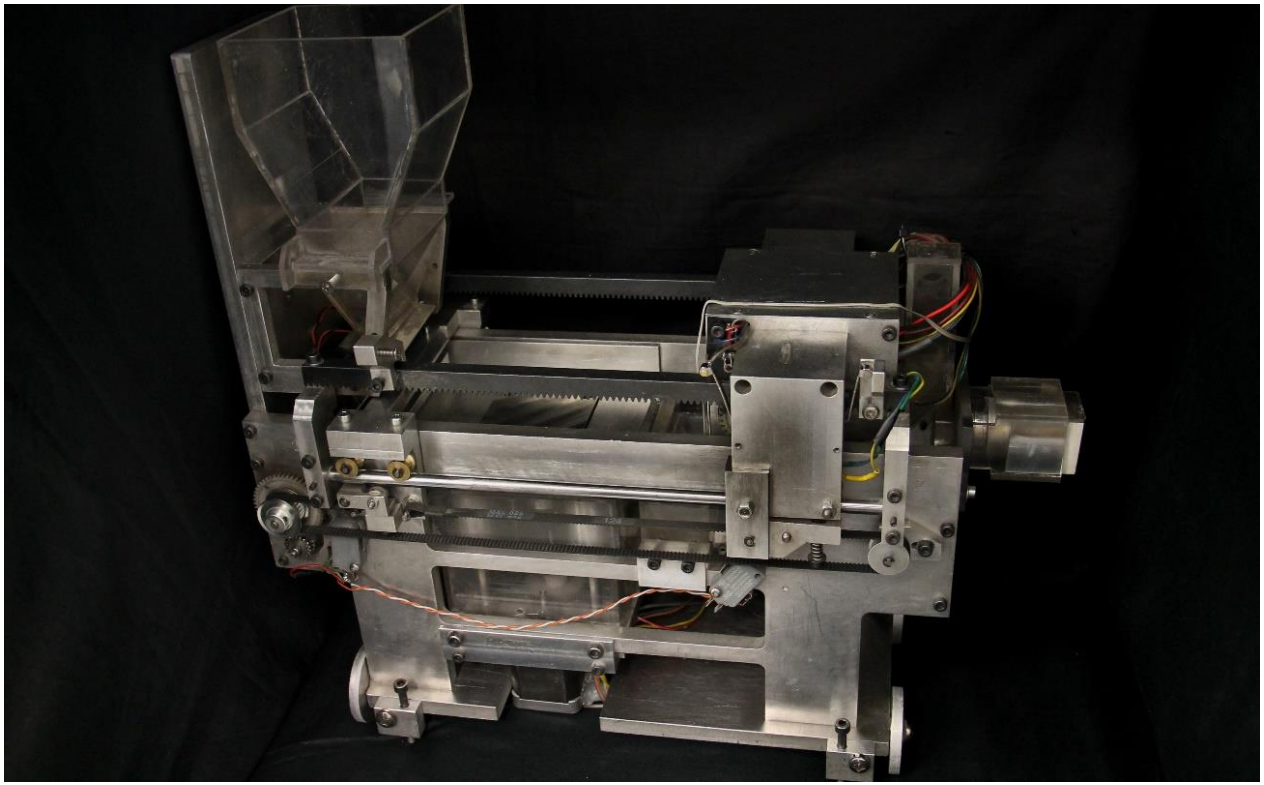
DEVICE FOR IN-SITU DEFECT REMOVAL DURING 3D PRINTING OF METAL PARTS



PRIORITY NUMBER:

102018000010598

KEYWORDS:

Metal additive manufacturing
Powder Bed Fusion
In-line defect removal
In-situ monitoring
Zero-defect

The proposed invention is the first metal additive manufacturing system that autonomously identifies and removes defects during the printing process. More in details, this is a novel Laser Powder Bed Fusion machine equipped with an innovative defect deletion system that combines a subtractive technology (i.e., grinding) and a superficial thermal treatment for in-line defective layer removal driven by intelligent in-situ monitoring methods.

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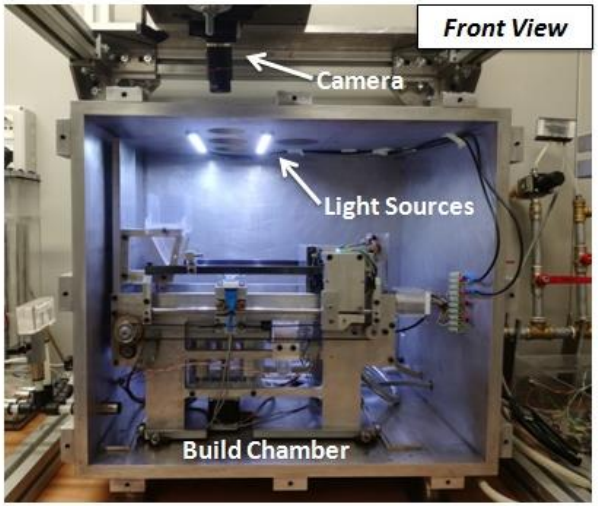
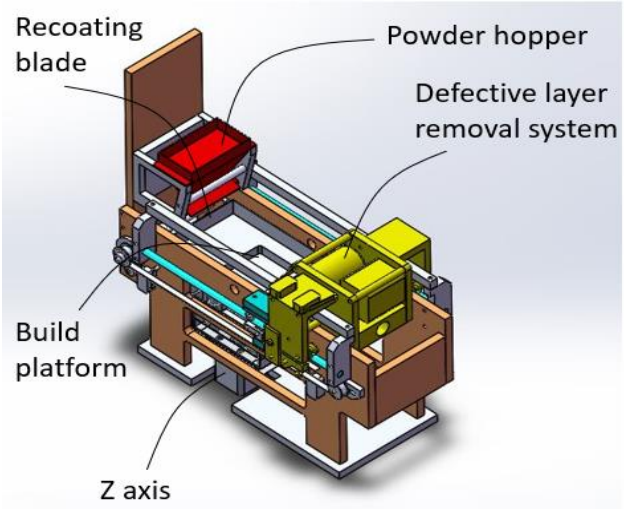


DESCRIPTION:

Additive Manufacturing processes provide the opportunity to produce metallic components with a level of customization and shape complexity definitively higher than parts produced with traditional technologies. The proposed invention represents the first example of additive manufacturing system based on Laser Powder Bed Fusion (LPBF) that is able to detect the onset of a defect and to remove it during the process. The main idea consists of combining an in-situ sensing system, which allows layer-by-layer defect identification, and an in-line defect removal system to eliminate the layers where defects occurred. Layers deletion is performed by a grinding machine integrated into the additive system, followed by a superficial thermal treatment to reduce discontinuities within the part. After defects removal, the process carries on, eventually by adjusting process parameters to avoid the risk of new defects generation.



ADVANTAGES:

- The reduction of defectiveness rate, usually caused by process instability, wrong parameters and scan strategies etc.
- The reduction of scrapes and production chain costs (additive and post-production processes)
- Lead-time reduction and productivity increase for the realization of complex and innovative components

APPLICATIONS:

- Possibility to print ‘first-time-right’ metallic components through LPBF processes for production of parts with complex geometries, new or difficult to print materials, and stringent quality requirements (e.g., aerospace and biomedical industries.).
- The system has been conceived for LPBF industrial applications and for the development of innovative LPBF solutions

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