

# **DEVEDM** ADVANCED COMPOSITES LAB

### LABORATORY INFORMATION FACT SHEET

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DEVCOM's Benét Laboratories has extensive experience in the field of composite materials that spans the entire lifecycle of composite parts, starting with research, and moving into design, analysis, development, manufacturing, and forensics.

## TECHNOLOGY/FACILITY DESCRIPTION:

Research efforts have included studying high temperature composites for gun applications, multi-scale modeling techniques, and how the cure properties of thermosetting composites change over time. Development efforts have included the

XM360 120 mm tank gun, the electromagnetic railgun, the ATO MOUT shoulder fired munition, and a lightweight 81 mm mortar system. Current work involves more research in high temperature composites, and systems involving metal matrix composites, carbon-carbon composites, and 3D weave structures.

Composite testing and prototyping is performed in Benét's Advanced Composites Launcher Laboratory, which is co-located with Watervliet Arsenal's composites production facility, ensuring a seamless transition of design from concept to production. Benét's prototyping capabilities include fiber placement with both thermoset and thermoplastic material, filament winding, hand layup, and compression molding with both polymer and metal matrix composites. Thermoplastic tape placement can be performed at elevated tension levels to produce prestress in the final part. Research can be performed on new materials and manufacturing methods using a variety of resources such as a rheometer which can be used for cure monitoring and modeling. Benét engineers have access to a wide array of modeling techniques that can be used in the design of new parts, helping to ensure that the best products make their way into the warfighter's arsenal.



#### EQUIPMENT AND EXPERTISE AVAILABLE:

- Six Axis Fiber Placement Machine (3' x 34.5') Thermoset/ Thermoplastic Capability, Variable Tension demonstrated up to 80 ksi with Thermoplastics
- Entec Two Axis Filament Winder (30" x 14' Capability)
- CNC Prepreg/Cloth Cutter (6' x 16' table)
- Walk-in Oven (5' wide x 8' deep x 6' tall)
- 60 kip Instron with T-Slot Table for mounting large parts

- 3' x 24' Optical Table for precision setups
- Two Laboratory Sized Autoclaves
- 150 ton Heated Platen Press capable of 1300 °F
- Rheometer for measuring viscoelastic properties
- Rheometer can be used to control autoclave cures
- Access to Arsenal's production winders, ovens, and autoclave
- Design and Analysis of polymer, metal, ceramic, and carbon/ carbon composites
- Thermoplastic part fabrication and testing
- Thermoset part fabrication and testing
- Nano-composite fabrication and testing
- Composite material property testing
- Verification of composite material cure cycles
- Forensics of failed composite parts



