Laser plastic welding

The system satisfies in welding of thermoplastics and automated scanner welding through its efficiency and versatility.

Fields of application

- Automotive
- Medical technology
- Electronic industry
- Consumer goods industry

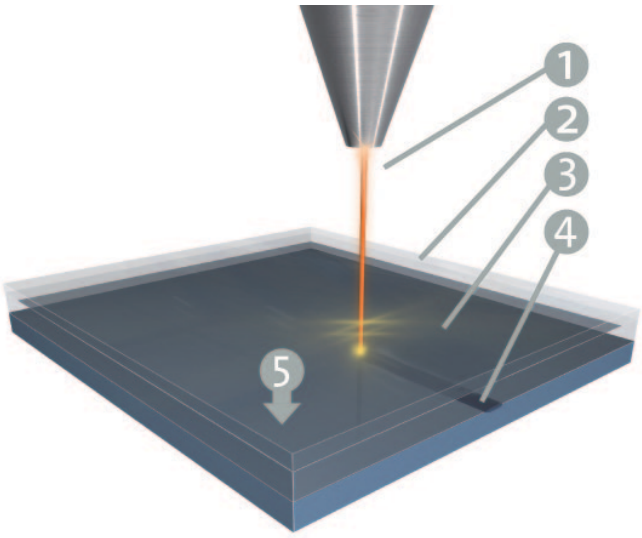
ORLASER

Laser plastic welding defined by efficiency

Laser plastic welding is considerably more effective in comparison with conventional gluing or ultrasonic welding methods and guarantees high-strength joints without markings and surface damage.

The process allows contact-free processing of a wide range of materials in different material thicknesses. Characteristic process properties are the absence of particles and low thermal influence.

Through high welding speeds and a stable process without pre- and post-processing a high level of automization is ensured.



1: laser beam • 2: transparent plastic • 3: absorbed plastic • 4: welding seam • 5: clamping pressure

Strong and flexible: The ORLAS STATION laser plastic welding system

With the plane-field lens with long focal length and two galvanometer mirrors (scanner optics), which guide the laser beam accurately over the component, the ORLAS STATION offers a processing field of up to 560 x 560 mm.

The spot size of the laser can be varied by a beam expander.

Implementing a scanner technology, the system is the ideal solution for contour welding and quasi simultaneous welding tasks.

Easy integration

The turn key solution system characterizes itself through its compact measurements which allow this system to be easily integrated into diverse production environments.
This robust stand-alone system is developed to be operational 24/7. Productions from small series to mass production are possible with this system.

Process monitoring through a laser-proof bulkhead

The equipment of the system with plastic parts that are about to be welded are mounted through a laser secured bulkhead and locked with the integrated clamping device.

Optionally the machine can be equipped with a turning table which allows the system to be fed during a welding operation. Cycle times can be further reduced and production costs can be minimized at the same time as raising your productivity.

The process control is carried out via an automatic clamping pressure controller and the way-time monitoring of the whole welding process.

Intuitive operation

The ORLAS STATION is operated via an intuitive touchscreen display that provides access to all parameters and set data.

The joint contour is created precisely in the control software or is scanned in via a DXF file, and an easily visible pilot laser visualizes the welding contour onto the workpiece.

Touchscreen display „Lilly Board“

Application examples

Typical serial application in laser plastic welding

Automotive sector: Distributor

Automotive sector: Recessed valve caps

Consumer sector: Drinking cup

Specifications

Laser source	diode-pumped
Wavelength	between 940 nm – 2.500 nm, depending on the application
Max. mean power (cw)	up to 300W
Focus diameter	0,8 – 5 mm
Processing field	up to 560 mm x 560 mm
Load capacity turning table (optional)	100 kg per side
Traversing distance	Δz = 200 mm
Cooling	air cooling
Dimensions (d/h/w)	1.200 mm/2.200 mm/1.160 mm
Weight	800 kg

Optional equipment

Turning table	with optional ports for sensors and optical pressure device
Up to 2 rotating axes	for radial welding applications
Process control	customized solutions on request
Automatic clamping pressure unit	for homogeneous force input over the entire clamping process
Multi-clamping-system	to increase the cycle frequency

Highlights at a glance

- scanner technology permits outline and simultaneous welding
- 24/7 operation
- workpieces up to 100 kg
- local heat input
- no pre- or post-processing required
- online process control
- variable spot diameter

✓ Short cycle times
✓ High productivity
✓ Precise welding

Compatibility matrix

Overview of weldable plastics

RESIN 1 \ RESIN 2	ABS	ASA	PA	PA 11	PA 12	PA/ABS	PBT	PC	PC/ABS	PE	PET	PMMA	POM	PP
TPE-A				weldable	weldable			weldable	weldable					
TPE-E							weldable	weldable	weldable		weldable			
TPE-O										weldable				weldable
TPE-S	weldable with modified thermoplastics						weldable with modified thermoplastics	weldable with modified thermoplastics	weldable with modified thermoplastics	weldable				weldable
TPE-U	weldable	weldable	weldable			weldable		weldable	weldable					
TPE-V	weldable with modified thermoplastics		weldable with modified thermoplastics						weldable with modified thermoplastics					weldable

weldable — weldable with modified thermoplastics — not weldable

RESIN 1 \ RESIN 2	ABS	ASA	MABS	PA 6	PA 6.6	PA 12	PBT	PBT/ ASA	PC	PC/ ABS	PE-LD	PE-HD	PEEK	PES	PET	PMMA	POM	PP	PPS	PS	PSU	PVC	SAN
ABS	strong weld	strong weld	strong weld				strong weld	weak weld	strong weld	strong weld				weak weld	strong weld	strong weld				weak weld	weak weld	strong weld	strong weld
ASA	strong weld	strong weld					strong weld	strong weld	strong weld	strong weld						strong weld					strong weld	strong weld	strong weld
MABS	strong weld		strong weld																				
PA 6				strong weld	strong weld	strong weld																	
PA 6.6				strong weld	strong weld	strong weld																	
PA 12				strong weld	strong weld	strong weld																	
PBT	strong weld	strong weld					strong weld	strong weld	strong weld					weak weld	strong weld	strong weld				strong weld	strong weld	strong weld	strong weld
PBT/ASA	weak weld	strong weld					strong weld	strong weld	strong weld					weak weld							weak weld		
PC	strong weld	strong weld					strong weld	strong weld	strong weld	strong weld				strong weld	strong weld	strong weld				weak weld	weak weld	strong weld	strong weld
PC/ABS	strong weld	strong weld							strong weld	strong weld						strong weld							
PE-LD											strong weld	weak weld	weak weld		weak weld	weak weld		strong weld		weak weld			
PE-HD											weak weld	strong weld				weak weld		strong weld					
PEEK											weak weld		strong weld	strong weld		weak weld					weak weld	weak weld	weak weld
PES	weak weld	weak weld					weak weld	weak weld	strong weld				strong weld	strong weld							strong weld		
PET	strong weld						strong weld		strong weld		weak weld				strong weld							weak weld	weak weld
PMMA	strong weld	strong weld					strong weld		strong weld	strong weld	weak weld	weak weld	weak weld			strong weld				weak weld	strong weld	strong weld	strong weld
POM																	strong weld						
PP											strong weld	strong weld						strong weld					
PPS																			strong weld				
PS	weak weld						strong weld		weak weld		weak weld					weak weld				strong weld	weak weld	weak weld	weak weld
PSU	weak weld	strong weld					strong weld	weak weld	weak weld				weak weld	strong weld		strong weld				weak weld	strong weld	weak weld	strong weld
PVC	strong weld	strong weld					strong weld		strong weld				weak weld		weak weld	strong weld				weak weld	weak weld	strong weld	strong weld
SAN	strong weld	strong weld					strong weld		strong weld				weak weld		weak weld	strong weld				weak weld	strong weld	strong weld	strong weld

strong weld — weak weld — no weld

Source: Prof. Dr. Rolf Klein, Laser Welding of Plastics, Wiley-VCH, 2011

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