HELICAL CONE BEAM COMPUTED AXIAL LITHOGRAPHY (CAL) VOLUMETRIC 3D PRINTING

Tech ID: 34285 / UC Case 2026-036-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Traditional 3D printing methods rely on layer-by-layer deposition, which often limits speed and introduces structural weaknesses. Computed Axial Lithography (CAL) revolutionized the field by using projected light to cure entire volumes at once, but it was previously constrained by the size of the illumination field. UC Berkeley researchers have advanced this technology with a Helical Cone Beam CAL system. By combining a rotating target volume with a synchronized translation mechanism, the system projects patterned cone beams in a helical path through radiation-reactive material. This allows for continuous printing of much larger objects than traditional CAL and even enables "inner printing"—the fabrication of new structures inside or around existing solid objects.

SUGGESTED USES

- Industrial Scale Manufacturing: Producing large, complex components for the automotive or aerospace sectors without the structural "grain" of layered printing.
- Medical Implant Customization: Printing bespoke, high-resolution prosthetic or orthopedic components with smooth surfaces and integrated internal geometries.
- Overprinting and Repairs: Adding complex features or protective coatings to existing manufactured parts by printing directly onto or inside them.
- High-Throughput Production: Utilizing the continuous motion mechanism to print a series of different objects in a single, uninterrupted process.
- Soft Robotics Fabrication: Creating seamless, multi-material robotic actuators that require integrated internal channels and flexible structures.

ADVANTAGES

- Unprecedented Build Volume: The helical movement overcomes the physical limits of stationary projection, allowing for the volumetric printing of significantly longer or larger objects.
- Enhanced Structural Integrity: Because the object is formed as a single volume rather than layers, it lacks the weak points typically found at layer interfaces (anisotropy).
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CONTACT

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INVENTORS

- Taylor, Hayden K.

OTHER INFORMATION

CATEGORIZED AS

- **Computer**
  - Hardware
- **Engineering**
  - Engineering
- **Materials & Chemicals**
  - Other

RELATED CASES

2026-036-0

Extreme Speed: Volumetric curing is orders of magnitude faster than point-by-point or layer-by-layer methods, dramatically reducing fabrication time.

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Surface Quality: Eliminates "stair-stepping" artifacts, resulting in exceptionally smooth surfaces that require little to no post-processing.

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Versatile Fabrication: The ability to print within or around existing objects opens new possibilities for composite materials and complex assembly integration.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Computed Axial Lithography (CAL) For 3D Additive Manufacturing
- Roll-To-Roll Based 3D Printing Through Computed Axial Lithography
- High Fidelity 3D Printing Through Computed Axial Lithography
- System And Method For Tomographic Fluorescence Imaging For Material Monitoring
- A New Method for Chemically Recycling Dicyclopentadiene Thermosets

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