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Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and
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ADDITIVE CONSTRUCTION AT DRAKE STATE—DEVELOPING THE FUTURE ADVANCED
MANUFACTURING WORKFORCE: A COLLABORATION BETWEEN NASA MARSHALL (MSFC)
AND DRAKE STATE COMMUNITY AND TECHNICAL COLLEGE THROUGH THE MINORITY
EDUCATION RESEARCH EDU. PROJECT.

Abstract

Drake State Community and Technical College, a Historically Black College (HBCU) in Huntsville, Alabama and National Aeronautics and Space Administration's (NASA) Marshall (MSFC) started working on a collaborative joint project in Advanced Manufacturing and Additive Construction in September 2020. The project targeted goal was to address the need for a diverse, qualified, knowledgeable pool of large-scale 3-D printer technicians by creating a robust technician training that is tailored to the need of the existing and future NASA MSFC as well as commercial research and project implementation needs. The training program included a practical building project utilizing the 3-D printer. The proposed project contributed to enhancing Technology Readiness Levels (TRL) and enhancing the body of knowledge in large-scale printer design, printing processes, and printing structures.

The project addresses defined NASA's needs in Advanced Manufacturing, Structures, and Materials specifically, NASA needs in developing technologies that enable additive manufacturing of large-scale, non-metallic 3-D structures. The development of these needs requires maintenance and operation of 3-D printers by experimental researchers who are engaged in fundamental research aimed at solving complex scientific research questions. As research teams experiment with new technology, materials, and concepts, they need qualified technicians who are knowledgeable about utilizing the complex equipment such as 3-D printers. During the design and implementation stage or in the event of breakage, maintenance and problem troubleshooting for additive manufacturing equipment, such as large-scale 3-D printers, can significantly delay a research project or detract valuable research team time and resources. Skilled additive manufacturing technicians are a valuable asset to research and development teams working on NASA's Additive Construction research project Moon-to-Mars Planetary Autonomous Construction Technologies (MMPACT).

This abstract and follow-on paper will report on the technology development partnership, highlight benefits of a specific NASA need in advancing knowledge and technical readiness levels in additive manufacturing/construction at NASA's Marshall Space Flight Center, and benefit NASA's goal of creating pipeline of qualified diverse workforce, as well as develop Drake State's strategic and development needs.