Because the regulation of textile-based imports and exports is of major importance to the authorities within governmental departments of trade and industry, it is crucial that the fibre content is correctly specified on required documentation so that the right tariffs are applied, or not as the case may be, to the appropriate fibre. The Multi Fibre Agreement which controlled such international trade, followed by agreements reached under GATT and those accepted and still under review in WTO negotiations all illustrate the importance of definitions.



Expanding the alphabet of fibres

The Cargill Dow's new plant in Nebraska, heart of the corn belt.

Understanding the language of technical textile tracts has required a sharp memory for abbreviations - otherwise you could be left wondering just what an AR or UHMPE* fibre is. Fibres with classifications starting with P dominate the fibre lexicon, running from PA to PVA - and woe betide anyone who confused his PAN with her PET.

Just when you thought you had safely committed them all to memory, along comes yet another - the first of the 21st century: PLA. And this fibre, because of its environmental sustainability, if for no other reason, is set to make a major impact on many industries for the foreseeable future.

PLA is the official abbreviation for fibres produced from polylactic acid or poly lactate. For a fibre to be classified as PLA it must be a synthetic fibre manufactured from those sources derived from naturally occurring sugars, such as those in corn or sugar beets.

In January this year, the United States Federal Trade Commission announced the new generic classification as a result of the revolutionary NatureWorks fibre developed over the past few years by Cargill Dow LLC. From the time of its application to the FTC to the official announcement has been just two years, a remarkably short period of time when it normally takes between three to five years to get a sub-category of an existing fibre technology to be classified. Although there have been substantial fibre developments over recent years, especially in the 1990s, PLA is the first new generic for almost a quarter of a century.

Other regulatory bodies, such as that in the EU, are now reviewing the application on an international basis but it should not be long before the classification is accepted worldwide.

The investment in PLA has been substantial and, since the formation of the company in 1997, Cargill Dow has made a capital investment of some $300 million. The company recently completed construction of its first world-scale PLA manufacturing facility in Blair, Nebraska, which, at capacity, will produce up to 300 million pounds (140,000 metric tons) of PLA annually. The result will be a dramatic increase in the commercial availability of NatureWorks fibres in conjunction with consumer products being introduced across the market in late 2002 and 2003. The first products will be household linens while apparel will follow a season or two later.

By having its own designation, users and consumers will more readily understand and appreciate that there is product and performance differentiation between PLA and any other type of fibre. It will also be more readily understood that, for once, there is a synthetic fibre which comes from an annually renewable resource, one which does not take years, centuries or millennia to grow or form.

The idea of using sugars to form polymers was first mooted as long ago as the 1930s, but it was only in 1988 that Cargill, Inc. began to research

the concept for converting it into polymers suitable for spinning and forming textiles. Then in 1997 Cargill and Dow Chemicals came together to form a new company, Cargill Dow, to exploit and develop the technology.

The patented process to create NatureWorks PLA fibre allows the company to 'harvest' the carbon which plants remove from the air during photosynthesis. Carbon is stored in plant starches, which can be broken down into natural plant sugars. The carbon and other elements in these natural sugars are then used to make a series of polymers, the polylactide (PLA). The development and manufacture of the fibre relies on basic fermentation and distillation as its core chemical process, followed by simple polymerisation.

To receive new generic classification, Cargill Dow had to show properties and chemical composition that is radically different from other fibres as well as indicate what commercial use is foreseen. It also had to show that the new generic is of importance to the public. Having done so, PLA now joins other classifications including cotton, wool, silk, nylon and polyesters as a recognised fibre category.

"It is a major honour to be recognised as the first new generic classification of the 21st century. NatureWorks PLA is truly a revolutionary new fibre for textiles," said Andy Shafer, commercial director for fibres, Cargill Dow. "Receiving this designation marks a major milestone for us, our customers and the fibre industry." Obviously the FTC was impressed and approval was unanimous with a 5-0 vote.

"NatureWorks PLA is unique in that it is melt spinnable and derived from natural plant sugars," states Dr. Jim Lunt, the company's global applications director. "In the 1900s the benefits of synthetics from oil were realised. With NatureWorks, we have taken the best performance attributes of a natural and a synthetic and delivered a new fibre derived from renewable resources."

As a fibre, it combines the most desired physical characteristics of natural fibres, such as wool, cotton and silk, and conventional synthetics. It has the benefit of lightness when compared with many of the natural fibres but also has excellent wicking and anti-odour properties, developments which in recent years have been strongly associated with synthetics.

The new fibre shows impressive performance as well as environmental benefits as a result of using renewable resources like corn. In the future it is anticipated that Cargill Dow will be using other non-food crop sources for its feedstock, a further environmental benefit. For the cost-conscious textile industry, NatureWorks competes head-to-head with traditional fibres on a cost and performance basis and is already generating worldwide interest among brand leaders in the textile industry. The sports activewear industry has also been quick to see the potential of the new fibre, as demonstrated at recent trade-related exhibitions and getting its first real press viewing at the Outdoor Retailer show in fall 2001. Major companies which have been taking up PLA include Penn Nyla in the UK, Draper Knitting in the US and Kanebo in Japan.







(Clockwise from top left) PLA fabric samples from Penn Nyla, Draper Knitting and Kanebo.

Now that full scale polymer production is set to come on stream by mid-2002, it is expected that many more spinners will be showing an interest. In anticipation of this, Cargill Dow has invested in a major R&D fibre line facility which will in effect be helping its customers shorten the lead time for getting fibre spun and on to the looms.

"The new designation from the FTC will allow us to work with the industry to develop a significant, differentiated product that is recognised by – and is important to – consumers," claims Shafer. "The establishment of a generic will also encourage others to follow our lead in creating more sustainable and environmentally responsible textiles." In the meantime, with such a major investment in the new fibre, the company is likely to enjoy a period of time without competition. There are possibilities though of Cargill Dow developing licensing opportunities with interested partners.

There could also be a subjective and psychological boost for the hard-pressed US spinning and textile industry which in the past few years has seen some 100 spinning mills close and the loss of some 60,000 jobs in the spinning, weaving and knitting sector. The concerns about overseas sourcing of textiles are real - according to analysts, the increase in the country's imports of textiles and apparel under the WTO arrangements has been phenomenal with increases of 74% from the Philippines to as high as 196% from Pakistan. Perhaps the development of the first - and second generation - PLA will provide those remaining US spinners and weavers with some respite, even if only for a few years.

David Buirski

***AR - Aramid.**

***UHMPE - Ultra high molecular weight polyethylene**