Automated Precision Assembly for Complex Optical Systems

Results in Brief

Automated assembly of complex optical systems

An EU-funded consortium achieved significant progress towards a more standardised automated assembly of laser and optical systems.

With EU funding of the project APACOS (Automated precision assembly for complex optical systems), project partners developed holistic solutions for the automated assembly of laser systems in applications such as production equipment, product design and process design. The results include new laser sources and optical designs tailored for automated assembly, and industrial micro-assembly systems for efficient manual, semi- or fully automated assembly.

The core components of the assembly solutions were ultra-precise micromanipulator technology, precise dosing systems for adhesives, and camera technology for locating and identifying parts and reference marks.
A micro-assembly cell (MicRohCell) was mechanically enhanced by an ultra-precise micromanipulator, a jet-dispensing unit and an actuated target camera for providing a fully automated industrial assembly process. A detailed laser safety concept was also developed. The enhanced machine successfully fulfilled the requirements set by the laser manufacturers in the project.

The Tampere University of Technology (TUT) in Finland provided Modulight, a laser manufacturer from Finland, new laser sources for edge-emitting semiconductor lasers with increased output power. The Fraunhofer Institute in Germany delivered an optical design for a novel multi-single module emitting at red, with promising results regarding coupling efficiency. TUT also developed new laser chips with improved efficiency to be used in vertical-external-cavity surface-emitting lasers.

Altechna aims to develop a high-power yellow laser based on optically pumped laser technology with perspectives in the markets of health care and aesthetics. Modulight targets a single-emitter-based product platform for green and yellow lasers used for projection and display applications as well as in the medical field.

Products from SmarAct, a Germany-based provider of precision technology, can be integrated into highly demanding production solutions. With the MicRohCell assembly platform, Rohwedder Micro Assembly, a Germany-based company, aims to develop micro-optical systems for diode lasers.

Keywords
Automated assembly, optical systems, laser, micro-assembly, micromanipulator

Project Information

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