

## **Workshop “Shaping, Analyzing and Monitoring the Laser Beam in Material Processing Applications” at LPW 2019**

### **Topics descriptions & speakers biographies**

#### **Optical Coherence Tomography (OCT) - A Milestone for Laser Welding Applications, Alexander Denkl, Head of Application Engineering, Lessmueller Lasertechnik**

Topic description. Due to its contactless 3D topography measurement capabilities, OCT enables omnidirectional seam tracking, penetration depth measurement and online post-process seam monitoring. Its easy adaptability to almost all types of welding optics, be that fixed or more complicated scanner optics, without additional interfering contour in the processing area, makes this measurement approach an ideal solution for monitoring laser welding processes.



Biography. Alexander Denkl (Electrical Engineer, M.Sc.) is Head of Application Engineering at Lessmüller Lasertechnik GmbH. He joined the company in 2012 and helped developing most of the devices in the actual product line-up. During and after his graduation he gained a strong background in controlling and monitoring of laser welding processes especially using optical coherence tomography for welding depth measurements.

#### **Beam Shaping for Industrial Laser Processing, Dr. Malte Kumkar, Laser Application Center, TRUMPF Lasertechnik**

Topic description. New and improved materials processing is enabled by beam shaping. This will be exemplified for applications addressed by multimode and fundamental mode lasers in continuous, short and ultrashort pulsed operation. The potential of 3D-beam shaping for processing by nonlinearly induced absorption inside the volume of transparent materials will be demonstrated together with the benefit of wave optical simulation combined with in situ diagnostics for process development.



Biography. After graduating in physics from the University of Hannover, Dr. Kumkar received his doctorate from the Technical University Berlin in 1994. Dr. Kumkar developed laser engraving systems at the Swiss company MDC Max Daetwyler AG, followed by positions in laser development at HAAS-Laser GmbH and as Managing Director, fiber laser modules, at JTOE GmbH&Co. Since 2011, Dr. Kumkar has been responsible for laser application development at TRUMPF Laser- und Systemtechnik GmbH.

**Archetype Solution for Laser-based Battery Assembly with Pouch Architecture for Low Volumes Production Rate, Maurizio Gattiglio, Chairman & CEO, Convergent Photonics, Giovanni Di Stefano, Head of Materials and Process Technologies, Comau**

Topic description. This presentation shows the use of a jointly developed hybrid laser source (direct diode and fiber laser) for multi-purpose laser welding and brazing applications. Additional information will be given about the validation process, the process parameters definition and the equipment used in production, including real-time quality inspection based on artificial neural networks.



Biography. Maurizio Gattiglio is Chairman of Convergent Photonics LLC, MA USA and Board Director of EPIC European Photonics Industry Consortium. He has worked within the Prima Group since 1986 where he has occupied a number of different positions. He holds several patents of invention in the area of coordinate measuring machines and high power laser technology. Maurizio Gattiglio obtained a degree in mechanical engineering in 1984 from the Polytechnic University of Turin.



Biography. Giovanni Di Stefano is Head of Materials and Process Technologies, BU Automation Systems, Comau. He graduated in Electronics Engineering in “Roma Tre” University in 2011, followed by a Master degree in Industrial Automation at the Polytechnic University of Turin. Since joining Comau in 2012, Giovanni Di Stefano held several positions and is now responsible for an international team dedicated to innovative industrial automation.

**Water-cooled Reflective DOEs for High Power Lasers , Dr. Shogo Yagi, Senior Expert Engineer, NTT Advanced Technology**

Topic description. Reflective DOEs (diffractive optical elements) are introduced, realized on several kinds of heat conductive thin substrates, whose backside can be water-cooled to withstand high power laser exposure. This technology allows flexible design of DOEs according to requirements such as generating desired intensity profiles, prolonging focal depth and allowing large  $M^2$  of incident light quality. Using technologies like multi-level etching, these DOEs are fabricated in nanotechnology.



Biography. Shogo Yagi is a Senior Expert Engineer in NTT Advanced Technology Corporation (NTT-AT), Japan. He has majored in Physics at Tohoku University, then studied optical memories, holography, and KTN optical devices in NTT laboratories before moving to NTT-AT. He is now developing products related to KTN devices and DOEs.

### **Online Laser Beam Monitoring for High Power Lasers, Oren Aharon, CTO, Duma Optronics**

Topic description. Novel beam analyzer measures critical parameters such as beam size, accurate beam position and power – right on the work-piece environment, as a part of the process, allowing online correction of laser beam for best performance. Its compact size allows it to be built-in into every laser machine or robotic arm. This product line offers not only profile measurement but also power level measurement and accurate position in respect to predefined mechanical axis, as well as  $M^2$  measurements.



Biography. Oren Aharon (CTO & Founder, Duma Optronics) is a passionate laser technologist, especially for high-power lasers and medical devices innovations. Having a strong background in optical alignment, beam profiling, lasers and electronic autocollimators, he developed a full line of instruments for these applications. He founded Duma Optronics to serve the optronics industry. Oren Aharon holds dozens of patents in the electro-optical field.

### **Fast LAM Process Control System Measuring and Maintaining Melt Pool Geometry, Rodrigo Linares Herrero, Business Development Manager, NIT New Infrared Technologies**

Topic description. With CLAMIR, a closed-loop laser power control system for cladding and laser metal deposition processes (Laser Additive Manufacturing, LAM), the melt pool geometry is measured and maintained using a 1,000 image per second in-line infrared camera. Attached to an optical port of the laser head, the system enables on-axis process observation and closed-loop control of the laser power unit at high speed – fully integrable into Industry 4.0 applications.



Biography. Rodrigo Linares (Telecommunications Engineer, M.Sc., MBA) has been Business Development Manager at New Infrared Technologies since 2009. He has a strong technical background in infrared sensing from his former position as consultant at the Thermal Imaging Laboratory (Spanish Navy R+D Center) where he implemented the measurement procedures for the performance characterization of thermal / IR systems. Rodrigo Linares is author and co-author of multiple papers.