

CHAPTER I

INTRODUCTION

1.1 ADHESIVE

Adhesives or glue are the material that adhere two surfaces together, such as starch and polyvinyl acetate emulsion that used as an adhesive of paper and wood, neoprene solution for rubber. Adhesive can be categorized both in terms of their chemical composition (polymer type) and physical forms. Adhesive compositions frequently include a number of additives in their formulation. To enhance performance, primers and coupling agents are also employed.

An adhesive must be applied as liquid, preferably of a low viscosity, both to wet the adherend surface and to flow into crevices and asperities universally found in solid surface. The liquid form of the adhesive obtained by heating to the point that facile flow occurs, dissolving or dispersing the material in a solvent, or starting with liquid monomers or oligomers that polymerize or react after application. Eventually, the adhesive must undergo a phase change, ie, by cooling, solvent evaporation, or reaction, to a solid in order to adhere material.

Adhesives are produced in a number of form including hotmelt types, solutions, aqueous dispersion, activated adhesives, film adhesives, polymerizing types, and pressure sensitive adhesives.

1.2 HOTMELT ADHESIVE

Hotmelt adhesive is solid at room temperature and becomes liquid when heated, usually to temperature over 100°C , is ejected from the heating device at the bonding face as a hot liquid, loses heat to the surface and sets as solid. The adhesives depend upon thermoplastic polymers for their formulation. Hotmelt adhesive is the most rapid method because no solvent lossing nor chemical reaction are involved. The polymer in adhesive have a low heat content and easily lose heat to solidify in seconds. If the surface has a high heat conductivity, a joint of poor strength may be form because the layer of adhesive contacted with the surface may be chilled before wetting thoroughly the microscopic irregularities of the surface.

Hotmelt adhesive may be use with automatic bonding machine or with hand-held 'gun'. The later is used in some small industry including the shoe and toy industry. But the major use must be with automatic placement of the adhesive and closure of the bond and the capital equipment necessary for this is designed for mass output and high speed. Book binding by hotmelt adhesive is applied to the mass produced magazine too thick to be secured by staples in the flat before folding and to paper-backed books. Machine will handle such articles at speeds above 100 books per minute.

Obviously, from their application, hotmelt adhesive have poor heat resistance in the sense that in astressed condition at even moderately elevated temperature, creep is experienced and even cold flow at room temperature if the

Table 2.1 U.S. Adhesive markets, in thousand metric tons

Adhesives	1982	1995
Natural adhesives		
starch and dextrin	1203	1770
sodium silicate	280	382
rubber	106	150
animal	73	59
flour	50	52
other	116	107
Synthetic adhesives		
phenolic	480	615
hotmelt	242	731
vinyl	351	561
rubber	361	590
urea	269	364
acrylics	83	184
polyethylene	54	23
epoxy	15	38
other	32	308

stress is high enough and maintained for long periods. A book, for example, left open with face downward will retain a memory of this situation for a long while.

The use of hotmelt adhesive in machines have its own problems. In continuous operation a reservoir type machine has adhesive kept at high temperature for long periods with consequent danger of oxidative breakdown or crosslinking as well as to the appearance of colour and odour.

1.3 THE OBJECTIVES OF THE THESIS

1.1.1 To find the maximum peel strength of hotmelt adhesive when the adhesive is applied to polyolefin (especially polypropylene) laminated paper (by varying additive component).

1.1.2 Use Factorial Experimental Design to predict adhesion strength and cost of specific additive when changing the additive.

1.4 THE SCOPE OF THE THESIS

1.4.1 Prepare Hotmelt adhesive base on the formula as following.

Elvax 260	as based polymer	63-85%
Hercotack 1149	as wetting agent	12.5-25%
Sasol wax	as viscosity reducer	1-5%

Dibutyl phthalate as plasticizer	1-5%
BHT as antioxidant	0.5-2%

1.4.2 Parameters to be vary are Elvax 260, Hercotack 1149, Sasol wax, dibulyl phthalate and BHT.

1.4.3 Measure peel load to develop adhesion of hotmelt adhesive by adjusting formula .

1.4.4 From the data obtained, single formula will be developed to predict the prices and peel strength of the hotmelt adhesive.



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย