TEXTILE.ORG

TECHNICAL CATALOG · 2026

Technical Embroidery Systems

Engineered Textiles for Electronics, Biosignals, Fluidics & Composites

Stitch electronics. Place tow. Prototype tomorrow.

FUNCTIONS COVERED

Conductive Stitching · Chenille Biosignal Electrodes · Wire & Smart-Textile Cording · Composite Tow Placement

BUILT FOR

Universities · Research labs · Hardware startups

Contact

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Technical Embroidery Catalog

Edition 2026

Embroidery is now an assembly process.

Textile.org operates a fleet of industrial embroidery platforms re-purposed for functional textile manufacturing. The same DST workflow that drives commercial embroidery now lays conductive thread, couches wire, places carbon tow, and routes pneumatic tubing — turning every machine in this catalog into a programmable fabrication tool for electronics, biosignals, fluidics, and composites.

CONDUCTIVE STITCHING

Embroidered PCBs, antennas, and surface sensors

Lay conductive threads as engineered traces, jumpers, antennas, capacitive pads, and piezoresistive...

STITCHCIRCUIT-15 · BENCHWEAVE-X · BATCHCIRCUIT-5

CHENILLE BIOSIGNAL ELECTRODES

Soft, high-surface-area chain-stitch electrodes for EEG / EMG / ECG

Chenille and chain stitch build out-of-plane loops with dramatically higher skin contact area than flat...

NEUROSTITCH-12

WIRE & SMART-TEXTILE CORDING

Lay copper wire, CNT yarn, heating elements, and pneumatic / fluidic tubing

The PD (taping) head couches a continuous core under flat stitch — turning the embroidery field into a...

CONDUCTRA-9 · FLUIDWEAVE-9 · TOWFORGE-4

COMPOSITE TOW PLACEMENT

Tailored fiber placement — flat, drapable preforms from 1K to 52K tow

The PD head also places dry tow — the same couching mechanism applied to carbon, glass, basalt, and...

TOWFORGE-4 · COMPOSITRA-9

What we can stitch, couch, and place.

Every material listed below has been validated on the catalog's platforms. The table is intentionally specific — bring your spec, and we will stitch a sample on the platform that matches.

CONDUCTIVE THREADS

Silver-plated nylon thread
General-purpose conductor — traces, electrodes, antennas

Kevlar thread (conductive twist)
High-strength conductor — flex-tolerant routing

Carbon nanotube thread (16 µm)
Low-noise biosignal contact, lightweight antennas

Water-soluble thread
Sacrificial routing for free-form conductor patterns

WIRES & CONDUCTIVE CORES

Copper wire 42 AWG to 20 AWG
Couched under flat stitch via PD head

Carbon nanotube thread (16 µm)
Lightweight conductor, low-noise sensing

Tinsel and stranded wire cores
Flex-fatigue resistant wearable harnesses

TUBING (FLUIDIC / PNEUMATIC)

Silicone tubing up to 15 mm OD
Pneumatic actuators, microfluidics

TPU / PU tubing
Wearable hydraulic / cooling lines

ELECTRICAL ENVELOPE

3 V – 55 V
1 mA – 15 A · DC and low-freq AC

COMPOSITE TOW

Carbon tow
1K through 52K — engineered fiber paths

Glass tow
Insulating structural reinforcement

Basalt tow
High-temperature applications

Natural fiber tow
Flax, hemp — sustainable composites

Aramid yarn
Impact zones, ballistic, abrasion resistance

SENSOR GEOMETRIES

0.5 cm × 0.5 cm up to 100 cm × 100 cm and larger — any side, any shape. Capacitive, piezoresistive, and hybrid sensor patterns supported.

FIELD APPLICATIONS

- Car seat heaters · deicers · heated jackets and apparel
- EEG / EMG / ECG electrodes for clinical and consumer biosignal devices
- Soft robotic actuators and pneumatic grippers
- Tailored composite preforms for aerospace, automotive, motorsports
- Wearable antennas and embedded RF structures
- Pressure-sensitive textile interfaces (capacitive + piezoresistive)

CONDUCTIVE STITCHING

Embroidered PCBs, antennas, and surface sensors

Lay conductive threads as engineered traces, jumpers, antennas, capacitive pads, and piezoresistive sensor patterns directly into fabric. Density and stitch path are programmed from a DST file — the same workflow used for commercial branding, redirected to functional geometry. The 360°-rotating R-series head enables true any-direction trace routing without rotating the substrate.

WHAT YOU CAN BUILD

- Embroidered PCB traces and jumpers
- Wearable antennas (patch, monopole, meander)
- Capacitive touch electrodes and proximity sensors
- Piezoresistive pressure / strain sensor patterns
- Embroidered shielding and ground planes

COMPATIBLE MATERIALS

- Silver-plated nylon thread
- Kevlar (with conductive twist)
- Carbon nanotube thread (16 µm)
- Water-soluble thread (sacrificial routing)

RECOMMENDED PLATFORMS

CONDUCTIVE STITCHING — PLATFORMS

STITCHCIRCUIT-15 · BENCHWEAVE-X · BATCHCIRCUIT-5

See full spec pages for each platform.

CHENILLE BIOSIGNAL ELECTRODES

Soft, high-surface-area chain-stitch electrodes for EEG / EMG / ECG

Chenille and chain stitch build out-of-plane loops with dramatically higher skin contact area than flat stitch — a natural fit for dry biosignal electrodes. Geometries from 0.5 cm × 0.5 cm point electrodes up to 100 cm × 100 cm and larger arrays, in any shape and any orientation. Pair conductive thread on the chenille head with insulating thread on the flat head to print electrode + lead routing in a single setup.

WHAT YOU CAN BUILD

- Dry EEG electrodes (hex array, ring, disk)
- EMG surface electrodes for muscle activation
- ECG patch electrodes and lead routing
- Wearable biosignal cuffs and headbands
- Custom electrode geometries from 0.5 cm to 1 m+

COMPATIBLE MATERIALS

- Silver-plated nylon thread (electrode contact)
- Carbon nanotube thread (low-noise option)
- Standard polyester (insulating lead cover)

RECOMMENDED PLATFORMS

CHENILLE BIOSIGNAL ELECTRODES — PLATFORMS

NEUROSTITCH-12

See full spec pages for each platform.

WIRE & SMART-TEXTILE CORDING

Lay copper wire, CNT yarn, heating elements, and pneumatic / fluidic tubing

The PD (taping) head couches a continuous core under flat stitch — turning the embroidery field into a placement system for wire, yarn, and tube. Suitable for 42 AWG up to 20 AWG copper wire, 16 µm carbon nanotube thread, and tubing up to 15 mm. Electrical envelope spans 3 V – 55 V and 1 mA – 15 A. The 4-LPD production machine runs four placement heads in parallel; the single-PD platform is the development counterpart.

WHAT YOU CAN BUILD

- Embroidered heating elements (car seats, deicers, jackets)
- Wearable circuit harnesses with 20–42 AWG copper
- Embedded antennas using CNT yarn
- Pneumatic and hydraulic tubing routes for soft robotics
- Microfluidic channels in textile carriers

COMPATIBLE MATERIALS

- Copper wire 20 AWG – 42 AWG
- Carbon nanotube thread 16 µm
- Silicone / TPU tubing up to 15 mm diameter
- Tinsel and stranded wire cores

RECOMMENDED PLATFORMS

WIRE & SMART-TEXTILE CORDING — PLATFORMS

CONDUCTRA-9 · FLUIDWEAVE-9 · TOWFORGE-4

See full spec pages for each platform.

COMPOSITE TOW PLACEMENT

Tailored fiber placement — flat, drapable preforms from 1K to 52K tow

The PD head also places dry tow — the same couching mechanism applied to carbon, glass, basalt, and natural fibers. Lay drapable flat preforms in any planar fiber orientation, sized from sample coupons up to the full embroidery field. Tow sizes 1K through 52K. The 4-LPD machine is the production platform; the single-PD platform handles sample-scale development and design iteration.

WHAT YOU CAN BUILD

- Tailored fiber preforms with engineered fiber paths
- Flat drapable preforms (1K – 52K tow)
- Locally reinforced patches and skins
- Hybrid layups combining wire and fiber
- Sample coupons through full-field preforms

COMPATIBLE MATERIALS

- Carbon tow (1K – 52K)
- Glass tow
- Basalt tow
- Natural fiber tow (flax, hemp)
- Aramid yarn for impact zones

RECOMMENDED PLATFORMS

COMPOSITE TOW PLACEMENT — PLATFORMS

TOWFORGE-4 · COMPOSITRA-9

See full spec pages for each platform.

CONDUCTIVE STITCHING · 360° HEAD

STITCHCIRCUIT-15

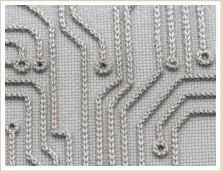
Model FT-1501R

Embroidered PCBs, antennas, and surface sensors at production speed.

Build embroidered circuits and antennas with 15-needle colour range and a 360°-rotating R-series head — the only platform in the catalog with true any-direction trace routing without rotating the workpiece.

WHY THIS MACHINE

Lay a meander antenna, drop in a capacitive touch pad, jumper a trace, and route a piezoresistive grid — in one DST file, on one head. Fifteen needles means you can pre-load conductive, insulating, sacrificial, and gradient threads and let the color change call them up in sequence.



Conductive traces on woven substrate

CAPABILITIES

- Silver-plated nylon, kevlar, carbon nanotube, water-soluble thread
- Capacitive and piezoresistive sensor geometries (all types)
- Embroidered patch, monopole, and meander antennas
- Sacrificial routing for free-form conductor patterns
- 15-needle thread library — multiple conductors loaded simultaneously

IDEAL FOR

Wearable electronics groups, antenna researchers, sensor labs scaling beyond bench coupons.

SPECIFICATIONS

Configuration	15 needles × 1 head, 360° rotary
Functions	Flat • Cap • Finished garments
Embroidery area	350 × 500 mm
Maximum speed	1,200 spm
Control	12" colour touchscreen LCD (17-language)
Memory	20,000,000 stitches • 200 designs
Stitch length	0.1 – 12.7 mm
Voltage	Standard 120 V (wide-input 80 – 260 V)
Power	150 – 160 W — quiet operation
Net weight	100 kg
Standard accessories	Cap driver, cap station, 2 cap frames, garment frames (9/12/15/19/30×30 cm), 58×36 cm flat frame, steel stand, auto winder, tool kit

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

CHENILLE BIOSIGNAL ELECTRODES

NEUROSTITCH-12

Model FT-1201+1CT

Soft, high-surface-area electrodes for EEG, EMG, and ECG.

A flat head paired with a dedicated chenille / chain-stitch head — purpose-built for out-of-plane electrode geometry while a second head prints insulating lead routing on the same workpiece in one setup.

WHY THIS MACHINE

Chain stitch lifts conductive thread off the fabric in tight loops, multiplying skin contact area. Dry electrodes match the performance of wet sensors with none of the gel and none of the rigid PCBs. Print electrode + lead routing on one workpiece — no separate assembly step.

Hex chain-stitch electrode array

CAPABILITIES

- Electrode geometries from 0.5 cm × 0.5 cm to 100 cm × 100 cm and larger
- Any side, any shape — hex arrays, rings, disks, custom outlines
- Conductive chenille for skin contact + insulating flat for leads
- Silver-plated nylon, carbon nanotube, kevlar conductive threads
- Combined fine + bulky decoration in one setup

IDEAL FOR

Neuroscience labs, BCI startups, wearable biosensor companies, sports physiology groups.

SPECIFICATIONS

Configuration	12 needles flat head + 6-needle chenille (CT) head
Functions	Flat • Chenille • Chain stitch
Embroidery area	560 × 1200 mm
Cap embroidery area	280 × 60 mm
Maximum speed	1,000 spm flat • 700 spm cap
Stitch length	0.1 – 12.7 mm
Head distance	350 mm
Control	10" colour touchscreen LCD
Voltage	Standard 120 V
Net weight	650 kg
Machine size	2,470 × 1,630 × 1,600 mm

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

Reference photo — current production unit photography available on request.

COMPOSITE TOW PLACEMENT · PRODUCTION

TOWFORGE-4

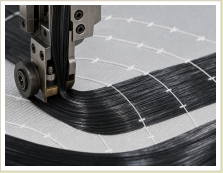
Model FT-604+4LPD

Four-head production tailored fiber placement — 1K to 52K tow.

A four-head specialty platform pairing flat embroidery with a large taping/PD head at every position. The 4-LPD is a production machine — engineered for parallel tow placement and continuous wire / tube placement at industrial throughput.

WHY THIS MACHINE

Composite engineers can program fiber paths that follow the load, then build four identical preforms in parallel — or four variations for design-of-experiment work. The same platform places copper harnesses, CNT yarn, and tubing for high-volume smart-textile production.



Tailored carbon-tow preform

CAPABILITIES

- Tow sizes 1K through 52K — carbon, glass, basalt, natural fiber
- Flat preforms that drape — programmed fiber orientation
- Production-scale parallel output across four heads
- Couches 20–42 AWG wire, 16 µm CNT thread, tubing to 15 mm
- Drives 3–55 V, 1 mA – 15 A heating element circuits

IDEAL FOR

Composite manufacturers, aerospace and automotive R&D, smart-textile OEMs scaling production.

SPECIFICATIONS

Configuration	6 needles × 4 flat heads + 4 large taping (PD) heads
Functions	Flat • Cording • Taping • Tow placement
Working volume	750 × 750 × 1000 mm
Maximum speed	1,000 spm
Control	15" colour touchscreen LCD
Drive	70 mm servo main motor
Thread capacity	Extended spool — ~3.5× standard
Power	Standard 120 V — quiet operation
Packing	Wooden crate

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

WIRE & SMART-TEXTILE CORDING

CONDUCTRA-9

Model FT-901+1PD

Embroidered wires, sensors, heating elements — the smart-textile workhorse.

A nine-needle flat head paired with a single PD (taping) head, configured for couching continuous wire, CNT thread, and conductive cord under engineered stitch paths. The platform that turns embroidery into an electrical assembly process.

WHY THIS MACHINE

Drop a 28 AWG copper wire under flat stitch, route a meander, and you have a heated panel. Swap to CNT thread and you have an antenna. Add a piezoresistive thread and you have a pressure sensor. One machine, one workflow, the entire smart-textile stack.

Couched wire heating element

CAPABILITIES

- Couches 20–42 AWG copper wire and 16 µm CNT thread
- Electrical envelope: 3 V – 55 V, 1 mA – 15 A
- Heating elements — car seat heaters, deicers, heated jackets
- Integrated laser cutter for trimmed-edge encapsulated conductors
- Three-bead sequin head for hybrid decoration + function

IDEAL FOR

Heated-apparel makers, smart-textile startups, e-textile research groups, deicing / heated-surface developers.

SPECIFICATIONS

Configuration	9 needles × 1 flat head + 1 taping (PD) head
Functions	Flat • Cording • Taping • Three-bead twin sequin • Laser cutting
Embroidery area	650 × 1200 mm
Maximum speed	1,200 spm
Control	12" colour touchscreen LCD
Special equipment	Three-bead twin sequin device, laser cutting device
Power	Standard 120 V — quiet operation
Machine size	2,470 × 1,630 × 1,600 mm
Net weight	650 kg

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

FLUIDIC CORDING · SOFT ROBOTICS & MICROFLUIDICS

FLUIDWEAVE-9

Model FT-901+1PD

Pneumatic and hydraulic tubing — soft actuators and wearable fluidics.

Same platform, different mission: the PD head's couching channel handles silicone and TPU tubing up to 15 mm, anchoring fluidic routes into a textile carrier without crimping the lumen.

WHY THIS MACHINE

Soft robotics teams have wrestled with hand-routing pneumatic lines for years. Program a path in DST, drop the tubing under the PD head, and you have a textile-integrated pneumatic harness in minutes. Microfluidic researchers can build wearable assays the same way.

Silicone tubing in textile carrier

CAPABILITIES

- Silicone, TPU, and PU tubing up to 15 mm diameter
- Pneumatic actuation routes for soft robotic skins and gloves
- Hydraulic lines for thermal management and wearable cooling
- Microfluidic channels for biosensing and lab-on-textile
- Combined fluidic + electrical routing on the same workpiece

IDEAL FOR

Soft robotics labs, microfluidics groups, wearable cooling / heating startups, prosthetics R&D.

SPECIFICATIONS

Configuration	9 needles × 1 flat head + 1 taping (PD) head
Functions	Flat • Cording • Taping (fluidic) • Sequin • Laser
Embroidery area	650 × 1200 mm
Maximum speed	1,200 spm
Couching capacity	Tubing up to 15 mm OD
Control	12" colour touchscreen LCD
Power	Standard 120 V — quiet operation
Machine size	2,470 × 1,630 × 1,600 mm
Net weight	650 kg

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

COMPOSITE TOW PLACEMENT · SAMPLE SCALE

COMPOSITRA-9

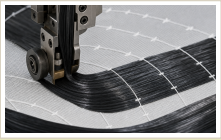
Model FT-901+1PD

Sample-scale tailored fiber placement — design and iterate before production.

The same FT-901+1PD platform configured for tow placement R&D — develop and iterate fiber paths, evaluate tow size, and prove a preform geometry before scaling to the 4-LPD production line.

WHY THIS MACHINE

Composite design groups can sketch a load path, stitch a preform, infuse it, test it, and revise — in a single afternoon. When the design is locked, the same DST file scales to TOWFORGE-4 for four-up production.



Sample-scale tow placement

CAPABILITIES

- Tow sizes 1K through 52K — carbon, glass, basalt, natural fiber
- Flat preforms that drape onto curved tooling
- Engineered fiber orientation along principal stress directions
- Hybrid layups: tow + couched wire + flat conductive thread
- Integrated laser cutter for net-shape preforms

IDEAL FOR

Composite R&D, aerospace structures groups, university composites programs, motorsports innovation labs.

SPECIFICATIONS

Configuration	9 needles × 1 flat head + 1 taping (PD) head
Functions	Tow placement • Flat • Cording • Laser cutting
Embroidery area	650 × 1200 mm
Maximum speed	1,200 spm
Tow range	1K – 52K (carbon, glass, basalt, natural)
Control	12" colour touchscreen LCD
Power	Standard 120 V — quiet operation
Machine size	2,470 × 1,630 × 1,600 mm
Net weight	650 kg

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

R&D SENSOR PROTOTYPING

BENCHWEAVE-X

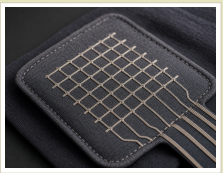
Model Halo-X

The bench platform — small footprint, full conductive workflow.

A compact 10-needle single-head machine optimized for benchtop R&D, university labs, and startup proof-of-concept work. Same conductive-thread toolchain as the production machines, sized for a single workstation.

WHY THIS MACHINE

PhD students and startup engineers shouldn't have to wait for production-line time to test an idea. BENCHWEAVE-X drops on a desk, runs on a 120 V outlet, and handles the same DST files as the rest of the catalog. From sketch to stitchout in under an hour.



Prototype pressure sensor patch

CAPABILITIES

- Capacitive and piezoresistive sensor prototyping (all geometries)
- Conductive thread stitching — silver, kevlar, CNT, water-soluble
- Compact 0.5 cm minimum geometry up to 240 × 360 mm field
- Quiet 120 W operation — fits in a shared lab without retrofit
- 100M-stitch memory — long runs without reloading

IDEAL FOR

PhD research groups, university teaching labs, hardware startups in proof-of-concept stage, corporate innovation benches.

SPECIFICATIONS

Configuration	10 needles × 1 head
Functions	Cap • Finished garments • Bench R&D
Embroidery area	240 × 360 mm
Maximum speed	1,000 spm
Control	7" colour touchscreen LCD
Voltage	Standard 120 V (wide-input 80 – 260 V)
Power	120 W — quiet operation
Memory	100,000,000 stitches
Machine size	540 × 820 × 1,500 mm
Net weight	42 kg

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

PARALLEL SENSOR / PATCH PRODUCTION

BATCHCIRCUIT-5

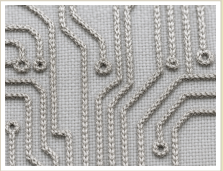
Model FT-905HC

Five identical sensor patches per cycle — the parallel-production sensor line.

A five-head, nine-needle high-speed flat platform that produces five identical sensor patches, electrode arrays, or smart-textile units in parallel. When a design is locked, this is how you scale it.

WHY THIS MACHINE

Five-head parallelism turns a single operator's stitchout time into five units of throughput. For sensor companies shipping production patches, biosignal electrode arrays, or wearable circuit substrates, BATCHCIRCUIT-5 is the bridge from prototype to product.



Parallel 5-up sensor patches

CAPABILITIES

- Parallel sensor / electrode / patch production (5-up)
- Identical conductive trace geometry across all five heads
- 9-needle thread library per head — multi-conductor designs
- Commercial throughput at 1,200 spm
- 200 × 500 mm field per head

IDEAL FOR

Sensor product companies, electrode array manufacturers, smart-textile OEMs in pilot production, scale-up labs.

SPECIFICATIONS

Configuration	9 needles × 5 heads
Functions	Flat • Parallel patch / sensor production
Embroidery area	200 × 500 mm (per head)
Maximum speed	1,200 spm
Control	7" colour touchscreen LCD
Drive	Servo main motor
Voltage	Standard 120 V (wide-input 80 – 260 V)
Power	150 W — quiet operation
Machine size	1,950 × 1,130 × 1,300 mm
Net weight	690 kg

SAMPLING Bring your spec — we'll stitch a sample on this platform at our Albany showroom.

PRICING Contact for current pricing — tariffs included; rent-to-own available.

Prove validity before you purchase.

Sampling for applications to prove validity is highly encouraged before purchase. Reach out if you'd like to try something at our showroom — we'll dial in a stitchout with your conductive thread, tow, tubing, or sensor geometry on the platform that fits your program.

1. SEND YOUR SPEC

Email a description of the geometry, material, and electrical or fluidic envelope. Existing DST files welcome.

2. WE MATCH THE PLATFORM

We identify the best machine in the catalog for your application and schedule a sample stitchout in Albany.

3. EXAMINE AND ITERATE

Visit in person or receive the sample by mail. Revise the design, run another sample, and lock the spec before purchase.

HOW TO START

Topher Anderson · Textile Engineering and Science, PhD
Email: Topher@textile.org · Phone: 717-706-7702
Showroom & lab: Albany, New York — by appointment

Every platform, turnkey for research.

Every platform in this technical catalog ships with the same complete package — new equipment, ready-to-run software, training, supplies, and showroom access. Tariffs are included in quoted pricing.

STANDARD WITH EVERY MACHINE

- New machine — tariffs included in quoted price
- Embroidery software with DST file support (included with purchase)
- $2,000 digital embroidery design library from KreationsByKara
- Starter supplies — thread, backing, fabric, and consumables
- In-person and remote operator training (typical operator readiness: one week)
- Service & maintenance training class — keep equipment running in-house
- Sample stitchouts available on request
- Showroom sampling and hands-on examination in Albany, NY
- Financing available — rent-to-own programs offered
- Runs on standard 120 V power — quiet operation

WHERE TO VALIDATE YOUR APPLICATION

SHOWROOM & LAB · ALBANY, NEW YORK

Sampling · examination · operator and service training.

Contact Topher Anderson to schedule a visit.

Build with us.

Pricing, bundle configurations, training schedules, financing, and delivery terms are handled individually. Reach out by email or phone — or visit the Albany, NY showroom to examine the machines, request a sample stitchout, and meet the team.

TEXTILE.ORG

Technical Embroidery Systems — Engineered Textiles

Topher Anderson

Textile Engineering and Science, PhD

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SHOWROOM	Albany, New York — by appointment

BUILT FOR

- Universities running applied research programs
- National labs and federally funded research centers
- Hardware startups in prototype and pilot stages
- Corporate innovation groups
- Composite engineering teams
- Wearable electronics and biosensor companies