

adaptive comfort

Outlast Technologies has found a way to incorporate its patented 'Thermocules' into nylon and polyester fiber to give a broader range of fabrics. Kathlyn Swantko reports.

Outlast Technologies, the Boulder, Colorado, based pioneer and worldwide provider of phase change fibers, fabrics and foams, first developed "phase change technology" in 1988, for NASA .

The company is now moving into the next generation of its 'Adaptive Comfort' products by developing a process for injecting its patented phase change material right into nylon and polyester yarns. This marks a major step, and opens broad opportunities, particularly with manufactured fibers and blends.

Brad Poorman, vice president of North America for Outlast Technologies, stated the company's most recent Adaptive Comfort products moves application beyond what has proven successful in outdoor ski apparel, socks, snow-board and ski boot liners, glove liners, and bedding products like mattress pads, comforters, and pillows. New developments are now finding their way into sports apparel and mainstream fabrics for everyday apparel.

The next generation of Adaptive Comfort products are solving a basic consumer complaint. Poorman explained, "The most

exciting part of what we are doing is responding to the number one complaint of consumers. Whether they are traveling, going in or out of the office, commuting, or playing sports, they say their clothes become saturated and uncomfortable as they become over-heated. Typically, mainstream apparel fabrics haven't had the capability to be able to store and moderate temperature by buffering radiation from the sun, or just through the energy that you produce."

Phase change technology

Outlast's patented phase change material, called Thermocules, has been used commercially since 1995. Using patented technology, the Thermocules are concentrated where they are most effective - at the surface of the product.

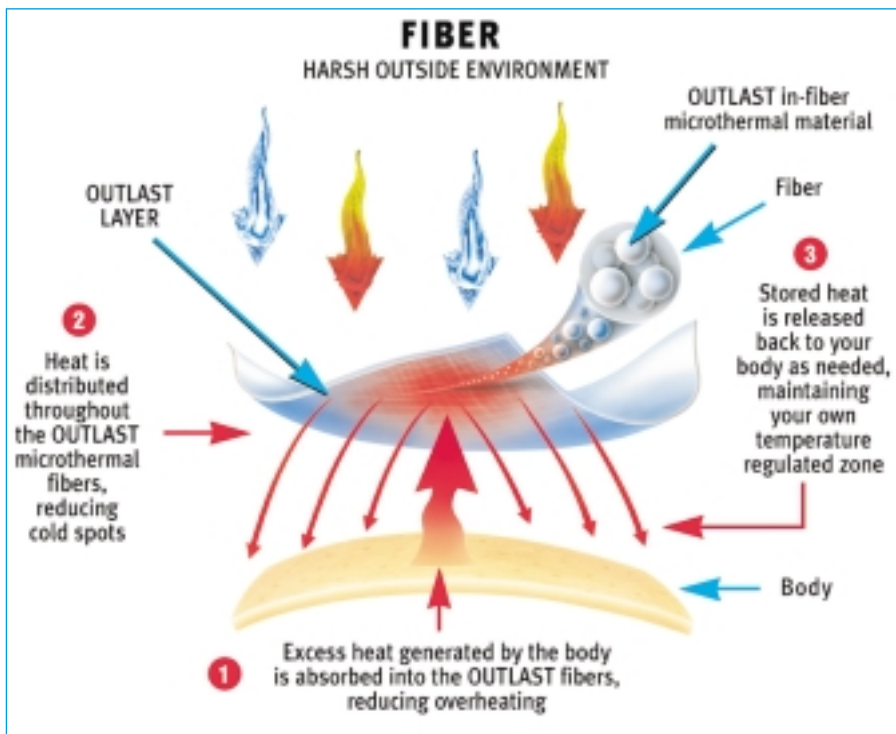
The Thermocules are in a hydrophilic compound applied as a pattern coating to a base fabric and pulls moisture through the fabric system. The matrix coating maintains air permeability. The result is superior breathability and moisture management in a fabric system which helps control the wearer's microclimate between the skin and the fabric.

Even small changes in skin temperature can cause discomfort, and force the body to compensate by sweating or shivering. The Outlast Adaptive Comfort products keep the wearer more comfortable by absorbing excess body heat when it creates too much heat and by releasing stored heat when the body needs it most. The Thermocules work with the body to regulate temperature and humidity better than fabrics or insulation alone. The wearer stays warmer with less bulk, sweats less, and stays drier.

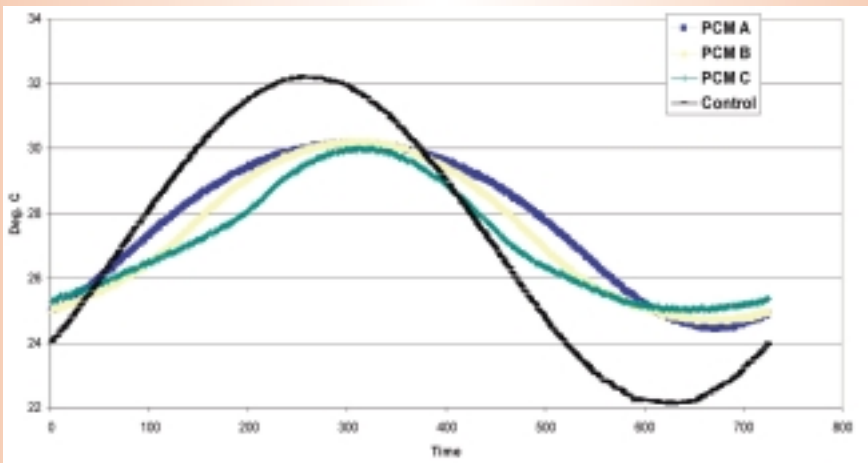
Outlast products provide a buffer against overheating, while mitigating the chill common after exercising in cool weather.

This ability to adapt to one's ideal skin temperature assures maximum individualized comfort.

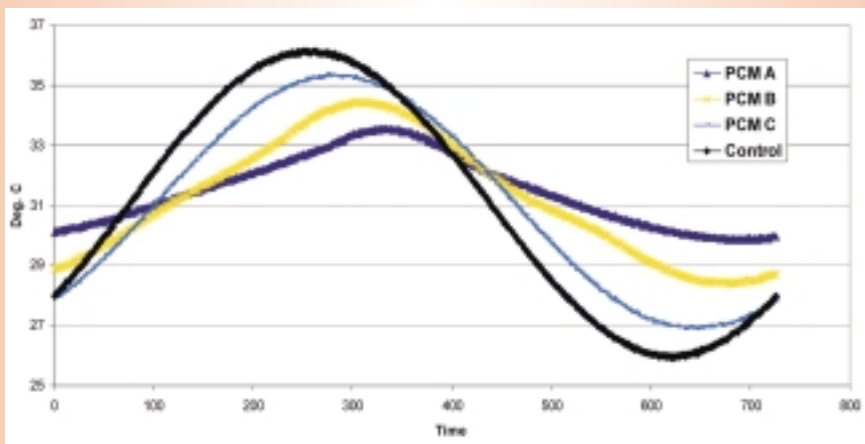
While the Outlast Adaptive Comfort technology has been very effective, staying with a topical matrix coating treatment has limited its application, particularly in fabrics worn next to the skin. There was a need for new technology to create the same capabilities in a broader range fabrics, and for a broader range of end-uses. Initially, there was success in injecting the



TRF sample temperature readings at 14°C setpoint



TRF sample temperature readings at 18°C setpoint



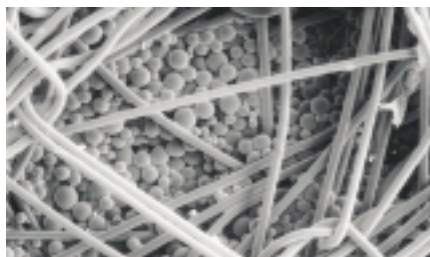
Thermocules into acrylic fiber during fiber production.

Recent developments of injecting the Thermocules into polyester and nylon have now opened new horizons. Poorman explained, "We have been doing this successfully with acrylic fiber utilizing a different process. But, our new development is a whole new process that we're patenting for use on polyester and nylon fibers. It's a different product that has different attributes associated with it."

Next generation phase change

According to Poorman, products utilizing the new process of injecting the Thermocules directly into polyester and nylon yarns is currently going through beta testing. Poorman noted, "During this phase, we're having people use these fabrics in the field, so that we can gather all of the results of what exactly the value qualities will be to the consumer."

Poorman said that these products will



Above: Electron micrograph of the phase change fabric showing the spherical 'Thermocules'.

deliver a different functionality, in that they can be used in garments that will be worn closer to the body than previous applications. He explained, "The products won't have as high of an Adaptive Comfort rating as some of our coatings do. But, at the same time, they are going to broaden our product line into more activewear and spring/summer related fabrics, like pique knits, golf shirts, spandex shorts and tops, jog bras, and running shorts and pants.

"The new development will be more effective in addressing these end-uses than

the matrix coatings, because the fabric provides a softer hand than the coated fabrics."

The procedure used in adding the Outlast technology to nylon or polyester fibers also provides more durability. Poorman noted, "The coating process used in outerwear pieces and footwear doesn't see nearly the type of wet flexing that you would see in a shirting fabric or a Lycra pant or bike short.

When going into these applications, we realized that we needed a process where the technical material is injected into a straw core, and the polyester or nylon bi-component fiber would be on the outside, so the technology is permanently placed inside of the fiber. This allows for greater durability. The garment can go through extensive launderings without effectively reducing the capacity for the technical materials to store energy."

Business as usual in knitting

Poorman doesn't anticipate many problems in knitting or weaving these new technical fibers. He stated, "Once we get to the correct denier and tensile strength, and some of the other variables that are common to these yarns, I don't believe that we'll see many problems in the knitting or weaving processes.

I think that a lot of the development has to do with how we blend this product with other products to create the end result, i.e. the soft hand, the stretch of the product, the UV protection, etc. There's still a lot of work to be done developmentally in perfecting these products for the various markets. But at this point, from what we can see, there hasn't been any set-backs as far as dyeability, yarn breaks, or things of that nature that would make the manufacturing process difficult."

According to Poorman, the new product will probably be available for retail selling in spring '04. Right now the plan is to make the technology available to apparel manufacturers to incorporate into their product lines by March/April of 2003.

Poorman said, "Our progress seems to have accelerated over the last six months. We've had some real breakthroughs on the technology side. Now, it's just a question of making sure that we have the right partners, and that we take all of the necessary steps to ensure that we produce a quality product."