EPIC Online Technology Meeting on Mid-IR Technologies for Industrial Manufacturing (in cooperation with Mid-IR Alliance)

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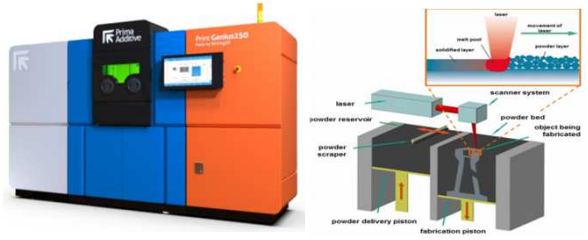
Prima Additive

Company presentation

Prima Industrie S.p.A. for over 40 years of leading in sheet metal manufacturing.

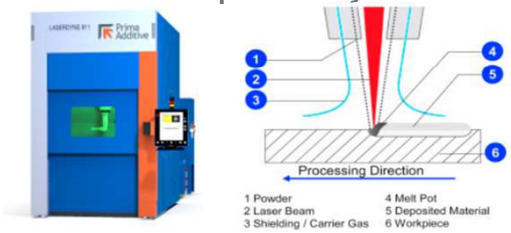
Powder Bed Fusion systems



- Metal powder (15÷45 µm)
- Laser scanner melts specific points on a layer of metallic powder
- Movements of the platform to built the part
- Application: production of free form parts (aerospace, oil & gas, automotive, biomedical..)
- Materials: Steel alloys, Titanium alloys, Nickel alloys, Aluminium alloys, Cobalt-Chromium alloys

In October 2018 born the new division Prima Additive focused on laser additive systems.

Laser Metal Deposition systems

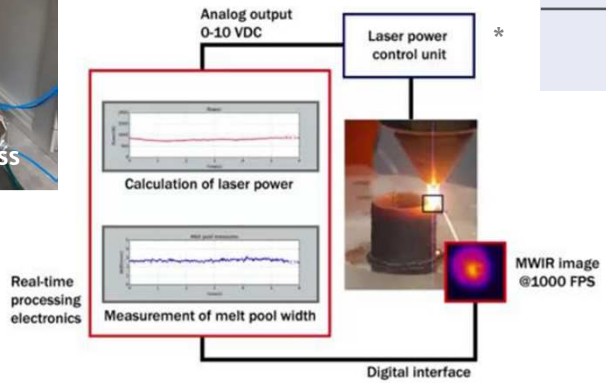


- Metal powder (50÷150 µm)
- Laser source fuses metal powder sprayed at the focal point of the laser beam
- 3 or 5 axis deposition machine
- Powder flow is coaxial with the laser beam (different configurations)
- Application: repairing of damaged parts, coating of existing surfaces (automotive, oil & gas, aerospace)
- Materials: Steel alloys, Titanium alloys, Nickel alloys

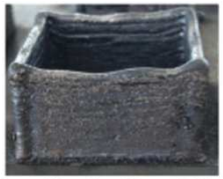
LMD: Monitoring system

R&D demonstrator

- **CLAMIR Commercial monitoring system**
- Detection in real-time of the melt pool width
- Images coaxial with the laser beam
- Closed loop on the laser power



Characteristics	Technical specifications
Components	Infrared sensor head with real-time processing electronics and connectors. Imaging lens.
Laser power control [VDC]	0-10, Analog signal control
Electronics	Embedded FPGA
Imaging lens	CaF2, f=40mm with manual focus mechanism
Mechanical interface	C-mount thread
Infrared camera	64x64 pixels MWIR response (1-5µm), frame rate 1000 images/s



Part realized without CLAMIR:
H = 16.00 mm
W= 2.10 mm

Part realized with CLAMIR (control on the dimensions of the melt pool):
H = 16.20 mm
W= 2.20 mm

* 'Closed-loop power control system for LMD and cladding processes', Commercial Presentation by NIT, June 2019

Next steps

LMD future views

- Automatic calibration of the PID control
- Higher resolution of the camera: higher homogeneity of the melt pool borders
- IR camera with 200 kHz resolution
- Different kind of monitoring/sensing: fume detection during the process, is it possible?

PBF monitoring system

At the moment there is not real time monitoring during process: problem of scanner in the optical channel

Detection of the powder bed quality with camera in visible range

- Possibility to detect in closed loop control
- Fume detection during the process, is it possible?

Prima Additive

www.primaadditive.com