

LENS[®] 850-R

Proven Industrial Additive Manufacturing System for Repair, Rework, Modification and Manufacturing

LENS 850-R is a state-of-the-art Additive Manufacturing system, using advanced alloys to restore the functionality of high value metal components.



LENS 850-R System



Impeller repaired by LENS 850-R System

The LENS 850-R system offers a large 900 x 1500 x 900mm working volume, making it ideal for repair, rework and modification of large industrial components. The LENS 850-R uses a high-power IPG Fiber Laser to build up structures one layer at a time directly from metal powder. The resulting material has mechanical properties that can be equivalent to or superior than the original component. The 850-R offers a full range of features, including 5-axis CNC-controlled motion, closed loop controls, and full atmosphere control. These features, backed by Optomec's full application and service support, make the 850-R the system of choice for industrial additive manufacturing users.

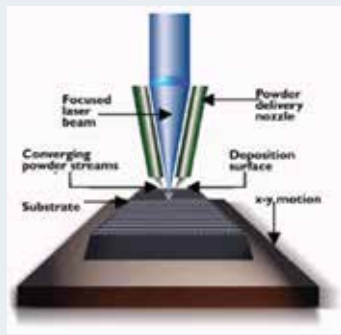
LENS FEATURES

- ▶ Large working volume - ideal for blisks, impellers and shafts
- ▶ 5-axis motion - rotary and complex repairs
- ▶ Closed-loop controls – precision process control
- ▶ Fiber Lasers – reduced cost of ownership
- ▶ Full software suite – generate toolpaths rapidly
- ▶ Full atmosphere control – superior material quality
- ▶ Common materials: Inconel Alloys, Stainless Steels, Titanium alloys

LENS APPLICATIONS

- ▶ Repair of worn components
- ▶ Rework of mis-machined components
- ▶ Modification of tooling for re-use
- ▶ Hybrid Manufacturing
- ▶ Advanced Product Development

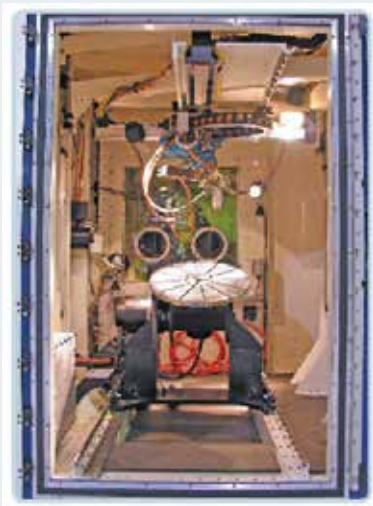
Laser Engineered Net Shaping



LEN S® Deposition Head

How the LENS system works:

LEN S 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/CNC Process



Compressor Blade
Repaired by LENS System



Exhaust Duct
Fabricated by LENS System

LEN S 850-R Typical Performance Parameters

Process Work Envelope	900 x 1500 x 900 mm
Enclosure	Class I Laser Enclosure, Hermetically sealed to maintain process environment and Safety
Motion Control	5-axes standard: XYZ linear gantry motion Tilt-Rotate worktable All axes under full CNC control
Positional Accuracy	± .25mm
Linear Resolution	± .025 mm
Motion Velocity	60 mm/s
Deposition Rate	Up to 0.5 kg/hr
Parts Handling	Tilt-Rotate table tilts +/- 90°, infinite rotation. Rails and part cart allow table to move through machine and out. 38 cm diameter antechamber.
Gas Purification System	Dual unit maintains O2 level continuously ≤ 10 ppm
Powder Feeder	Two feeders each hold up to 14 kg of powder
Lasers	1 or 2 kW IPG Fiber Laser
Software	G-code Workstation Control; STL Editing; Part-Prep slicing
Closed-Loop Controls	Optional SMART-AM™ melt pool sensor
Enclosure Dimensions	3 x 3 x 3 m w/o gas purification system or laser

ABOUT OPTOMEC

Optomec® is a privately-held, rapidly growing supplier of Additive Manufacturing systems. Optomec's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. Optomec has more than 200 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit <http://optomec.com>.