Candiani
DENIM

A GUIDE
TO MAKING

COMPOSTABLE JEANS

COREVA™

PLANT-BASED COMPOSTABLE STRETCH TECHNOLOGY

MADE IN MILAN
ITALY
SINCE 1938

Candiani
DENIM

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Once Upon A Time...

Back in 2015, Alberto Candiani, at his local delicatessen, saw something new while looking at something he'd seen hundreds of times. This time the salami hanging behind the counter became more intriguing. He thought, "What was that string suspending the salame in place?" It seemed to stretch perfectly and had a slight bounce. He took a closer look and found out that the casing was made from natural rubber, and that's when the wheels started turning.

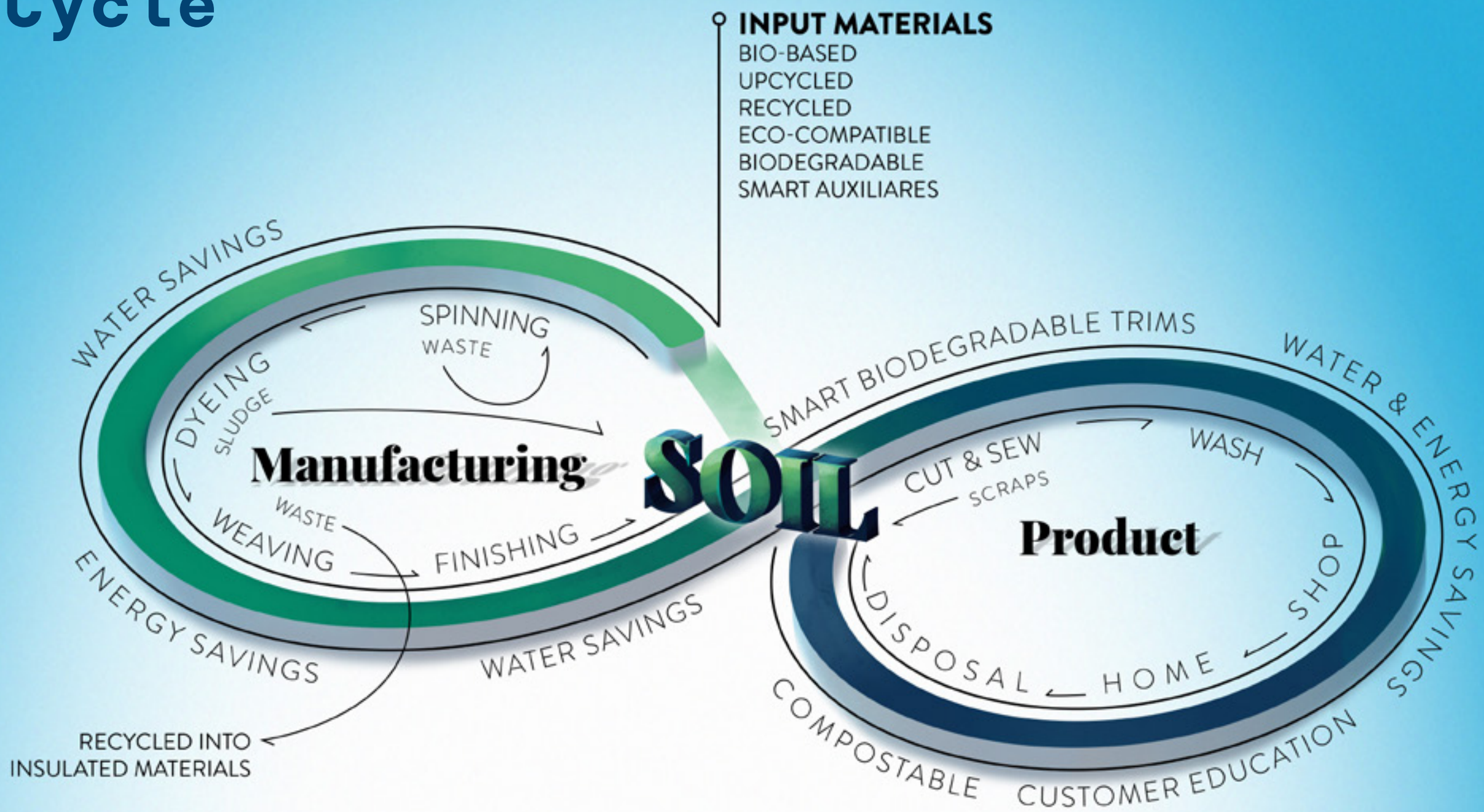
Five years later, Candiani Denim presented the only true alternative to petroleum-based elastomers in the denim industry. It is a patented stretch technology that is 100% plant-based, derived from 100% renewable resources. When core-spun into organic cotton fibers create the world's first biodegradable and compostable stretch denim.

COREVA™ Stretch Technology is a step closer to a truly circular, regenerative model in which raw materials become fabric, then garment, and then return to nature thanks to their compostability. Once composted, these garments can be used to fertilize the fields of cotton and natural indigo needed for the next ones, so the cycle continues.

"The long-term vision of Candiani is a circular model based on the connection between industrial production and regenerative agriculture. We are fighting landfill in a different way. Our target is to close the loop, meaning that our fabrics, all the ingredients they are made of, all the waste made during production, everything can be returned to nature. Recycling is great, and it needs to be done, but we are offering an alternative way out."

ALBERTO CANDIANI

The SOIL Cycle



COREVA™ Is...

100% PLANT-BASED

The raw material originates from Hevea Brasiliensis, natural rubber trees, cultivated in Thailand

FROM RENEWABLE SOURCES,

which is very different from the typical synthetic elastomer made from fossil fuels

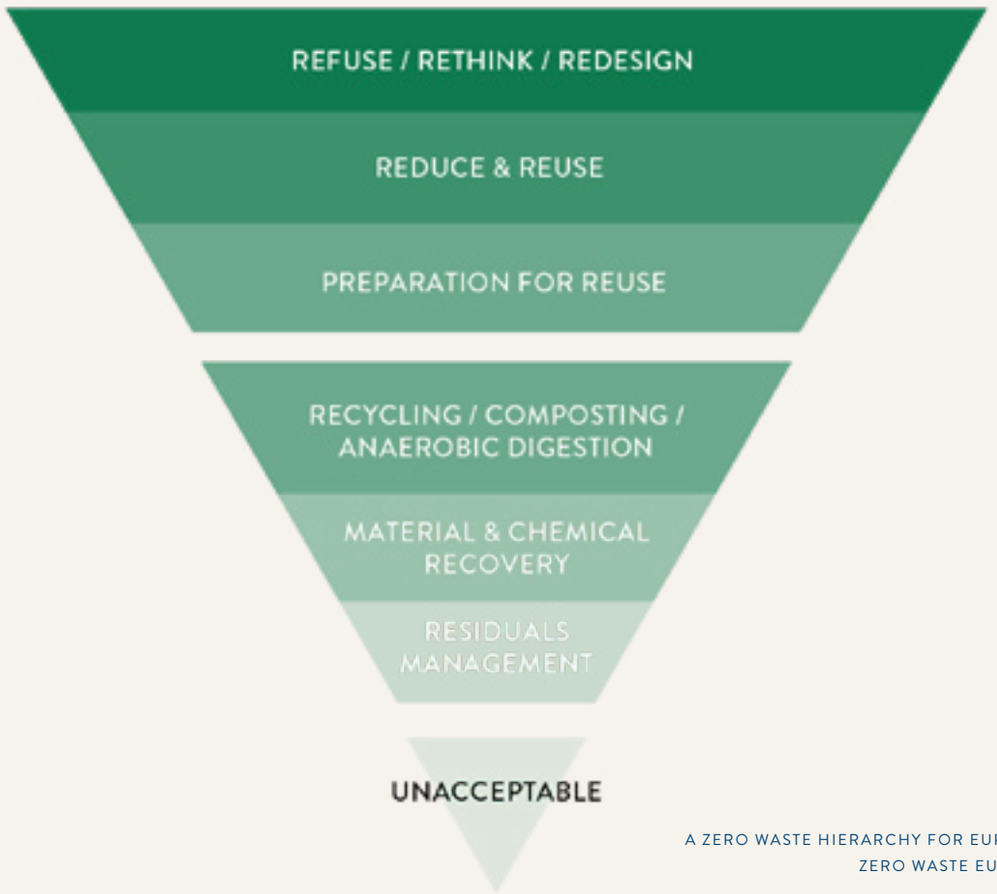
COMPLETELY PLASTIC FREE,

thus not contributing to a serious environmental problem, which affects global rivers and oceans, impacting many species of fish and birds, as well as human health

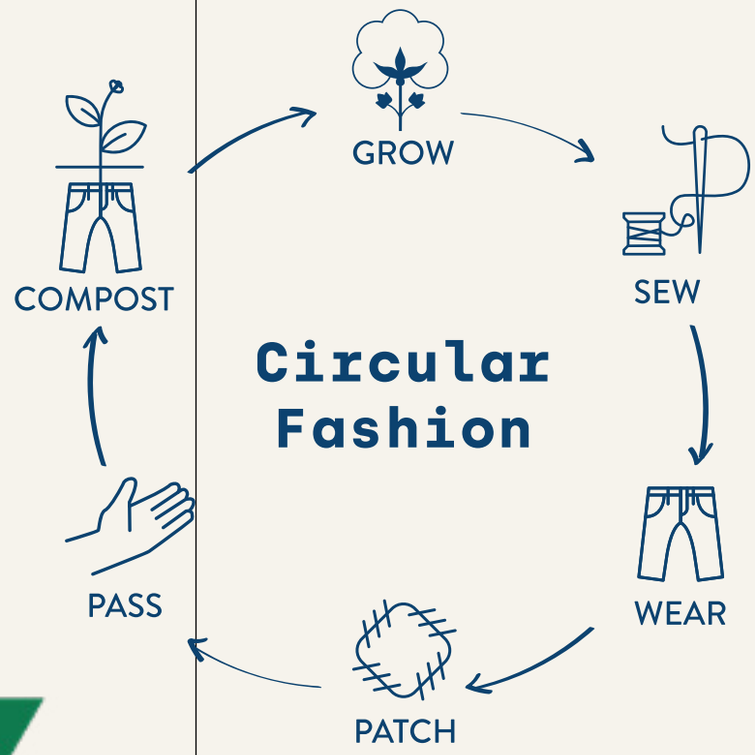
TECHNICALLY SPEAKING...
Coreva is considered an Elastodiene not an Elastane.

MEANT TO LAST
Biodegradability does not impact performance.

The Waste Hierarchy



A ZERO WASTE HIERARCHY FOR EUROPE, ZERO WASTE EUROPE



There are several waste disposal methods, and this graph grades which are the best post-consumer options available at the end of a garment's useful life.

Linear systems result in the often-premature disposal of materials, which result in air, water, and soil pollution and inefficient use of natural resources.

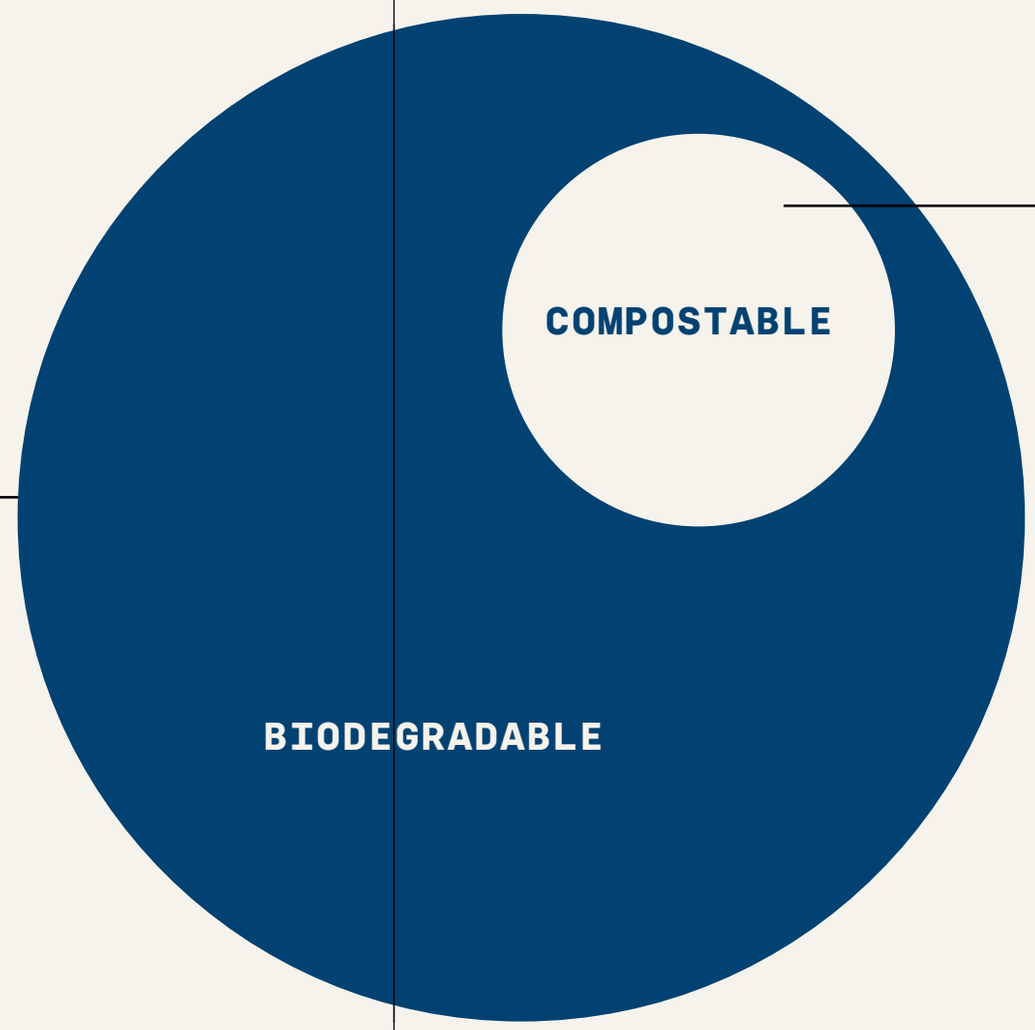
One way to extend the life of materials is through recycling, but usually, this will result in downgrading and reducing the material quality. Upcycling means adding value to existing materials and products by reworking them into items of equal or higher quality.

Another way to reduce the environmental impact of garments that have reached the end of their useful life is to design for biodegradability or compostability. These fibers will return to nature once not in use anymore and will therefore prevent the creation of additional waste and pollution.

Biodegradability vs. Compostability

It's very easy to confuse biodegradability and compostability. So what's the difference?

COMPOSTABLE: a substance or material that is biodegradable, and that leaves no visible, distinguishable or toxic residues. The resulting material is often humus, a nutrient-rich oganic-matter that can be used as soil fertilizer, or when conducted in anaerobic environments, methane gas, that can be used to produce energy.



BIODEGRADABLE: a substance or material that can be degraded into CO2, water, inorganic compounds, and biomass by naturally occurring microorganisms such as bacteria, fungi, and algae.

***Biodegradability is a pre-requisite for compostability – but, bear in mind that just because a material is biodegradable does not automatically make it compostable.

RAW MATERIALS IMPACT

Oil-Based vs. Bio-Based

OIL-BASED PLASTICS can have many uses in the fashion and textile industry and can commonly be found in textile fibers, printing and embellishing materials, components, and packaging.

This type of materials are made from non-renewable petroleum sources, and oil extraction can cause harmful oil spills and habitat destruction. At the end of useful life, oil-based plastics can enter landfill and release harmful gasses into the atmosphere as they try (but fail) to biodegrade. Instead of biodegrading, oil-based plastic photodegrades, breaking down through light exposure into smaller pieces that can easily enter the food chain and cause damages to wildlife, hormone mimicking and disruption, fertility issues, fetal developmental issues, and hormone-related cancers.

BIO-BASED PLASTICS have been developed in response to the impacts of oil-based plastics: these materials are made from plant-based polymers.

Many bio-based plastics have been designed to biodegrade and, therefore, in the proper setting, with specific humidity or temperature, or with the right bacteria and microbes, they can break down in landfill without releasing the harmful gasses that oil-based plastics do.

To guarantee the reduced environmental and social impacts of this alternative over oil-based ones, it is important to ensure that crops used to grow plants are not genetically modified (GM), sourced from endangered forests or the cause of deforestation, and that they are not grown with harmful chemicals or pesticides.

Make It Compostable

MAKING A FULLY COMPOSTABLE GARMENT IS NOT EASY, BUT HERE ARE A FEW TIPS TO HELP YOU ALONG THE WAY.

While 100% cotton jeans can technically be considered biodegradable and even compostable, dyes and other chemical auxiliaries mean that this is not always possible. The other thing that is often getting in the way are the trims.

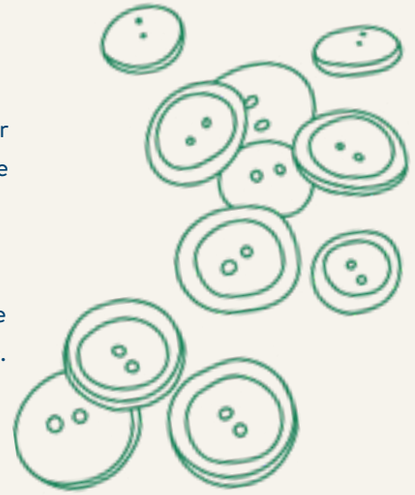
Try to use compostable components or those that can be easily removed from the garment at the end of its usable life to be recycled, or even better to be reused for new products. To help this, you can provide disassembly instructions to consumers on how to remove non-compostable elements from their denim.

We have pulled together some recommended materials and components to consider when creating your garments.

MAKING IT COMPOSTABLE

Trims: Buttons

Most denim garments feature fastenings for functionality or aesthetic purposes, and these can be made from a wide range of materials.



AVOID

We recommend avoiding new plastic-based materials, as these could contribute to plastic pollution during and after their use.

WHAT TO USE FOR EASY...

COMPOSTABILITY

For your denim articles to effectively turn into compost, material composition must be considered. These materials must break down in nature, so we recommend trims made from natural materials such as wood, Corozo, or coconut, or man-made bio-based plastics such as Polylactic Acid (PLA).

DISASSEMBLY

If sourcing compostable buttons is not an option, wearers must be able to easily remove buttons from their denim. When designing for disassembly, we recommend using high-quality screw on buttons, as these could be reused ad infinitum for future garments.

MAKING IT COMPOSTABLE

Trims: Zips

Zips are another common feature of denim clothing and, like buttons can have a range of impacts if not properly disposed of. Zips typically have several components, and these can be made from a variety of different materials such as metals, oil-based plastics, bio-based plastics, and natural textile fibers.

AVOID

We recommend not having oil-based synthetic materials (such as polyester, nylon, and acrylic) in any component of the zip. If possible, avoid metal components and choose bio-based plastic instead.

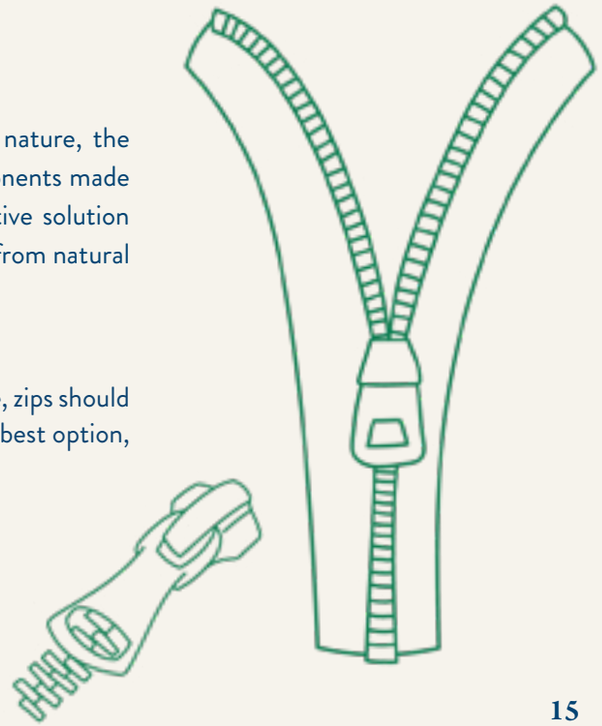
WHAT TO USE FOR EASY...

COMPOSTABILITY

Although most metals eventually break down in nature, the process can take some time. Therefore, zip components made from bio-based plastic materials can be an effective solution and these should be used alongside zip tape made from natural fibers such as cotton, ideally certified organic.

DISASSEMBLY

If sourcing compostable components is not possible, zips should be easily removable. However, button flies are the best option, particularly using screw-on buttons.



MAKING IT COMPOSTABLE

Trims: Rivets

Rivets are used to prevent denim garments from wearing out and ripping at the seams. These tiny button-like components are typically made from metals or oil-based plastics.

AVOID

We recommend avoiding all oil-based plastic materials: while recycled plastic reduces virgin raw material production, compostability is still compromised.

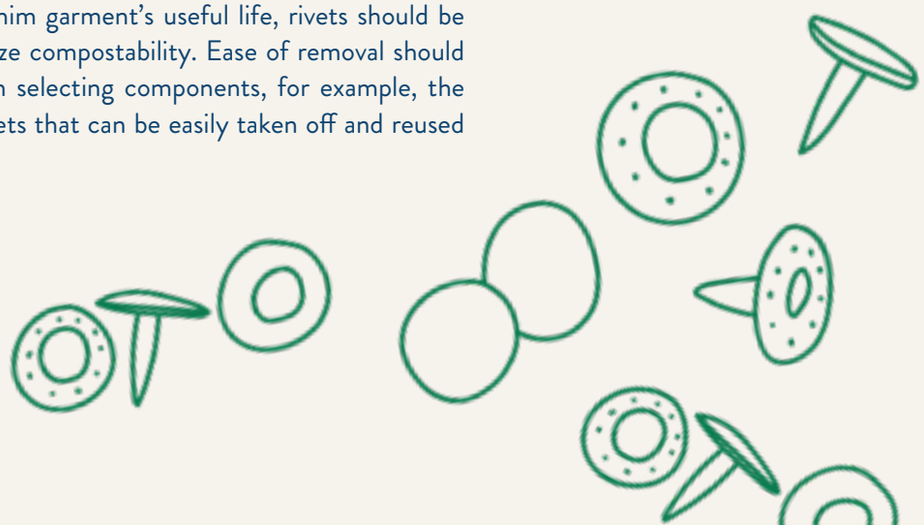
WHAT TO USE FOR EASY...

COMPOSTABILITY

Although most metals will eventually return to nature, we would recommend using bio-based plastics options which will accelerate the compostability of a rivet. However, the best option is to create bar tacks in place of rivets, using a compostable thread.

DISASSEMBLY

At the end of a denim garment's useful life, rivets should be removed to maximize compostability. Ease of removal should be considered when selecting components, for example, the use of screw-on rivets that can be easily taken off and reused over and over.



MAKING IT COMPOSTABLE

Trims: Sewing Thread

Sewing thread is challenging to remove from post-consumer garments and therefore, if you want your garments to compost at the end of their life should always be made from compostable materials such as natural (preferably organic) cotton or responsibly sourced man-made cellulosic fibers.

AVOID

Synthetic, oil-based sewing thread such as polyester, polyamide or polycotton as they are not biodegradable nor compostable.

WHAT TO USE FOR EASY...

COMPOSTABILITY

Sewing thread should be made from reduced impact fibers that will return to nature at the end of their useful life, such as organic cotton or viscose – lookout for FSC certified options.

MAKING IT COMPOSTABLE

Trims: Patches & Jacrons

Patches and jacrons are common in denim apparel, especially jeans. They often contribute to the aesthetic of denim garments rather than the function and can be made from a wide range of materials, from bovine or recycled leather to plastic-based leather alternatives.

AVOID

Leather won't be suitable for vegan customers and can carry significant environmental impacts such as contribution to deforestation, heavy metal pollution, and greenhouse gas emissions. Plastic-based leather alternatives should be avoided as these will not biodegrade.

WHAT TO USE FOR EASY...

COMPOSTABILITY

To effectively become compost, patches should be made from natural materials such as cork, remnant denim fabric (Candiani, of course!), made from 100% or compostable plant-based leather alternatives.

DISASSEMBLY

If compostable patches cannot be sourced, it is recommended that high-quality patches are used as these can be detached and reused. Be sure to label products with consumer-facing instructions on how best to disassemble garments at the end of their useful life.

MAKING IT COMPOSTABLE

Trims: Labels

Internal labels are used for branding, composition, and location of manufacture and care instructions. They are often made from polyester, which will not biodegrade. Garment labeling and markings are regulated by local legislation, and so their instructions must be strictly complied with.

AVOID

Try to avoid the excessive use of internal labels and labels made from synthetic fibers such as polyester. While recycled polyester uses existing resources, it will not biodegrade at the end of its life.

WHAT TO USE FOR EASY...

COMPOSTABILITY

Choose natural fibers such as organic cotton, or alternatively print information inside the garment (for example, on waistbands and pocket bags) using water-based inks. A combination of markings on the garment's body and printed labels may be used. Pocket bags are the perfect spot and should be made from 100% natural or compostable fabrics.

DISASSEMBLY

Ensure labels are attached to garments so that it is easy to remove or print all information inside the garment, so disassembly isn't required. Just make sure you use water-based inks and not synthetic ones.

MAKING IT COMPOSTABLE

Finishes

There are many different finishing and washing effects for denim and each can be achieved using varied technologies and ingredients.

For better compostability and disassembly, we recommend avoiding complicated finishes that use adhesives or oil-based ingredients and components. Finishes to avoid include foiling, flocking, glitter, sequins, and embroidery that isn't done with biodegradable thread.

We recommend enzyme or laser finishes and washes instead because they can guarantee the best compostability.

Food for Thought

Why not initiate a send-in service to recover post-consumer trims for reuse? This will not only reduce the impact of your denim apparel, but also provide a good opportunity for communications

Trial a swap / re-commerce platform for your customers and elongate the useful life of your life of your COREVA™ denim products before they are turned into compost in landfill

If you cannot source compostable trims, make sure your garment labelling and online communications explain to your customers the importance of disassembling their garments once they have finished wearing them

Appendix

COMPOSTABILITY TEST

Coreva™ has undergone tests to assess biodegradability, disintegration, and eco-toxicity, that when you put together determine compostability. The tests were conducted at a local laboratory in Milan, and in accordance with the requirements of EU Standard EN 13432.

This harmonized EU standard for "Packaging: requirements for packaging recoverable through composting and biodegradation" was the reference chosen to confirm the potential compostability of COREVA™. The following requirements must be achieved in order to conform to this standard:

- After 12 weeks, no more than 10% of material pieces can be larger than 2mm
- Within 6 months, the test sample must produce at least 90% of the CO_2 that is generated by the control fabric (in this case, the control material used was a cellulose microcrystalline, Avicel).
- There must be no evidence of negative environmental effects on the composting process.
- There must be low levels of heavy metals (such as copper, nickel, lead, chromium etc.).
- There must be no effect on bulk density, pH, salinity, volatile solids, total nitrogen, total phosphorus, total magnesium, total potassium, and ammonium nitrogen characteristics of the compost.

Whereas, conformity to EN 13432 was established using the test method, ISO 14855:2012, that examines aerobic biodegradability of plastics, made of organic compounds, in controlled composting conditions with a constant 58±2 °C and 50% ±5% humidity.

RESULTS

Phase 1: At the end of 12 weeks, the sample disintegrated at 98.1% of it's original value therefore, it falls within the limits speficied.

Phase 2: After 104 days, the sample reached an average value of biodegradation equal to 91.4+/-0.4%, and within the required 90% of the control sample comparison, thus confirming biodegradability in mature compost.

Phase 3: To determine the ecotoxic effects on plants, seeds were planted in soil containing the composted COREVA™ sample. After 12 weeks, it was found that the germination and growth of the seeds was in no way inhibitied, with results showing plant growth was actually superior when COREVA™ compost was included in the growing medium.

BACKYARD COMPOST

We wanted to test the biodegradability and compostability, quite literally, in our own backyard, so we did just that. We constructed ten wooden boxes and in each one buried a pair of jeans, all made with COREVA™. The results were quite impressive showing, an increase in organic matter by almost 50%.

FARM TRIALS

Our ultimate goal for COREVA™, at the end of its useful life, is to turn it into nutrient-rich fertilizer that can be used in agriculture and to grow cotton for the next pair of jeans. We wanted to give it a try ourselves, so we planted a crop of cotton near the mill and have been using COREVA™ as fertilizer. A local agronomist is our technical partner and is overseeing the project.

WE WANT YOUR SCRAPS

Send us your scraps and seconds. Please inquire about the possibility to be included in our on-going COREVA™ to Compost farm trial.

Please contact

sustainability@candianidenim.it

with any questions regarding COREVA™ or the making of your compostable jeans.

Candiani
COREVA®
PLANT-BASED BIODEGRADABLE STRETCH TECHNOLOGY