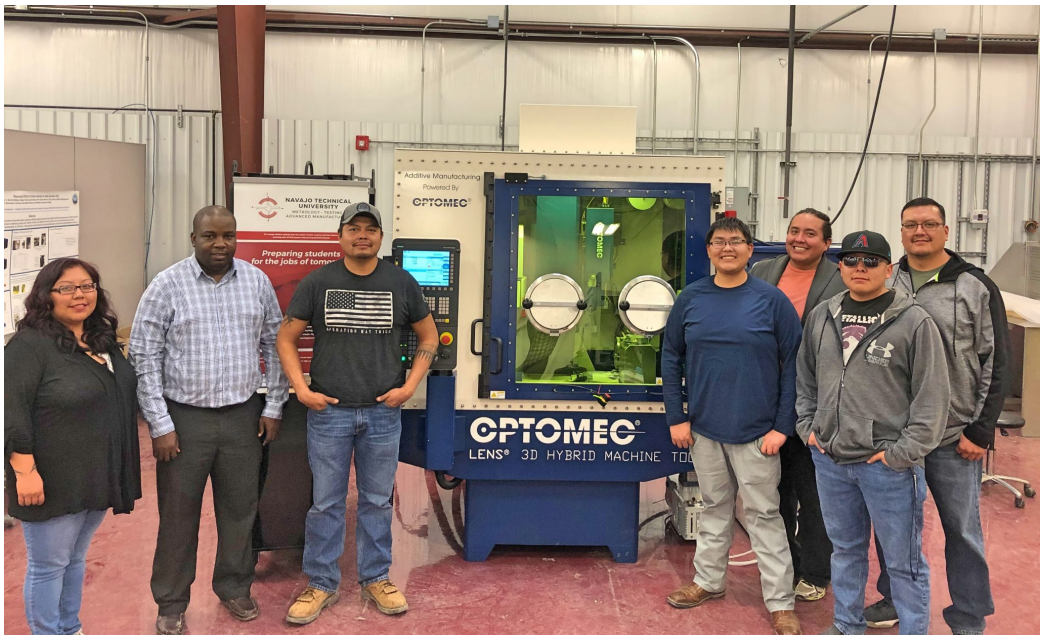
NTU selects Optomec LENS 3D printing for bi-metallic NASA project

Optomec, the New Mexico-based developers of Directed Energy Deposition (DED) and Aerosol Jet Printing (AJP) metal 3D printers, has revealed that its Laser Engineered Net Shaping (LENS) 3D printing technology will help NASA reach the moon in 2024.

As part of a project led by the Navajo Technical University (NTU), Optomec's LENS 3D printer will be used to produce bi-metallic rocket engine parts that will support NASA's mission to send astronauts back to the moon by 2024. Also working on the project are the Marshall Space Flight Center Advanced Manufacturing Center (MSFC), University of Alabama Huntsville (UAH), and V&M Global Solutions, a scientific and engineering consulting firm.

The project is supported by a grant from NASA, provided to help encourage additive manufacturing research and education for space technology applications. "We are extremely honored to receive this grant from NASA," comments Dr. Monsuru Ramoni, Ph.D., an assistant professor of Industrial Engineering at Navajo Technical University and the principal investigator for this grant.

"In addition to providing working parts for NASA to meet its goal of walking on the moon in 2024, these research activities provide unprecedented learning opportunities."



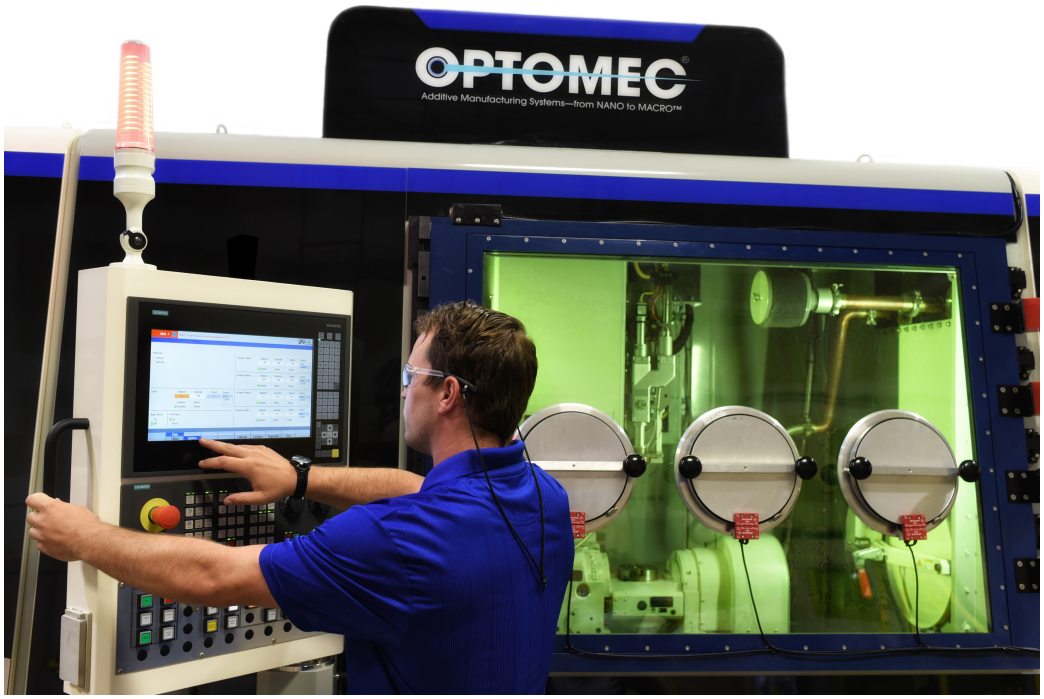
Dr. Monsuru Ramoni, Ph.D., assistant professor of Industrial Engineering at Navajo Technical University and his team of students will be investigating the benefits of Additive Manufacturing for space exploration with the help of Optomec LENS for NASA. Photo via Optomec.

Optomec 3D printing technology

A type of DED 3D printing technology, Optomec LENS uses a metal powdered feedstock that is blown through a nozzle and then melted on contact with a laser array to 3D print parts. Its capabilities make it particularly suitable for adding new material to pre-fabricated components. As such, it has been used in applications such as maintenance, repair and overhaul, and reducing waste.

Alongside LENS 3D printing, Optomec is also the developer of AJP technology. This 3D printing process is capable of manufacturing electronics on both 2D and 3D substrates, and has been used to manufacture high-resolution electronic circuits and devices, like strain sensors, wireless Bluetooth transceivers, and small digital-to-analog converter chips.

Recently, Optomec revealed that it had reached the milestone of delivering its 500th 3D printer worldwide. Almost 300 of the install base consists of AJP systems, while the remainder are LENS 3D printers. The company also released a new software tool aiming to accelerate the use of additive manufacturing for repair named AutoCLAD. It generates a custom toolpath for each part prior to processing, and can be used with the LENS systems. Last week Optomec announced that it had also developed process parameters for its LENS technology allowing for the production of pure copper parts.



The Optomec LENS 860 closed atmosphere hybrid additive manufacturing system. Photo via Optomec

3D printing bi-metalliic components for aerospace

The NASA project team will primarily focus on collaborative additive manufacturing research around the creation of bi-metallic parts for NASA applications using DED technology. They also aim to build institutional capacity in STEM research and education. “We’re very excited to be working with this team and NASA to explore how the benefits of Additive Manufacturing can be applied to space exploration,” explains Tom Cobbs, Optomec LENS product manager.

The research project will investigate the microstructure characterization (micro and nano-scale) of 3D printed Inconel-Cu alloy bi-metallic parts in three different conditions. This includes the part after it has been 3D printed, without any post-processing. The other two conditions will test the 3D printed bi-metallic part after it has had hot-isostatic pressing and heat treatment, and also after it receives a combination of both.

This will help enable the project team to understand the necessary linkages between microstructure, post-processing, dimensional accuracy and mechanical properties of 3D printed bi-metallic parts. Additionally, the research will also leverage metrology to measure the dimensional accuracy of DED 3D printed parts for use in NASA’s Space Launch System rocket, which will help put humans back on the moon for the first time since 1972. NASA is also working with engineers from Boeing in order to leverage 3D printing to better

insulate vulnerable parts of the deep space rocket. By going back to the moon, NASA aims to test new technologies and resources and provide the foundation that will eventually enable human exploration of Mars.

“LENS is an ideal solution for printing multi-material components used in higher-performance liquid rocket engine components and holds the potential to provide significant advantages in terms of cost and time savings, especially if we can print the bi-metallic parts on one machine in one process,” adds Cobbs.

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Featured image shows Dr. Monsuru Ramoni, Ph.D., assistant professor of Industrial Engineering at Navajo Technical University and his team of students will be investigating the benefits of Additive Manufacturing for space exploration with the help of Optomec LENS for NASA. Photo via Optomec.