

# Plastic welding with laser

with five important advantages:

- **Water-proof, high-strength welding seams**
- **Touchless, locally limited and controlled application of energy**
- **Appearance of welding seams well suited for visible parts**
- **Flexible process - welding contours programmable**
- **Can be easily integrated into assembly lines**

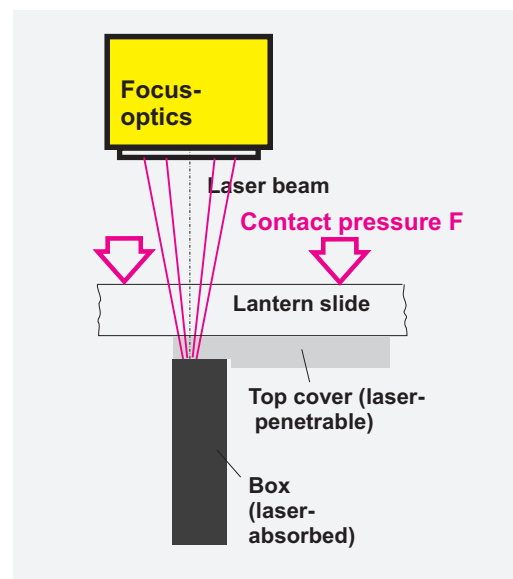


## Principle

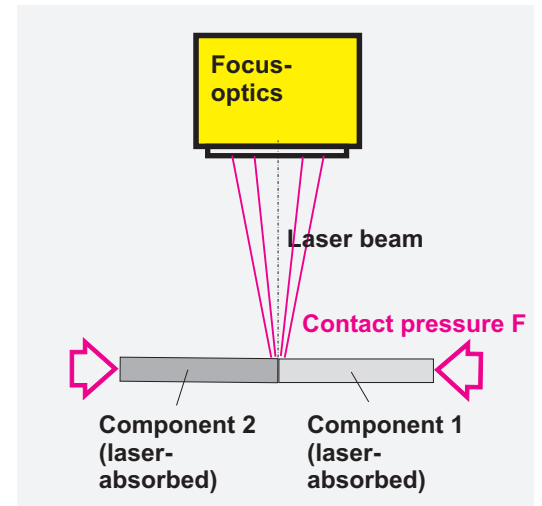
By plastic welding most assembly parts are overlapped and radiograph welded.

The overlap welding can be achieved a welding seam resistance in the size of the basic material resistance by very short transition sections and low application of energy.

At this method the laser beam beams through the upper join partner and is absorbed on the surface of the bottom join partner. It leads to fuse superficially of the absorbed partner. By the planar contact of the together pressed join partners the laser transparent join partner is fused superficially localised.



In the transmission section happens a mix of the molecular chain by the thermal expansion of the fused material, which can behave up to 30%, by an accordant contact pressure of the join partner. By the dull butt welding both join partners must be laser absorbed similarly. The join partners are warmed directed at the seam by the laser beam and the material is fused superficially. Also here is an accordant contact pressure necessary.



## Material selection

- Basically
- the thermoplastic can laser welded by itself...
  - The thermoplastic elastomers can laser welded by thermoplastic...
  - different thermoplastics can laser welded Together...

...By the transmission technique

The **overhead join partner** (facing the laser beam source) must show a low absorption rate for the radiation of the used laser. The transmittance should lie over 60%.

In rawness most plastics are laser transparent. Fibre optics rates reduce the radiographability. If the overhead join partner should be colored, you will use laser transparent pigments. Corresponding pigment recipes are standard today. Laser transparent blackenings are possible.

The **underlie** join partner should be laser absorbed. The laser radiation should intrude maximal 0,3 mm. This is achieved simplest by blackening with sooty particals. There are also other laser absorbed colorings possible.

## Laser-application

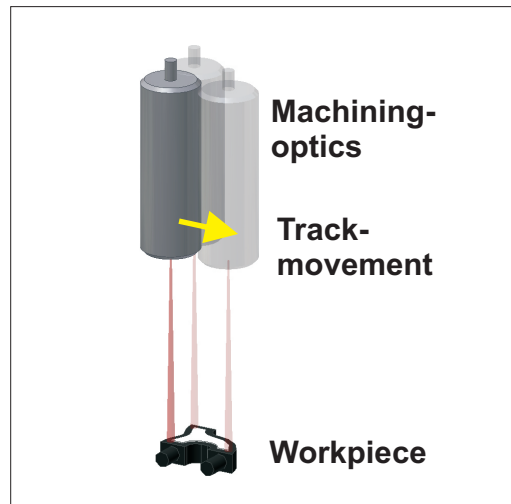
The laser radiation can apply to the workpiece different:

At the **contour welding** a focused laser beam is moved along the welding track once. The value of the focal spot is equal to the thickness of the welding track. Contour welding make high standards on the planarity of the welding face. The gap must not exceed 0,1 mm.

Advantages:

- low standards to the beam quality
- enough low laser power

By **simultaneous welding** the form of the laser beam is adapted to the welding seam.

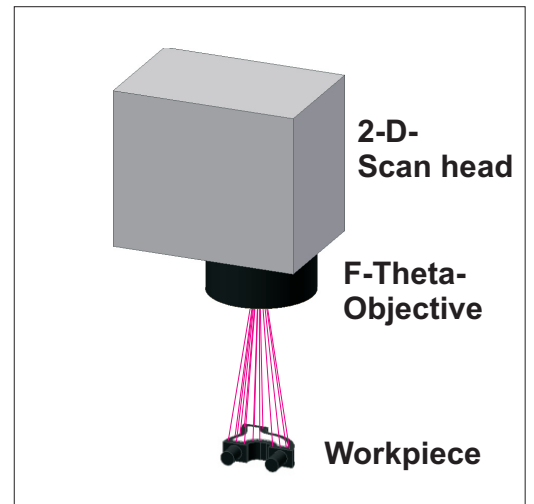


The movement of the laser beam along the welding track escapes. This process recommends for geometrically easy welding outlines.

By the **quasi-simultaneous welding** the focused laser beam is moved in short cycles over the welding track, so that the whole welding track is warmed steady. If the movement of the laser beam happens about the scanner mirror, there will be geometric complex welding outlines possible.

Advantages:

- Process observation by measuring of the composition movement possible
- low demands at the welding face by weld flash
- short process times possible.



## Machines

Laser welding machines for plastics can build as full automated machines in "In-Line- constructions" or as hand work station. The basis is the Wolf - Standard cell (look separate product information "Production modules")

Dependent from the concrete task laser welding systems can equipped very different. All machine components are widely maintenance free.

The machine is completely enclosed (Laser class 1).

High performance-diode laser with a wave length from 940 till 980 nm are used for a laser. The laser systems are produced for the industrial continuous operation. Thereby the availability is over 98%. This will be ensure among other things by a 24 hours service concept. The service concept reduce also the service costs and the maintenance costs, because the expensive "One-site inspection" for the component change escapes. (look separate product information "Laser Power Pack").

Following more features aim for all Wolf laser welding machines:

- Robust construction with appealing design
- Free programmable, specific operation axes (contour welding)
- High-quality Scan head with standard Programming software (quasi-simultaneous welding)
- Modular construction
- Observation of important process parameter
- Comfortable user interface for enter of the positions (direct input or teach-In modus) and for enter of welding parameter.

## Examples



Short info to a customer specific machine:

- Product: Box FI-Security swich



- Welding type: Dull butt welding
- Clock cycle: 3,2 s per part
- Two welding stations on one rotary table
- Industrial-PC with touch-Screen as user interface

Other machine examples you can find on our website

**wolf**  
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**Special soldering process**

**Installation-Automation**

**Plastic welding by a laser**

**Other application field:**

