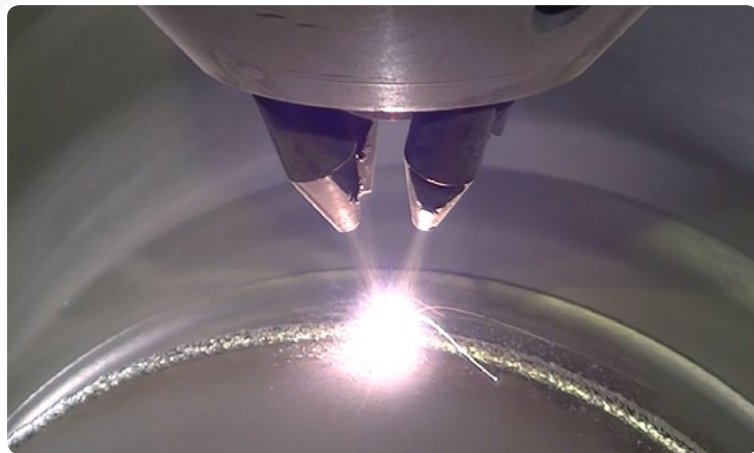


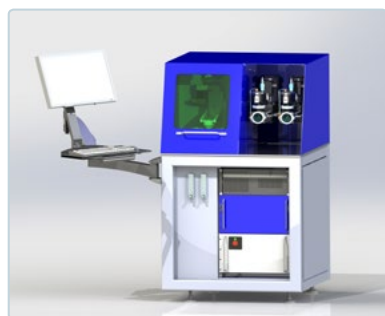
LENS[®] 450

The LENS[®] 450 brings industrial-strength metal 3D Printing technology to the laboratory and classroom

Additive Manufacturing, also known as 3D Printing, has recently emerged as the first manufacturing revolution of the 21st Century. Industrial applications are growing rapidly and processes are being qualified in numerous industries. In the area of metal Additive Manufacturing, applications such as repair, rework, coating and low volume manufacturing are being implemented across a wide range of industries, including oil and gas, aerospace, mining, power generation and medical.



LENS in action repairing a casing



LENS 450 System

The all-new LENS 450 system offers a low-cost entry to metal Additive Manufacturing. With a 100mm cubed working volume, 400W fiber laser and full LENS control software, the LENS 450 gives the user the same process as the industry-proven LENS 850R and MR-7, all with a smaller footprint and lower cost.

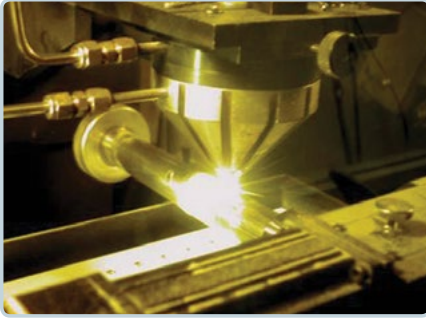
KEY FEATURES

- ▶ Blown Powder Deposition – visible, teachable process
- ▶ Industry-proven LENS process
- ▶ Rapid set-up – make a new material in ten minutes!
- ▶ High brightness solid-state Fiber Laser
- ▶ Rapid solidification rates (>1000C) – Novel microstructures
- ▶ Complete Atmosphere Control – full protection for highest quality
- ▶ Create mixtures - rapid alloy discovery

LENS 450 APPLICATIONS

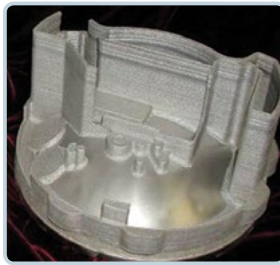
- ▶ Teaching and research on metal 3D Printing
- ▶ Rapid Manufacturing
- ▶ Rapid Prototyping
- ▶ Hybrid Manufacturing
- ▶ Rapid Alloy Screening
- ▶ Repair & Remanufacture

Laser Engineered Net Shaping



How the LENS system works:

LENS systems utilize a high-power laser together with powdered metals to build fully dense structures directly from a 3-dimensional CAD solid model. The CAD model is automatically sliced into a tool-path, which instructs the LENS machine how to build the part. The part is constructed layer by layer under the control of software that monitors a variety of parameters to ensure geometric and mechanical integrity. The LENS process is housed in a chamber which is purged with argon such that the oxygen level stays below 10 parts per million to ensure there is no impurity pick-up during deposition. The metal powder is fed to the process by Optomec's proprietary powder-feed system, which is able to flow small quantities of powder very precisely. When complete, the part is removed and can be heat-treated, Hot-Isostatic-Pressed, machined, or finished in any other manner.



Defense Housing
Fabricated by LENS System



Compressor Blade
Repaired by LENS System



Exhaust Duct
Fabricated by LENS System

LENS® 450 Typical Performance Parameters

Process Work Envelope	100 x 100 x 100 mm
Enclosure	Class I Laser Enclosure, Hermetically sealed to maintain process environment and safety
Motion Control	3-axes standard: XY linear table motion Z Gantry motion
Positional Accuracy	± .25mm
Linear Resolution	± .025 mm
Motion Velocity	60 mm/s
Deposition Rate	Up to 80 g/hr
Gas Purification System	Direct purge system to achieve low oxygen levels
Powder Feeders	One feeder (option to add one more) The feeder holds up to 2 kg of powder
Laser	400W IPG Fiber Laser
Software	Workstation Control; STL Editing; PartPrep slicing
Enclosure Dimensions	1 x 1 x 1.5 m, standalone unit

ABOUT OPTOMEC

Optomec® is the world leading provider of additive manufacturing systems for high-performance applications in the Electronics, Biomedical, Photovoltaic, and Aerospace & Defense markets. These systems utilize Optomec's patented Aerosol Jet Printed Electronics technology and LENS powder-metal fabrication technology.



Optomec Inc.
3911 Singer Blvd. NE
Albuquerque, NM 87109 USA

Tel: 505-761-8250
Fax: 505-761-6638
E-mail: requestinfo@optomec.com

LENS is a Trademark of Sandia Corporation