

NATICK SOLDIER CENTER

TESTING SERVICES BROCHURE



DEPARTMENT OF THE ARMY

U.S. ARMY Soldier and Biological Chemical Command

Research, Development and Acquisition Enterprise

Kansas Street Natick, MA 01760-5000

CONTENTS

Introduction

Testing Services

- a. Airdrop Testing Capabilities
- b. Climate Testing Capabilities
- c. Food and Packaging Testing Capabilities
- d. Textile Testing Capabilities
- e. Prototype Fabrication Shops
- f. Sample of Testing Agreement

Low-cost testing for your products and materials

Helping our clients in private industry

How can we help your business grow?
Why use Natick's Testing Services?

We are an Army Research, Development & Engineering Installation (RD&E) with a varied mission and product line. As a result of our being a premiere government facility we support the entire Department of Defense community as well as Federal, State and Local government agencies. Our testing facility and Services are located at the Natick Soldier Systems Center in Natick, Massachusetts—only 20 miles west of Boston.

In a cavernous hall the temperature drops or soars through a 235-degree range, and the wind speed climbs to 40 miles per hour.

...Visit the Doriot Climatic Chambers to see how we run tests on products *and* people under extreme conditions.

What happens to a 5-ton truck when it falls from a great height and hits the ground?

...Visit the 45-foot Drop Tower to find out how we measure the shock of impact for almost *any* size product.

A syringe draws a sample of air from a sealed package. How much oxygen does it hold?

...Visit the Packaging Materials Testing Laboratory to learn how we use that information to extend the shelf life of food.



Welcome to the Soldier Systems Center-Testing Services. As a subordinate organization of the U.S. Army Materiel Command and Soldier and Biological Chemical Command, we have numerous testing capabilities that can enhance your company's success. Thanks to the passing of law 10 U.S.C. § 2539b, we can now offer our testing services to private industry. Being a Government RD&E Center, we are not allowed, by this law, to make a profit on our testing services. Therefore, we can pass the benefit of low cost on to you. This will allow you to come in under your budget costs [saving you money and time](#).

How can we help your business grow?

You can turn to us to perform more tests and lower your costs for many specialized tests.

You can contract testing operations with us, or send your own staff to use our testing equipment on site.

We offer:

- + Low-cost services
- + Unique testing facilities
- + Highly rated and experienced staff
- + State-of-the-art equipment
- + Test plan development, data analysis and report preparation

Why use Natick's Testing Services?

- + We'll work with you on any size project, no matter how large or small your needs.
- + We have provided testing for the U.S. Armed Forces for over 45 years. This experience reflects the type of quality service and reliability that you can depend on to evaluate your product.
- + We're inexpensive—our equipment, facilities and staff are already in place, minimizing your out-of-pocket expenses for specialized testing.

You can be confident with the results you receive from our testing professionals. We have been conducting tests on food, clothing and equipment of various types for years for our military. We know from experience the value of obtaining reliable data, with the welfare of America's sons and daughters serving in our Armed Forces depending on it. That same care goes into all testing procedures regardless of whom it may be for.

Developing a working relationship based on dependable service is an effective way to avoid a crisis. We can offer you the testing experience and skills you need to complete a special project or meet an important deadline.

Why wait until you reach a critical point in you project? Give us a call at (508) 233-4184, (508) 233-5192 or get in touch with us at our web site (<http://www.sbccom.army.mil/>), so that we can work together to keep your business running smoothly without delays.

Roller Test Facility

What it is

A roller bed moves the cargo to the rear of a plane, where it can be unloaded or dropped from the air while the plane is in flight. Our Roller Test Facility is a mock-up of the roller bed from a Cargo aircraft.



How it works

The Roller Test Facility uses 136-instrumented rollers to make measurements on the cargo. We can:

- + Measure the cargo's size, weight, and center of balance
- + Use our **Drop Tower** crane to test all points where the cargo is tied down
- + Test special "honeycomb" materials that support the cargo and help keep it intact

Benefits

Rapid response...All work is performed in-house with a short turn-around time.

Special capability...We can simulate up to 80,000 pounds of force on cargo that's pulled from a plane by parachute.

How we can help our clients in private industry

Rollers can ease the transport of a heavy load inside a plane... but is your cargo putting too much weight on the roller bed? And will all the ties and rigging hold?

For our clients in the aircraft and air transport industries, Natick's instrumented roller bed helps provide the answers you need to move cargo safely.

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Ultralight Aircraft for Parachute Airdrop

What it is

“Ultralight” means our aircraft weighs just 295 pounds. We test experimental designs and procedures before they are carried out in full-size aircraft.



How it works

Some of our special testing equipment:

- + Onboard **video systems and data loggers** that let us analyze data as we record it
- + Some of the **fastest recorders available**—including accelerometers and altitude recorders

Ultralight Aircraft Specifications

Maximum load	900 pounds
Maximum airspeed	125 miles/hour
Maximum altitude	5,000 feet

Benefits

Accessibility...We can access this site (just 15 miles from Natick) and be in the air in less than 90 minutes.

Remote control...We can fly when most planes are grounded.

Cost savings...This aircraft is hi-tech but low-cost to operate.

How we can help our clients in private industry

You can use our ultralight aircraft and the launching site for flight-testing your new designs quickly and inexpensively.

What can you test? Here are some of the systems we've worked with:

- + Model and experimental parachutes
- + Air-launched aircraft
- + GPS guidance systems
- + Air-to-air and air-to-ground video systems
- + Still-photo reconnaissance systems

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Drop Tower

What it is

Your product falls from a great height and hits the ground. How badly is it damaged? The Drop Tower lets us simulate and measure that shock of impact.



How it works

The Drop Tower has two parts: an overhead crane with a weighted hook that holds and releases the test load; and below it cement pad. We fully instrument the test load to measure the impact shock and other variables, like temperature and pressure.

Drop Tower Specifications

Crane height	39 feet
Crane capacity	40 tons
Cement surface	40 square feet

Benefits

Controlled conditions...We carefully regulate the test environment and use only proven test methods.

Special features...We also provide photo and video coverage of the test.

How we can help our clients in private industry

We've tested products ranging from 5-ton construction vehicles to rock climbing and rappelling equipment.

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Doriot Climatic Chambers

What it is

Products and people endure extremes - of temperature, rainfall, humidity, and wind - in the Climatic Chambers. We **test equipment** and study **human physiology** under controlled conditions.



How it works

Our world-class facility is the largest of its kind for human research. In two large wind tunnels, we can simulate environmental conditions occurring anywhere in the world.

WIND TUNNEL SPECIFICATIONS

Dimensions	10 ft. high by 15 ft. wide by 60 ft. long
Temperature	Arctic: -70 to 120 °F Tropic: 0 to 165 °F
Rainfall	Up to 4 inches per hour
Relative humidity	10 to 90 percent
Solar load	Simulates exposure to the sun with 6 rows of 250-watt light bulbs
Wind speed	Up to 40 miles per hour

Two conditioning rooms prepare products for actual testing by bringing the temperature and humidity slowly up or down.

Benefits

Controlled conditions...Temperatures are maintained to ± 1 degree. We are unique in achieving high humidity under extreme conditions.

Competitive costs...Our reasonable rates include two operators with the use of the facility. We tailor each contract to meet your needs.

How we can help our clients in private industry

Whatever your product, clothing, scientific equipment, or automobile coatings, the Chambers let you discover *how* and *why* it's affected by extremes of weather. Rough environments pose risks to people too. We can have human subjects live in the Chambers for prolonged periods of time to conduct research in a controlled climate.

Contact

Climatic Chambers Team

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Raincourt Facility

What it is

The raincourt brings rainfall into a controlled, indoor setting...at rates up to 3 inches per hour. When designs fail and seams leak, the raincourt lets us find the reasons.



How it works

This facility measures 40 feet by 40 feet, making it *one of the largest raincourts* in the United States. That means we can evaluate products as large as full-scale truck covers. Human test subjects have room to perform exercises (such as riding a bicycle) that help identify design problems in their wet-weather clothes.

Benefits

Accessibility...The raincourt can be used year round.

Cost savings...We eliminate the need for expensive field-testing.

How we can help our clients in private industry

Can your product withstand a tropical rainfall? Use the raincourt to test the wet-weather performance of any item. We've tested

- + Raingear, camping equipment, awnings, and human subjects.
- + Water-repellent treatments
- + Water-resistant seams

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Container Testing

What it is

Microwavable packaging... biodegradable materials... food trays for the Armed Forces... we constantly test and improve packaging designs to keep food fresh and protected in new situations.



How it works

Our specialized equipment lets us

- + Mimic all the falls and vibrations a package endures during shipping and handling
- + Make and fill packages on-line to simulate commercial production runs
- + Test how well packaging performs in rough weather like desert, arctic, and tropical conditions, using the packaging environmental chambers

The Equipment

- + Metal Traycan #10 can Seamers
- + Polymeric Tray Heat Sealer
- + Vacuum/Gas Flush Pouch Heat Sealer
- + Pouch Maker
- + Vibration Tables
- + Environmental Chambers
- + Drop Tester
- + Horizontal Form-Fill Seal Machine
- + Compression Tester

Benefits

Longer life... Our tested packaging designs can help extend the shelf life of your product.

Experienced staff... We're extremely knowledgeable about fabrication details and emerging technologies.

How we can help our clients in private industry

Dropped, shaken, squeezed... whatever rough handling your packaging might endure, we have the equipment to test it.

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Packaging Materials Testing Laboratory

What it is

Good packaging keeps food fresh and intact. We test the performance of new materials for packaging food or any other product.



How it works

Our testing equipment measures:

- + The force needed to break a material or break a seal
Why? The test shows whether a package will stay intact.
- + How fast water and oxygen pass through a packaging material
Why? Oxygen and water are two primary culprits for food spoilage.
- + The amount of oxygen in a sealed, airtight package
Why? Keeping the percentage of oxygen low helps extend shelf life.

The Equipment

- + Instron Tensile Strength/Seal Strength Tester
- + Mocon Water Vapor/Oxygen Transmission Rate Tester
- + Headspace Oxygen Analyzer

Benefits

Comprehensive... Working with Natick's Container Testing Lab, we can analyze, fabricate and test packaging all at one site.

Special facilities... We use Natick's tensile/compression machines to measure the strength of a single packaged container/pallet load of packages.

How we can help our clients in private industry

Will your packaging break under pressure? Or let your food product spoil? We have all the equipment needed to test the effectiveness of new packages and packaging materials.

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Advanced Food Processing and Chemical Analysis Laboratory

What it is

What ingredients will make the best new sandwich? Will the food stay stable as it's shipped and stored? And how will soldiers in the field respond as they eat it? To answer these kinds of questions, we:

- + analyze new food samples and quantify their chemical composition, structure and texture
- + investigate and improve methods of processing and preserving food products

How it works

Our production equipment, all on a pilot plant scale, includes:

- + **meat-processing chamber...**Meat products are processed in a large, temperature-controlled oven.
- + **starch research and baking area...**We use commercial-scale ovens and proofers.
- + **freeze dryers...**Removing moisture from food products makes a lightweight and compact product.
- + **steam retorts...**These large-scale pressure cookers are used to steam-heat packaged food at high temperatures in short times.
- + **twin screw extruder...**Using computer control, the extruder accurately apportions food into packaging.
- + **continuous processor/sealer system...**Pureed foods are transported into collapsible tubes and sealed for preservation.
- + **laboratory encruster (Rheon Model KN300)...**This special equipment can extrude three components together to form a wide variety of food products.
- + **solution colorimetry, pressurized microwave digestion, and MALDI - TOFMS Mass spectrometry chemical reaction calorimeter and pressurized microwave oven...**These are valuable tools for the chemical and structural characterization of food samples.
- + **food yield quantifier...**We can relate the weight and volume of initial "as purchased" and final "edible portion" quantities of food items, which eliminates guesswork in the purchase of raw materials and minimizes waste.
- + **high pressure processing unit.**

Benefits

One stop...Our lab offers all of this preparation and processing equipment at one location.

Economy of scale...Our pilot-plant scale equipment is easier to work with, generates less waste and allows us to test a large number of variables.

How we can help our clients in private industry

Use our equipment to evaluate your food items and support their small-scale production. Our processing experts—including food technologists, chemists, packaging specialists and microbiologists—are on-site to provide assistance and advice on product development.

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Small Burner Test Facility

What it is

Soldiers in the field need a source of heat: for food, for shelters and for the water used in rations, laundries, kitchens and sanitation. We develop and test small fuel-fired burners that produce heat in the field. We also test equipment—like showers and camp stoves—that the burners are used in.

How it works

The “small” in our small burners means that they’re usually portable, with heat outputs that range from 2,000 BTU/hour (the pocket stove) up to 350,000 BTU/hour (the thermal fluid heaters).

Some of our special testing equipment:

- + **A thermal imager** makes infrared images that give a complete picture of the burner’s temperature over time
- + **Gas measuring devices** that measure O_2 , CO , CO_2 , NO , NO_2 , SO_2 , NH_3 and $CHOH$
- + **An ultrasonic flow meter** that measures fluid flow rates in pipes and tubes

Benefits

Our tests ensure that the burners meet these standards:

- + Clean and efficient combustion
- + Safe and reliable performance
- + Easy operation and maintenance

How we can help our clients in private industry

We can test the performance of any small burner or fuel-fired appliance—such as propane stoves used in the camping industry.

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Sensory and Consumer Testing Laboratory



What it is

This laboratory is capable of conducting a wide range of studies to characterize the sensory properties of and consumer responses to foods, beverages, fabrics, clothing items, and other consumer products. The facility consists of 9 individualized and light-controlled sensory testing booths that adjoin a standard test preparation kitchen and panelist reception/wait area. Each sensory booth contains a computer terminal, keyboard and mouse for on-line data acquisition. Data collection is controlled by a PC-network system that integrates panelist interface terminals with multiple experimenter terminals, used for test design and construction, monitoring of sample presentation, and data analysis. The system uses SIMS 2000 sensory software and enables the conduct of a wide range of standardized and/or customized sensory and consumer test paradigms. Typical protocols include, but are not limited to, sensory thresholds; detection and discrimination tests, e.g. duo-trio, triangle, etc.; sensory intensity ratings, including visual analogue scales and free-format magnitude estimation; descriptive profile techniques, e.g. flavor, texture, and handfeel evaluations; hedonic testing, using 9-pt hedonic scales, semantic ratio scales, etc.; and standard survey data collection techniques.

The laboratory makes use of other in-house facilities, including sensory descriptive panel rooms, focus group rooms, and two environmentally-controlled fabric conditioning rooms. Trained flavor, texture, and handfeel panels are available for descriptive sensory testing. Extant human use protocols enable testing of a wide range of FDA-approved and experimental products, and a large volunteer consumer panel (~ 350 individuals) is available for use in consumer testing protocols.

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3-D Anthropometric Data

What it is

What is the geometry of a body shape? And how do body shapes differ among different human populations? These questions are answered in a branch of research known as three-dimensional anthropometry.

How it works

We use CyberwareO digitizing systems to record the three-dimensional (3-D) shape of a person's head and to scan 95% of a standing person's body. That lets us collect 3-D information about human shape differences. The data can be imported to computer software that helps us:

- + Design new clothes.
- + Evaluate how well clothing and equipment fits the human wearer.
- + Make prototypes.

Benefits

Less time, less money... We can collect 3-D data quickly and accurately, *and* we can use that data in computerized design—two fast, cost effective tools for developing clothing and equipment.

How we can help our client in private industry

Use our scanning systems and design software to gather information about body shapes and optimize the fit of any clothing...from business suits to uniforms.

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3-D Digitizer

What it is

How well does a helmet cover your head? Are there any air gaps in your layers of protective clothes? These are the kinds of questions we can answer using the digitizer, a laser that helps us make 3-D models of objects.



How it works

A low-power laser projects a stripe of light onto the surface of an object. In just a few milliseconds, the stripes are translated into points in space to make an image on a computer screen.

Benefits

Designing and engineering...Our 3-D models can be imported and manipulated by computer-aided design and engineering (CAD/E) software.

Capturing complex shapes...This technology is particularly useful for items with irregular geometries.

How we can help our clients in private industry

We can digitize a face, a head, a whole body...and anything you might wear, from uniforms to backpacks to shoes. How can you use our 3-D digitized models?

- + As a base for building equipment, much as a dress form is used for making clothing patterns
- + As objects in virtual reality applications
- + In simulations for testing and research

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Ballistic Test Chamber

What it is

A small projectile speeds toward you at hundreds of feet per second. Will your eyewear survive the impact? The Ballistic Test Chamber lets us test how well eyewear and other safety gear provides protection from ballistic hits.



How it works

Some of our special facilities:

- + A **ballistic gun** fires the fragments. Eyewear fails the test if the fragments pierce the foil behind it.
- + A **weatherometer** simulates exposure to the sun before testing.
- + An **environmental chamber** lets us test at extreme temperatures (-73 °C to 200 °C).

Benefits

Standard methods...We can test protective equipment against the requirements of any ANSI or military specification.

Controlled environment...Computer control keeps our chamber at the desired temperature.

How we can help our clients in private industry

Protection from projectiles...whatever your equipment, we can test it. Our experience comes from extensive tests on eye armor for the military.

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Individual Armor Laboratory

What it is

From head to toe, from helmets to overboots whatever protective gear you use, we have all the equipment and tools needed to ***make, repair and test it.***

How it works

We have access to these special facilities:

- + ***Computer-aided design and engineering:*** lets us create and analyze new designs
- + ***Headset analysis:*** tests whether headsets block unwanted noise or useful sounds
- + ***Helmet impact tester:*** tests how well helmets stand up to impacts

Benefits

Computer capabilities...We can streamline production by sending designs directly to computer-controlled manufacturing machines.

How we can help our clients in private industry

We're a "one-stop shop" for testing your protective equipment: our lab team will work with you to lay out equipment and hardware, experiment with designs, and test your products.

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Rapid Prototype System

What it is

What's the best way to experiment with a new design for a part without going through the time and expense of manufacturing it? Make a prototype first. We build precise three-dimensional objects of any shape.



How it works

Our design engineers use modeling software (Pro Engineer) to create the data for any 3-D shape. Or we can use data generated by *your* software - Laminated Object Manufacturing (LOM).

We build parts up to 32 by 22 by 20 inches. If you need a larger part, we can join separate pieces.

Benefits

Special tools...We can build the tools needed for resin casting and vacuum forming.

Dramatic savings...You'll see big reductions in time and cost over traditional methods of making prototypes.

Better designs...We can explore different "what if" scenarios to optimize your design.

How we can help our clients in private industry

From hardware mockups to scale models...we build prototypes to help design and develop any product. That means you can test new concepts quickly while spending less time and money.

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Helmet Impact Tester

What it is

Helmets can protect you from head injuries, brain injuries, even death. We simulate crashes to test new helmet designs and helmet materials (like foam pads).



How it works

To test a helmet, we raise it high on a monorail, and then drop it onto a steel anvil.

The key question is this: how well does the helmet keep energy from being transferred to the head? The less energy transferred, the better the protection. We get that information by making measurements on the helmet such as its velocity and deceleration at the time of impact.

Benefits

Real-time testing...We get immediate results that let us experiment with different designs and materials.

Compliance...Our tester conforms to specifications set by ANSI, ASTM, DOT, and the National Firefighters Protective Association.

How we can help our clients in private industry

Wearing a helmet, according to a report from the Bicycle Helmet Safety Institute, could prevent Eighty-eight percent of bicyclists' brain injuries. Use our Helmet Impact Tester to test the performance of any industrial or commercial helmet.

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Uniform Prototyping and Computerized Pattern Grading

What it is

Clothing, like people, comes in all styles and sizes. We can make any pattern using computer-aided design. Our prototypes let us test how well clothing fits and lasts.



How it works

To make patterns... We create, plot and cut patterns using the computerized Apparel Design System. We can generate any size from one "master" pattern.

To make prototypes... Our clothing designers have access to a battery of specialized equipment including sewing, fusing and ultrasonic machines.

To create sketches... We can create sketches of designs utilizing a computer-aided design tool for illustrations showing color, texture and prints of woven or knit fabrics. This tool places the drawings in the designer's hands before creating a prototype, maximizing performance which reduces development time.

Benefits

Skilled staff... Our expertise comes from 100 years of combined experience with military systems.

Personalized service... We'll work with you one-on-one and respond quickly to your changing requirements.

Award winner... We've been named the Department of Defense Center of Excellence for Clothing and Textiles.

How we can help our clients in private industry

From sporting clothes to combat uniforms to formal wear...we'll make the patterns for any clothing. We can put together data packages for large-scale orders.

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Camouflage Evaluation Facility

What it is

You're under a moonlit sky in the desert...but you're not outside. This is the Camouflage Evaluation Facility, where we test camouflage patterns year round in our novel indoor settings.



How it works

The setting

We use four controlled settings: arctic, desert, urban and woodland with realistic details like live plants and simulated day and night skies.

The tools

Effective camouflage blends well with its background and, like nature, resolves over distance. Our trained observers use the unaided eye, night vision devices, and special sensors to compare the patterns and colors of the camouflage and its setting.

Our unique *Terrain Analysis System* collects data on videotape from any environment. We use the data to develop stripes and colors for different background patterns.

Benefits

Reliable data...Unlike outdoor test sites, our facility provides a consistent background.

Cost savings...We can save you time and money by weeding out ineffective patterns before committing to expensive field-testing.

How we can help our clients in private industry

Use our facility to design and test your camouflage patterns quickly and inexpensively. What can you test? Just some of the products we can work with:

- + Camouflage clothing
- + Camping equipment
- + Face paint
- + Law enforcement apparel
- + Sporting and hunting equipment

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Shade Room

What it is

What makes fuchsia different from purple? We evaluate colors and the differences between colors using instruments *and* the human eye.



How it works

Our specialized equipment includes:

- + **Spectrophotometer**...gives us a numerical basis for judging shades
- + **Glossmeter**...measures the shine or glare from a surface (like the finish on a helmet)
- + **Color matching table**...a standardized way of differentiating colors with the human eye

Benefits

Controlled conditions...We carefully regulate the test environment using, for example, calibrated light sources.

Versatility...Using the human eye together with machines gives us a visual check on our numerical evaluations and can also save you time and money.

How we can help our clients in private industry

A royal blue uniform, a bright red sports car...we can set standards and tolerances for the color of any product, from textiles to paints and plastics. Our customers have included the U.S. Army and the U.S. Postal Service.

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Stitchless Fabrication

What it is

Sewing is the best mechanical way to join two pieces of fabric but each stitch can damage the material. So what are the alternatives? We're exploring new "stitchless" ways to make seams and bond textiles.



How it works

Some emerging technologies:

Fusion means joining two pieces of fabric by melting. We're using ultrasonics, extremely fast vibrations that cause materials (100% synthetic, or blends with up to 40% natural fibers) to heat up and fuse together, creating a strong seam.

Adhesives are applied wet to cover a fabric's whole surface, then dried to form a strong, solid bond. Adhesives like fast-drying "hot melts" can work so well that the fabric will break before the seam.

Benefits

Low costs...We keep the cost of labor down by seeking the simplest alternative to sewing.

Reduced bulk...Stitchless fabrication cuts down on the heavy layers of fabric at the seam, making the final product strong and light.

Faster production...Stitchless techniques save time, particularly on repairs.

How we can help our client in private industry

Turn to us whenever you need a strong, all-weather seam. Whether it's camping equipment, sporting clothes, webbing, or parachutes...we'll work with any textile product.

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Wet and Dry Performance Testing

What it is

Tearing ...laundrying...burning...what conditions will your textile product endure? And how will it perform? We run all physical wet and dry performance tests on textile materials.

How it works

Our tests conform to industry standards like those of the American Society of Testing and Materials (ASTM) and the American Association of Textile Chemists and Colorists (AATCC).

Click on each category for a complete list of tests and methods.

[Abrasion and pilling testing](#)

[All materials testing on battings](#)

[Blocking](#)

[Color analysis](#)

[Colorfastness testing](#)

[Dimensional stability testing](#)

[Flame resistance testing](#)

[Guarded hot plate testing](#)

[Microscopy testing](#)

[Physical testing](#)

[Water resistance testing](#)

[Weathering](#)

Benefits

Controlled environment...We carefully maintain both temperature and relative humidity.

State-of-the-art equipment...Our equipment is calibrated regularly to ensure accurate results.

How we can help our clients in private industry

Now our years of experience with performance tests for the military are available to all textile manufacturers. You can:

- + Verify that your product's characteristics **meet specifications**
- + **Establish new criteria** for your developmental materials

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Abrasion and Pilling Testing

Test Description

Brush pilling
 Frosting
 Gelbo flex
 Inflated diaphragm
 Mace snag
 Random tumble pilling
 Stoll flex
 Taber
 Wyzenbeek

Standard Test Method

ASTM-D-3511
 AATCC-119
 ASTM-F-392
 ASTM-D-3886
 ASTM-D-3939
 ASTM-D-3512
 ASTM-D-3885
 ASTM-D-3884
 ASTM-D-4151

All Materials Testing on Battings

Test Description

Compression (with Instron)
 Water absorption
 Weight and bulk

Standard Test Method

Federal tests
 ASTM-D-1117 (modified)
 Federal tests

Blocking

Test Description

Adhesion of coating
 Cold box
 Cold crack
 Oven aging

Standard Test Method

ASTM-D-751
 ASTM-D-751
 ASTM-D-751
 ASTM-D-751

Color Analysis

Test Description

Instrumental shade evaluation
 Near-infrared reflectance (per color)
 Opacity
 Transmittance
 Visual shade evaluation

Standard Test Method

AATCC-Proc 7
 Federal tests
 FED-TM 5780, 5781
 Federal tests
 Federal tests

Colorfastness Testing

Test Description

Bleaching with chlorine
 Crocking
 Laundering
 Light
 Perspiration

Standard Test Method

AATCC-101
 AATCC-8
 AATCC-61
 AATCC-16
 AATCC-15

Dimensional Stability

Test Description

Crease retention
 Physical surface appearance change
 Soil release
 Wash with appearance evaluation
 Fabrics
 Garment
 Washing shrinkage
 Wrinkle recovery of fabrics

Standard Test Method

AATCC-88C
 Federal tests
 AATCC-130

 AATCC 124
 AATCC 143
 AATCC 135, 150
 AATCC-128

Flame Resistance Testing

Test Description

Camping industry standard
 Percent consumed
 Thermal protection performance
 Vertical
 Guarded Hot Plate Testing

Standard Test Method

CPAI-84
 FED-TM-5905
 ASTM-D-4184
 FED-TM-5903.1

Test Description

Steady state heat flux measurements
 and thermal condition properties
 by means of a heat flow meter apparatus
 Thermal resistance
 Water vapor resistance

Standard Test Method

ASTM-C-518

 ISO 11092
 ISO 11092

Microscopy Testing

Test Description

Atomic force microscope
 Light microscope
 Reflected light
 Scanning electron microscope
 Transmission electron microscope
 Transmitted light

Standard Test Method

Visual
 Visual
 Visual
 Visual
 Visual
 Visual

Physical Testing

Test Description

Adhesion of seam tape
 Air permeability
 Ball bursting strength
 Bond strength
 Breaking strength (cut strip method)
 Breaking strength (grab method)
 Breaking strength (ravel strip method)
 Denier
 Fiber analysis
 Moisture vapor transmission rate
 Peel strength
 pH
 Puncture propagation tear
 Seam strength/efficiency
 Static decay
 Stiffness (Cantilever)
 Stiffness (Clark)
 Tearing strength (Elmendorf)
 Thickness
 Twist
 Yarn number
 Yarns/inch
 Weight

Standard Test Method

ASTM-D-751
 ASTM-D-737
 ASTM-D-3878
 ASTM-D-751
 ASTM-D-5035
 ASTM-D-5034
 ASTM-D-5035
 Universal yarn balance
 AATCC-20
 ASTM-E-96
 ASTM-D-751
 AATCC-81
 ASTM-D-1922
 ASTM-D-1683
 FED-TM 5931
 ASTM-D-747
 Federal tests
 ASTM-D-1424
 ASTM-D-1777
 ASTM-D-1422
 ASTM-D-1907
 Visual
 ASTM-D-3776

Water Resistance Testing

Test Description

Hydrostatic pressure, low and high
after abrasion
after chemical contamination
after cold crack
after Gelbo flex
after high humidity
after strength of coating
Dynamic absorption
Resistance to organic liquids
Spray rating

Standard Test Method

ASTM-D-751
Federal tests
AATCC-70
AATCC-118
AATCC-92

Weathering

Test Description

Accelerated laundering
Carbon arc
Weathering
Xenon

Standard Test Method

Federal tests
AATCC-111
AATCC-169
AATCC-169

Microscopy Laboratory

What it is

Microscopes use light or electrons to magnify tiny objects. With these images we can learn more about how materials are put together, down to the level of atoms.



How it works

We can characterize materials using our many traditional optical microscopes. But we've also assembled a battery of equipment that lets us do more specialized work:

Atomic Force Microscope

Laser Scanning Confocal Microscope

Transmission Electron Microscope

Scanning Electron Microscope

Environmental Scanning Electron Microscope (ESEM) *...our newest acquisition!*

Energy dispersive x-ray analyzer for the ESEM

With these microscopes we can look carefully at the surface *and* the internal structure of materials. The ESEM heats and cools samples and even lets us analyze wet samples, something a conventional SEM can't do.

Benefits

Versatility...Our microscopes give us a wide range of capabilities to meet your research needs.

Experienced staff...Our personnel have formal training and years of hands-on experience.

How we can help our clients in private industry

Use our microscopes to study the inside and outside of materials from fabrics to finishes to food. A sampling of our analyses:

- + The chemical composition of stains and finishes on fabrics
- + The diameter of spider silk
- + The effects of ballistic impacts
- + The particle sizes in face paints and powders
- + The structure of composite and ceramic materials
- + The structure and functionality of food

Contact

Phone: DSN 256-6481

COMM: 508-233-6481

E-mail: AMSSB-RSC-B@natick.army.mil

Spectrophotometer Evaluation

What it is

Together, all the wavelengths found in nature from long-wavelength radio waves to short-wavelength gamma rays are known as the “electromagnetic spectrum.” We see only a bit of that spectrum as visible light, with different wavelengths appearing as different colors.

A spectrophotometer measures *how much light passes through a material at different wavelengths* throughout the spectrum.

How it works

We use a spectrophotometer called a “Lamba 9 UV/VIS/NIR.” That means we can make measurements from the ultraviolet...through the visible...to the near-infrared parts of the electromagnetic spectrum.

Benefits

Knowledgeable staff...We have 58 combined years of experience using spectrophotometers.

Cost savings...We charge low rates for the use of our equipment.

How we can help our clients in private industry

How much light can pass through your product? That’s critical information for items like eyewear and dyes. Use our spectrophotometer to get the data you need.

Contact

Phone: DSN 256-4478

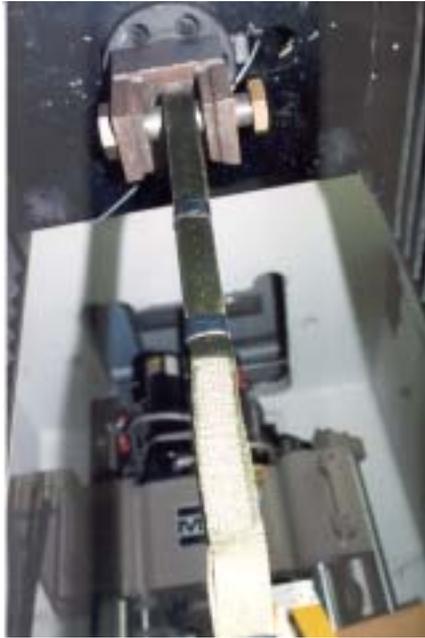
COMM: 508-233-4478

E-mail: AMSSB-RSC-B@natick.army.mil

Tensile/Compression Machines

What it is

A block of concrete is squeezed with a tremendous force until, at last, it crumbles...Our machines use “tensile” or “compressive” forces to pull or push on a material until it breaks. That tells us how strong and how elastic the material is.



How it works

Machine

Servo-hydraulic
Screw [Instron 1128]

Capacity

550,000 pounds
112,000 pounds

The servo-hydraulic machine uses “cyclic” control commands, a special feature that lets us measure strength by quickly loading and unloading a material with a large force.

Benefits

Large capacity...Our machines can handle materials with high breaking strengths.

Standard methods...We use test methods dictated by ASTM and federal standards.

How we can help our clients in private industry

How much stress and strain can your product withstand? We’ve tested the strength of materials from fabrics to metals.

Contact

Phone: DSN 256-5192

COMM: 508-233-5192

E-mail: AMSSB-RSC-B@natick.army.mil

Waterjet Cutting Equipment

What it is

With a high-pressure blast of water we can cut through stone... Our waterjet cutting equipment uses 50,000 pounds of pressure per square inch to cut any two-dimensional shape no matter how complex.



How it works

What materials can we cut? Any material... glass, metal, plastic, stone, wood... up to 5 inches thick.

What shapes can we cut? Any two-dimensional shape, using computer control for the greatest accuracy.

How do we make the cut? The water pressure supplies the energy... but a bit of garnet in the waterjet makes the actual cut.

Benefits

Environmentally safe... We cut materials without creating any heat or fumes.

A finished cut... The waterjet leaves no burrs or refuse behind.

How we can help our clients in private industry

We can make any 2-D shape you need in materials ranging from fiberglass to fabrics. The waterjet cuts your labor dramatically.

Contact

Mechanical Prototype Team

Phone: DSN 256-4061

COMM: 508-233-4061

E-mail: AMSSB-RSC-B@natick.army.mil

Tentage Prototype Shop

What it is

"Tentage" means tents, shelters, and canopies; almost any fabric structure. We make prototypes and even run small productions.



How it works

Our shop team can:

- + **Use CAD** (computer-aided design) to translate sketches into drawings
- + **Join fabric** with techniques that are resistant to water or chemicals

To make parts, we turn to Natick's full-service metal prototyping shop. To find out how well a product handles rough weather like desert and arctic conditions, or heavy rain we run tests at the [Doriot Climatic Chambers](#) and the [Raincourt Facility](#).

Benefits

Rapid response...Time-sensitive programs can usually be launched right away. **Experienced staff...**We're extremely knowledgeable about fabrication details, material properties and emerging technologies.

How we can help our clients in private industry

We can move you quickly from concept to hardware. Our prototype team lays out design options, helps you choose a method of fabrication, and recommends the best material for your product all with your performance requirements in mind.

Contact

Phone: DSN 256-4347

COMM: 508-233-4347

E-mail: AMSSB-RSC-B@natick.army.mil

Textile Pilot Plant

What it is

Print, dye, finish and dry...The Textile Pilot Plant lets us *scale up laboratory processes* for any textile material.



How it works

Our specialized production-scale equipment:

printing machine...produces five yards of full-width samples

dyeing jig...dyes and finishes full-width fabrics

padder...dyes and applies functional finishes (like water repellents and flame retardants)

pin tenter frame...dries and cures chemical treatments on fabrics

Benefits

Short turn-around time...We can repeat cycles quickly to let you “tweak” your formulation or process.

Cost savings...You’ll use less material and save money by running trials in our pilot plant.

How we can help our clients in private industry

Do you need just enough material to make and test prototypes? Do you need to pinpoint any problems in your production? Use the full-size production equipment at the Textile Pilot Plant.

Among our many successful programs, we’ve

- + Developed water repellents and applied them to raincoat fabrics
- + Created shade standards for a camouflage pattern used by the U.S. Armed Forces

Contact

Phone: DSN 256-6481

COMM: 508-233-6481

E-mail: AMSSB-RSC-B@natick.army.mil

**TESTING SERVICE AGREEMENT
BETWEEN
NATICK SOLDIER CENTER
&**

NAME OF TEST OR NATURE OF SERVICE: *(Brief Description)*

SPECIFIC ITEM TO BE TESTED: *(List or explain)*

PURPOSE: *(Include one Sentence Purpose Statement and Reference Attached Statement of Work)*

WHEREAS 10 U.S.C. 2539b(a)(3) gives the secretaries of the military departments authority to make available to any person or entity, at an appropriate fee, the services of any government laboratory, center, range, or other testing facility for the testing of materials, equipment, models, computer software, and other items.

WHEREAS *(Insert Company Name or Individual)* _____
(hereinafter referred to as the Purchaser) has requested, and the Natick Soldier Center (hereinafter referred to as NSC) has agreed to conduct and/or furnish, certain tests and/or test services as described above, the Purchaser, after having indicated that this test is not in direct competition with private industry, and NSC do now therefore agree to the following terms and conditions which shall govern the conduct and/or furnishing of such tests and/or test services:

a. It is understood that NSC will accept the items(s) listed above for the stated test and any information submitted for use in such test shall not be disclosed outside the Government, except that such information may be disclosed to foreign governments when tests are conducted for or on behalf of private foreign industry. Unless otherwise specified herein, the results of the stated test are confidential and may not be disclosed outside the Government without the consent of the Purchaser.

b. The test and/or test services shall be conducted and/or furnished at *(Insert Building Name & Number)* NSC to commence on a date and at a time convenient to NSC as determined by the laboratory director, who will notify the Purchaser of such scheduled date and the estimated completion date. The aforementioned beginning and estimated completion dates are to be furnished for planning purposes only, and NSC may, at its discretion, change such dates or terminate the test prior to completion with or without prior notice to the Purchaser, and the Government shall not become liable to the Purchaser as a result of or because of such changes or termination.

c. (1) In consideration of the test and/or test services to be conducted and/or furnished by NSC, the Purchaser agrees to pay NSC the cost thereof as determined by NSC, it being mutually agreed that such cost will include the amount necessary to recoup both the direct and indirect costs involved that are incurred by NSC to provide for the testing.

(2) Additionally, it is understood and agreed that the Purchaser will bear all costs for transportation, packing, crating and drayage relating to the item(s) submitted for testing, including that which NSC may, for its own convenience, perform or cause to be performed.

d. It being estimated by NSC that the cost of the test and/or testing services to be provided by NSC will not exceed the sum of \$ _____ which sum includes:

- Performing the tasks as outlined in Purchaser's attached Statement of Work,
- The Purchaser will pay to NSC prior to commencement of the test and/or test services, the sum of \$ _____ by cashier's check, certified check, bank money order or U.S. Postal Money Order, payable to Natick Soldier Center.

The Purchaser shall note on the check and in an accompanying cover letter that payment is for Testing Services Agreement. In addition, the Purchaser shall note the following information within the cover letter: (1) the project name (2) the Purchaser's name (3) the Government technical point of contact (4) the Directorate name. Payment by check shall be made to the **Natick Soldier Center**.

The Purchaser shall mail the payment to the following address:

**Natick Soldier Center
ATTN: Mark Daley (AMSSB-RRM-PB)
Kansas St.
Natick, MA 01760-5021**

- It is understood and agreed that NSC will not incur costs in excess of the estimated amount without notice to the Purchaser of a revised estimated cost, and deposit with NSC by the purchaser of such additional sum as may be required to cover the additional estimated costs.

e. The Purchaser and NSC agree that:

(i) The Government shall not be liable for loss or destruction of or damage to the test item, or for any other damages, whether direct or consequential.

(ii) Upon completion or termination of the test and/or test services, and receipt by the Purchaser of notification of such completion or termination, the Purchaser will promptly remove the test item from the Government's premises.

(iii) All transfers of property or services of whatever nature made pursuant to this Agreement shall be without any express or implied warranty whatsoever, including the warranties of merchantability and fitness for a particular purpose.

f. The Purchaser agrees

(i) to hold harmless and indemnify the Government against the following insofar as they may result from the performance and/or furnishing of the test and/or test services described above:

(A) claims (including reasonable expense of litigation or settlement) by third persons (including employees of the Purchaser) for death, bodily injury (including sickness or disease) or loss of, damage to, or loss of use of property, and

(B) loss of or damage to property of the Government or property in its custody, and loss of use of such property, and

(ii) that he will, at the request of and to the satisfaction of NSC, furnish bond, U.S. Postal Money Order, certified check or other security to guarantee compliance with part (1) of this clause.

g. The Purchaser agrees not to circulate, refer to, or otherwise use for publicity or advertising purposes the results of the tests conducted by NSC in any manner that will bear a connotation of endorsement of a product by NSC or any other agency of the Government. He may state that the items were tested at the U.S. Army Natick Soldier Center, but he may not state the NSC has approved the items.

h. NSC reserves the right to limit the number and term of visits of observers and/or test participators.

Natick Soldier Center
Natick, Massachusetts 01760-5056

(Name & Address of Purchaser)

BY:

BY:

(Project Officer Signature)

(Signature)

(Printed Named and Title)

(Printed Named and Title)

(Date)

(Date)

BY:

(Signature)

Testing Service Agreement Officer

(Date)