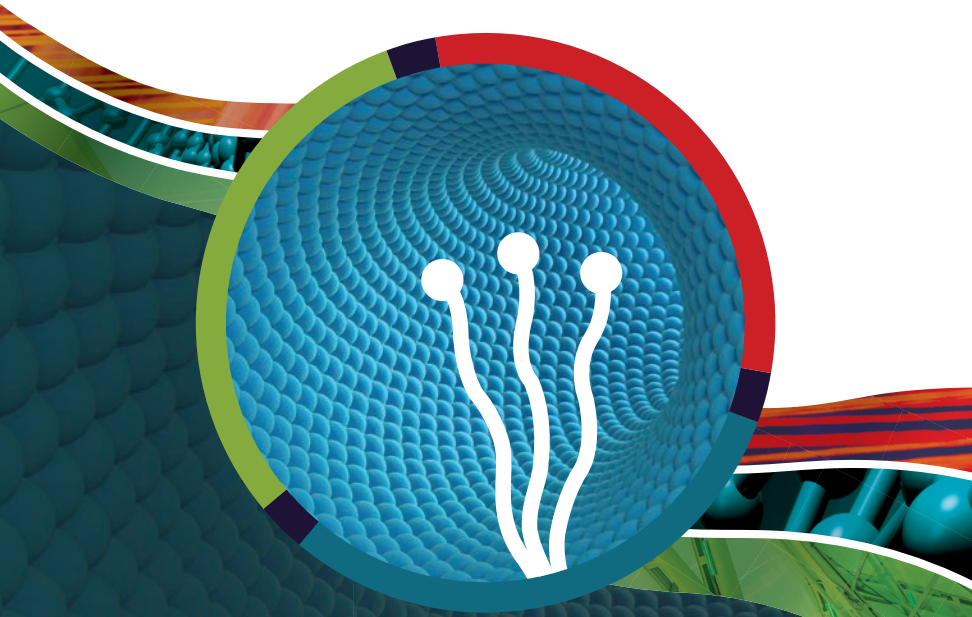
IFAI EXPO

SMART FABRICS PROGRAM

with E-Textiles Workshop



Sept. 26–29, 2017 | New Orleans, LA USA

Advanced Textiles Conference begins Sept. 26
Show Floor | Sept. 27-29

IFAIexpo.com/Smart

IFAIexpo.com/Smart

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IFA EXPO
Smart Fabrics Program

Goals

- Facilitate new partnerships, discussion, and ideas
- Give attendees access to experts, materials, and education
- Showcase innovative suppliers
- Create a common understanding among textile, electronics, manufacturing, and design

Highlights

Advanced Textiles Conference—Smart Fabrics Track

Sessions on smart and interactive textile technologies from mechanical, chemical, and biological to electronic, with a focus on commercialization.

- Expo Plus registrants
- Tuesday all day and Wednesday morning

E-Textiles Hackathon Design Challenge

A contest to spur innovative, new e-textiles products with commercial value, using only materials found in the E-Textiles Workshop

- Winner Announcement | Friday 9:30 am
- E-Textiles Workshop (A200)

E-Textiles Standards Round Table

A discussion, moderated by the Department of Commerce, to bring together organizations who are creating standards and find the best way forward.

- Open to all | Thursday 8–9:30 am
- Classroom 243 (above hall E)

E-Textiles Workshop on the Show Floor

A gathering place for e-textiles innovators, suppliers, beginners, and experts.

Coffee provided by Jakob Mueller

- Open to all | During show floor hours
- Booth A200

E-Textiles Workshop

Visit Booth A200 to see what e-textiles are all about. Network, discuss, make, design, learn...and enjoy a cup of coffee, courtesy of Jakob Mueller.

Kits

Work with experts to assemble an e-textiles device and network while working with your hands.

- Open to all while supplies last
- During show floor hours
- See page 10

Ask the Experts

A diverse panel of experts in IP, Law, Standards, Flexible Substrates, Electronic Components, and Interoperability exchange understanding among the diverse points of view and field questions from the audience.

- Open to all | Open House Style
- Wednesday | Noon–2 pm

Market Discussions

Open forum discussions on e-textiles in specific market applications.

- Open to all | See Schedule

E-TEXTILES WORKSHOP SCHEDULE

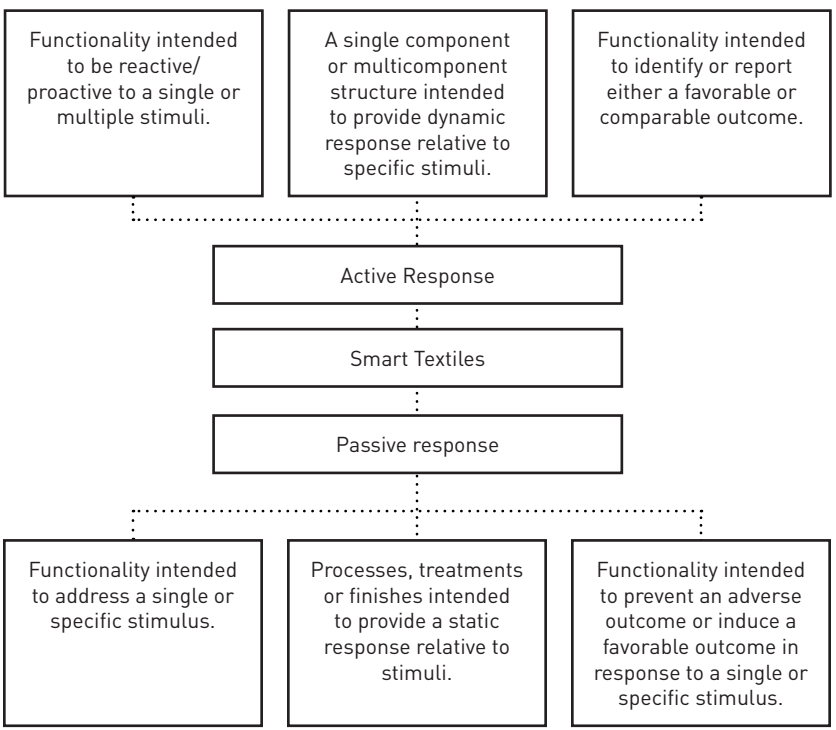
Wed., Sept. 27	
11 am–5:30 pm	E-Textiles Workshop Open
11 am	Hackathon Design Challenge Kickoff
Noon-2 pm	E-Textiles Ask the Experts
2:30–3 pm	Bio/Medical Discussion
3:30–4 pm	Structures Discussion
4:30–5 pm	Apparel Discussion
Thurs., Sept. 28	
11 am–5:30 pm	E-Textiles Workshop Open
11:30 am–Noon	Health/Fitness Discussion
12:30–1 pm	Virtual Reality Discussion
1:30–2 pm	Home Discussion
2:30–3pm	Protection Discussion
3:30–4 pm	Automotive Discussion
4:30–5 pm	Military Discussion
Fri., Sept. 29	
9 am–2 pm	E-Textiles Workshop Open
9:30 am	Hackathon Design Challenge Winners Announced/ Projects Displayed
10:30-11 am	Sports Discussion
11:30 am–Noon	Aerospace Discussion
12:30–1:15 pm	Don't Leave Valuable IP Unprotected—Design Patents in the Wearable Market: IP Wearables, Design Patents, Intellectual Property

What are Smart Fabrics and E-Textiles?

Smart textiles can sense and react, actively or passively, to conditions or stimuli, such as biological, chemical, electrical, magnetic, mechanical, and thermal sources. Many smart textiles already exist and have limitless applications. **E-Textiles** use electrical stimuli, creating a challenging and exciting merging of the textiles and electronics industries.

Active or Passive Functionality

How Performance Characteristics relate to Properties



Questions to Consider:

- What do you want the "smart textile" to do?
- Does the textile receive data/transmit data?
- Does the textile collect and store data?
- Does smart textile mean proficient?...useful?...diagnostic?...remedial?
- Does a smart textile already exist that can be made "smarter"?

Advisor: Vincent Diaz, Chairman, ASTM D13 Terminology Subcommittee

Terminology

The electronics and textile industries speak different languages. Here is some commonly used terminology you may find useful.

E-textile Terms

electronically integrated textile (e-textile)
a fabric or textile product with permanently-integrated electrical circuits or parts of electrical circuits

interoperability
the capability of two or more networks, systems, devices, applications, or components to externally exchange and readily use information securely and effectively

smart textiles
planar structures that can distinguish and react to external stimuli, external factors such as mechanical, thermal, chemical, and magnetic changes

wearable
textile structures that can be donned and worn as a garment

Electronics Terms

actuator
a component that provides a physical output in response to a stimulating variable signal

attract
exert a physical force causing or tending to cause to approach, adhere, or unite

BAN
body area network

capacitor
a device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator

capacity
ability to perform, produce, function, hold or contain; an electrical phenomenon whereby an electric charge is stored; the power to learn or retain knowledge

conformance
the fulfillment by a product, process, or service of specified requirements

conductance
a specific material's response to the flow of an electrical field applied to it; units (inverse of resistance): $1/\Omega$

conductor
a strand or combination of wires, either insulated or non-insulated, used for transporting electric current

network
any set of devices or subsystems connected by links joining (directly or indirectly) a set of terminal nodes

printed circuit board (PCB)
a planar or non-planar structure containing embedded wiring and metallic planar structures

Note: A PCB serves as a mounting substrate for numerous electrical devices, with the embedded wiring forming interconnections between device pins. Without those devices, the PCB is a "bare board" and after they are installed, it is a "loaded board."

resistance
a specific material's reduction of an electric current flowing through it; units: Ω (ohms)

resistor
an insulated element that impedes movement of electric energy

Note: A resistor as used in electric circuits for purposes of operation, protection, or control, commonly consists of an aggregation of units. Resistors, as commonly supplied, consist of wire, metal, ribbon, cast metal, or carbon compounds supported by or embedded in an insulating medium. The insulating medium may enclose and support the resistance material as in the case of the porcelain tube type, or the insulation may be provided only at the points of support, as in the case of heavy duty ribbon or cast iron grids mounted in metal frames.

sensor
a device that responds to external stimuli

Note: biological, chemical, or physical stimuli (such as heat, light, sound, pressure, magnetism, motion, and gas detection). Sensor transmits the resulting signal or data for providing a measurement, operating a control, or both.

transducer
a device that converts energy from one domain into another; the device may be either a sensor or an actuator

Textile Terms

denier
a direct yarn numbering system used to indicate mass per unit length; weight in grams per 9000 meters

design
(n) the creation of something in the mind; a decorative or artistic work; the act of working out the form of something; an arrangement scheme; something intended as a guide for making something
(v) create or execute in an artistic or highly skilled manner; make or work out a plan for; devise; plan an attack; conceive or fashion in the mind; invent

intrinsic
essential; belonging to a thing by its very nature

launderability
the ability of a textile structure to be cleaned in order to remove soil or stains by a washing treatment using and aqueous detergent solution followed by subsequent rinsing, extracting and drying

fiber
a long thin flexible structure from an animal, vegetable, mineral or synthetic substance, which is most often twisted into yarns and used in the construction of textiles

form
(n) a perceptual structure; a category of things distinguished by some common characteristic or quality; a distinct state of matter in a system;
(v) create; develop into a distinctive entity; establish or impress firmly in the mind; give shape to

nano-technology
technology that deals with dimensions and tolerances of less than 100 nanometers, especially the manipulation of individual atoms and molecules. ("Nano"- indicates a factor of one thousand-millionth in units of measurement.) Nano-technology operates at a molecular level; often as a coating when used in textile production

phase change materials (PCM)
a substance with the ability to change condition or character depending on the surrounding temperature, solid when cool and liquid when warm (and vise- versa) also capable of storing and releasing large amounts of energy

woven fabric
a planar structure produced when at least two sets of yarns are interlaced, usually at right angles to each other, according to a predetermined pattern of interlacing, and such that at least one set is parallel to the axis along the lengthwise direction of the structure

knitted fabric
a textile structure produced by inter-looping one or more ends of yarn

laminated fabric
a layered textile structure wherein a face, or outer textile is joined to a continuous sheet material, in such a way that the identity and characteristics of the continuous sheet material is retained; and, either by a heat fusing method, or by an adhesive, can be joined, but not always, to a backing fabric

nonwoven fabric
a textile structure produced by bonding or interlocking of fibers, or both, accomplished by mechanical, chemical, thermal, or solvent means, or combinations thereof

yarn
a cord of twisted fibers used in sewing, weaving, knitting, etc.

For more electronics definitions, create a free account on IEEE's Standards Dictionary

dictionary.ieee.org

Thanks to the translation guide advisors:
Vincent Diaz, President, Atlantic Thread & Supply Co.; Cherry Tom, Emerging Technologies Intelligence Manager, Institute of Electrical and Electronics Engineers (IEEE); Diana Wyman, Technical Director, AATCC; Roberta Gruber, Head, The Department of Design, Drexel University

E-Textiles Standards

The 'Bridge' Between Research and Market

All areas of innovation depend upon standards as foundational elements as well as enablers of acceptability. By bringing together the standards community, innovators, and other stakeholders, we ensure that bridge is both strong and wide.

E-Textiles Standards Round Table

Open to all
Thursday 8–9:30 am
Room 243

Traditional products in the electronics, textiles and apparel sectors have well-established standards for performance and testing. But as electronic and other capabilities are integrated into textiles and apparel, it is recognized that existing standards need to be adapted to facilitate development and market acceptance. This panel will explore the state of standards development in the smart fabrics space and where the development of standards for smart fabrics is headed. Audience participation and questions are encouraged.

Standards Enable Innovation

Early engagement:
- examine technological developments alongside the existing standards landscape
- determining the scope of a new hub or center of excellence
- list of relevant standards and the standards development organizations
- identification of necessary resources
- how they should be engaged

↓

Illuminate new and/or revised standards needed to build a foundation for future innovation and avoid future delays.

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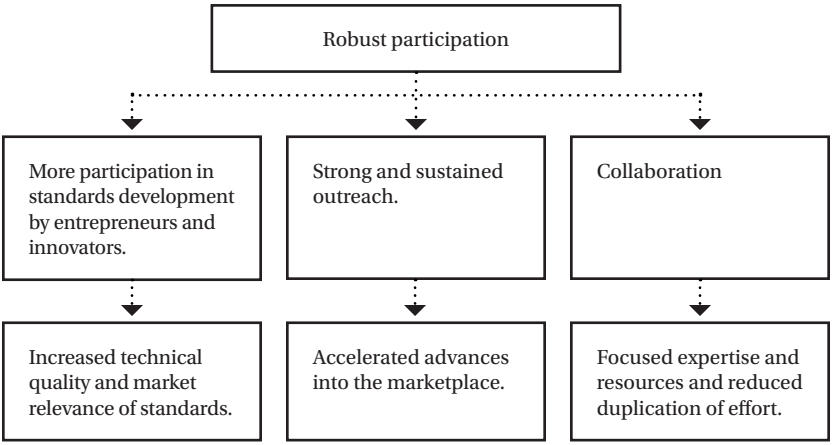
Standards serve as true enablers and catalysts of innovation.

Active Participation Benefits All



STANDARDS ORGANIZATIONS

AATCC, American Association of Textile Chemists and Colorists, provides test method development, quality control materials, publications, educational programs, and professional networking for its members around the world. AATCC is best known for developing and publishing international standards for fibers, fabrics, and finished goods, most recently covering e-textiles.
• aatcc.org

ASTM International-Subcommittee D13.50 on Smart Textiles develops specifications, test methods, practices, guides, classifications and terminology for textiles that can sense and react to conditions or stimuli, including but not limited to, those from mechanical, thermal, chemical, electrical, or magnetic sources. The activities will be coordinated with other ASTM Technical Committees as well as outside organizations related to the integration of applied sciences.
• astm.org/Standards/textile-standards.html

IEEE, Institute of Electrical and Electronics Engineers, develops international standards that underpin many of today's telecommunications, information technology, and power-generation products and services. More than 423,000 IEEE members-engineers, scientists, and allied professionals whose technical interests are rooted in electrical and computer sciences, engineering, and related disciplines–come from over 160 countries.
• ieee.org

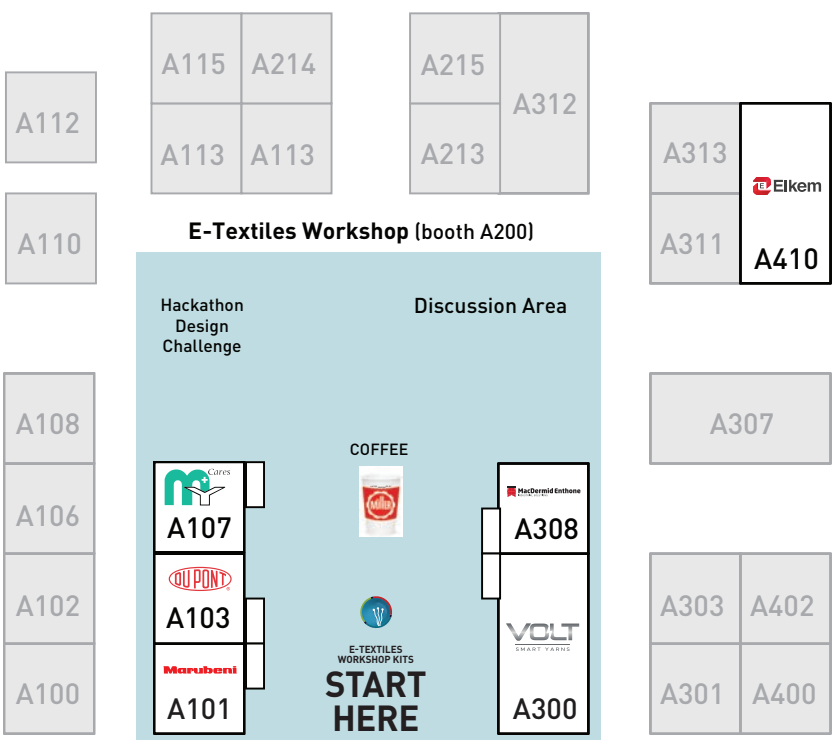
IPC, Association Connecting Electronics Industries, IPC D-72 E-Textiles Materials Subcommittee-developing an industry standard for e-textiles materials. IPC-4931, Requirements for Electronic Textiles (E-Textiles), Conductive Fibers and Conductive Yarns will establish the classification system, qualification and quality conformance requirements and electrical/electronic performance requirements for electronically-integrated textiles (e-textiles).
• ipc.org

E-Textiles Kits

Work with experts to assemble an e-textiles device and network while working with your hands.

Kits are open to all, while supplies last

1. Watch Intro to E-Textiles video
   "The Bar" was written and illustrated by Roberta H. Gruber, Drexel University and animated by Josh Gdovin, Drexel University
2. Visit each E-Textiles Workshop exhibitor to learn about their technology
3. Find an e-textiles workshop host to help assemble a kit or answer your questions



Step 1

Watch Intro to E-Textiles video.
(At the "start here" table or in the discussion area when not in use)

Step 2

Visit each E-Textiles Workshop exhibitor to learn about their technology.

DUPONT BOOTH A103	MATERIAL DESCRIPTION:
Elkem BOOTH A410	MATERIAL DESCRIPTION:
MacDermid Enthone INDUSTRIAL SOLUTIONS BOOTH A308	MATERIAL DESCRIPTION:
Marubeni BOOTH A101	MATERIAL DESCRIPTION:
Cares BOOTH A107	MATERIAL DESCRIPTION:
VOLT SMART YARNS BOOTH A300	MATERIAL DESCRIPTION:

Step 3

Find an E-Textiles workshop host to help assemble a kit or answer your questions.

"The Missing Link" and Lead Workshop Host

Eva Osborne

VP Research and Innovation, Significant Difference

Eva Osborne is an innovation addict who uses her company, Significant Difference, to support her habit. Her specialty is using experimental design on creative solutions in the technical textile and functional apparel arena. She has worked with very small businesses as well as large corporations with fabulously equipped electronic jacquard looms and a mechanic to die for. Eva calls herself the "The Missing Link." One foot in design (BS-Drexel U) and one foot in Textile Science (MS-VaTech).

Electrical Safety Glove for Current Detection

Che Middleton

Applications Specialist

Fabric Speaker

Eric Lewallen

Independent Consultant

Eric is a product design leader with a unique balance of business, technical, and creative sensibilities. Eric lays groundwork for IoT and textile innovation, working with cross-functional teams to develop terminology and standards for emerging e-textile systems. Eric is an advisor and mentor for the University of Oregon Sports Product Management Program and a wearable tech workshop facilitator & instructor.

Haptic Posture Recognition Garment: simulation, programming logic, and interconnectivity

Joe Mango

Head of Engineering and Development, Principled Design

Joe Mango is a creative technologist/engineer whose focus is the research and development of new and embedded wearable technologies. His practice ranges from design, audiovisual performance/installations, wearable tech, electrical engineering, custom sensors, seamless electronics embedding, and interactive telecommunications.

LED Technology

H. Lee Wainwright

E-Textile Technologies Consultant, Off Grid Technologies LLC

H. Lee Wainwright invented the LED/Optic E-Textile (Flexible Fabric animated display) (1985) and the first machinery to manufacture E-Textile displays (1995). He's the creator of E-Textile displays for MGA Entertainment, Spinmaster, SONY, MACY's, Sylvania, NASCAR, GM Motors, MGM, Disney, Target, Miller Brerwery, D& G, GIVENCHY and many other companies.

Fumiko Green

CEO, Off Grid Technologies LLC

Fumiko has worked for the past 15 years conducting E-Textile application labs for students of all ages. Masters in BA degree Penn State, 10 years CEO of Off Grid Technologies, launched multiple products into Home & Garden, E-Textile apparel, accessory, toy, promotional advertising, and safety markets.

Advanced Knitting, Textile Engineering

Connie Huffa

President, Fabdesigns, Inc.

Connie Huffa is president of Fabdesigns Inc. and an alumnus from Philadelphia University. She's built a solid reputation for first to market success stories in several markets. She has several patents, and patents pending. Her specialty is advanced textile materials.

Conductive Fibers

Hugo Trux

Executive Director, Conductive Fibers Manufacturers Council

Hugo R. Trux is the founder and director of the Conductive Fiber Manufacturers Council and the CEO of AccuFiber Technologies, a startup producer of products with optically signaling nanofibers. He has been recognized for his achievements and has published numerous articles in marketing and performance audit research. Hugo served three years active duty with U.S. Army counterintelligence, has a Lean Six Sigma Black Belt and earned B.A. and M.A. degrees from Ohio State University.

Electronics and Information Technology

Eduardo Siman

IT Director, Intradeco Apparel

Eduardo Siman is one of the original Angel Investors in Virtualitics. He is a tech blogger and VR evangelist, who has been recognized as a top 100 influencer in the areas of augmented reality and big data. Eduardo is the Director of Information Technology at Intradeco Apparel and leads initiatives on data visualization, business intelligence, software development, cybersecurity, and cloud migration.

Fashion Design, Product Design, Merchandising

Roberta Gruber

Head, The Department of Design, Drexel University

Professor Roberta H. Gruber joined the Drexel Faculty in 1986 after more than 15 years as a design professional doing fashion illustration, designing wearable art, sportswear, engineered print dresses, handbags, men's and women's business cases along with small leather goods. Roberta is engaged in diverse art and design projects, and serves as the Educational Chair for Collab, a collaboration of design professionals supporting the modern and contemporary design collections at the Philadelphia Museum of Art.

Flexible Circuits, Electronics

Tara Dunn

President, Omni PWB

Tara Dunn is a seasoned professional with more than 20 years in the electronics industry exclusively focused on the PCB sector. Tara is now president of Omni PWB, a manufacturers' rep firm which is uniquely focused on the PCB market, offering engineering support, specializing in flex, rigid flex, RF microwave designs, and microelectronics.

Footwear, Apparel, Health Monitoring, Military

Ben Cooper

Managing Director, IoClothes

Ben is a passionate product and business developer driven by the need to find practical solutions to real world problems. He is currently Managing Director of IoClothes. He led the product research and testing initiatives for Timberland, Vans and The North Face innovation, and VF's wearable tech exploratory group. Ben received a B.S. in Biomedical Physics from Northeastern University and M.S. in Biomechanics with high distinction from Boise State University.

Performance Wearables

Dr. Valerie Lamontagne

Founder & Creative Director, 3lectromode

Valérie Lamontagne is a Montréal artist-designer, curator, and holds a PhD in "Performative Wearables: Bodies, Fashion and Technology" from Concordia University where she teaches in the Department of Design & Computation Arts. She is the owner & designer at 3lectromode and co-owner of the wearables startup synapseWear.

E-TEXTILES WORKSHOP
Host

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TVF Top Value Fabrics

Vintex Inc Engineered Textile Solutions

VOLT SMART YARNS

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Mark Your Calendar

IFAI EXPO

Oct. 15–18, 2018 | Dallas, TX USA
Education Oct. 15–18 | Show Floor Oct. 16–18
Co-locating with CAMX | IFAIexpo.com

Advanced Textiles Conference starts Oct. 15.