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## POWDER JET MONITOR

### Task

In powder-based laser material deposition, the supply of filler material into the melt pool plays a crucial role. It influences the dimensional accuracy of the applied layer, the quality of the layers and volumes produced as well as the cost-effectiveness of the process. Both the adjustment and wear state of the powder feed nozzles used and the parameters of the powder feed – such as particle size of the powder, powder mass flow and conveying or protective gas streams – determine the formation of the powder gas jet. In order to ensure high process quality, there is a need to characterize and document this tool, the »powder gas jet«.

### Method

Fraunhofer ILT has developed a method that allows users to calculate parameters for characterizing a powder gas jet on the basis of the particle density distribution. The method can be used, on the one hand, to determine the position of the powder focus relative to the nozzle tip and, on the other, the diameter of the particle distribution. To use the method, the institute has developed a system based on industrial standards, one that makes it possible to carry out the measurement automatically. The standardization and automation of the measurement process is the prerequisite for users to compare characteristic features of the powder feed.

### Results

For the first time, the measuring method makes it possible to fully characterize a powder gas jet. On the one hand, this allows the certification of coaxial powder feed nozzles and, on the other, investigations on influencing variables on the powder gas jet. This way, an industry-standard system is provided for measuring the tool, »powder gas jet«.

### Applications

Areas of application include all activities in the field of laser material deposition, where exact knowledge of the powder gas jet is required, such as in the process and nozzle development and the production of components.

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- 3 Particle distribution in different distances to the nozzle tip.
- 4 System for measuring the tool »powder gas jet«.