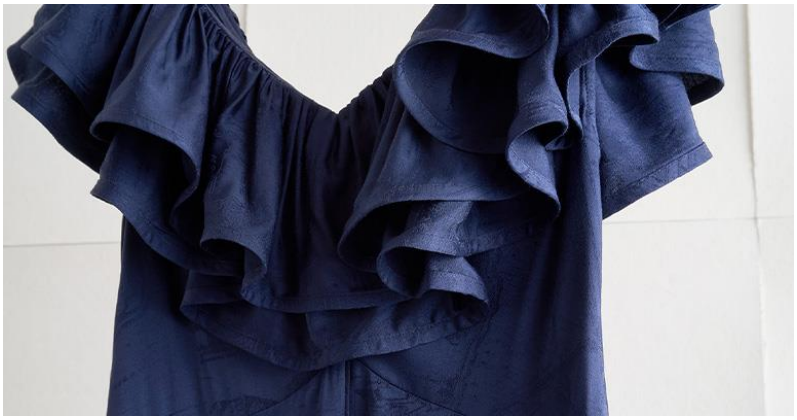
CIRCULOSE NATURAL MATERIAL FOR FASHION INDUSTRY MADE BY RENEWCELL IN SWEDEN



The Renewcell company based in Sweden has created a new material called *Circulose*® made from discarded cotton and other natural fibers and production scraps. Using a breakthrough process powered by 100% renewable energy, the technology created by the company dissolves textile waste into a new, biodegradable raw material, the Circulose pulp that can be turned into textile fiber, be fed into the textile production cycle and meet industry specifications.

The company mainly recycles cotton and viscose garments and textile waste due to the high amount of cellulose they contain. The new natural material Circulose produced through the Renewcell recycling process is certified, organic, biodegradable, recyclable (after use) and presents similar characteristics to conventional cotton fibres.

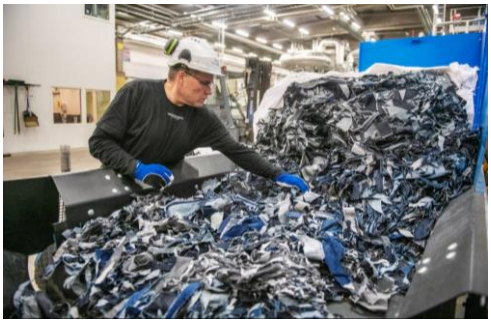
The Renewcell company aims at saving natural resources and reducing the huge negative impact that the fashion industry causes on the environment and on climate change. The relevant consumption and waste of water, tree felling, deforestation and the production of huge amounts of waste are among the problems widely documented at the international level. The urgency to find solutions to these problems in recent years has generated extensive research and experimentation of new production processes to bring the circular economy into the world of fashion.

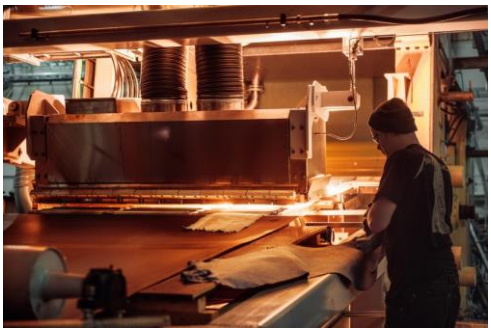
The Circulose new material was developed by Renewcell to reuse discarded textiles in response to the waste generated by the fashion industry: less than one per cent of clothes are currently recycled while the vast majority of unwanted or worn-out garments end up in landfill or incineration plants. One kilo of clothing recycled through the process adopted by the company instead of being produced from raw materials can save thousands of liters of water and decrease emissions of CO_2.

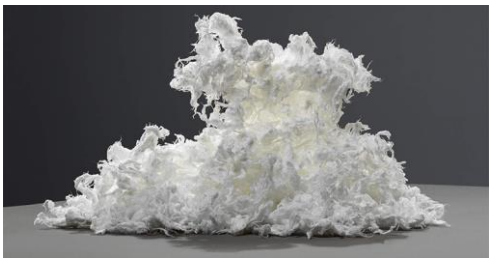
In particular, the new natural material produced by Renewcell aims also at reducing the fashion industry's reliance on virgin cotton. Cotton is the purest type of cellulose that is found in nature, and it is the preferred fiber for producing Circulose. The cellulose pulp can be turned into a textile fiber, which can be spun into filaments and turned into a textile. Renewcell was started by scientists at the Royal Institute of Technology in Stockholm, who were researching more efficient ways of producing bio ethanol and finding new ways to decompose cellulose. After realizing that it could be a major way of recycling textiles, they founded Renewcell in January 2012. The Renewcell recycling technology transforms high cellulosic waste into pure, natural dissolving pulp, called circulose pulp. The procedure is very similar to that of recycling paper.

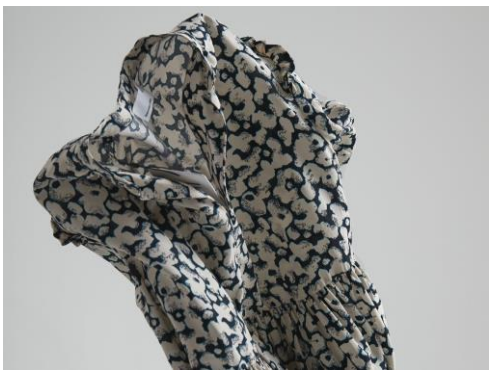
The process adopted by the company for using Circulose pulp involves the following steps:

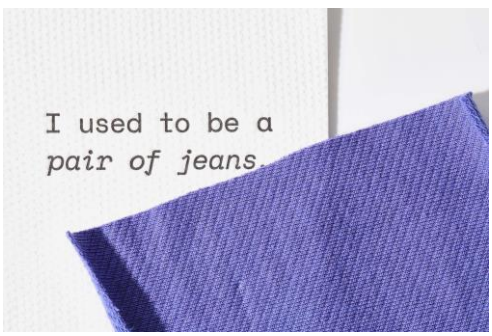
- garments that can't be resold either because they're way too worn-out or hopelessly out of style are received by the Renewcell plant and used for the recycling process. The clothes are shredded, de-buttoned, de-zipped and de-colored. Clothes are then torn or shredded into pieces.
- Any non-cellulose content, like polyester and plastic, and any other contaminants, are removed from the slurry.
- What remains is pure cellulose - the biodegradable organic polymer from which cotton, and all green plants and trees are made out of.
- The slurry is dried to produce sheets of pure *Circulose*® branded pulp. Once the slurry is dry, sheets of this special fiber are produced, ready for new garments to be made.
- The sheets of the new material are packaged into bales and shipped to fashion manufacturers who can use them in the textile production cycle as natural textile fibers.
- A brand designs the new clothes made using *Circulose*® fibers. The Circulose® brand is a registered trademark owned by Renewcell. For the fashion industries involved, using the trademark is an effective way of sharing the circular story behind the new clothes.











The exact process is a trade secret, but Renewcell ensures that no solvents are used during the production process and only ecofriendly chemicals are utilized and regularly recovered at each stage of the process.

The company has its main office in Stockholm and operates a recycling plant for pre- and post-consumer textiles in Kristinehamn, with 20 full time employees. This demo-plant is in commercial operation since 2018 and currently produces around 7,000 tonnes of Circulose biodegradable pulp per year. The company estimates that the experience developed in the demo-plant allows for designing full-scale plants to produce approximately 60,000 tons of pulp per year.

In 2020 the new collection of *Circulose* clothing was presented at the *Première Vision* fashion and textiles fair in Paris. Well-known brands as Levi's and H&M have already chosen Renewcell *Circulose* for their products. H&M, which has been a minority investor in the Renewcell recycling company since 2017, used *Circulose* in a dress for women in the collection called Conscious Exclusive SS20 and will become the first retailer to sell clothes made from the circular fabric. In 2020 Levi's has created the *Recycled jeans*, made with organic cotton and *Circulose*, launching their famous Levi 501 model for men and the High Loose for women.

Circulose® was also included on Time Magazine's list of the 100 Best Inventions 2020.

Fashion brands urgently need a circular solution and the vision of the Renewcell company is to inspire an industrial evolution to a sustainable world.

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