nanosystec
PRECISION AUTOMATION

VersaWeld-TLPW

Production System for the precise Laser Welding
of transparent Plastics

VersaWeld-TLPW

Laser Welding of transparent Plastics

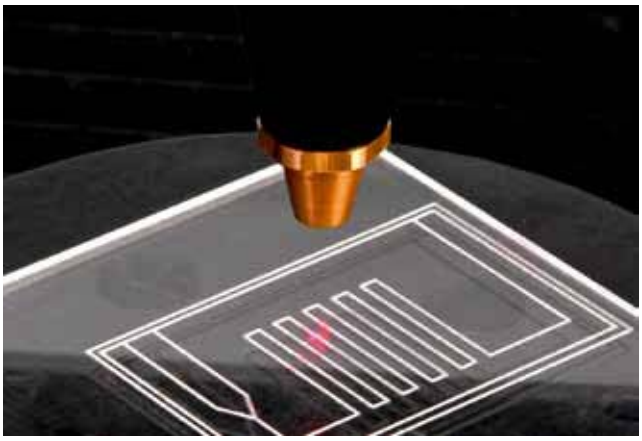
The production system VersaWeld-TLPW is a combination of laser precision welding of transparent plastics (TLPW) with accurate positioning systems, machine vision and handling of the work pieces. The configuration of the work station depends on the joining task and the production flow. The modular design results in an optimal price/performance ratio.

Laser precision welding of transparent plastics requires the focused laser beam to hit exactly the joining area. The volumetric absorption and the high power density lead to uniform melting of the plastic material in the focus of the laser beam. After cooling down there is a stable connection of the two parts. There is no need for any additives to have sufficient absorption.

The laser beam can be focused to a small diameter for very fine weld seams.

PC, PE, PVC, PP, PET, TPU and many other olefin-based transparent plastics are well suited for laser precision welding. These polymers are semi-transparent for the wavelength of the weld laser.

The safety circuits of VersaWeld-TLPW include the weld laser. The system therefore complies with the requirements of laser safety class 1.



VersaWeld-TLPW focuses the beam strongly to obtain very fine weld seams.

Positioning for 3-dimensional Joints

The positioning system for 3-dimensional joining tasks is configurable not only for 2-dimensional joining of work pieces with TLPW, but also for complex trajectories. An overlap of the work pieces is no longer mandatory, components can be oriented rectangularly or in any other shape and joined with fillet welding. The translation stages of the SlimlinePlus series position with a deviation of less than a micrometer. They are a solid foundation for demanding joining tasks on miniature work pieces.

Advantages of VersaWeld-TLPW

- **Volumetric absorption of the laser radiation**
- **Joining of transparent plastics without additives**
- **2- or 3-dimensional seams**
- **Penetration or fillet welds**
- **Manual, semiautomatic or fully automatic handling**
- **Powerful machine vision for inspection**
- **Operation with Laser Class 1**

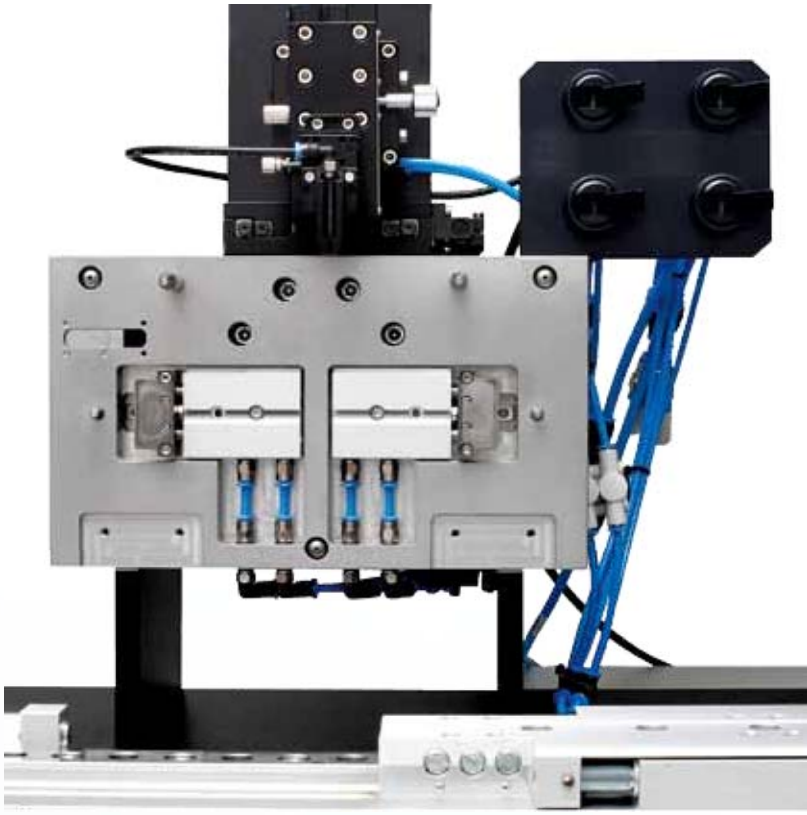
Image Processing for Production Control

The focal length of the optics is typically 100 mm. A CCD camera integrated in the lens covers the required field of view. The detection of fine structures and fiducials with powerful machine vision is used to position the work piece relatively to the laser beam. The high quality lenses show minimal distortion. The acquired pictures are used for visual inspection of the welding results and they can be stored for quality control.

Process Software

The software package TestMaster is used for setting the parameters and sequence control. Interfaces of the system are configured in TestMaster for seamless integration in the production flow.

A database stores device- and process-relevant data. Several access levels define user rights and allow optimal operation.



Loading stations outside of the system are used for mounting the work pieces. This reduces the process time to the core process and increases the throughput.

3- dimensional objects with butt joint can be realized with VersaWeld-TLPW. High-precision stages with a repeatability in the sub-micrometer range are ideally suited for demanding joining tasks.

Manual or automatic loading

Loading of the VersaWeld-TLPW can be manual, semiautomatic or fully automatic. The method which is used for loading/unloading depends on the production flow. The pieces to be joined have to be firmly attached to each other without any gap.

A fixture holds the two parts. Loading of the fixture takes place outside of VersaWeld-TLPW. Two fixtures allow the full utilization of the system: One fixture with the parts is processed inside the system and the other one is loaded outside.

Technical Data

Output Power	5 W, 10 W, 15 W, 20 W
Wavelength	1900 - 2000 nm
Pilot laser	650 nm, 1 mW (optional, not for all models)
Pulse width	2 ms to continuous emission, full power
Trigger signal	TTL and/or 24 V
Electrical supply	120/230 V, 50/60 Hz
Cooling	Water (tap water or recirculating chiller)

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