LEISTER

LASERSYSTEMS

Laser welding of plastics – innovative and flexible.

Quasi-simultaneous welding

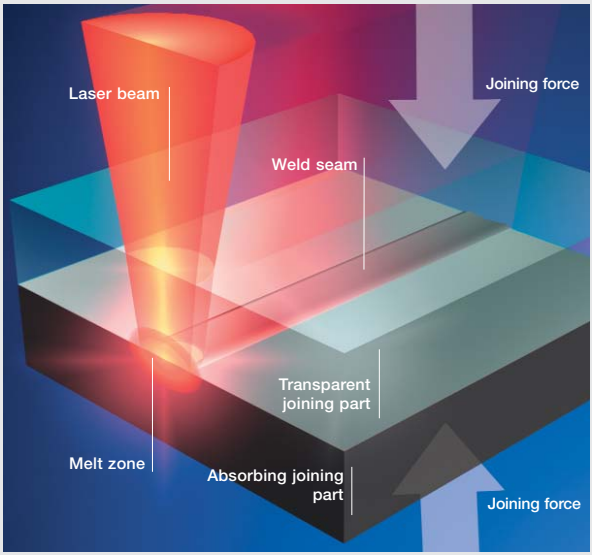
The collapsing method.

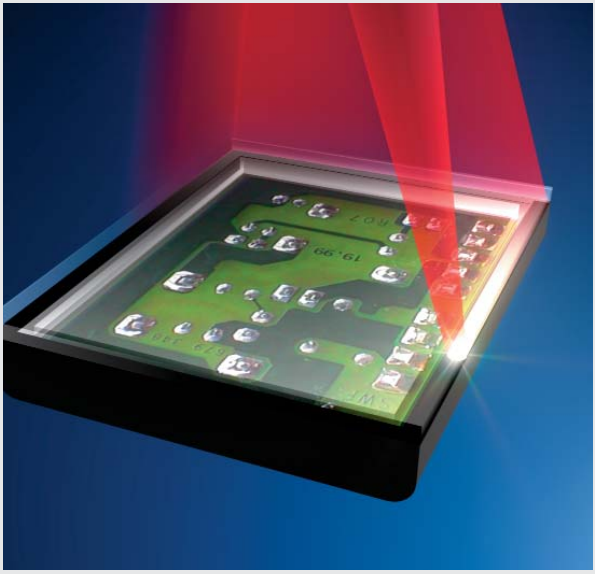
NOVOLAS

The principle of laser welding

A transparent and an absorbent mating partner are joined when laser welding thermoplastic plastics. The laser beam penetrates the transparent plastic to encounter the absorbent one, which means the process is referred to as "laser transmission welding". Due to the laser energy, the absorbent mating partner melts and conducts heat to the transparent mating partner, until this also melts. This requires physical contact in the joining zone, which is applied by mechanical clamping. An inner joining force results through local heating and expansion. Internal and external joining forces ensure a firm weld of the two parts.

Almost all thermoplastic plastics and thermoplastic elastomers can be welded with the laser beam – including ABS, PA, PC, PP, PMMA, PS, PBT as well as fiberglass reinforced plastic types. The weld seam strength remains within the area of basic material strength.





Quasi-simultaneous welding

Two mirrors in the scanner lens deflect the punctiform laser beam and guide it along the welding contour at high speed. The joining area is moved down several times per second, this enabling the laser beam to heat and plasticize the entire weld seam. Shaped part tolerances can be compensated by collapse and hence realized in the setting path.

Complete production systems

The scanner lens is connected to air-cooled lasers via an optical waveguide and can be used both in the NOVOLAS Basic AT series and with the NOVOLAS WS-AT. This means it can be extended to a complete production system. User-friendly application software is provided for both series.

Scanner lens
The scanner lens is the core component in quasi-simultaneous welding. The size of the scan field is determined by the F-Theta lens, which always focuses the laser beam with the same focus diameter onto the rectangular processing level despite deflection angle. Contours can also be welded with the lens by slowly moving down the contour. Different weld seam widths and power distributions can be realized by using a diffractive optical element (DOE) during radiation.

NOVOLAS Basic AT

NOVOLAS Basic AT
The NOVOLAS Basic AT series is designed for integration in production lines. It can be optimally configured for the most diverse requirements thanks to the logical modular structure. In this way, almost all welding concepts can be realized with the various diode laser and optical modules. The finely tuned components ensure both a high level of process reliability and cost-effective production. The use of multiple laser and optical modules in a single system efficiently paves the way for increasing the throughput – thereby reducing costs.

The scanner lens is used with an air-cooled laser, which is usually installed in the NOVOLAS Basic AT Compact.

NOVOLAS Basic AT Compact

NOVOLAS WS-AT

NOVOLAS WS-AT
The laser system NOVOLAS WS-AT gives the customer a complete, turnkey laser welding system. This central supply unit contains all components necessary for the process. This is designed for the integration of all options. In this way, you can select those components that are necessary and recommended for the welding process. To increase the throughput, the systems can also be equipped with a rotary indexing table or integrated in an automated production line. The software supplied is customized to the systems and the relevant process. It comprises all requisite modules for the process control and monitoring and is designed for the integration of further options and accessories. The laser system NOVOLAS WS-AT is ideal for small and medium-sized components thanks to its tremendous flexibility. Retooling times are drastically reduced. Productivity is boosted for low-volume series above all.

Customer-specific integration

Leister provides support for customer-specific integration of the scanner welding technology as well as other processes. This also includes advice as well as method and process development. The production of prototypes and low-volume series is part and parcel of our product portfolio.

Typical applications

Quasi-simultaneous welding is versatile in use. Its areas of application include sensors with sensitive electronic components as well as fluid components that have to be joined together with total precision. Many such applications can be found in the automobile industry. Use in medical technology is also increasingly widespread.

Small components in large numbers
An ideal application for quasi-simultaneous welding. Especially components with changing geometry can be manufactured quickly and easily.

Components rigid in design
These are often subject to shape tolerances in the welding zone, which have to be bridged during welding. The fusion of the joining zone during simultaneous pressing is an effective method for this. Shaped part tolerances up to 0.5 mm can be bridged in this way.

2D with small component sizes
Typical applications are in the 2D range with component sizes smaller than 200 x 200 mm. Both complex and simple welding contours can be realized. The method is also used in the packaging industry.

Design guidelines

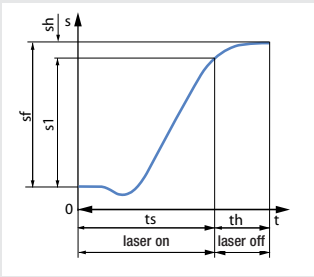
For quasi-simultaneous welding, the same rules apply in respect to the materials as for laser plastic welding in general. As a rule, the joining area is simple in form, without complex, special design elements. The following points must be observed:

- The desired fusion path should not be greater than the laser beam diameter.
- The joining zone should be accessible for the laser radiation. The radiation angle of the scanner lens should be observed for this.
- The joining area should be free of reject marks and incidence points despite the collapse path.

Process monitoring

Thanks to the almost simultaneous heating of the joining area, the quasi-simultaneous method provides the opportunity to realize a collapse path that can be measured by path sensors. The measurement can then be used as a cancel condition and also saved and visualized for monitoring. In addition to the path, the force of the components pressing onto one another can also be measured.

Pyrometry also provides an additional process monitoring in some cases. Here the heat in the welding zone is detected, this being incorporated for a statement on the weld seam quality and compared with empirically determined curves.



Graphic:
Time progression of the joining path
s1: Welding path ts: Welding time
sh: Holding path th: Holding time
sf: Joining path

NOVOLAS™

ISO 9001 certified

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