LENS® 3D PRINTED METAL FAQs

Q1. What are the main technologies available for 3D printing metal parts?
A1. The two most common metal printing technologies are “powder bed” and “blown powder”.

Q1. What are the differences between powder bed and blown powder technologies?
A2. In powder bed systems a laser is used to selectively melt a bed of metallic powder in a layer-by-layer process to build up the physical part. The end result is buried in the powder cake and is not visible until the excess powder is removed and the part is revealed. In blown powder systems, the process continuously blows powder into the melt pool, and the laser builds up the part in free space. The entire process is visible as the part is grown up layer by layer.

Q3. What are the advantages of powder bed systems?
A3. Powder bed machines are better at building smaller, more complex shaped parts and produce better surface finish.

Q4. What are the advantages of blown powder systems?
A4. Blown powder machines, such as the Optomec LENS® system, are better at adding material to existing parts, or building larger parts with good mechanical properties.

Q5. So, if I want to build a small component, should I use a powder bed technique?
A5. In many cases, yes. The main exceptions are if there is a gradient of composition from one material to another, or if the material is not commonly processed by the powder bed systems.

Q6. What are the main applications of LENS blown powder systems?
A6. There are multiple applications well suited for the LENS process. (1) Repair of worn or damaged parts - mainly high value components or when replacement parts are no longer available, where a small amount of material has been lost due to wear and the dimension needs to be restored. (2) Production rework – for salvaging new parts by correcting defects by adding material to those mis-machined or under-filled areas. (3) Building large components if a part is needed that is larger then the standard size for powerder-bed machines. (4) Materials Research - multiple powder feeders can be filled with different materials, and then programmed to produce gradients in composition through a single sample. The Thermal Imager can be used to measure temperatures and calculate cooling rates, which can be used as inputs to modeling software. (5) Teaching - because the LENS system continuously blows powder, and the deposition head stands off away from the substrate, the process is easy to see and understand. Additionally, the LENS process uses low-cost powders (e.g. $10/lb for stainless steel), and the powder is recyclable.

OPTOMEC®
Production Grade 3D Printers... with a Material Difference
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Q7. Are there customers actually using the LENS process in production?

A7. Yes, the LENS process has been used in production for more than 10 years, in many locations around the world. Most of the successful applications are in repairing and reworking worn components.

Q8. What is the deposition rate with LENS?

A8. Deposition rate depends on laser power. Roughly, 500W = 100g/hour, 1kW = 200g/hr, 3kW = 1kg/hr.

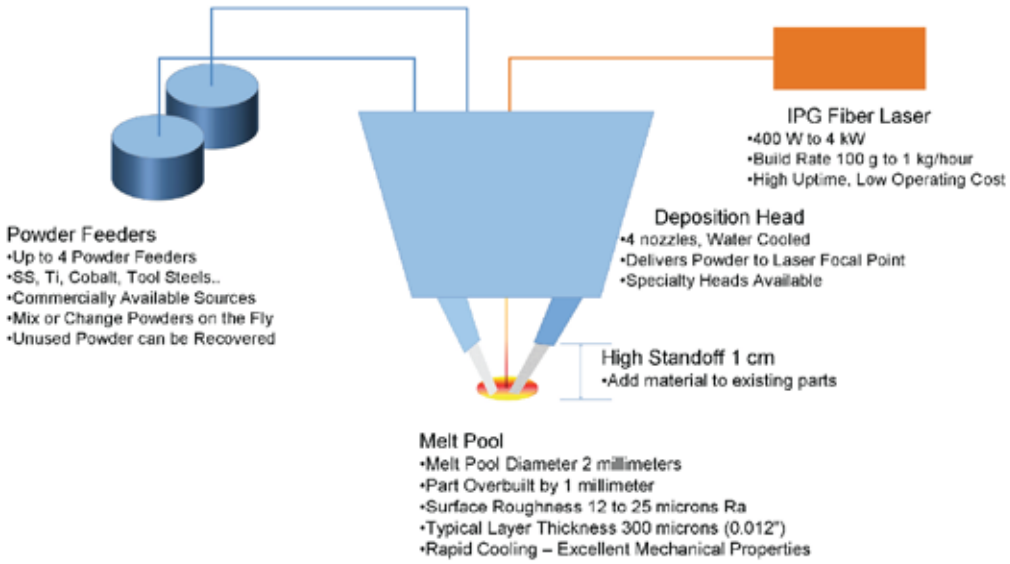
Q9. What materials are commonly used with the LENS process?

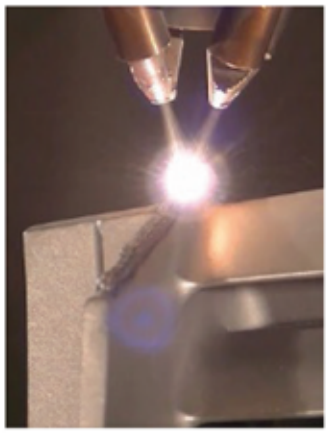
A9. LENS mainly uses common engineering alloys, such as stainless steels, tool steels, titanium alloys, cobalt alloys. It can also process a wide variety of more exotic materials, such as some ceramics, refractory metals, and others.

Q10. What is the material density produced by the LENS process?

A10. LENS material is typically fully dense. Small (less than 100 micron) porosity can be observed in some materials.

LENS Process Schematic





LENS Repairing
Titanium Blade Edge

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