

High-Definition Laser Metal Deposition

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Laser Metal Deposition (LMD) is an advanced AM technology relevant to the metalworking industry and composite material research. Improved accuracy of particle positioning in experimental facility is enhanced by applying numerically obtained theoretical solution of coupled laser technology, ultrasonic vibrations, aerodynamic flow and particle flow problem. Unique solutions allow to perform high-definition multi-material 3D printing at once.

The main technological principle of our developed LMD system is illustrated in Fig. 1 and consists of 5 parts: (I) ultrasonic metal powder positioning jet, (II) laser system, (III) suction system, (IV) building platform with a controller and (V) monitoring system. Jet is used to separate metal particles and point the powder flow towards the building platform. Laser beam is focused and pointed to the metal powder on the building platform. Suction system helps to avoid defects by collecting unmolten powder particles and agglomerates from the building platform. Building platform, where the 3D object is being produced, has three moving axes (X, Y, Z). The whole process is being monitored by a monitoring system, which can determine building platform temperature, stability of metal particle flow, stability of particle flow, size (diameter) of the particle flow, pressure and oxygen concentration inside the building chamber.

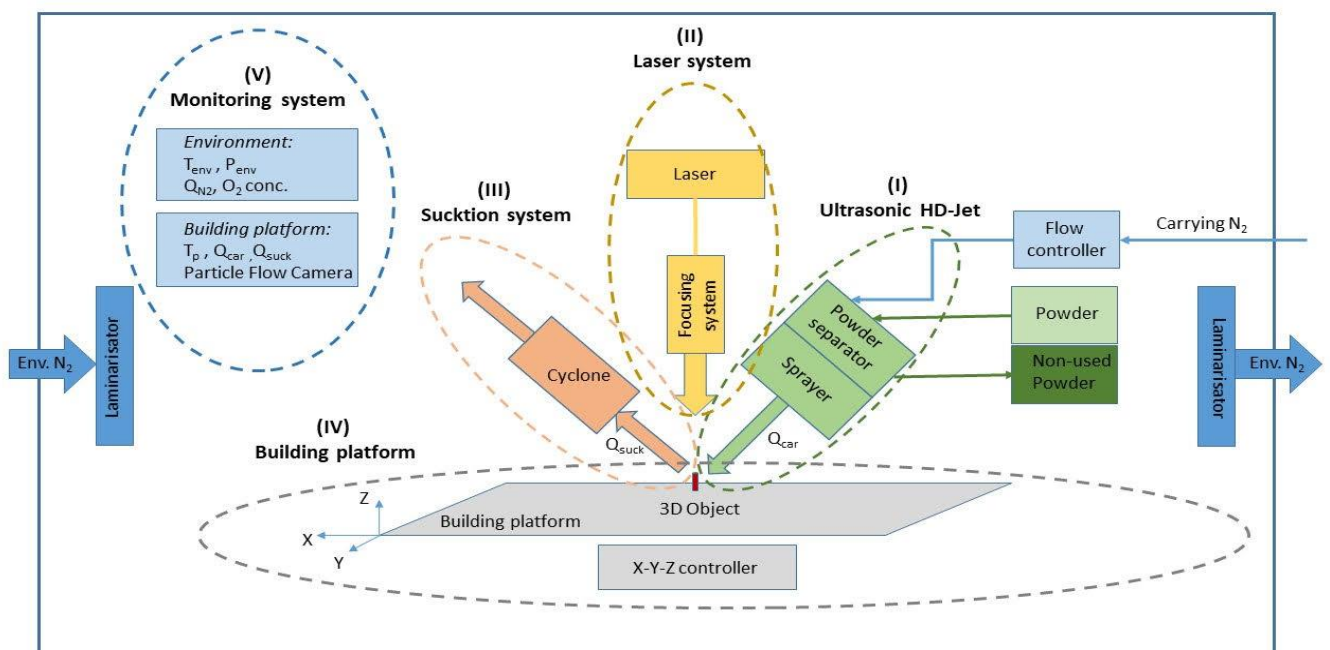


Fig. 1 Technological principle of new LMD system