

Chevron Additive Manufacturing Laboratory (CAML)

The Chevron Additive Manufacturing Laboratory at Tuskegee University aims at securing a leadership role for Tuskegee University in the strategic area of additive manufacturing (3D printing), described by some experts as the 3rd industrial revolution. Additive manufacturing is a relatively new but fast evolving technology set to fundamentally change the way manufacturing and design are done in almost all industries including aerospace, automotive, clean energy, biomedical, and construction.

The laboratory capabilities include 3D printing with multiple technologies, including bioprinting, as well as related technologies like accurate 3D scanning, reverse engineering, topology optimization, inspection and quality control, prototyping, and computer numerical control (CNC) milling. The laboratory capabilities also include the development, characterization, and testing of novel functionalized polymers suitable for use in 3D printers (both filament and resin) for targeted advanced applications. The Laboratory activities will be comprised of the following main components:

Educational Component

This component integrates the fundamentals of 3D printing/scanning, inspection metrology, and reverse engineering into mechanical engineering curriculum to provide graduates with proper exposure of these technologies and their applications in real world. The lab facilities will also be available to support students' course projects, capstone design projects, and other student innovation support needs.

Research Component

Additive manufacturing presents a tremendous opportunity for research and innovation. Research

opportunities include better understanding and control of existing processes, development of new



materials with enhanced properties, design for additive manufacturing, and expanding its applications particularly in the bio and aerospace industries. Combined with precision metrology, the laboratory will enrich the research portfolio of Tuskegee University and give both its graduate and undergraduate students opportunities to participate in rewarding research. The following research topics are planned:

- Process structure properties relationships for 3D printing
- Topology optimization for lightweighting
- Development of new specialized materials for use with 3D printing technologies, with emphasis on fused deposition modeling (FDM) and nano-functionalized filaments
- Manufacturing of membrane electrode assemblies (MEA)
- Printing of bone and tissue structures



Tuskegee University has in place strong capabilities and infrastructure to support these research activities. This includes comprehensive testing of

mechanical and thermal properties, including impact and fatigue, and advanced material characterization techniques including optical, scanning electron, and atomic force microscopes.

Outreach Component

Tuskegee University provides a variety of pre-college summer programs such as MITE-I, MITE-II, FASTREC-I and FASTREC-II. Students attending these programs will be exposed to the CAML technologies through structured hands-on experiments, workshops, and interactions with graduate and undergraduate students.

Tuskegee University will also leverage CAML in its existing outreach programs to local, middle, and high schools. Direct participation of students in the wide range of manufacturing-related technologies offered by CAML is expected to generate excitement and interest in engineering and applied research.



Leveraging of Resources

In addition to the funding provided by Chevron and other federal and private research partners, Tuskegee University is a member of the Institute for Advanced Composite Manufacturing Innovation (IACMI), a consortium bringing Oak Ridge National Lab, industrial, and academic Institutions to address big challenges in various areas, including energy and advanced materials.

Point of Contact

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