



THE ADHESIVE AND SEALANT COUNCIL, INC.

The Evolution of Adhesives Used in Packaging & Converting Applications

1940s – Present

DECADE	ACTION	BENEFIT	
1920s	• J&J introduces first Band-Aids with pressure sensitive adhesives	• More convenient and hygienic wound care for mass market (initially bandages were made from cloth; changed to plastic in early 1950s)	
1940s	• Polyvinyl acetate based adhesives used for military shipments for case sealing	• Water resistance, adhesion	
	• Polyvinyl acetate based adhesives used for spiral wound tubes for blood plasma, shells, rations, etc.	• Water resistance, adhesion	
	• Polyvinyl adhesives used to laminate aluminum foil to paper—confuse radar	• Adhesion	
	• SBR based adhesives developed for solvent borne pressure sensitives	• Natural rubber not available during war	
	• Waxy maize used to replace tapioca as starch for labeling and other applications	• Tapioca not available during war	
	• Thermoplastic labeling	• Heat seal adhesives based on polyvinyl acetate and other polymers used for limited applications replacing cut and stack labeling; convenience	
1950s	• Beginning of widespread use of polyvinyl acetate based adhesives used for packaging and converting replacing natural based adhesives	• Setting speed, water resistance, adhesion	
	• Envelope folding machines increase in speed by two and three times	• New front seal and back seam adhesives developed based on dextrans and starch/polymers; better machining, faster speed, improved adhesion	
	• New window films used for envelopes replacing glassine	• New better adhering window gums developed based on polyvinyl acetate including polyvinyl acetate copolymers	
	• Waxy maize starch based jelly gums developed for labeling	• Better tack and machining at higher speeds	
	• Rosin based hot melts being used for can labeling, and some polyvinyl acetate based hot melts used for bookbinding	• Faster speed and beginning of the realization of the advantages of hot melts	
	• Introduction of EVA for hot melts	• Start of the development and use of hot melts	
	• EVA hot melts introduced for bookbinding	• Replace animal glues; better adhesion and aging; faster speed	
	• Acrylate/acetate copolymer solvent based pressure sensitives replacing rubber based pressure sensitives	• Better adhesion and aging	
	• Casein based labeling adhesives at breweries	• Water resistance and removability in soakers	
	• Bottle labeling machines with much increased speeds	• New adhesives developed to machine at the higher speeds; based on starch or casein; labeling of glass and coated glassware; better adhesion	
	• New polyvinyl acetate based adhesives with no water resistance	• Setting speed, water resistance, adhesion	
	1960s	• Improved hot melt applicators introduced	• Better machining and controls
		• Disposable baby diapers introduced	• Hot melts used in construction; better adhesion, speed on films and nonwovens
• Widespread use of hot melts for packaging and converting		• Speed of set, adhesion, water resistance, reduced packaging lines space; replacing water based adhesives	
• Self adhesive postage stamps		• First introduction of pressure sensitive adhesives for this application replacing dextrin based remoistenable adhesives; convenience	
• VAE based emulsions introduced		• Adhesives developed with better adhesion and less compounding	
• Envelope folding machine speeds increased again		• New front seal and back seam gums developed based on starch or dextrin and polyvinyl acetate homopolymers and copolymers	
• Dextrin compatible polyvinyl acetate polymers developed		• Used to make new envelope front seals and in other adhesives where dextrans were used; better adhesion and increased drying speeds	
• Clear plastic bottled introduced		• Polymer based water borne adhesives developed for better adhesion to the plastic	

DECADE	ACTION	BENEFIT	
1960s (cont.)	• PSA labels used to replace cold glues for labeling of plastic bottles	• Ease of use, better adhesion, speed	
	• Flexible laminating, acetate/acrylate solvent borne adhesives	• Better adhesion and aging	
1970s	• PET beverage bottles	• Hot melts used for labeling and on initial bottles for adhering the base cup; adhesion, speed, clarity	
	• Self crosslinking VAEs	• Water borne adhesives with better adhesion and heat resistance	
	• Diaper tape for leg bands on baby diapers	• Hot melts with improved adhesion	
	• Introduction of SIS, SBS and SEBS copolymers for hot melts including PSAs	• Adhesion, aging, no solvent, speed	
	• Hot melt pressure sensitives for the pressure sensitive strip on feminine care products	• Better aging, removability	
	• Water borne adhesives for flexible laminating	• Eliminate solvents	
	• Non-casein bottle labeling adhesives	• Eliminate importation of casein; better raw material uniformity	
	• Growth of the entire nonwoven disposable market	• Hot melts used because of their adhesion, aging, speed of set, reduced line space needed	
	• Transdermal drug delivery	• Adhesives based on acrylics, silicones and polyisobutylenes; suitability for the end application	
	• Recyclable hot melts introduced	• Natural based products	
	• Commercial UV and EB curing systems available	• Speed of set and curing; led to the development of hot melt, warm melt and 100% solid products	
	• Water borne and hot melts used for PSAs	• Eliminate solvents	
	• PSA self adhesive postage stamps	• Eliminate dextrin based remoistenable adhesives; convenience.	
	• New starch and emulsion based back seam gums for envelopes	• Better machining and better adhesion	
	1980s	• Higher solids VAEs introduced	• Higher solids and faster drying speed adhesives developed
		• Tylenol tragedy	• Tamper evident packaging; new adhesives for cartoning, lip seals, bubble packs and shrink sleeves
		• Shrink labeling	• Hot melts; adhesion and speed of set
• PUR based hot melts introduced		• Bookbinding and other packaging and converting applications; better adhesion and aging	
• Right-to-know laws		• Safety	
• No label look and in mould labeling		• Adhesives with improved clarity and adhesion	
1990s	• New water borne adhesive coaters for pressure sensitives	• Eliminate solvents	
	• Labeling-shrink labeling, clear labels, shrink sleeves, roll and shrink labeling, security labeling, higher speed labeling	• All become widespread and made possible with hot melts	
	• Low application temperature hot melts developed, 250–300°F	• Increased safety, energy savings, reduced maintenance and spare parts, less char and gels	
	• Better performing hot melts	• More stable and machining	
	• Plastic beer bottles and PSA labels	• Hot melts or pressure sensitives for adhesion	
2000s	• Packaging becomes part of the hot melt	• Reduced packaging waste	
	• UV and EB curable acrylic hot melts, warm melts and other 100% solid products including moisture curing PUR hot melts for flexible laminating and PSAs	• Better adhesion, aging, eliminate solvents, less floor space	
	• Reduced application temperature hot melts, 200°F	• Safety, energy savings, less char and gels, less spare parts needed for maintenance	
	• Increased emphasis on sustainable adhesives	• Biopolymers, biodegradable adhesives, recyclable adhesives	

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