Maine-Lee
technology group, LLC

Fibers, Fabrication, & Focus

An Intelligent Approach to Holistic Textile-Aparrel Design

A body-focused break with tradition

Many traditional textile manufacturers chose between a wide and narrow path to success. Those seeking larger targets look to exploit technological advances by applying a given fabric to an entire product line. One has only to look at the history of products like Polartec and Gortex to see how breakthrough textiles can be used in a broad range of garments positioned to cover consumers from from head to toe. Niche-focused companies, by contrast, look for individual garments to tailor their fabrics to a specific application.

That approach can lead to either fashion failures like the polyester pantsuit or enduring classics like denim blue jeans. In either case, however, the adaptation of these textiles to the apparel that features them is often incidental. The fibers selected and fabrication methods chosen are designed with a primary eye trained on the cloth, not the clothes, they'll be made from them. What's worse, these textiles are also often created without an intimate focus on the functions of the bodies they're designed to serve.

Maine-Lee Technology Group (MLTG) is a different kind of company. Though it was started to solve a very specific apparel-problem, it evolved to innovate the products, practices, and approach that led to holistic solutions that integrate textile and apparel design. These "Intelligent Textiles" are engineered and constructed to leverage technological advances that put a body-first focus on their multifunctional use. That intelligent textile technology allows Maine-Lee to private label, co-brand, and license its technology to support a product line that meets a broad array of client needs. These include applications such as athletic wear, collegiate attire, corporate-branded promotional products, and many more.

A doctor's new take on design

One needs to look no further than the company's founder to discover the distinct identity that sets MLTG apart. Dr. Lee Thibodeau's life journey from Maine farm boy, to competitive ski racer, to multi-patented neurosurgeon inspired the unique passion and perspective that led to his company's technological textile breakthrough. Lee drew upon his sportsman's experience and intimate knowledge of the body's structure and systems to tackle his mission of perfecting of what is arguably the single most challenging piece of apparel to design—the sock.

Great progress has been made in the textile industry in the past several years to create garments with an increased capacity to protect and comfort users throughout a wide range of physical activities and environmental conditions. However, these advances have largely ignored the very foundation of the wardrobe that supports the body. The foot's complex structure and wide range of motion, coupled by its function as the prime point of contact between the body and an often harsh and unpredictable world presents the sock as the ultimate challenge for performance apparel design.

In typical scientific fashion, Lee began outlining the series of problems, analyses, and possible solutions that could create a sock that worked both with, and like, the human body to protect and support its wearer. To do so, he turned to the textile technologists and marketing experts who could complement his physiological insights with the technical and corporate knowledge needed to create and market the product he envisioned. That group became MLTG, the company that solved socks—once and for all.

A step by step review of the MLTG work-flow reveals the scientific approach that yielded the results of MLTG's efforts: the EZ Glider® Sock, the multi-functional, three-in-one sock for all-day work, rest, and play. It's an overview that grants a deeper peek not only into the evolution of a product, but of the people who created a company to bring a new vision for textile creation to life.

EZ Glider Socks: A case study in integrated textile-apparel design

Problem 1: Friction-free Boot Entry and Exit

Analysis & Solution:

MLTG began with a problem that no competitor had attacked directly before: creating a

sock that could slide quickly in an out of ski or hiking boots to get outdoor enthusiasts in and out of the action with ease. This dilemma initiated MLTG's "Triple Fiber Focus" on each fiber's composition, placement, and weave to yield a solution. That design began with an analysis of both foot and fabric, to understand how the latter could best support the foot's structure and movement during athletic performance and when entering or exiting the boot. Proprietary "EZ Glide®" synthetic fibers were developed for strategic placement on the ball of the foot, top of the arch, and the heel, to decrease the coefficient of friction needed in these areas. However, that placement required the custom weaving that would support not only the fibers' location but other benefits described later in this brief.

The sophisticated weaving required led to the development of the proprietary manufacturing processes that could fashion a sock made from a composite mix of strategically placed fibers. That effort produced a sock that afforded an "EZ Glide" into or out of any boot or shoe. Yet once in, the garment's form-fitting design also allowed for close connection between all non-EZ Glide fibers and the foot. That feature supports the instant transfer of foot movement into action needed for optimum athletic performance.

Problem 2: Moisture Retention

Analysis & Solution:

There are more sweat glands in the feet than anywhere else in the body. Sweating is part of the body's elegant system of thermo-regulation through the movement and evaporation of water to keep it cool. Understanding and replicating this process has been the central focus of many modern textile technologists. While advances have been made in many areas of fabric and garment design to mimic this system, socks' sheathed location at the base of the body have left them an unsolved moisture challenge. When traditional sock fibers like wool became saturated, the insulating pockets within them fill, conducting—instead of insulating—body heat. Even "wicking" socks often fail because the moisture these socks are designed to remove has no place to go.

MLTG's thread-level focus led to the development and placement of proprietary fibers and weaves to create a "Moisture Management solution to this problem. Special voided yarns use capillary action to transfer moisture away from the foot and up the length of the sock. Since the elimination of this moisture is dependent upon traveling a path away from its source long enough to allow for its evaporation, MLTG designed special

weaves to create intricate custom patterns. These longer moisture-bearing routes provide the greater distance needed for evaporation to occur.

Problem 3: Blistering

Analysis & Solution:

Moisture and friction are the prime factors for blister creation. With MLTG's Moisture Management in place, friction was the part of the problem left to be solved. The answer required a form-fitting sock specifically engineered to conform to every contour of the foot, ankle, and shin to close the space between sock and skin where frictions occurs. Again, this required MLTG's Triple Fiber Focus on the fiber composition, placement, and weaves that could achieve this goal. Proprietary manufacturing techniques were developed for the creation of a completely seamless sock that could orchestrate its mix of fibers in the complex weaves needed to wrap to the foot's topography.

The resulting sock is composed of areas that not only follow every curve it covers, but that also stretch in different ways to accommodate the foot's biodynamic actions. These include strategic stretches across multiple axes, including a sophisticated four-way stretch plotted in specific locations. Careful placement to "set and forget" this intricately engineered sock by the wearer each morning leads to the "second-skin" protection that provides support throughout the most physically demanding activities.

Problem 4: Impaired Circulation

Analysis & Solution:

Tired and aching feet are often thought of as the unavoidable "reward" for a long and active day. Yet there is a solution often known only to those who suffer from the most severe circulatory problems. In the past, compression socks have largely been associated with these medical needs, yet MLTG saw the opportunity for weaving their advantages into a sock for everyone. Creating a range of compression options was the solution for offering this benefit to suit a variety of consumer preferences.

Three classes divide the way these features are offered to create a broad array of fits and feels for wearers to choose from. "Mechanical" compression is achieved by the selection of elastane fibers in the sock. "Structural" compression is yielded from the specific weaves of those fibers. "Gradient" compression is the engineered mix of fibers and weaves that creates the greater pressure at the base of the foot that gradually

diminishes through the upward length of the sock, a feature that is especially efficient at stimulating blood to travel away from the foot and back into circulation. The varying ranges of gradient compression MLTG has designed, along with their structural and mechanical counterparts, creates an almost unlimited continuum of options for the daylong circulatory support that can refresh and revive tired feet.

Problem 5: Odor and Bacterial Reduction

Analysis & Solution:

Foot odor is a byproduct of the breakdown of bacteria on the skin by sweat. Antimicrobial agents can kill and control these bacteria to reduce or completely eliminate odor. In the past, heavy metals and other chemical additives have been used to combat bacterial growth in apparel, but the harmful environmental impact of their application as well as the potential for leaching harmful contaminants into the skin has fostered safer alternatives. Today, most responsible manufacturers use all natural elements such as bamboo or charcoal for solutions friendlier to both human and environmental health. But MLTG has gone a step further in developing more powerful next-generation textile antimicrobials. The use of the all-natural shellfish derivative, chitosan, in EZ Glider socks allows for the impregnation of this particularly effective liquid agent deep into sock fibers for the complete absorption that retains potent antimicrobial efficacy throughout the life of the product. MLTG is continuing to investigate even more-advanced antimicrobials and application processes that promise even greater anti-bacterial performance and product value.

Problem 6: Product Deterioration

Analysis & Solution:

Any pair of socks' active, day long duties can cause undue wear and tear. Retained moisture can accelerate fiber breakdown and accumulated odors can inspire early disposal as well. EZ Gliders' Moisture Management and Odor and Bacterial Reduction (noted above) can address both of these factors to enhance sock life. But the EZ Glider's construction is the prime reason for its longevity. The complex weaves and fiber arrangements that afford the multiple performance benefits detailed above also create a structural integrity that achieves unparalleled durability. Through repeated washings and wear, EZ Glider socks retain their form-fitting shape and multi-functional benefits long after other socks have been stretched, worn out, and discarded.

The Three Primary Values of Intelligent Textiles

The critical analysis and solutions to the six product problems outlined above led to much more than a sock that sets a new standard for multi-functional performance and wear. It has granted Maine-Lee Technology Group the specialized knowledge that can be shared through any one of four customized corporate programs: Product Customization, Private Labeling, Co-branding Opportunities, and IP Licensing of MLTG's patent-pending proprietary technology. These capabilities allow Maine-Lee to expand its current focus on footwear to provide customized solutions for clients interested in producing intelligent textile uniforms, athletic wear, and blankets, to name just a few. Each of these garments can be adapted to further distinguish any client's promotional product needs by incorporating company brands, athletic team logos, and university insignia into their chosen fabric application.

The Intelligent Textiles the company is committed to producing and improving upon are woven from the three primary values of the MLTG brand. These core advantages support its mission of redefining the standards for consumer and professional foot apparel:

MAINE-LEE TECHNOLOGY GROUP'S INTELLIGENT TEXTILES ARE WOVEN FROM

OUR FIBERS

Our ability to engineer advanced, proprietary fibers provides the foundational materials for our work.

OUR FABRICATION

Our innovative manufacturing processes are designed to support the specific functions of any textile or garment and the body it serves.

OUR FOCUS

Our expert application of our fibers and fabrication processes provides any buyer of consumer or professional foot apparel with the textiles, socks, and/or manufacturing insight that can meet their unique needs.