

A Step towards Sustainability: Aqueous Barrier Coatings and Corrugation Boxes



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plastic than we even realize, be it tea/coffee cups, straws or carry bags; plastic has become an essential need of our life. The more we are using plastic, the more we are contributing to pollution. Sustainability is the hottest topic trending right now. Key factors driving sustainability are consumer preference, Power of social media, brand image & regulation & compliance. While Paper alone is highly recyclable, when it is extruded with a thin layer of PE it becomes non-recyclable as it is highly challenging to remove PE from Paper with a special equipment.

The next alternative to single use plastic is PLA coating; PLA (Poly Lactic Acid) which is a plant based polymer can be engineered to give barrier properties once coated on paper surface by extrusion method. This product is although not recyclable but it can bio-degrade and composted under Industrial conditions as PLA is derived from natural source like Starch. Major challenges is in the segregation of the products, because till now, all products are available in market, be it PE coated cups (which cannot be recycled, composted or bio-degraded) to PLA coated cups (which are only bio-degradable but not recyclable). The Government of India did try to ban the use of single use plastic back in 2019, but due to no alternative, this ban was lifted and companies across the globe started doing research and development for plastic alternative. One such alternative to single use plastic is water based barrier coatings. These are acrylic polymers engineered in such a way that it gives plastic like barrier properties and is recyclable and some of them are compostable in industrial coating.

For sustainability, recyclability is far more critical than biodegradability & compostability as it helps in circular economy as used Cups/plates can be collected & directly used back in paper mills & the useful fiber (which constitutes more than 90% of the product) instead of ending in landfills. The barrier coated product for hot beverages should match PE in terms of excellent water resistance, good heat sealability while converting, retention of side wall stiffness when exposed to hot liquids, no blocking while unwinding etc. which can be very challenging. A cold beverage is still more challenging as it should have condensation-proof surface on outside while having a good printability. Barrier coated Food Service Board is relatively less complex as it should have a required kit value for food contact. A very good base paper with optimum smoothness & sealed surface is key

Introduction

Like many other major plastics applications, plastics use in flexible packaging has come under deep scrutiny in recent years as sustainability concerns rise and spread globally. Paper is often lauded as a far more environmentally friendly alternative but how do the two materials really compare? And what is the most sustainable solution? Historically, papers have been used in flexible packaging for many applications, including confectionery, pet food and dried food. By the early-2000s, however, paper demand as a flexible packaging substrate began to decline due to competition from down-gauging and the rise of plastic alternatives.

Development of Aqueous Barrier Coatings

Plastic has been associated with us for more than 100 years now. Although it is wonderful product in terms of barrier properties but as far as sustainability is concerned, it is not recyclable, bio-degradable & compostable easily; meaning plastic produced over 100 years ago is still present in mother nature. We are more dependent on



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to these coatings. These coatings can be applied off-line or on-line with various application methods like Air knife, Metering bar, blade, gravure or curtain. Good coat weight control, efficient contactless drying with temperature control & optimum cooling before reeling is also very critical. Many companies in India have already launched their plastic free barrier products and are in market for more than an year now. These products are mainly cup stocks, paper straws, food service boards etc.

The main issue right now is the high cost of this product which is unaffordable to small players . Unless and until the government comes up with strict law & implementation plan for the ban of single use plastic, there will be quite a challenge to pitch these products in market against low cost PE coated products. Big brand owners like Nestle, McDonalds, Starbucks, KFC, Coca-Cola, PepsiCo, P & G & Unilever have Sustainable goals to shift to recyclable sources by 2025 which can prove as a boost to Aqueous Coated products. For the proposed single use plastic

ban as per draft notification for Plastic Waste Regulation 2021, which will be applicable by July, 2022 , Indian Paper Industry is gearing up in terms of plastic alternative with a lot of Research & Development initiatives. And with big volumes, the cost of production of these barrier coated products will also come to an optimum level, providing consumers a sustainable product at a reasonable cost in times to come.



Technological Challenges & Opportunities in Indian Corrugation Industry

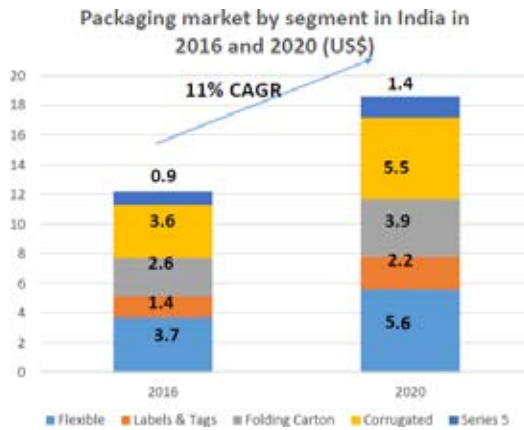
The demand for packaging is guided by a wide range of factors. The size and condition of the economy plays a major role in determining the size and scope of the packaging market, and subsequently its growth. Besides, there are other factors impacting packaging demand, which include changing lifestyle, demographic changes, brand awareness, environmental awareness, and demand for smaller pack sizes among others.



Indian packaging industry is becoming a preferred hub for global packaging industry & it is 5th largest sector in India's economy. Present market of Indian Packaging Industry is around 5.5 Mn MT by volume & Rs.25,000 Cr by value. With steady growth over the past years, even after COVID-19 challenge, the industry is showing firm potential for expansion, including in the export markets. Low cost of packaging, in some cases 40% lower than the costs in many parts of Europe, combined with India's resources of skilled labor, make the Indian packaging industry a potential sector for investment. The per capita consumption of packaging in India, however, is on a lower side as compared to other countries. This low consumption level indicates the untapped potential in the sector.

In India, packaging may be broadly divided into two categories viz, rigid packaging and flexible packaging. In the recent years, the demand for flexible packaging materials has been increasing faster than the demand for rigid packaging materials. The strong demand for flexible packaging material has been mostly arising from food & beverage industries, personal care, and pharmaceutical industries. The booming Indian economy and a flourishing organized retail have raised the expectations that consumption of corrugated packaging will increase as the number and volume of goods packaged in corrugated increases. Prices of corrugated sheet and converted boxes have remained low due to the over-capacity, manual operations and low productivity. Besides, transport constraints and high freight costs have meant that small to medium sized corrugated box plants are located near the customers.

Approx. 15000 units are in existence and around 15 units across India have adopted Automatic 3/ 5 Ply plants and rest are having Semi-Automatic Machines. Most of the Big Corrugators have operation size of 1500 MT to 3000 MT per month & only few of them have more than 5000 MT per month capacity. The over 15,000 corrugated board and sheet plants are highly labor-intensive, employing over half a million people – both directly and indirectly. However, tide of liberalization and globalization has brought in a trend wherein Indian manufacturers are more willing to upgrade technology and have



completely automatic lines at their production units. This present scenario is already being challenged by the sweeping changes that are beginning to take shape.

More and more in-line automatic plants are being set up as corrugated box makers gear up to meet the new demands for high precision boxes with attractive graphics and large integrated production capacities. Amid the e-commerce surge, the Indian packaging industry is witnessing steep growth and is one of the strongest growing segments.

Since the pandemic, companies have been tweaking their products, marketing strategies and service offerings to cater to the evolving needs of consumers – highlighting what matters most today – safety, immunity and health. Swiggy, for instance, introduced a double-layered packaging that keeps food safe and fresh.

Similarly, Nature's Basket switched from cloth bags to single-use paper bags that can be disposed of immediately after use. Packaged food product companies are focusing on packaging materials that support longer shelf-life. A few others are updating their packing designs to include communication around appropriate sanitization.

The prime factors which will drive major investments in the Corrugation Box manufacturing segment are:-

- Increasing demand and high volumes will trigger consolidation and setting up of large automatic plants.
- Amid the e-commerce surge, the Indian packaging industry is witnessing steep growth and is one of the strongest growing segments.
- Increasing the demand of safe and cushioned packaging of the product will augment the growth of the product will augment the growth of India Corrugated box market.

Technological Changes Expected in Future for the Industry:-

- The future of automatic corrugation is very bright and is expected to replace gradually the existing semi-automatic & manual manufacturing lines. Runability on automatic corrugators – uniform GSM, Caliper, Cobb, RCT, winding quality & joint-less reels are very critical as non-stop snag free running of packing line at customer end needs to be ensured.
- Increasing demands on Kraft Paper suppliers to specify RCT (Ring Crush Test) instead of BF & adhere to it consistently. Box manufacturers have started differentiating mills on the basis of consistent quality– A grade mills with consistent quality are preferred and fetch a premium while B grade mills are valued at 16-24 BF and box makers live with the inconsistency in quality. Kraft mills are also under pressure supply odor free and specs/dirt free paper.
- Re-engineering box construction to achieve weight reduction while maintaining the same BCT (Box Compression Test) values. Re-engineering and strength demands are at times satisfied only through imports of low GSM, high BF, high RCT material, though of late Indian Kraft Paper Mills have invested in better technology in this direction.
- Focus on flute formation & other conversion parameters in order to achieve desired SCT of the board leading to higher box compression strength.
- Improved use of automatic Flexo Folder Gluers (FFG) for multi-color printing without loss of flute height.
- E-flute cartoons will have great demands due to their edge for high quality printing performance.
- Attempts to seek value for delivered quality (aspired to bill on length meters instead of weight).
- Demand for White Top liners – Shift towards low gsm bleached/coated kraft liners from duplex board.
- The procurement of latest technology machines from Europe, Japan, China, Taiwan and other Asian Countries in order to make production fast and accurate will also drive the future of India Corrugated Box Industry. Also machines equipped with latest technologies have optimum consumptions in terms of steam, power and adhesives, ultimately reducing the cost of production.

Conclusion

As we move ahead to a new tomorrow, the focus on sustainable packaging is not going away and is likely to increase rather than diminish and with new advancements in development of sustainable packaging be it the aqueous barrier coating or corrugation packaging we just have to start using more and more sustainable products and rely less on nature polluting plastic products.