Press release VII / 2017
Smart laser processing heads in the digital age

Integrated digitization of processes for laser materials processing provides customers with measurable results in industrial applications. Based on the IWS' comprehensive systems engineering know-how, cyber-physical laser materials processing systems are being developed by means of new hardware and software solutions. These systems assist the operator in the performance of complex manufacturing tasks, they improve product quality, and they enhance the reproducibility of manufacturing results both for regular and frequently changing production sequences. Research developments for hardening, cutting and joining as well as for additive manufacturing processes will be presented at the Hannover Messe Industrie and at the Laser Messe München.

The current practice of laser buildup welding is no longer conceivable without laser processing heads from the modularly structured COAXn group. Several hundreds of individualized systems configured over the last 20 years, have found their way to our customers from car manufacturing, aircraft, oil production, mining, machine building, and die- and mold-making industries. The heads are used for coating processes, functionalization, repair and additive manufacturing from small µm-sized structures up to areas of several m². Rough environments and non-stop-24-hours-runs are the standard situation in production engineering practice.

The influencing variables of the process – the material and the manufacturing system that determine the welding process reliability and the final component characteristics – have been well established in a wide variety of IWS applications .Based on these experiences a new generation of powder nozzles has been developed for the digital age Industry 4.0. An innovative concept with integrated sensors, which are cross-linked in a structured approach, makes it possible to record relevant data online and put it into the context of the process very conveniently. This way, the processing heads can be made more intelligent incrementally.

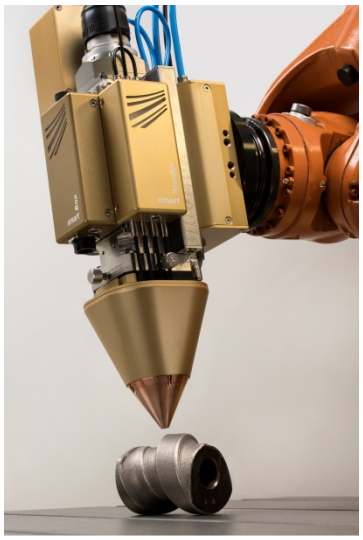
The new coaxial powder nozzle with clearance area is characterized by a fluidic-optimal design and guarantees a powder focus of minimally 600 µm. It is designed for maximal 6 kW laser power and dimensioned for tracks 0.6 to 6 mm wide. The interchangeable nozzle tip and the integrated media connections make it operator-friendly and low maintenance, as always. The head is also, of course, totally direction-independent and even, within limits, 3D-suitable.

Sensors for temperature, pressure, flow rate, and acceleration are integrated at the active processing head and cross-linked via software. When the nozzle is in use, this sensor network provides information about critical temperatures in relevant areas, media flows, powder distribution, and possible damage to optical elements, and stops the process in the case of significant failures, such as collisions.

The data are transmitted to a microcontroller, which processes the measured data generated and forwards it to be used in process control and supervision, via the BUS system. Finally, the new data management software enables new functions, such as online cross-

linking, visualization of process data, access to parameter databases, and control functions for the machine and the laser as well.

The prototype of the novel nozzle generation will be presented at the Hannover Messe Industrie (hall 6, booth A30) and at the LASER World of PHOTONICS (Fraunhofer joint booth hall A2, booth A2.431) in Munich.



Laser processing head
for Industry 4.0
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Laser buildup welding with a
COAX laser processing head
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