Advanced Automated Thermoplastics Manufacturing Laboratory

Fiber Reinforced Structural Thermoplastic Composites Manufacturing Pilot Line

The University of Maine’s Advanced Structures and Composites Center is an interdisciplinary research center dedicated to the development of novel advanced composite materials and technologies.

Our latest expansion, the Advanced Automated Thermoplastics Manufacturing Lab and W², will bring our total facility size to over 9,200 m² (100,000 ft²), where materials and structures are evaluated from nano- to full-scale.

The primary goal of the Advanced Automated Thermoplastics Manufacturing Lab is to address the following technical challenges currently facing industry:

• Realizing faster manufacturing cycle times
• Developing reliable and fast thermoplastic joining methods
• Transforming manufacturing methods to substitute high VOC thermosets with thermoplastics
• Characterize thermoplastic composites for desired performance and economical manufacturing

Pilot Line For Thermoplastic Composite Manufacturing

**Step 1:** Rapid layup of thermoplastic prepreg tapes using an ATL system.

**Step 2:** Additive manufacturing 3D printer to manufacture molds.

**Step 3:** Automatic transport system of stacked composite laminates to fast reaction presses, where the laminate is consolidated and press-formed to the shape and size of required part.

**Step 4:** Trimming and shaping the part formed in previous step to give the part the final shape and size.

**Step 5:** Automated welding, using robotic arms that utilize ultrasonic welding, forming parts of a larger integral structure.

Contact: David Erb, Senior R&D Program Manager
UMaine Advanced Structures and Composites Center
(207) 951-3515 • david.erb@maine.edu
composites.umaine.edu

Construction is underway; photo taken on 5/27/2015.
**FiberForge Automated Tape Placement Machine**

The RELAY Station 2000 includes a rapid tape dispensing system, which feeds composite tape through a track positioned above a two-axis motion table.

**Ultrasonic Welding Manufacturing Cell**

A flexible robotic sonic weld machine for the purpose of bonding reinforcements and attachments on thermoplastic part using a single robot weld cell and (3) interchangeable tool carts.

**Stratysys Fortus 900**

The Fortus 900mc 3D Production system prints accurate, repeatable parts as large as 914 x 610 x 914 mm (36 x 24 x 36 in.). With 12 material options, it’s suitable for building fixtures, factory tooling and end-use parts, as well as the most demanding functional prototypes.

**Techni-Modul Fast Reaction Press**

1000 metric ton press system for thermoplastic and thermoset structural composites. Utilizing IR heaters and a robotic preform transportation system.

**Pilot Manufacturing Line**

- Composite Material Selection
- Thermoplastic Prepreg Tape
- Automated Tape Laying
- Blank
- Automated Transport System
- Thermoforming Press
- Consolidated Part
- Automated Ultrasonic Welding
- Mold
- Part or Mold Assembly
- Trimming and Shaping Station
- Final Part