

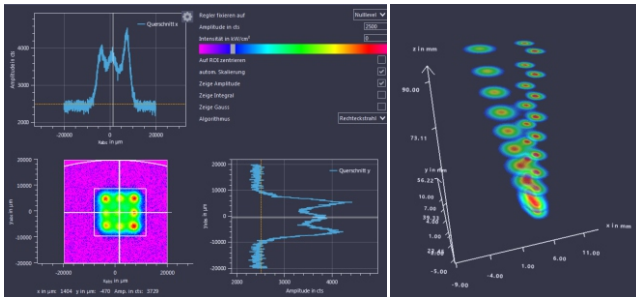
Multi-focal Optics by SILL



MultiSpot optics with 3 x 3 pattern

- Robust, but compact design.
- 3 x 3 pattern, with outer dimensions of 50x50x35 mm³.
- Easy to align.
- Cost optimized design.
- Low absorption coating for diode lasers: 900-1070 nm.

Multi-caustic measurement by PRIMES



Measurement software for multi caustics

- Simultaneous measurement and evaluation of up to 3 x 3 laser caustics.
- Huge measurement area of 40mm x 40mm.
- Separation and reconstruction of overlapping laser beams.
- Evaluation of rectangular shaped laser beams.
- Simultaneous power measurement and breakdown to the power of the individual beams.

Project Partners and Contact



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Associated Project Partners

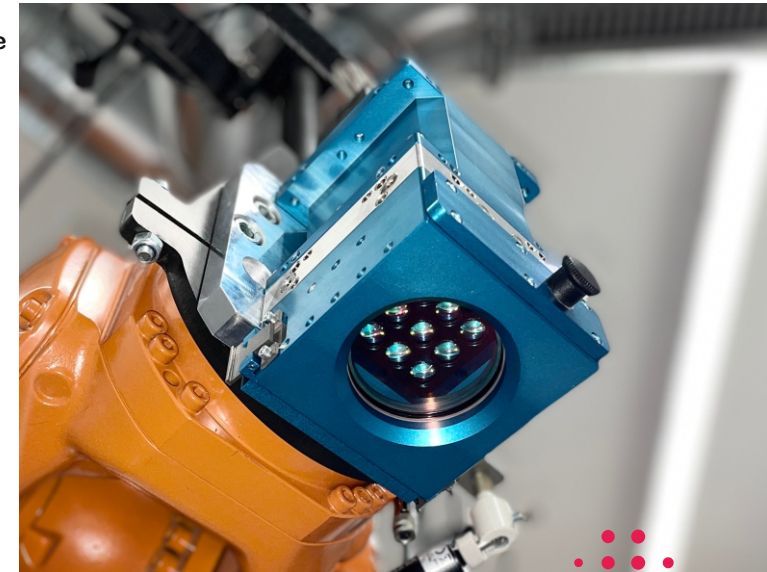


This project was funded by

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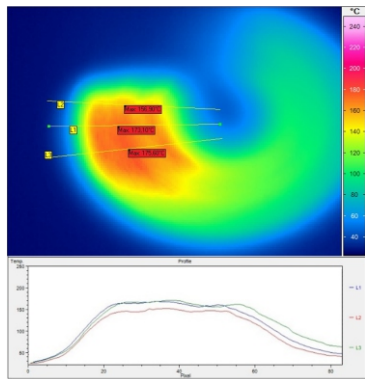
The project MULTISPOT was funded by the German Federal Ministry of Education and Research as part of KMU-innovativ



Laser welding with spatially and temporally variable intensity distribution using a multi-focal optics

The Project

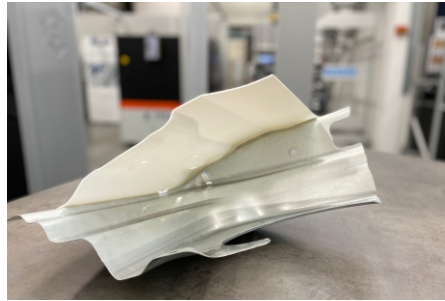
The aim of the MultiSpot project was to develop a welding head based on individual modularly controllable laser spots in order to be able to adapt the desired intensity distribution within a laser focus to meet the demands for a flexible weld seam geometry. For the first time, this welding head makes it possible to partially adapt the intensity distribution to both the weld seam geometry and the material properties.



Optimized temperature distribution during welding of small radii. Over the width of the weld seam an almost constant temperature can be achieved.

Temperature differences within the wide weld seams and when generating radii, which typically occur with conventional welding, are so reduced to a minimum. The basis for this is a diode laser system with laser diodes modules that can be addressed independently of one another, so that the output power of each diode laser module can be set individually. Using innovative beam shaping concepts, the radiation is formed in such a way that a desired temperature field is generated within the joining zone. For the evaluation of the intensity distribution a new beam diagnostic device was developed, allowing the measurement of multi caustics. This new welding technique based on the MultiSpot welding head was used to not only to join thermoplastic parts, but also it was demonstrated

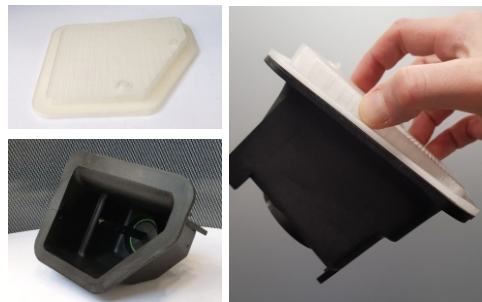
Application



Laser joined demonstrator made of metal and thermoplastic parts

- Laser transmission welding of different thermoplastics for example PP, PE, PA, PEI PPS, PEKK and ABS.
- Welding of short an endless glass fiber reinforced thermoplastics.
- Heat conduction welding of carbon fiber reinforced thermoplastics.
- Joining of metal- thermoplastic hybrid parts.

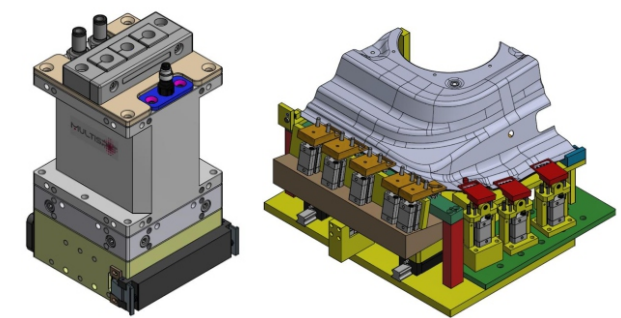
Process development by LZH



Laser welded servo oil container

- Development of intensity pattern for a homogeneous temperature over the width of the weld seam.
- Process monitoring by detection of the processing temperatures.
- Automated change of pattern during the welding process.
- Evaluation of the weld seam quality by cross sections and shear strength testing.

Welding Set-up by LMB



- Design of clamping devices for laser transmission welding and heat conduction welding.
- Design of the welding head applicable for robot applications.
- Layout of MultiSpot workstations as standalone systems.
- Planning of the integration of the MultiSpot equipment into production lines.

Diode laser system by neoLASE

- Compact rack unit with dimensions of 60x55x85 cm.
- Equipped with the neoCON software to control the individual intensity distributions.
- Automated calibration program for calibration of the laser intensity distribution.
- OPC-UA remote control interface.
- Maximum Power of 1kW / >100W per spot.
- Laser diodes by Coherent.

Surface of the neoCON software (left) and laser system (right)

