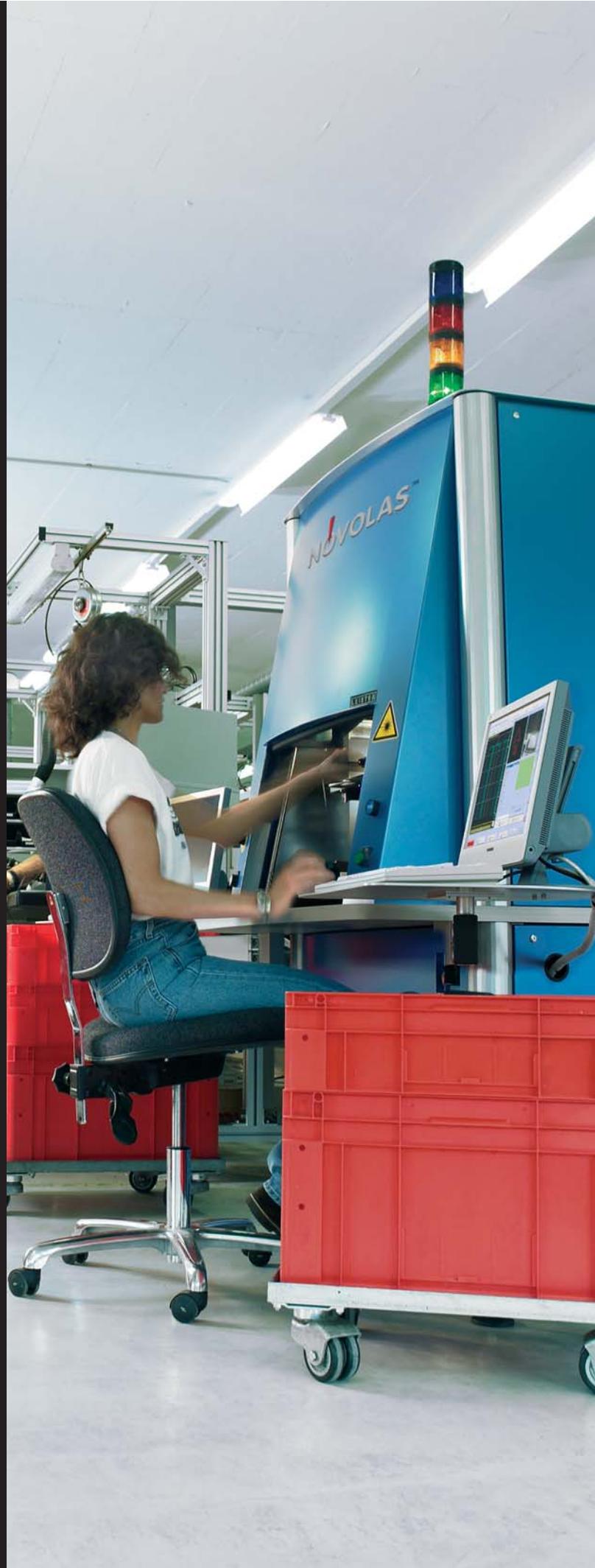


**LEISTER**

**Laser welding  
of plastics.**

**Innovative  
and flexible.**



**NOVOLAS™**

## Leister delivers performances.

Wherever you need to apply heat, Leister provides the ideal solution. We have been the worldwide leader in the field of plastic welding and hot-air blowers for over 50 years. For several years now we have also been offering innovative and effective laser systems and micro-systems. We develop and produce all of our products in Switzerland – so you can always rely on the proverbial Leister quality. And because 98% of our production is exported, therefore, we have established a dense network of service centers throughout the world – guaranteeing excellent service anytime and anywhere.



The company building in Sarnen, Switzerland

**LEISTER**



### Plastic Welding

For decades now, we have been the worldwide market leader. The proverbial performance and reliability of our products makes Leister the first choice. Our tools are used in roof sealing systems, floor coverings, plastic sheeting, in earthworks, hydraulic and tunnel engineering, in process equipment manufacturing and for vehicle repair.

**NOVOLAS™**



### Lasersystems

Our innovative solutions for the precision welding open up new production methods in automotive manufacturing, in medical and sensory industry as well as electronics and microsystems technology.

**LEISTER**



### Process heat

Whether for activation, heating, curing, melting, shrinking, welding, sterilization, drying or warming: hot-air is increasingly deployed in industrial processes. Leister customers profit from our extensive engineering knowledge and benefit from our advice in the conceptual design of hot-air applications.

**a:etris**



### Microsystems

In tomorrow's world, the smallest of structures will play a huge role! In order for our customers to keep ahead of the field in the future, we are already developing and producing micro-mechanical sensors and micro-optical components in our cleanroom today.

# Laser beams weld plastics.

Leister competently and flexibly addresses the literal diversity of the plastics industry in regard to materials and components and their design and size. With the versatile laser systems, the most diverse welding tasks are resolved individually and customer orientated.



Sensor housing



Display



Optical sensor



Electronic housing



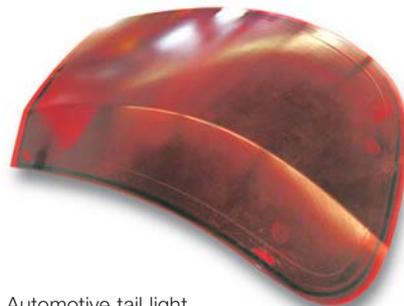
Micro fluidic device



Gas measurement device



Expansion housing



Automotive tail light



Multi well plate



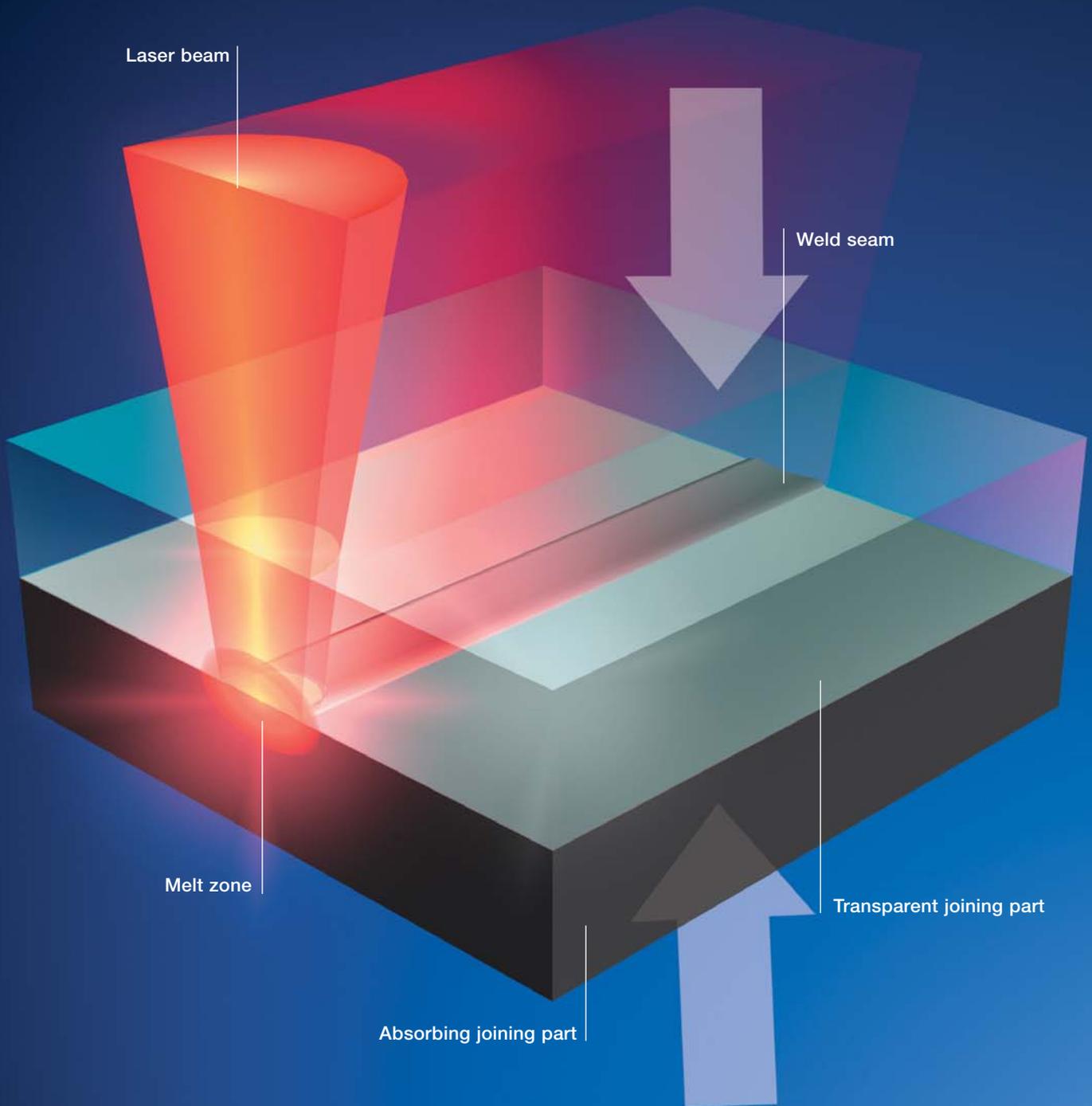
Position sensor



Filter housing



Technical textile



#### Laser welding concept.

In laser welding of thermoplastics, sometimes referred to as «laser transmission welding» or «through transmission IR welding» (TTIr), transparent and absorbing parts are bonded together. The laser beam penetrates the transparent plastic and is converted to heat in the absorbing plastic. Since both parts are pressed together during the welding process, heat is conducted from the absorbing to the transparent plastic, allowing both materials to melt and create a bond. Internal joining pressure is also generated through the local warming and thermal expansion. The internal and external joining pressures ensure strong welding of both parts.

# Plastics – laser welding brought to the point

Innovation is as much a tradition at Leister as practice proven, dependable tools. Therefore the step to welding plastics with a laser beam was simply a logical progression, but it was also a technological breakthrough.



Leister has been one of the world's leading suppliers of plastic welding equipment for many decades. A wealth of theoretical and practical knowledge of plastics processing is at our disposal. Leister revolutionized product assembly with the introduction of laser beam welding. As evidenced by being one of the very first companies to develop and manufacture laser systems for plastic welding, every new development at Leister defines state-of-the-art possibilities.

## Total customer focus

In our development laboratories, Leister scientists, engineers and technologists have developed a broad range of laser welding concepts, which have proven themselves in practice time and time again. We conduct research together with leading institutes. This lays the foundations for developing tailored solutions for almost every customer application. We are there to support you across the board: from the concept, through design and material selection, right up to process optimization and integration.

## This is what you get from Leister

Advice:

- Selection of the most suitable laser concept
- Material selection assistance and weldability tests
- Engineering and recommendation of suitable joining geometries

Development of processes and techniques:

- Definition of the process window for all relevant parameters
- Component testing and assessment of welding quality
- Integration of the process into the production environment

Prototypes and small series production:

- Manufacture of prototypes
- Pre-series and scale-up production
- Job shop service through Leister and its partner companies

## Bringing new techniques to maturity

Today laser welding is a recognized joining technique for thermoplastics. New applications are continually emerging while advantages over traditional joining techniques are brought to bear. Laser technology often provides solutions where conventional systems have failed or can be improved upon. Profit from our know-how and let us help develop your application.

## Nothing but advantages

- Non-contact, flexible joining technique
- Minimal thermal stress on the welded parts
- Simple joining seam geometry
- No particulate development
- Vibration-free processing
- Optically perfect welding seam
- High precision
- High strength
- Gas-tight, hermetic seals
- No tool wear
- No consumables (adhesive, fasteners, etc.)

## Suitable materials

Nearly all thermoplastics and thermoplastic elastomers can be welded with laser radiation – e.g. ABS, PA, PC, PP, PMMA, PS, PBT – even those reinforced with glass fibers. The welding seam strength is comparable with that of the base material.

The laser process requires a laser transmissive plastic to be bonded to a laser absorbent plastic, typically containing carbon black. Special pigments also allow welding of dark/dark and transparent/transparent combinations, as well as of colored plastics.

Laser systems from Leister are used in a wide range of industries.



### Medical:

Clean and emission-free welding



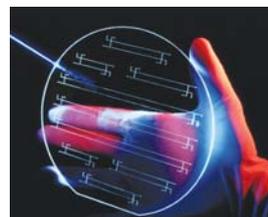
### Automotive:

High reproducibility and process reliability in all dimensions



### Electronics:

Vibration-free bonding without mechanical stress



### Micro technology:

Precise and localized application of energy

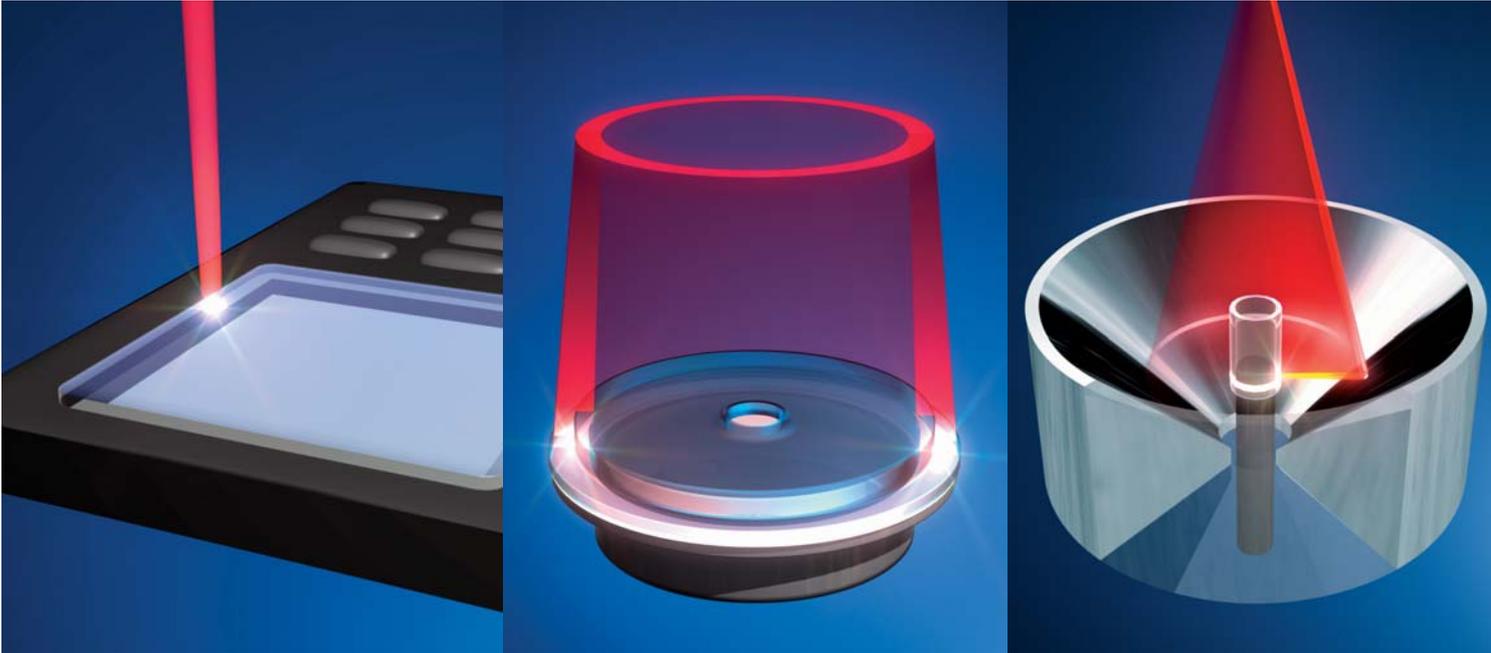


### Textiles:

Continuous and fast joining plastic films and fabrics

# Individual solutions for an extensive range of tasks

Laser welding is suitable for diverse areas and diverse applications. To be able to provide the optimum solution for every application, Leister has developed various concepts. In this way the potential of this process can always be applied profitably. Leister offers systems for contour welding and simultaneous welding, as well as for radial welding. The range is extended through the mask and GLOBO welding concepts that were distinguished with the Swiss Technology Award.



## Contour welding

In contour welding, a laser spot is guided sequentially along a predetermined welding pattern, melting it locally. The welding volume remains comparatively small as a result of the geometric conditions, and extrusion of the melt is avoided. Relative motion, is achieved by moving the component, the laser, or a combination of both.

## Simultaneous welding

In this technique, one or more lasers heat the entire weld path simultaneously. High power diode lasers are generally used as a result of their compact design. It is very easy to achieve linear welding seams. Almost any beam geometry can be generated by means of special, state-of-the-art beam shaping elements.

## Radial welding

A unique method for bonding cylindrical components whereby a mirror deflects the laser beam such that it impinges radially on the outside symmetrical surface of the component. The tight fit between the joining parts ensures the clamping pressure required for the welding process. The component remains in a fixed position during the circumferential, continuous welding process.

### Characteristics and application:

- Laser beam focused to a spot
- High flexibility
- Arbitrary 2D joining line
- Ideal for frequent changes of component

### Characteristics and application:

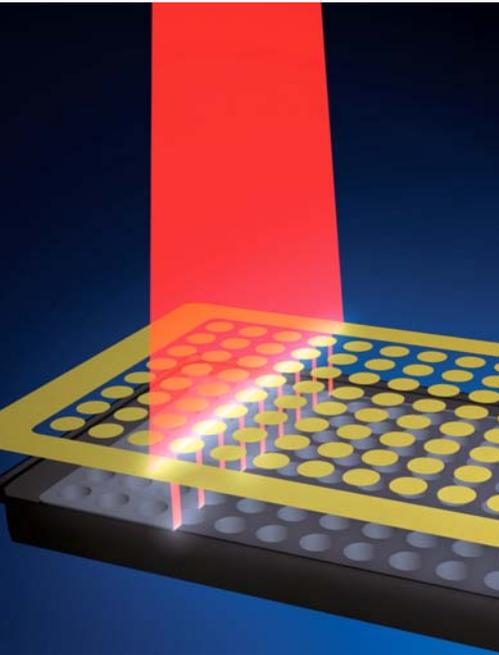
- Short processing time
- No relative motion
- Gap filling possible
- Suitable for mass production

### Characteristics and application:

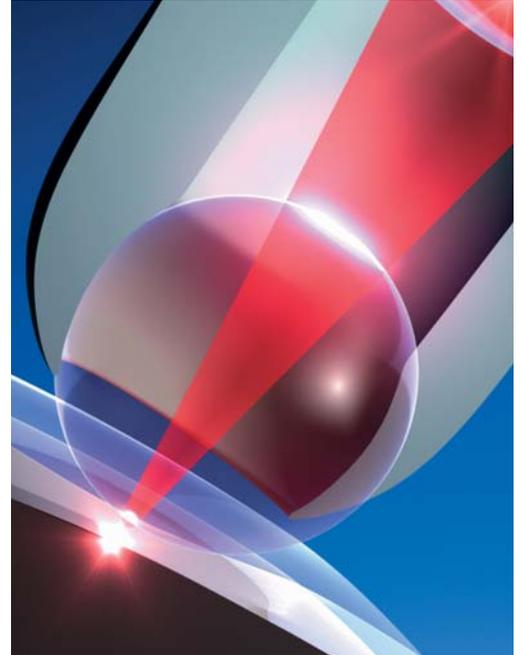
- Suitable for different diameters
- No rotational movement
- High throughput
- No clamping device required



Mask welding developed by Leister was granted the «Swiss Technology Award» 2000.



GLOBO welding developed by Leister was granted the «Swiss Technology Award» 2004.



### Mask welding

With this Leister patented technique a mask is inserted between the laser source and the parts to be welded. A curtain or collimated laser beam is moved across the entire joining area of the parts. The laser beam is only incident on the components where they are not obscured by the mask. The mask makes it possible to project extremely fine structures in the order of micrometers. Mask welding therefore achieves a very high resolution. The most diverse welding seam structures can be produced with mask welding – for example straight and curved weld lines of different width, as well as two-dimensional structures – all in a single operational step.

### Characteristics and application:

- Line-shaped laser beam
- Any desired joining geometry within a plane
- Fast and flexible
- Very fine 2D joining structures
- Suitable for micro and macro applications



### Globo welding

Globo welding works along the lines of contour welding. A laser beam is focused at a point on the joining plane via an air bearing, frictionless, freely rotating glass sphere. The glass sphere not only focuses – it also serves as a mechanical clamping tool. While the sphere rolls on the component, it applies continuous pressure at a point on the joining plane. This ensures that the laser beam is only incident at the point at which the contact pressure is also applied. The glass sphere replaces the mechanical clamping device and expands the scope of laser welding for both continuous and three-dimensional applications.

### Characteristics and application:

- Arbitrary joining geometries in two and three dimensions
- Welding without a clamping device
- Optimal synchronization of clamping pressure and energy application
- Suitable for robotic applications

# Leister Lasersystems

NOVOLAS™ WS and NOVOLAS™ BASIC AT: The combination of these laser systems with the laser welding principles described gives rise to a multitude of options, ready to take on every challenge. Leister Novolas laser systems are enhanced with comprehensive accessories matched to the systems. The accessories have been developed for varied applications, allowing you to assemble or retrofit a laser welding system specifically geared to your needs, applications and processes.

## NOVOLAS BASIC AT™

The new class NOVOLAS Basic AT is optimised for the integration into production lines. It can be easily configured for various requirements, due to its consequent modular design. Almost any welding concept can be realised with the different diode laser and optic modules. The mutually matched components provide high process stability as well as cost-saving production. The use of multiple laser and optic modules in one single system enables an efficient way to increase throughput which also helps reducing costs.

### Technical Data

Laser type	diode laser	
Beam shape	point and line laser	
Laser power	W	up to 200
Multi Laser	multiple, laser modules per system possible	
Data interface	digital/analog I/O, RS232, RS422/485	
Pilot laser	mW	<1
Line voltage	V~	200 / 230 ±10%
Frequency	Hz	50 / 60
Max. current consumption	A	16
Cooling	water/air cooled, exhaust air max. 55 °C	
Environment conditions	°C	15–40
Weight	according configuration	
Laser class	4	

CE listed. Technical data subject to change. Further options on request.

- Flexible and cost-effective; suitable for diverse applications
- Individual control via customer supplied guidance system
- Multiple laser and optic modules in one system possible
- Very high throughput possible with an appropriate upgrade
- Modular design with various optional components



Easy to integrate laser welding system in a compact housing.

The NOVOLAS laser systems can be optionally equipped with rotating tables or can be integrated into existing transfer systems. Many further adaptations can be implemented specific to the application.



## NOVOLAS WS

An all-modular, all-purpose system. It contains all components necessary for processing and is ready for connection of all options. You can therefore select any additional components necessary and useful for your process. The software provided is matched to the system and process. It includes all process control and monitoring modules required and is designed for integration of additional options and accessories. Immediately after installation of the turnkey system you can start with production.



Welding system with laser protection housing; configured as manual workstation.

### Technical Data

Laser type		diode laser
Beam shape		point and line laser
Laser power	W	up to 200
Controller		PLC-CNC
Data interface		I/O, RS232, Ethernet
Pilot laser	mW	<1
Line voltage	V~	200 / 230 ±10%
Frequency	Hz	50 / 60
Max. current consumption	A	10
Compressed air connection	Pa	6 · 10 <sup>5</sup> , 1/4" hose
Cooling		water/air cooled, exhaust air max. 55 °C
Environment conditions	°C	15–40
Weight	kg	approx. 500
Laser class		1

CE listed. Technical data subject to change. Further options on request.

### Concept

Standardized	Central supply unit
Integration	Easy integration in production lines
Modularity	As a manual workstation, partially or fully automated

### Communication

Structure	Robust and flexible structure
System	Industrial standards
Interfaces	Various connection options

### Software

Visualization	Intuitive visualization
Programming	CNC programming incl. programming tools
Service	Extensive information accessible locally or via remote diagnostics

- Turnkey system including optimized welding process
- Intuitive user interface with programming tools
- Very high throughput possible with the appropriate upgrade
- Modular design suited for customization

# Optional components for WS and BASIC AT

The range offered by Leister Lasersystems is rounded off by a multitude of accessory parts co-ordinated with the systems. With these accessory components developed for various applications and requirements, the systems can be optionally equipped according to customer specifications. For mask welding, apart from the special line lasers, masks are also offered which can be individually manufactured according to customer specifications. Special clamping devices and customer-specific optics belong to Leister's performance spectrum.



## Standard optics

- A range of focal lengths
- Camera can be integrated
- Pyrometer upgrade available



## GLOBO head

- Integrated optical and clamping system
- Glass sphere on air bearing
- Pneumatic clamping device
- Adjustable welding seam width



## Pyrometer

- Process monitoring and control
- Measuring frequency 1 kHz
- Temperature range 160 to 450 °C
- Modular evaluation software



## Ring optics

- Nearly any ring diameter
- Welding seam width is selectable
- Homogeneous energy distribution



## Radial optics

- For rotationally symmetrical components
- Welding seam width can be adapted
- Laser safety can be integrated into optical head



## Line laser

- Line lengths 10 - 150 mm
- Laser power > 200 W possible
- Very homogeneous energy distribution due to special optics
- Robust safe design

# Faster and more economical ways to reach the goal

Those who use plastic welding technology know Leister. The leading supplier of innovative, practice proven and reliable devices.

## Knowledge transfer for our customers

Whether new plastics or new processes, our customers can rest assured that Leister develops the appropriate devices, supported by a worldwide service network. We have built up unparalleled know-how in close cooperation with experts from various fields. Being one of the first companies to develop laser welding solutions for the plastics industry, we have compiled a vast amount of experience on this bonding method and are pleased to pass this knowledge onto our customers.

## Technology taken to maturity

Laser welding technology is complex. Only through our customer focus, as well as our plastics and processing experience, can we bring innovative techniques – such as mask welding, radial welding, or Globo welding – to maturity. We are there to support you in all matters concerning laser welding – from the selection of suitable materials to the concept and design of productive laser welding systems.

## We capitalize process optimization

Tap into our specialists' knowledge and benefit from our optimally equipped application laboratory. Together, let us optimize your process and integrate it into your production line. Our services include consultation, the development of processes and techniques, as well as the manufacture of prototypes, production scale-up, and small series production.



Besides state-of-the-art laser welding systems, we also offer a wide range of tests on material and components in our application laboratory.



Section through a laser welding seam of 3 mm width.

## Application support from A to Z

We are pleased to assist you in the selection of the most appropriate laser welding technique for your task. We support your engineers in the selection of the ideal material with weldability tests and can aid your designers in defining a joining geometry compatible with the material and process.

## Our know-how for your welding quality

We can compile all the relevant parameters for you and define the process window in the course of developing processes and techniques. Our know-how is available for component testing and in the assessment of welding quality. With our advice, you can rapidly integrate the laser welding system into your production line.

## Anything is possible

We are also there for you if you do not have the suitable infrastructure: We can manufacture prototypes and small series production for you in our application laboratory and offer you a comprehensive job-shop service at our facility or with one of our partner companies. Put us to the test.



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Our close worldwide network of more than 120 Sales and Service Centres in more than 60 countries.

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