LEISTER®

Laser Plastic Welding

General Catalog

swiss made

Leister Brand Products

Standalone and Integration Systems for Laser Plastic Welding

For decades, Leister has been a technology leader in the development, production and sales of innovative laser systems for a range of industrial applications in the automotive sector, in medical engineering and in electronics. As your experienced and reliable partner, Leister offers individual process development for the perfect welding result.

We know how.

Content

We are Leister

Experienced engineers, product managers and specialists from ISO-9001-certified Leister in Switzerland develop products and systems for plastic welding applications and for generating industrial process heat. Based on innovative technologies including hot air, contact heat, extrusion, laser and infrared, and our passion for customized solutions, we are able to significantly influence our market segment and set high standards worldwide.

Our employees are proud to produce high-quality premium products with strong, reliable performance. Close cooperation with our worldwide customers, sales partners and suppliers is essential for our mutual success. Local experts provide sales and service support to our customers in over 100 countries. Eight country subsidiaries and 130 sales and service partners guarantee our worldwide presence and customer proximity.

Global Leader in Plastics Processing

Leister is characterized by products featuring a wide range of technologies for processing plastics and designed for a broad spectrum of applications. We develop and produce application-specific products, including accessories, for welding, shrinking, forming, heating and joining plastics in our business areas of Industrial Heat, Laser Systems and Plastic Welding Products.

Industrial Heat and Laser Systems

Leister offers three technologies for the industrial sector: Hot air, infrared and laser. This means that we cover the majority of industrial process heat and plastic connection applications. You will find the right solution for your challenge in our wide range of products.

Plastic Welding Products

The Leister product range for plastic welding includes hot-air hand tools, extruders and welding machines, including comprehensive accessories for craftsmen and industry. With over 70 years of experience, we offer you products and services that set standards in your respective areas of expertise.

Laser Plastic Welding

Laser Plastic Welding has established itself worldwide through its outstanding performance and application-specific solutions. Highly innovative markets such as the automotive industry and medical technology are increasingly opting for laser welding of plastics.

The Laser Welding Principle

In laser welding of thermoplastics, a joining partner that is transparent to the laser radiation is joined to an absorbent joining partner.

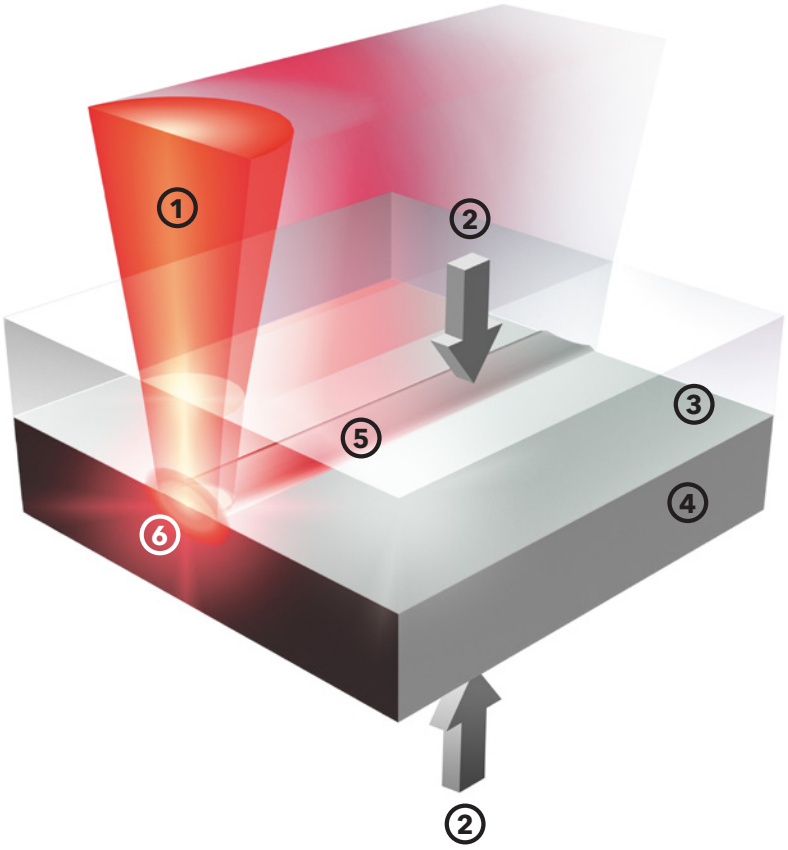
The laser beam penetrates the transparent plastic and hits the absorbing plastic. There, the energy of the radiation is converted into heat and the plastic melts. Being in intimate contact with the absorbing partner, thermal conduction causes the transparent plastic to also melt, and a bond is formed. When the plastics cool the weld is completely formed.

Benefits of Laser Welding

- Contactless energy input
- Minimum thermal and mechanical component stress
- Simple joint geometry
- Contamination-free
- Optically perfect weld seam
- High precision and strength

Laser Transmission Welding Illustration

1. Laser beam
2. Joining pressure
3. Transparent joining partner
4. Absorbing joining partner
5. Weld seam
6. Heat affected zone

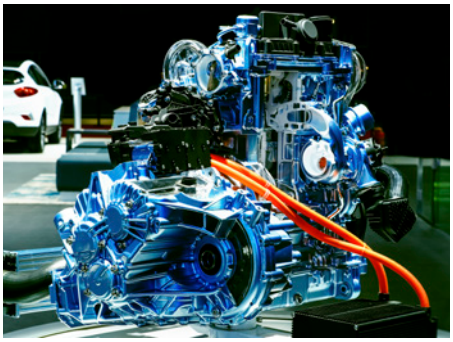


Comprehensive know-how in Laser Plastic Welding

As one of the pioneers in laser welding of plastics, Leister delivered and integrated the first turnkey system at the turn of the millennium. Since this time, Leister has delivered several hundred systems in use in various industries all over the world. Our goal is to develop specific solutions together with our customers. Our many years of expertise in development, application and sales enable us to provide individual and competent advice for specific applications in laser welding of plastics.

Versatile Use

Applications in laser welding of plastics are versatile and can be found in various industries. Whether small, narrow weld seams or large-area welds – weld seams produced with the laser are visually appealing and are often integrated into the design of a component. The process has become particularly established for components that required reproducible weld seam properties, such as a hermetic seal for fluidic components.

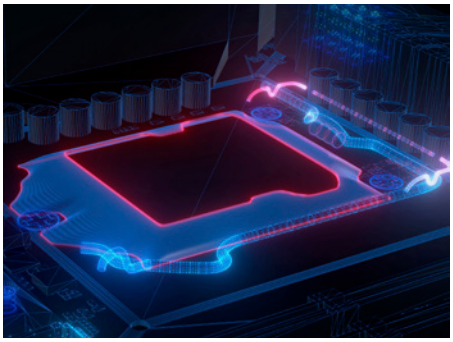


Mobility

Mobility is the headline of individual freedom of movement. Whether by automobile, plane, train or bicycle. Laser welding of plastics is used everywhere.

Medicine

Laser welding of plastics is the preferred method in medical technology for applications with high safety and hygiene requirements. This is because laser welding produces contamination-free and reliable joints.



Electronics

Many electronic components are protected from environmental influences by a plastic housing. Sealing with laser beams has established itself in various applications.

Company References

B BRAUN SHARING EXPERTISE

bürkert FLUID CONTROL SYSTEMS

Schneider

JOHNSON ELECTRIC

Continental

MAGNA

West

BOHUI

polycontact

testo

VOITH

MAHLE

FRESENIUS MEDICAL CARE

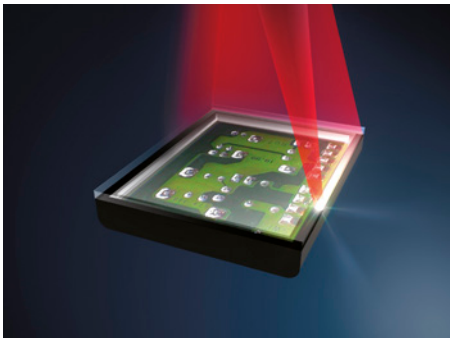
FILTERTEK An ITW Company

VOLKER

SF Spritzguss + Formenbau Bergmann

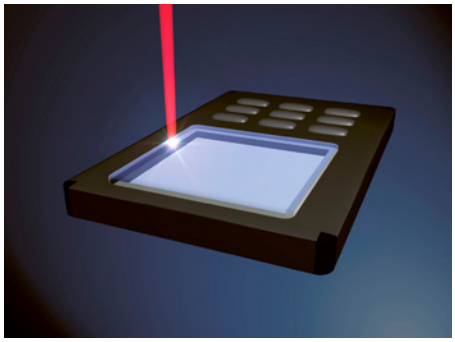
Laser Welding Process at a Glance

The variety of welding processes results in individual, material and application-specific solutions. Depending on the process, additional options for process and quality control are available.



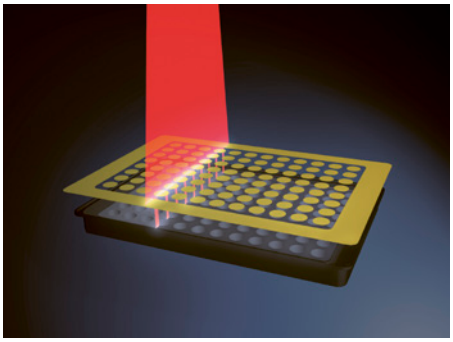
Quasi-simultaneous Welding

- Point-shaped laser beam
- Unlimited pattern flexibility
- Bridges gaps
- Suitable for mass production



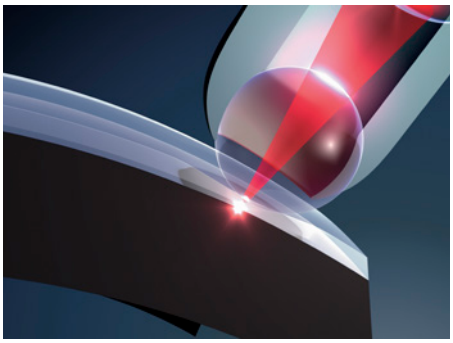
Contour Welding

- Point-shaped laser beam
- Adjustable weld seam width
- Any 2-D-contour
- Ideal for frequent component changes



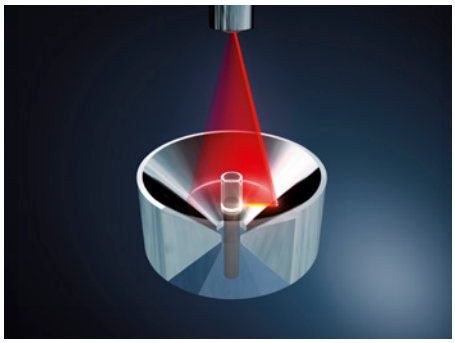
Mask Welding

- Line-shaped laser beam
- Any 2D weld seam geometry
- Fast and precise
- Suitable for micro and macro applications



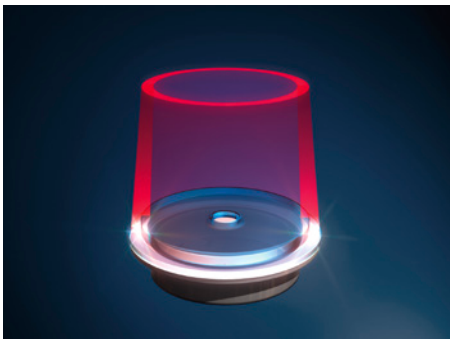
Globo Welding

- 3D welding possible
- Simplified clamping technology
- Sequential pressing
- Suitable for robots



Radial Welding

- No rotation
- Different diameters possible
- High throughput
- No clamping system required



Simultaneous Welding

- Short process time
- No relative movement
- Gap bridging possible
- Suitable for mass production

Together for an Individual Solution

Leister provides its customers with comprehensive and competent support in evaluating the optimum welding process for specific applications. Support and proposals for material selection, component design, and selection of the welding process are the first steps, which are confirmed by welding tests in one of our application centers. Only then is the implementation discussed. Of course, we also accompany our customers during installation and after delivery through one of our service centers.

From Evaluation to Support

Suitable Material

The right choice of material is crucial for the success of laser welding of plastics. In numerous tests with different materials, we have developed a welding matrix and published it on the Leister website: Weldable materials with laser.

Functional Design

The design of the welding zone is subject to general and process-related guidelines for laser welding of plastics. Depending on the application, these can be requested from Leister.

Welding Tests

Welding tests are essential in confirming the design of the welding process. Leister application centers are equipped with modern laser welding systems to evaluate and confirm the optimal process parameters.

Planning and Implementation

The implementation of the welding process in the production environment requires careful planning. That is why Leister project managers are involved right from the start to implement laser welding systems according to customer-specific needs and wishes.

System Choice

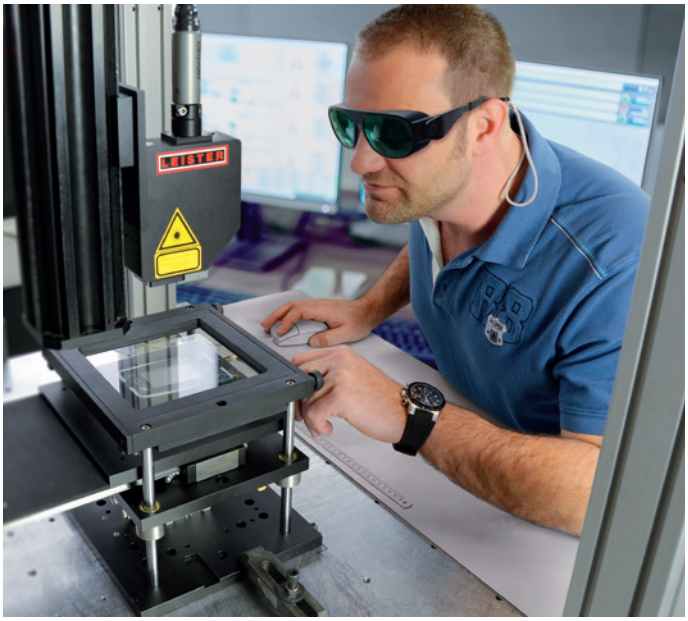
Leister offers turnkey systems as well as systems for integration into production lines. Turnkey systems always map the entire welding process, while integration systems are able to map the entire process but do not necessarily need to.

Installation and Training

Once the laser welding system is delivered, Leister specialists will support you on site for configuration, installation and application training. We offer different training courses depending on the system type.

Service

Regular maintenance and care of laser welding systems pay off. In addition to maintenance contracts tailored to the system, Leister offers telephone support, remote access options, spare parts and repairs.

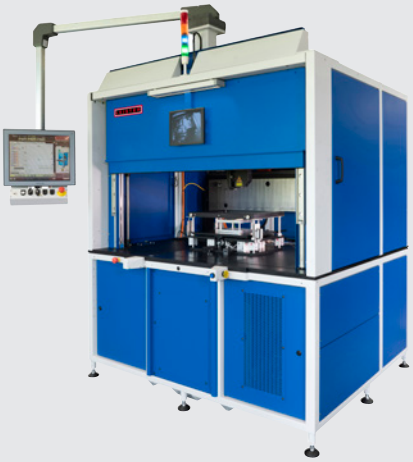


Standalone Systems

Leister's standalone systems handle the entire laser welding process. The motion, laser and clamping system can be accessed and individually saved via input masks in the Leister HMI. This means that different parts can be welded with one system.


LEISTER
NOVOLAS
laser welding

MAXI



MAXI is a modular, universally applicable laser welding system and specializes in large components. It can be equipped in many different ways as a manual workstation and can be adapted to customer-specific applications and processes.

+ Modular laser plastic welding unit
+ Optional robot integrated in control software
+ Online process control
+ Easy to integrate into existing processes
+ High throughput and profitability

Technical data

Wavelength	800–2000 nm	
Laser type	Diode laser; Fiber laser	
Laser power	40–600 W	
Coolant laser	Air; Deionized water	
Multilaser	Yes	
Welding range (X-direction)	1170 mm	46.06 in
Welding range (Y-direction)	750 mm	29.52 in
Number of linear axis	On request	
Rotary axis	Yes	
Robot	Yes	
Control interface	CAN; Customer specific; Digital/ Analog I/O; Ethercat; OPC UA; Profibus; Profinet	
Required air pressure	5.3 bar	76.87 psi
Phases	3x	
Voltage	360–440 V	
Frequency	50/60 Hz	
Power	6400 W	
Ambient temperature	10–35 °C	50.0–95.0 °F
Humidity	69 % at 35°C/95°F or 80 % at 32°C/89.6°F, non-condensing	
Length	1500.0 mm	59.05 in
Width	1760.0 mm	69.29 in
Height	2200.0 mm	86.61 in
Weight	1350.0 kg	2976.24 lb
Approvals	CE	
Laser class	Laser class 2M	
Noise emission level	< 70 dB(A)	

More information

NOVOLAS WS-AT

The NOVOLAS™ WS-AT is a modular, universally applicable laser welding system. It can be equipped in a variety of ways as a manual workstation and can be adapted to customer-specific applications and processes.

+ Modular laser welding device for plastics
+ User-friendly software
+ Online process monitoring
+ Easy to integrate into existing processes
+ Enhances profitability by increasing output

Technical data

Wavelength	800–2000 nm	
Laser type	Diode laser; Fiber laser	
Laser power	40–600 W	
Coolant laser	Air; Deionized water	
Multilaser	Yes	
Welding range (X-direction)	400 mm	15.74 in
Welding range (Y-direction)	300 mm	11.81 in
Number of linear axis	Max. 3	
Rotary axis	Yes	
Robot	No	
Control interface	CAN; Customer specific; Digital/ Analog I/O; Ethercat; OPC UA; Profibus; Profinet	
Required air pressure	5.3 bar	76.87 psi
Phases	1x	
Voltage	210–250 V	
Frequency	50/60 Hz	
Power	3600 W	
Ambient temperature	10–35 °C	50.0–95.0 °F
Humidity	69 % at 35°C/95°F or 80 % at 32°C/89.6°F, non-condensing	
Length	1230.0 mm	48.42 in
Width	1310.0 mm	51.57 in
Height	2260.0 mm	88.97 in
Weight	450.0 kg	992.08 lb
Approvals	CE	
Laser class	Laser class 2M	
Noise emission level	< 70 dB(A)	

More information

NOVOLAS WS-AT RTT

The laser welding system NOVOLAS™ WS AT RTT is equipped with a rotary indexing table (RTT). The RTT increases throughput and efficiency by allowing the operator to safely load and unload components while components inside the system are being welded.

+ Turnkey laser system for all laser welding concepts
+ Intuitive user interface
+ Several laser and optical system modules per system
+ Integrated online process control
+ Customizable

Technical data

Wavelength	800–2000 nm	
Laser type	Diode laser; Fiber laser	
Laser power	40–600 W	
Coolant laser	Air; Deionized water	
Multilaser	Yes	
Welding range (X-direction)	180 mm	7.08 in
Welding range (Y-direction)	200 mm	7.87 in
Number of linear axis	Max. 3	
Rotary axis	Yes	
Robot	No	
Control interface	CAN; Customer specific; Digital/ Analog I/O; Ethercat; OPC UA; Profibus; Profinet	
Required air pressure	5.3 bar	76.87 psi
Phases	1x	
Voltage	210–250 V	
Frequency	50/60 Hz	
Power	3600 W	
Ambient temperature	10–35 °C	50.0–95.0 °F
Humidity	69 % at 35°C/95°F or 80 % at 32°C/89.6°F, non-condensing	
Length	1380.0 mm	54.33 in
Width	1310.0 mm	51.57 in
Height	2260.0 mm	88.97 in
Weight	450.0 kg	992.08 lb
Approvals	CE	
Laser class	Laser class 2M	
Noise emission level	< 70 dB(A)	

More information

NOVOLAS TTS

The efficient, compact laser welding device NOVOLAS™ TTS contains all necessary components for laser welding of plastics. It's space-saving, easy to program via HMI software and a cost-effective system.

+ Compact and efficient table top laser welding device
+ Cost-effective, air-cooled diode laser
+ Multiple adjustable application modes
+ Can be operated via HMI software
+ Laser Safety Class 1

Technical data

Wavelength	800–1100 nm	
Laser type	Diode laser	
Laser power	40 W	
Coolant laser	Air	
Multilaser	No	
Welding range (X-direction)	100 mm	3.93 in
Welding range (Y-direction)	100 mm	3.93 in
Number of linear axis	2	
Rotary axis	No	
Robot	No	
Required air pressure	5.0 bar	72.52 psi
Phases	1x	
Voltage	100–250 V	
Frequency	50/60 Hz	
Power	600 W	
Ambient temperature	10–40 °C	50.0–104.0 °F
Humidity	80% rel.(5-31°C/41-87.8°F) linear decreasing to 50% rel.(31-40°C/87.8-104°F)	
Length	500.0 mm	19.68 in
Width	553.0 mm	21.77 in
Height	892.0 mm	35.11 in
Weight	70.0 kg	154.32 lb
Approvals	CE	
Laser class	Laser class 1	
Noise emission level	< 70 dB(A)	

More information

Integration Systems

Leister's integration systems are prepared for use in production lines or turnkey systems. Their modularity allows them to be integrated into a variety of production systems.

Inline Welder

The Inline Welder is a laser-safe integration system for production lines welding 2D contours using Scanner Optic. Modular, space-saving and with decentralized components. Ideal for rotary indexing tables/transfer lines.

+ Laser-safe integration system
+ Various lasers configurable
+ Space-optimized due to decentralized units
+ Mounting on rotary indexing table or conveyor belt
+ Modular laser unit

Technical data

Wavelength	975–1070 nm	
Laser type	Diode laser; Fiber laser	
Laser power	0–300 W	
Coolant laser	Air; Air (Leister)	
Multilaser	No	
Control interface	Digital/Analog I/O	
Required air pressure	8.0 bar	116.03 psi
Phases	1x	
Voltage	200–240 V	
Frequency	50/60 Hz	
Ambient temperature	10–35 °C	50.0–95.0 °F
Humidity	69 % at 35°C/95°F or 80 % at 32°C/89.6°F, non-condensing	
Length	720.0 mm	28.34 in
Width	805.0 mm	31.69 in
Height	1415.0 mm	55.7 in
Weight	290.0 kg	639.34 lb
Approvals	CE	
Laser class	Laser class 1	
Noise emission level	< 70 dB(A)	

More information

BASIC S

The BASIC S air-cooled laser system is designed for integration into production lines and manufacturing cells. With its modular design, the laser system can be configured for diverse industrial requirements.

+ Flexible, modular laser system for integration
+ Flexible and inexpensive; suited for a variety of applications
+ High throughput
+ Modular construction with diverse optional components

Technical data

Wavelength	960–1100 nm	
Laser type	Diode laser; Fiber laser	
Beam guidance	Fiber coupled	
Laser power	47–200 W	
Coolant laser	Air	
Multilaser	No	
User interface	Leister web HMI	
Control interface	Digital/Analog I/O; TCP/IP	
Phases	1x	
Frequency	50/60 Hz	
Voltage	100–250 V	
Power	1850 W	
Ambient temperature	15–35 °C	59.0–95.0 °F
Humidity	69 % at 35°C/95°F or 80 % at 32°C/89.6°F, non-condensing	
Length	489.0 mm	19.25 in
Width	483.0 mm	19.01 in
Height	322.0 mm	12.67 in
Weight	45.0 kg	99.2 lb
Laser class	Laser class 4	
Laser class Pilot laser	Laser class 2	
Noise emission level	< 70 dB(A)	

More information

BASIC M

The modular system BASIC M is a laser welding system for integration into industrial production plants. The basic configuration BASIC M includes the Main Unit, optics, and a laser.

+ Modular building block system
+ Variable integration depth
+ Configuration determines process responsibility
+ Several welding concepts possible
+ Easy to integrate into production lines

Technical data

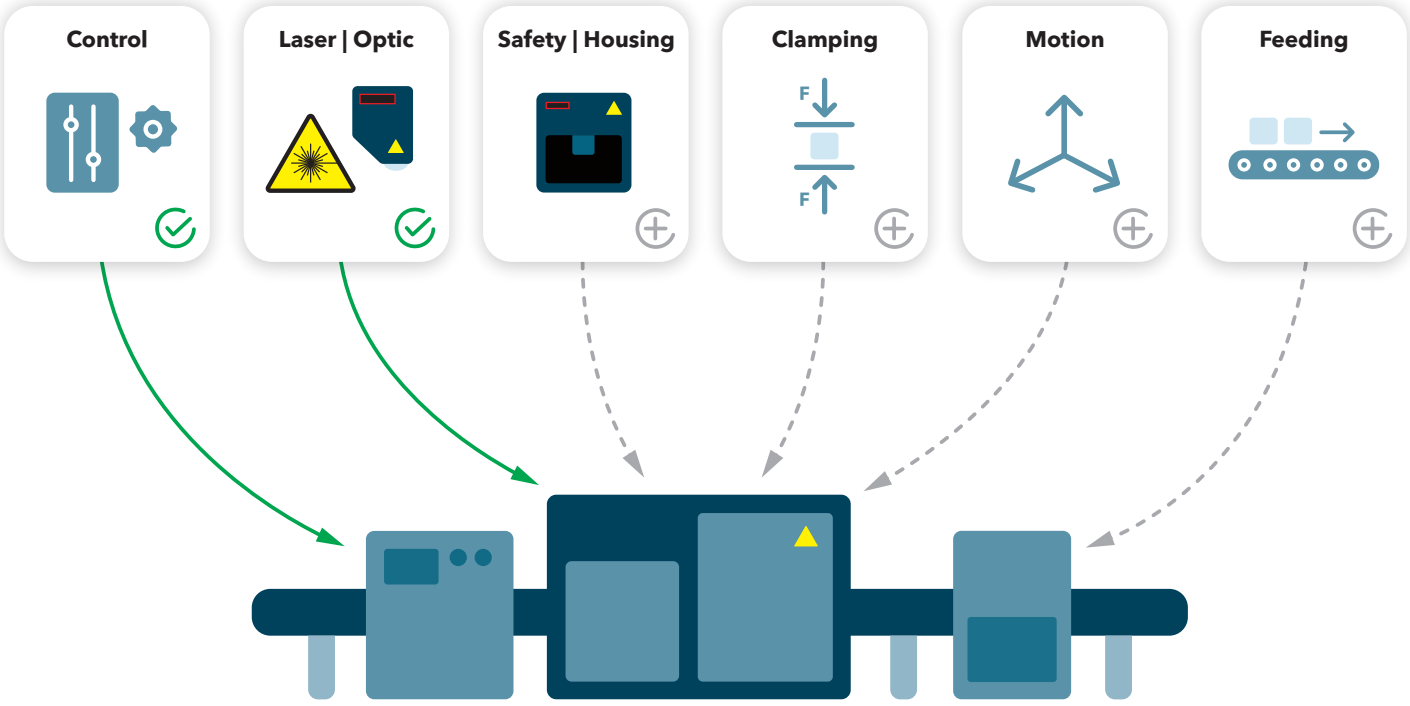
Wavelength	970–1100 nm	
Laser type	Diode laser; Fiber laser	
Beam guidance	Fiber coupled	
Laser power	47–300 W	
Coolant laser	Air; Air (Leister)	
Multilaser	Yes	
User interface	ML HMI	
Control interface	Digital/Analog I/O	
Ambient temperature	15–35 °C	59.0–95.0 °F
Humidity	69 % at 35°C/95°F or 80 % at 32°C/89.6°F, non-condensing	
Laser class	Laser class 4	
Laser class Pilot laser	Laser class 2M	
Noise emission level	< 70 dB(A)	

More information

BASIC M/L – the Modular System

Based on the BASIC M/L modular building block principle, Leister offers flexible solutions for laser plastic welding. Designed for integration in industrial production lines, the welding system is tailored precisely to customer requirements. Predefined standards ensure short delivery times.

Modular Integrational System for Laser Plastic Welding



High Quality Welding through Perfectly Matched Components

The BASIC M/L integration system from Leister comprises encapsulated functional units representing the core components of a laser welding system. The different units are used as building blocks for the system and can be combined in numerous ways according to specific requirements. The customer decides the depth of process at which Leister is to be integrated. At maximum integration depth, Leister supplies all components relevant to the welding process. The advantage here is that they are perfectly matched to the application. The ideal prerequisite for high-quality welding. If the entire process is mapped by Leister, Leister is the single point of contact, i.e. process-relevant disturbances can be handled more efficiently. A BASIC L system differs from the BASIC M in the additional integration of laser safety.

Easy Integration

The units are housed in 19-inch racks and perform core tasks in the welding process. The Main Unit controls the entire system and must be present in each case. Together with a Laser Unit and an optical system, they form the smallest BASIC M system, which can be expanded with additional units. The customer interface on the Main Unit ensures simple integration into the higher-level system. The supplied HMI software is individually configured for the welding process and also offers interfaces with higher-level control systems. A declaration of incorporation is issued for the individual units, which simplifies certification of the overall system by the customer.

Advantages of the Leister Building Block Principle

- Short lead times thanks to the standard components design
- Perfectly suited to customer-specific requirements
- High process responsibility from Leister with maximum depth of integration
- Various applications feasible thanks to different welding concepts
- Easily integrated into production lines
- Various interfaces for communication with the superordinate system
- Simple operation in a single HMI

Explanatory video BASIC M/L

Leister Optics

Leister offers various optical systems for different welding processes. The selection of the optimum optical system is largely determined by product requirements. The optics can be evaluated from the variety of optical systems in the application laboratory. At the same time, optional process control ensures the desired welding quality.

Process Optics

Leister optical systems have a modular design and are adapted to the welding processes. All optical systems use an optical unit that shapes the laser beam. Leister's standard shapes include spots, rings, lines and fields of various sizes.

The optical systems are divided into those with and without electronics. The advantages of optical systems with electronics lie in the monitoring and measuring functions, which contribute to quality evaluation and quality assurance. The advantage of optical systems without electronics lies in their compact, lightweight design.

Equipment Variants

The optical systems must be differentiated according to generation and monitoring functions. Depending on the beam shaping, not all variants are available.

Basic housing	Optical system	Fiber monitoring	Performance measurement	Pyrometer
	BT	no	no	no
	S	no	no	no
	AT	yes	yes	optional
	M	yes	yes	no
	L	yes	yes	yes

Process Monitoring

When it comes to process monitoring, a distinction can be made between safety features and options for monitoring welding quality:

- The fiber monitoring system checks the correct position of the laser fiber in the optical system to ensure that the laser beam only exits the aperture of the optical system in a controlled manner. If not assembled correctly, the laser cannot emit.
- Laser power measurement: In the beam path, a partial beam is decoupled and directed to a photodiode that measures the laser output. Simultaneous measurement and comparison of measured values in the optical system and at the laser, together with fiber monitoring, ensure that the condition of the fiber is monitored.
- The pyrometer is used for contact-free temperature measurement in the welding zone. The pyrometer signal can be used for either monitoring or control of the welding process.

Scanner Optic

The Scanner Optic is characterized by the integrated option of motion and is mainly used for quasi-simultaneous welding. Two movable mirrors guide a spot-shaped laser beam along a programmed contour. The size of the working field can be adjusted by different focusing lenses. The Scanner Optic can be installed in various Leister laser welding systems.

Spot Optic

The Spot Optic focuses the laser beam to a spot and is mostly used for contour welding. The focal lengths of the focusing lenses used determine the spot diameter, which in turn determines the width of the weld seam. The laser beam can therefore be adapted to the individual requirements of plastics welding by replacing optical components.

Radial Optic

With the Radial Optic, rotationless radial welding is possible without additional clamping technology. Radial welding is suitable for rotationally symmetrical parts that are difficult to rotate themselves. The laser radiation is deflected onto the circumference of the parts by a conical mirror. This allows components with a diameter of up to Ø 68 mm to be welded simultaneously. The advantages are short cycle times and high throughput.

DOE Optic

The laser beam can be individually shaped with the DOE Optic. Beam-shaping optics change the shape of a spot laser beam. These are also easily replaceable via the drawer system. Geometries for simultaneous welding can be generated as well as power density distributions that optimize the thermal impact on the plastic during contour welding. These optical systems are often used with fiber lasers to shape the radiation to the process.

LineBeam

The LineBeam is the ideal beam source for mask welding. It produces a line with nearly constant power density distribution, achieving a consistent welding pattern. The LineBeam is a compact system consisting of a diode laser and a directly coupled optical system. The optical components of the system can be configured for different line lengths.

Globo Optic

With the Globo Optic, welding in 2-D or 3-D is possible without complex clamping technology. The air-bearing glass sphere focuses the laser beam and serves as a mechanical pressure tool. As the ball rolls over the component, it presses permanently and locally on the joining plane. This means that the laser radiation only hits where contact pressure is present.

Roller Optic

The Roller Optic does not require any additional clamping technology. In the Roller Optic, a line-shaped laser beam is guided through a glass roller, which is both the clamping tool and the last optical element. The double-sided roller can produce weld seam widths of around 3.0–6.7 mm. The roller's self-aligning bearing compensates for minor uneven spots in the axial direction.

Rotation Optic

The Rotation Optic is used for the sequential welding of parts with rotational symmetry. It is operated solely with a fiber laser whose laser beam can be set to different spot diameters using an M-shape DOE. A synchronous electric motor with hollow shaft and incremental position measuring system is integrated into the optical system and moves an extension arm (rotor) around the part. At the end of the rotor, the laser beam is deflected towards the center using an adjustable mirror.

Special Optics

Customized Optics

If no optical system from the range of process optics fits the customer's requirements, Leister also offers the development of customized special optics.

2µm Optics

Many optically transparent plastics, which are highly transparent at a wavelength of 900–1100 nm, absorb a significantly larger proportion of the laser radiation at around 2000 nm. This means that also transparent plastics can be welded in this wavelength range. The optical elements of these optical systems must be matched to the new wavelength, however.

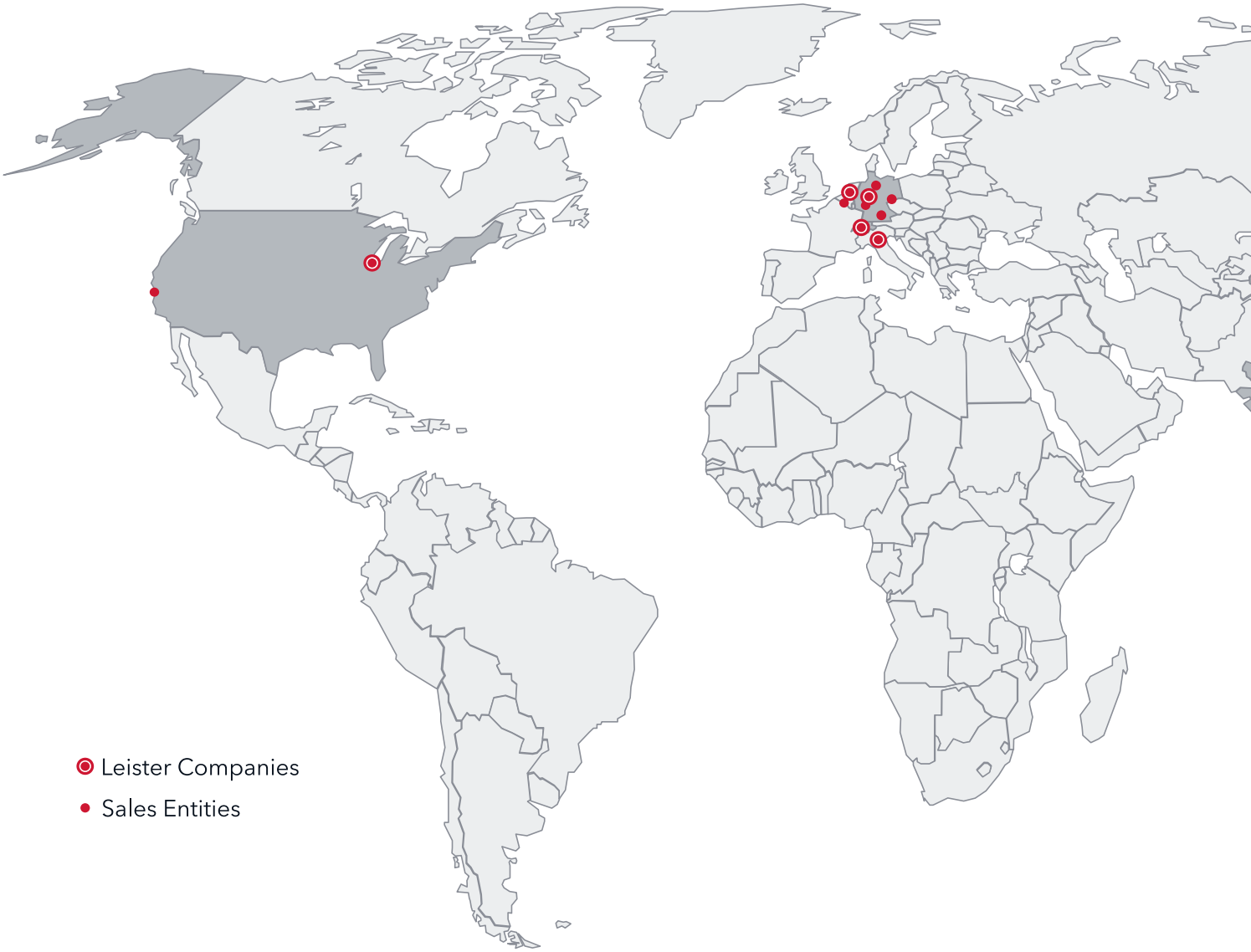
Laser Orbital Welder

The Leister Laser Orbital Welder is an innovative tool for radial welding of joints in pipe systems without having to rotate them. They are moveable and can therefore be used in any position.

Our Sales and Service Partners

Our sales and service partners regularly participate in training courses for applications, products and repairs. This way, we guarantee our customers competent service worldwide in accordance with our high standards.

Our national companies in Europe, Asia and the USA are equipped with modern application laboratories, guaranteeing global operational readiness within a short time.



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