Sustainable denim manufacturing process creates 'green' jeans

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Like sausage, making denim jeans isn't pretty. Some estimates suggest that producing one pair of jeans requires more than 2,500 gallons of water, nearly a pound of chemicals and vast amounts of energy. Multiply that by 2 billion — the number of jeans produced worldwide every year — and you get a snapshot of an industry that contributes a hefty share of wastewater and greenhouse gases to the environment.

But an emerging greener chemistry process, described today at the 16th annual Green Chemistry & Engineering Conference, could help change all of that. The conference is sponsored by the American Chemical Society's Green Chemistry Institute (ACS GCI).

The process, called Advanced Denim, can produce a pair of jeans using up to 92 percent less water and up to 30 percent less energy than conventional denim manufacturing methods, according to Miguel Sanchez, a textile engineer at Clariant, a specialty chemical company based in Muttenz (near Basel), Switzerland, that developed Advanced Denim. In addition, it generates up to 87 percent less cotton waste (which is often burned, adding carbon dioxide and other greenhouse gases to the atmosphere) and virtually no wastewater.

Unlike conventional denim production methods, which require up to 15 dyeing vats and an array of potentially harmful chemicals, Advanced Denim uses just one vat and a new generation of eco-advanced, concentrated, liquid sulfur dyes that require only a single, sugar-based reducing agent. All other production steps are eliminated, according to

Sanchez.

If just 25 percent of the world's denim jeans were dyed with this technology, Sanchez said, it would save enough water to cover the needs of 1.7 million people every year. That's equivalent to about 2.5 billion gallons of water every year. It also would forestall the release of 8.3 million cubic meters of wastewater, save up to 220 million kilowatt hours of electricity and eliminate the release of a corresponding amount of carbon dioxide emissions into the atmosphere annually.

"Advanced Denim wants to go beyond the technologies that are today considered standard for obtaining denim material," Sanchez said. "We offer new possibilities for enlarging the number of tones and effects currently achievable, make production more simple and efficient, and all this with the minimal use of resources."

Sanchez said that Clariant is working with many of the world's leading jeans manufacturers and that there is high interest in adopting Advanced Denim technologies.

"This is another great example of the kind of positive impact adopting green chemistry offers businesses: Major savings in key materials, energy, water usage, waste and emission reductions, and ensuring your right to operate in communities around the world," said Bob Peoples, Ph.D., director of the ACS GCI.

More information: www.gcande.org

Abstract

74 - Advanced Denim: A new concept for sustainable denim production

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Over the last years, industrial growth without considering resource savings has become unthinkable not only for the producing companies but also for legal administrations and countries. The pressure to produce any kind of article in an eco-efficient way gets stronger day-by-day. This trend particularly affects current Textile production, where the amounts of energy and, very specially, water required reach a peak. This fact, combined with the high generation of residues and their treatment has put the way to make textile articles in the center of a global debate. Denim is, within the Textile Apparel market, a very special case in all aspects. It is a truly global segment, accepted and adopted by all types of consumers, regardless age, gender, social status, 1Ž4 it is REAL GLOBAL. However, denim production requires vast amounts of scarce resources, being water the most critical one.Advance Denim is a proposal for drastically reducing the amount of water (up to 92 %) and energy (up to 30 %) required for Denim colouring and finishing and reducing the volumes of wastes to a minimal level. At the same time, Advanced Denim opens new ways to develop special shades, tones and looks as well as improving at the same time the quality of the produced articles in terms of fastness and appearance. Advanced Denim is today a clear alternative for an efficient and sustainable production of denim articles.

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