'Gold standard' recycling – or fly-tipped?
A fisherman's tale, Scrapbook, page 50

FEATURES

TEXTILES

Textile separation takes some lessons from plastics

New technologies seeking to recover the value from textiles that are unsuitable for reuse could result in a huge shift in this traditional sector in a matter of years. ANDREA LOCKERBIE REPORTS

Research underway could lead to radical developments in the textiles recycling sector within the next few years, and result in significant volumes of textiles being diverted back into use as new fibres.

The key problem being addressed is how to regain value from discarded textiles that are not fit for reuse, including blended materials such as cotton/polyester. This is material that would currently get downcycled into the likes of wipers or insulation or simply be disposed of.

Of the estimated 10 million tonnes of end-of-life textiles in Europe, only three million tonnes is currently being collected, leaving huge potential to capture and recycle a waste stream still going to landfill or incineration.

UK-based Worn Again is developing chemical recycling technology to separate and recapture polyester and cellulose from cotton out of end-of-use textiles, leaving behind dyes and other contaminants. Its aim is for this recaptured material to be used again in textiles.

Sector comes together: textile recyclers need to find a new way to manage resources to remain profitable

Worn Again recently announced that its technology was entering the next phase of development, and that it had joined forces with fashion retailer H&M and luxury sport and lifestyle group Kering, which includes the Puma brand.

Cyndi Rhoades, Worn Again chief executive, explains: "We have got two key industry brands that want this solution involved in the R&D to deliver it. It is encouraging because it means that we can develop the technology along with the industry and its supply chains, rather than in a silo, in an R&D lab."

Rhoades believes that collaboration across the industry is essential. While there is some way to go with its R&D, she adds: "It is not just about the technology – development also needs to take place around the value loop."

To help with these other developments, Worn Again is involved in the Textile Sorting Project, led by Netherlands-based non-profit organisation Circle Economy since late 2014. The project is part of its wider Circular Textiles Programme, which aims to develop and establish a commercial and scalable model for closing the loop on post-consumer textiles in the EU. It believes that having effective material sorting technology and processes is key.

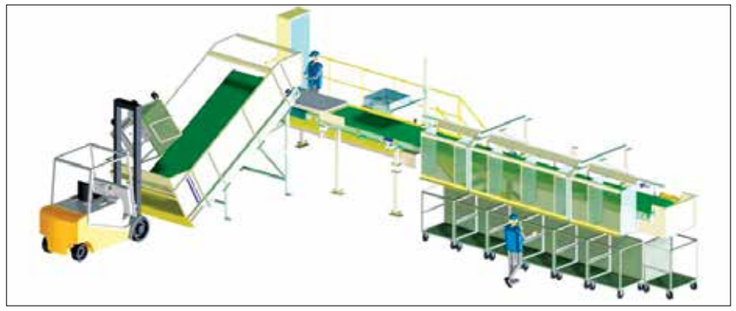
The project includes looking at how to commercialise the use of the Fibersort machine, a near-infrared (NIR) spectrometry system similar to those used for plastics polymer identification.

Hélène Smits, lead of the Circular Textiles Programme, explains that the concept for the project originated in 1999 and it has been through various guises over the years. The focus historically had been on proving the technology rather than how commercially feasible it is. The current project's partners include textile sorter Wieland Textiles, engineering firm Valvan Baling Systems, clothing collection company Reshare, Worn Again, Faritex and Metrohm, which is responsible for developing the NIR spectroscopy scanning technology.

Circle Economy identified that, for high-value recycling of post-consumer textiles, sorting by material composition was needed because recyclers must be able to control their inputs in order to get quality outputs. The organisation is investigating feedstock factors such as how to programme a materials library, what the available feedstock would be and what are the most common materials. It is also looking at the markets to determine what recyclers are capable of, upcoming recycling technologies and what output such a machine would need to feed into the recycling industry.

Smits hopes to get textile sorting companies excited by the prospect that such technology could increase the value of recyclables "that are now a bleeder for the industry": "Our partner Wieland says that the amount of recyclables [items unfit for reuse] is getting so high and the quality of textiles is getting so low. Also, the reuse market is really bad at the moment due to unrest and other factors, so they are having difficulty to even turn a profit. If they could make a few cents more on every kilo of these recyclables, that would have a really big impact."

Such sorting equipment would never be able to replace the human role of judging whether an item could be sold for reuse. But once regular companies have sorted for reuse, materials not fit for that purpose could then be sold to a company operating a Fibersort, which would use the unit to scan by material composition to create higher value recycling streams. This would be able to tell whether an item was a 60/40 cotton/polyester blend, for example, or 70/30.



Fibersort: near-infrared spectometry is used on blended textiles so they can be recycled separately

Manual sorters could feel if something was, say, 100% cotton or wool or a cotton/polyester blend, but could not be more specific. Throughput of the machines would be higher than manual sorters, reducing labour costs.

Smits says: "There is also the possibility in the design to make the Fibersort a more integral part of a bigger system, where you have all these stages being supported by conveyor belts and voice-guided sorting. Something comes in and there are a couple of people sorting for reuse. Everything that is recyclable they put on a conveyor belt and say 'that is Fibersort' so that it is integrated into the existing sorting system."

Another option is that the Fibersort could function as a quality control (QC) system, so that recyclers with input requirements can prescan incoming material and reject any that are contaminants to its process. "This is interesting for mechanical recycling of polyester because any contamination by natural fibres is really bad for the process, so a QC system in place before processing would be very valuable.

"So there are different types of applications that the Fibersort technology could be used for, depending on how you programme the detection and how you set up the machine around it."

While the technology itself is not new, this type of application in the sector is. Currently there is only one test stand in Belgium at the machine-building company. Smits says that for any sorting company interested in buying the machine, it is likely to want to see how it works and whether the business model really adds enough value to justify the investment.

"Currently, that is difficult because we are still working on the market development of recycling companies that are now doing mostly downcycling or are focused on post-industrial recycling to say 'why don't you look at high-value recycling of post-consumer textiles? But there is a limited number of companies that currently have the capability to do so.

"But we expect in the coming three years that there is going to be a really big shift [in the market] due to new chemical recycling technologies which will take in really large volumes of these [recyclable] materials."

Smits says that businesses like Worn Again are already thinking about where they would get feedstock for a future plant, although they have not yet completed their R&D. "So there is this transition period that is going to be tricky," she says. "But in terms of what the technology can do and where we are going, I think it is really suited to the textile recycling sector."

● Watch the Fibersort in action: http://bit.ly/1KDCj6s

IN FOCUS

PARALLELS BETWEEN TEXTILES AND PLASTIC BOTTLE RECYCLING

Technology

Use of Fibersort NIR technology for sorting textiles by fibre composition is similar to the use of NIR sorters for plastics polymers. Hélène Smits, lead of the Circular Textiles Programme, says: "Since you can now separate PET and so on, there are more clean streams and higher value recycling. So we are trying to do the same for textile recycling."

Competing with virgin

The emerging textiles recycling sector could face similar issues to those recently affecting plastic bottle recyclers such as Closed Loop, which suffered when virgin oil prices fell.

Cyndi Rhoades, Worn Again chief executive, says: "This is a huge issue, and I think the plastics bottle industry is a very good example: what is happening to them could happen in this space as well. It is another reason why we need the whole sector to come together to find a new way of managing resources.

"When we started out, part of the design specification to the chemical engineers was that we had to design a technology that at scale would be able to provide, with processing costs and input costs, a competitive product to virgin-derived resources. We can offer a long-term stable price as opposed to the fluctuations you get with virgin inputs."

She adds that there is still "a lot of room for development and evolution" in terms of how brands view sourcing resources, because sourcing circular has "far more benefits when you start calculating the true value and the true costs behind production and the resources that go into it".

● The Textile Sorting Project: next steps

By September the project aims to have validated and optimised the technology before looking to do a next phase, subject to funding. It wants to set up a demonstration facility this year which is likely to be in the Netherlands.

It also wants to engage big brands to see how the technology could be instrumental for them in being able to use recycled content.