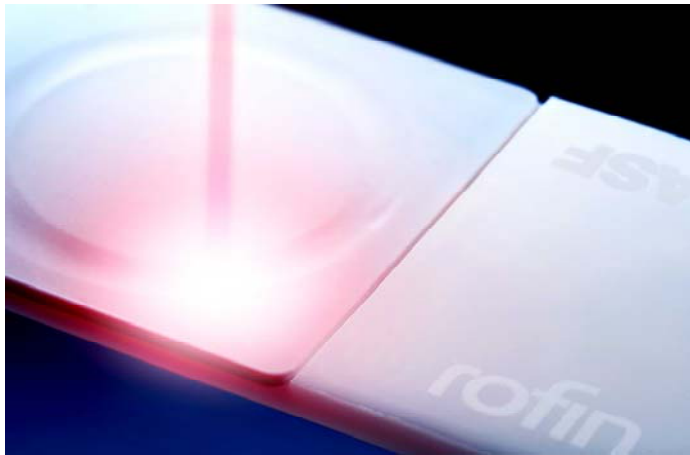


## ▶▶ LASER-BASED PLASTICS WELDING



Aside from conventional welding methods, laser welding of plastics has established itself as a proven bonding method.

The component-conserving and clean process offers numerous advantages and enables welding of sensitive assemblies in automotive, electronic, medical device manufacturing, food packaging and consumer electronics markets.

### Overview of advantages

- minimal mechanical stress
- minimal thermal stress
- stable process
- very flexible
- completely particle-free
- internal joint
- small melt ejection
- no additional materials (e.g. absorbants) required
- very high quality and durability of the weld



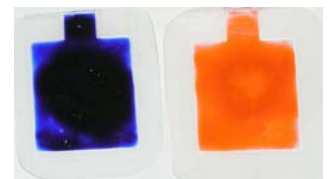
Liquid carrying assemblies can be welded particle-free and with a tight seal



Welding without damage to sensitive electronic components



Welding of design surfaces is no problem when using lasers



Tight seals are also achievable with transparent materials

### Flexible processes for highly durable joints with perfect surfaces

In order to receive highly durable joints with perfect surfaces, overlap- and beam transmission welding are typically used. Here, the absorption of laser energy in the IR-range is usually realized using pigments (e.g. soot). In transmission welding, laser radiation is transmitted by one joining partner and is absorbed by the other joining partner. Today, a multitude of colors in plastics can be welded with a high durability by adding various pigments to the join. When compared with traditional joining methods such as adhesive bonding, ultrasound-, vibration-, or heat-welding, laser technology possesses a range of advantages.

Adhesive bonding usually requires pre-treatment of the contacting surfaces and uses organic solvents.

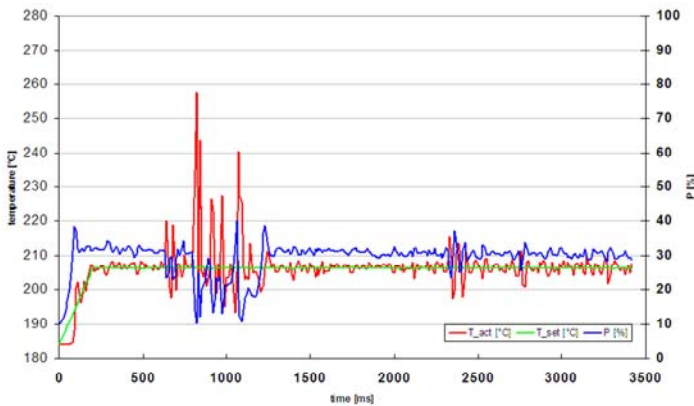
Welding with heat elements or hot air means low investments but is, at the same time, comparatively slow and prone to wear. Large areas are heated which makes the process unsuitable for sensitive assemblies.

Friction-, vibration-, and ultrasonic-welding exert a large amount of mechanical force upon the joining partners. This makes complex constructions and regular inspections of machines necessary.

Laser welding, on the other hand, invokes a minimal thermal and mechanical stress on the assembly. It is clean, particle- and solvent-free as well as highly flexible. The weld is performed within the joining partners.

## ▶▶ LASER-BASED PLASTICS WELDING

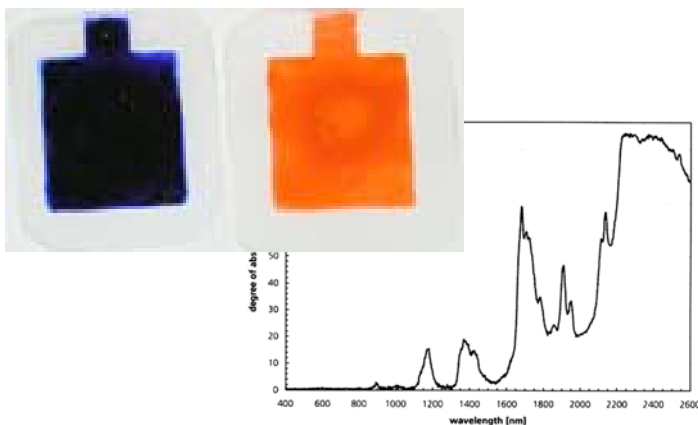
### Process reliability and control



The pyrometer has proven to be a useful tool in the process control of laser welding. In combination with a DILAS COMPACT high-power diode laser system it offers the advantages of a contactless temperature measurement as well as fast adjustability. This closed-loop control system keeps the melt at a constant temperature in order to avoid overheating.

The temperature signal can be displayed graphically within a defined process window, enabling an in-line rejection of badly welded parts. DILAS offers this option in combination with galvanometer scanners along with a color corrected f-Theta lens.

### Wavelengths



DILAS Industrial Laser Systems offers the wavelength at 1940nm in addition to the standard wavelengths for transmission welding. In this wavelength range, welding of transparent foils or two transparent joining partners is possible without the addition of absorbants. For welding transparent plastics, the DILAS diode laser systems at 1940nm are delivered together with a license allowing the usage of patent PCT/EP99/05109.

### Products



The COMPACT is a diode laser system in a standard 19-inch format. The modular concept enables the integration of various diode laser modules with output powers of up to 500W with a standardized interface and footprint.

Tailored accessories, such as processing optics at various focal lengths, homogenous beam profiles and scanner heads, that are optionally equipped with pyrometer, complete the product range, making this system the perfect tool for laser-based plastics welding.