



TEXTURES

SPRING 2016

AMERICAN
TEXTILES

WE MAKE AMAZING

WATER DIVERSION: Nonwoven Textiles from Scrap

Leigh Fibers President Donald Bockoven will likely smile if you tell him his company is doing a “shoddy job” with regards to the American automotive industry.

That’s because Leigh Fibers, a textile waste recycler, helps divert nearly 160 million pounds of global textile waste from landfills each year. The company converts scrap from textile manufacturers into fiber that can be used to manufacture a variety of products that make vehicles lighter and safer and their passenger cabins, quieter. One of these products is known in the industry as “shoddy.”

“We’ve turned the waste textile manufacturers would have to pay to send to a landfill into something valuable, and depending on its worth, we pay them for it,” Bockoven said, noting this saves the textile industry between \$6.4 to \$9.6 million annually in global disposal fees. “By creating a revenue stream from their waste, we can help them reinvest in their companies and reduce landfill waste at the same time.”

In addition to purchasing textile waste products, Leigh Fibers also helps textile companies and others become “zero waste” operations by devising plans to keep waste streams separate, thus maximizing the value of the waste streams for reuse or recycling.

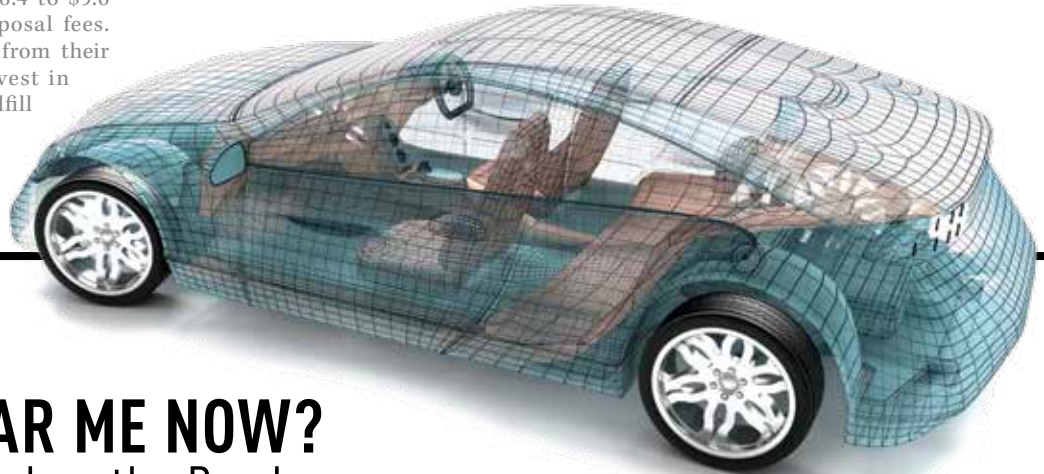
The company’s QuietLeigh™ and SafeLeigh® lines of product use a proprietary blend of reclaimed fiber engineered to meet fire resistance and sound-deadening specifications for vehicle insulation materials. Automotive manufacturers in the U.S. purchase the fiber and mold it into a variety of insulating parts such as acoustic panels for vehicle floors, doors and wheel wells, and as backing for headliners and floor carpets.

“We contribute to a smaller greenhouse gas footprint by saving material that otherwise would have to be made new,” Bockoven

said. “And the end product makes vehicles lighter, so they’re more fuel-efficient, all while meeting strict safety standards.” ❏

We’ve turned the waste textile manufacturers would have to pay to send to a landfill into something valuable.

Donald Bockoven
President, Leigh Fibers Inc.



CAN YOU HEAR ME NOW? Staying Connected on the Road

Using a hands-free cell phone via Bluetooth means parents can keep pace with their family’s busy schedule, and businesspeople can make the most of travel time.

Those conversations wouldn’t be possible without a quiet passenger cabin. American textile industry innovations make automobile passenger cabins quieter, so Americans can safely stay connected on the road.

Spartanburg, South Carolina-based Milliken & Company combines material science with engineering to create nonwoven textile acoustic panels found in vehicle doors, trunks, floors and wheel wells. The panels result in quieter passenger cabins and lighter vehicles.

“People traditionally think of textiles as inexpensive materials that are coverings,” said Milliken spokeswoman Barbara Haaksma. “We make textiles that play a role in automotive

innovation, including improved performance, aesthetics and interior air quality.”

Milliken’s acoustic panels have proven to be 27 to 45 percent lighter than previous panels, contributing to improved fuel economy. Additionally, the company engineers panels used in underbody areas to absorb less moisture and dry more quickly, so rain and ice buildup don’t add weight on rainy or snowy days.

“We’re investing in acoustics, including in-house testing capabilities, to push performance further,” said Brandon Roberts, business strategy director with Milliken & Company. “As we make acoustic panels more sound-absorbent, lighter and weather-resistant, automakers have more opportunities to expand their use beyond premium vehicles, and that means improved safety for everyone on the road.” ❏

We make textiles that play a role in automotive innovation, including improved performance, aesthetics and interior air quality.

Barbara Haaksma
Spokeswoman, Milliken & Company

PROTECTING THE BRAVE

PROTECTING THE BRAVE AT HOME

Workers shouldn't have to live in fear of workplace safety hazards. Safety concerns – for example, the potential of an arc flash or flash fire – can be both distracting and off-putting, leaving workers focused more on the potential for disaster than the work at hand. Enter textile industry innovators.

“Americans couldn't perform in their daily lives without the use of innovative, special-use textiles,” said Rich Lippert, director of business development, protective market at Glen Raven. “As an industry, we look for opportunities to produce items that push the current level of technology, giving industrial workers an end product that is functional, safe and comfortable.”

Prior to 1973, workers in the oil and gas, utilities and manufacturing industries typically wore cotton or cotton-polyester uniforms, leaving them vulnerable to hazards like energized electrical equipment, combustible dust and active hydrocarbon zones. Once flame-resistant (FR) garments entered the picture, and were later required as personal protection equipment (PPE), worker safety dramatically improved.

“When FR garments were initially introduced, arc flash-rated workwear provided minimum-level protection and was not comfortable or durable,” said Lippert. “Now, the industry is able to provide superior protection with lighter-weight, longer-lasting materials that can withstand a 10-12-hour workday. The apparel is comfortable, breathable and abrasion-resistant.”

One such product is Glen Raven's GlenGuard FR 5.3 oz., a lightweight alternative to bulky PPE. GlenGuard is made with solution-dyed meta-aramid fibers that are fade-resistant and can withstand multiple runs through an industrial washing machine. This innovative solution is the foundation of FR apparel by Workrite Uniform Co., a subsidiary of the leading workwear provider Williamson-Dickie.

“In addition to durability and practicality, workers asked for more comfortable transitional clothing – adaptable apparel that makes working in high temperatures and in a variety of settings easier,” said Lippert. “We understand those end-user requirements, and we've produced something that's indistinguishable from what people wear every day. The clothing feels the same as what they would wear to watch a football game or play golf.”

In spring 2015, workers in Eagle Ford Shale, Texas, tested GlenGuard uniforms during a

rig move. The apparel's protection, flexibility and breathability helped them set up oil platforms and move enormous cranes across numerous platforms in 85-degree heat.

Lippert believes GlenGuard is only the beginning. Through innovative research and collaboration with firms like Workrite, Glen Raven hopes to push the envelope, in turn creating a ripple effect throughout the industry.

“At the end of the day, creating products that ensure the safety of hardworking Americans is what it's all about,” Lippert said. “If we can create a product that better protects our friends, family and neighbors from potential workplace disasters, we're going to do it.”

PROTECTING THE BRAVE ABROAD

From the home front to the battlefield, the textile industry is protecting our bravest citizens. Resiliency, ingenuity and trust: These are words that describe the long-standing, symbiotic relationship between the American textile industry and the U.S. Armed Forces.

The military buys more than 8,000 different textile items. It spent \$1.5 billion for military textiles in 2014 and as much as \$2.2 billion annually at the height of the conflicts in Iraq and Afghanistan.

Textile companies across the country deliver a range of products from body armor material to lightweight camouflage systems for tents, tanks and military structures.

“The industry is constantly working to strike a balance between what's economical and





what's the best, safest product," said Mia Hill, industrial business manager at Glen Raven. "Military products are far from an ordinary piece of fabric. They're a protective system that has to be ready for any situation a soldier may face."

Greenwood Mills, which recently celebrated 126 years of business, supplies textiles to the U.S. military as well as the protective clothing and specialty industrial markets. The company strives to produce fabric that protects soldiers from biological and chemical agents as well as extreme weather.

"Investing in research and technology is imperative. R&D makes it possible for us to bring new, innovative, smart textiles to the ever-changing needs of the soldier," said Jay Self, president of Greenwood Mills. "During the First Gulf War, soldiers found that sand cut through 100 percent cotton material. So we devised a more durable nylon-cotton blend that can withstand desert environments. The material is still used today."

Additionally, the textile industry is evolving to meet military weight requests. Producers are cognizant of the many items a soldier has to carry in the battlefield – backpack, weapons system, body armor, helmet and more – and are working with top military

More efficient equipment allows us as soldiers to focus not on ourselves, but rather the most important part of our work, the mission at hand.

Philip Tonseth

West Point Graduate and Second Lieutenant in the U.S. Army

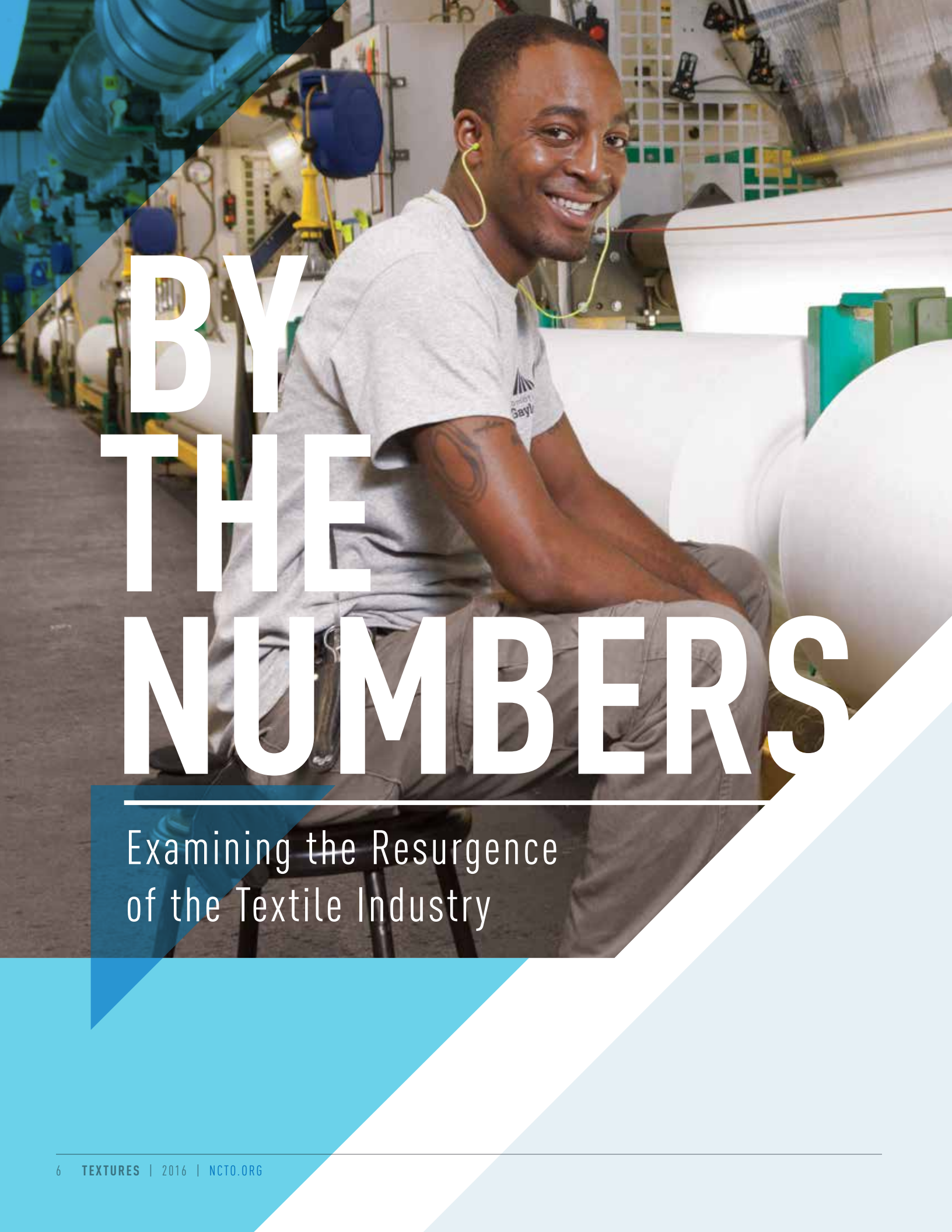
researchers to create lighter-weight products that don't compromise integrity.

"More efficient equipment allows us as soldiers to focus not on ourselves, but rather the most important part of our work, the mission at hand," said Philip Tonseth, West Point graduate and second lieutenant in the U.S. Army. "The Armed Forces operate in a multi-threat world, and any advantage that our equipment can provide is not only appreciated by the soldier, but is also necessary for success."

Companies like Greenwood Mills and Glen Raven are doing just that – protecting committed soldiers from all kinds of threats. Greenwood Mills specifically engineers material for each branch of the military. For example, Marine uniforms are treated with insect repellent and are flame-resistant

to protect those facing the risk of IEDs. Glen Raven produces an ultra-lightweight camouflage system (ULCANS) that not only hides military structures from the naked eye, but also deflects plane radar systems.

"An immense amount of passion and ingenuity are poured into each and every military textile creation. The immediate post-9/11 years are a perfect example: During that time, textile workers labored 13 of every 14 days to ensure enough military fabric was available," said Self. "The textile community expresses its admiration and support through production. It's why we work tirelessly to provide our soldiers with the safest, most reliable, most advanced textiles on the market." ❧



BY THE NUMBERS

Examining the Resurgence
of the Textile Industry

American textile workers are busy making things customers around the world want to buy, rewriting the popular narrative of the industry's demise.

Mount Vernon Mills Vice President and Secretary Ned Cochrane has seen it all in his 30-plus years at the Mauldin, South Carolina-based manufacturer. He said the industry's resurgence is real and sustainable thanks to a confluence of factors and circumstances.

"Servicing the customer is the most important thing we do, and we do it better (domestically) than any country in the world," he said. "Customers today want something special or unique. They want to be different from the next guy. They want consistent quality, and they know that in order to get that, they have to do business domestically."

Bringing Textiles Home

Higher labor rates, transportation costs and energy tabs in Asia, coupled with a substantial appreciation in the value of the yuan, have helped spur a blended marketplace strategy with a strong focus on American-made textiles. The industry generated \$54 billion in shipments in 2015 – a five-year increase of 7.3 percent – decades after many thought U.S. textiles were dead.

'Made in America' Is Back, and It's Likely To Stay

Retailers from Wal-Mart to Abercrombie & Fitch are responding, creating sections for American-made items and sourcing goods domestically. In fact, Wal-Mart, which pioneered global sourcing to find the lowest-priced goods for customers, said it would increase spending with American suppliers by \$50 billion over the next decade — and save money by doing so. Businesses in need of fast-turn, high-quality, low-risk goods have found a new sourcing spot—right where it used to be.

"We believe that U.S. consumers will increasingly position their support behind brands and companies that are investing in the USA," said Senior Vice President of Public & Corporate Affairs Peter Iliopoulos of Gildan, a leading supplier of quality branded family apparel. "We have invested \$350 million in the U.S. in the past three years. Gildan has leveraged the great quality and superior value of USA cotton complemented with a strong base of skilled labor, low energy costs and a stable investment climate."



From 2001 to 2013, the U.S. textile industry invested \$20.5 billion in new plants, equipment and recycling centers.

Building the Modern Factory

Advantages of today's U.S. textile industry include new manufacturing facilities filled with state-of-the-art equipment and a world-class workforce that can do substantially more with less. Between 2002 and 2012, U.S. textile mills increased productivity by 34 percent, one of the largest increases of all industry sectors. Gone are the days of dungarees and lunch pails. Today's U.S. factories aren't the clangorous, dusty places where lappers fed raw cotton into the sharp metal teeth of carding machines for eight hours a day. Low-wage, low-tech jobs are out, and comprehensive computer skills and specialized training are in. The new "Made in America" economic ecosystem relies on customization, cutting-edge technologies and workers who have mastered the machines.

"Our ownership has reinvested more than \$100 million back into the company to modernize facilities and increase productivity," said Cochrane. "We went out and got the best equipment money could buy, so we needed a more skilled workforce to handle it. As a result, our productivity is through the roof."

"We have invested (significantly) in new equipment, technology and process improvements over the last 10 years," said Iliopoulos. "Many of the innovative solutions now in our facilities were deployed through collaboration between our employees and our suppliers. We do not believe we could have achieved this level of success without that connection between our people and technology."

Creating Jobs and Growing the Bottom Line

Increased demand and investments in technology have helped American textile companies achieve phenomenal growth, both in domestic job creation and the bottom line.

The increased demand for quality, domestically-sourced textiles from state-of-the-art U.S. facilities has stemmed the tide of job losses that characterized the industry during the Great Recession. Today, the textile sector as a whole – from textile fibers to apparel – employs more than 500,000 workers.

The rise of the machines also correlates with a rise in pay for skilled textile workers. In 2014, the average textile wage was \$37,900, compared to \$28,216 in 2002. In fact, textile workers earn 143 percent more than apparel-store workers while also receiving health care and pension benefits.

Now innovation is a part of our DNA.

Ned Cochrane

Vice President and Secretary,
Mount Vernon Mills

“The introduction of more sophisticated technology within each process, with complicated circuitry and software driving almost all textile equipment, has elevated textile jobs,” Iliopoulos said. “We believe the shift toward sustainability in textiles has also created (job) opportunities, and the factors driving these changes will likely continue into the future.”

Innovating for the Future

“When things get tough, the easy thing to do is quit,” said ITG’s Burlington Group President Jeff Peck. “And once you quit, you’ve sealed your fate. So even when we were down, we never stopped development, and we never stopped innovating. Our customers today want products that do more and that have a story to tell, so they can create differentiation in the marketplace.”

Thinking differently has paid off for ITG. In 2007, just six years after filing for bankruptcy, ITG’s Burlington Group launched Burlington Labs, a state-of-the-art “petri dish” where ideas become reality.

“We have become a lightning rod for inventors and for emerging technology, because we can take raw ideas and commercialize them at lightning speed. Customers see this and ask, ‘Can you do this?’ And because of Burlington Labs, we can say, ‘yes.’”

By the end of 2016, Gildan’s investment in domestic yarn-spinning operations will have created 700 jobs in the U.S.



We believe strongly in the strength and sustainability of the fundamental advantages within the U.S. (textile) industry. Our investments over the last 24 months reinforce that.

Peter Iliopoulos

Senior Vice President of Public & Corporate Affairs, Gildan

Innovation in the industry has led to two new growth categories: nonwovens and technical textiles. Nonwovens are fiber-based products made of fabric that is compressed, heated or tangled (like felt). Envelopes, facial wipes, mops and medical scrubs are nonwovens. In the last decade, North Carolina has gained 1,945 jobs in the nonwoven products business.

Technical textiles are manufactured for non-aesthetic purposes, where function is the primary criterion. Products include protective clothing for firefighters, welders and astronauts; medical applications such as implants; and geotextiles that include reinforcements for embankments. Technical textiles have become one of the hottest growth categories for the industry, with a 34.9 percent increase in exports between 2007 and 2014.

“Innovation was our salvation,” Cochrane said. “When times were tough, we were forced to innovate to find new products that helped boost sales, like technical textiles. Now innovation is part of our DNA. It’s who we are. After all, what you make is what makes you.”

The U.S. textile industry has grown by leaps and bounds, but Made in America is far from done. U.S. companies are recognized as world leaders in research and development and are innovating new products every day, from body armor to conductive fibers and from fabrics that adjust to climate change to smart textiles that purify water with nothing but sunlight.

“Today’s end users don’t just wear textiles for comfort, they rely on them,” Peck said. “They need textiles for their safety, their health and their wellness. What we do now is more important than it’s ever been.” ❧



DELIVERING INNOVATION TO THE MOON AND BEYOND

Technology-Based Solutions Provider Makes Performance Textiles Better

Today's textile companies thrive on making ordinary fabrics extraordinary. High-performance textiles is one of the industry's fastest-growing segments.

"Textiles" refers to a simple woven, knit or nonwoven substrate. So how has an 88-year-old company founded on a single graphited lubrication product for automobiles become a world leader in performance textiles without weaving or sewing a single product?

Cathy Knowles, marketing manager for Lubrizol's Engineered Polymers business, says Lubrizol is a technology-based solutions provider rather than a traditional textiles company.

"Our work begins at the molecular level, where we add value by delivering chemistries that differentiate and optimize the quality and performance of products," she said. "The work we do is market-facing, customer-centric and innovation-driven."

Lubrizol might not be a household name, but its unique formulations have made possible many of the distinct characteristics that drive consumer-buying decisions when it comes to today's most popular performance textiles.

Jack Scott, global applications manager for Lubrizol's Performance Coatings business, says the company's groundbreaking work is challenging and rewarding.

"We are continually developing new chemistries and gaining more understanding of how our products work in end-use applications," he said. "We have a fundamental passion for innovation and developing materials to match market needs. It's gratifying to see an idea make it from the lab to consumers who love it, even if they don't know our name."

Many of today's leading billion-dollar performance-textile brands rely on Lubrizol's molecular innovations to integrate advanced functional, aesthetic and durability benefits into their consumer products.

"We support brands by working with customers who represent generations in the textile industry," Knowles said. "Their businesses are growing. They're adding capacity including new capital investment in equipment and workforce expansion to meet greater demand."

American textiles are helping make the world's future aspirations a reality.

Matt Dudas
Global Market Segment Manager,
Lubrizol Performance Coatings

Lubrizol's formulations help make footwear more cushioned, yoga pants more fitted, compression gear more comfortable and outdoor gear more protective.

"We're driven to push the innovation envelope, and what we add makes the difference," said Matt Dudas, global market segment manager for Lubrizol Performance Coatings. "When the U.S. wanted to go to the moon, we provided NASA with a textile innovation in aluminized nylon – the space program's classic silver suit that protected John Glenn in the first manned Earth orbit. When it's time to explore Mars and beyond, we'll be there with our next-generation fibers, films, coatings, inks and adhesives. American textiles are helping make the world's future aspirations a reality." ❧

MAKING THE IMPOSSIBLE POSSIBLE WITH PERFORMANCE TEXTILES



Whether climbing Mount Everest or scaling a rock wall at the local gym, running a marathon or chasing a toddler on the playground, skiing in the Swiss Alps or building an imaginary fortress out of freshly fallen snow, consumers expect their clothing to offer more than just a protective barrier against the elements. They expect performance.

Modern performance textiles have changed the way people interact with the outdoors, enabling them to scale the tallest mountains, run long distances in all seasons and even circumnavigate the world on a bicycle. But even for those with less lofty athletic ambitions, performance wear has become the new T-shirt and jeans. Sales of athletic apparel continue to grow, driven by cultural factors including a focus on fitness and active lifestyles, a growing interest in sports, and a preference for clothing that is high-performance yet also comfortable and fashionable.

“Today’s consumers expect so much from the products they buy,” said Gary Smith, CEO of Polartec®, a premium producer of innovative textile solutions that eventually find a home in waterproof running shoes, moisture-wicking base layers and warm, breathable jackets that allow freedom of movement. “Achieving versatility in textiles is a relentless pursuit, but that’s what drives us to keep innovating.”

Polartec prides itself on solving “problems you don’t even know you have” through innovative textile development. Throughout the company’s history – from its beginnings as a knitter of wool fabrics for the United States military, to its current position as a leading producer of performance wear textiles – Polartec has been a problem-solver, innovator and inventor of textile technology that has literally changed the world.

In the late 1970s, the founder of Patagonia approached Polartec’s predecessor, Malden Mills, to help refine Patagonia’s synthetic alpine sweater. Though lofty, lightweight and quick-drying, the sweater was also scratchy, itchy and uncomfortable. The two companies collaborated and the resulting invention – synthetic fleece, also known as “polar fleece” – was named one of Time magazine’s top 100 inventions of the 20th century, right between the zipper and sliced bread.

“The textile industry is a smart industry. We have scientists, engineers, chemists, knit technicians and many others who are constantly pushing the limits of fiber and textile technology to solve a whole range of problems,” said Smith. “If we couldn’t wear clothes, everyone who lives in a cold climate would have to migrate south every winter. At Polartec, we are constantly working to create the most innovative, adaptable and versatile textiles that meet the needs of our multitasking, jet-setting culture.”

We often take it for granted that what we are wearing is technology. Ninety percent of the value of a garment is embedded in the textile itself. You can't take a bad textile and make a great garment.

Gary Smith
CEO, Polartec®

To innovate is to create something new, and the development of new technologies is where Polartec thrives. One of the company's latest innovations is a product called Polartec Alpha®. Originally developed for the U.S. Army Special Forces as an advanced insulating material for combat uniforms, the fabric uses technology that regulates body temperatures during both dynamic and static activities, eliminating the need to shed or add layers while on the move.

"With Polartec Alpha, we invented a whole new category of performance wear that we call 'active insulation,'" said Smith. "Historically, insulation was always viewed as a static product. It was great for watching a football game or standing in line for the ski lift – not aerobic activity. This technology is being used in garments designed for start-stop activities like running and cycling, where you need a range of comfort levels."

Innovation in apparel is inextricably linked to the textile itself. But prior to the 1970s, the performance wear category had little to offer. Polartec's innovations in waterproof, breathable, durable, moisture-wicking, active stretch and insulating textiles have led to incredible growth of industries and brands founded on performance-wear technology.

"We often take it for granted that what we are wearing is technology," said Smith. "Ninety percent of the value of a garment is embedded in the textile itself. You can't take a bad textile and make a great garment."

That's why the world's leading brands such as Nike, Patagonia, The North Face, Adidas and many more turn to Polartec fabric technologies to improve the performance of their garments. And the future of the performance textiles industry is rosy: Millennials – the largest demographic – are driving steady growth in the athletic apparel industry.

"We are always trying to find ways to bring more benefits to the consumer through our innovations, but every time we think we've done something great, we realize there's so much further to go," Smith said. "As long as we have basic human needs to stay warm and dry, we will have to keep innovating." ✕

GREEN TEXTILES

Protecting the Future

If you look around, it's likely that you'll see at least one place where hook-and-loop fasteners from the VELCRO® brand are making life simpler for you. In fact, there are probably several; the textile product is ubiquitous.

It's in the computer pouch that keeps your laptop safely ensconced during a jarring rush-hour commute. It holds your car's headliner fabric in place to ensure a quieter ride, and it keeps your sofa cushions perfectly stuffed so you can read your favorite book in comfort. From the intimacy of a child's diaper to the brute force of an armored tank (yes, it's in there, too), the VELCRO brand is in our lives more than we know.

"It's not something that people really think about," said Fraser Cameron, CEO of Velcro Companies, which owns more than 400 active patents and numerous trademarks.

The job the VELCRO brand is doing to keep our daily lives comfortable is matched by the work the company itself does to keep our environment safe.

Growing Environmental Efforts in the U.S. and Abroad

"We've done a lot in sustainable manufacturing—long before it was fashionable," Cameron said.

From low-energy lights and occupancy sensors to processes designed to redirect waste at manufacturing facilities, Velcro Companies holds industry firsts in its sustainable manufacturing processes: first in the industry to remove solvents from coating processes,

and the first to substantially reduce the use of heavy metals in its manufacturing. Yet, this ISO 14001-certified company knew it could do more.

"Our philosophy is about making connections, and we knew that if we wanted to make amazing connections with customers, we'd have to first make connections with the community," he said. "We thought, 'Let's take it one step further.'"

That step included broadening environmental responsibilities to incorporate social responsibilities, and the company has almost completed construction of the largest charitable school in Cambodia.

Environmental efforts in the U.S. and abroad continue to grow as well. Velcro Companies now has on-site generators to capture fossil-fuel burn-off, and 98 percent of the electrical and thermal power is self-generated. Additionally, it is installing solar

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Fraser Cameron
CEO, Velcro Companies

panels for energy generation. It is a company that is well on its way to meeting a self-set sustainability goal of reducing its carbon footprint by 20 percent by 2025.

Velcro Companies has 2,500 employees, including about 600 in Manchester, New Hampshire, the site of its U.S. headquarters.

"Surveys tell us sustainability is crucial to employee satisfaction," said Cameron, who describes employees as high-tenure, including some who stay with the company 40 or 50 years. "Many of our employees spend a lifetime making our product. We want to ensure the product's attributes, and the way the product is made, make them proud."

Taking Sustainability Full Circle

Kathie Leonard knows something of company pride. She is the owner and president of Auburn Manufacturing Inc. in Mechanic Falls, Maine, just over 100 miles from Velcro Companies' New Hampshire facility.

"We've been making textiles for 36 years, and people can't believe we're in the business we're in and live happily in Maine," Leonard said of the state that she fell in love with and never left after what was supposed to be a short visit in the 1970s. "But we're good corporate citizens. We have to be. What you do—good or bad—follows you with only 1.2 million people in the state."

Auburn is a manufacturer of high-performance coated textiles and composite fabrics for extreme-temperature applications and

Velcro Companies is well on its way to meeting a self-set sustainability goal of reducing its carbon footprint by 20 percent by 2025.

Auburn Manufacturing created a kit that features the company's coated fabrics in a composite that is easy to customize – like contact paper with pre-measured squares that can be cut to size. Auburn's kit also includes hook-and-loop fasteners.

"We've provided an easy, cost-effective way for facilities to cover those components, and they're reducing their greenhouse gas emissions by up to 8 percent," she said. "It's a big movement in a lot of these institutions, for the retrofit market and new construction."

Auburn also created a similar kit with a water-vapor barrier for chilled water systems; it keeps the cold in and prevents corrosion of pipes.

"Sustainability is a way for the textile industry to show off," Leonard said. "There's a lot of knowledge and technology incorporated into textiles."

Fraser Cameron of Velcro Companies echoes the sentiment.

"What you can do with a textile product is quite extraordinary," he said. "At the core, our goal is to go beyond what people might possibly expect. We have a story of undiscovered heroes in our industry." ❧

Sustainability is a way for the textile industry to show off. There's a lot of knowledge and technology incorporated into textiles.

Kathie Leonard
CEO, Auburn Manufacturing Inc.

for end-use products including welding blankets, curtains and pads. Its manufacturing is extremely efficient: the use of water-based materials for coatings offers less volatility and very little waste. Instead of sending waste fabrics to landfills, Auburn donates the remnants to welding schools for use as protective fabrics.

Auburn's sustainability story goes full circle with innovative product development that has helped the company's customers in their own sustainability efforts.

Many of Auburn's products go into insulation applications as components of other products, such as custom-made, removable insulation

covers for heavy equipment in mechanical rooms. The insulation protects odd-shaped equipment that pipe insulation can't cover.

Covering unusual shapes and sizes often requires expensive handcraftsmanship that sometimes is cost-prohibitive for institutions such as hospitals, colleges and government facilities.

Leonard describes a typical mechanical room in the basement of a building on a college campus.

"The pipes are covered, but the components are not," she said. "You're losing heat in all those places where the pipes connect, and it's rising into the classrooms and libraries from the rooms below it. It's like insulating your attic, but leaving your front door wide open."

As a result, greenhouse gas emissions – and energy costs – rise.

"Our silicone-coated fabrics are generally used on the outside of those custom products," Leonard said. "We thought, 'Why don't we help these folks make the component covers more quickly and inexpensively so they can save energy?'"

DENIM THAT TRANSCENDS TIME



Image provided courtesy of Cone Denim, LLC, a division of International Textile Group

“Denim excites and inspires. It gives you a feeling that you can’t quite pinpoint. At Cone Denim, we’re in the business of sharing our passion and inspiring denim.”

Kara Nicholas
Vice President of Product Design and Marketing, Cone Denim

Denim is ingrained in our culture. It’s in the movies we watch, the songs we play and the closets we envy. It tags along on our first date to the school dance, and it’s waiting for us when we get home from the first day at our first job. It stands by us during our successes and failures. It subtly reminds us of the past, makes us feel good in the present and eases our anxiety concerning the future. Our denim knows us, inside and out.

“Denim is something we talk about as being extremely personal,” said Kara Nicholas, vice president of product design and marketing for Cone Denim. “People create a bond with

their favorite pair of jeans. More than any other item in a closet, jeans tell your story.”

Cone Denim, a supplier of denim fabrics to top denim apparel brands, was established in 1891 by brothers Moses and Ceasar Cone. More than a century later, the brand remains focused on its core principles: innovation, art and American heritage.

“The dichotomy of old alongside new is something distinctive to Cone Denim,” said Nicholas. “Our 110-year-old White Oak plant runs a 1940s loom next to the modern looms, the next generation works alongside

operators with 60 years of experience, and we still use a long-chain dyeing process developed by our employees in the 1920s. Thanks to our rich history, we are able to provide people with iconic denim.”

Cone Denim strives to strike the ideal balance between artistic heritage and scientific innovation. With scientists, fabric construction experts, and loom technicians and operators all in-house, the company endeavors to be at the forefront of product innovation and ahead of market trends.

“We understand the pulse of the market, and we want to provide brands with innovations they can count on, such as sustainability initiatives, new moisture management, antimicrobial properties and other performance technologies,” said Nicholas. “We’re constantly weaving these innovations into our long and glorious unique history.”

Denim enthusiasts worldwide recognize Cone Denim for its place in history as the creator of long-chain indigo dyeing, denim sanforization (which reduces shrinkage after washing) and Cone Deeptone® Denim. Furthermore, the White Oak mill is recognized for its re-creation of vintage selvege denim.

“It’s about connecting with people and meeting them wherever their love of denim lies: vintage or contemporary, light or dark, worn or like new. No other fabric moves so easily from the NYC runway to rugged cowboy to workwear,” Nicholas said. “Other fabrics don’t speak to people like denim. Denim excites and inspires. It gives you a feeling that you can’t quite pinpoint.

“At Cone Denim, we’re in the business of sharing our passion and inspiring denim.” ✂



FROM HARRY POTTER'S INVISIBILITY CLOAK TO ACTIVEWEAR THAT BREATHES ON ITS OWN...

...the Textile Industry Is Going Places We Never Imagined

What comes to mind when you consider the word "textile"? If you stopped at thread, fabric or yarn, it may be time to expand your textile horizon. The modern textile industry is going places we never expected or imagined. Through cutting-edge projects in disciplines like color chemistry, 3-D printing and microbiology, industry trailblazers hope to awaken the public to the audacious world of textile innovation.

"Due to the accelerating pace of change, opportunities abound for those currently in the industry, as well as those looking to join the textile field," said Marcia Weiss, associate textile design professor at Philadelphia University. "Among students, there is great interest in new technologies, sustainable textiles and artisanal textiles. Seeing how students mix these mediums is both captivating and inspiring."

Ally Leedy, a senior at North Carolina State University's College of Textiles, is one such student. As one of only 60 students in the world majoring in polymer and color chemistry with a concentration in science and operations, Leedy's niche educational experience makes her especially valuable to leading textile brands.

"I've observed and conducted a range of research experiments while in school. Recently, I created a goo using sound waves. With further processing, it can then be made into tiny micro-fibers that, when layered upon each other, can filter toxins from blood," said Leedy. "It's hard not to be optimistic about the future of the industry when I witness students exploring textiles through chemical experimentation and absorbing guest lectures from Nobel Prize-winning professors."

To introduce students to refractive index theory, Leedy's professor placed an oil-filled shot glass inside an upright pint glass. He proceeded to fill the pint glass with the same oil, and as he did, the shot glass disappeared. It sounds like a magic trick, but the professor applies this theory to his textile research, hoping to discover fabrics with negative indexes and in turn create fabrics that essentially appear to be invisible. Cue Harry Potter's cloak.

Brianna Brinkley, senior fashion design student at the Savannah College of Art and Design, echoed Leedy's sentiments: "I recently took a textile class that addressed the future of fabrics comprised of cotton, wool and silk, and it amazed me. It's hard to wrap your mind around just how many fabrics are out there and the thousands of ways they are created."

One microbiology case study highlighted by Brinkley's professor chronicles a Brooklyn-based biotech startup's efforts to grow ready-to-wear materials. The company, Modern Meadow, uses bovine cells to create a dense material similar to cowhide. By influencing cell cultures, scientists can customize a material's strength, texture, weight and elasticity. Modern Meadow scientists and creatives hope to ultimately fashion a type of leather that is lightweight, transparent, stretchy and responsive.

"Concepts of microbiology are being applied to a range of fashion products," Brinkley said. "I am particularly intrigued by athletic apparel. I was wowed by a New Balance project that used bacteria to create a synthetic 'second skin' that physically transforms when exposed to moisture. When a person's body temperature reaches a certain point, the second skin responsively opens up and allows sweat to evaporate."

Using Atomic Force Microscopes, a micron-resolution printer and other tools, researchers at MIT Media Lab's Tangible Media Group attached these bacteria to wearable fabric. The team developed many performance tests using a variety of patterns and shapes of cells; tests ranged from folding and bending exercises to raising a texture on a cloth. Designers then integrated the printed film composites into clothing using heat maps to determine where the body sweats most during exercise.

"These projects speak to why it is important for the industry to train future generations," said Bill Jasper, chief executive officer of Unifi Inc. "As the region and industry move into a more sophisticated era, it's becoming increasingly important to have prepared, passionate, innovative and thoughtful young talent. We've hired many young engineers and chemists over the last few years, and we've tasked them with developing what's next for our company and driving sustainability throughout the industry."

Unifi manufactures an array of textile products including multifilament POY (partially oriented yarn), draw textured yarn (DTY), polyester stable fiber, nylon textured yarns, recycled PET (polyethylene terephthalate) chip and premier value-added yarns with enhanced



performance characteristics. One such value-added yarn is Unifi's REPREEVE® product. REPREEVE is a family of recycled fibers made from recycled materials, including plastic bottles. REPREEVE turns the bottles into items worn and used every day, creating a "reprieve" for the planet.

"We continue to invest in research and development, especially from a functionality standpoint. We enjoy working with Ford, The North Face, the University of North Carolina at Chapel Hill and others to develop innovative projects and initiatives," Jasper said. "It's amazing where these types of partnerships take the industry. Right now, with REPREEVE, we're transforming bottle and polyester waste into yarn, which ultimately ends up in products like The North Face jackets and automobile interiors."

This industry is technical. It's savvy. It's sophisticated. According to SelectUSA, U.S. textile exports increased by 45 percent between 2009 and 2014 to \$18.3 billion. Textile and apparel manufacturing employment stands at a half-million; and because our industry requires inputs and other support services, a multiplier effect is generated. In major textile-producing states, government statistics show that each textile job supports an average of three additional jobs in sectors as diverse as banking, chemicals, shipping, rail, energy production and more.

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Bill Jasper
CEO, Unifi Inc.

"Since I entered college, textile careers have continued to shift and evolve, and that evolution excites me," Leedy said. "I'm hopeful as I enter the job hunt, because those I'm learning from and about are incredibly intelligent. These industry leaders are not only smart enough to dream up innovative ideas, but they are also bold enough to attempt them. That boldness captivates me."

Leedy's optimistic outlook resonates with Brinkley, Weiss and Jasper. Whether student, professor or CEO, there is a general consensus that the industry is heading in a progressive and innovative direction. Textile workers are becoming more skilled, while the industry as a whole is becoming more technologically advanced. Aspects of Harry Potter's world of wizardry may just be within our reach after all.



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