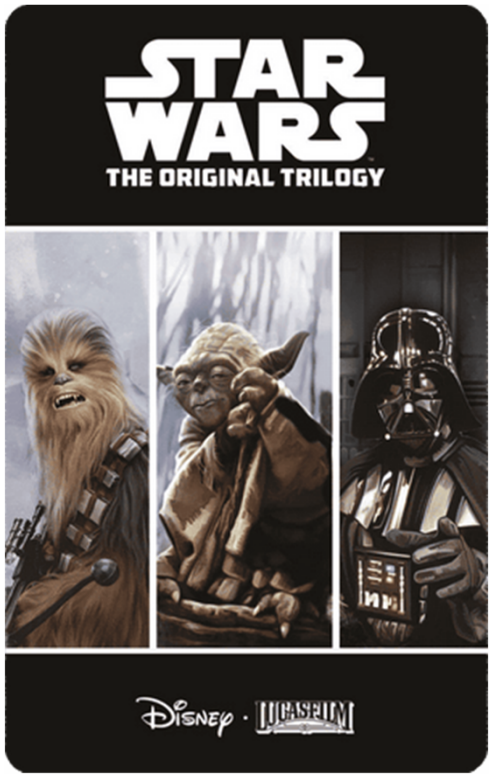
To truly deliver a message- tell it in a trilogy!



To truly delivery a message- tell it in a trilogy!

Extrusion Coating in an Adhesive Lamination World

Extrusion Coating versus Adhesive Lamination – A Comparison Study

Extrusion Coating Versus Adhesive Lamination - Which Process Should I Use*?*

Peaking behind the curtain

Factors that affect the decision

- **Adhesive lamination or Extrusion Coating**

Lean Adhesive Lamination

Scrap

- More time is spent getting an extrusion coating product up and running compared to adhesive lamination.
- Includes purge, edge trim, start up waste.
- “When we get a non legacy structure, all things being equal, we first look at adhesive lamination due to the scrap issue.”

Volume

~~Why Adhesive~~ Lamination?

- Low volume –
  - 2,000 lbs. or less.
- Less cost to run
- Less energy consumption?

Why Extrusion Coating?

- High volume
- Need 10,000 lb. order,
- EC can be 2 ½ times more expensive to run per hour

Temperature - Retort

- Retort require temperatures from 250^{o}F - 275^{o}F
- Very difficult and costly to use an extrusion primer to handle that temperature. (solvent based foil for retort lidding)
- Basic extrusion coating polymers will have difficulty standing up to these temps.

Fitments

- The process of using fitments (buttons on coffee, spouts, straws, etc.) can lean towards adhesive lamination due to the higher temps needed to heat the HDPE grooves on the fitments which would be too high for a basic PE extrudate.
- Liquefying the PE can cause lack of support for other layers (foil), resulting in increased flex cracking.
- Ultrasonic sealing – Often used with fitmits due to ability to seal through contamination. (straw areas splash back) can cause unintended melting of extrusion coating layer, unless accurate welding settings are used.

Curl

- Asymmetrical structure when subject to temp can curl. Some products can't handle it.
  - Capping web (ex top of hot dog package)
  - Lidding stock where lidding will be stacked not supplied in roll on a VFFS machine.
- In coex, difference in crystallinity or rate of crystallization can create curl during cooling.
- Can look at running lower EC temps to reduce curl.
- May result in combination ec/adhesive tri lam structures if all ec results in too much curl.

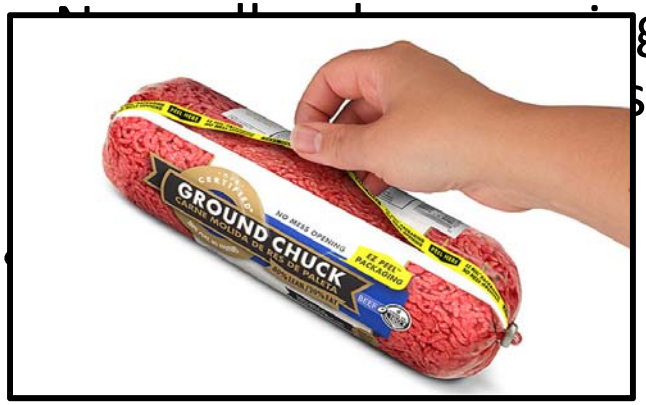
Mono Materials and sustainability

Why Adhesive Lamination?

- Replacing the thermally stable PET films can create a challenge with extrusion coating. Stretching of the PE based films when subjected to EC will cause headaches.
- Work being done in extrusion coating to account for the expansion.
- If tight repeat or gauge are required on non oriented films, adhesive may be the way to go. (meat chub)

Why Extrusion Coating?

- Extrusion coating has the advantage when running very thin structures, (chip bag) where the adhesive non plastic components could be too high to classify it as a mono material (90%)



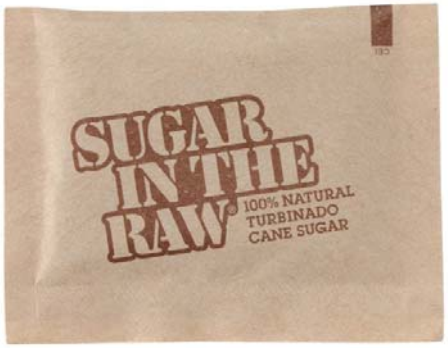
How thick is my sealant?

Why Adhesive Lamination?

- Sealant > 1 mil (25 µ)
- Multi layer sealant – (barrier, release)
- Need blown for stiffness

Why Extrusion Coating?

- Sealant < 1 mil (25 µ) – use EC.
- Simple blown sealant
- Can provide stiffness through other layers in the structure.



Can I get rid of the blown film sealant?

Not if I need the strength

- Zipper pouches
- Industrial sized bags
- Liquid bags

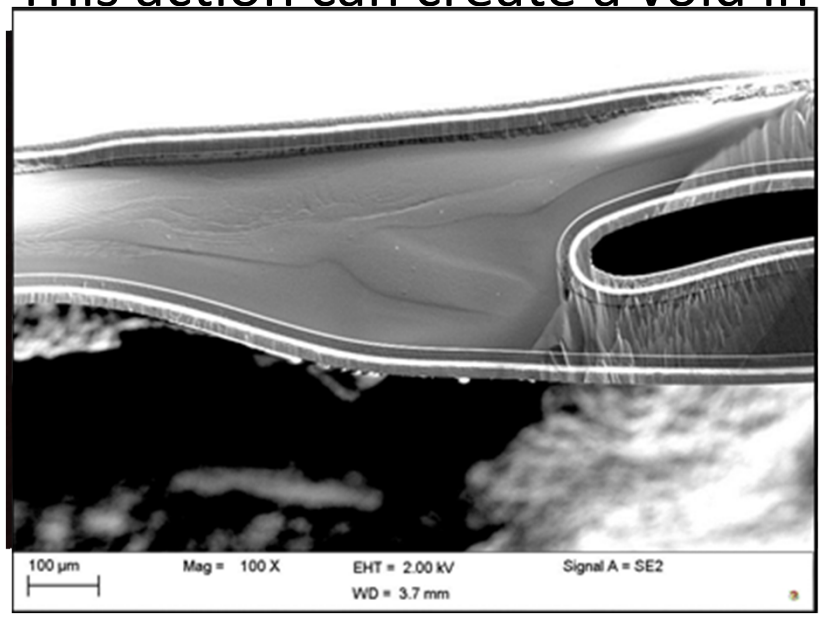
Chemical resistance

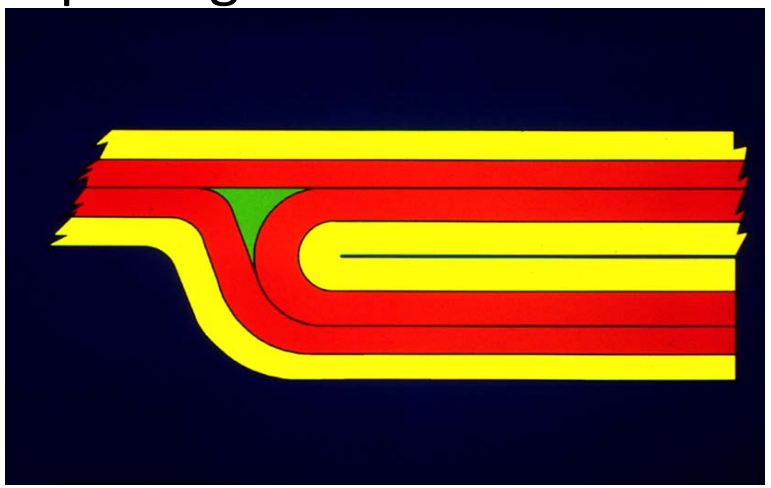
- Adhesive lamination may have advantages when compared to a basic PE sealant.
- Trying to contain water or alcohol-based components or extremely acidic products, (strong spices, hot sauce, cleaning chemicals) can degrade water-based primers requiring solvent based primers
- Like to keep extrusion coating solvent free
- Barrier resins could help combat this deficiency but may not be available in all EC lines.

Lean Extrusion Coating

Triangle of Death

- Stresses occur as the materials in a fin seal that do not effectively dead fold, are now forced to fold.
- After the package is released from the clamps the fin seal material will attempt to normalize those stresses by reverting back to their position before being clamped
- This action can create a void in the package





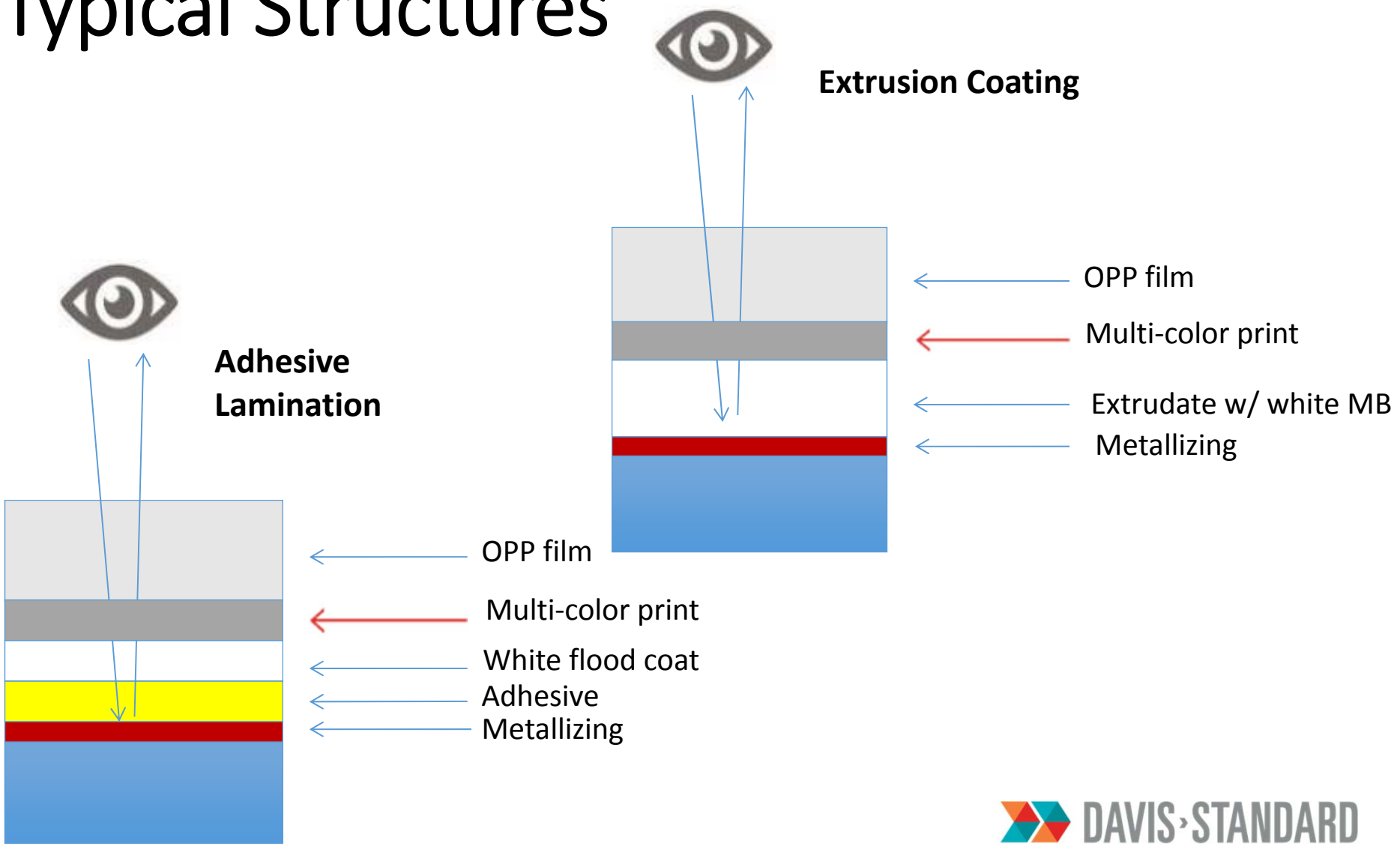
Increase sealing speed

- Extrusion coating can use high performance sealants that may not be available or difficult to provide in a blown film sealant film, potentially tipping the scales to extrusion coating.
- Some converters feel that this ability can result in running faster at the VFFS machine.

White Background

- Masterbatch is so much cheaper than a white flood coat.
  - By eliminating flood coat, its like adding a color.
  - Better opacity if covering metallized

Typical Structures



Pet Food and Solvents

- Pets have sensitive noses. With EC there should not be any retained solvents to worry about, but you do have to worry about any aldehydes being created if PE temp is too high. Multiple converters said they would lean extrusion coating for pet food.
- There is a similar issue for pharma/medical applications.

Paper structures

Why Adhesive Lamination?

- If paper is too light, extrusion coating temperatures can suck out too much moisture, resulting in curl if not re-moisturized.

Why Extrusion Coating?

- Adhesives will suck into paper and will require too much to be required unless the paper has a light extrusion coat to make it less permeable or use special high viscosity adhesives.

Create a multi wall bag – Salty snacks

- Extrusion coating can create the advantages of a multi wall bag without the cost, by running with a loose nip to limit the adhesion of the extrudate to the substrate. This creates a structure that is more difficult to tear.
  - Can be used on industrial French fry

Foil

- EC does a better job of filling in holes in foil than adhesive lamination reducing the chances of blocking.
- Less flex cracking due to better support because of ‘caulk-ability’ of the extrudate.

Summary

- There is no perfect method of converting.
- Adhesive lamination and extrusion coating should be with us for a while.
- Better understanding of what each process can and cannot do will help ensure the right process is used to maximize quality and profitability.

Acknowledgements

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- Converter #3
- Converter #4