Of the consumer goods currently being made out of post-consumer recyclables, polyester is putting in a stellar performance.

rPET now and tomorrow

By Shari Shallard

As mountains of accumulating garbage (250 million tons of it every year in the US alone, according to *Scientific American*) spread from being a fact of life we can keep out of sight to an unsightly fact that's threatening quality of life, the need to reduce, reuse, and recycle waste has never been more urgent. Sustainability, as a concept and buzz word, is moving from being a novel selling point for fringe goods to an expected staple of any reputable business.

For many companies, efforts to be environmentally responsible can be found through a link at the bottom of their websites—click the word 'Responsibility' or 'Sustainability' to see, for instance, how many trees a company has been planting to offset its carbon footprint. Such efforts are commendable and necessary but generally peripheral to the company's primary products and objectives.

For others, though, sustainability is a fundamental part of a company's ethos and inventory. These are the companies that are turning not to Earth's finite resources for materials, but towards those mountains of garbage. More specifically, they're turning to the recycling centres, and turning discarded products into new ones.

Of the consumer goods currently being made out of post-consumer recyclables, polyester is a serious player. Recycled polyethylene terephthalate (rPET) is not a brand new concept, but its foothold in the consciousness of manufacturers and retailers is becoming ever more secure.

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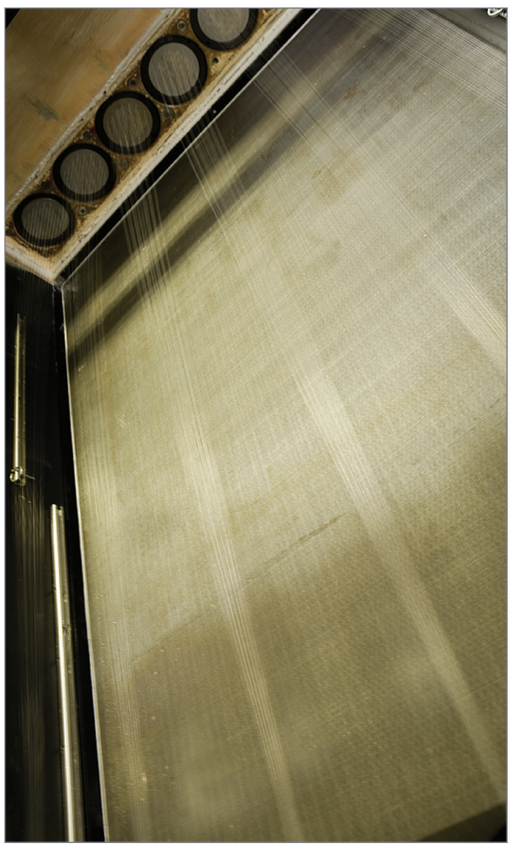
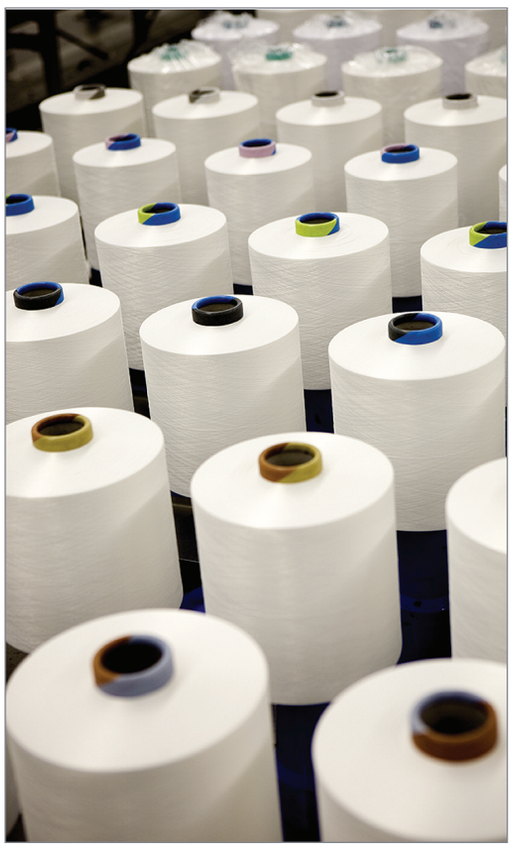
Unifi





Unifi insists there is no compromise on quality with recycled polyester.
Unifi

If this concept is new to you, you might not be alone. Not everyone realises that the five empty water bottles in your garbage bin covered, perhaps, with mushy banana peels and sticky muffin wrappers are actually building blocks for a name-brand running top that wicks sweat, combats odour, and looks good. (Equally, anyone who has a garbage bin with five empty water bottles in it might not realise that it's 2010; he or she needs to start sorting and get a recycling bin.)

Turning water (bottles) into wine (coloured tops)

In the case of Unifi, a producer of multi-filament polyester and nylon textured yarns and related raw materials (and a pioneer in the field of recycled polyester), this is how the extraordinary metamorphosis can happen. The average conscientious consumer or company does the responsible thing with recyclable waste they send it to recycling facilities. Pre-consumer polyester fibre waste and post-consumer plastics go through a material conversion process, involving chopping, grinding and melting, ultimately forming recycled chips that look like plastic beads.

According to Unifi, whose 100% recycled chips are the basis of its Repreve-brand polyester, the chips are melted into molten polymer to be extruded through tiny openings in a spinneret (imagine something like a shower-head) that creates continuous filaments to make the yarn. Additional processes give bulk, crimp, and strength to the recycled yarns, while texturing introduces properties such as stretch and softness. From that point, fabric mills use the recycled yarns to create fabrics either as the entire content or blending it with other yarns in different percentages. Potential final products range from performance apparel to curtains to furniture.

Not just a pretty fabric

While Repreve is not Unifi's only brand (others include AIO all-in-one yarns, Sultra's ultrasoft yarns, and Reflexx stretch yarns), it is the one with the potential to, as the tagline reads, "offer reprieve for our planet's resources". Repreve was first introduced in 2006 as a recycled filament polyester yarn and received, according to Roger Berrier, executive vice-president for Unifi, "a tremendous response from the market proving to be the right product at the right time". Seizing on that momentum, Unifi extended the line to include recycled staple polyester, recycled filament polyester, recycled filament nylon 6.6, and recycled performance fibres (which can include flame retardant, moisture wicking, UV protection, stretch and colour technologies).

This recycled yarn finds its way into a varied list of products, such as Patagonia's Synchilla vest, Envirosax's reusable bags, HON's Ignition chair, and, of particular interest to the performance apparel industry, Optimer's drirelease e.c.o. (environmentally correct origins) fabrics. The drirelease e.c.o. blend

takes several forms, the most popular of which is the recycled polyester/organic cotton and recycled polyester/wool yarns, according to Optimer's David Lambert, business development manager for the brand's US western region.

Mr Lambert attributes this popularity to not only the consumers' appreciation of the line's environmentally friendly content, but the apparel's comfort: "Drirelease is unique in that it takes on the aesthetics of the minor fibre in the blend, so the end product feels like cotton, wool or Tencel, rather than the polyester which makes up the majority of the yarn content."

He feels that advances in cleaning and processing post-consumer PET enables recycled polyester staple fibre to readily replace virgin fibre without sacrificing performance or aesthetics. "The consumer," he says, "does not see any loss of expected garment feel, performance or durability."

As with most innovations, it is the quality of the product that will secure its fate, and on that fact alone, rPET should continue to hold its own in this competitive market. But it is hard not to celebrate the environmental, and potentially economic, benefits of using rPET.

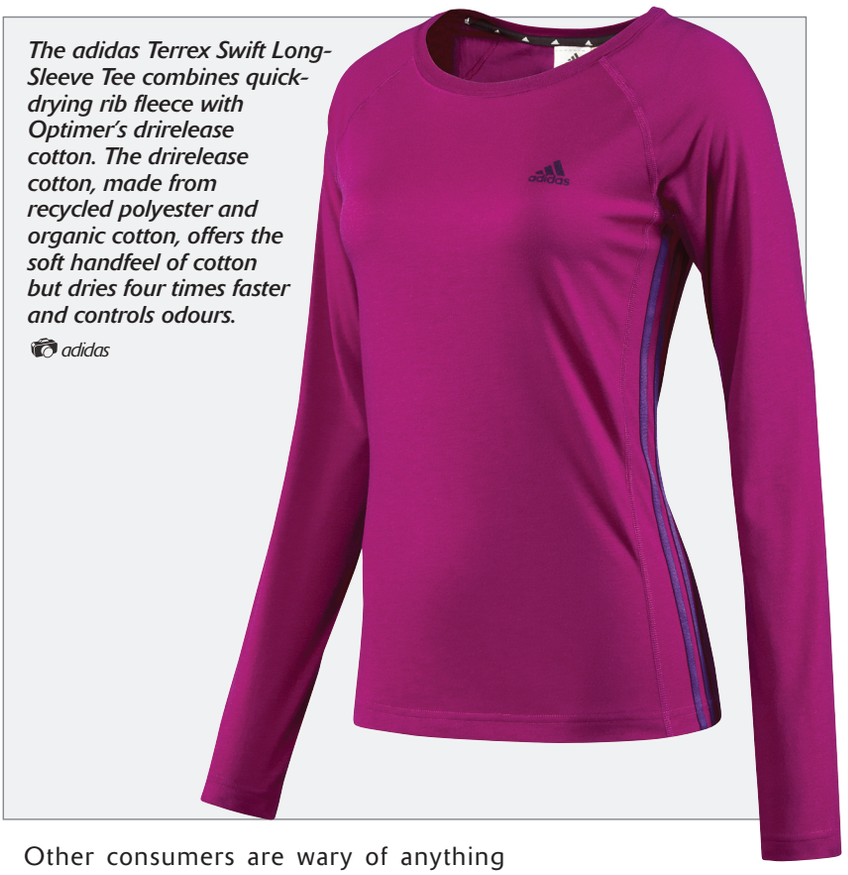
Using recyclables eliminates the need for crude oil, which eliminates the need for drilling, refining, and transporting crude oil, breaking the crude oil into chemicals, blending it with other additives, or turning it into the raw materials needed for manufacturing. According to Unifi, a pound of Repreve yarn conserves, on average, the equivalent of half a gallon of petrol. Another manufacturer of rPET, Libolon, states that its RePet-Solution recycled yarns reduce emissions of greenhouse gases, require less water consumption, and decreases the amount of chemicals involved in the production process.

Small battles

Such benefits seem to come at minimal cost; the challenges that have arisen through rPET's evolution are being worked through every day, according to Mr Lambert. The quality of available raw feedstock materials has created issues for the fibre producer in maintaining consistent colour and dyeability; but, he says, "great strides have been made in the past few years to minimise these issues".

Other ongoing hurdles involve consumer misconceptions.

Some customers have expressed concern about whether clothes made from recycled goods can be hygienic, but Mr Lambert credits recycling education programmes with helping the public understand that the high temperature required for melting and extruding PET neutralise biological contaminates.



The adidas Terrex Swift Long-Sleeve Tee combines quick-drying rib fleece with Optimer's drirelease cotton. The drirelease cotton, made from recycled polyester and organic cotton, offers the soft handfeel of cotton but dries four times faster and controls odours.

adidas

Other consumers are wary of anything utilising plastic, after reading studies in recent years regarding the leaching of substances from a plastic bottle to its contents, but this is a concern that Mr Lambert feels is irrelevant to the apparel market. "These types of exposure conditions would not be present in the case of garments worn on the body, even against the skin," he says. "There would not be these same circumstances in the case of fabrics; high temperatures, tightly closed environments, and internal ingestion are not encountered, even if someone told you to 'eat your shirt'."

A slightly bigger battle

The final challenge to rPET's complacency surrounds the issue of integrity; there is a need to assure consumer trust in a company's claims of sustainability. When apparel purporting to be made of recycled materials is indeed made of recycled materials, the benefits to the consumer and the environment are vast. However, it is not unheard of for a company to market its goods as containing recyclables, to get that green bump in approval, even if the sustainability factor is negligible.

"The term 'recycled' can mean 100% post-industrial, a blend of post-industrial and post-consumer, or 100% post-consumer feedstock," says Mr Lambert. "Also, post-industrial can have different meanings depending upon the fibre producer: [it can refer to] fibre production waste, off-quality fibre, and/or off-spec PET fibre or bottle resin."

To distinguish its brand as offering 100%

recycled fibre, Unifi keeps information about its sourcing and manufacturing accessible to the public. "To maintain our brand's integrity, we're very watchful of the claims we and our partners make," says Mr Berrier. "Products made from Repreve fabrics are tested and certified before they can use the Repreve brand name."

This is why a company like Optimer uses a credible yarn source like Unifi; a discerning selection of suppliers assures consumers of the brand's quality, according to Mr Lambert. While there is a need to clarify the recycled content within a product, he doesn't feel that regulation is essential, or that an industry-wide standard needs to be formally adopted: "Those companies that make the effort to communicate content will most likely be preferred partners with those who care about these issues," he says.

The future of rPET polyester

Today, paper products, playgrounds, park benches, and so many more parts of our daily lives are made entirely or in part of recycled materials. Does post-consumer recycled polyester have the potential to achieve the same ubiquity?

Mr Berrier of Unifi thinks so: "As consumers continue to desire eco-friendly products, and because there's no sacrifice to performance and quality with Repreve, the demand for recycled synthetics like Repreve will surely grow."

Unifi's commitment to the increasing use of recycled materials is evident in the company's investment into a new Repreve recycling facility, which is designed to recycle post-industrial and post-consumer waste into Repreve fibres and, eventually, fabrics. "The goal of the facility," says Mr Berrier, "is to expand production capacities and capabilities, improve fibre colour and whiteness and drive volume growth for improved economics."

Optimer's Mr Lambert also expects continued growth for rPET in apparel, pointing to the way companies such as Nike, Mountain Equipment Co-op, and Walmart now consider sustainability part of their respective corporate cultures. He feels, however, that such growth is dependent upon economics, the philosophy of a given brand or retailer, and the availability of suitable raw materials.

And although the western world has garbage in disconcerting abundance, those suitable raw materials cannot be taken for granted. Mr Lambert cites the findings of NAPCOR (National Association for PET Container Resources) that the US has only 11 bottle deposit states which provide the cleanest separated PET bottles, and those states recycle more beverage containers than the other 39 states combined. Only 27% of the US's available PET bottles are collected and recycled.

"If more states enacted bottle deposit laws, the number of bottles recycled would increase significantly and, thus, the amount of available raw materials, which in turn could result in improved economics," he says. "Today post-consumer recycling to produce fine denier staple fibre for apparel is more expensive than producing these same fibres from virgin resin."

That first step, that effortless first step, is key to the growth of this most innovative and efficient movement. A plastic bottle in the tip will be there for literally hundreds of years; a plastic bottle dropped in a recycling bin could be woven into a coat and keeping you warm by next winter.