Fashion goes greener with dye cleanup tech

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Each season the fashion industry surprises with new fabrics in a myriad of colours. Producing multi-coloured textile, however, has an environmental cost. Indeed, heavy polluting dyes find their way to the textile industry's waste water. Now, the fashion conscious are one step closer to getting a green conscience.

A new water clean-up technology has found a potential application in the textile industry. The most polluting textile dyes components--so-called recalcitrant organic compounds-- can more be easily removed through an innovative waste water bio-filtering technology, after being broken down

by ozone treatment.

The technology developed under the EU programme INNOWATECH offers the advantage of integrating biological treatment with a chemical oxidation treatment, based on ozone, while physically separating these two steps. “The innovation is to get together biological degradation and chemical oxidation, to processes used with completely different goals and timings in conventional systems”, says Claudio Di Iaconi, the researcher responsible for the technology at the Water Research Institute (WRI) of the Italian National Research Council, based in Bari in the South of Italy.

Unlike traditional biological systems, this novel biological treatment filter called Sequencing Batch Biofilter Granular Reactor (SBBGR) relies on microorganisms growing in aggregates and is separated from the basin containing ozone and the waste. The waste water is poured over the microorganisms, which process pollutants. Each aggregate holds up to ten times more microorganisms than conventional technologies. Di Iaconi says: “Our system produces 80% less sludge than traditional biological ones”. Indeed, sludge is reduced because microorganisms only just survive in these conditions without being able to reproduce. Joan Mata Professor at the Faculty of Chemistry of the University of Barcelona, Spain comments: “this biological process has competitors, among others, the well-established membrane bioreactors, which also can produce less sludge than the standard activated-sludge system.”

Following biological treatment, the liquid phase goes to a basin containing ozone to be further biodegraded before being sent back for biological treatment, in a cyclical way. Ozone is not used to remove recalcitrant organic compounds, unlike conventional systems. Instead, it is used to make these organic compounds biodegradable so that they can be removed biologically, in the next treatment step. This means that 20-30% less ozone is required. “I am afraid the main problem of this

technology is its costs," Mata says. "Ozone is expensive and producing it consumes a lot of electricity."

Although this technology is one among many available waste water treatment technologies, what would prove its worth for applications such as for the textile industry would be its ability to scale up. "To be really convincing you need to show something that is already working at real scale because as the system gets bigger problems tend to surge", says Adri?n Garrido, a research technician at the Department of Land and Water of the Commonwealth Scientific and Industrial Research Organization, Canberra, Australia. "These might range from the system not being able to absorb peaks, to high energy consumption levels and maintenance related problems, especially since this system implies a lot of aeration and pumping that make it easier for something to get damaged."

In addition to the building of a pilot plant for application of this technology to the tanneries industry, laboratory tests for application to the textile industry have now been completed. Lariana Depur, an Italian waste water treatment company based in Fino Mornasco, which is operating plants in the textile industrial district of Como, financed these tests. The company realised that if SBBGR system were applied to its own plant, it would produce three times less sludge than a standard treatment plant located in Alto Seveso used for comparison. Lariana Depur is now planning to integrate the technology with its own full scale plant servicing the nearby textile industry.

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