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ADHESIVES AND  
SEALANTS

# Advances in Flexible Packaging Adhesives

CPP Expo Presentation  
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# Agenda

- Basic types/ functions of adhesives used in flexible packaging
- Laminating adhesives: types, chemistries, and advances
- Heat seal coatings: applications, types and advances
- Cold seal adhesives: applications, trouble shooting and advances
- Conclusions

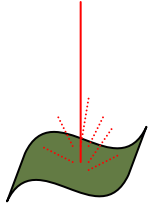


# Types of Adhesives Used in Flexible Packaging

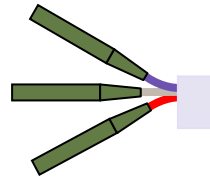
- Laminating – join two flexible web substrates together
- Heat seal – join a flexible web to another web, other substrate or structure cup using heat and pressure
- Cold seal – seals adhesive surface to adhesive surface using pressure only



# Types of Packaging Solutions



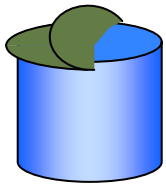
**Serfene™**  
*Barrier Coatings*



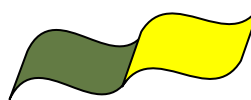
**Tymor™**  
*Extrudable Resins*



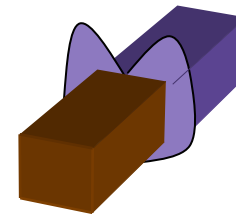
**Adcote™**  
**Mor-free™**  
**Robond™**  
*Laminating Adhesives*



**Adcote™**  
**Robond™**  
**Mor-Melt™**  
*Heat Seals*



**Adcote™**  
**Mor-free™**  
**Robond™**  
*Coatings*



**Coseal™**  
**Robond™**  
*Cold Seals*



# Laminating Adhesives

- Can be classified by application type:
  - Solvent borne
  - Solventless (100% solids)
  - Waterborne
  - Radiation Curable (100% solids)
  - Combination radiation curable
- Can be classified by performance level or chemistry



# Adhesive Chemistry

**Polyether Urethane** – water, solvent, and solventless

**Polyester** – solvent based

**Polyester Urethane** – water, solvent, and solventless

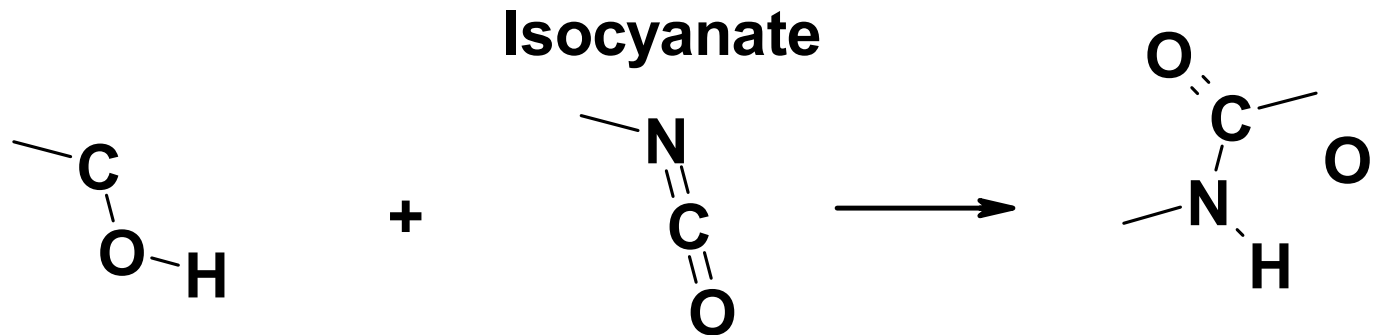
**Acrylic** - usually water based but could be solvent



# Urethane Chemistry

## Definition

- The reaction between an “isocyanate” group and “hydroxyl” group creates a “urethane”.



Hydroxyl (-OH) -containing molecule

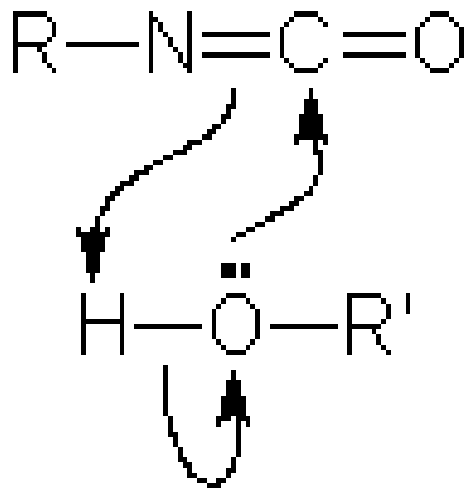
Urethane



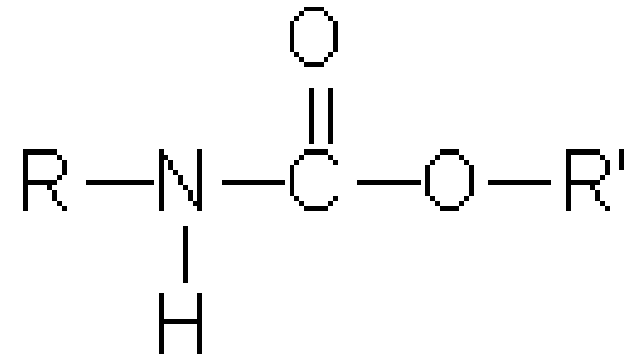


# Isocyanate Reaction: Polyurethane

Isocyanate



Urethane unit



Reaction with -OH



# General Purpose

- Can be single or two component solvent based, solventless or water based
- Typical uses:
  - Salty snacks
  - Confectionery
  - Bottle labels
  - Bakery



# General Purpose Example

- Performance of adhesives goes from fairly low performance to very demanding
- Here we have a bottle label – low bond strength, some water resistance, and high line speeds
- Can be waterborne or 100% solids



# Medium Performance

- Can be two component solvent based, solventless or water based
- Typical applications:
  - Spice pouches
  - Flavors
  - Chemical
  - Soap
  - Industrial
  - Medical/ pharmaceutical
  - Hot fill (juices, etc.)



# Medium Performance

- Must have product resistance
- Must have high heat resistance for zipper installation



# High Performance

- Specialty applications where high heat and or chemical resistance is needed (solvent based or solventless)
- Typical applications:
  - Retortable pouches
  - Retortable lidding
  - Concentrated chemical storage
  - Outdoor exposure / agricultural bags



# Highest Performance

- Adhesive must survive retort process (up to 120°C 30 minutes).
- Adhesive must have product resistance.
- Usually solvent borne; some uses of solventless in high performance



# Advances In Laminating Adhesives

- New high performance adhesives that give improved application characteristics (higher solids at lower viscosities)
- New waterborne adhesives that have bond values more equivalent to solvent based adhesives





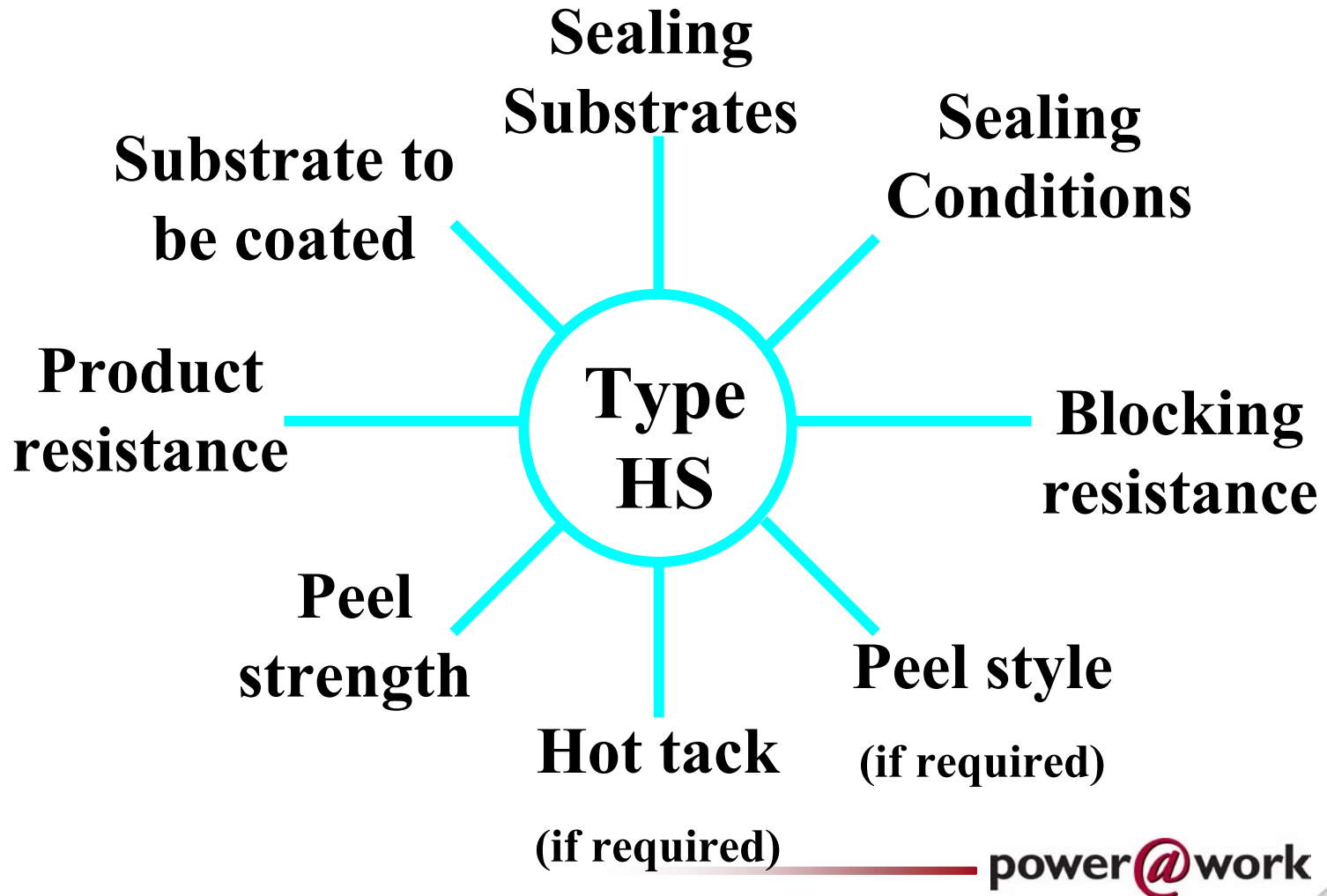
# What Is A Heat Seal?

- Thermoplastic material applied as a liquid coating, dried, tack, and block free.
- **Heat** activated by to become soft and tacky.
- **Pressed** to second substrate to make bond.
- **Cooled** to room temperature to form bond between layers of substrates.



# Choice for a Heat Seal

## Need to define the following



# Components of Heat Seals

- Defining resin or resins.
- Tackifier resins or additives.
- Lubricants, waxes, and slip modifiers.
- Antioxidants and stabilizers.
- Anti-blocking and heat stabilizing fillers.
- Solvents and diluents.
- Water, dispersants, pH control, and surfactants.



# Classes Of Chemistry

## Solid Resin

- Ethylene Vinyl acetate (EVA).
- Modified EVA.
- Modified Polyolefin Copolymers.
- Modified Polyolefin Terpolymers.
- Polyester (PET).
- Modified PET.



# Classes Of Chemistry

## Water Based

- EVA and Modified EVA
- Ethylene acrylic acid (EAA)
- Ethylene methacrylate (EMA)
- Ethylene methyl methacrylate (EMMA)
- Polyvinyl alcohol (PVOH)
- Ionomer
- Acrylic
- PVdC



# Classes Of Chemistry

## Solvent Based

- EVA
  - Vinyl
  - PET
  - PVOH
  - Acrylic
- Ionomer  
EMA  
EMMA  
Polypropylene (PP)  
Polyamide



# Markets Served

- Food Pouches
- Medical
- Pharmaceutical
- Peelable Lidding
- Portion Packaging
- Industrial
- Instant Photograph
- Agricultural Containers
- Paper and Graphics
- Frozen Food Cartons
- In Mold Label



# Market Trends

- Specific performance targets for specific applications.
- Higher peel and burst strength with strong seal through properties.
- Primerless HSC for foils.
- Freezer to oven easy peel lidding.
- Hot fill, aseptic, retort applications.





# Heat Seals: New Developments

- Waterborne high porosity heat seal coating – platform technology for varying porosities and seal activation temperatures.
- Higher solids EVA waterborne heat seal coatings
- Heat seal coatings for shrink label applications



# Cold Seals Defined

- Adhesives (cohesives) that bond when exposed to pressure only
- Formulated so that tack to non cold seal surfaces is minimized
- Release lacquers or films are still required due to pressure in roll stock



# Product Applications for Cold Seal Adhesives

- Heat sensitive products such as chocolate and ice cream
- Very high speed packaging machines
- Combination of both: high speed packing for heat sensitive products
- Medical packaging materials
- Industrial applications



# How Cold Seals Work

- When cold seal is applied and dried, adhesive portion orients toward the film, while the cohesive orients toward the surface
- Pressure is applied and the long rubber polymer chains intertwine giving cohesive bonding



# Synthetic Cold Seals

- Composed of cohesive and adhesive components
- Cohesive components are synthetic elastomers
- Synthetic elastomers eliminate variation due to natural product
- Synthetics also eliminate allergy issues



# Cold Seals: New Developments

- Acrylic / natural rubber based cold seals formulated to decrease end seal deadening
- 100% synthetic cold seal using proprietary technology

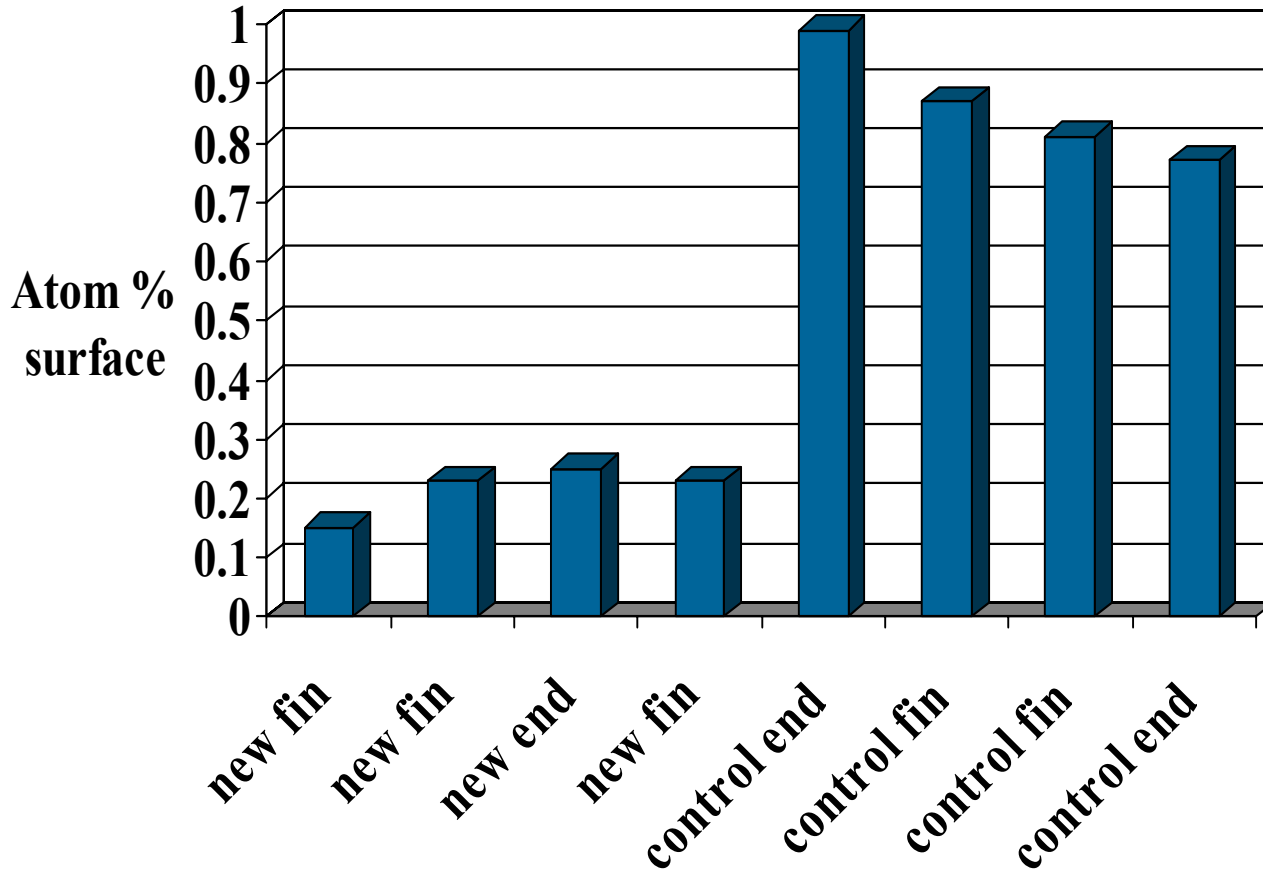


# Surface Analysis Of Coated Samples Acrylic Cold Seal

- XPS quantifies elemental composition of the surface from all sources
- Used to compare surface contamination



# XPS Analysis



Data from trial # 3

3

2

2

3

3

2

2





# New Synthetic Cold Seal

- Based on proprietary technology
- Developed for laminates:
  - white OPP/ release OPP
  - MOPP/release OPP
  - MPET/release OPP
- Eliminates dependence on natural rubber latex supply



# Summary

- Laminating adhesives, heat seal coatings and cold seal adhesives cover a wide variety of applications for flexible packaging
- When deciding on flexible packaging adhesives to be used, information sharing with the adhesive supplier is crucial to success





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# Thank You

Questions?

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