



# Containerboard 101

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## – A Comprehensive Overview

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Any manufactured or processed item must be securely packaged for shipment and then adequately protected in transit. These are the two basic requirements for any container. Before any business or industry sets out to produce anything it must first develop an effective supply chain for packaging that material. Three criteria must be firmly established:

1. Is the design and construction of the container adequate and appropriate?
2. Is the purchase price and the terms of sale competitive?
3. Can the supplier insure "just-in-time" deliveries, even in an emergency?

### What's the Current Condition of This Market?

Is this a growing market? Yes, in spite of the global credit crises and economic downturn. According to a new study

by the Freedonia Group world demand is forecast to increase 3.4%/year to 213 billion square metres in 2013. In 2008 the world box industry produced 180 billion square metres. Two reasons for these optimistic growth projections: 1. rising box demand because of growth in industrial/manufacturing activities and, 2. ongoing developments in small flute and high-quality graphic board which will allow corrugated boxes to penetrate traditional folding carton applications. And, from an environmental standpoint, corrugated containers made from biodegradable paper are far superior to plastic crates (and, they don't have to be cleaned and returned). For this reason recycled board will continue to capture market share at the expense of virgin kraft linerboard and is expected to be over 70% of the market by 2013. This is not altogether a bad thing since the global production of unbleached

softwood kraft pulp is declining each year as more pulp producers prefer to market fully bleached grades.

For further details on the comprehensive study done by the Freedonia Group visit: [www.freedoniagroup.com](http://www.freedoniagroup.com)

### What are The Fastest Growing Areas?

Geographically, the Asia/Pacific Rim region, Eastern Europe and the Africa/Middle East regions will all outpace the global average. China is expected to gain the greatest amount and will surpass the US as the world's largest corrugated box market by 2013 followed by India which will benefit from strong growth in industrial output. As a nation's middle class grows and income levels along with it, it can be expected that there will be a growth in demand for packaged consumer goods. These goods

will invariably be shipped to the stores in corrugated containers.

### How Does A Highly Industrialized Country Like The U.S. Currently Compare With These Fast Growing Areas?

The U.S. paper and containerboard capacity decreased 0.8% in 2008 to 96.3 million tons. From 2001 to 2007 the downward trend rate was almost 1.0%/year. Taken together total capacity has declined 7.3% since its peak in 2000. A total of 41 paper machines and 18 entire paper mills closed permanently in 2008 and already in 2009 two more paper machines are scheduled for closure. Several other machines have been shut down but have an outside chance of being restarted if market conditions improve. Total paper and paperboard capacity is projected to decline 1.8% in 2009 and then expand by 0.3% in both 2010 and 2011. These figures were taken from the American Forest & Paper Association's 49th Annual Survey of Paper, Paperboard and Pulp Capacity.

### What Are The Component Parts of A Container?

Containers are most often corrugated cartons consisting of the outside layer called linerboard, a middle section of fluted corrugating medium and the inside layer called testliner. Testliner, because it is on the inside, does not have to be as strong as linerboard and is often made with slightly more OCC in the furnish. In the vast majority of cases for medium sized and larger cartons the weight of the outside layer is 104 gsm, the medium is 39 gsm and the inside testliner 63gsm. There is also a heavier weight of linerboard for very large or heavy appliances which is a 144 gsm version. As can be imagined, this heavier weight liner is usually composed of a higher percentage of virgin unbleached softwood fibre just as is another grade known as "high performance liner". This latter grade is made to the lower 104gsm weight but with the higher percentage of virgin fibre.

### Describing The Fibre Furnish of A Container.

Having now brought up the subject of fibre furnish it should be mentioned that there are 3 basic ingredients in most containerboard: (a) virgin

softwood fibre, (b) OCC made from Old Corrugated Containers and, (c) ONP-Old Newspapers. The ONP is usually added in small quantities (i.e. 10-15%) for grades where higher bulk (caliper) is required. Unfortunately bulk is all ONP has to offer since its strength level is very low. In many parts of the Far East OCC has become the predominate ingredient in all containerboard grades. It makes up 100% of the fibre furnish in corrugated medium and often at least 80% in liner and testliner. With the improvement in refining techniques (higher consistencies and refiner plates designed specifically for longer fibre softwood) and internal sizing agents (i.e. cationic headbox starches) which improve both burst and internal bond, paper mills have begun using more and more OCC in their linerboard and test liner grades. OCC has two significant advantages: it is far less costly than virgin fibre and it is easy for stores/customer to collect and bale the flattened cartons. Many, many thousands of 25mt containers cross the Pacific each year and this number is growing. On the downside, OCC does have a limited life cycle since about 16% of the fibres are lost each time they are processed

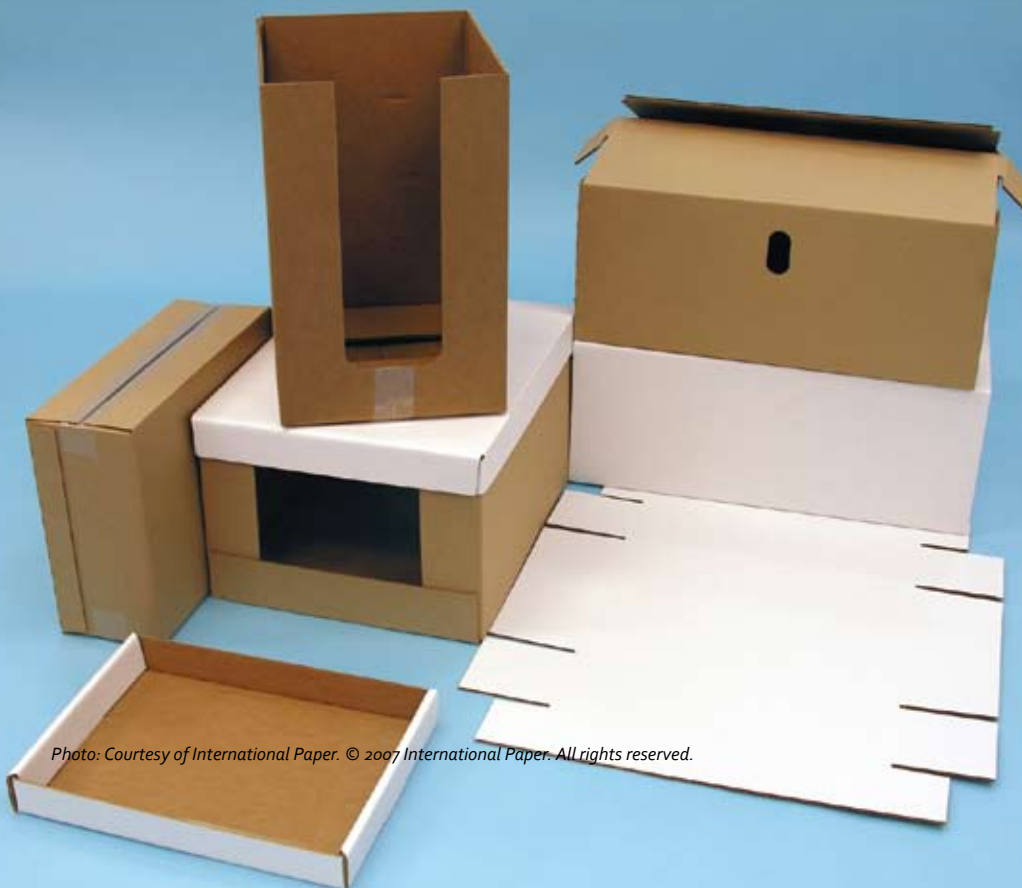


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across the paper machine. The fibres become shorter, they become weaker and the more fractured pieces turn into fines (particles measuring no more than 0.2mm) and fall through the fourdrinier wire. Fortunately there always seems to be enough new OCC in each carton so that the portion which is old and tired out does not hurt the finished paper to any great extent.

Another major category is known as Folding Cartonboard also known as Folding Cartonboard or paperboard...used to make folding cartons for packaging a wide variety of consumer goods. The three main types of boxboard based on fibre furnish are (1) solid bleached sulfate (SBS) which is a high-end premium board used extensively in medical products, tobacco, cosmetics and food packaging and (2) coated unbleached kraft (CUK). The third major grade is Recycled. This third grade is 100% recycled can be:

- (a) uncoated – known as URB
- (b) white top on which a thin layer of bleached fibres is spread by means of a secondary headbox on the outside of the board and,
- (c) coated recycled board (CRB) which is used extensively in cereal, detergent, tissue and disposables (i.e. nappies,

femine hygiene) packaging products. Of these three grades the most physically demanding is a high end variation of CUK (coated unbleached kraft) which is used in beer and soft drink cartons and sleeves. The exceptional strength requirements of a carton carrying (and protecting) 24 glassbottlesofbeerismatchedonlyby the demanding graphic requirements of the coated outside layer. The outside of CUK is almost always printed 4/C where the ink is expected to exhibit high gloss, good holdout properties and good dot resolution so that the detailed graphics appear as sharp as possible. As one might imagine, CUK is often made with a higher percentage of virgin fibre so that all the strength requirements can be met. In the US two companies

have excelled in the production of this grade – MeadWestvaco and Graphic Packaging. They have exported their CUK all over the world and developed an excellent reputation. In Europe Smurfit-Kappa has had similar success and has supplied CUK to many countries.

**The Box Plant and How It Operates**

Box plants are normally set up on a regional basis to provide “just-in-time” service to customers on an “as needed” basis. Customers almost always expect the box plant to maintain an inventory of flattened cartons ready to ship on



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short notice. Ideally the box plant is in the same city (or the same State/Province) as the customer. The box plant can have a corrugator but this is not necessarily essential. Many smaller box plants purchase sheets of corrugated containerboard and then do the slitting, scoring and printing for their customer – who is probably a smaller buyer with unusual or very demanding requirements.

Most box plants, however, have their own corrugator – often measuring either 240 cm or 275 cm in width. Of course, these widths can vary depending on the kinds of business being regularly conducted (i.e. small package, large appliances, TVs etc.). Speaking of “small packages” this is a rapidly growing segment of the business as internet sales expand. Today eBay and Amazon.com are shipping thousands of smaller packages made from lighter weight linerboard and test liner – often 27-35 gsm. This has been a commonly made grade in Europe – Mondi, for one has specialised in it. But, in the US, containerboard producers were reluctant to make the necessary changes on their paper machines that would allow them to make these lower grammage grades. Just last year (2008) IP-Pensacola (FL) and Pratt Industries in Louisiana announced to the market that they were now capable of producing

these grades. It would seem only a matter of time before all the larger, integrated companies developed this capability.

### Box Plant: Profit Center or Cost Center?

It has been traditional for integrated companies to set up their accounting practices to make their wholly-owned box plants a cost center. What this means is the paper mill would transfer the paper at or close to list price (so that they could always make a profit) and the box plant would be challenged to produce a profit by seeking to obtain the highest price for the finished cartons they delivered. In a highly competitive market this could be a real challenge! The corporation often would often tell its box plant managers “we’ll be happy if you just don’t lose money”. Now, this situation only applied to integrated producers of containerboard and finished cartons. Independent box plants were forced to make a profit if they intended to stay in business. The number of these independent box producers usually numbers around 30% of a nation’s total. Therefore these independent box plants would shop around to all the paper producers (especially the ones located close by to reduce the mill’s freight costs) to try and obtain the lowest delivered cost and the most attractive terms (60 or 90 day payment times and a yearend discount

based on total tons purchased during the year). A sharp purchasing manager usually could buy containerboard for prices much below what the fully integrated box plants were paying.

### What Other Products Does Containerboard Go Into?

1. In corrugated containers there is often a tray to hold the top layer of cans and in the case of bottles or jars there can be solid paper separators.

Heavy cores for paper, textiles, wire, plastic, thread/fibres etc.

Tubes for protecting long length material in transit

Lightweight, spiral-wound cores for paper towels and bath tissue

Fibre drums for chemicals, plastic molding compounds, powders etc.

This short list is certainly not meant to be exhaustive but is only designed to illustrate the wide variety of end use applications for this versatile group of products. It is universal in nature....no society can expect to manufacture anything or be involved with any kind of commercial activities without properly designed packages. These must be well designed and be capable of protecting the product even when it involves rough handling, they must be attractively printed, be delivered on time, and, most important, must be appropriately priced to be competitive. No mean small feat! PA



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