CHOOSING THE OPTIMAL RELEASE LINER FOR A PSA APPLICATION

Choosing the Optimal Release Liner for a Pressure Sensitive Tape Application

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Abstract

The ability to choose the optimal release liner for pressure sensitive applications is essential to your business success. This paper will review the process of choosing a release liner to best fit the needs of various pressure sensitive tape applications. A discussion of the variables which are important, both dependent and independent, will be shared. Clear communication of the dependent needs is the primary foundation of the process. The independent variables can then be selected to provide a successful product. Dependent variables, or the requirements of the final desired PSA tape, include but are not limited to the following: PSA psa type, release target and testing method, process limitations, cost, regulatory and environmental needs. Independent variables which can be manipulated to get to the desired dependent variable include: adhesive types, release coating components, substrates, and carriers.

Choosing the Optimal Release Liner for a Pressure Sensitive Tape Application

Pressure sensitive tapes are used in a variety of markets, from medical to industrial applications and everything in between. Choosing the optimal release liner for the PSA application takes knowledge, effective communication, and experimentation. Knowledge means getting acquainted with the facts of the application. What are the customer requirements? Effective communication can be described as listening to the customer and suppliers involved in the design of the product. Watson Wyatt's Hierarchy of Effective Communication can be used as a learning tool for communicating effectively. Using Wyatt's model, the selection of a release liner for a PSA application begins with awareness, and then moves through the stages of understanding, acceptance, commitment, and action.

During each phase, communication among the customer(s), supplier(s), marketing, R&D, and production controls the speed at which the project moves forward. Last, the experimentation step consists of working with the associated materials to determine how the marriage works. This paper will expand on these topics and discuss the dependent and independent variables involved in choosing the optimal release liner for PSA applications. A few examples will be shared.

Dependent Variables

The dependent variables are the requirements of the final desired PSA tape. These variables are important to the adhesive tape manufacturer, and ultimately determine what is provided by a release liner manufacturer to the adhesive tape manufacturer. The PSA application may call for a double-sided acrylic, or a single-sided removable, or maybe a silicone PSA. The end-product could be a urethane foam, clear-on-clear label, mounting tape, or a transdermal drug delivery patch. These applications

all call for different independent variables to yield the dependent needs. Additional dependent variables include the carrier type, application method, speed of application or stripping, regulatory needs, environmental needs, and, of course, cost.

Independent Variables

Independent variables are those variables that can be manipulated to get to the desired dependent variable. In other words, what items in the final product can be altered to meet the requirement? The formulation of the adhesive can be modified to obtain critical parameters for adhesion, cohesion, tack level, and peel. The release liner can be modified in a variety of ways. This paper will focus on the independent variables of the release liner.

Substrate:

Paper: (400F)

Glassine: Light, transparent, available in colors, highly refined pulp, caliper controlled

SCK: Paper with a smooth finish from a supercalendar

MFK/MGK: Machine finish or glazed kraft, polycoating bases, Glazed is high gloss

Linerboard: Bulky, high basis weight and caliper, sometimes contains recycled content

Clay Coat: Paper with a surface coating of clay, smooth, bright, printable

Saturated Kraft: Latex impregnated papers for improved consistency

PEK: PE or PP Polycoated kraft is typically an extrusion process that extrudes LDPE, HDPE, or PP onto a base paper. Gloss/Matte construction is standard, but variations can be produced.

Films: HIP/STY (150F, 66C):

PE (160-210F): LDPE, MDPE, or HDPE.

PP (225F, 107C)

PET (290F, 143C)

Films are characterized by their temperature resistance and physical properties. PP will die-cut better than HD or LDPE. PET has the most temperature and heat resistance.

Key Questions -Substrates: What temperature requirements are needed? Does the application require layflat characteristics?

Adhesive Type:

Hot melt

Solvent Acrylic

Water-based Acrylic

Water-based Rubber

Silicone Adhesive

Key questions: What adhesive type is being used? What release range is targeted? Is the product a differential? What method of application will be used for the adhesive? Is the release liner a carrier or process liner, or part of the final product?

Coating Type: Release coatings are characterized by catalyst type

Tin (Sn) catalyzed**:** Condensation Cured system, compatible with most adhesives, wide release ranges, cures at low temperatures

Platinum (Pt): Addition Cured system with higher immediate cure levels than tin chemistry. Easy release at fast stripping speeds. Sensitive to adhesive interaction

UV (free-radical / cationic): Typically fast curing with a variety of substrate types, do not require thermal curing, providing substrate flexibility.

Electron Beam (EB): Fast cure, not compatible with acrylics. Non-thermal, used on a variety of temperature-sensitive substrates.

Fluorosilicone**:** Compatible with silicone adhesives. Fairly high temperatures and dwell times are used for cure. High cost.

Adhesive Compatibility Chart

	Hot melt	Rubber	Silicone	Water Based acrylic	Solvent acrylic
Solvent tin	Yes	Yes	No	Yes	Yes
Emulsion tin	Yes	Yes	No	Yes	Yes
Solventless platinum	Yes	Yes	No	Probably	Maybe
Solvent platinum	Yes	Yes	No	Probably	Maybe
Emulsion Platinum	Yes	Yes	No	Probably	Maybe
Ultraviolet light	Yes	Probably	No	Yes	Yes
Electron beam	Yes	Yes	No	Maybe	Probably not
Fluorosilicone	No	No	Yes	No	No

Industry Examples

1. **PSA for Electronics industry**

   Dependent Variables: Cleanliness, die-cut, one side solvent acrylic

   Independent Variables: Substrate, release type and level, Single side release

   Starting Point: Clear PET with an easy release coating focused on low silicone extractables

2. **Silicone PSA for High-Tech Application**

   Dependent Variables: Film substrate, silicone psa, self-wound product

   Independent Variables: Benzoyl peroxide level, fluorosilicone chemistry with a release differential, PET

   Starting Point: Differential coated fluorosilicone liner

3. **Label application**

   Dependent Variables: High speed die-cut labels, acrylic adhesive

   Independent Variables: Substrate, elease level

   Starting Point: SCK / Glassine paper or PET with a platinum release coating capable of high speed release. Communication of more details is important.

Conclusion

In conclusion, choosing the optimal release liner for PSA applications results from communication of the details of the project. Forming an interface for communication from the point of awareness to commitment and action will improve the project understanding and success rates. Obtaining details regarding dependent and independent variables is critical to choosing the best liner for the application. Some projects will require extensive experimentation for optimum product performance.

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