

Design of a New Parcel Package Based on Environmental Protection

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Abstract: This study intends to address the following question excessive packaging has led to resources waste, meanwhile it also causes pollution and does the reflection for it. Based on the existing issue of the packaging of the parcel in the Chinese express industry, the thesis put forward design principles of novel parcel box for express parcels in order for the common goal- greener, affordable, higher level of information and securinger of ascension of the whole. And devise a kind of novel, green parcel box, also discusses its feasibility, implementing situation and effect finally.

Keywords: Express logistics · Packaging · Creation design · Green · Environmental protection

1. Introduction

With the rapid development of e-commerce, online shopping is gaining credibility as a new mode of shopping. The 2015 TMALL 11.11 global shopping festival' fell in on November 12, 2015 with the tune of 91.217 billion. Meanwhile according to the national statistics, the total value of parcel was 7.67 billion during a 6-day period from Nov. 11 to Nov. 16 with very significant growth comparing with 2014's total of 5.86b. The YTO Express' orders (53.28 m) and receipts (20.58 m) reached a new high. But sewage which caused other

new problems such as packaging waste pollute the environment. In fact the domestic express industry generates tens of millions of pieces of packaging waste each day, data has showed. It's a considerable problem, It's imperative to accelerate the design and implementation of green courier packages.

2. The state and cause of the packaging of the parcel

2.1 The cause of excessive parcel packaging

At present, the number of online shopping products, the demand for packaging has a rapid growth. However, the existing relevant regulations for the use of courier packaging material is not any provision, there is not mandatory requirements for the use of environmentally friendly materials, or relevant measures such as recycling guidelines. So the majority businesses chose over packaging in order to avoid the goods damage occurred in the logistics process and compensation disputes. Obviously, the excessive packaging of express goods increased the cost of goods logistics, but also caused a large number of public nuisance, courier bags, cartons, tape and so on.

The legislation of parcel packaging has lagged behind the development of electricity suppliers. The normative documents for courier packaging, there is only one "Express business operating guidelines" Set by national post office, which should be used in accordance with national standards and industry standards courier packaging supplies, but, specifically how the packaging, what is appropriate use, but not clearly defined (As at 11.2015). In addition, in April 1, 2010, "the national standards for food and cosmetics" had be unveiled, which limits the excessive packaging of goods and cosmetics factory packaging, once access to online shopping channels, no matter how to be excessive packaging, are not subject to the restrictions.

In addition, the packaging has defective designs, especially in the aspect of recycling. So common, rough handling still existed in express deliver, also lead to the excessive packaging.

2.2 The reflection about excessive parcel packaging

2.2.1 the ecological and environment problem caused by parcel packaging.

With the rapid growth of express delivery business, a mountain of packaging waste brought huge resource waste and environmental pollution problems. That's because we can't reuse the packaging box, the recipients were always throw packaging and express waybill when they received goods. Some express enterprises had tried recycle the packaging boxes. Quanfeng ever recycled paper envelope when a customer got ten. The E-business the store had started an activity about recycling boxes in Shanghai, Beijing, Tianjin and so on nearly 20 cities. The Sf-express also did it. But they all failed. The work requires making sure all recycled packaging box are clean and unbreakable, customer would mind it. The other hand recycled boxes took up storage space, it's not worthwhile considering the cost factor. Or we considered them as rubbish, but there isn't an economic perfect treatment to treat them.

Most of packing material are corrugated paper, it's recycling price is too low about 0.5 yuan per kilogram. Some workers are not willing to recycle. It takes about 3.75 tons of logs to produce a single ton of corrugated cardboard, quite in cutting down 17 adult trees. Chinese express delivery enterprise waste about 18.2 million tons of corrugated cardboard, quite annual cut 1547 hectares of forest and of that - excessive packaging (Lv Chao, 2015) ONP, PS and EPS are commonly used buffer material at present, but aren't recyclable. Scotch tape which is used for sealing also is world recognised white trash. Now the main waste disposal method is landfill or incineration, these plastic products buried in the underground degradation cycle for more than 200 years, but also will pollute the soil and groundwater, burning will produce dioxin, causing serious damage to human health.

2.2.2 The security problem caused by parcel packaging

Ma Junsheng, director of the State Post Bureau, said: "by 2020, China's express business volume will reach 50 billion, equivalent to the level of today's global

express delivery, the annual business income will reach 800 billion yuan” in the first China (Hangzhou) international express industry conference in on November 13th in Tonglu, Zhejiang .Online shopping has become indispensable consumption patterns: small to toothbrushes, toothpaste, washing of supplies, clothing, electronics, gold jewelry luxury, net purchases of goods value is getting more and more expensive, ten yuan freight express worth more and higher. But these precious goods is often difficult to get good protection in the transport process, first there is the problem of rough handling in courier companies generally, followed by freight drivers ,do not pay attention to the parcels in the process of loading and unloading, at last when the parcels arrive the designated point, there is no time to storage, cause partial damage in the warehouse.

Consumer personal information security is also worth worrying, because aexpress waybill often have to go through a lot of links, courier, courier company insiders, delivery link, every side has the risk of information leakage. The current leakage of personal data is common in the express industry. In March last year, CCTV reported that there are students found that some security vulnerabilities in courier companies when doing network security testing, and sell personal information from their website.

2.2.3 The logistics service level of express goods packaging is low

Express packaging in a variety of forms has be an inconvenience to transport, sorting, storage and disassembly. Because the courier companies mostly design the size of package followed product, not considering mixed stowage and ensuring to maximum the utilization rate of transport truck.

As to pull up the feeling of users, many express companies launched a new web-based delivery service-online shipment tracking. But It's crap, because the information you get is very limited, even false information. Such as tracking records show that have taken part, but no follow-up information, can't query certain courier' real-time status. Customers wondered what happened to their couriers with seeing the information later.

3. The design object of novel packaging boxes

Courier packaging is different from the traditional commodity packaging, which should be more focused on the crash resistant and anti-fall, light weight, recycled and other performance (Xu, 2015). Designer should make innovative design of the packaging materials, packaging, and the use of models and others. Although the prospective packaging box is not the same, but following the same principles, in order to ensure it's to effectively address quality attribute requirements.

3.1 The novel packaging box should be environmental

The requirement of green package is using biodegradable polymer, photocatalytic materials or water soluble natural material. Now more than 70% of the packaging materials is paper, but the paper packaging is not exactly green packaging from the point of view of the life cycle. Despite people's lives without paper, but paper has been much criticized by the State as a national high energy consumption, high pollution of the seven industries, and the film recovery rate is low. There are about 90 lines of biodegradable, which starch filled 44 polyethylene, polystyrene production lines, 35 light degradable plastics production lines, a starch polyvinyl alcohol alloy production line and a whole starch production line. It has been most extensively studied in the processes of biodegradable meal box (BMB), starch-based degradable plastics also appeared to replace conventional plastics, which can be naturally degraded in the soil for 4 months (Li, 2014). In 2014, the Dangdang.com had be the first in using new environmental protection bag with the corn starch obtained as main materials in Fuzhou. The STO Express costed 10 million yuan to invest in environmentally friendly packets which material is calciumcarbonate and some low molecular polyethylene.

In addition to packaging materials need to meet the requirements of low-carbon environmental protection, loose-fill packaging is also in urgent need of reform and innovation. Traditional materials such as old newspapers,

polystyrene foam(PS), EPS and so on are easy to cause white pollution and unable to recover. The designer would take priority of using new packaging materials, such as air packed pouches, composite bubble bags, foam gaskets, air bubble pack sheets, co-extruded poly and so on. Meanwhile, refused to choose transparent packaging tape.

3.2 The novel packaging box should be stronger and more durable

In order to ensure the integrity of the express delivery, the new green courier packaging box is required to be outside strong, with a waterproof sunscreen effect, can be recycled, the internal shock facilities effect is good, but also to avoid excessive packaging.

Because the tension of carton is limited, the support for the internal goods is not as good as the new carton after multiple use. Should choose robust materials, such as plastic, its main features are water-proof and compactness. The design of internal shock should be good cushioning performance, capability of repeated impact. The need for express parcel in the interior through a fixed buffer material to ease the external physical impact, thereby avoiding the direct contact with the outside of the box and damage. At present the most suitable packaging filling material is the gas packaging bag, which material is foamed polyethylene, it's contain any heavy metals, burning non-toxic, air-locked, moisture and environmental. It consists of a single column of gas, each is provided with reverse gas stop function, not affect the overall protective effect after a single column rupturing. And per square meter of gas packaging bag can withstand the weight of at least 100kg (Zhang, 2014).

3.3 The novel packaging box should be easy-to-use

Courier packaging design should be placed in the express logistics system to consider, so the modular design is an important. Because it is conducive to the use of containers and pallets packing, loading, but also be conducive to transport and storage. So as to realize the coordination of the logistics system. The designer need to take into account the transport equipment, handling equipment, transportation equipment, goods packaging and storage equipment

specifications in determining the size of the package.

The design of box structure also need to be easier, more standard. Because Package is very complicated. And it is difficult to ripped open the package, removing adhesive tape intact. It's easy to destroy the packaging box. Therefore, the requirements of design is to be able to quickly open and remove the packaging.

3.4 The design of express way bill should protect privacy from leaking

There are two kinds of express waybills on the market, one of which is the self-adhesive paper in quadruplicate; another is polished self-adhesive label. The both all stick with hot-melt adhesive or water emulsion for which is not to fall in transit. But lots of information residue on express waybill, such as the sender and recipient's name, telephone, address and product weight, price, leak out easily.

Therefore, the design of a express waybill to ensure that it is not easy to fall off in transit and ensures easy peeling for the recipient. So we can choose Label Prapel, or to disable the adhering form, to switch to his way.

3.5 The novel packaging box should be lightweight and cost-effective

The designer should uphold meeting the requirements of suitable packaging volume, minimal packaging materials, minimum quality and the lowest cost, in meeting the specific requirements of the transport packaging performance requirements.

3.6 The design should enhance packaging box's informatization degree

At present, the express delivery industry uses bar-coded express waybill for inputting and outputting data, chooses additional sensors or data logger as a monitoring system. But the traditional bar code is visual communication technology, easily refused to read when it's wear or crumpled. And it is difficult to uniquely identify a single product. The more accurate and convenient information storage and transmission methods are essential anchors for

improving the delivery efficiency and strengthening the monitoring of the parcel. Such as RFID and DropTag, it's shown "great potential, according to Airport Business with a read rate of over 97% compared with around 80% for conventional bar codes."

4. A demonstration design of the novel packaging box and its feasibility analysis

4.1 The detailed description of this novel packaging box

This box is analogous to improved shuttle box as illustrated in figures 1 and 2. The main raw materials of packaging boxes is cornstarch, honeycombed.

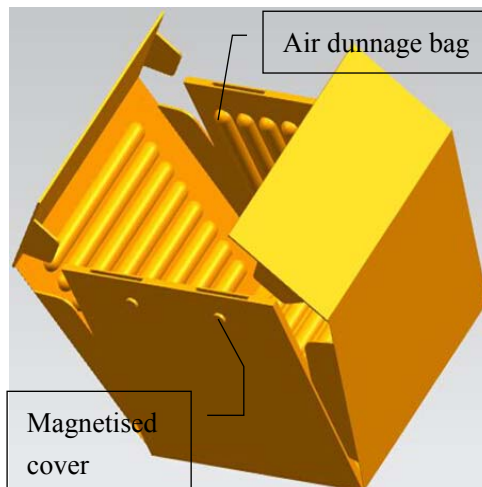


Fig. 1. Simulated stereogram

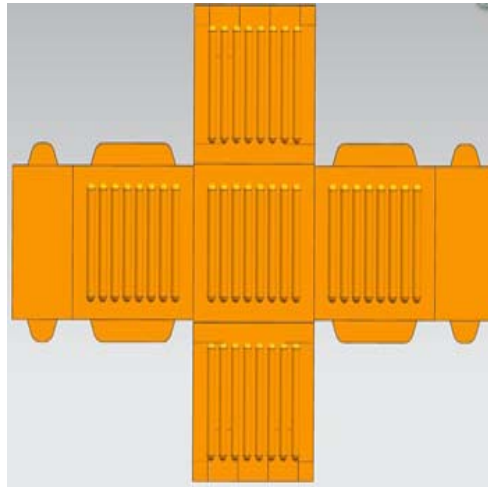


Fig.2.Development of plane-surface solid

The air dunnage bag which is made of synthetic rubber is packaging support. Enclosure has a built-in air channel, buffer airbags wall is made up of each column stitching on the channel. The air dunnage bag is changed via the variation of the goods size.

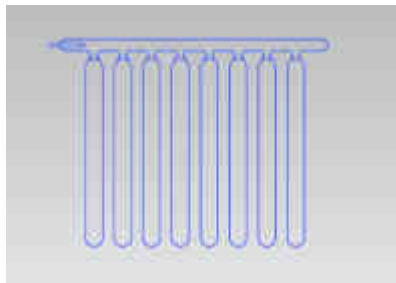


Fig.3.Air dunnage bag

The packaging box only has an opening at the top, sealing it with kraft paper tape and magnetised cover, as shown in Figure 4. The kraft paper tape can paste the seal. External use elastic strap with secondary packaging. The structure of this elastic strap is shown in Figure 5.



Fig.4.Top view



Fig.5.Elastic strap

Remove the glue left behind by express waybills.

4.2 The feasibility analysis

This packaging box could reduce the cost. Choosing this box which is biodegradable is a great way to promote the business. The packaging box has rapid and convenient dismantlement, the recipient could unpack inspection. This box could provide better protection for postal articles by air dunnage bag. And it is better for reducing the box size. The magnetised cover is intended to improve security.

5. Conclusion

With the global environment worsening, many firms are giving increasing weight to the protection of nature. The enterprise must seek a sustainable development model. And this green packaging box could save energy and

reduce the cost, increase resource utilization rate and reduce waste.

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