

Laser beam forming opens up exciting opportunities in car body construction

Spanish automotive supplier Gestamp is a leading multinational company that operates in 13 R&D centres around the world to help shape future mobility worldwide. Gestamp is involved in pioneering work with the products of the GES-GIGASTAMPING® family: large components that reduce vehicle weight, increase safety, improve the efficiency of production processes and shorten assembly times. "Our specially developed welding strategies, such as Ges-Wire and G-Weld, have the potential to fundamentally transform the manufacture of structural components – particularly in the case of overlapping laser welding," explains Miguel Angel Ferrandez, Director of R&D BIW at Gestamp. As part of a collaborative partnership, Gestamp and TRUMPF have joined forces to tackle the challenge of developing an industrial-grade laser welding process.



Gestamp

www.gestamp.com

Gestamp, which has its headquarters in Madrid, is a leading multinational company in the automotive supply industry, specialising in the development and manufacture of ultra-technical metal components. With 115 production sites in 24 countries and over 43,000 employees, Gestamp focuses on innovation, sustainability and operational excellence. In 13 R&D centres worldwide, the company develops solutions that shape the mobility of the future and make vehicles safer, lighter and more sustainable.

INDUSTRY	NUMBER OF EMPLOYEES	LOCATION
Automotive supplier	43,000	Madrid (Spain)

TRUMPF PRODUCTS

- TruFiber
- PFO 33-3
- TruLaser Cell

APPLICATIONS

- Laser welding

Challenges

The automotive industry is undergoing technological change, and the fewer components a vehicle requires, the more efficiently it can be manufactured. "Larger components allow us to produce more efficiently and reduce assembly time," explains Miguel Angel Ferrandez, Director of R&D BIW. "In addition, the vehicle weight can be reduced and safety increased." Gestamp is doing pioneering work here with the Ges-Gigastamping® family. These are large-format structural components that are produced by hot forming from high-strength steels. However, welding these reliably using a laser in an industrial-scale process was a challenge, according to Ferrandez: "The press-hardened steels are provided

with an aluminium-silicon coating (AlSi), which protect the components from corrosion. This does not play a role in conventional spot welding. But at first, we really struggled with laser welding." The sticking point was that we couldn't get the two different materials to bond homogeneously within the weld seam. Instead, intermetallic phases and alpha ferrite form structural components that negatively affect the weld quality and the resulting mechanical properties of the component, according to Nicolai Speker, Head of Application Development at TRUMPF.

Solutions

TRUMPF set to work on the basis of the G-Weld laser welding innovation developed by Gestamp. G-Weld® was developed by Gestamp to replace traditional spot welding for patch and overlap blanks. A G-shaped weld seam enables welding speeds that are up to five times faster, as well as significantly improving production efficiency and quality. "However, this time saving would quickly be lost if we had to remove the aluminium-silicon coating as part of a preliminary process before laser welding," explains Ferrandez. The solution: Beam shaping – in the case of Gestamp, using the Multifocus option. In this process, the laser beam is split into four individual beams of approximately equal intensity. All four partial beams have a core beam and a ring beam. "The fact that not just one jet, but four jets act on the weld pool ensures that the two materials are thoroughly mixed. This prevents the formation of undesirable microstructures," explains Marc Hummel, Global Business Development Manager for Mobility Applications at TRUMPF. The additional energy from the ring beam also prevents spatter formation." The result: a strong weld seam that can withstand even the automotive industry's stringent crash test requirements.

Implementation

During the development phase, the TRUMPF experts initially worked with materials provided by Gestamp. As the project progressed, real components were used, and eventually entire automobile bodies were subjected to real-world crash tests at Gestamp. "The work paid off," says Ferrandez, summarising: "The new welding strategy offers several advantages." For one thing, we save on production and equipment costs – such as assembly robots – and the simplified assembly process reduces complexity in the final production stage. "In addition, the faster welding speeds allow us to increase our productivity while improving weld seam quality." And there is another key advantage: The laser not only offers better accessibility, but also enables what is known as a "semi-visible surface" through single-sided welding. The seam is no longer visible from the underside of the component and can be painted directly. Prior to introducing the new process, Gestamp initiated the validation phase. "As soon as this internal validation is complete," says Ferrandez, "we will roll out the technology across all our facilities."



Forecast

"There is a growing need for simpler and more competitive manufacturing methods," explains Miguel Angel Fernandez, before continuing: "In particular, the products in our Ges-Gigastamping® family require precise, fast and defect-free joining –without visible joints." Our new welding approach opens up completely new possibilities and has the potential to fundamentally change the design and production of components."

Find out more about our products

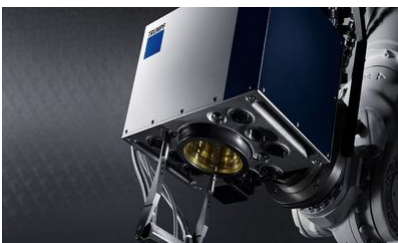


TruLaser Cell 7040

The TruLaser Cell 7040 laser system provides customers with the perfect solution – whether they need to process 2D or 3D components or tubes. Operators can easily switch between cutting, welding and laser metal deposition. The modular setup of the machine, as well as the option of individual adjustment and retrofitting, enable you to optimally customise the TruLaser Cell Series 7040 to a modified production environment and to respond to changing customer requirements with flexibility.



[Zum Produkt](#)



Programmable focusing optics

The programmable focusing optics from the PFO line are scanner optics for remote welding and cutting. Using two mirrors, the laser beam can be positioned in any specified position within the processing field or space, or be guided along any seam geometries. They can thus be welded without moving the workpiece or the focusing optics. No shielding/assist gas is required.



[Zum Produkt](#)

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