

PRESS RELEASE

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AI for Photonics at the Laser World of Photonics 2025

In its special show "Photonics meets Robotics: AI Success Stories" Laser World of Photonics 2025 will be focusing on the future field of cyberphotonics, and the Fraunhofer Institute for Laser Technology ILT in Aachen is playing a key role in this. Researchers from the institute will give presentations on specific applications and exhibit research results to show how AI and other digital methods are already increasing quality and efficiency in photonics, robotics and laser-based, highly automated manufacturing processes. The special show in Hall A3.433 builds a bridge between LASER and the parallel automatica.

Artificial intelligence (AI) is changing the photonics industry. Already omnipresent at Fraunhofer ILT, it is being used by the Aachen-based research institute to shorten the time-to-market of its innovations. With experimental measuring points, they use AI to identify which process parameters are relevant and which experiments they need to carry out next. "This strategic use of AI reduces the number of measurements and experiments required to determine optimal process parameters, both of which significantly reduce the time and costs involved," explains Prof. Carlo Holly, head of the Data Science and Measurement Technology Department at Fraunhofer ILT and the Chair of Technology of Optical Systems TOS at RWTH Aachen University.

With AI to autonomous, self-learning production

The potential of AI in research and development is far from exhausted. If photonic sensor technology provides detailed insights into processes and measured variables and AI-based algorithms enable analysis and prediction in real time, then process sequences can be determined more and more precisely and parameters can be optimized during the ongoing process. "Monitoring and controlling laser processes is just the beginning. We are now on the way to making self-learning photonic production possible and will be closing control loops with AI support in the future," says Holly.

Fraunhofer ILT is already using self-learning systems to optimize additive processes such as the LMD and ELHA laser deposition processes or laser powder bed fusion (LPBF). The institute is also using AI to significantly improve quality, efficiency and process reliability in laser material processing. These innovations range from welding, cutting and polishing to structuring; they are used in laser surgery processes, material analysis and water treatment, for the sorting of valuable metal alloys in recycling, as well as for high-throughput sorting of living cells.

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Pioneering AI applications at the Laser World of Photonics 2025

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From June 24 to 27, 2025, Laser World of Photonics will dedicate a special show to the future field of cyberphotonics: "Photonics meets Robotics: AI Success Stories," in Hall A3.433. Together with Fraunhofer IPA and other partners from industry and science, Fraunhofer ILT will present the know-how it has acquired in AI applications. This will take the form of 15 moderated presentations, on the one hand, and pioneering exhibits, on the other. These include a moving AI-optimized repair robot that repairs damaged and worn areas using the LMD process. This originated out of a cooperation project with Picum MT from Hanover. Fraunhofer ILT will also be showcasing solutions for automated, AI-supported engineering and AI-supported process chains for damage analysis and LMD repair of wear parts subject to high loads. The institute will also be presenting a smart articulated-arm welding robot with four industrial partners (Carl Cloos Schweisstechnik, Scansonic MI, oculavis and 4D Photonics). This robot makes AI-supported laser welding processes possible, which can be viewed remotely with VR glasses. This approach is particularly valuable when there is a shortage of skilled workers on location, since specialized experts can provide remote support when welding issues arise.

"We cordially invite interested parties to be inspired by our presentations and exhibits and to talk to our experts," says Holly. In recent years, Fraunhofer ILT has built up tried-and-tested expertise in the development and application of AI for photonic processes. "We are happy to pass this on to interested companies as part of innovation projects," he explains.



Image 1:
The panel "Photonics Meets Robotics: AI Success Stories" in Hall A3.433 promises inspiring insights: modern AI methods combine photonics and automation.
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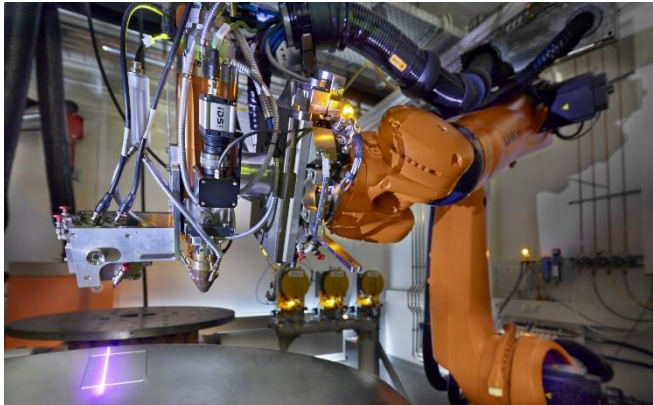


Image 2:
The Fraunhofer ILT will be presenting a robot for the mobile repair of damaged and worn areas using the laser metal deposition (LMD) process.
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