Working with Cardboard for Packaging
There is no limit to the number of potential designs for carton packaging and there always remains scope for improvement, innovation and creativity.
Structural packaging design can often surpass the numerous other methods of winning customer loyalty, such as advertising, marketing, graphic imagery and can significantly improve competitiveness in the marketplace.
A successful carton design can forge a company’s image in the public’s eye, convey a sense of quality and deliver functional and environmental improvements.
There are many different types of cardboard and papers used for packaging, depending on the strength and amount of protection required. Coated and uncoated stocks, pulps (for egg cartons and the like) and corrugated boards each have a purpose in the arena of carton design and manufacturing.
# Carton Board Types

<table>
<thead>
<tr>
<th>Description</th>
<th>Typical uses</th>
<th>Approx Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>White back folding box board</td>
<td>Novelty &amp; luxury packaging e.g. cosmetics, confectionery and high quality foods</td>
<td>0.3-0.58</td>
</tr>
<tr>
<td>Folding Box board reverse side cream</td>
<td>Food Products including frozen, pharmaceuticals and cosmetics</td>
<td>0.35 - 0.65</td>
</tr>
<tr>
<td>Solid bleach board</td>
<td>High quality packaging used for cosmetics and the luxury trade</td>
<td>0.285 - 0.49</td>
</tr>
<tr>
<td>Recycled solid white-lined chipboard (minimum 75% recycled content)</td>
<td>Display outers and non-food products</td>
<td>0.3 - 0.85</td>
</tr>
<tr>
<td>Pulp Board</td>
<td>Used for low cost products, special promotions packs</td>
<td>0.3 - 1</td>
</tr>
<tr>
<td>Unlined A Flute Corrugated</td>
<td>Used for packs which need no strength, providing a layer of protection for the product</td>
<td>4</td>
</tr>
<tr>
<td>Single faced A- Flute Corrugated</td>
<td>FMCG with good crush resistance and tactile qualities</td>
<td>4.2</td>
</tr>
<tr>
<td>A-Flute Corrugated 33 flutes per foot</td>
<td>Very fragile goods _ great shock absorbency</td>
<td>4.5 - 4.7</td>
</tr>
<tr>
<td>B-Flute Corrugated 47 flutes per foot</td>
<td>Optimal levels of crush absorbency</td>
<td>2.1 - 2.9</td>
</tr>
<tr>
<td>C-Flute Corrugated 3 flutes per foot</td>
<td>Very High shock absorbency (more than B-Grade Corrugated)</td>
<td>3.5 - 3.7</td>
</tr>
<tr>
<td>E-Flute Corrugated 90 flutes per foot</td>
<td>Thinnest Corrugated packaging used in instances where a narrow gauge of corrugation is required</td>
<td>1.1 - 1.2</td>
</tr>
<tr>
<td>Double walled Corrugated B &amp; C Flute</td>
<td>Used to protect fragile goods and to increase the strength of cartons containing heavy objects</td>
<td>5.6 - 6.6</td>
</tr>
<tr>
<td>Multi layered solid bleached board (Waterproof lined)</td>
<td>Food and drinks packaging</td>
<td>0.8 - 1</td>
</tr>
</tbody>
</table>
The basic structure of the corrugated board consists of a fluted sheet glued to one or more layers. Here are the different types:

- **Unlined Corrugated A Flute**
- **Single Face Corrugated A Flute**
- **Single Wall (double face) Corrugated A Flute**
- **Double Wall (A and C Flute)**
A number of flute structures are available, depending on packaging specifications.

- A Flute Corrugated: 33 flutes per linear foot
- B Flute Corrugated: 47 flutes per linear foot
- C Flute Corrugated: 39 flutes per linear foot
- E Flute Corrugated: 90 flutes per linear foot

Corrugated board is used in multicoloured shippers and point of sale displays. It is one of the cheapest of all packaging materials.
Before embarking on full production of a new packaging item it is strongly recommended that you make a mock up using the final materials with the exact measurements of the final work.
This can not only give the client a good tangible idea of how the final pack will look and feel but will also avoid any costly mistakes. The design may require perforations, die cutting or gluing. It may be designed to be self locking or require a lot of intricate folding.
To make a mock up you always start with a knifeline drawing or dieline of the intended carton or pack shape.
A knifeline is a 2 dimensional drawing that acts as a ‘pattern’ or template for a 3 dimensional object. A knifeline is drawn to the exact measurements of the final carton or pack with indicators for scoring, folding, cutting and gluing.
Knifeline Drawing

Finished Carton
A successful fold is determined in two ways; fold quality and fold strength. The quality of a fold refers to its appearance and the strength is measured by how many times a piece of paper can be folded back and forth before breaking.

There are several factors in achieving the highest quality and strongest folds. These include the following:
Machine Folding for Mass Produced Packaging

For mass produced packaging, standard folding machines can make four separate folds in one go. With additional folding machine extensions the number of folds can be completed automatically is considerable. In addition there are folding machines that can score, perforate and glue at the same time as they fold.
Buckler Folding Machine

The paper travels through the machine.

Hits the deflector (A) and begins to buckle (B)

The paper is then caught in the rollers and is pulled through, creating the fold

Knife Folding Machine

The paper travels through the machine.

The knife comes down at a precise moment, hits the paper and buckles it

The paper is then caught in the rollers and is pulled through, creating the fold
Paper Grain

Wood pulp used in making paper and board contains fibres. At the beginning of the process the pulp is in a liquid state but as the paper goes from a liquid to a solid state the fibres tend to align themselves in one particular direction. This direction is referred to as the grain.
It is generally recommended that paper is folded with the grain, meaning that the length of the fold lies parallel with the grain. Folding against the grain can lead to cracking where the fibres wrapping around the fold break in two. Resulting in a rough, jagged edge along the fold.
Additionally booklets and folders tend to lie flatter when the paper stock is folded with the grain. Often, folding against the grain is unavoidable. For e.g. folders with pockets, it is generally recommended that the main fold is made with the grain and the secondary fold against the grain.
Fibre Content

The fibre content is a significant factor in fold strength. The greater the number of fibres, the stronger the fold. Coated papers generally contain less fibres and therefore do not fold as well.

Coated paper also tends to crack more easily as the coated surface of the paper is less elastic than the paper itself.
Moisture

Moisture content of the paper is also an important factor. If paper is too dry and brittle it tends to crack when folded, if it is too moist it will pull and buckle and will not hold a crisp and accurate fold.
Printing

Allow time for ink to dry before attempting to fold paper. Printing dark inks over folds tends to accentuate the fold, especially if the paper has a tendency to crack, so design your piece accordingly.
Scoring

To reduce the stress that folding puts on paper, it may be scored before being folded. Scoring also reduces the risks of cracking and for some types of board scoring is necessary to create a clean, well-defined fold.
In packaging production, there are several types of scoring devices, all working on the same principal; a rounded rule pressing the paper into a channel. The width of the rule and the channel depend on the thickness of the paper.

The rule should never be thinner than the paper. Surprisingly, the paper is actually folded away from the score to create three stress points rather than one.
Principal of Scoring

Folding After Scoring  
correct  

incorrect
Scoring should be considered in the following situations:

- Coated papers; fewer fibres and hard coating are prone to cracking
- High velocity printing uses hot air to dry inks. This makes inks brittle and susceptible to cracking
- Thick paper and all types of board as the weight of the stock increases so does the tendency for it to crack
- Folding against the grain
- Heavy ink coverage at the fold
- Whenever a job requires multiple folds.
Production

Folding is one of the last operations in the printing process, so mistakes can be very costly.

Therefore it is essential that you consult with your printer, bindery and paper supplier regarding the technical aspects of producing your design.
Thankyou!

Working with Cardboard for Packaging

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