

Twenty Years of Laser Plastic Welding

Technology pioneer LPKF celebrates anniversary

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The development of high-quality and innovative devices for applications in the automotive sector, medical technology, and many other industries also has LPKF's innovative strength to thank for making it possible. The company already began employing the laser twenty years ago as a tool for the reliable, dust-free, hygienic joining of plastic parts resulting in a joint as strong as the material itself. Since then, it has been possible to bring out the full advantages of plastic as a material – moldability, low weight, stability – for countless applications.

The engineers of the then LaserEquipment AG, a spin-off of Bayerisches Laserzentrum in Nuremberg-Erlangen, laid the groundwork for laser plastic welding. At that time – just like now at LPKF – they developed and produced laser systems for joining injection-molded parts. Production services for laser plastic welding have also been a field of activity since then. Initially received with hesitation in the market, laser-welded plastics are widely used today in medical technology, consumer electronics – and in every recently built car. No one wants to do without compact and light-weight, yet stable, control devices such as parking sensors anymore.

The Technology

In laser transmission welding, two components are welded together. They differ slightly in their material properties: one of the parts is transparent to the laser wavelength used and the other absorbs the laser energy. The heat that arises locally in the absorbing part during the process is transferred through a slight mechanical pressure applied to the second part, which results in both parts melting at the weld seam – and a reliable joint with the same strength as the parent material. Many different plastics with various geometries can be welded in this way. (Fig. 1)

In the early days of the company, relatively small welding heads for line integration in the automotive industry were the focus of developments (Fig. 2). They were supplemented by complete systems for standalone operation. Various welding methods became dominant for different application fields. For example, cylindrical bodies are joined with radial welding systems, whereas large 3D parts are welded using a special, patented

LPKF method. “Hybrid welding” is LPKF’s name for a method using multi-axis robots to enable fast and flexible processes. (Fig. 3) In addition, with LPKF systems, even transparent plastics can be laser-welded.

Outlook

With the systems, which have been developed and optimized over the years as expertise has been gained, the most diverse of components – large or small, with wide or narrow weld seams, exhibiting simple or complex geometries – can be joined without any problems. Today, extensive automation of the laser machines is just as natural as easy-to-use hardware and software that ensure the traceability of individual production steps are. As a result, the welded products even meet the exacting requirements in the automotive and medical technology industries.

Simon Reiser, on board as Managing Director since 2019, is proud of his employees’ achievements. “There are now over 1,200 LPKF systems for laser plastic welding in use on all continents of the world; more than 3,000 different processes are carried out with these systems. In the automotive industry, nearly every OEM supplier is using LPKF systems.” (Fig. 4)

He also sees many opportunities for the future. “The still-growing plastics market is changing and is still searching for solutions, for example, for the further treatment of recycled plastics or new materials. LPKF is working on innovative solutions for this, too, so that the advantages of laser technology – cleanliness and joining without chemicals or chip formation – over other joining technologies can continue to be used in as many application areas as possible.”

Illustrations

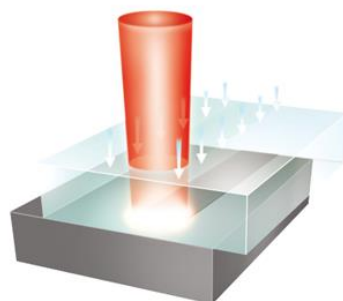


Fig. 1: Laser plastic welding principle: Two parts are welded together using a laser beam and slight contact pressure.



Fig. 2: The LPKF InlineWeld 6200 welding system is ideal for integration into 24/7 production lines.

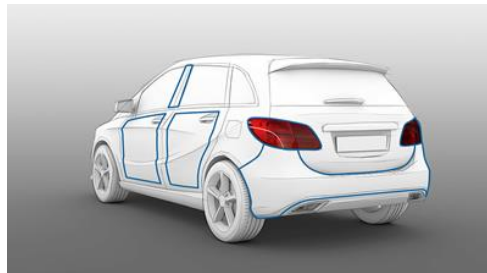


Fig. 3: Even large plastic parts such as those in or on cars can be welded with laser technology.



Fig. 4: Simon Reiser, Managing Director of LPKF WeldingEquipment GmbH



Fig. 5: Headquarters of LPKF WeldingEquipment GmbH in Fürth

About LPKF

LPKF Laser & Electronics AG manufactures machines and laser systems used in electronics fabrication, medical technology, the automotive sector, and the production of solar cells. Around 20 percent of the workforce is engaged in research and development.