

circular economy

The recovery options for today's multi-material products need more than just recycling. Creative thinking in design and end products can allow for increased opportunities that pave the way for circular economy.

Ore Streams,
Studio Formafantasma



Note:

Formafantasma's Andrea Trimarchi and Simone Farresin created the furniture as part of their Ore Streams project, a two-year study into the current state of electronic waste recycling that proposes new approaches for designers working on gadgets.



recycled gold

With the project, Ore Streams, the Italian designers at Studio Formafantasma, are exploring how electronic waste can be repurposed and gold is one of the materials they scavenge. They transform gold circuit boards to create new surface finishes. The objects created for Ore Streams act as a Trojan horse to initiate an exploration of 'above ground mining' and of the complex role that design plays in transforming natural resources into desirable products.

Submersible Mike Horn edition 47mm,
Panerai



EcoTitanium®

The watch industry often turns to the aviation sector when it needs new case material ideas. Titanium, which is used a lot in the manufacture of airplane parts, has widely been used in the watch industry. EcoTitanium® is recycled titanium from alloy scrap (turnings and massive scrap) collected from major aircraft manufacturers and their subcontractors. This material makes its horological debut fittingly in a watch associated with nature conservationist, Mike Horn. The Panerai Submersible Mike Horn edition 47mm, is a professional diver's watch whose case, crown, the bridge protecting the crown, the bezel and the caseback are made from EcoTitanium®. Fittingly, the watch is paired with a black strap made from recycled plastic (PET) bottles.



The production of 1 kilogram of cotton garments uses up to 3 kilograms of chemicals.



The equivalent of more than 3 trillion plastic bottles is needed to produce plastic-based clothes every year.



Textiles production (including cotton farming) uses almost 100 billion cubic metres of water annually, representing 4% of global freshwater withdrawal.



recycling car tires

Car tire waste globally is immense, with just the US producing approximately 330 million used tires a year. Solutions have come in the recycling of the rubber material, but not without concerns. The tires are typically ground down and used as crumb rubber infill for children's playgrounds or sports fields. Though most US and European tires have little chemicals of concern, a lower cost version from elsewhere can contain heavy metals like lead and manganese, volatile organic compounds like toluene, and polycyclic aromatic hydrocarbons. The chemicals are associated with cancer and other illnesses at certain levels of exposure and indeed, some communities are banning the crumb rubber infill, including Westport, Connecticut, and Edmonds, Washington, though there is no current research that shows a direct link.

jeans redesign

Developed by 40 denim experts in academia, fashion brands, retailers, manufacturers, collectors, sorters, and NGOs, a new set of circular economy guidelines for denim production have been created on behalf of the Ellen MacArthur Foundation. Backed by leading retailers such as Gap, H&M, and Lee, these guidelines set minimum standards for recyclability, durability, material health, and traceability of a pair of jeans, in a bid to curb the outside environmental cost of denim production. The first pairs of jeans produced in line with the guidelines are expected to hit shops in 2020. Bearing the Jeans Redesign Logo, these jeans will be able to withstand at least 30 washes, feature labels with clear information on product care, be made with at least 98% plant-based fibers from organic or regenerative farming methods, and design out metal rivets to improve recyclability.

Note:

Tropical crop residues are far too abundant to compost effectively. This “waste” is simply left to rot creating significant methane pollution and crop disease.

-Circular Systems

Making biotextiles from food crop harvest waste

Circular Systems is a clean-tech company that produces low cost, and highly scalable biofibers, made entirely from food crop waste. The company has developed a closed-loop processing system, called “Agraloop” Bio-Refinery,” capable of converting the residual biomass remaining after the harvest of food crops, such as oil seed grains (i.e. flax, hemp), and tropical leaf fibers from fruits (i.e. banana, pineapple), into valuable and versatile biofibers that are applied to supplement cotton textiles.



Agraloop Bio-Refinery,
Circular Systems

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We have created a miracle: a technology that allows textile waste to be used again and again, preserving 100% quality.

-Infinited Fiber

New ways to produce cellulose fibers

The Infinited Fiber Company has developed a process technology that can turn cotton-rich textile waste, paper and cardboard waste into new, cotton-like fibers for the textile industry. And not just once, but infinitely. The output is similar to viscose and can be recycled again and again without decreasing the quality of the fiber. The technology can be integrated into existing pulp, dissolving pulp, and viscose fiber plants.



Infinited Fiber technology process,
Infinited Fiber

innovations to combat the world's apparel waste problem



Pencils made from textile waste,
Manaoemea

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Big things are for making big things, and small things are for making small things. Trees are ideal for making furniture, but not pencils.

-Christine Arlt, Ph.D.,
Manaoemea

Textile upcycling used as an alternative to plastic

ESA BIC Bavaria startup, Manaoemea, has developed a technology that turns textile waste into pencils based on an aerospace technology. While pencils are the first application of this technology for consumers, other applications in the future could include other rigid components such as buttons and buckles used in the fashion industry. Typically, this technology is used to produce carbon fiber components for satellites; however, it is now being leveraged to produce strong pencils made from waste textile fibers.

reinventing waste

telling the brand's story through packaging

Food waste bioplastics,
Genecis



Note:

Genecis are best suited for higher-end, multi-use products like toys, flexible packaging, 3D-printing filament, and medical applications including surgical staples, sutures, and stents.

-Genecis

Food waste bioplastics

Genecis is commercializing its first product line of PHBVs, a high-quality biodegradable plastic that is used to make thermo-resistant packaging, compostable coffee pods, 3D printing filaments, and is also marine degradable. The company uses a three-step process to create their PHAs. First, a bacteria culture breaks down the food waste into volatile fatty acids. The fatty acids are added to another bacteria culture specially selected to produce PHAs in their cells. Finally, an extraction process breaks open the cells, then collects and purifies the plastic.

55%

The percentage of brands that say recycled content in packaging is the most important marketing claim for their customers.

-Stylus

Waste feather packaging

AEROPOWDER has developed an innovative way to convert feather waste from the poultry industry into valuable, repurposed products. Their first product, called 'Pluimo,' is made of 95% waste feathers and 5% biobinder that is then wrapped in a compostable sheet. This biodegradable product is meant to insulate perishable food and replace polystyrene (PS), a non-recyclable material used for packaging in food delivery and grocery e-commerce.



Pluimo,
AEROPOWDER



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The solution to the problem of plastic waste: collection, sorting and recycling to achieve in the circular economy.

-Florian Riedl,
Director Business Development, APK AG

From recycling to Newcycling®

Newcycling®, the innovative recycling technology developed by APK AG, is the most effective way to close-the-loop. The solvent-based Newcycling® technology enables to produce, pure granulates with properties similar to virgin plastics from complex waste streams, e.g. mixed plastic waste and multilayer packaging, whereby the process is economically and ecologically efficient. In comparison to chemical recycling, the plastic is retained and does not have to be repolymerized using energy and cost-intensive processes.



**MC# 6560-12
NATURAL**



Custom Closed-Loop Panels

The first active closed-loop process that can convert fiber waste streams into environmentally superior, design friendly, high-performance ECOR composite panels, embracing cradle-to-cradle design principles. Using the Fiber Alloy™ technology, it can deliver the optimal performance for a specific product, ranging from single and multi-ply panels to 3D assemblies using just water and heat.

Applications include retail graphics, trade show displays, book shelves, office furniture, walls and accessories.

**MC# 8534-04
NATURAL**



Bio-Granulate Reinforced

A patent-pending bio-resin with fiber reinforcement developed as an alternative to conventional petroleum-based resins. With a bio-sourced content of over 95%, the biopolyester resin is based on starch. The resin is combined with short cut natural fibers for reinforcement.

Applications include furniture and the plastic packaging industry.

**MC# 7773-04
POLYMER**



Asclepius Films

Biaxially oriented polyester (BOPET) films with maximum recycled content to lower the carbon footprint. These films offer excellent surface properties, dimensional stability, and machinability and are available in clear and metalized grades. According to ASTM testing, they exhibit high tensile strength, elongation, and barrier performance for use in flexible packaging and labeling.

Applications include flexible packaging, labelling, insulating material, as well as for electronics and printing mediums.

**MC# 8536-04
POLYMER**



Trifilon BioLite®

The first biocomposite to meet the demanding requirements of exterior automotive applications. This range of high performance, locally sourced fiber reinforced resins have been engineered for injection molding. Using hemp fibers from Sweden and other parts of northern Europe, the current base resin is polypropylene (PP), but recycled PP, PS, PE, and PLA are all being tested for use.

Applications include automotive parts and suitcases.

**MC# 8493-01
NATURAL**



Made of Air

A carbon-negative building material made of 90% atmospheric CO₂. The material is made from waste biomass that has absorbed CO₂ during its lifetime.

Applications include sheathing boards, tabletops, and cladding panels.

**MC# 8606-01
POLYMER**



OSOMTEX®

A patent-pending example of closed-loop manufacturing for apparel, using mixed discarded post-consumer and post-industrial textile waste that otherwise would end up in a landfill. It creates high-quality upcycled yarns and fabrics using no water, dyes, or harsh chemicals, eliminating the need for virgin resources and reducing water usage and emissions.

Applications include home, fashion, accessories, and furniture.

**MC# 9622-01
PROCESS**



Deinking Technology

A patented, water-based technology for removing inks from various plastics before recycling. The technology differs from conventional deinking solutions formulated with a solvent base, representing a significant advantage from an economic and environmental point of view.

Applications include packaging and other consumer goods made out of plastic.

**MC# 9623-01
PROCESS**



manaomea

A process developed to turn textile waste into pencils based on aerospace technology. Traditionally, the technology has been used to produce carbon fiber components for satellites; however, it is now being leveraged to produce strong pencils made from waste textile fibers.

Applications include promotional items, stationary, and fashion.

**MC# 9641-01
POLYMER**



EcoAllene

A 100% recyclable resin made from once unusable waste from multi-layer food and beverage cartons. The company has developed a patented process to melt discarded polyethylene and aluminum elements into an upcycled raw material. Supplied as pellets, they are easily colorable and have a slight metallic sheen. Performance properties are comparable to virgin plastics.

Applications include automotive, flooring, giftware, toys, and tools.

**MC# 9995-01
CARBON-BASED**



CARBONIUM® ORIGINAL & CARBONIUM® GOLD

The first recycled carbon fiber-based material to bring aerospace-grade structural properties with a unique aesthetic to the parts obtained. The patented manufacturing process allows the molding of complex geometry parts that remain machinable. Its specific architecture made of discontinuous carbon fibers is particularly adapted to carry high loads and absorb energy impact damage.

Applications include luxury goods such as watchmaking and custom interiors for supercars, yachts and business jets.

MC# 9047-01
NATURAL



The Eco.Bottle

The world's first commercially-viable paper bottles made from recycled materials. The bottles are made using a proprietary technology that combines an outer shell made of 100% recycled cardboard and old newspaper with a thin liner with recyclable, non-laminated, mono-polymer (PE) structure to deliver a smarter packaging solution.

Applications include liquid or dry personal care products.

MC# 9054-02
CERAMIC



Flock

A durable ceramic-based material made out of leftover pieces of colored porcelain, in which the combination and visibility of the used separate "crumbs" give the material a new and distinct character. It enables the creation of random patterns and each piece is one-of-a-kind and can be customized depending on the available waste.

Applications include tableware and tiles.

MC# 9209-01
POLYMER



The Breath@

An efficient and ecological fabric solution that adsorbs and disaggregates toxic polluting molecules from indoor and outdoor environments. This 'three-layered system' is comprised of 2 printable layers of zinc and silver activated polyester and a single layer of carbon mesh, where all 3 layers work in synergy to guarantee a 360° cleaning action.

Applications include office furniture for residential, hotels, and schools, as well as for billboards and placards.

MC# 9216-01
NATURAL



Banana fiber leather alternative

A tough, tear-resistant mat of banana fibers made into thick sheets of paper. Banana fiber is one of the world's strongest natural fibers. The material consists of thick-walled cell tissue, bonded together by natural gums. Its natural color is tan, but it can be printed onto using acrylic silk-screen printing.

Applications include wallets and purses.

MC# 9242-01
POLYMER



rPET PP*STAR Woven pinch bag

A closed-loop, cost-efficient manufacturing of the first woven pinch bottom bag that is made from 100% recycled PET bottle flakes. It offers higher tenacity, stiffness, less creep, and better aroma barrier compared to PP or PE. This single-layer bag is fully recyclable and lightweight while lowering the transportation cost and CO2 emissions.

Applications include packaging of dry bulk goods such as rice as well as grocery and shopping bags.

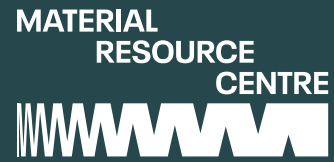
MC# 9288-01
NATURAL



GELATEX

A leather-like textile that is chemically identical to and feels like leather. The nonwoven textile consists of nanofibers based on gelatin from low-value meat waste. Producing the nonwoven requires only organic non-toxic substances and almost no water. The characteristics of the material, such as texture, water-resistance, and thickness, can be customized upon request.

Applications include apparel, footwear, fashion accessories, and automotive and furniture upholstery.



Material ConneXion®