

MUREP High-Volume Manufacturing and Supply Chain Management (MUREP High Volume)

Title: Resilient Supply Chain Ecosystem for Agile Manufacturing of Unmanned Aircraft Systems

Institution: University of North Texas

City/State: Denton, TX

PI: Kameswara Rao Namuduri

Summary:

As Advanced Air Mobility (AAM) systems transition from defense and recreational uses to widespread commercial applications, manufacturing of Unmanned Aircraft Systems (UAS), particularly electric Vertical Takeoff and Landing (eVTOL) vehicles are projected to significantly increase. US aerospace and defense (A&D) supply chains must pivot from low-volume manufacturing of large UASs for defense applications to more resilient, highly customizable, high-volume manufacturing (HVM) to support a wide array of commercial uses. However, US A&D manufacturing supply chains are not well prepared for this transition and confront significant competition from foreign manufacturers that dominate the recreational UAS market. To assist A&D manufacturing and supply chains to successfully pivot from low to HVM, MUREP-SAM proposes to:

- Conduct a supply chain data analysis of A&D supply chains by mapping each tier from source of supply to end user to determine where risks and vulnerabilities to HVM exist and collaborating with AAM manufacturers to develop strategies to improve resiliency and responsiveness.
- Enable HVM of components and systems deemed to be of high risk or constraining by creating a testbed using a digital twin virtual/physical system paired to the Army Research Laboratory Common Research Configuration (CRC) model system.
- Commercialize new parts, processes, and technologies by leveraging the strengths of AAM ecosystem partners. This process provides the ability to identify new suppliers in addition to assisting new start-ups and linking to venture capital.
- Increasing diversity and inclusion in a UAV workforce through integrated learning experiences in manufacturing and supply chain education enabling professional development with associate, undergraduate and graduate degrees, and certificates.
- Create a vibrant ecosystem that includes multiple AAM manufacturers, suppliers, infrastructure providers, government agencies, and educational institutions to provide sustainable supply chain, manufacturing, and policy solutions.

UNT is uniquely qualified to execute this proposal. As a Hispanic serving institution, Carnegie R1 doctoral university with high research activity, UNT is in Dallas-Fort Worth in the heart of the aerospace industry. UNT has been actively engaged in NASA's AAM National Campaign (NC) program since its inception in 2019. After successful completion of the NC Development Test program (X3) in 2020, UNT is currently leading the North Texas Cohort in the NC-1 flight test activities planned to be conducted in 2022. Our logistics program is nationally ranked with a strong research faculty.

This proposal has a high potential for inclusion of minority and tribal groups in supply-chain and advanced manufacturing workforce. UNT has 4,500 undergraduates in supply chain, engineering, and computer science programs, of which 75% receive financial aid and over 40% receive Pell Grants. UNT's undergraduate student population includes 43% Black, Indigenous, People of Color (BIPOC) and 26% Hispanic/Latinx. Forty percent are transfer students and 90% transfer from community colleges with 60% of the community transfer students being part of the Eagle bound community college partners. The proposed project aligns with the strategic thrusts 4 and 6 of the NASA's Aeronautics Research Mission Directorate program supporting affordability and assured autonomy of eVTOL vehicles.