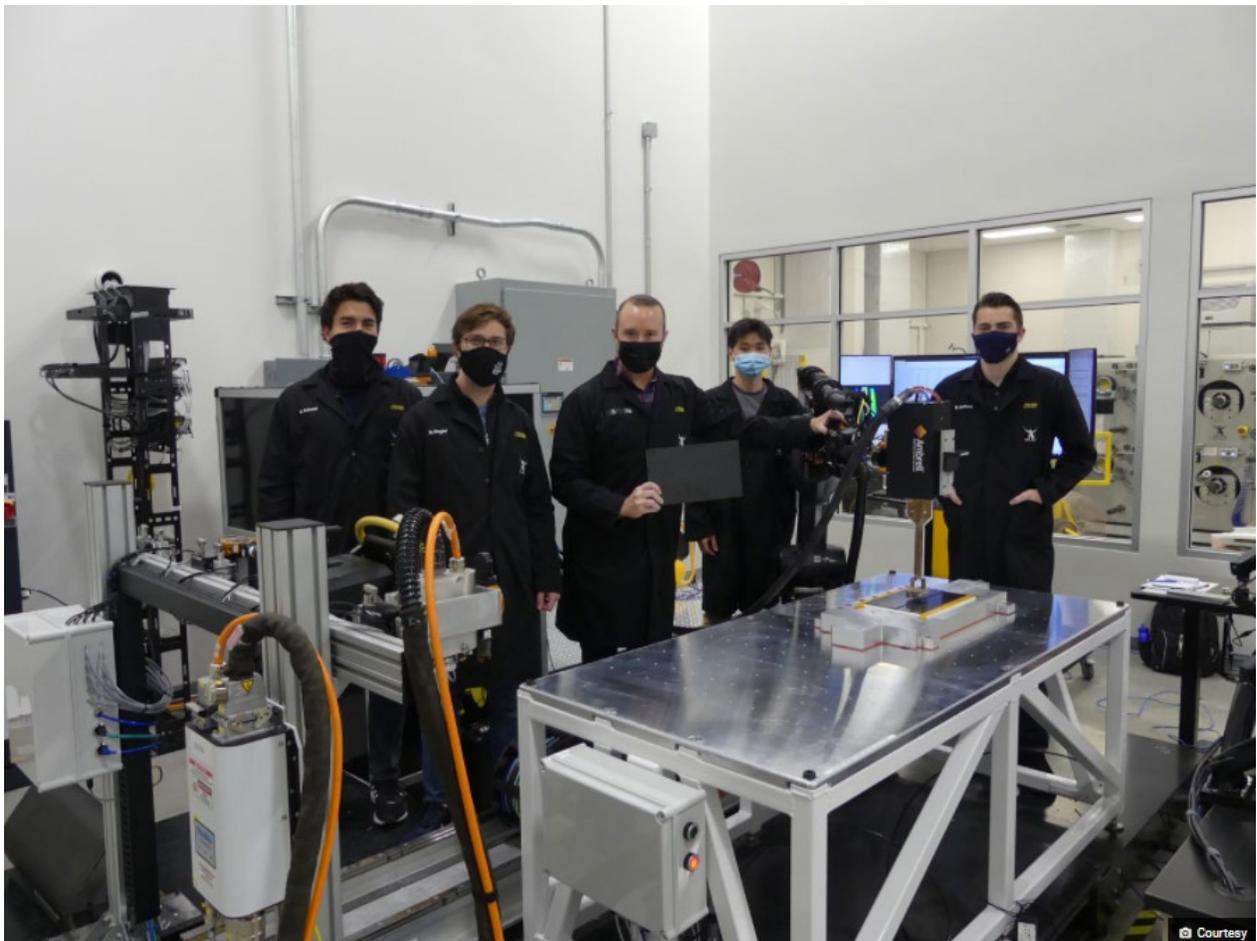


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NIAR's ATLAS announces addition of automated thermoplastic welding and tape-slitting capabilities

By Strategic Communications



The ATLAS team is featured in their lab on Wichita State's Innovation Campus. NIAR recently announced the addition of two technologies to the ATLAS lab: a fully integrated thermoplastic welding system and a prepreg tape slitting and tow-rewinding machine.

Wichita State University's National Institute for Aviation Research (NIAR) announces the addition of two new technologies to its Automated Technologies Laboratory for Aerospace Systems (ATLAS): a fully integrated thermoplastic welding system and a prepreg tape slitting and tow-rewinding machine.

Thermoplastic Welding

The new thermoplastic welding (a.k.a. fusion bonding) system features in-process inspections and closed-loop controls for continuous welds using an industrial robot. In addition to induction welding, engineers are developing resistance and ultrasonic welding processes to support joining representative aircraft parts with fusion bonding as an alternative to adhesive bonding or bolted joints. Fusion bonding does not require the rigorous surface preparation steps typically required for adhesive bonding and can be automated to eliminate operator dependency. The modular control system can easily be scaled up to production size.

This system was developed under NIAR's Modeling for Affordable Sustainable Composites (MASC) research program, sponsored by the Air Force Research Laboratory. The MASC program is laying framework to enable of the rapid development of automated manufacturing processes for new composite materials and advanced structural concepts.

"Leveraging the electric conductivity of carbon fibers and principles of electromagnetism, we are able to develop processes to join composite structures while eliminating the need for adhesive joints or fasteners," said Waruna Seneviratne, ATLAS director and lead scientist for MASC program. "This creates significant weight savings and cost reduction."

Prepreg tape slitting and tow rewinding

Composite Automation and Mikrosam have completed installation of a custom single-step composite prepreg tape slitting and tow rewinding unit within NIAR ATLAS.

"With the addition of Mikrosam slitter to our portfolio of automated manufacturing equipment, we are able to support demand from multiple automated fiber placement machines at NIAR – conducting research in a timely manner and supporting our industry partners' slit-tape material needs," said Dr. Waruna Seneviratne, ATLAS Director. "The integrated in-process inspection system and the machine-learning algorithm for detecting defects allows us to perform quality control on the fly."

The prepreg slitting equipment from Mikrosam is a single-step process for slitting of unidirectional thermoset and thermoplastic prepreg tapes and rewinding them on multiple station traverse winders. The equipment will accommodate slitting for prepreg tapes sizes from 0.25-24.5 inches (6.35-600 mm) that rewind on a spool that can be used for automated fiber placement. It can also be used for slitting 3-6 inch (75-150 mm) tapes on a spool that can be directly used on automated tape laying processes.

"NIAR's ATLAS is the only fully-integrated facility that can perform the comprehensive composites manufacturing research that OEMs and tiered suppliers demand in order to reduce risk," said John Melilli, President of Composite Automation LLC. "Composite Automation is honored to be part of the team."