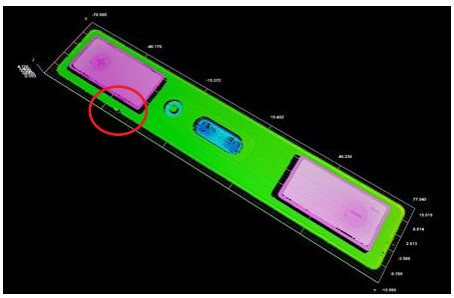
Weld seam inspection of the battery cells

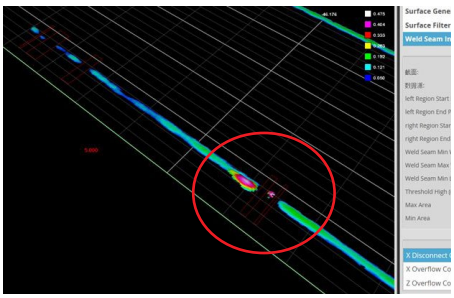
Challenge

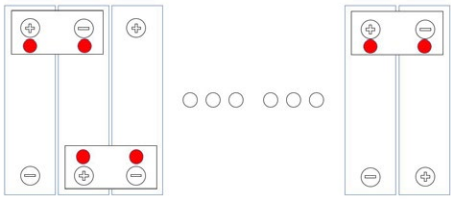
The second application comes after the laser welding of the battery cells is complete. This weld has to be verified for quality in order to detect if there are any overflows or breaks/ openings in the seam.

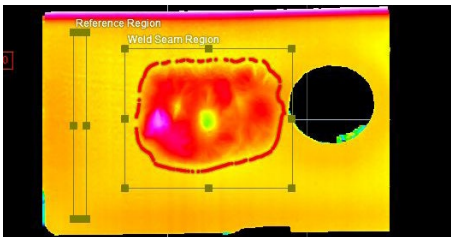
Solution

Networked Gocator® 3D laser profile sensors are mounted at a 45 degree angle in the Z and X axes in order to scan all four edges of the battery, while delivering the same high performance on each edge.









Spot welding inspection on the connector module

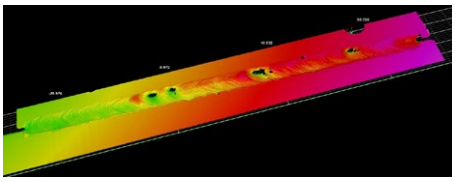
Challenge

After the cells are welded, connectors are spot welded to the electrodes in order to build them out in series. The connector is spot-welded to the electrodes in order to build them out in series. The spot welds need to be inspected for correct height and position.

Solution

Gocator® offers two built-in tools to solve this challenge. The first is a native **height* detection tool** that is based on blob analysis, and the second is a **position detection tool** that leverages data from all four sides of the battery for high-accuracy results.

*Shape measurements such as height can only be achieved using 3D technology. 2D cannot execute this type of inspection.



Package weld seam quality

Challenge

In the next step, cells are combined into a single package that requires welding in the corner of the shell. The corner weld seam has to be inspected in order to ensure the package is stable.

Solution

Engineers can use either Gocator® 3D line profile sensors or snapshot sensors for this application, depending on their needs. Gocator® locates the seam and produces height and intensity data, as well as accurate pass (OK) counts on compliant corner weld seams and fail (NG) counts on overflowing/broken/missing seams.

Conclusion

Gocator® 3D smart sensors offer a variety of built-in features and functionality designed to easily solve the specific challenges of battery weld inspection in today's growing consumer electronics (CE) industry.

Only with 3D sensing are you able to measure the following features on a battery:

- Surface
- Edges
- Dimensions
- Weld seams
- Cell height

For similar applications that can only be solved using 3D, download our glue bead inspection industry application note.

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