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Bamboo, from traditional crafts to contemporary design and architecture

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Abstract

Discover bamboo and its wide variety of uses from food to furniture. Bamboo is a traditionally cultivated plant and used on continents and in different cultures. New technologies combined with traditional techniques awaken both the creator and the user with a spirit of inspiration and innovation by applying bamboo's practical qualities to the challenge of sustainability. In many cases, designers work in collaboration with artisans, creating different products, changing lifestyles and applying new technologies to create a world with sustainable products in an ecologically supportive way as social design.

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1. Sustainable design: renewable fibers.

Today global trends allow the environment and world economic power to take stock for the benefit of our planet. This extends the interest in natural materials who supply the wood, like bamboo and other plant fibers that regenerate much faster than traditional woods. Companies increasingly bet on the use of natural fibers in an attempt to be "green", which increases their philosophical points of view about "eco".

According to the Brundtland Report: "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: first, the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and second, the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.*"

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2. Bamboo, rattan, wicker and other materials with similar characteristics.

2.1. *Bamboo*; common name, is a giant grass the group of plants belonging to the family of herbaceous grasses, which are characterized by long stems and woody shrubs that develop stems (culms) of large diameter and size. According to the Colombian architect Simon Velez, "G. *Angustifolia* bamboo is a renewable resource in the areas of construction and infrastructure, which is used structurally in homes and other buildings. With a grade above the normal stress, similar to steel and concrete in compression. It can be used for furniture, carpets, paneling, flooring, partitions, plumbing, roof, structure and forms, among many others."

Bamboo furthermore is a food and alternative medicine. Since ancient times, bamboo has been a food for the peoples of East and for animals. Bamboo leaves have a high nutritional value and is also food for grazing, favorite food of elephants. In the human diet, the tender shoots are used in certain species and seeds. In India, they eat the stems of some flowers. In the field of natural medicine is beneficial for bones and skin.

2.2. *Rattan or Rota* (from Malay rotan) is the common name for some species native to tropical regions of Africa, Asia and Australia. They have slender stems 2-5 cm diameter with long internodes between the leaves. They are superficially similar to bamboo, but distinct in that the stems (Malacca) are solid rather than hollow, and they need some support, while bamboo can grow independently often at great heights without breaking.

2.3. *Wicker*, is a hard vegetal tissue fiber that comes from a family of shrub willows (genus *Salix*, *Salix viminalis* first and *Salix fragilis* and *Salix purpurea*), is knitted to create furniture, baskets and other useful objects. Other renewable fibers are abaca, coir, yute, sisal and kenaf or cannabis.

3. Bamboo: innovation and sustainability from our grandmothers shopping basket to computer case.

The designers are investigating the capacities offered by natural fibers like bamboo in the development of products of high quality and innovation. They use bamboo in intensive technologies generating new products.

Bamboo has been, in some cases associated to negative connotations. It is thought that bamboo products are, for example, of poor quality, cheap, rustic or neglected, or used to create vulgar handicrafts. The expectations of this material are increasing considering the wide possibilities of industrial processing of bamboo, seeking the profit of markets and the many opportunities in which traditional designs made by artisans can coexist with current trends. Industry can define new concepts in design and can explore innovative processing techniques. The artisans have had to frequently review and update their designs to meet the current demands of consumers. It is the designer of the product that is often due to update the design and its incursion in the field of social design.

3.1. Social design. *In this new "social" way to address the future of crafts, fair commerce stores appear, as Oxfam, SKIP (Supporting Kids In Peru) and initiatives such as Project Kala derived from the collaboration of the Spanish textile company Nanimarquina with Care & Fair Association, who are carrying out the disclosure and the redesign of the main local crafts in the places where they operate. Similarly, projects such as a bank of designs created by Spanish designer and Professor Manuel Bañó and his team have been very successful in relation to these initiatives. From www.freedesignbank.org, craftsmen access for free to a platform where selected objects, created and designed by volunteers Spanish designers as a way of working with disadvantaged artisans from southern countries of Africa. Are marketed through the fair trade (Fair Trade), and has developed a project with more than 200 student volunteers since 1998.*

Another project, developed in Ghana and Kenya (Africa) is the Byke Project Bamboo as a sustainable transport alternative. Led by American designer Craig Calfee, bicycle Bamboosero is an example of the new products developed with bamboo. The production of bicycles in Ghana, in collaboration with local artisans, aims to open shops for export worldwide. The Byke Project Bamboo and the Earth Institute at Columbia University (USA) have

studied the industrial manufacture of bicycles on a large scale in the above mentioned two populations of Ghana and Kenya. The flexibility of the material makes it suitable for absorbing shock which occurs in the road.

In farming communities producing bamboo, these initiatives are proving to be very beneficial to the consumer as well as for farmers, and can create a responsible production and motivate companies to develop products of push technology. The role of farmers and artisans is not limited only to crop management, harvesting and transport, but to the influence on the final manufacture of bamboo products. The use of bamboo has spread to other applications such as computer Bamboo laptop designed for Asus Ecobook or BoxWave's case for the iPhone. These are products that follow the current market trends to satisfy a demanding and extremely selective consumer, the so called 'hyper consumers', which are collectors of experiences that create new emotional and hedonistic experiences, words uttered by the French philosopher and sociologist Gilles Lipovetsky.

Another curious application is the production of motorcycle helmets designed by the French Company Roof. This is the first bamboo fiber hull, which has successfully passed the safety requirements required by the Standard E22-05, certification required for marketing in Europe. Undoubtedly, this product made with 100% sustainable natural fibers has among its properties that is derived from an unlimited source on which can be applied multiple mechanical possibilities of the material.

Are also the manufactured bamboo fiber textiles for use in bedding, underwear and towels, in which bamboo is often mixed with other fibers such as cotton or polyester to achieve greater long lasting value. As the spinning process allows different textures, his touch is becoming increasingly soft even almost like silk; in comparison with cotton, which is also soft, we can say that bamboo is significantly softer. Bamboo is also used for medical and cosmetic products and for the container. It is also used for baby diapers made from bamboo, rayon, and its interior handmade and organic velvet-textured waterproof and breathable whose always-dry effect on baby's skin.

Other applications have been inspired by bamboo furniture from the Ming dynasty, for example, spectacle frames. Designed with clean lines in remembrance of another time and true to the philosophy of order and minimalism are very light, and combine the aesthetics, craftsmanship and function.



Figures 1, 2, 3. Upper right: Bamboo Spectacle Frames Inspired by Chinese Ming Dynasty Furniture. Source: Designboom. Middle; Motorcycle helmet, the R06 Roof, which consists of a shell constructed entirely from bamboo fiber. Source: Roof brand. Upper left: Bicycle Bamboosero designed by Craig Calfee. Source: Bamboosero.

3.2. Architecture and urbanisms applications.

Among the architectural and urbanisms applications, we have the T4 Terminal (NAT) Barajas Airport (Madrid, Spain) is one of the most important construction projects in the world made of bamboo because it has an area of 1.2 million square meters. Designed by architect Richard Rogers Partnership (England) and Estudio Lamela (Spain), this project makes exemplary use of the shock absorbers of light.

Bamboo is an excellent material when confronted with the vibrations of an earthquake: light, strong, rigid and elastic at the same time, making it ideal in construction.

In the urban plan and outstanding example of architectural use of bamboo were the eleven buildings conjoining the organization INBAR (International Network for Bamboo and Rattan) for the Shanghai Expo 2010 (China), Especially the German Chinese House.

The German Chinese House was the result of a scope of cooperation between Germany and China, the project *Gemeinsan Bewegung* (Forward Together), which aims to promote mutual understanding as a basis for successful cooperation to reinforce the image of Germany as a future-oriented country. The German Chinese House is not only the highlight of the architecture of the Shanghai Expo 2010, but also a pioneering example of the construction made from natural materials. It is a unique example of building with a two storey structure of bamboo in the world exhibition. The building is a very significant sustainable building. The project was developed by the designer and installation artist Markus Heinsdorff.



Figures 4, 5, 6. Upper right: Terminal (NAT) Barajas Airport (Madrid, Spain). Source: Photographs by the author. August 2011. Middle; German Chinese House. General view. Source: Photographs by the author. September 2010. Upper left: The Spanish Pavilion, made by rattan, wicker and bamboo. Source: Photographs by the author. September 2010.

Another highlight of the Shanghai Expo 2010 was the Spanish pavilion, known as the "Spanish basket." The project team was the study of Enric Miralles and Benedetta Tagliabue EMBT Architects, located in Barcelona and was founded by the Catalan architect Enric Miralles (1955-2000) and architect Benedetta Tagliabue, from Milan. The Spanish pavilion in its construction and content, was projected with the slogan: "From the city of our fathers to the city of our children." It offered a spectacular look that combines the latest technology with the use that was made in it, on a scale never seen before of one traditional material such as bamboo, wicker and rattan, with which it was completely covered its facade. Since the beginning of the project, raised the proposal to use these materials in the architecture of the Pavilion. In Tagliabue's words: "We found something very Spanish, but we faced with something new. Now we are discovering organic materials and natural heritage of wicker products use traditions of both countries, because in China there is a strong tradition of basketry. "

These cutting-edge applications provide great versatility to the uses of bamboo, which added to his contribution in the field of social design place it at an alternative replacement for wood and often with other properties that place it in an advantageous position.

4. Conclusions

If you want to plan for a year. Then plant seeds ...
 If you want to plan for 10 years. Then plant trees ...
 But ... if you want to make plans for 100 years. Then plant bamboo
 An old Chinese proverb 510 BC

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