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## Additive Manufacturing (3-D Printing) Of Standardized 5xxx Series Aluminum

Tech ID: 33420 / UC Case 2020-626-0

### BRIEF DESCRIPTION

A technology utilizing additive manufacturing (3D-Printing) processes and systems for efficient deposition of standardized aluminum 5xxx series, mitigating defects such as cracks and pores.

### SUGGESTED USES

Additive manufacturing of standardized 5xxxx aluminum for aerospace, automotive, marine environments.

### FEATURES/BENEFITS

- Effective reduction or elimination of defects like cracks and pores in the resultant object.
- Variability of adjustable parameters over time for optimal results.
- Capability to form both 2-dimensional patterns and 3-dimensional objects.

### FULL DESCRIPTION

·5xxx series aluminum describes several standardized alloys, using magnesium as the main element, that are readily weldable, have a high tensile strength, and good resistance to corrosion. For these reasons, these standardized alloys are commonly used in automotive, marine, and aerospace applications.

·Current additive manufacturing (3D printing) of aluminum uses proprietary powders rather than standardized aluminum alloys because previous attempts to additively manufacture standardized 5xxx alloys have introduced unacceptable defects such as cracks and pores into the finished product. Thus, there exists a need for additive manufacturing (3D printing) of aluminum where standardized 5xxx alloys are required.

·The technology focuses on the use of additive manufacturing processes, particularly Direct Energy Deposition (DED) techniques such as Laser Engineered Net Shaping (LENS®), for deposition of the aluminum 5xxx series. The process involves providing a feedstock of the Al 5xxx alloy and depositing it under adjusted thermal conditions that allows formation of 2D patterns or 3D objects. Various parameters, such as laser power, scan speed, mass flow rate, hatch spacing, Z spacing, and oxygen concentration in the deposition chamber, can be altered over time to optimize the formation process.

### STATE OF DEVELOPMENT

TRL3-4: Technology validated in lab

### PATENT STATUS

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### INVENTORS

» Lavernia, Enrique J.

### OTHER INFORMATION

### CATEGORIZED AS

- » **Materials & Chemicals**
  - » Other
- » **Transportation**
  - » Aerospace
  - » Automotive
- » **Engineering**
  - » Other

### RELATED CASES

2020-626-0

Country	Type	Number	Dated	Case
United States Of America	Published Application	US-2023-003	02/02/2023	2020-626

#### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ [CoFe-Al2O3 Soft Magnetic Composite](#)

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