Although new 'natural' fabrics and apparel appear to be the 'in' thing with companies and consumers at present, polyester is fighting its corner and is even transforming itself into a sustainable product.

Fighting back against nature — polyester does its bit for the planet

Guilt is a powerful emotion. Consumers are constantly being reminded that, after having abused the planet and its atmosphere for centuries, they need to do whatever they can to save what is left of it, so it is not really surprising that they have embraced the idea of 'natural' products. Like every other sector, the textile industry has also jumped on the eco-warrior bandwagon that has led to the recent resurgence in the popularity of natural, organic fibres and fabrics in apparel. But, although there is most definitely a place for natural fibres in the industry, their share of total fibre output actually fell from 41.9% to 41.4% in 2006. So, where does that leave synthetics in the grand scheme of things, and particularly polyester which, with in excess of 40% of the fibre market, has overtaken cotton as the leading fibre, and accounts for a staggering 75% of the synthetic fibre market?

Since ICI developed Terylene and DuPont went on to launch Dacron, polyester, or polyethylene terephthalate (PET), has had a huge impact on the textile industry, stealing nylon's leading position in the synthetic fibre market in the late 1970s and opening up vast opportunities in the production of apparel as a result of its strength, ease of care, and crease and stretch resistance. To that one must add its durability, dimensional stability, high modulus, and lower production costs. However, in the 21st century there is one negative aspect to polyester that is outweighing all of its attributes and could even threaten its future… as a petroleum-based product it's not viewed as sustainable.

Sowing the seeds of the future

But that could all soon change following a recent breakthrough made by scientists at the Institute for Interfacial Catalysis (IIC) based at the Pacific Northwest National Laboratory in the USA, who believe that they have discovered the most effective method yet to convert glucose, found in plants, to hydroxymethylfurfural (HMF), a chemical derived from carbohydrates such as glucose and fructose that can be broken into components for products now made from petroleum, including polyester.

Although naturally-occurring sugars have been used to produce alternatives to petrol-based products before, the yields were often too low to be commercially significant, but experts at IIC are said to have directly converted high yields of glucose into a primary building block for fuel and polyesters, and the new technology is being touted as a "promising surrogate for petroleum-based chemicals". To achieve the necessary yield, IIC developed a non-acidic catalytic system containing metal chloride catalysts in a solvent capable of dissolving cellulose. The solvent, an ionic liquid, enabled the metal chlorides (chromium chloride) to convert the sugars to HMF and, what's more, these liquids are re-usable and therefore the process produces no wastewater, thus creating a renewable and sustainable process for the manufacture of polyester. With this kind of technology on the horizon the future of polyester quickly looks a great deal brighter as this type of breakthrough could alter both apparel manufacturers' and consumers' perception of the fibre, allowing it to compete with natural fibres based on its performance attributes alone, rather than being hampered by its negative environmental image.

Coming full circle

But, whilst this new technology, and similar projects, undoubtedly represent a major breakthrough in the manufacturing process of polyester, it could take several years before it is a viable option in terms of the mass production of the fibre. In the fast-paced world of performance textiles, during this time polyester could lose a serious portion of its market share if it were unable to compete with alternative 'natural' products in terms of sustainability. And, being

fully aware of this possibility, fibre and fabric producers have already made significant moves to improve the environmental credentials of polyester through recycling.

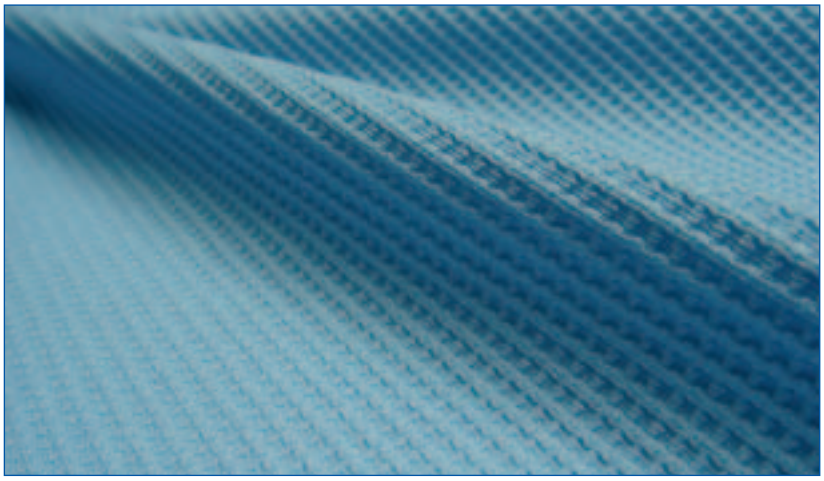
In fact, US producer of polyester fibres and packaging Wellman claims to have introduced its first polyester textile fibre, Fortrel EcoSpun, made from post-consumer PET packaging, as far back as 1993 and the company now has the capacity to recycle in excess of a staggering 2.5 billion PET bottles and containers annually, which are then used to produce fibres and packaging products. Produced by Foss Manufacturing, Ecospun is made from 100% certified recycled plastic PET bottles and can go into any textile product. Just as with virgin polyester, it can also be blended with other fibres such as wool, cotton, and rayon as well as, more recently, the company's Fosshield anti-microbial technology. It is also said to be nearly identical to non-recycled fabrics in terms of its chemistry and function. The only difference would appear to be that it causes less harm to the environment through reducing oil consumption and preventing large numbers of PET bottles ending up in landfill sites around the globe.

Having also already established a line of sustainable fibres, Polartec will showcase new products with additional recycled and renewable content at the Outdoor Retailer show in August which will be included in the autumn collections of brands such as LL Bean, Nau, Patagonia, and REI. Over 10% of the company's total production now uses recycled content and the company plans to increase this to 20% by next year. Furthermore, Polartec has now moved from using 100% post-industrial waste content yarn in its fabrics to now include 10% post-consumer waste content yarns (PET bottles), whilst maintaining the performance properties of its products.

Maintaining performance

Other companies have also managed to combine their performance enhancing technologies with recycled polyester. Manufacturer and processor of multi-filament polyester and nylon Unifi Inc. produces a 100% recycled polyester yarn, Repreve, which is said to combine all of the performance benefits of its aio (all-in-one performance) yarn family, including its Sorbtek moisture management and Reflexx stretch technologies, within a sustainable product. And the environmental savings are significant. According to the company, compared with fibres produced from virgin polyester, for every pound of Repreve produced half a gallon of petrol is conserved.

In line with this trend towards sustainable fibres and fabrics, numerous fabric manufacturers have now incorporated Repreve into their products. Canadian textile company Consoltex Inc. worked with Unifi to introduce it into its Mojave, Energy, Vector and Zircon technical activewear fabrics sold under Consoltex's Earthwhile brand. Launched last year, these fabrics, which are said to offer the same level of stretch, comfort and durability as their virgin polyester equivalents, are now used in a wide array of performance apparel including soft shells.



Eschler has introduced Repreve in its 2008/09 collection of fabrics

Christian Eschler AG

More recently, Ideal Fastener Corporation, the second largest zip manufacturer in the world, announced the launch of a new line of sustainable zips using Repreve. Sold under its Ideal Earth brand, the products are designed to provide customers with a solution for a complete eco-package from fabric to accessories and adornments.

Swiss knitted fabric producer Christian Eschler AG has also introduced Repreve in its 2008/09 collection of fabrics. A bluesign member, Eschler opted to include Unifi's recycled polyester and DuPont's corn-based Sorona in its new line, unveiled at the Outdoor show in Friedrichshafen, Germany, in July. This is all positive news for the polyester industry; however, in spite of the general hype over the shift towards 'natural' fabrics, it would appear that the market for sustainable fibres is far from mature and that the crossover from conventional petroleum-based fibres is taking time. Speaking about the launch of its new collection, Philip Schär from Eschler stated, "Our line—manufactured from recycled polyester yarns and from yarns based on renewable resources—has been deliberately kept small. But we see great future potential for this line, which is to be extended over the next few months. This will happen in close collaboration with our key customers, who are replacing their conventional Eschler materials with eco-friendly versions."

Although sustainable fabrics may not have replaced conventionally produced products as yet, brands are increasingly using such fibres and fabrics in their apparel offerings, even in less technical garments. One of the most recent companies to add recycled polyester to its offerings is UK-based Marks & Spencer which

has developed a range of schoolwear made from recycled plastic bottles, claiming to be the first retailer to do so. Set to debut in its stores in August, the range includes fleeces, skirts, trousers and polo shirts all of which are made from 100% recycled polyester and cotton. Commenting on the decision to adopt recycled polyester, director of Menswear and Boyswear Julian Kilmartin, stated, "We're constantly looking at ways to give our customers the most innovative, best value and highest quality schoolwear on the high street. Using recycled polyester is another way that we're doing this and what's great about this range is you're getting the same M&S quality that you'd find in all our schoolwear but you're also doing your bit for the environment."

Old for new

Just as Polartec has begun to expand the quantity of post-consumer waste it includes in the production of sustainable fabrics, other firms are also moving away from using industrial waste alone and adopting post-consumer goods in the manufacture of polyester products. This makes sense in light of the huge volumes of PET that is discarded in the form of plastic bottles and polyester products such as carpets, furnishings and garments. American Fibers and Yarns Company (AF&Y) recently began a partnership with Plastex Incorporated to set up a new recycling programme whereby AF&Y produced yarns, and fabrics made exclusively with AF&Y yarns, can now be regenerated to produce a variety of durable goods.

Apparel brands have also embraced this concept of reducing the ecological footprint of their products by recycling used garments, and none more so than Patagonia. Known around the globe as one of the most ecologically aware outdoor brands, Patagonia introduced garments made from post-consumer waste as far back as 1993. In its latest move, aimed at reducing the environmental impact of not only its own products but the outdoor apparel industry in general, the company has expanded its Common Threads Recycling Programme to include any used Polartec-branded fleece garments whether they are produced by Patagonia or competitor companies. But whilst the decision to add competitors' goods to its programme may appear to be a very noble gesture, Patagonia is also a hugely successful commercial entity and acknowledges that the expansion of Common Threads is an astute decision that fits well with the company's environmental ethos. It also pleases the accountants. "With the expansion of our Common Threads Recycling Programme we'll effectively be recycling our competitors' garments into Patagonia clothing, what a great, environmentally sensitive way to supply our own supply chain!" comments Rick Ridgeway, vice president of the company's environmental initiatives.

Naturally synthetic

Recycled polyester is now being incorporated into every product imaginable from outerwear and base layers through socks and footwear counters to swimwear. The strides it has made in being accepted as a sustainable fibre are beginning to become apparent. Recycled polyester is now cited alongside natural fibres in the 'eco' credentials of fabrics and garments. Elastane brand Creora included recycled polyester alongside fibres such as organic cotton, linen, bamboo, soya, and Seacell in its new eco-friendly fabric collection launched at ispo in July. This goes some way to illustrate how polyester really can compete with natural fibres in the race for sustainability and maintain its leading position in the textiles industry. As Roger Berrier, vice president of Commercial Operations for Unifi, comments, "The eco-trend is actually not a trend at all; it's become a way of life. As the green movement continues to grow, we believe that recycled polyester will play an even larger role as an eco-friendly option in the synthetic fibre market."

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Patagonia

New developments in nylon

Whilst polyester is the most widely used synthetic fibre, and has therefore been the focus of much research and development in the field of sustainability, nylon remains a hugely important product in the apparel industry, and is used in approximately 70% of all outerwear and snow sports apparel. Having already established recycled polyester products in the market, developers are now turning their attention to the second most popular synthetic.

In addition to recycled polyester products, one of the leaders in synthetic fibres and fabrics, Japan's Toray Industries, has now launched recycled nylon 6 fibres under the Recyclon brand. Using the off-spec yarn generated during its virgin nylon production to create post-industrial recycled content yarn, Toray claims to require only 15% of the energy needed during the production of virgin nylon fibres made from petroleum to produce Recyclon. Furthermore, the process is also said to reduce carbon dioxide emissions by a staggering 80%.

Set to hit the consumer market in autumn this year or spring next year, Toray believes this new process will have a significant impact on the environmental footprint of nylon production for the apparel market.