



Case & Tray Forming 101

The corrugated industry offers many options to businesses to help them meet their packaging and shipping needs. Customers can choose from a variety of corrugated material and box styles to meet the demands of their products and the industry in which they operate. However, this is only the beginning.

The world of packaging goes beyond corrugated to include, among other aspects, the process of case and tray forming. The purpose of this paper is to explore the options available to customers and explain how these different options work.

The Challenge

In addition to the properties of corrugated material and the features of different cases, customers need to be aware of the factors that can adversely affect the quality and behaviour of corrugated during the forming process. For example, in dry weather corrugated can get hard and coarse and in wet weather it can become soft.

Other factors adversely affecting the quality and behaviour of corrugated include:

- The type of scoring applied by the manufacturer
- The type of corrugated material used
- The age of the corrugated material
- The design of the box

Responding to Customer Needs

The number one problem encountered by customers is overcoming the variables in corrugated quality that can disrupt the corrugated forming process. The first step to overcoming these variables is to understand them. The second step is to find a solution that has been designed to meet the needs of corrugated, rather than one that makes corrugated conform to its features. Whether customers form corrugated boxes manually or automatically, the simplest solution is often the best solution.

Technology & Mechanics

To help ensure reliability in case forming, the erecting process is separated into simple steps. Each step is well defined and simple. The process is seamless, and appears to be continuous, but they are in fact a series of steps that work together.

Servo Driven Mechanics

Sensors at each step in the case forming process ensure that each step is completed successfully before moving to the next step. Since not every step takes the same amount of time to complete, the start of some steps can be delayed until the previous one is completed. This timing can be adjusted to compensate for different types of cases and trays.

Principles of First Case Separation

First case separation functions together with a pin & dome system to provide a simple, mechanical solution for forming cases such as Regular Slotted Cases (RSC), Half Slotted Cases (HSC) and Centre Special Slotted Containers (CSSC) / All Flaps Meet (AFM) boxes.

- Step One: Prior to separation the cases are pushed through the magazine to the separator head and against the injector blade.
- Step Two: The separator pushes the first case downward into the caliper slot, which ensures only one box can be separated from the next.
- Step Three: The separator retracts, releasing the case. This frees the box from the rest of the magazine. The box tilts forward and is available to be injected onto the pins.
- Step Four: The mechanical jaw closes on the case, which is injected upward on to the pins. The outer surface of the case is metered by domes and onto the pins.

Pin & Dome System

The pin & dome systems is used after the injection system to open the box. It uses pins onto which the major and minor flaps of the case are injected. The pins slide into the flutes of the corrugated which is guided into place by domes against which the outer liner slides when the case is pushed upward. The pins and domes are situated along a mechanical jaw, which uses a hinge mechanism to open the box.

The pin & dome system has been around for over 20 years. Its success can be attributed to the fact that it can compensate for the variables affecting the quality and behaviour of corrugated boxes. It can erect cases whether they are dusty, wet or have irregular surfaces.

Hot Melt Systems

Hot Melt Systems use hot glue and compression to create a strong bond. One much stronger than can be achieved using a mandrill. There are two types of Hot Melt Systems.

- Internal compression module: It presses the end flaps into place on all four corners.

- Swinging compression module: It swings into the case and uses active compression to compress the box closed by compressing the corners in.

Case Erectors

RSC Formers

The pin & dome is the heart of RSC Formers. As mentioned previously, pins are injected into the major and minor panel and the box is literally pried open using the mechanical jaw. The flaps of the pin & dome system can be customized and the major flap can be off set to erect special types of RSC boxes.

Bliss Box Formers

Bliss Boxes are constructed using a single piece of corrugated for the bottom, sides, and top of the box, and two separate end pieces. The Bliss Box Former features two end panel magazines and one body magazine that delivers blanks down vertically. It also features a mandrill, which picks up the two end panels and strikes the body, forming it around the end panels. The body of the Bliss Box features flanges upon which a hot glue bond is applied. The end panels are pressed against the flanges using high compression to ensure a strong bond. Each piece of the Bliss Box is separated from the magazine using a vacuum system.

The Bliss Box Former uses a servo driven mandrill, which can be programmed to change speeds during the forward and backward strokes of the machine to optimize the speed of the machine without damaging the box. For example, a mandrill can be programmed to move forward slowly and then retract quickly for the next box and avoid jams. It can also be changed to accommodate various sizes of Bliss Boxes.

Tray Formers

There are two different types of Tray Formers.

- 1) Vertical
- 2) Horizontal

Vertical Tray Formers use vertical magazines in which blanks are placed. These blanks are driven down at which time hot melt glue is applied. A mandrill strikes the box horizontally, driving the box through the machine and forming it. Horizontal Tray Formers use horizontal magazines in which blanks are placed. These blanks are driven down at which time hot melt glue is applied. A mandrill strikes the box vertically, driving the box down and forming it.

In both vertical and horizontal tray formers, outer guides are used to form the corrugated around the mandrill and the outer flaps are compressed against the inner flaps to form the tray. The hot melt glue is applied, holding the flaps in place. The boxes are pushed out on to a conveyer by the mandrill itself.

Automatic Tray Locker

The Automatic Tray Locker is a type of Tray Former that forms a tray using a die-cut blank by sequentially folding the corner flaps and folding the two sides in using the tab lock feature, where the sides tuck over the other flaps and hold them into position using tabs and slots.

It features an easy load magazine that transports the boxes from the lower loading position up to the dispensing position at the top of the machine. The boxes are then delivered downward in front of the mandrill. The mandrill is servo-programmable and can be changed to different speeds for different types of trays.

Self-locking Tray Former

The Self-locking Tray Former automatically locks self-locking trays. Typically, customers start out hand locking these trays but as volume grows, they can introduce automation into their production line.

This machine runs the blanks through the machine horizontally. The blank is drawn off the bottom using a vacuum to a pusher, which pushes it forward into the drive wheels, which are then delivered under the mandrill. An arm is used to align the blank under the mandrill. The sides are then folded over mechanically completing the process.

Summary

There are as many options to forming cases and trays as there are styles of corrugated boxes and trays. The machines that erect cases and trays can be complex however, the most reliable machines use mechanics that are mechanics are relatively simple.

Case and tray formers designed to meet the needs of corrugated are best able to overcome the variables in corrugated quality that can disrupt the forming process.