

Validation of the EHLA3D process on a 5-axis CNC system

Extreme high-speed laser material deposition (EHLA) is a special variant of laser material deposition that reaches a process speed of up to 200 m/min and can process difficult-to-weld metals. Numerous different systems have become established on the market for coating rollers or other rotationally symmetrical components; in these, the required high feed rates are generated by rotation of the part. Highly dynamic handling systems are needed to utilize the unique features and advantages of the process in three dimensions, for example, for free-form coating or near-net-shape additive manufacturing (EHLA3D). Together with Fraunhofer ILT, the company ponticon GmbH successfully developed a tripod system, which was launched on the market a few years ago, a system that works with stationary processing optics and a moving processing table.

Industry cooperation with Makino Asia

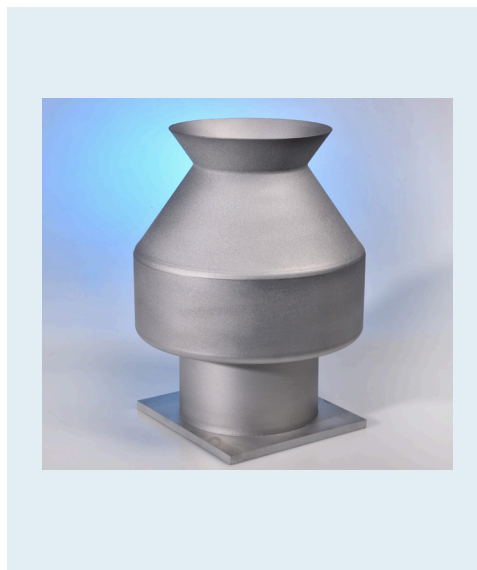
In collaboration with the company Makino Asia Pte Ltd, Fraunhofer ILT has investigated and validated another system concept for the EHLA3D process with a movable processing optics. To this end, Makino Asia modified a CNC system and Fraunhofer ILT qualified the EHLA3D processes for the

materials IN718 and M2. In addition, they systematically investigated how the highly dynamic tool movements influenced the powder gas jet.

Modified 5-axis CNC system for the EHLA3D process

The high-speed camera recordings verify that the dynamic path movements do not measurably influence the powder gas jet at feed rates of up to 30 m/min. Furthermore, the partners could successfully demonstrate that the components and system technology used, such as processing optics or fiber optic cables, reached consistently high quality and precision as the CNC machine was operated under highly dynamic conditions over several years. The concept of a modified CNC system can therefore be reliably used for EHLA3D operation. In combination with the rotary/tilting table, free-form surfaces can be machined and more complex overhang geometries produced.

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1 EHLA3D 5-axis CNC system.
2 Individualized AI flange.