

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES TO STUDY VARIOUS MATERIALS, METHODS AND HEAT SEALING PARAMETERS USED IN BLISTER PACKAGING PROCESS

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ABSTRACT

Blister packs initially comprised of a thermoformed plastic plate with a lidding material produced using plastic, paper, foil or a mix of these, with the item being expelled either by pushing through the cover or by means of a peelable lidding. A blister that folds onto itself is frequently called a clamshell. Blister packs are helpful for securing items outer components, for example, moistness and defilement for broadened timeframes. Opaque blister additionally ensure light-touchy items against UV rays.

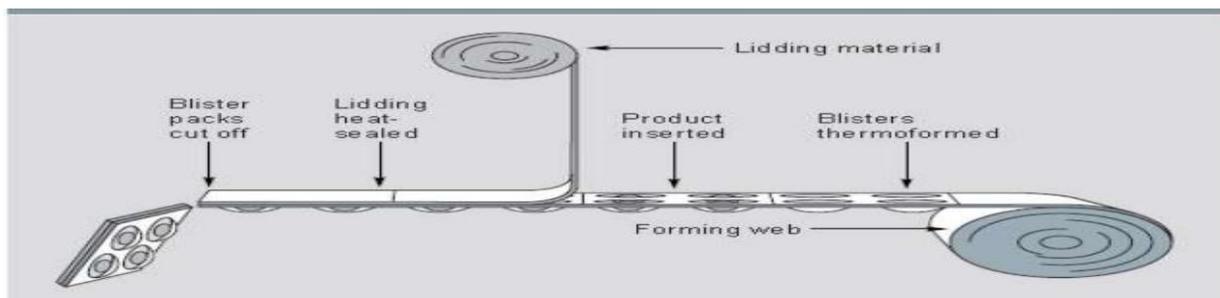
Keyword: Blister Packaging, Heat Sealing, Cold Forming, Sealing parameter.

I. INTRODUCTION

Blister packaging is performed by two techniques known as thermoforming blister packaging and cold forming blister packaging. In thermoforming process of blister packaging heat sealing bar is used to make a bond between lidding base materials and blister forming film. In Cold forming process of blister packaging aluminum foil is used in both sides, this process is used in such packaging applications on which higher moisture and oxygen obstruction is required.

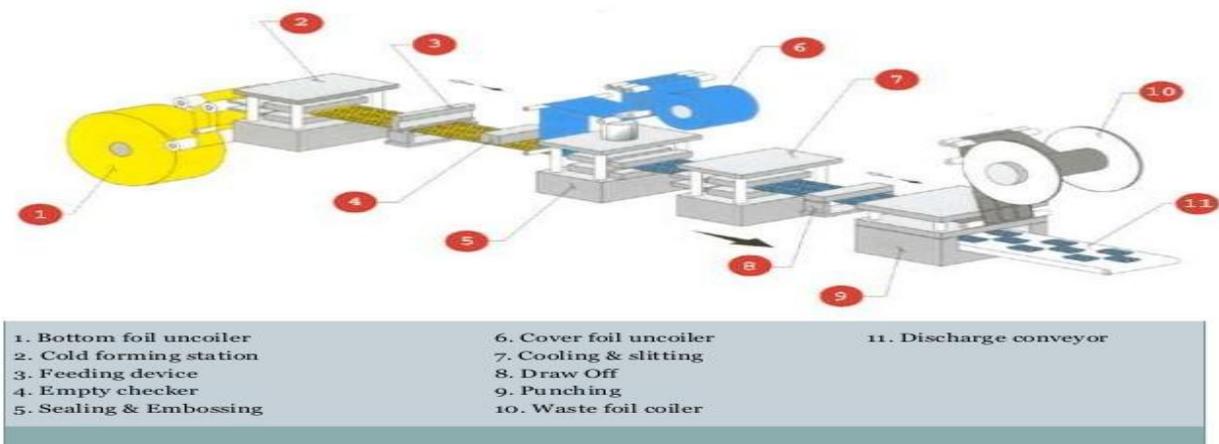
II. VARIOUS PROCESSES USED TO MAKE BLISTER PACKAGING

a. Thermoforming: In the thermoforming processes of blister packaging a pre –heating station is used before the shaping station of blister lines which raise the temperature of plastic base film and make it malleable and mollify for framing. The warm plastic film at that point came to the framing station on where a mold is made with the assistance of pneumatic stress powers. After the framing station the molded plastic sheet came at the chilling station which decrease the temperature of molded plastic sheet and change over into the inflexible shape.



Thermoform Blister Machine

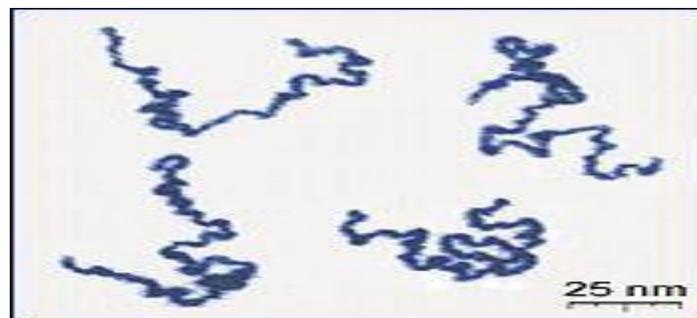
b. Cold Forming: Cold forming procedure of blister packaging for the most part use for such application where aluminum based film is utilized as a part of place of PVC or plastic film used as a part of thermoforming process. In the industries these blisters are called cool form foil (CFF) blisters. In the cold forming process of blister packaging mold is made essentially with the assistance of stamp. Aluminum blister packaging is an ease back process when contrasted with thermoforming process it used as a part or such application where more water and oxygen obstruction and long life is required for the product.



Cold Forming Blister Machine

III. TYPES OF MATERIALS USED IN BLISTER PACKAGING

a. Polymers: The word polymers mean numerous monomers. Monomers are basic particles connections of a specific organization that are fortified together to shape long rehashing chains. The polymers are genuinely late materials classification contrasted with metals and ceramic production; they wound up noticeable a standout amongst the most used materials in the whole world, because of their one of a kind and assorted properties. Focal points of plastics incorporate minimal effort, protection from consumption and chemicals and so on.



Appearance of real linear polymer chains

Types of Polymers used in blister packaging

- PVC (polyvinyl chloride)
- PVDC (polyvinylidene chloride)
- PET (polyethylene terephthalate)

b. Aluminum: It is used into cold forming process of blister packaging because of its different points of interest into 3-layers overlay: PVC/Aluminum/Polyamide. The PVC side is within in contact with the product.

c. Paperboards: There are numerous plans for blister and card, including straightforward card to blister, clamshell, and folding or double fold card. Despite technique, the polymer material is attached to the paperboard during the sealing procedure. The paperboard material itself is infrequently of result, because of the way that most paperboard used as a part of blister packaging is coated in some laminate or adhesive. Paperboard materials comprise for the most part of bleached wood pulp that is layered with polythene to build its rigidity.

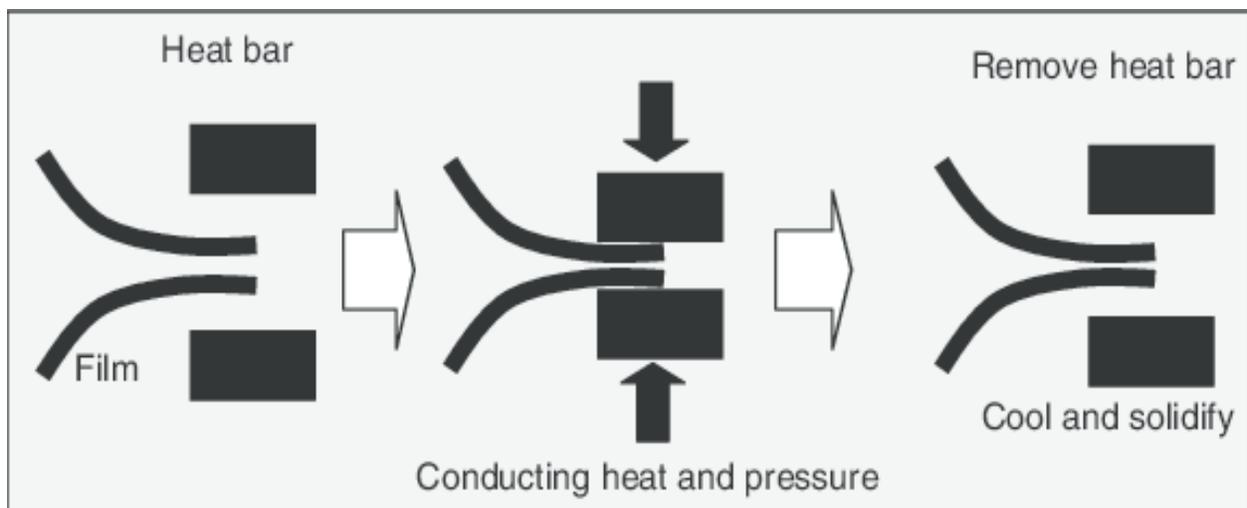
Type sof paper substrates used in sealing process of blister packaging:-

- Duplex Paper Board
- Matte Paper
- Laminated Paper etc.
- Folding Boxboard.

c. Adhesive: Any substance which connected to one or the two surfaces of various things to combine them and oppose their partition is known as adhesive. In the blister packaging it is the most contributing variable to the seal of the bundle and used to seal the paperboard to the plastic base film blister. In blister packaging application for the most part solvent based hot met glue is used, on the grounds that properties of this adhesive make it appropriate for sealing, it liquefy at high temperature and change over into strong frame on cooling and have a more prominent resultant quality to follow the two surfaces.

IV. SEALING IN BLISTER PACKAGING

In a sealing process, the blister and blister card are joined with each other by pressure and heat. The coating film and blister soften, liquefy into each other and shape a compound. In the blister process, the coating goes about as an operator between the blister card and the plastic blister. A standard heating cycle seal takes around 2-5 seconds at a temperature of 130°-150° Celsius. Inside the distinctive decisions available in the scope of blister packaging, heat seal blister packs are by far the most by and large utilized compose in around the world. The clarification behind this is undeniable. Heat seal blister contain only two bits of materials, a solitary piece of board and a blister heat seal blister packs are thusly sparing to convey. The main group of which the blister card is conveyed is secured with a layer of heat seal covering. All things considered there are two key sorts of covering being utilized to convey heat seal cards. These are water based heat seal covering and dissolvable based heat seal coatings.



Heat sealing process with a heat bar

With the present moved progressions most coatings are sensible to seal both, PET blister or PVC blister, utilized a comparative covering. In ordinary the bond nature of dissolvable based coatings is better that the nature of water based coatings, yet if each one of the principles for the utilization and dealing with are being respected two sorts of

covering give splendid fixing occurs. Heat seal covering are hygroscopic, inferring that they draw in dampness. The weakness of dampness in the covering is that in the fixing procedure. Dampness in warm fixing cards causes undesirable air isolate territories/awful holding spot in the zone where the blister is being fixed.

V. DIFFERENT PARAMETERS USED TO CONTROL BLISTER SEALING

The resultant materials bond and seal quality of heat seal packaging process relies upon a few elements, including: sealing temperature, sealing pressure, sealing dwell time attributes of the sealant and even the test strategy used to quantify the seal quality. Seal must be sufficiently solid to withstand the rigors of transportation and taking care of and it ought to likewise be easy to use for the last shopper of the related item.

a. Sealing Temperature: The heating components of heat seal packaging gear are raised to a temperature sufficiently high to either dissolve or actuate the sealant. Temperature must be sufficiently high to activate the sealant layer, while not over heating the surface of the material and instigating extraordinary transparency. Variety in the temperature during sealing process may influence the nature of bond and additionally straightforward of the final pack, and it might be diverse for various substrates and adhesive used into process.

b. Sealing Pressure: The third key factor of fixing is the pressure at which the layers joins together and holds the two materials together to frame the seal. Sealing pressure may differ as compare with the real balanced pressure into the input control system. For the most part 4 to 8 bar pressure is used as a part of heat sealing process.

c. Sealing Dwell Time: Sealing dwell time alludes to the time the component parts of a packaging procedure are in organize contact with the substrate. It very well may be it is conceivable that uneven or two-sided heating. The two materials get together to frame a bond or seal. It is critical to perceive how the equipment's measures the stay time to choose "True Dwell Time", which is the point at which the webs are really pressed together. Resultant nature of the sealing quality may differ with the variety in the sealing dwell time.

d. Others Factors: There are some different factors identified with the time, temperature and pressure that can likewise influence heat seal. Some regular variables include:

- Variation in platen temperature.
- Non-uniform heat transfer due to uneven contact or pressure.
- Material thickness or variation etc.

VI. BLISTER PACKAGING MACHINE

The blister packaging machine might be separated in to plate type, roller type and roller plate type.

Blister packaging machine in view of structure

a. Plate type Blister Packaging Machine: It is likewise called level compose blister machine. In plate compose blister machine, the blister shaping mold and the fixing mold are plate-framed. The surface of upper and lower molds contacts amid heat fixing and satisfactory temperature, weight and furthermore fixing time should be given to ensure fixing quality, in the plate type blister packaging machine the blister can be stretched to depth up to 35mm.

b. Roller Type Blister Packaging Machine: It is also called rotary type of blister machine. In roller type blister packaging machine, the blister forming mould and the heat sealing mould are barrel formed. It is reasonable for the blister packaging of tablet, container and not appropriate to forming of deep blister. It has high generation rate and low power consumption with instant sealing as compare with plate type blister packaging machine.

c. The roller-plate type Blister Packaging Machine: It is the combination of both plate type and roller type blister packaging machine. In this kind of blister packaging machine the blister forming mould is plate formed while the heat sealing mould is cylinder shapes. It works with the benefits of the two kind machines and defeats the disadvantages. It works with continuous heat sealing, straight contact amongst PVC and aluminum foil and delivered brilliant blister with least wastage and high creation speed.

VII. CONCLUSION

After the study of complete process of blister packaging, it was found that blister packaging is the most suitable packaging process for the pharmaceuticals industries due to its various advantages over normal conventional packaging process used in other packaging applications. In blister packaging application mainly two sealing processes thermoforming and cold forming are used according to the suitability of the products. In cold forming process of blister packaging only aluminum foil is used to cover the product but in thermoforming process two different materials used as lidding bases and blister forming film for packaging. Blister packaging process can be performed by plate type, roller types and roller-plate type machines for various applications.

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