LENS®MATERIALS FAQs

LENS systems process common engineering materials such as stainless steels, tool steels, titanium alloys, and cobalt alloys. LENS technology can also process other materials including Zirconium, Tantalum, Tungsten, Aluminum, Bronze, refractory metals and some ceramics. These materials are available in powder form from a variety of commercial suppliers.

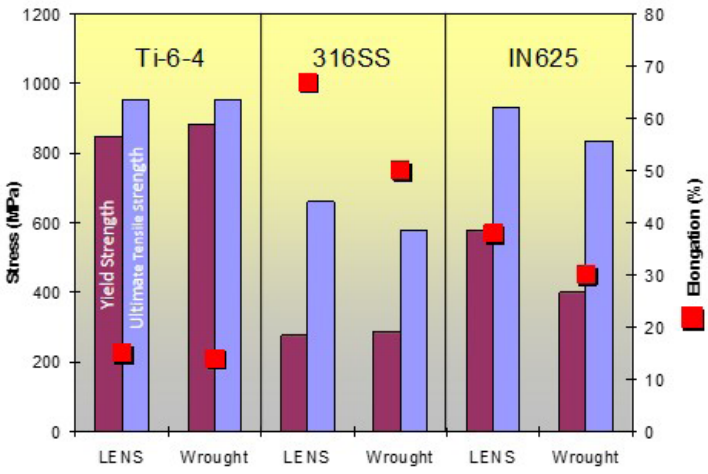
Printing Features of LENS Systems:

- Layer Thickness: 250 to 750 microns
- Melt Pool Diameter: 2,000 microns Typical
- Minimum Wall Thickness: 300 microns
- Deposition Rate Based on Laser Power: 2 kW = 0.5kg/hr.
- Surface Roughness: On the sides, 12- 25 microns Ra

Schematic cross-section through a part. This schematic shows five layers. The sides will show a layered appearance, with a generally smooth top.

Printed Metal Properties

In general, the LENS process produces fully-dense material that has mechanical properties at least equal or better than cast material, and in some cases very similar to forged material.



Powder Characteristics:

- Size: Powder particle size is -100/+325 mesh, equivalent to a powder diameter of 44 to 150 microns.
- **Shape:** Powder sufficiently spherical to flow.
- **Chemistry:** The LENS process does not alter powder chemistry.
- **Cleanliness:** Inert-Gas-Atomized or Plasma-Rotating-Electrode powders are normally of acceptable quality.

MATERIALS FOR OPEN ATMOSPHERE

ALLOY CLASS	ALLOY
Stainless Steel	13-8
	17-4
	304
	316
	410
	420
	15-5PH
	AM 355
	309
	416
	420

ALLOY CLASS	ALLOY
Nickel	IN625
	IN718
	IN690
Copper	Pure Copper
	Bronze
	Cu-Ni
	GRCOP-84
Tool Steel	H13
	S7
	A-2
Cobalt	Co-Cr
Carbide	Ni-WC
	Co-WC

MATERIALS FOR CONTROLLED ATMOSPHERE

ALLOY CLASS	ALLOY
Titanium	CP-Ti
	Ti 6-4
	Ti 6-2-4-2
	Ti-6-2-4-6
	Ti-48-2-2
	Ti-22Al-23Nb
Ceramics	Alumina
Aluminum	4047

ALLOY CLASS	ALLOY
Nickel	Waspalloy
	Hastelloy X
	MarM 247
	Rene 41
	Rene 142
Refactories	W, Mo, Nb
Composites	TiC
	CrC

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 300 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about Optomec, visit http://www.optomec.com.

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