

Selection and application of green packaging materials

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Abstract: Under the situation of Global highly advocated green packaging from the point of the principle of green packaging design and based on the technical indicators of cardboard, this article analyzes the requirements for different products and provides the reference for the future design of green cardboard packaging.

The world of paper production and consumption continued to grow in twenty-first century, even influenced by the Asian financial crisis, and the slow European economic development, American manufacturing recession of the American manufacturing. Among the market factors, the environmental problem is the main reason of paper packaging to compete with other packaging material and packaging container. It can be used as a renewable resource recycling, can also realize the lightweight in the premise of unchangeable protection function and structure characteristics, so as to ensure the favorable position of paper packaging products in the competition. The global paper packaging products are over 1/3 of the packaging materials and containers of production or output In the world market, The paper packaging is environmentally friendly packaging.

Foreign and Domestic Paper Production and Consumption

According to a report in Japan pulp paper trade network, in 2011 the global paper and paperboard consumption and production are both up with a new high record. As early as in 1998, the global paper and paperboard consumption are more than 3 tons, from 2007 to 2000 it has been steadily growing, in 2007 up-to 3.94 tons, and affected by the global financial crisis. In 2010, as the economy rebounds, the global paper and paperboard consumption is up to 3.94 tons, in 2011 to 3.99 tons, 1.3% over the previous year, again refreshing a record.

Enter after twenty-first Century, China has become a big country with paper packaging production and consumption. Chinese paper and paperboard production and consumption are over American since 2009, ranking first in the world. In 2010, Chinese paper and paperboard production was 92600000 tons, accounting for 23.5% of total world production. Production of more than 10000000 tons and USA 75850000 tons, Japan, 27290000 tons, Germany 23120000 tons, Canada 12790000 tons, Finland, 11790000 tons, South Korea 11410000 tons, Sweden 11120000 tons. In 2010 Chinese paper and cardboard consumption was 91660000 tons, accounting for 23.2% of world total consumption. Paper and paperboard consumption of more than 10000000 tons of countries and America 75250000 tons, 27870000 tons, 19760000 tons of Japan, Germany, Italy, India 10830000 tons, 10780000 tons and 10520000 tons of Britain. The year 2012 paper and paperboard production and consumption will exceed one hundred million tons. In 2013 1 ~ 6, Chinese mechanism for paper and paperboard production is totally 59128000 tons, paper and paperboard packaging and many other advantages, excellent printability can beautify the promotional products, play a "silent salesman" role, as a cheap and good transport packaging, can reduce logistics costs, improve packaging efficiency. Therefore, the paper packaging occupies an important position in the world packaging industry.

Green Packaging Design Principle

The green revolution, a revolution of the packaging industry-- new century packing major trend of development, has become a commodity production and the irreversible trend of world trade. This

change is to adapt to environmental protection and conservation of resources, the inevitable result caused in ideas, materials, production and consumption of all aspects of the green revolution is reducing unnecessary waste; to provide renewable products; to stress the economic benefits and ecological benefits; the prohibition of the use of environmental pollution, the destruction of the natural products etc.. The waste of material, at least, and resources-saving and energy; are easy to recycle and reuse and recycling; waste combustion can generate new energy and does not have the second pollution; packing material at least and self decomposition, don't lead to the pollution to the environment, the above is the requirements of green packaging, between the green packing requirements, put forward the "green packaging design" green design ideas and principles. Green packaging design covers many aspects: the protection of the ecological, environmental consciousness; human health safety consciousness; the design idea of sustainable development; natural and comfortable, concise design concept. from the point of view of environmental protection, the aims of the selection and design of materials are to create no pollution, benefits to human health, and are conducive to the ecological environment of human survival package, therefore, green packaging is not only the technical considerations, but also the choice of materials, transformation of concept, design concept update.

Packaging design reduction, from the source to reduction of packaging waste, green packaging is the preferred way of the world recognized. In the green packaging design and material selection we should follow the 3R1D principles and economic principles.

Principles of Green Packaging 3R1D. The principle of 3R1D is green packaging design principle and method of internationally recognized, but it is also an important content of green packaging. 1) the principle of reduction principle. Packaging products i to ensure packaging, protection and use is to consume the least amount of material to save resources, reduce energy consumption, cost, emissions and waste. To fulfill this principle, including the optimization of structure, the amount of packaging, packaging, packaging takes the place of heavy to light of renewable resource materials to replace the non- renewable resources, instead of resource materials. 2) REUSE principles, namely the repeated use of principle. Packaging products are reused many times, saving materials, reducing energy consumption, and beneficial to environmental protection. Packaging design should give priority to the possibility of reuse, in technology, materials and recycling management feasible, the implementation of repeated use. 3) RECYCLE principles, namely the principle of recycling. Packaging products can not be reused, needs to form the possibility of regeneration treatment consideration recycling technology, whether the formation of recycled materials or recycled packaging recycling technology, such as recycled paperboard. 4) DEGRADATION principle, the degradation principle. Is the packaging products and materials, waste can not be recycled, recycling processing cannot recovery, or the less-value recycling , should erode degraded in the natural environment, the natural ecological environment pollution.

Green Packaging Economy Principle. Reduction of the cost of green packaging design should save material, reduce cost, improve efficiency, and increase competitiveness, based on the principle of material selection, concretely considering the following points: 1) the use of packaging materials to materials recycling is dominant and preferred ecological packaging materials, development of new environmental protection materials. 2) the use of green packaging printing, pollution-reducing. 3) packaging material selection, in addition to the selection of easy degradation, natural materials, material saving and promotion of green packaging. If a package emphasizes very much on structure, packing paper, packing box, layer upon layer, although the decoration exquisite design, good taste, because of the waste material, and non-worth advocating. Packaging design is reasonable, it can save packaging materials, reduce packaging costs, environmental pressure. Considering the shape elements of packaging carton design, we should choose those that save raw material geometry.

Selection and Application of Analysis on 3 Green Packaging Materials

Cardboard packaging material is the material widely used in the packaging industry, it has convenient processing, low cost, is suitable for mass production, and molding and folding, the material itself is also suitable for printing. Paper packaging material can basically be divided into

paper, cardboard, corrugated paper. Paper and paperboard are quantitative (according to the weight of unit area) or thickness to distinguish. The quantitative above 200g/m², the paper or the thickness between 0.3mm - 1.1 mm is referred to as the board. The cardboard is strong, easy folding processing and becomes the main material in the production of sales packaging carton. Corrugated board is mainly used for making external packaging box, can protect commodities in circulation, thin corrugated paper can be used as sales packing materials or goods packaging paperboard liner, to strengthen protection function.

Technical Standard Board. Choose different board materials packaging products with different design, different shape, it can save packaging materials, reduce packaging costs, environmental pressure. Standard board is a kind of special molded products for production of precision as well as an important product of cardboard for packaging, reference standard cardboard technical index can better choose suitable reference board, technical indicators in Table 1.

Analysis of Cardboard Packaging Material Selection. To understand the performance of different cardboard, rational use of the characteristics of different paper, it can save resources, and packaging design final visual effects play a significant role. White board with chemical pulp with waste paper pulp is made, a single board, one side coated white board, firm texture thick, smooth white paper, with a very good strength, surface strength, folding and printing adaptability, suitable for folding boxes, packing hardware, sanitary ware box. It also can be used for the production of waist hoop, tag, lining the bottom bracket and plastic packaging., because of its low price, so it is most widely used.

Coated paper is divided into single and two-side paper. Coated paper are mainly wood, cotton fiber and other advanced materials refined. Per square meter in 30 grams to 300 grams, 250 grams of white card called etching. Paper coated with a layer of white paint, adhesives and various auxiliary additives for coatings, the super pressure light, white paper, high smoothness, adhesion, water resistance, ink can be printed up after revealing bright white, suitable for multi-color offset printing. After printing colorful, varied levels, clear figure. Packaging and label applied to printing gift box and export products. Thin paper applies to box paper, bottles paste g degree low, canned paste and products like wood.

There are three kinds of cardboard, white cardboard and cardboard glass. White cardboard paper firm, smooth and white. Shiny glass card paper. Ivory cardboard paper with ivory glass surface texture. Jams are expensive, so generally used for gift box., wine box., tag and other high-end packaging.

Kraft paper board itself gray color to force its connotation of rich and colorful, and honest. So as long as printed on a color, can show its inherent charm. Because of its low price, cost-effective advantages, designers like to us Kraft paper as a packaging bag.

Art board is a kind of a variety of embossed texture surface, colorful art paper. It is a special processing, therefore expensive. Generally used only for high-end gift packaging, increased sense of precious gift. Because the concave convex texture of the surface of the paper, printing ink is not practical, so it is not suitable for color printing.

Recycled paperboard is a green paper, osteoporosis, at first glance like Kraft paper, low price. Because it has the above advantages, the world designers and manufacturers are optimistic about this paper. Therefore, the recycled paper is a major direction for future packaging paper.

Yellow cardboard thickness in the 1 to 3 mm, with a very good strength. But the surface rough, not direct printing, there must be the first printed on coated paper and offset paper pasted on the outside, can obtain the decoration effect. Used for packing box diary, lecture notes folder, stationery of shell lining and low-grade products.

Box board (also called corrugated) a wide range of uses, can be used as the packaging and transport packaging. A concave convex corrugated pressure through the corrugated paper machine heating. According to the size of corrugated bump, it can be described as thin and thick corrugated. Generally uneven depth of 3 mm for the thin corrugated, glass is often used directly in shock as blocking paper.

Analysis and Application of Cardboard in Packaging Design. Paperboard packaging in the molding is very simple, its shape along with the market demand changes, such as the use of skylights in the packing is easy to carry portable structure, hard box clamshell packaging, sales POP convenient packaging, food packaging, personalized stores such as product packaging. Cardboard packaging molding is usually folding, folding carton is the most widely used, most of the structure and shape changes a form of sales packaging, folding cartons, low cost, good strength, good display effect, suitable for fine printing and medium-sized batch mechanization production. To understand the performance of the paper, the rational use of different paper characteristics of packaging design, the final visual effect will play a great role. The properties of the paper include cardboard quantitative, thickness, strength, bending, texture trend, softness, folding endurance etc.. The choice should be based on board of the object weight inside, the weight of different objects to select the appropriate thickness of the board, for example, 0.1kg items, packaging design needs to select the 0.81mm thickness of cardboard, cardboard box volume of 3300 ~ 4100/cm³, the reference values as shown in Table 2.

Table 1 Standard Cardboard Technical Indicators

Index Name	Company	Regulations	
		A	B
Compactness \geq	g/cm ³	0.75	0.75
Transverse tensile strength \geq	kN/m	15.0	12.0
Thickness 1.0mm		22.0	18.0
1.5mm		29.0	24.0
2.0mm		37.0	29.0
2.5mm		44.0	35.0
3.0mm		59.0	47.0
4.0mm		78.0	59.0
5.0mm			
The transverse elongation \geq	%	5.5	5.0
Ash \geq	%	2.0	2.0
The water extract acidity	%	0.05	
Delivery of water	%	10.0±2.0	

Table 2 Folding Carton Using Cardboard Thickness Meter (contents not bearing)

Carton volume / cm ³	Contents quality /kg	The board thickness / mm	Carton volume / cm ³	Contents quality /kg	The board thickness / mm
0~300	0~0.11	0.46	1800~2500	0.57~0.68	0.71
300~650	0.11~0.23	0.51	2500~3300	0.68~0.91	0.76
650~1000	0.23~0.34	0.56	3300~4100	0.91~1.13	0.81
1000~1300	0.34~0.45	0.61	4100~4900	1.013~1.70	0.91
1300~1800	0.45~0.57	0.66	4900~6150	1.70~2.27	1.02

Conclusion

Paper packaging material in the packaging industry is the most widely used, a large quantity of production, processing is convenient, economical cost, green environmental protection, Recyclable recirculation, molding and folding is good, easy to print, plays a "silent salesman" role, as a cheap and good transport packaging, and it can reduce the cost of logistics, according to the characteristics of different products, we select the appropriate board, to save packaging design to maximize the

economic benefits, so as to improve the packaging, achieve environmental protection goals. Therefore, cardboard packaging occupies an important position in the world packaging industry.

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