



VISION-GUIDED LASER WELDING

Vision guidance is used in situations where the combination of tolerance stack-ups, beam diameter, and feature size would cause inconsistent welds.

The Challenge With Precision Laser Welding

When you manufacture medical devices, automotive sensors, and other intricate products, failure is not an option. With tight tolerances and complicated assembly processes, consistently laser welding complex components can be a difficult task to accomplish and maintain over a long period of time in a production environment.

The focused spot diameter for laser welding applications is typically 100-1,000 microns. The position of the joint under the laser must be precise enough to ensure that the focused spot does not miss.

The allowable misalignment is a function of the focused beam diameter as well as the joint design and is typically in the range of ± 75 microns.

For many applications, hard tooling is sufficient to locate the part for welding. However, in applications where part tolerances exceed ± 75

microns, active positioning of the weld joint and/or laser spot are required for an accurate, consistent weld.

Bringing Vision Guidance to Laser Welding

Invotec has integrated vision-guided laser welding systems into a wide range of custom equipment—

Invotec has integrated vision-guided laser welding systems into a wide range of custom equipment for the medical device, automotive, and defense industries.

By incorporating vision-guided laser welding systems, our customers have been able to automate previously manual weld operations, increase weld quality and consistency, reduce scrap, and increase throughput.

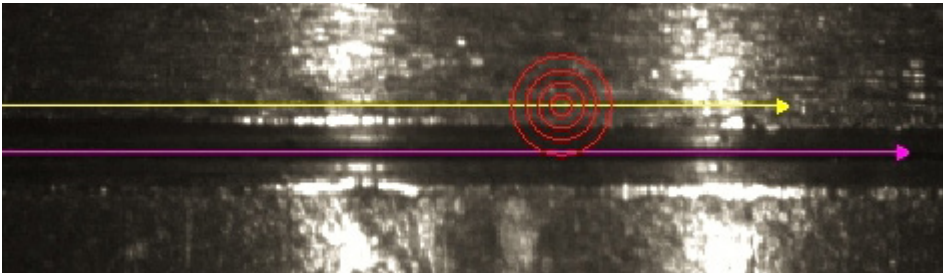
including laser spot welders, seam welders, and laser machining centers—to solve complex welding problems for the medical device, automotive, and defense industries.

Here's how it works:

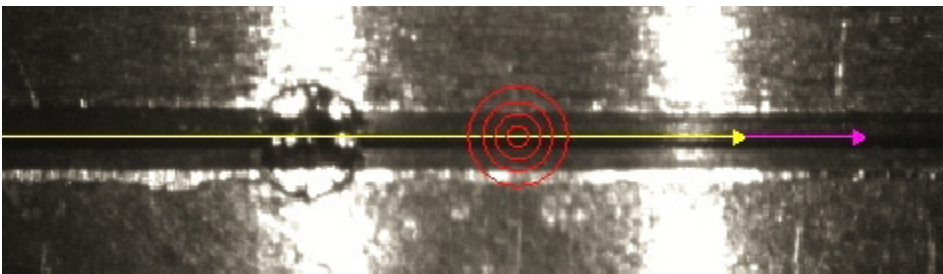
A vision inspection system is used to determine where the focal point of the laser energy will land relative to the features to be welded.

Once the offsets are determined, a servo positioning system moves either the terminal optics or the parts to be welded, ensuring the energy is delivered to the correct weld location.

These photos demonstrate the accuracy of a vision-guided laser weld as opposed to a traditional weld. In the first photo, the magenta line is the position of the weld seam. The yellow line is where a traditional laser welding system will place the weld seam. This would produce a rejected part.



In the second photo, the system automatically aligns the laser path with the weld seam. The red welding target is now properly placed on the seam. The result is an approved part each time.



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To learn more about all of our vision capabilities—from vision-guided laser welding to inspection and error-proofing—visit www.invotec.com.

Want to Learn More About Invotec, Inc.?

Invotec was started by two engineers with a common goal: solving manufacturing challenges with innovative solutions.

We build complex assembly, test, and inspection equipment for customers in highly-regulated industries—including medical device manufacturers, automotive suppliers, and consumer products. We specialize in applications with small to medium sized products or components, and our flexible approach allows customers to refine their product design while we engineer the equipment.

Our technical solutions include: controls engineering, error proofing, machine vision systems, mechanical assembly systems, micro laser processing, precision joining, process development, and test systems.