

ADVANCED TECHNOLOGIES LAB FOR AEROSPACE SYSTEMS



The vision of ATLAS is to develop a multi-disciplinary manufacturing environment and an engineering education program to prepare engineers and educators for the Factory of the Future and to aid the current workforce in seamlessly adapting to advancements in the workplace.

The mission of ATLAS is to provide a neutral ground for advanced manufacturing research and development with state-of-the-art machines, software and processing options.

➔ CAPABILITIES & EQUIPMENT

Automated Manufacturing

- Automated Fiber Placement (AFP) and Automated Tape Laying (ATL) of thermoset, thermoplastic and dry fiber material systems.
- ElectroImpact System (AFP & ATL)
- Coriolis System (AFP)
- Automated Dynamics (ATL)
- Laser and Humm3 heating options for thermoplastic materials

Slitting machine [coming soon]

Integrated 6 x 20-foot Vacuum Table [coming soon]

Industrial Press with Thermoplastic Capabilities [coming soon]

- Integrated Robot, Infrared (IR) Oven, and Injection Molding Unit for Thermoplastics Press molding, Injection molding, and Over-molding

Thermoplastic Welding (coming soon)

- Induction, Resistance, and Ultrasonic Welding

Autoclave

- 13 x 26-feet with 800 deg-F / 200 psi Capability [coming soon]
- In-situ Material State Monitoring Autoclave Control (MSMAC) with Wireless Temperature Sensors and Integrated Rheometers [Access to 3 x 6-feet and 6 x 12-feet NIAR Autoclaves]

Computer-Aided Simulations & Analysis

- High-Performance Computing
- Manufacturing Simulations
- Process Modeling
- Residual Stress and Failure Analysis
- Discrete Damage Modeling
- Continuum Damage Modeling for Progressive Failure Analysis
- High Fidelity Analysis using Global-Local Approach

High-Fidelity Inspections

- Dual Tube Dual Detector X-Ray CT System
- Micro-focus (up to 5µm resolution) & Mini-focus X-ray Tubes; X-ray Energies from 10kV- 450Kv; Flat Panel Detector & Linear Diode Array Detection Technology
- In-Situ XCT Scanning with Load Fixture, Extensometer, and DIC
- Capable of scanning large components up to 60 in diameter x 60 in tall nominal part envelope
- Ultrasonic (MAUS)
- Ultrasonic Pulse Echo testing, MIA Testing, Resonance Testing, Pitch Catch, Phased Array
- Pulse Thermography

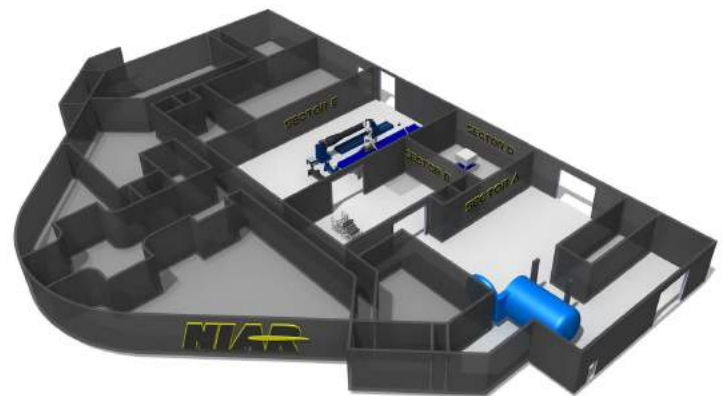
- SC 4000/6000 FLIR Camera using Thermal Wave Imaging TSR Processing
- 320x256 Detector; 59.94 Hz Camera Frequency
- Acoustic Emission (16 Channel System)
- Digital Image Correlation (Microscopic 5MP & Standard 29 MP) – 0.3x0.3-inch to 9x9-ft field of view

Structural Test & Evaluations

- Electrodynamics Test System (670 lbf Max Capability at 200Hz)
- Permanent Magnet Shakers for Modal & Structural Analysis
- Planar Biaxial Testing (Axial: 55-kip / Torsion: ±10,000 in-lbf in)
- Large-Scale Test Rig (6 x 38 x 16-foot test envelope)
- 40 MTS Structural Actuators (Range: 10 – 110-kip)
- MTS AeroPro™ Software and MTS FlexDAC™ 20 Data Acquisition System (40 Control Channels and 400+ Strain Channels)
- Durability & Damage Tolerance Testing
- Structural Health Monitoring
- Aging Evaluations and Life Extension
- Repair Evaluations

Training

- Composite Manufacturing, Inspections, Repair, and Testing
- High Fidelity Stress Analysis



WICHITA STATE
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FOR AVIATION RESEARCH

➔ HIGHLIGHTED RESEARCH PROJECTS

- AFRL – Advanced Material Characterization and Structural Certification (MASC)
- AFRL – Modeling for Affordable Sustainable Composites (AMCSC)
- AFRL/Boeing – Composite Airframe Life Extension (CALE)
- AFRL/Lockheed – Quantification of Aging from Long-term Exposure (QALE)
- AFRL/Northrop – Fail-Safe Technologies for Bonded Unitized Composite Structures (FASTBUCS)
- Army – Combat Capabilities Development Command Aviation & Missile Center (CCDC) – Rotorcraft Inspection and Repair, Composites Training, and Adhesive Characterization
- FAA – Joint Advanced Materials & Structures (JAMS)
 - Certification Efficiency and Safety, Damage Tolerance of Composites, Inspection and Teardown of Aged In-Service Bonded Repairs, Structural joints (Adhesive and Thermoplastic Welds), and Sandwich Damage Growth
- Navy – Novel Multi-scale/Multi-physics Integrated Tool for the Prediction of Manufacturing-Induced Defects in Autoclave Composite Airframe Parts
- Navy – High-Fidelity Residual Strength and Life Prediction Tool for Adhesively Bonded Composite Structures
- Navy – Innovative Analysis Tool for Damage Growth from Loaded Composite Fastener Holes
- NASA – Advanced Composite Consortium (ACC)
 - Progressive Damage Analysis, Rapid Tools, and Laminate Cure Defects Process Model Development
- NTSB Composite Aircraft Crash Investigations

➔ CONSORTIUM MEMBERSHIPS AND RESEARCH PARTNERSHIPS

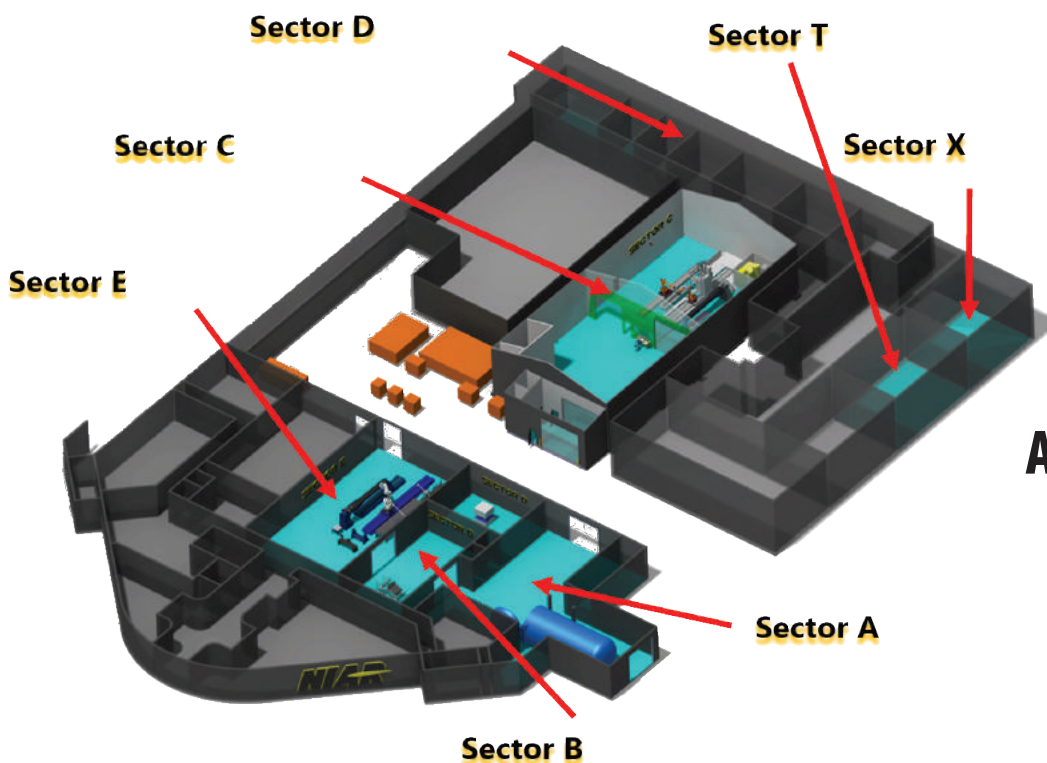
- Composite Materials Handbook (CMH-17)
- FAA Joint Advanced Materials & Structures (JAMS)
- Kansas Aviation Research & Technology (KART)
- NASA Advanced Composite Consortium (ACC)
- NASA In-Space Structural Composites Manufacturing
- Navy Composites Manufacturing Technology Consortium (CMTC) - The Composite Consortium

➔ CONTACT

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ATLAS SCHEMATIC