

MATERIALS

# Bamboo - The Ultragrass

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Pulse

MaterialConnexion  
BEAUTYSTREAMS

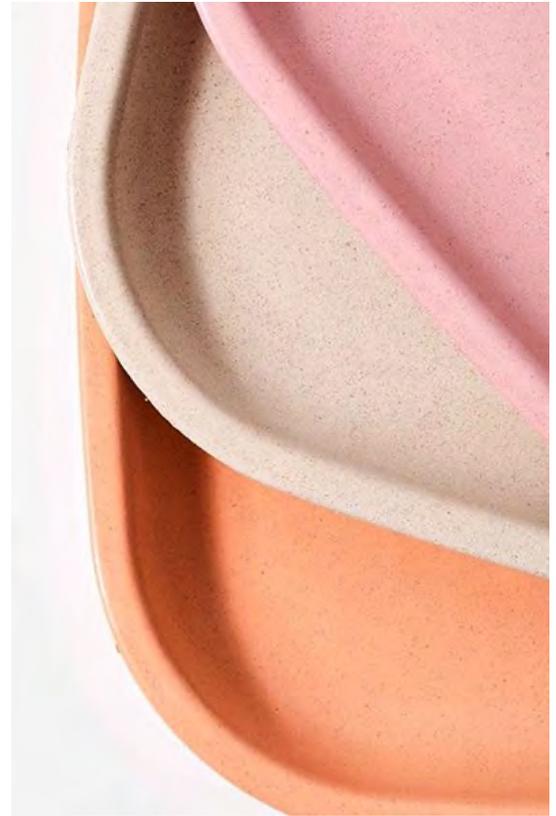


## Provenance and Careful Processing Are Key

Versatile, fast-growing, ubiquitous, and one of the few materials that screams sustainability, bamboo can be a viable basis for a lot of packaging designs. But choose your application carefully, because although the use of the material itself is typically considered an unalloyed good, there are considerations about its processing that you need to be aware of. We know that bamboo is a grass, and that it grows exceptionally fast – up to 3 feet in a day – meaning that it sequesters CO<sub>2</sub> at an amazing rate. But its popularity has led to some less than ethical methods such as clear-cutting endangered forests to plant new bamboo fields, meaning that to truly trust the provenance of the material, you need to ensure that it is FSC (Forest Stewardship Council) certified or other industry recognized affiliation to guarantee that it has been sourced from a sustainable location.

Once harvested, it has myriad uses, from the flexible to highly rigid. The first well known application has been flooring, revered for its hardness and distinct aesthetics, but be aware, this use, as well as many others, requires that resins be used to bond the material together, and to finish the surface. The caps used for cosmetic containers are cut and hollowed out from a rod of bamboo strands that have been pressed and bonded into shape, commonly with a thermoset phenol formaldehyde or an epoxy. These types of resins are also used when molding brush handles and the occasional bottle form. An easier way of creating molded forms using bamboo has been the inclusion of bamboo fibers in commodity or sustainable plastics.

**BEAUTYSTREAMS**



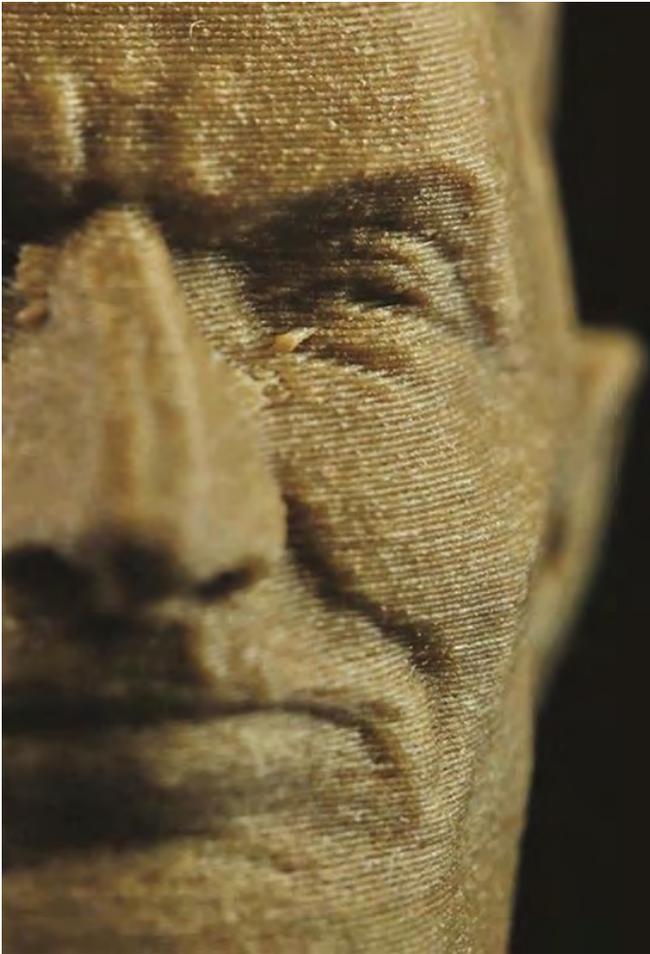
## Bamboo Composite by Pivot Materials

This advanced material by [Pivot](#) is made using bamboo in place of purely fossil fuel-based plastics. This is done by incorporating the natural fibers of bamboo into traditional plastics such as polypropylene (PP), polyethylene (PE), high-density polyethylene (HDPE), and the bioplastic polylactic acid (PLA). The resulting material is lightweight, sustainable, durable, and cost-competitive. It does not require changes in the current manufacturing setup or special tooling for injection, thermoforming, and extrusion molding. Though the material can be easily colored, it will have a fibrous appearance due to the bamboo content, a visually charming side effect. The company recently launched the world's first car part made out of a bamboo fiber-reinforced composite, which will go into production soon, with other applications including beauty and rigid packaging, toys, furniture, housewares, and other consumer products.



## Molded Pulp Fiber by Golden Arrow

Reducing the amount of plastic used and upping the amount of natural fiber, [Golden Arrow](#) has successfully created premium-quality, plant-based, molded fiber packaging for high-end consumer applications. Pulp fiber forms have come a long way in the last few years, but predominantly using wood fiber. This version is made with 60% bamboo, 30% bagasse pulp (by-product of the sugar making process that would normally be thrown away), 5% bonding agent, and 5% other additives using proprietary processes, and it's 100% recyclable and biodegradable. These raw materials are naturally highly pliable, allowing for diverse design possibilities compared to paper-substrate packaging. The pulp is injection-molded, then thermo-formed to various geometries, and dried, all in one process on the same bespoke machine that can attain intricate shapes not achievable elsewhere. It is die-cut into finished products with 1 mm (0.039 in) or higher thickness. The water used during the manufacturing process is completely recycled and reused. A single-layer process allows additional structures to be easily added, creating a unique "unboxing" experience. The fiber molding allows for embossing and debossing and can be made with various finishes ranging from smooth to rough, thereby adding tactile and visual elements to elevate the look and feel of the product. The manufacturer uses only clean and sustainable printing methods, including soy and eco inks as well as recycled paper products to create modern, high-quality packaging for mobile devices, wearable electronics, cosmetics, jewelry, perfumes, food and beverages, pharmaceuticals, and health care.



## Bamboo Filaments by ColorFabb

Not to be outdone, 3D printing has also jumped on the bamboo bandwagon. This biopolymer filament by [ColorFabb](#) is composed of 80% polylactic acid (PLA) and 20% recycled bamboo fibers and is intended for additive manufacturing, enabling the creation of parts with the look, feel, and aroma of bamboo. Specifically engineered for fused deposition modeling (FDM) or fused filament fabrication (FFF) printers with direct-drive extruders, the filament is tan in color and available in two diameters, 1.75 and 2.85 mm (69 and 112 mil), for toys, novelties, and jewelry.

# Biobased Foam by EVA Glory

Foams are also being created with bamboo as a major constituent. The Taiwanese EVA supplier [EVA Glory](#) produces a resilient foam called DeCoto that includes at least 25% bio-based foam (from sugar cane) but also bamboo fibers, creating a distinct "eco" look and feel. During its production, bio-EVA and bio-PE resins, which are derived from sugar cane, are mixed with traditional virgin plastics and then blended with residual or waste stream to create foam sheets. The formulation can be adjusted to meet the desired physical (densities from 0.15 to 0.33 g/cm<sup>3</sup>, 9.36 to 20.6 lb/ft<sup>3</sup>) and performance properties for the specified end use. The sheets can be further processed via standard techniques such as lamination, pattern embossment, thermoforming, thermo-molding, and CNC routing to achieve desired foam profiles. The standard sheet size is 100 cm x 200 cm (39.4 in x 78.7 in) with a thickness range of 2 mm – 80 mm (0.08 in – 3.15 in, depending on the formulations). The material is USDA, REACH, and RoHS certified and can be recycled. Applications are suitable for footwear, sports and leisure, outdoor and marine, packaging, medical and health care products, as well as toys.





## Bamboo-Based Paper by Sony

On the much more flexible side, there has been a consistent flow of new applications for papers using bamboo fibers. Not a new use for sure since bamboo has been used in this application for thousands of years, but it offers a refined and more sustainable story for some brands. Cue [Sony's](#) Original Blended Material, an environmentally conscious and sustainable paper material made from bamboo, sugar cane fiber, and post-consumer recycled paper. Sony specifies that the bamboo used for Original Blended Material is cultivated in three mountains in the Guizhou Province, China, and is a different type of bamboo than the one used as a food source by the pandas that live in these mountains. It is strong and highly durable, as well as moldable into a variety of shapes, offering the potential for a wide range of uses, on top of being entirely recyclable without sorting. Since it can be embossed, it is also possible to further improve environmental attributes by incorporating characters into the design without the use of ink.

And one final note on bamboo: Its use in fabric has been much lauded, with bed linens, towels, apparel, and accessories all being offered in a soft and luxurious fabric created from the grass. Be aware though, this is bamboo viscose, produced using the same process that makes standard viscose from wood fibers and cotton linters. The process requires a lot of caustic chemicals, and though these are retained in the manufacturing, some suppliers are not too careful about where they dump the effluent. As with all decisions about using more sustainable materials, do the research to ensure it is a reputable supplier, or even source lyocell bamboo, which drastically reduces the amount of toxic chemicals used with a similar quality fabric.

There are no purely sustainable materials – it's how you use them that counts!



## Dr. Andrew Dent

### **Material ConneXion**

Andrew Dent, Ph.D., is one of the world's leading authorities on materials for the design sector. He is EVP of Research at Material ConneXion, a global materials library and consultancy that helps Fortune 500 to start-up companies take their products to the next level through innovative material solutions.

To learn more: [MaterialConneXion.com](https://MaterialConneXion.com).