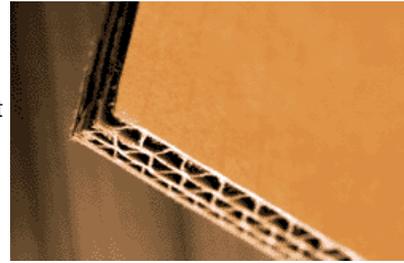


Corrugated Basics

Corrugated 101

Corrugated cardboard is easy to recognize. It is made of paper and has an arched layer, called "fluting," between smooth sheets, called "liner." The corrugated cardboard most commonly used to make boxes has one layer of fluting between two smooth sheets. But there are many types of corrugated available, each with different flute sizes and thicknesses.



Corrugated is an extremely durable, versatile, innovative and lightweight material used for custom-manufactured shipping containers, packaging and point-of-purchase displays, in addition to numerous non-traditional applications ranging from pallets to children's toys to furniture.

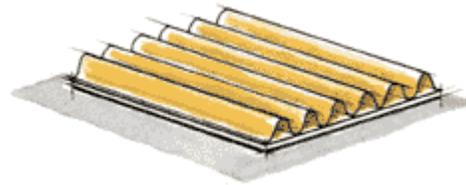
All About Corrugated

Box Structure

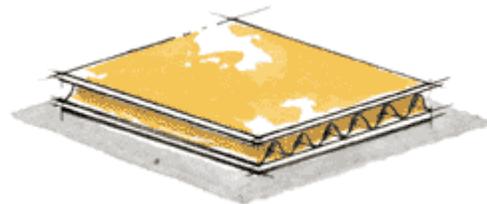
Corrugated fiberboard, or combined board, has two main components: the linerboard and the medium. Both are made of a special kind of heavy paper called containerboard. Linerboard is the flat facing that adheres to the medium. The medium is the wavy, fluted paper in between the liners..

The following illustrations demonstrate four types of combined board.

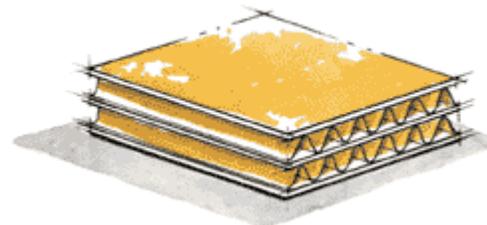
Single Face: One medium is glued to one flat sheet of linerboard.

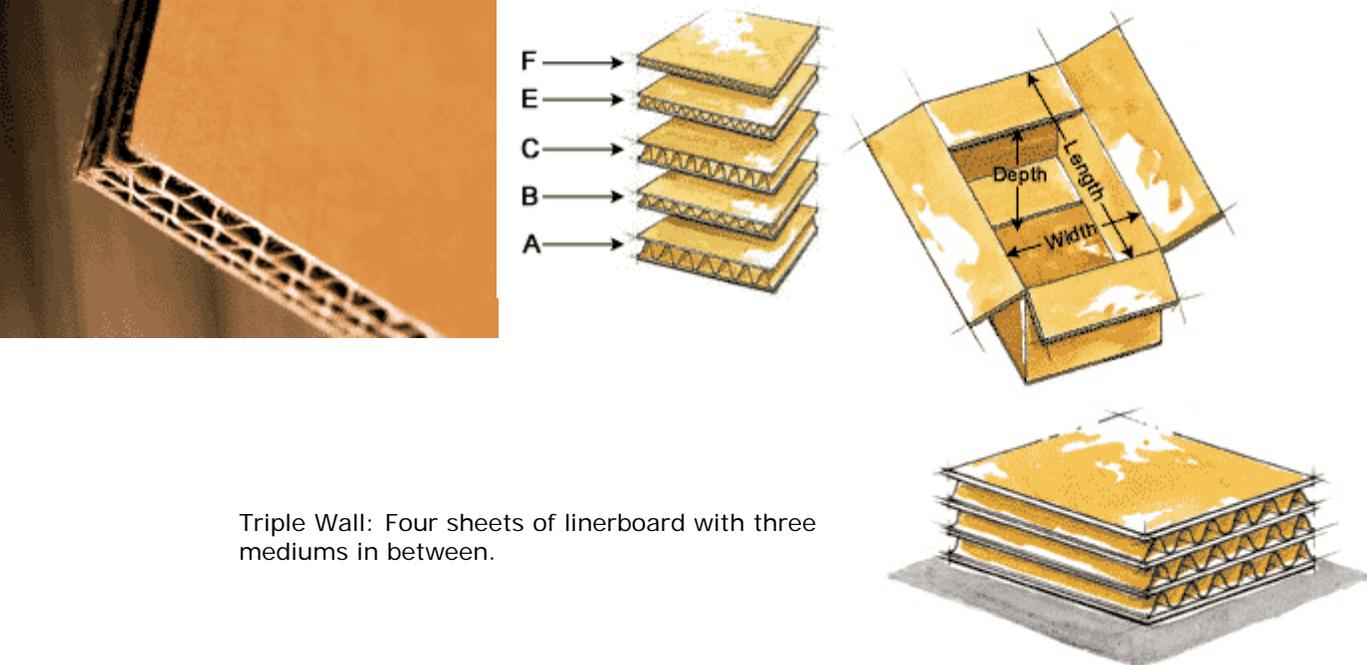


Single Wall: The medium is between two sheets of linerboard. Also known as Double Face.



Double Wall: Threesheets of linerboard with two mediums in between.





Triple Wall: Four sheets of linerboard with three mediums in between.

Flutes

Architects have known for thousands of years that an arch with the proper curve is the strongest way to span a given space. The inventors of corrugated fiberboard applied this same principle to paper when they put arches in the corrugated medium. These arches are known as flutes and when anchored to the linerboard with a starch-based adhesive, they resist bending and pressure from all directions.

When a piece of combined board is placed on its end, the arches form rigid columns, capable of supporting a great deal of weight. When pressure is applied to the side of the board, the space in between the flutes acts as a cushion to protect the container's contents. The flutes also serve as an insulator, providing some product protection from sudden temperature changes. At the same time, the vertical linerboard provides more strength and protects the flutes from damage.

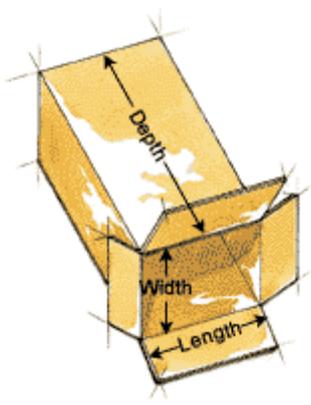
Flutes come in several standard shapes or flute profiles (A, B, C, E, F, etc.). A-flute was the first to be developed and is the largest common flute profile. B-flute was next and is much smaller. C-flute followed and is between A and B in size. E-flute is smaller than B and F-flute is smaller yet.

In addition to these five most common profiles, new flute profiles, both larger and smaller than those listed here, are being created for more specialized boards. Generally, larger flute profiles deliver greater vertical compression strength and cushioning. Smaller flute profiles provide enhanced structural and graphics capabilities for primary (retail) packaging.

Different flute profiles can be combined in one piece of combined board. For instance, in a triple wall board, one layer of medium might be A-flute while the other two layers may be C-flute. Mixing flute profiles in this way allows designers to manipulate the compression strength, cushioning strength and total thickness of the combined board.

Box Dimensions

Dimensions are given in the sequence of length, width and depth. Internationally, the words length, breadth and height may be used to express these dimensions. The dimensions of a box are described based on the opening of an assembled box, which can be located on the top or the side, depending on how it is to be filled. The opening of a box is a rectangle; that is, it has two sets of parallel sides. The longer of the two sides is considered its length, the shorter of



the two sides is considered its width. The side perpendicular to length and width is considered the depth of the box.

Dimensions can be specified for either the inside or the outside of the box. Accurate inside dimensions must be determined to ensure the proper fit for the product being shipped or stored. At the same time, palletizing and distributing the boxes depends on the outside dimensions. The box manufacturer should be informed as to which dimension is most important to the customer.



Environmentally Responsible.

Corrugated, made from a natural renewable resource, has a great environmental record. Corrugated is frequently manufactured using high percentages of secondary fiber (including old corrugated containers, kraft, old newspapers and even straw), thereby diverting these materials from the municipal solid waste stream.

In 2006, 25.2 million tons of corrugated were recovered and **recycled** in the U.S. -- that's **76.4 percent** of all containerboard produced in the same year. Corrugated has the best recycling rate of any packaging material used today. And that's what happens **after** the corrugated box has been used and reused time and time again to store and move items around the home, store and office.

In addition, the use of corrugated constructions with high-performance linerboard has led to a significant overall reduction in basis weight and a significant **source reduction** of raw materials.

Water-based inks are now used almost exclusively for printing graphics on corrugated containers, avoiding the use of lead-based inks and solvents which pollute the air and the water used to wash down printing equipment between color changes.
