

office insights

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materials



BAMBOO FOREST

What is the Value of Bamboo?

by Peter Carey

If the **US Green Building Council** has done one thing in a supremely effective manner, it has been to motivate interior designers to seek out sustainable materials for their projects. This has led to a wholesale desire within the design community to find the greenest, cheapest material available.

Under the banner of its rapidly-renewable capability, bamboo is an emblematic material that sends a strong environmental message when used in commercial interiors projects. Most know that bamboo is not a wood, but a very fast growing grass. With over 1,500 species across the globe, the image of bamboo is connected with China, where it resonates deeply with the population. "In China it is a cultural icon," said **Eric Chan**, president of **ECCO Design** and a native of China. "It is an enlightened element: spiritual, honest, fast growing, strong, and flexible. It embodies qualities most people would like to have for themselves."

The exotic nature of bamboo conjures up images of faraway places and remote jungles untouched by today's

modern life. But, considered as a building material for commercial interiors, bamboo has greater compressive strength than concrete and about the same strength-to-weight ratio as steel in tension. On an ecological level, it releases 35% more oxygen than a comparable cluster of trees.

As this suggests, bamboo is a great material and a wonderful choice for certain aspects of interiors projects. It is, however, also the subject of a fair amount of greenwashing in our industry. Many manufacturers have capitalized on the association with sustainability to appeal to consumers desiring to buy green, even where these qualities are not present. Users and specifiers of this material, therefore, should be aware of the benefits as well as the tradeoffs that are inherent in using bamboo for interior projects.

Bamboo Textiles

"It's not that bamboo textiles are bad; just don't kid yourself that they are better than something else," said

Kristie Strasen, textile designer and owner of **Place Textiles**. Fabrics made from bamboo generally use chemically processed bamboo, which is the same manufacturing process as rayon. Manufacturing rayon entails using wood pulp and breaking it down with caustic chemicals to arrive at its most basic natural building block – cellulose.



KRISTIE STRASEN

The viscous solution of cellulose and chemicals is then extruded through a spinneret. "You don't buy a wood pulp shirt; you buy a rayon shirt. The fabric is made from cellulose whether it is bamboo or wood," said Ms. Strasen.

The **Federal Trade Commission** recently joined the discussion and sent a bulletin urging manufactur-

ers and marketers of bamboo textiles to stop calling chemically processed bamboo fiber anything other than rayon (or viscose, the name for rayon in Europe). Since material from many different natural plants can be used to create rayon, there's no trace of the original plant in the finished product. "The issue with bamboo textiles comes

down to common sense, and it is a matter of being informed," said Ms. Strasen. "One argument for bamboo is that it grows five times as fast as a tree. Well, there are certain kinds of trees that are raised for paper making that may not grow as fast as bamboo, but they do grow fast, and they are located in North America. And they don't require pesticides or fertilizers, just like bamboo."

A tactic some fabric mills have been using recently to tout the greenness of bamboo textiles is to say that their yarns made from bamboo are manufactured in a closed-loop process. By definition, a closed-loop system is one in which some or all of the manufacturer's output is used again as input to create more of the same product. Unlike nylon, another man-made fiber, rayon fibers cannot be introduced back into the manufacturing process and thus cannot be made in a closed-loop environment.

Another type of textile fiber made from bamboo is available, but not in great enough supply for contract interiors. The bamboo stalks are processed mechanically, not chemically ("resulting in the somewhat inelegant name of "mechanically processed bamboo"). This is done by crushing the bamboo and breaking down the stalk to get to the fiber within the bamboo. The crushed bamboo is then treated with natural enzymes. The final step in the process is to comb the fibers and spin them into yarn; this is similar to the process used to create wool thread. It is much more labor intensive and results in a fiber that feels more like linen or hemp.

Bamboo Flooring

The most recognizable use for bamboo in commercial projects has been flooring. To prepare it for manufacturing as a flooring material or for panels, most bamboo stems are sawn into $\frac{3}{4}$ " wide strips that run the length of an eight- or ten-foot stalk. The outer green skin is removed and the material



TERAGREN'S 3-PLY COUNTERTOP BOARD



THE MANY COLORS OF BAMBOO, FROM NATURAL FLAT GRAIN TO CARAMELIZED VERTICAL GRAIN AND MULTICOLORED STRAND

is planed smooth. In addition to using the material in its characteristic natural color, manufacturers can also steam it, which darkens the color, however, darker colors compromise bamboo's performance. Steaming burns off sugars within the strips and opens pores; it also reduces bamboo's overall hardness, sometimes by more than 10%.

Once the strips are dried and planed again, they are ready to be laminated. This is a critical stage in the manufacturing process and one that often separates sustainable-minded manufacturers from those trying to make a quick buck. Many low-cost laminating adhesives contain urea formaldehyde, which is extremely high in volatile organic compound (VOC) content. VOCs

have a large impact on the quality of air inside buildings and can contribute to respiratory problems and allergic reactions in many people.

In order for bamboo to provide high quality flooring material, plants must be from five to seven years old before harvesting. Certain species of bamboo have a reputation for growing more than eighteen inches in a single day; however, the inner walls of the plant need time to transform into a dense and usable product for flooring. "The overall problem that we have with bamboo, sustainability aside, is that anybody can get an importer license and bring questionable quality bamboo into the country," said **Cathy Leidersdorff**, president of **Architectural**

Flooring Resource, a large New York flooring contractor. "A lot of the calls we get on bamboo flooring jobs now are about re-dos from other manufacturers and installers. Bamboo looks and feels like wood," she said, "but it's not. It's a specialty product. Unless the spec is called out for a really reputable manufacturer, what's the point?"

In an unusual turn of events, the **Forest Stewardship Council (FSC)** allowed bamboo into its system in 2004. The FSC addresses the exploitation and mismanagement of forests across the globe and is an important organization that measures the sustainability of wood for building products. As mentioned above, bamboo is a grass, so why does it need FSC certification?

By all accounts, this was a decision made by manufacturers, not a request by specifiers or end users. The desire to achieve the LEED MR7 credit for certified wood is very high for some manufacturers, despite the increased cost for using FSC-certified products, which can be sometimes as much as 20% higher. At any rate, FSC only tracks how the bamboo is grown; it doesn't address the critical component of how the flooring is manufactured. It is possible that an FSC-certified bamboo floor was laminated with urea formaldehyde adhesive, which would negate the purpose of using the sustainable product, as well as disqualify it for the LEED IAQ 4.4 credit for low-emitting materials.

If a designer is solely interested in achieving a rapidly renewable LEED credit for their project's flooring material, specifying linoleum would be cheaper on a square-foot cost basis, as well as a monthly maintenance basis. If a designer desires to specify a product that looks green and sends a message of sustainability, bamboo achieves that, but so does reclaimed wood flooring, which could also potentially get a Regional Materials LEED credit if the wood is reclaimed within



ERIC CHAN'S ECC09707 BAMBOO CHAIR

500 miles. However, reclaimed wood is typically not hardwood, and thus not an ideal flooring for a contract environment. As with many issues surrounding sustainability, there is no single winner and no easy answer.

Ms. Leldersdorff named **Teragren** as recommended manufacturer of bamboo flooring for commercial use. "Our product behaves like an engineered floor, not a solid flooring product," said **Ann Knight**, Executive Vice President of Teragren. "Many consumers don't know what they are asking for when they want bamboo flooring." Teragren is one of the few flooring manufacturers that also manage its own bamboo forests in China. *Moso* is Teragren's preferred species of bamboo for their flooring and paneling. I asked her why it can't be grown closer to home, and she replied, "It can. It's ideal for pig farmers because the bamboo uptakes the nitrogen in the soil." Ms. Knight continued, "We have been exploring the idea of growing *Moso* in the Mississippi Delta region where the soil and weather conditions are ideal."

Like most domestic manufacturing, setting up a factory from scratch is a long term investment. "Economically it doesn't make sense unless the volume is there," said Ms. Knight. "To grow a plantation to maturity would take about

twenty years. After that, the bamboo can be harvested every 5-1/2 to 6 years."

When it comes to using bamboo veneer for furniture or millwork, one advantage arises, but, ironically, it may not be one that most commercial interior designers would appreciate in this instance: consistency. Many designers choose exotic wood veneer because of its rich and natural character. The organic pictures created in wood veneer panels are highly sought after by end users who are looking to send a message of wealth, status and sophistication.

Since the only veneer that can be made from bamboo is laminated composite veneer, each strand is matched with other similar colored strands to create a consistent color and texture. Unlike exotic wood veneer, which comes in many different shapes and sizes, bamboo veneer is predictable and has much less waste. Each sheet of bamboo veneer has a uniform shape and is thus much easier for a millworker to use. The clean look of a bamboo floor may not always be appropriate for elaborate millwork or paneling, but it can be used elegantly and creatively in many applications from conference tables to lounge furniture. Used as an accent, bamboo veneer has almost limitless applications.

Eric Chan's 9707 Bamboo Chair

Coming from the opposite end of the bamboo manufacturing spectrum, industrial designer **Eric Chan** designed a way to incorporate the strong and flexible benefits inherent to bamboo while minimizing the large amounts of glue and embodied energy that are usually expended to make bamboo products. Commissioned by the **Hong Kong Design Centre** to commemorate the tenth anniversary of the reunification of Hong Kong with mainland China, Mr. Chan in collaboration with **Herman Miller** created the **ECCO 9707**.

Starting with the shape of the seat, the chair takes important cues from tra-

ditional bamboo harvesting. Mr. Chan opted to take the long and thin processed strips made by most bamboo manufacturers and use them individually to form the chair's operative ergonomic component. Instead of gluing the strips to create a monolithic surface, the edges were carefully machined for the comfort of the sitter. A notch in the bottom of the strip was routed to interface with a special polymer suspension piece known as *Super Seat* suspension that Mr. Chan originally developed for the **Foray** office chair by **Gelger**.

By designing a variation of a traditional **Ming** chair, Mr. Chan has capitalized on the emotional association of his native countrymen with the shape of the chair and the material with which it is made. He also modernizes its comfort to ergonomically move and support the body of the sitter, regardless of their position in the chair. This new approach to both seating and manufacturing has the potential to create an industry within an industry, possibly shaping how we all use bamboo in the future.

Conclusion

The best sustainable intentions may not have the most practical or beneficial manufacturing outcomes. Bamboo is an important material for the future of the building industry, but when manufactured improperly, it not only damages our environment but also the reputation of a material that, along with a host of other materials such as wool, cotton, cork and a host of byproducts from the food industry, has the potential to stabilize the world's finite supply of long-cycle renewable materials. ■

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1 SUPER SEAT SUSPENSION OF CUSTOM CUT TIPS