RUTGERS
Center for Advanced Infrastructure and Transportation

PROJECT OVERVIEW REPORT

1. UTC Identifying Number
   69A3551847102

2. Center Identifying Number
   CAIT-UTC-REG88

3. Project Title
   Digital Manufacturing Integration for Transit Agencies

4. Principal Investigator & Contact Information
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7. Project Description
   This project will implement a digital manufacturing workflow beginning with the identification of high-risk and long-lead-time transit components. Selected parts will be digitized through reverse engineering and 3D scanning, followed by prototype production using appropriate additive manufacturing processes. Printed parts will undergo form and fit validation. Then, the appropriate additive manufacturing processes (e.g., material extrusion and powder bed fusion) will be selected for final printing. All approved components will be documented within a digital inventory, linking design files, manufacturing parameters, and validation records to enable repeatable, on-demand production.

8. Implementation of Research Outcomes
   This project will deliver a digital inventory system that supports repeatable, on-demand production of additive manufacturing spare parts for transit applications. The research will result in validated polymeric 3D-printed components, supported by documented form-and-fit testing and production parameters. The project will also train transit agency personnel, enabling knowledge transfer and fostering the adoption of advanced digital manufacturing technologies.

9. Impacts/Benefits of Implementation

   By enabling on-demand production of spare parts, implementation of this project has the potential to improve transit infrastructure state of good repair, extend asset life, and enhance system resilience. The integration of digital inventories and additive manufacturing promotes innovative, data-driven maintenance practices while reducing life-cycle costs and improving operational efficiency, aligning with USDOT priorities for digital transformation and efficient stewardship of transportation infrastructure.

10. Dates and Budget

    Start date: 10/1/2025
    End date: 6/30/2026
    UTC (CAIT) Dollars: $15,000
    Cost Sharing: $15,000
    Total Dollars: $30,000

11. Keywords

    Additive Manufacturing (AM), Digital Inventory, Spare Parts Procurement, Lead Time Reduction, On-Demand Manufacturing

12. Web Links (Reports and Project Website)

    https://cait.rutgers.edu/research/digital-manufacturing-integration-for-transit-agencies/