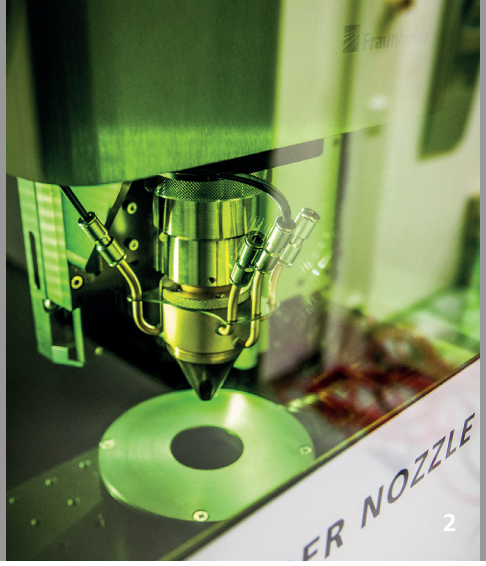
1



2

AUTOMATED MEASUREMENT OF POWDER JET NOZZLES

Task

In Laser Metal Deposition (LMD), the powder feed into the melt pool is of crucial importance. It has a decisive influence on powder efficiency, oxidation by the surrounding atmosphere and the geometry and roughness of the layer generated. For this reason, there is a need to characterize the powder gas jet to ensure process quality. Fraunhofer ILT has developed a measurement procedure that can be used to standardize powder nozzle characterization. For this process, a system has been built according to industrial standards and enables the measurements to be automated.

Method

The measurement process needs to be standardized and automated so that the characteristic properties of the powder feed can be compared. These include the particle density distribution and caustic of the powder gas jet as well as indicators derived from them such as location and size of the powder focus. To monitor the required sizes metrologically, the powder gas jet is illuminated by a laser line perpendicular to the powder gas stream and observed through the powder nozzle with a coaxially arranged camera. A high frame rate makes it possible to detect the individual powder particles in number and position. As the system progresses along the powder gas jet step-by-step, it records individual layers in order to calculate the particle density distribution with the appropriate algorithms.

Result

There is now a system for automated and standardized measurement of powder feed nozzles that can certify individual powder nozzles. For the first time, the measurement process opens up the ability to fully characterize a powder gas jet. The process has been qualified for different powder nozzles and powder grain fractions.

Applications

The areas where the system can be applied include all activities in cladding with laser radiation in which the exact knowledge of the powder gas jet is required. This know-how can be used in process development, nozzle development and production of components with high quality standards.

Contacts

Dipl.-Ing. Stefan Mann
Telephone +49 241 8906-321
stefan.mann@ilt.fraunhofer.de

Dipl.-Ing. Peter Abels
Telephone +49 241 8906-428
peter.abels@ilt.fraunhofer.de

1 System for the automated measurement of powder nozzles.

2 Powder nozzle in the measuring system.

Fraunhofer Institute for Laser Technology ILT, www.ilt.fraunhofer.de
DQS certified by DIN EN ISO 9001, Reg.-No.: DE-69572-01