Selecting a Case Packing System

THE FOLLOWING FALLAS WHITEPAPER WILL WALK YOU THROUGH THE SELECTION PROCESS.

We are going to discuss CASE PACKING SYSTEMS, also known as “END OF LINE” or SECONDARY PACKAGING, but to begin with we’ll discuss the most important element – the Case Packer itself.

In this first section we will start with:

**Case Packer Selection Based on Product Type:**

- **RIGID** – chipboard cartons of cookies and candy or tubs of detergent.
- **SEMI-RIGID** - over-wrapped trays of cookies, stand-up pouches (Doypacks) of coffee, or packs of shingled sliced cheese.
- **FLEXIBLE** – bags of candy or pouches of ketchup.

All three types of product require different approaches –

Automatic Case Packing started with the easy applications, i.e. RIGID CARTONS. The original non-robotic case packers were referred to as Hard Automation machines and are still in use today, but because of reduced flexibility, Robotic Pick-N-Place case packers are taking over. The new Robotic Pick-N-Place case packers combine high speed with more flexibility and ease of change-over.

SEMI-RIGID articles are not always suited to hard automation due to the nature of the product and may be advisable to go with Robotic Pick-N-Place solutions.

FLEXIBLE products require a totally different approach, often with sophisticated infeeds, which conveys the products pressurelessly. The simplest case packer is the Gravity Drop packer where a pre-counted collation (or layer) is fed into a cradle, known as bomb-bays, which open up and deposit the layer into the shipping case, which is located directly below the bomb-bays.

The main problem with gravity drop packers is the inability to do complex pack patterns. If the pack patterns are outside the scope of the simple gravity packer, then a Robotic Pick-N-Place case packer is required.

Also the gravity packer is not recommended for extremely delicate products.
Case Packer Selection Based on Product Type

<table>
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<tr>
<th>Rigid Packs</th>
<th>Semi-Rigid Packs</th>
<th>Flexible Bags</th>
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<tr>
<td>Lay-flat</td>
<td></td>
<td>Gravity Drop</td>
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<tr>
<td>Robotic Pick-N-Place</td>
<td>Robotic Pick-N-Place</td>
<td>Robotic Pick-N-Place</td>
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<tr>
<td>Stand-up (vertical)</td>
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<tr>
<td>Robotic Pick-N-Place</td>
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<tr>
<td>Down Stack</td>
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<td>End load</td>
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<tr>
<td>Robotic Pick-N-Place</td>
<td>Robotic Pick-N-Place with Rotation and Articulation</td>
<td>Robotic Pick-N-Place with Rotation and Articulation</td>
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</tbody>
</table>
Case Packer Selection Based on Pack Patterns:

There are many different kinds of pack patterns, but most of these can be divided into two types – **LAYFLAT** and **VERTICAL**.

We’ll start with **LAYFLAT** pack patterns and show you how to choose the best case packer for the job. (Refer to sketch below):

At first sight, they all look similar because they all LAY FLAT in the case. But there are some subtle differences. It’s probably true to say that a ROBOTIC PICK N’PLACE packer can load all those products shown. However, the FLEXIBLE bags of Pasta/Candy in the simple pattern can be done at lower cost and greater simplicity with a gravity drop Case packer.
As the complexity of the pack increases, then the ROBOTIC is the way to go. We’ll now show, with the aid of sketches, the Case Packer best suited to the application. Starting with SIMPLE PACK PATTERNS.

**LAY-FLAT - RIGID**

(Cartons of snacks or blocks of cheese)

Application - Robotic, Two Axis Pick-N-Place Case Packer.

Note: Assume that we are loading a corrugated RSC (regular Slotted Container).
LAY-FLAT – SEMI-RIGID PACK
(Overwrapped trays of cookies)
Application - Robotic, Two-Axis Pick-N-Place Case Packer.

(Bags of shingled sliced cheese)
Application - Robotic, Multi-Axis Pick-N-Place Case Packer.
LAYFLAT – FLEXIBLE BAGS
(Poly bags)
Application – Gravity Drop Case Packer.

Simple Pack Patterns Lay-Flat
Gravity Drop
Case Packer

(Poly bags or Gusseted bags, Flexible and Semi-Flexible)
Application – Robotic, Two-Axis or Multi-Axis Case Packer.

Complex Pack Patterns
Lay-Flat

Rotate & Articulate
Shift Case
Double "A" Pattern
Robotic 2-Axis
Pick-N-Place, (3) Products
Previously collated, Rotate and shift case (More moving parts)

Rotate & Articulate
"U" Pattern
Robotic Multi-Axis
Pick-N-Place, (1) Product "On the Fly" and Place Anywhere in the Case (Simple, Less Moving Parts)

Best way is Multi-Axis Robot for less product handling and less moving parts.
Now let's examine **VERTICAL** pack patterns to choose the best case packer for the job. (Refer to sketch below):

At first sight they all look similar because all the packs are VERTICAL in their cases. Generally speaking, those products which can stand up on their own (i.e. RIGID CARTONS, and STAND-UP FLAT BOTTOMED DOYPACKS) are much easier to load vertically than FLEXIBLE pouches.
We'll now show, with the aid of sketches, the Case Packer best suited to the application. Starting with the EASIEST PACK PATTERNS.

**VERTICAL - RIGID CARTONS AND FLAT BOTTOM DOYPAKS**

Simple Pack Patterns Vertical
Robotic, Two-Axis
Case Packer

Simple Pack Patterns Vertical
End Load "Hard Automation"
Case Packer

Cross Push
Down Stack
Rotate Case
Chamber to Case Loading
Robotic, Two-Axis
Case Packer

Pick and Place into Chamber

Push From Chamber Into Case
VERTICAL - FLEXIBLE BAGS (ALTERNATIVE METHOD)

4-Panel RSC Forming
Loading and Closing

Blank Feed Rollers

Case Blank Hopper

4-Panel Blank is Formed and Glued into a Display Case with Forth Panel Leading

Robotic, Two-Axis Pick and Place

Fourth Panel

Case is Flipped
LAYFLAT and VERTICAL PACK PATTERNS
For POINT OF SALE DISPLAY
Loading Lay-Flat into RSC Case with Tear-out

① RSC Case Erected and Bottom Flaps Folded and Hot-Melt Glued

② Empty Case Being Loaded (Lay-Flat) 3 Bags Per Layer

③ Top Flaps Folded and Glued
LAYFLAT and VERTICAL PACK PATTERNS
For POINT OF SALE DISPLAY
Loading Lay-Flat into RSC Case with Tear-out
(Continued)

④ Case Rotated for Shipment if Desired (Bags Vertical)

⑤ Tear-Out Panel Removed

⑥ Bags Displayed Vertically and can be easily removed for Shelf Display
LAYFLAT and VERTICAL PACK PATTERNS
For POINT OF SALE DISPLAY
Loading Lay-Flat into Economy 3-Panel Case or Tray then Lid Applied
WE HAVE NOW COMPLETED THE CHAPTER ON CASE PACKER SELECTION.

The next step is to define the TOTAL SYSTEM.

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CASE ERECTOR

A necessary component of the System is the CASE ERECTOR. The most common type is the RSC (Regular Slotted Container). As shown, in most cases the same machine will erect an HSC (Half Slotted Container). Once erected RSC or HSC blanks can be either sealed with TAPE or HOT MELT GLUE.

RSC

HSC

RSC Blank (opened up)

HSC Blank (opened up)

LH Case Blank Knockdown

RH Case Blank Knockdown

NOTE: If space is limited, case erecter can be built in to the case packer.

Other types of Erectors are "Wraparound", "Bliss" & "Tray Erectors"
PRODUCT INFEED

The following components are typical of any Infeed:

* Diverters and Collators
* Carton Upenders
* 90 Degree Rotate or Transfer
* Over and under Combining
* Cross Sweep
* 90 Degree Combining
CASE SEALER

Automatic Case Sealing with either TAPE or HOT MELT GLUE.

**Typical features to look for:**
* Top only Sealing
* Top and Bottom sealing
* Top and Bottom belts
* Plows for Minor and Major flaps
* Relay controlled tape management
* Random case size adjustment

**Features that contribute to high efficiency and longevity:**
* Powered Rear Minor Flap Folder (reduces jams for badly scored cases)
* Powered Major Flap Folders (reduces jams for badly scored cases)
* Powered Side Belts (easier to clear jams for bad corrugate)
* Automatic over filled case compensation (top section raises and lowers automatically)
* PLC Controlled for more consistent tape management i.e. no tape, low tape, broken tape and uncut tape, also useful for Data Acquisition
* Stainless Steel construction (no paint chipping, rusting or touch up)

**CASE CONVEYORS**

Case Conveyors are the simplest components in the System. However, attention must be paid to accumulation (if required) of the empty case. Also, is stainless steel required (for washdown or wet areas). Don’t forget that the motors need to be electronically controlled with photo eyes.

* In the event the Case Packer goes down the Case Erector must stop making cases and re-start automatically with system re-start.

* In the event the a jam occurs at the sealer, a signal must be sent to an alarm (light tree or audible horn).
SUPPORT EQUIPMENT

There are many pieces of equipment that do not readily fall into one of the previously described categories. Some of these are listed below.

* PRODUCT SETTLING CONVEYOR (Vibrator)
  - Good for overfilled cases where product protrudes above the score line.
  - Typically located before the Top Sealer to eliminate jams.
  - Operating modes should include:
    - Cases travel through at a constant speed and get vibrated as they go.
    - Pause can be initiated for more settling.
    - For even tougher jobs, units can have a top tamper to push the product down into the case.

* INSPECTION SYSTEMS – Case Checkweigher with reject
  - For verification that the case is filled with-in spec (weight) product.
  - Typically located before the Top Sealer so rejected cases can be manually inspected without reopening the case.
  - Reject mechanisms can be located on the unit or downstream.
  - Bar code reading can be added for random weight verification for multiple lines and for data acquisition.
  - Should be of robust construction for industrial applications.
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