The corrugated box:

A profile
and introduction
More than just a plain brown box

Ninety to ninety-five percent of U.S. manufactured goods are shipped to consumers in corrugated containers. In fact, more than 25 billion of these sturdy boxes are produced each year. But today the corrugated container is also recognized as an effective marketing tool.

Marketing experts have transformed the “basic brown box” workhorse into a show horse. Strong graphics, bright colors and distinctive shapes can make the fibre box a traveling billboard that catches the passing eye and imparts a quick, compelling message. A box can be printed and illustrated to show and demonstrate your product at the retail level. It can attract buyers and help close sales.

Excerpted from Fibre Box Association Handbook, Copyright 1989.
How boxes are made

The strength and durability of corrugated and the secret of its versatility lie in the very concept of the material. First, a sheet called corrugated medium is formed into a continuous, rolling wave. This is the flute. Observed vertically it can be seen to form a row of columns—a basic structural form capable of supporting great weight.

A sheet of linerboard is then glued to the sides of the columns. Viewed horizontally the flutes now form arches—another basic structural form and the strongest way to span a given space.

The combination of columns and arches produces a material far far stronger than the paperboard of which it is made. Yet, the sheet of corrugated paperboard can easily be cut to almost any shape, and creased or scored for folding in almost any direction.

A word about flutes

In addition to varying the weights of box materials, the flute size can be varied according to the strength needed in the finished box. The most common flutes are called A, B and C. The largest flute; “A,” is approximately 3/16” high.

Flutes should be free of the defects shown in the illustrations at the bottom of the page.

<table>
<thead>
<tr>
<th>Flute</th>
<th>Number per linear foot</th>
<th>Approximate height</th>
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<tbody>
<tr>
<td>A flute</td>
<td>36 ± 3</td>
<td>¼ inch</td>
</tr>
<tr>
<td>C flute</td>
<td>42 ± 3</td>
<td>⅛ inch</td>
</tr>
<tr>
<td>B flute</td>
<td>50 ± 3</td>
<td>⅞ inch</td>
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<tr>
<td>E flute</td>
<td>94 ± 3</td>
<td>⅛ inch</td>
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Corrugated board is made in several basic forms

Single face corrugated consists of one layer of corrugated medium bonded to a single layer of linerboard. It is flexible in two directions.

Single wall corrugated adds another layer of linerboard on the other side of the fluted medium. The board is now rigid. Double wall adds another layer of both fluted medium and linerboard for greater strength. Triple wall adds still another layer of medium and linerboard, offering exceptional strength for packaging very large and heavy products.
Box blanks

Corrugated board is manufactured in a continuous process on a corrugator which forms the flutes and glues the linerboard to the medium. After drying, the combined board receives its initial scoring on the corrugator and is cut to form box blanks, according to the needs of the particular job.

Additional cutting, scoring and slotting may be performed on another machine to produce the complete blank. The one shown here will become a “regular slotted container” (RSC), a common style.

The box blank for a slotted style box is usually constructed from a single piece of containerboard. Each blank produced is similar in characteristics with the exception of size, type of manufacturer’s joint and other miscellaneous features as hand holes, perforations, etc. An illustration of a corrugated box blank for an RSC style is shown.
Die cutting and scored inner packing

A variety of shapes and forms can be produced by die-cutting and scoring corrugated. Forms may be folded into displays, inner packing forms and a multitude of other special use configurations, thus illustrating the great versatility of corrugated.
Box joints

The joint is that part of the box where the ends of the sheet are joined together by taping, stitching or gluing.

**Glued joint**
inside of box
(1 1/8" minimum joint overlap)

**Stitched joint**
(2 3/8" maximum distance between staples, 1 1/8" minimum joint overlap)

**Taped joint**
outside of box

Box dimensions

Box dimensions are always inside dimensions and must be stated in the sequence of length, width and depth.

The length is the larger of the two dimensions of the open face; the width is the smaller. The depth is always the distance measured perpendicular to the length and width between the innermost surfaces of the box.

Box dimensions are particularly critical when the product is to be packed with automatic equipment.
**Terms**

**Adhesive:** Material capable of adhering one surface to another. As used in connection with fibre boxes, a material to glue plies of solid fibreboard, to glue facings to corrugating medium in combined corrugated board, to glue the overlapping sides of a box forming the manufacturer's joint or to glue the flaps in closing a slotted box.

**Basis weight** (of containerboard): Weight of linerboard or corrugating medium expressed in terms of pounds per 1,000 square feet.

**Box:** A rigid container having closed faces and completely enclosing the contents. Also refer to Rule 41 and Item 222 shown on the following page.

**Box Maker's Certificate** (BMC): A statement printed on a corrugated fibreboard box or a solid fibre-board box testifying that all applicable construction requirements of the carriers have been observed and identifying and locating the box maker.

**Caliper:** The thickness of a sheet measured under specified conditions, expressed in thousandths of an inch. Thousandths of an inch are often called "points.''

**Corrugator:** A machine which usually takes linerboard and medium and combines it into corrugated board consisting of two exterior facings and a fluted medium which is attached with adhesive applied at the tips of the flutes. The resulting board is called single wall corrugated fibreboard. By taking containerboard from five rolls, it also produces a corrugated board, commonly known as double wall, consisting of three facings and two corrugated mediums.

By adding another corrugated medium and facing, triple wall corrugated fibreboard is produced. The machine also may score the fibreboard in one direction and cut it to size.

**Die-cut:** A cut made with special steel rule dies. The act of making a part or container which is cut and scored to shape by such tools. Also used to denote a board which has been die-cut.

**Flaps:** The closing members of a fibreboard box.

**Flute or corrugation:** One of the wave shapes in the inner portion of combined corrugated fibreboard.

**Glue:** A term used in the Classifications as a synonym for "adhesive."

**Inner packing:** Materials or parts used in supporting, positioning or cushioning an item in an outer shipping container.

**Item 222:** A rule in the National Motor Freight Classification of the motor carriers containing requirements for corrugated and solid fibreboard boxes.

**Joint:** The joint is that part of the box where the ends of the scored and slotted blank are joined together by taping, stitching or gluing. When accomplished in the box manufacturer's plant, it is known as a manufacturer's joint; when effected at the time that the box flaps are sealed in a box user's plant (usually on automatic equipment), it is called a user's joint.

**Kraft:** A word meaning strength applied to pulp, paper or paperboard produced from wood fibres by the sulfate process.

**Linerboard:** Paperboard used for the flat facings in corrugated fibreboard; also as the outer plies of solid fibreboard.

**Panel:** A "face" or "side" of a box.

**Rule 41:** A rule in the Uniform Freight Classification of the rail carriers containing requirements for corrugated and solid fibreboard boxes.

**Score:** An impression or crease in corrugated or solid fibreboard to locate and facilitate folding (see also Slit-score).

**Seam:** The junction created by a free edge of a container flap or wall where it abuts or rests on another portion of the container and to which it may be fastened by tape, stitches or adhesives in the process of closing the container.

**Slit-score:** A score plus a cut made in a fibreboard sheet extending through only a portion of the thickness.

**Slot:** A cut made in a fibreboard sheet, usually to form flaps and thus permit folding. Normally it has a width of \( \frac{3}{8} \) inch or \( \frac{3}{4} \) inch.
Certified strength and tested reliability

The circular Box Maker’s Certificate printed on the bottom of many corrugated containers guarantees that the manufacturer has produced a container that conforms to the rules and regulations of the U.S. Commerce Commission. Also, there are several other forms of certification that are used for specific guarantees of box performance. However in the final analysis, each corrugated application must be individually reviewed to determine the nature of certification required.

The unique construction and material characteristics of corrugated containers—light weight and exceptional strength—make them ideal for an endless array of uses; from washing machines to champagne glasses, from mattresses to chicken parts.

Throughout the world, the corrugated box is recognized as the safest, most reliable, cost effective means of transporting and storing goods and products!