



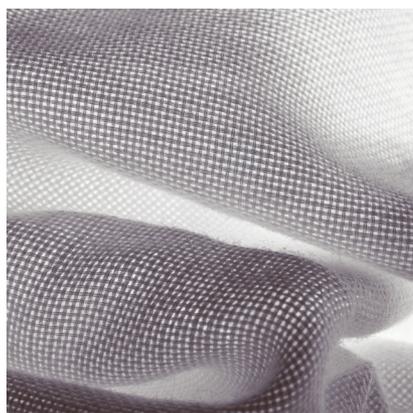
Slowing Down Fast Fashion

Society today is accustomed to immediate gratification. People want things fast — fast food, fast entertainment, and fast fashion, a relatively new concept.

The fast fashion industry draws inspiration from upscale fashion designers, but it turns those runway styles into inexpensive, trendy clothing quickly and in mass quantities. Brands such as H&M, Forever 21, and Zara bombard modern consumers with new collections and styles nearly every week. Themes often seem arbitrary or random — current collections include clothes tailored specifically for brunch, binge-watching television, and working from home.

Most products are of extremely low quality and are exceptionally cheap. Even at such low prices, however, fast fashion corporations profit millions of dollars due to the sheer quantity of items they sell each day.

Until the mid-20th century, the fashion industry was based around the seasons, and designers were able to create collections over several months.



▲ Over the past few decades, fast fashion brands that produce clothing quickly and with cheap materials have become increasingly popular. Recently, cutting-edge companies have begun developing materials that are more sustainable, such as fabrics made of cellulose fibers. Image courtesy of Spinnova.

This minimized the need for speed and low-cost labor, but restricted consumers to designers' creative choices and rendered fashion a luxury for the upper class. The industry quickened its pace and lowered costs in the 1960s, leading to today's trade, which runs on about 52 micro-seasons a year.

Without rapid manufacturing, the fast fashion supply chain would not be possible. Inevitably, labor is outsourced to places such as India, Ethiopia, and Bangladesh, where fewer protections for laborers are mandated. Garment workers in these countries are paid significantly below the U.S. minimum wage and often work in poor and even dangerous conditions.

Such conditions can have fatal consequences. On a summer day in 2013, engineers warned owners of the Rana Plaza garment factory in Bangladesh that their building was unstable, citing cracking plaster resulting from the addition of unauthorized floors. Management ignored those warnings and forced garment laborers to work. The structure collapsed in the early hours of the next day, killing 1,135 and injuring 2,515. Familiar fashion brands such as H&M, Mango, and Primark were among the chains supplied by the Rana Plaza factory.

Modern fast fashion also has a significant effect on the environment. According to a recent study, more than 60% of fabric fibers, including polyester, acrylic, and nylon, are produced from petrochemicals. These types of fibers are difficult to recycle — 85% of them end up in landfills, where they can take up to 200 years to biodegrade.

Microfibers, which are tiny fibers that shed as garments are manufactured, worn, or washed, are also a major pollutant. Up to 40% find their way into wastewater treatment plants

and ultimately into oceans and rivers. On a sunny day, microfibers are even visible in the air.

Microfibers can be generated by both natural and synthetic fabrics, but synthetic microfiber pollution is a bigger concern because it resists degradation and can poison food chains. Annual synthetic microfiber pollution in the oceans is estimated to be equivalent in weight to 50 billion plastic bottles, according to a 2017 report by the Ellen MacArthur Foundation.

Recently, the fashion industry has become more conscious of its environmental impact. Consumers and brands have expressed interest in sustainable, green clothing, and innovative textile technologies have risen to meet this demand.

Textile companies and researchers are exploring novel sustainable fabric materials and manufacturing methods that do not generate as many emissions. The fashion landscape is once again evolving, meeting consumer needs as they change with the times.

A natural fiber for sustainable fabrics

Spinnova, a sustainable fiber company based in Finland, was founded by scientists studying the properties of cellulose at the Technical Research Center of Finland (VTT). Inspired by the strength and flexibility of natural spider web silks, which are similar to cellulose, the team left the institute to create emission-free cellulose fibers. These fibers are similar to cotton, but they take less energy and water to produce than cotton fibers. They are also much more sustainable than synthetic, petrochemical-based textiles.

The novel process starts with pulp consisting of wood that has been broken down by various chemicals. In the paper industry, that pulp would

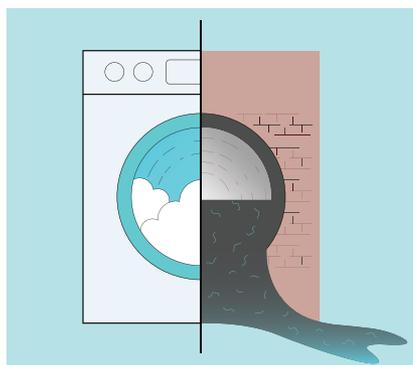
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undergo further chemical treatment and be made into paper products. The Spinnova process grinds the pulp mechanically to generate a paste-like material. Biodegradable polymers are added to create a gel-like suspension, which is extruded through very thin nozzles at high pressures to form filaments. The filaments are heated and dried to produce white, fluffy fibers.

Spinnova's process is sustainable in several regards. "We use no harmful chemicals and create no waste streams," says Emmi Berlin, Spinnova's head of communications. "The only real waste is evaporated water and heat released during the drying component, which is recycled in other parts of the process. The cellulose fiber is also completely biodegradable, similar to paper, and the raw material, wood, is renewable and sourced from responsibly grown forests. Most importantly, the process uses no water."

Growing and processing cotton, on the other hand, consumes vast amounts of water — 20,000 L are used to produce just 1 kg of cotton. The central Asian Aral Sea, formerly the fourth-largest lake in the world, completely dried up in 2014 as a result of water diversion to grow cotton crops. It is considered one of the planet's worst environmental disasters.

Spinnova is also currently



▲ Intrinsic Advanced Materials, a textile technology group, has created an additive that helps polyester microfibers degrade in the environment. These fibers shed from clothing during washing and travel through wastewater treatment plants to pollute rivers and oceans.

researching sustainable ways to finish their cellulose fibers to create soft, flexible materials similar to viscose. Viscose is a type of rayon fiber made from wood that requires the use of highly toxic carbon disulfide. Its production is harmful to both the environment and to garment workers. Spinnova hopes its fibers can eventually serve as a replacement for viscose.

Moving past fast fashion and implementing more sustainable practices is a major goal of Spinnova. "We support slow fashion," says Berlin. "We've kept this in mind as we partner with sustainable companies and some that operate in the fast fashion space but have sustainability goals. Our aim is to scale this innovation so that production is large enough to lower costs and increase availability. We want our product to not be a niche or luxury product, but one that is available at your H&M at a reasonable price, so that everyone can make the choice to be sustainable."

Managing microfiber pollution

The dark and light blues of the Pacific Ocean hold abundant wildlife and ocean flora. Over the past few decades, plastic has polluted these waters, muddying the ecosystem and destroying nature. Plastic bottles and packaging are only part of the problem. Marine researchers taking samples from the ocean surface to its deepest waters find synthetic microfibers, less than 5 mm in length, at every depth.

The immensity of the issue has inspired research into which types of fabrics shed the most microfibers and how consumers can change their washing habits to minimize the migration of microfibers to the ocean. A recent study by a team of researchers at Plymouth Univ. in England shows that a typical wash releases 700,000 fibers.

Textile technology company Intrinsic Advanced Materials, in a joint venture between Intrinsic Textiles Group and Parkdale Mills, has developed an

additive that helps polyester microfibers in fabrics biodegrade in the environment. "It doesn't prevent the fibers from shedding," says Andrea Ferris, CEO of Intrinsic Advanced Materials. "But should these fibers shed and find themselves in the environment, instead of lasting forever, the material will break down through microbial degradation. The technology works in seawater, wastewater treatment plants, soil, and in landfill."

The additive (tradenamed CiCLO) is a polymeric formulation that is mixed with recycled or virgin polyester or nylon during the extruding process (without a chemical reaction), at the very beginning of the fiber supply chain. The fibers become part of the plastic matrix as it moves along the supply chain to spinners and fabric manufacturers to be woven into textiles. Any microfibers that shed from the material degrade in the environment, due to multiple biodegradable nucleation points that the additive creates within the plastic fiber matrix.

Intrinsic Advanced Textiles sells the additive to fiber manufacturers that produce short-cut polyester fibers or to filament manufacturers that produce longer polyester fibers. The company sells only to certified fiber manufacturing partners around the globe — groups with robust sustainability goals, says Ferris. They market the concept to apparel brands and retailers, emphasizing the product's environmental impact, and then connect those fashion groups with their network of fiber manufacturers.

Intrinsic Advanced Textiles is particularly interested in working with outdoor brands, which produce clothing that requires the durability of polyester, but whose consumers are very interested in sustainability.

"We're working with dozens of brands — Cone Denim, a major denim supplier, is collaborating with us," says Ferris. "Our textile technology tackles the persistent microfiber pollu-



tion happening in oceans, and until we have mass textile recycling available globally, it helps materials break down should they end up in a landfill.”

The future of fashion

Fast fashion, over the past few years, has begun to slow down as companies such as Forever 21 have filed for bankruptcy and consumers become more aware of the implications of their purchases. Many brands have taken it upon themselves to make environmentally conscious choices and promote sustainable clothing.

“As a whole, there are so many apparel brands and manufacturers who are doing amazing work trying to make the textile supply chain more sustainable,” says Ferris. “Fast fashion issues are not just brand issues —

they’re also about consumer behavior. Many things would need to change to entirely transform the industry, but we’ve had hundreds of meetings with brands and major retailers, and there is some great work going on.”

Spinnova’s Berlin agrees that the responsibility to invoke change is not just on companies, but also on consumers. Awareness is the key to moving away from fast fashion. It is essential that people understand what goes into the polyester, viscose, or cotton supply chains and how their clothing impacts the environment, says Berlin.

In general, society as a whole must dispose of the use-and-throw-away mindset that has become ubiquitous in this age, particularly in terms of packaging, food, and clothing. As the environmental impact of human

activities is becoming more apparent and concerning than ever, consumers should consider their choices in every aspect of their lives, including fashion.

“It comes down to things as simple as how often you wash your clothes,” says Berlin. “Most of the environmental footprint of even an average cotton T-shirt comes from what you do with it, not from the beginning or end of its life. It’s a change of mindset — do you really need new clothes every week? It’s about how you take care of your clothes: How often do you wash them and use the dryer? Could you buy more second-hand clothing? Everyone seems to think there’s a higher power that will arrange it all for you, but it’s actually up to all of us on the planet, and how we behave as consumers.”

—Nidhi Sharma

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