



## HIGH PERFORMANCE FIBER FACILITY (HPFF)

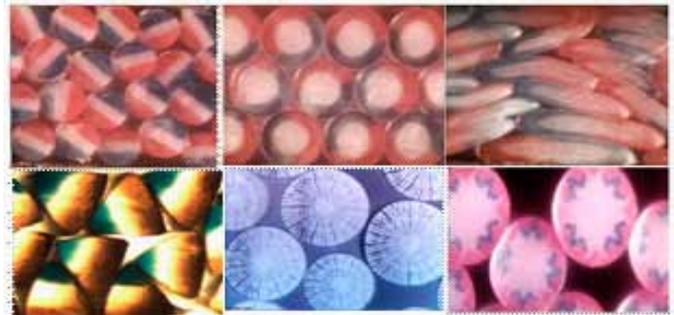
### OBJECTIVE:

The High Performance Fiber Facility (HPFF) will combine Natick Soldier Research, Development, and Engineering Center (NSRDEC), academia and industry expertise in novel fiber/textile technology to invent and rapidly transition new optical, electronic, high strength, flame retardant and reactive materials to Warfighters and First Responders.



### CAPABILITIES:

The HPFF utilizes a melt spinning fiber extruder to uniformly mix additives into polymers, and houses extensive multi-scale fiber extrusion equipment including a mono/bi/tri-component system. The capacity of this extruder is 1-6 pounds/hour and features three separate heating blocks to optimize extrusion of polymers with different melt profiles. Cross-section types include side-by-side, sheath/core, islands-in-the-sea, delta bi/tri triangle, saw tooth, and segmented pie morphologies. In addition, a lab scale DACA Spinline comprised of a piston extruder, two Godet rolls, and take up system can be used to process gram quantities of materials to make monofilament fibers. A lab scale DACA microcompounder is available to prepare small quantities of material containing additives for the DACA Spinline. Accessories include a yarn twister, semi-automated loom, knitting machine, and braiding machine. Mono/bi/tri-component fibers can be used to develop lighter, reactive/responsive fabrics that will make the wearer safer, more comfortable and have higher performance, in soft shelter, parachute, vehicle and numerous household fabric applications.



The HPFF's fiber extrusion capabilities are complimented by the NSRDEC's state-of-the-art analytical capabilities. Fiber/yarn/textile analysis is accomplished using Scanning Electron Microscopy, Transmission Electron Microscopy, Environmental Electron Microscopy, and Atomic Force Microscopy. Instron mechanical analysis, thermal analysis, x-ray diffractometry, nuclear magnetic resonance spectroscopy, liquid chromatography/mass spectrometry and laser evaluation are also available.

Fiber/yarn samples can be combined using a Yarn Doubling and Twisting Machine model UNI 1X1 750 for use in textile production. Woven and knitted textile samples can then be produced using an AVL Yarn Twister Industrial Dobby Loom Model IDL-24, with a 24 inch cloth width and a Fiber Analysis Knitter Sampler, Model FAK-Sampler, respectively. In addition, braided yarn samples can be produced using a braiding machine capable of producing 1/8" maximum diameter with multiple braid patterns.



Yarn Twister

Knitting Machine

Braiding Machine

Dobby Loom 24 in. Cloth Width

UNCLASSIFIED

REV 03-01-12 | OPSEC 07-77



**RDECOM**



**HPFF RESEARCH & DEVELOPMENT OPPORTUNITIES:**

For HPFF R&D opportunities please visit the Natick Soldier RD&E Center website at [nsrdec.natick.army.mil/business/](http://nsrdec.natick.army.mil/business/). The "Doing Business with Us" section includes detailed information on Broad Agency Announcement (BAA) opportunities for "High Performance Bi/Tri-component Fibers," CRADAs, and Testing Agreements.

**POINT OF CONTACT:**

**Warfighter Science, Technology and Applied Research (WarSTAR)**

COMM: 508-233-4577/6481, DSN 256-4577/6481

E-MAIL: [nati-amsrd-nsc-ss@conus.army.mil](mailto:nati-amsrd-nsc-ss@conus.army.mil)

**UNCLASSIFIED**

**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**