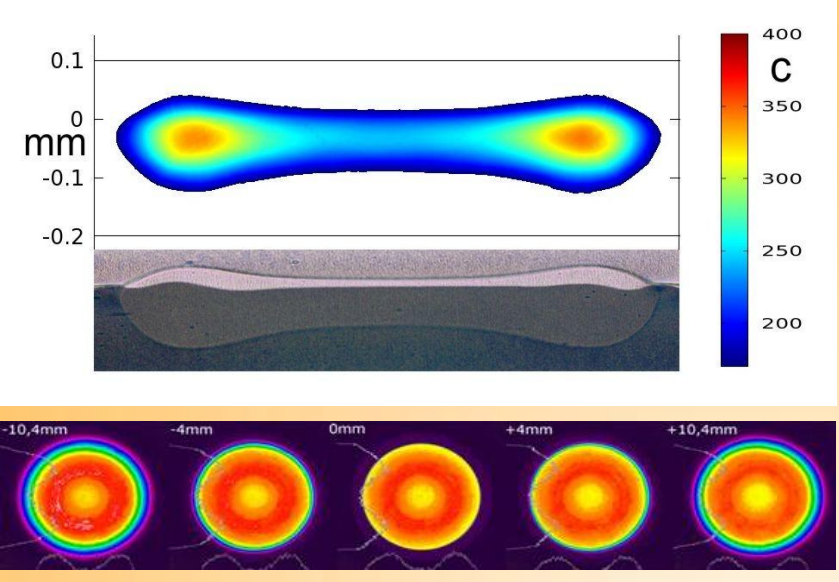
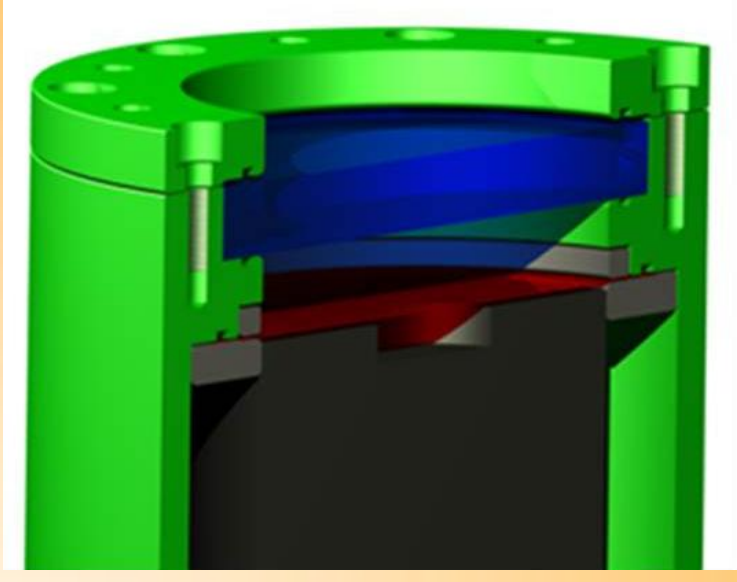
WP4 – FLEXIBLE, ROBUST AND FAST-ADAPTING LASER BEAM WELDING

ABSTRACT

PolyBright is intended to expand the limits of current polymer welding technology, especially by developing high brilliance laser sources with new wavelengths in the 1500-1900nm range. The project covers the whole process chain for laser based plastic part assembly and is structured in eight technical work packages (mainly: laser sources, material, welding method, applications, machines).



Top: Model and microtome cut of TWIST PP welding
Bottom: Caustic of LIMO's m-shape diode laser



Pressured clamping unit with elastic foil (red)

METHOD

Within 9 tasks, WP4 is aimed to investigate every laser polymer welding means with special respect to using high-brilliance lasers, new wavelengths, no IR absorbers:

- TWIST laser welding, modelling + experimental
- Quasi-simultaneous (QSLW) and remote welding
- Simultaneous Mask welding
- New welding joint configurations
- Welding using diffractive optical elements (DOE)

HIGHLIGHTS

- Theoretical model is in good accordance with TWIST welding
- TWIST welding is improved applying an ellipse TWIST contour
- Intelligent Power Control (IPC) software improves QSLW in corners
- Polymer scatterings smears DOE-shaped intensity distributions
- Dynamic mask welding using LCoS element has high flexibility

OUTLOOK

- TWIST scanner software needs "ellipse" options (variable orientation, v = const)
- Two photon absorption doesn't reveal polymer melt

CONTACT

alexander.olowinsky@ilt.fraunhofer.de