

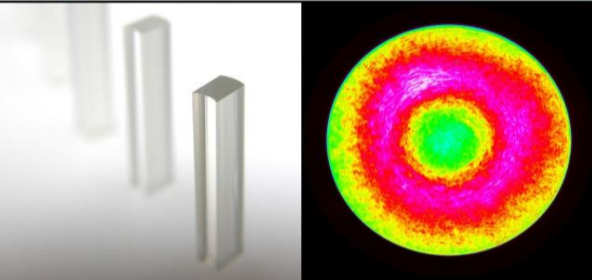


WP3 – HIGH SPEED SCANNING AND PRODUCT SPECIFIC BEAM SHAPING

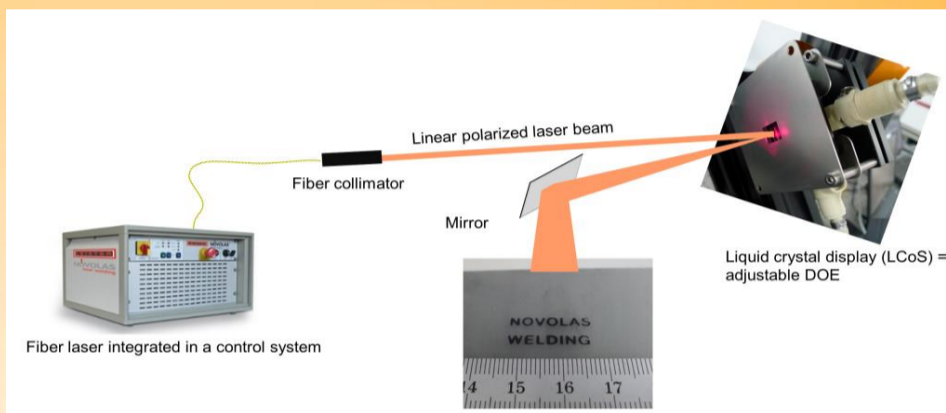


ABSTRACT

New and innovative beam deflection and beam shaping systems optimized for polymer laser welding have been developed. Scan heads equipped with fast and highly reflective mirrors extend the quasi-simultaneous welding process to wavelength ranges up to 2 μm . Refractive and diffractive optical systems shape laser beams to intensity profiles ergy input during welding and an increased weld seam



Fiber-coupled laser module with integrated bi-shaped lens generating an m-shaped intensity profile



LCoS setup for an easy and quick adjustment of any 2D laser contours

METHOD

2D and 3D scanning systems have been equipped with highly reflective silicon carbide mirrors for fast beam deflection. The 2D scanning system is completed with f-theta lenses whereas the 3D scanning system is extended with a beam expander on a precision optical rail.

Refractive optical designs with bi-shaped or aspherical lenses shape laser beams. Diffractive optical elements in combination with fiber lasers generate customer-sized spots with m-shaped intensity profiles or customer-specific laser pattern for contour, quasi-simultaneous or simultaneous polymer welding.

HIGHLIGHTS

- Fast 2D and 3D scan systems designed for wavelengths 1.5 - 2.0 μm
- Fiber-coupled laser modules featuring laser spots with M-shaped intensity profile for enhanced polymer laser welding (see figure left)
- Diffractive optical elements as exchangeable beam shaping tool generating customer-specific spot sizes and intensity profiles
- Mask welding with resolution up to 50 μm by highly collimated laser lines and automated alignment systems
- Cooper masks for high power and high resolution mask welding
- Easy and quick shaping of any 2D laser pattern by LCoS technique for simultaneous polymer welding (see figure right)

OUTLOOK

Methods and devices developed in WP3 are undergoing extensive welding tests in WP4 for further optimization and some of the WP3 achievements are pushed forward to an early market launch.

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