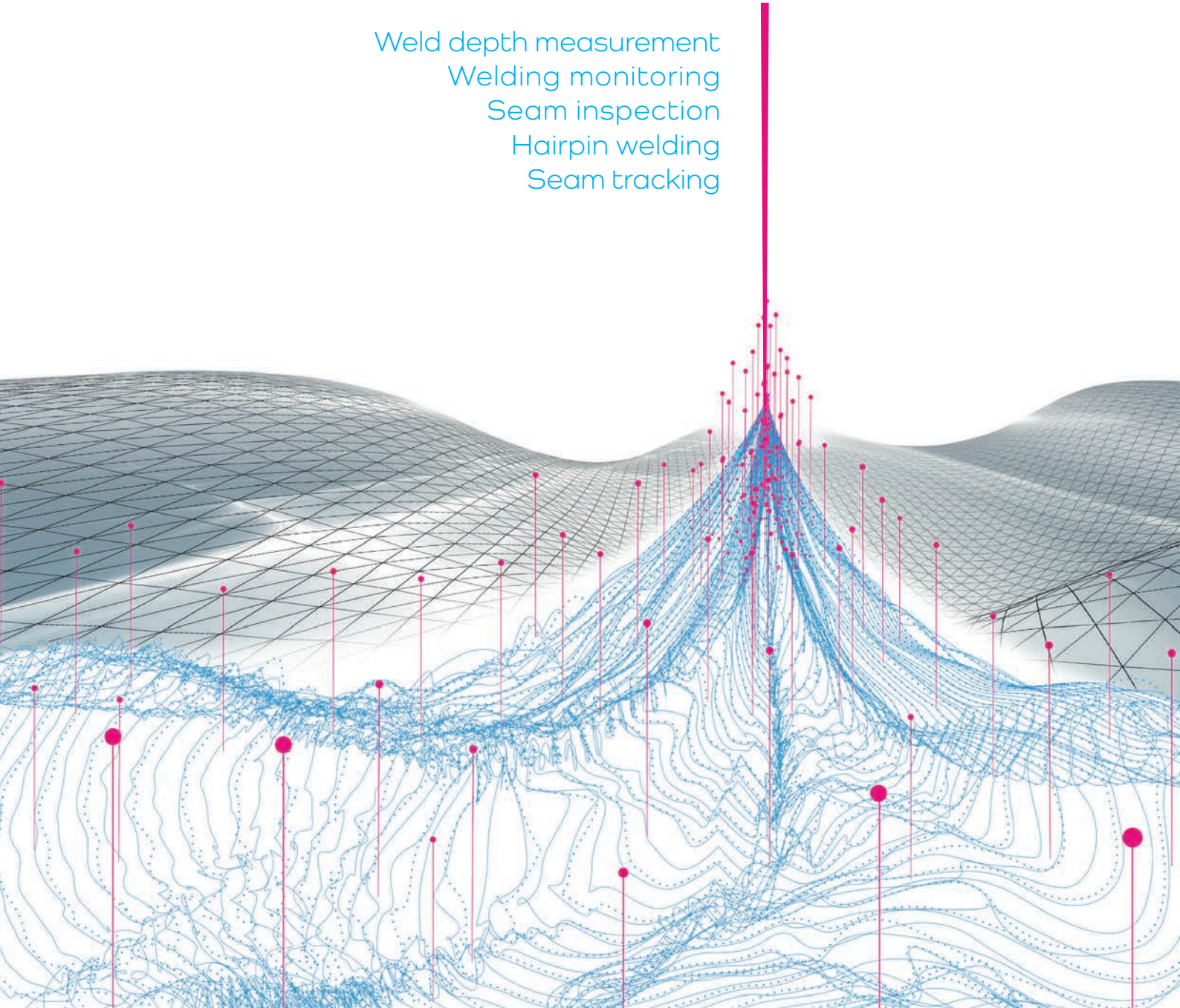


Sensor Technology

for optimizing industrial welding processes

Weld depth measurement
Welding monitoring
Seam inspection
Hairpin welding
Seam tracking



SENSOR SYSTEMS

Quality monitoring for your laser welding process

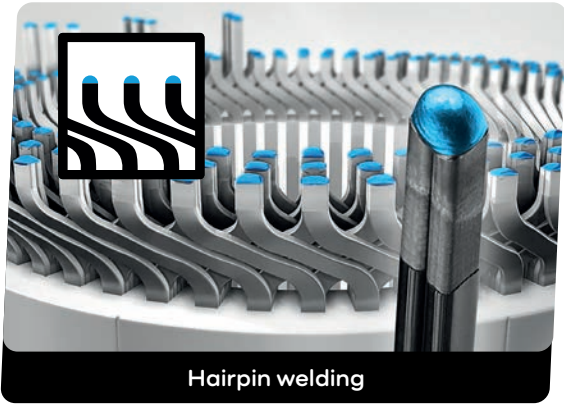
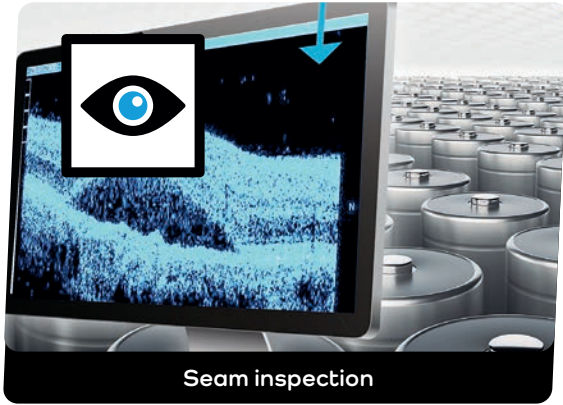
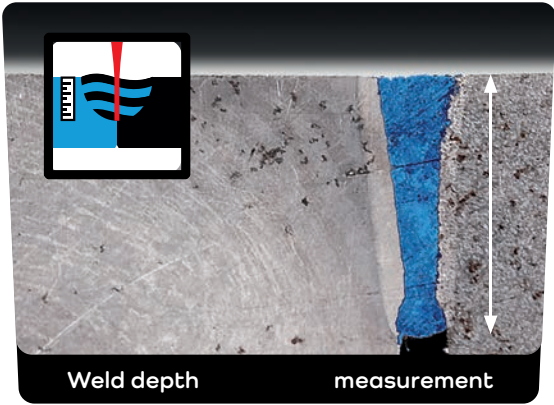
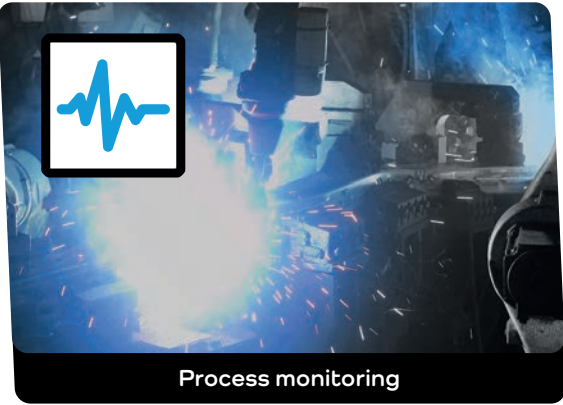
Industrial welding

Product solutions according to demand

See here a selection of different application options of **sensory systems** for industrial weld monitoring. Whether **seam finding**, **seam tracking** or **seam inspection**, **process monitoring**, measuring the **weld penetration depth** or **hairpin welding** - *Lessmüller Lasertechnik* offers you unique and differentiated solutions for the **quality assurance** of **your welding processes**.
The possibilities for integrating our products in the laser welding process are manifold. Whether before (**pre**), during (**in**), or immediately after (**post**) the welding process - depending on the requirements, there are completely different tasks and various uses of our technologies.
Our products are **compatible** and can be **integrated into existing production facilities**. Take advantage of our know-how to optimize your laser welding process. Ask us!



Sensory tasks for process optimization



Our product solutions



OCT 250



OCTSCAN 2.5



LSO incl. OCT 250



WELDCHECK 4.1



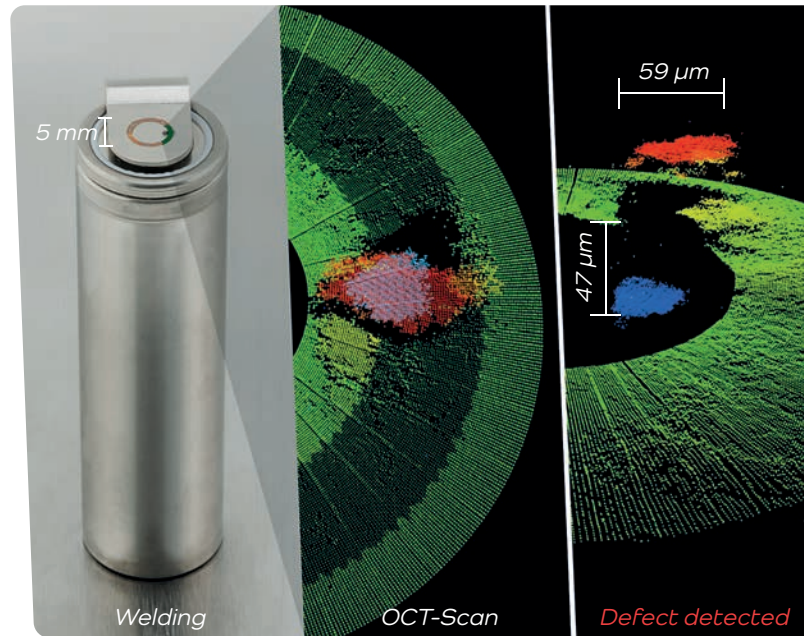
OCT 250

Optical Coherence Tomography

Seam tracking - Weld depth measurement Seam inspection - Hairpin welding

The **OCT system** from *Lessmüller Lasertechnik* offers completely new possibilities for the quality assurance of your welding process. Coaxially coupled into the laser beam of the process optics or as a standalone variant, the **OCT** performs a highly accurate **height profile measurement**.

This means that a single system can be used for precise **seam tracking** and **contour/surface inspection** of the finished seam without increasing cycle-time. There also is no other method to measure the **weld depth** during the process in a more economical way.



System Integration per ModSet

We make it fit for you

The **OCT systems**, as well as all other **sensor systems** from *Lessmüller Lasertechnik* are compatible with virtually all laser welding optics. Thanks to the modular adapter solution provided by our in-house **ModSets** the sensor technology can be individually connected to the customer's designated systems and integrated into the production process.

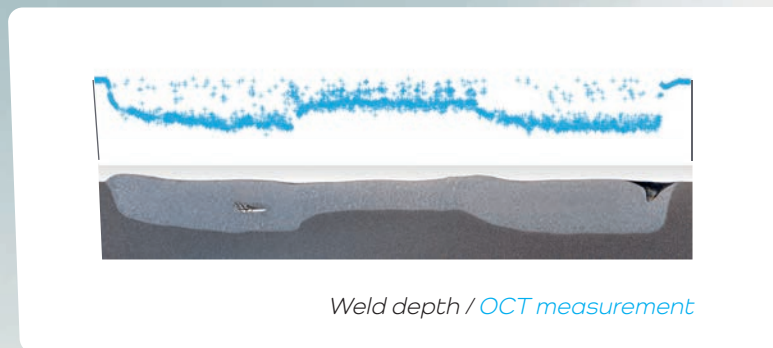
From the interfaces to the higher-level control system, we have standard variants and a great deal of experience for individual adaptation.



Example integration on FANUC optics LS3Di-A

Your advantages:

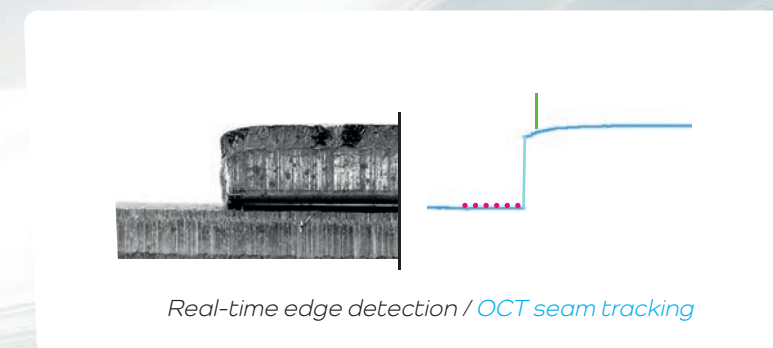
- + Precise edge and seam tracking in any direction and at any welding angle
- + Reliable, automatic detection of faults in the geometry of the welded seam
- + Weld depth measurement during the welding process
- + Field-proven algorithms for fault recognition and evaluation
- + Storing of all measurement and evaluation data for full traceability



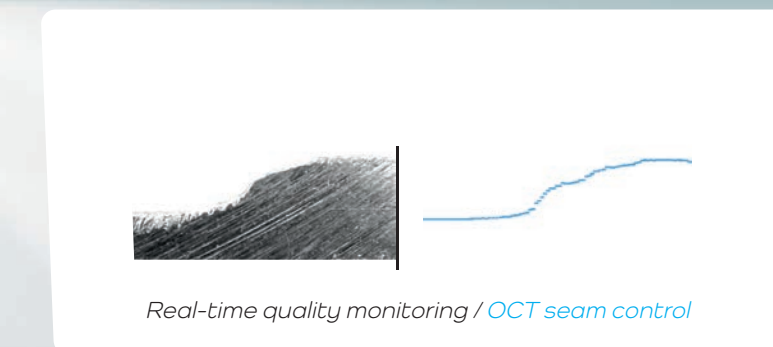
Weld depth / OCT measurement

Special features:

- + Proven integration into common laser welding optics and systems with fixed and scanner optics
- + Precise measurement, unaffected by surface conditions or optical disturbances
- + Individual configuration for your process
- + Dust-proof construction and robot compatible cables
- + Standard interface for common industrial fieldbuses
- + Automatic self-calibration



Real-time edge detection / OCT seam tracking

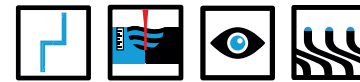


Real-time quality monitoring / OCT seam control



OCT 250 Scanner + OCT Sensor

OCTSCAN 2.5

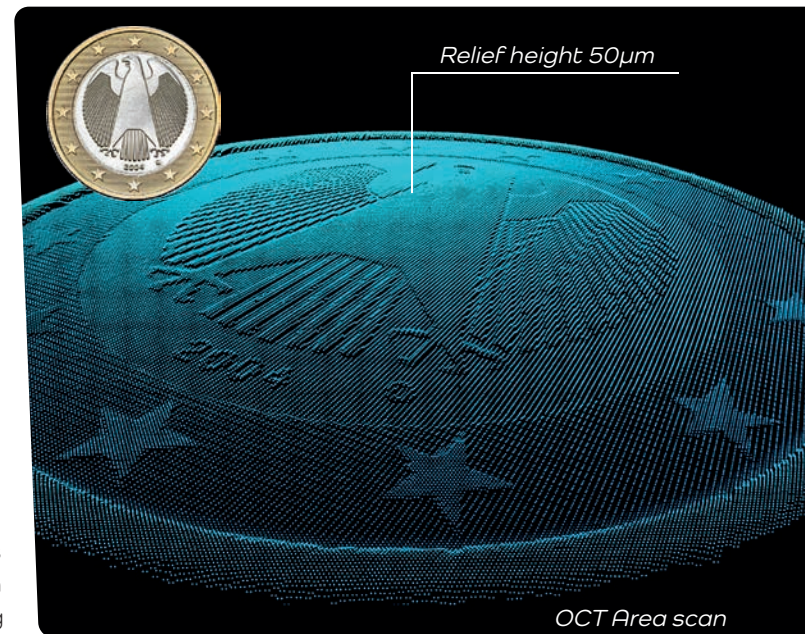


Scanner optics for laser welding

Seam tracking - Weld depth measurement
Seam inspection - Hairpin welding

OCTSCAN 2.5 from *Lessmüller Lasertechnik* is the perfect combination of process optics with **scanner** technology and **OCT** system. The system allows very **high welding speeds** during the remote welding of electrical and electronic components, such as battery cells and bus bars.

OCTSCAN 2.5 masters the high requirements for extremely fast and precise repositioning of the laser beam due to the seamless optical and electronic integration of optics and **OCT**. The additional possibilities of **weld depth measurement** and **topography inspection** make the **OCT** system the ideal tool for demanding applications.

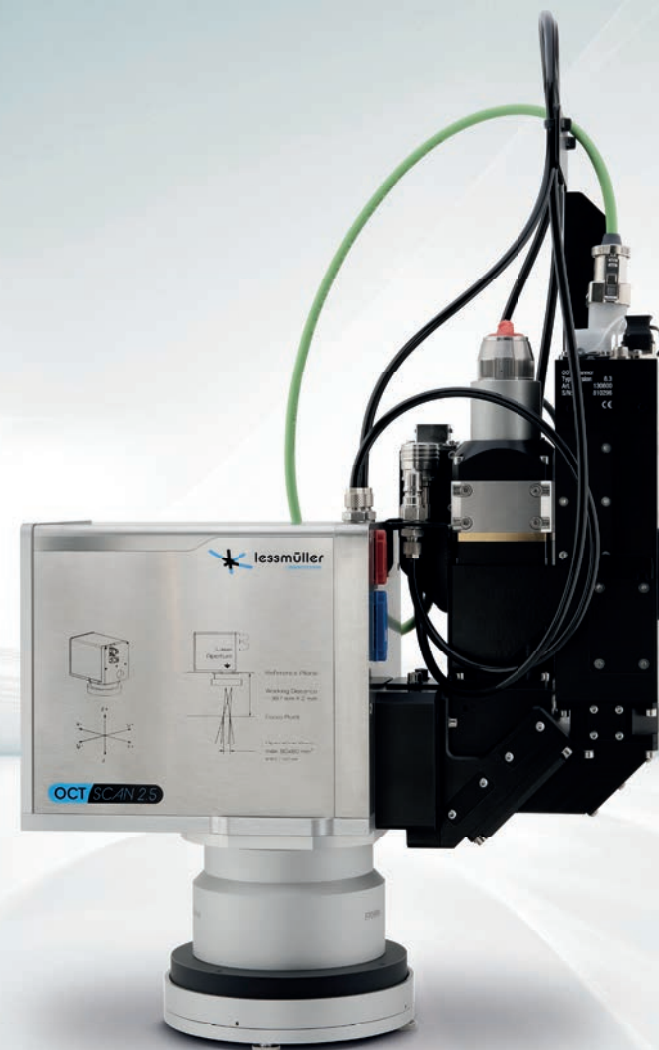


Your advantages:

- + Precise edge and seam tracking in any direction, and at any welding angle
- + Recognition of geometric features of the workpiece surface and exact positioning of the laser beam relative to the workpiece
- + Welding depth measurement during the welding process and seam control with only one sensor system
- + Full OCT performance in the pre-, in- and post-process also during oscillation welding (wobbling) and welding of tight radii at high speeds
- + Robust and proven detection and evaluation algorithms for a wide range of surface features and seam geometries

Special features:

- + Integrated autofocus of the process laser
- + Integrated and compact overall system consisting of process and measurement technology with common control electronics and program interface
- + Individual configuration of hardware and software to your process
- + Automatic self-calibration of OCT system and process system
- + Standard interface for common industrial fieldbuses



OCTScan 2.5

LSO incl. OCT 250

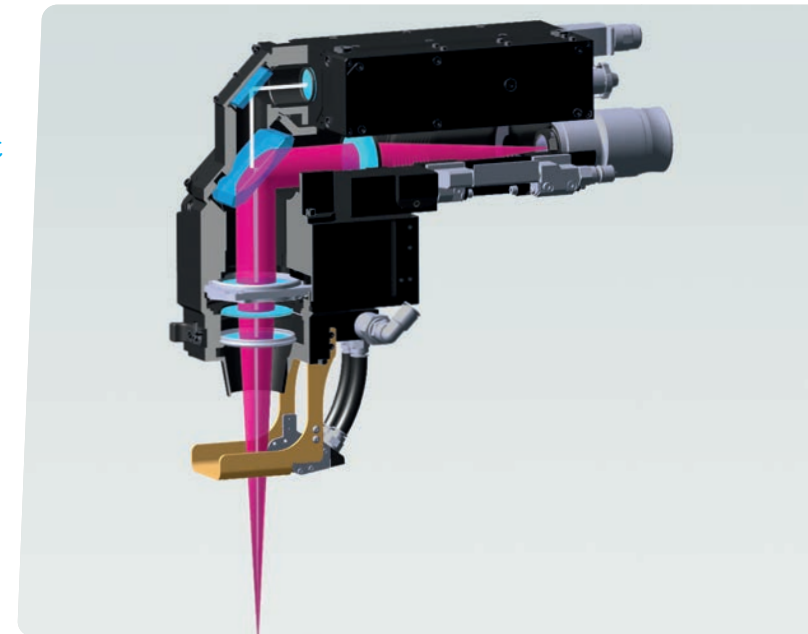


Lens Shifting Optics for laser welding

Seam tracking - Weld depth measurement
Seam inspection

The **LSO welding optics** from *Lessmüller Lasertechnik* closes the gap between fixed optics and remote optics with scanner technology.

LSO and **OCT system** form a compact unit that works perfectly together. With an expected deviation of max. 2.5 mm, the **LSO** with **integrated OCT system** enables a highly dynamic **correction** of the **welding position** and **focus position** during the welding process, thus ensuring an optimum welding result.

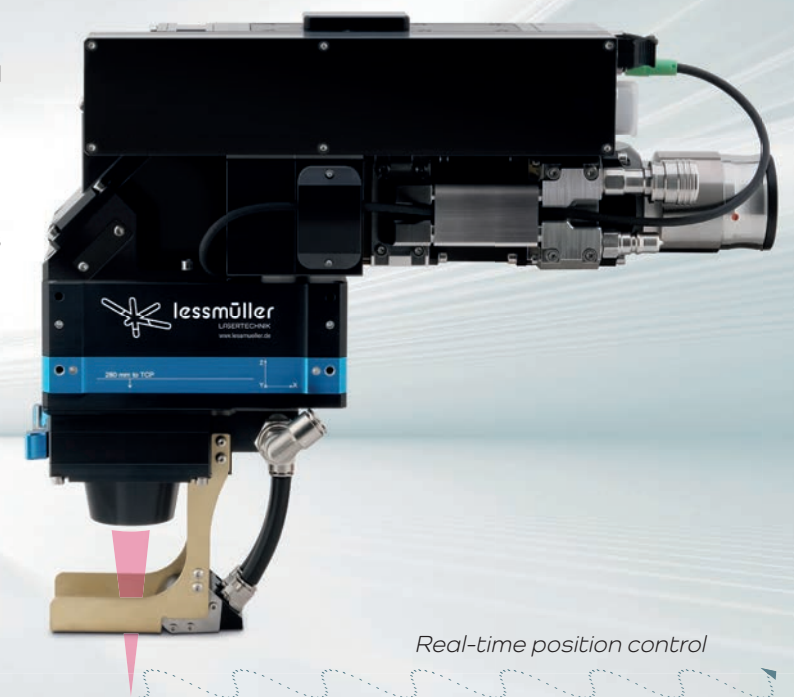
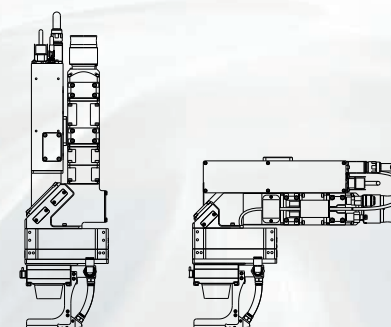


Your advantages:

- + Precise welding with solid-state lasers up to 6 kW
- + Fast and precise welding position control for various joint geometries
- + Fast and precise focus control
- + Weld depth measurement during the welding process
- + Reliable automatic detection of faults in the geometry of the welded seam

Special features:

- + Compact overall system consisting of process and measurement technology
- + Individual adaptation to your requirements
- + High configurability
- + Standard interface for common industrial fieldbuses
- + Storage of measurement and evaluation data for quality monitoring and traceability
- + Available with LLK-D and QBH-fiber coupling
- + Two designs for your machine planning:



Real-time position control
LSO (angled) + OCT Scanner

WELDCHECK 4.1



Process sensor for laser welding

Process monitoring - quality assurance

The **WELDCHECK** system analyses the light emitted by the welding process in real time and over a wide spectral range. **Deviations** in the weld are **detected** and reported **automatically**.

After 20 years on the international market, **WELDCHECK** from *Lessmüller Lasertechnik* enjoys unchanged popularity. In its latest version, **WELDCHECK 4.1** offers a slim design, excellent usability, and easy connections to industrial fieldbuses. Thanks to its compact design, **WELDCHECK** can be integrated in a space-saving and elegantly way inside the laser source or on all common processing optics.



Example integration to TruDisk (Trumpf)

Challenge our specialists!

Our welding laboratory for your test requirements

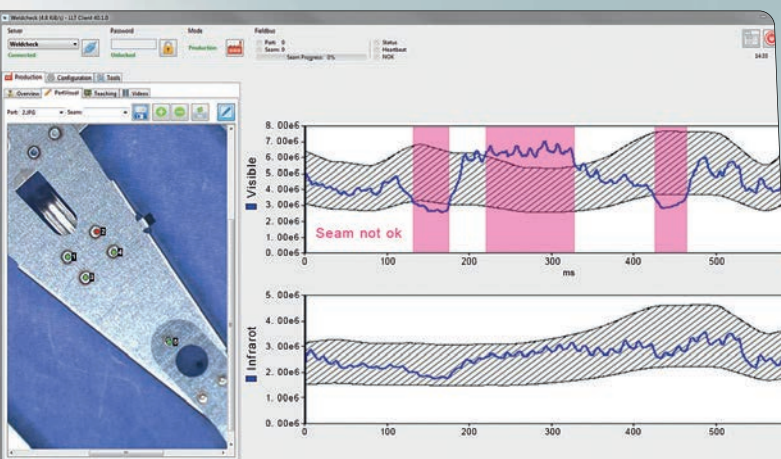
Do you have **special requirements** for the welding technology of your production? We have expanded: Our house offers you a welding laboratory with **three welding cells** in brand new premises on 2800 ft².

Take advantage of the possibilities to customize our **sensory systems** according to your requirements and tasks. Our trained specialists will help you find ways to significantly improve your laser welding processes in your production.

How can we support you? We will be happy to advise you. Simply call us without any obligation or send an e-mail to: info@lessmueller.de



Service in three welding labs



Your advantages:

- + Real time monitoring of your welding process
- + Immediate evaluation, and online failure detection
- + Wide spectral analysis range of 320 nm to 1650 nm
- + Simple mounting of sensor and evaluation unit
- + Excellent usability, easy configuration & reference teaching
- + Compact, robust, and cost-effective

Typical detectable faults:

- + Deviation of processing laser power
- + Contaminated optics and protection glasses
- + Shift of focus position
- + Out of range joint gap
- + Positioning errors
- + Changes in weld depth
- + Contaminated work piece surface
- + Seam breakthrough



WELDCHECK Sensor + Evaluation unit

System adjustments

Each process is unique

Whether a special edge geometry is detected or special features in the finished seam should have been searched for, every process is unique and requires individual **software algorithms**.

Therefore our programmers adapt the *Lessmüller* sensor technology to the **specific features** of **your process** to the system on site.

Our client software also provides you with a wide range of configurable standard functions, just as you need it.



Installation in clean room and commissioning on site

The installation of the **OCT** system on your processing optics is also part of our service. The system is installed and calibrated under clean room conditions. So you get your optics with an already fully functional **OCT**.

No matter whether **OCT**, **LSO** or **WELDCHECK** - every system from *Lessmüller Lasertechnik* is put into operation by our experienced service technicians on site. Here, the measurement parameters are finally adjusted and the interaction with your plant is optimized. Even after commissioning, we are **your contact** for optimizations and functional extensions of the sensor technology.



ABOUT US



Who we are

“We are your partner who solves your sensor tasks around welding together with you. From proven or innovative systems, from existing or new technologies, we jointly search for the suitable solution for your task. Fast, personal and targeted!”

Richard Steinbrecht | Managing Director



Job market & training

All those who want to take off professionally..

Whether it's **software**, **design**, **electronics** or **laser optics**, we are at the forefront of our field and are growing steadily. Since **trainees**, **interns** and **working students** are also part of our team, passing on knowledge on a daily basis is a matter of course for everyone. Because our hierarchy is flat and co-design is desired on all levels, there are also **good opportunities** for **promotion** for committed and highly skilled employees. Our corporate culture is exceptionally cooperative and our most valuable assets.

Interested? Would you like to be part of a great team? Then apply today!

Lessmüller Lasertechnik GmbH

For over 30 years

The technology company has been expanding in the heart of Munich **since 1990**.

We are the **market leader** of **sensory quality monitoring systems** in laser welding processes. Our 50-strong team of mainly engineers and technicians develops in the field of **automated process monitoring** in the different welding processes. Our customers include automotive manufacturers on all continents, their suppliers and Integrators of production lines.

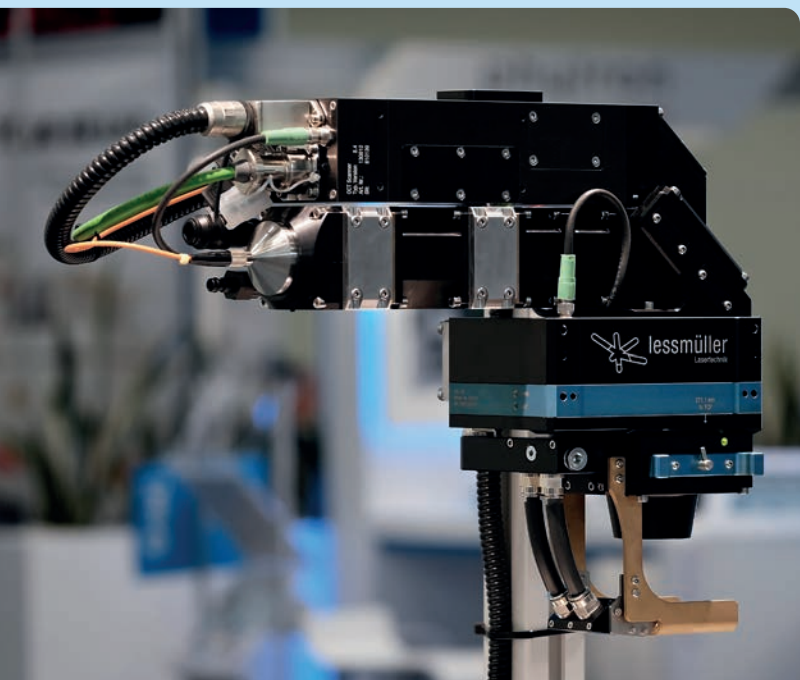
We are the right partner for all laser welding tasks including **car body construction**, the **powertrain** and for **e-mobility**.



Why I like working here

“I like the great vibe in the company, the family atmosphere and the high level of personal responsibility. Also, the home office option gives me flexibility for the family.”

Florian Günther | Sales



What distinguishes us

“Over 50% of our employees work in development at our company. Thanks to this high level of innovative strength, *Lessmüller Lasertechnik* will soon hold far over 30 patents and applications that drive our sensor technology and optimize our customers' welding processes.”

Dr. Christian Truckenbrodt | Managing Director



Made in Germany

“We are proud to research, develop and also produce here in the heart of Munich. We are at home here, but our customers come from all over the world.”

Eckhard Lessmüller | Managing Director & Founder

for a better weld

Germany

Japan

Korea

China

India

Italy

USA



The *Lessmüller Lasertechnik* team will be pleased to support you during the application testing as well as during and after on-site integration.



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You can find the contact details of our partners worldwide at www.lessmueller.de

- Data sheets for our products are available on request. -