the HOW’s and WHY’s of Recycling Denim

A product developers guide on ‘better denim’
ABOUT THE DENIM

The average conventional denim is made from 99 or 98 percent conventional cotton and 1 or 2 percent elastane. Conventional cotton scores a E on the Made-by fiber benchmark, mainly because of the heavy use of water needed to grow the fiber. In the diagram you can read the amounts of water, energy, chemicals and land that is needed to grow the cotton for 1 pair of jeans (600 gram).

FABRIC INFORMATION

Fabric mill: Orta, Turkey
Composition: 99% Cotton, 2% Elastane
Fabric price: € 4.50

99% Conventional cotton, 1% Elastane
Environmental Impact of the fiber of one pair of jeans:

WATER: 3,600 liters
ENERGY: 5 kWh
CHEMICALS: 1.2 gr
Eutrophication potential 22 gr
Acidification potential 10 gr
LAND USE: 9.3 M²

SUSTAINABLE DENIM. #1

The WHY?

Sustainable denim #1 represents the present-day industries’ possibilities of recycled denim. This garment exists out of 24 percent post-consumer recycled denim jeans, mechanically recycled at Recover, Spain. The remaining fibers of this fabric are made from Organic Cotton, which also has a lower environmental impact compared to conventional cotton, because of the lower use of water and harmful chemicals.

FABRIC INFORMATION

Fabric mill: Royo, Spain
Composition: 75% Organic cotton, 25% Post-consumer recycled jeans
Fabric price: € 4.95

75% Organic cotton, 25 % Recycled jeans.
Environmental Impact of the fiber of one pair of jeans:

WATER: 320 liters
ENERGY: 2.22 kWh
CHEMICALS: 0 gr
Eutrophication potential 0 gr
Acidification potential 0 gr
LAND USE: 7.1 M²

91 % less WATER
56 % less ENERGY
100 % less CHEMICALS
44 % less EP
77 % less AC
24 % less LAND
100% conventional cotton

Environmental Impact of the fiber of one pair of jeans

- WATER: 3.600 liters
- ENERGY: 5 kWh
- CHEMICALS: 1.2 gr
eutrophication potential 22 gr
acidification potential 10 gr

- LAND USE: 9.3 M²

ABOUT THE DENIM:
The conventional denim is made from 100% conventional cotton. This fiber scores a E on the made-by fiber benchmark, mainly because of the heavy use of water needed to grow the fiber. In the diagram you can read the amounts of water, energy, chemicals and land that is needed to grow the cotton for 1 pair of jeans (600 gram).

FABRIC INFORMATION
Fabric mill: ORTA, Turkey
Composition: 100% Cotton
Fabric price: € 4.25

50% Bio-chemical recycled cotton (lyocell), 50% Mechanical recycled jeans.

Environmental Impact of the fiber of one pair of jeans:

- WATER: 79.5 liters
- ENERGY: 3.46 kWh
- CHEMICALS: 0 gr
eutrophication potential (EP) 1.65 gr
acidification potential (AC) 1.75 gr

- LAND USE: 0 M²

ABOUT THE DENIM: POSSIBLE IN 1 TO 3 YEARS TIME
Denim #2 represents the nearby future of denim recycling. The cellulosic recycled fiber in the denim is created with the bio-chemical recycling of post-consumer cotton waste (denim jeans), something which is possible already on laboratory scale, and which will be possible on industry scale in a few years. On top of the cellulosic fiber (lyocell), the denim is made from mechanical post-consumer recycled denim. Together this makes a jeans of 100 percent recycled fiber possible.

FABRIC INFORMATION
Composition: 50% Lyocell from bio-chemical recycled cotton, 50% post-consumer mechanical recycled cotton.
The STAKEHOLDER MAP

‘The Who and Where’ - In the long and complex supply chain of recycling denim, the combining of the knowledge, investment and power of the multiple stakeholders in this industry, will greatly accelerate the transition towards a circular economy. To set up a circular system, get in contact with the stakeholder found on the map.

Legend

Waste-Collection Companies
1. Sympany, Amsterdam, The Netherlands
2. ReShare, Utrecht, The Netherlands
3. Salvation Army, England/France/Germany

Sorters
4. The Beer Group, Dordrecht, The Netherlands
5. Whedit Textiles, Wommersom, The Netherlands
6. Valions Fibersort, Moreen, Belgium
7. SOEX group, Ahrensburg, Germany

Recycling companies

Mechanical
9. Texperium, Haaksbergen, The Netherlands
Recover Tex, Valencia, Spain
Filatures du Parc, Brassac, France

Bio-Chemical
10. Ioncell-F, Helsinki, Finland
Renewcell, Stockholm, Sweden
8. Salkoll, Enschede, The Netherlands
Lenzing, Lenzing (Austria)

Chemical recycling
Worn Again, London, England
Tenk, England/France/Germany
7. Recytek, Brussels, Belgium

Bio-Chemical
10. Ioncell-F, Helsinki, Finland
Renewcell, Stockholm, Sweden
8. Salkoll, Enschede, The Netherlands
Lenzing, Lenzing (Austria)

Pre-consumer recycled fabrics

TRC Candiani, Milano, Italy
Celtek denim, Malatya, Turkey
Orta Anadolu, Istanbul, Turkey
IsoG, Bursa, Turkey

Post-consumer recycled fabrics

Royo Denim Valley, Valencia, Spain
Orta Anadolu, Bahrain

Pre-consumer recycled fabrics

TRC Candiani, Milano, Italy
Celtek denim, Malatya, Turkey
Orta Anadolu, Istanbul, Turkey
IsoG, Bursa, Turkey

For stakeholder contact details and the interactive ‘Stakeholder map’ go to: www.femkejonkmans.wix.com/recycledenim
SUPPLY CHAIN:

This supply chain is an example of a circular system (or open circle). This in contrast to the traditional linear take, make, dispose supply chain of the denim industry.

Critical in the circular supply chain is the identification and elimination of waste. Waste is divided in three categories: industrial, pre-consumer- and post-consumer waste.

To make this supply chain productive, all stakeholders including consumers and from the business side design and development need to collaborate, and keep the circular supply chain in mind when designing and disposing.