

LPKF Laser Plastic Welding  
The Most Efficient and Reliable  
Joining Technology for Plastics



Made in Germany

**LPKF**  
Laser & Electronics

# Better Products Generated Faster Thanks to LPKF Laser Plastic Welding

A core capacity of laser technology is the joining of plastics. Compared with other joining technologies, the material-preserving process impresses through its cleanliness, precision, and cost-effectiveness. Laser plastic welding is especially recommended when the overall component must meet the highest demands for quality and durability.

The system portfolio from LPKF covers laser systems for reliable welding of very small to large parts with weld seam widths of 100  $\mu\text{m}$  to several millimeters. The systems feature an impressively long service life and can be used as standalone machines or integrated into production lines.

On the following pages, we will present LPKF's application areas, machines, and offerings. If you have any questions or wish to request a sample of a welded part, LPKF representatives around the world are available to help you.

## Contents

- 3** Industry Know-How
- 10** Project Support
- 14** Laser Plastic Welding
- 16** Products
- 20** Software
- 21** Service & Support

# Industry Know-how for Reliable and Economical Plastic Welding

Plastics can be found today in and on nearly all industrial end products. We know the exact requirements of our customers with respect to the result of the joining process, especially in our three core industries of automotive, medical technology, and consumer electronics.

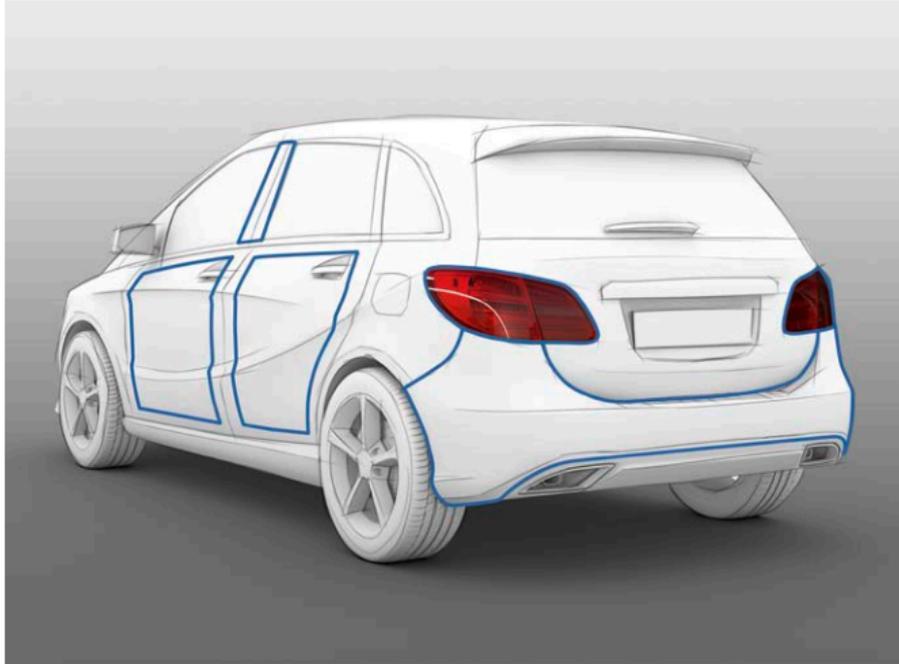
We use our long-standing knowledge of standards, regulations, requirements, and challenges in the respective industries to achieve the best possible results. Combining that with our comprehensive know-how in laser plastics welding, we can pinpoint the optimum application-specific solution.

Countless products – from small electronic housings to large valves – have already been produced using our machines,

and the number keeps growing every day. LPKF welding machines are at home in many industry sectors. See for yourself.



# Automotive



## **High-quality Plastics – High-quality Joints**

LPKF is a key partner to the automotive industry. The long-lived LPKF laser plastic welding systems are established in the automotive industry, where they provide for high yields.

Profit from our lengthy experience. Fast and efficient 24/7 production through laser plastic welding. For your best-in-class products.



### **Vast Array of 3D shapes**

Taillight – precisely welded with the PowerWeld 3D 8000



### **Cylindrical Bodies**

Valves: reliably and securely welded – quickly and easily



### **Extreme Loading**

Resistance and pressure – laser-welded tire pressure sensor



### **Complex Areas**

Perfect contour welding for comfortable vehicles



### **Premium Look**

Illuminated door sill guard on a premium-class car

# Medical Technology



## **Reliability: Traceable, Repeatable Processes, Purity in the Application**

We are big on process reliability and quality assurance. Because we know: compliance with specific purity conditions and process validation are important factors in the production of plastic parts used in medical technology.

Clean, fast, flexible, suitable for clean rooms, and reliable: with the LPKF laser systems for plastic welding, reliable, hygienic, and hermetically sealed joints can be produced between plastic parts without (chemical) additives, foreign matter, or particle loading.



### **Cylindrical Bodies**

A laser is used in a radial welding process for joining small to large cylindrical bodies made of plastic: catheters, valves, and pins.



### **Cartridges**

Fine channel geometries precisely executed – for perfect diagnostic results without turbulence, additives, or particles



### **Housings**

Laser-welded housings – truly tight with perfect, hygienic joints and the appropriate appearance



### **Transparent Parts**

Transparent plastic parts laser-joined – for microfluidics or for parts that must be transparent for esthetic or functional reasons

## Consumer Products



### **Flexible production, precise results**

Production of wearables, watches, in-ear headphones, or other exclusive plastic components – manufacturers of consumer goods profit from laser plastic welding: it lowers the reject rate, improves the esthetic quality, and saves money through the especially economical production process.

If, for example, delicate electrical components need to be encased in plastic housings, laser welding is the ideal joining technology. Precise and absolutely tight seams for complex 3D geometries or machining sizes in the micrometer range, compliance with strict hygiene directives, and flexible production planning – what more could you ask for?



### **Laser-welded Shaver**

Watertight and precisely joined with an LPKF laser welding machine



### **Pool Lighting**

So that the water in the pool shines especially beautifully, LPKF machines generate reliable weld seams around the delicate lighting electronics



### **Effective use for beautiful colors**

Functional and visually appealing results for decorative cosmetics

## Your Idea ...



### **Getting Started is Easy**

Every project is special. We know that. And that is why we are happy to take on your assignments. On request, we can recommend materials or designs for developing products that are as efficient as possible and that are economically and technically superior to conventional materials and designs. We select the right machine for you and calculate the optimum process parameters.

We are at your side from the concept stage to the final product. We know what we are doing and help you reach your solution.

## ... Our Solution

### **Our Expertise for Your Success**

With laser technology, you obtain reliable, fast, high-quality results. Our experts would be happy to advise you. Our machines “Made in Germany” stand for safe and reliable technology, and our employees for the innovative art of engineering.

### **Application Center for Evaluation and Consulting**

Our physicists and application experts can especially support you in the testing of new materials and designs. They develop optimized production processes – for the best product at the lowest cost. For this, LPKF has special application centers in North America, Europe, and Asia equipped with the latest laser technology from LPKF.



## We Accompany You – From the Initial Idea to the Finished Product



Application consulting, materials consulting, feasibility studies, materials analysis and testing.

Sampling according to your 2D or 3D drawings and parts, prototype production, process design.

Production at the LPKF application center or LaserMicronics.

Low and medium volumes can be produced by our partner LaserMicronics; backup solutions are possible.

# At Home in the Plastics Processing Industry

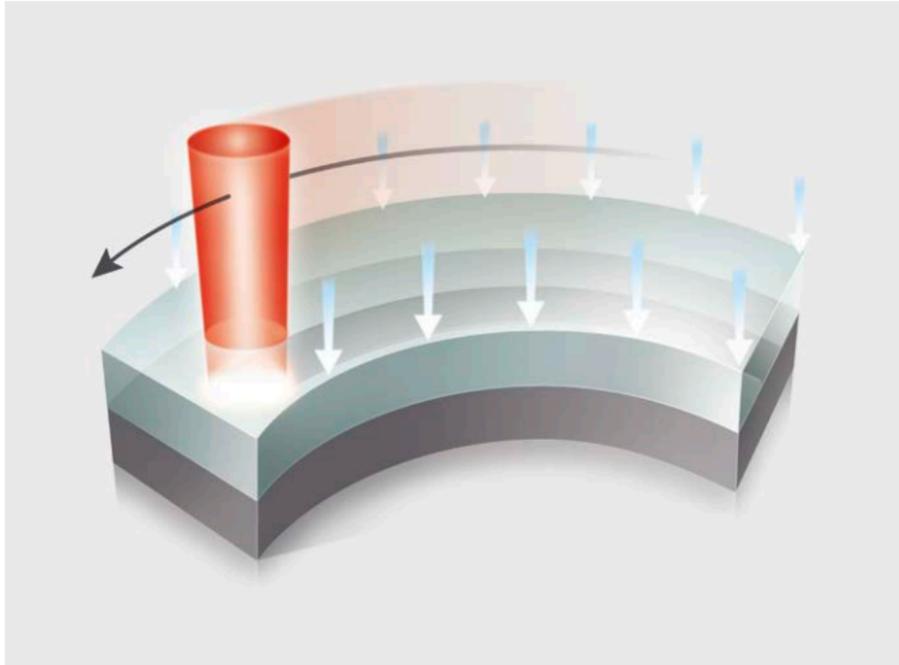
Packaging, electronic component, or watch? Toys, a ship's interior, or designer furniture? Laser transmission welding is used for many everyday objects made of plastic due to the host of advantages it offers:

- Precise weld seams in visible areas
- Invisible weld seams through clear-clear joints
- Absolute imperviousness of weld seams up to IP 67
- Complex 3D contours and large free-form parts realizable
- Possibility of welding particularly thin materials such as foils
- Welding of particularly small materials with seam widths in the micrometer range
- Flexibility for production planning

## **Experts for Special Requirements**

Our longstanding expertise in laser plastic welding allows us to take an informed look at materials, geometries, end products, and application- and industry-specific conditions. Through this, you find the right solution for the challenges in plastic product manufacturing.

## What is Laser Plastic Welding?



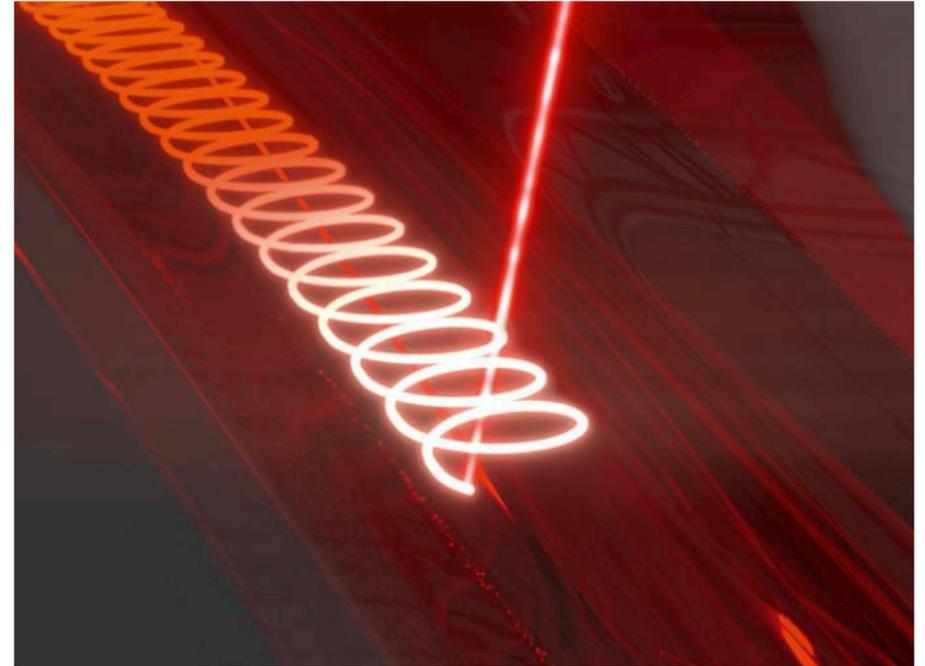
In many application areas, laser plastic welding is replacing conventional joining techniques such as adhesive bonding and ultrasonic welding. In cost- and quality-sensitive industries such as automotive, medical devices, and consumer goods, production is increasingly being converted to efficient laser welding technologies.

A molding made of a material that is transparent to the laser wavelength is joined to an underlying part, which absorbs the laser energy. The laser beam penetrates the laser-transparent part and is focused on the laser-absorbing part, melting its surface. The upper part is pressed against the lower part with a defined force; due to heat conduction, the upper part is also plastified.

This produces a reliable weld seam without damaging the surface. Laser plastic welding offers a number of advantages: low-cost tool holders, easy-to-program welding contours, and smart process monitoring during the welding process. Laser plastic welding leads to low reject rates and a hygienic, absolutely particle-free, attractive joining result.

#### **Process Parameters**

- Laser power [W]
- Speed [mm/s]
- Joining pressure [N/mm<sup>2</sup>]
- Material properties



## Laser Welding Systems for Line Integration – LPKF InlineWeld Systems



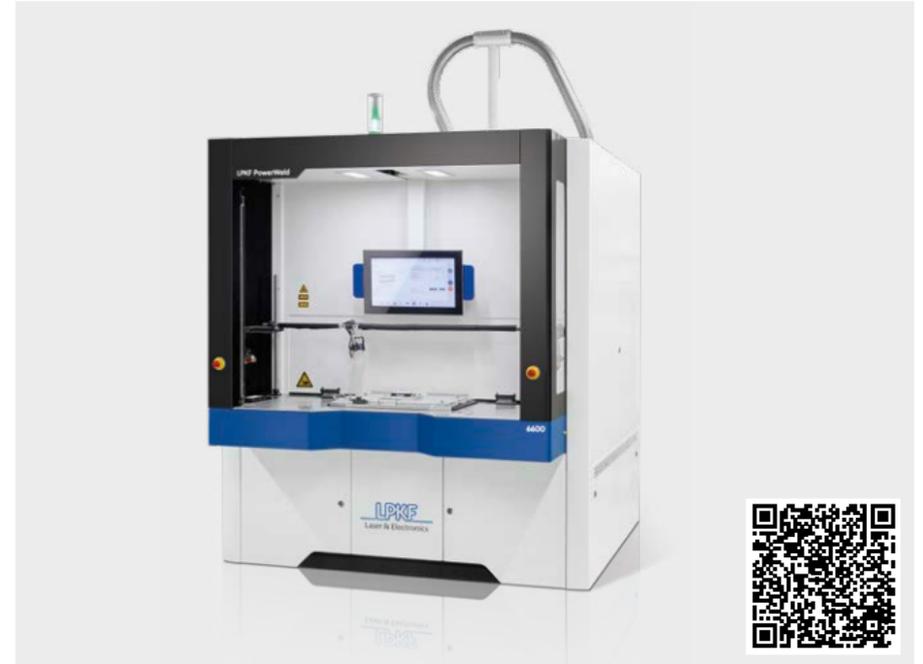
The systems in the LPKF InlineWeld series are designed for integration into production lines at customer plants. The processing unit is very small and flexible and can easily be integrated into automated workpiece carrier systems and rotary tables. The supply components are situated in a separate control cabinet. The LPKF InlineWeld systems generate weld seams of any shape. By changing the control data, you can directly adjust the welding contour.

LPKF offers suitable laser welding machines for all needs and wants: universal systems, variants with especially fast cycle times and 24/7 availability, or combinations of individual machine elements up to complex robot stations.

## Laser Welding Systems for Standalone Applications – LPKF PowerWeld Systems

The LPKF PowerWeld machines were developed as low-cost solutions to meet a wide range of requirements in plastic welding. The laser, the control unit, and the cooling unit are situated in a compact housing. Various laser sources and supply systems such as rotary tables in combination with efficient control and process monitoring systems ensure optimum workpiece quality and productivity.

The maximum possible machine availability is guaranteed thanks to high-quality components, while the integrated inline process monitoring ensures product quality. As modular solutions, the systems can easily be adapted to special customer requirements.



## Laser Welding Systems Specifically for Large Plastic Parts



For industry sectors such as the automotive sector in which large plastic parts are joined, LPKF developed two special systems: LPKF PowerWeld 3D 8000 and LPKF TwinWeld 6000.

As different as the welding processes used in the two machines are, the results are equally excellent: both systems provide for economical production of parts with perfect weld seams in terms of quality and appearance, even for complex 3D geometries.

The inline process control and, with it, reliably tight weld seams make use for the automotive sector and for sectors requiring IP 67 protection possible.

## Standardized Calibrated Transmission Measuring Device – LPKF TMG 3

For the laser plastic welding process, two parts with different absorption rates are required. The upper part must at least be partially transparent to the laser beam. In order to avoid bad parts, the calibrated LPKF TMG 3 transmission measuring device determines the amount of laser radiation transmitted through a plastic sample in accordance with DVS Guideline 2243. With a maximum measurement accuracy of  $< 1\%$ , it detects deviations in the transmission characteristics and thereby provides for optimum weld seams. The measurement results from different devices around the world can be compared with one another. Saving of data for gapless traceability is possible. The LPKF TMG 3 can be integrated into an LPKF laser welding system or operated individually.



## LPKF Software: Easy Operation, Exact Results



Especially for complex processes, the software is one factor that determines the flexibility and success of production. The new, specially developed software from LPKF radically simplifies machine setup. It takes over the 3D CAD data, calculates the optimum welding contours, and transfers the information directly to the machine control system. An integrated camera automatically detects the part and the welding contour. It doesn't get any easier than that.

Repeated manual machine adjustment is superfluous. The LPKF machine calibration enables identical quality to be achieved at the push of a button. With a single data set, calibrated machines deliver results that are repeatable everywhere in the world at all times.

## LPKF Worldwide: At Your Service and On Site Fast



# Service and Support

## **Laser Systems for the World Market**

For more than 40 years, LPKF has been active in material processing using laser beams – with high-power systems for industrial manufacturing. With development and application know-how as well as experience in high-volume production, LPKF is an important global partner to companies involved in plastic parts joining.

## **24-hour Complete Service**

For the optimum availability of your systems, you, the customer, receive comprehensive end-to-end service from LPKF. Service technicians and engineers will gladly perform the commissioning of the LPKF welding systems to ensure a smooth start to production. As soon as the welding systems are operating, highly qualified service personnel provide professional support – whether by phone, through remote maintenance, or via problem-solving on site. LPKF has put together various packages from basic to premium service to accommodate various service and support wants and needs. In addition, with replacement parts inventories worldwide, you are sure to receive high-quality replacement parts in no time.

## Service Packages: Our Tailor-made All-round Carefree Offerings for You



- Fast response times for minimal standstill times for your machine
- Qualified support by e-mail and telephone
- Free remote support



- Failure probability is greatly lowered
- Preventive maintenance protects your investments
- Easy planning thanks to planned maintenance
- Basic package included



- Complete service and full cost control
- Maximum machine availability
- Warranty period of up to five years
- Basic and Classic packages included

**Contact Your LPKF Representative:**

sales.laserwelding@lpkf.com



Made in Germany



**LPKF WeldingEquipment GmbH**

Alfred-Nobel-Str. 55 - 57 90765 Fürth Germany

Phone +49 (911) 669859-0 info.laserwelding@lpkf.com

www.lpkf.com

Part of LPKF Group



**LPKF Service & Support**

LPKF provides worldwide premium customer support. Learn more:

[www.lpkf.com/support](http://www.lpkf.com/support)

