

LABEL  
ACADEMY

# MASTER CLASS

FLEXIBLE PACKAGING

**WORKING WITH FLEXIBLE PACKAGING MATERIALS**

**SEPTEMBER 10, 2024**

**RYAN CHAI, STRATEGIC SOLUTIONS MANAGER, NOBELUS**

# Substrates & Their Applications

Flexible packaging should be designed to meet the needs of the product. Appearance is secondary.

Always begin with a single question:

**What product will go in the package?**

Other questions to ask:

- What are the strengths and weaknesses of this product?
- What environmental factors could harm the product?
- How will the product be used? Who will use it?
- Will the package be shipped? In what conditions?
- How will the product be displayed?
- How long will the product likely be left in the package?



# Foundations for Good Application Engineering

- Material Selection
- Designing for Functionality and Ease of Use
- Cost Efficiency
- Compliance and Safety
- Sustainability
- Adaptability, Efficiency, and Responsibility

# Customer Requirements

## Product Integrity

- Barrier properties (oxygen, moisture, light, etc.)
- Physical protection (puncture resistance, durability)
- Chemical compatibility (non-reactive materials)
- Temperature control (suitable for storage and transport conditions)

## Functional Design

- Ease of opening/resealing (zippers, tear notches, etc.)
- Portion control (individual servings, multi-use packaging)
- Convenience features (stand-up pouches, spouts, handles)
  - Branding and aesthetics

# Customer Requirements

Print Quality and Customization (high-definition graphics, branding consistency)

- Material transparency (clear windows to view contents)
- Tactile features (matte finishes, embossing)

Regulatory Compliance

- Food safety standards (FDA, EU regulations)
- Labeling requirements (nutritional information, expiration dates)
- Material safety (BPA-free, non-toxic inks)

# Customer Requirements

## Cost Considerations

- Material costs (selection based on budget and performance)
- Production efficiency (minimizing waste, optimizing processes)
- Total cost of ownership (considering lifecycle costs)

## Innovation and Trends

- Smart packaging (QR codes for consumer engagement)
- Active packaging (oxygen scavengers, moisture absorbers)
- Customization trends (short runs, personalized packaging)

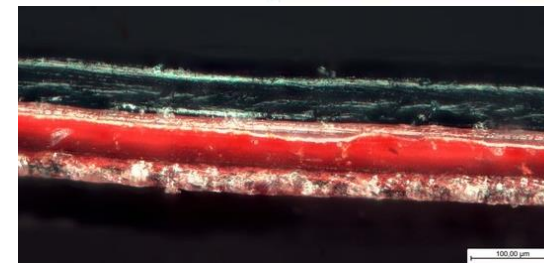
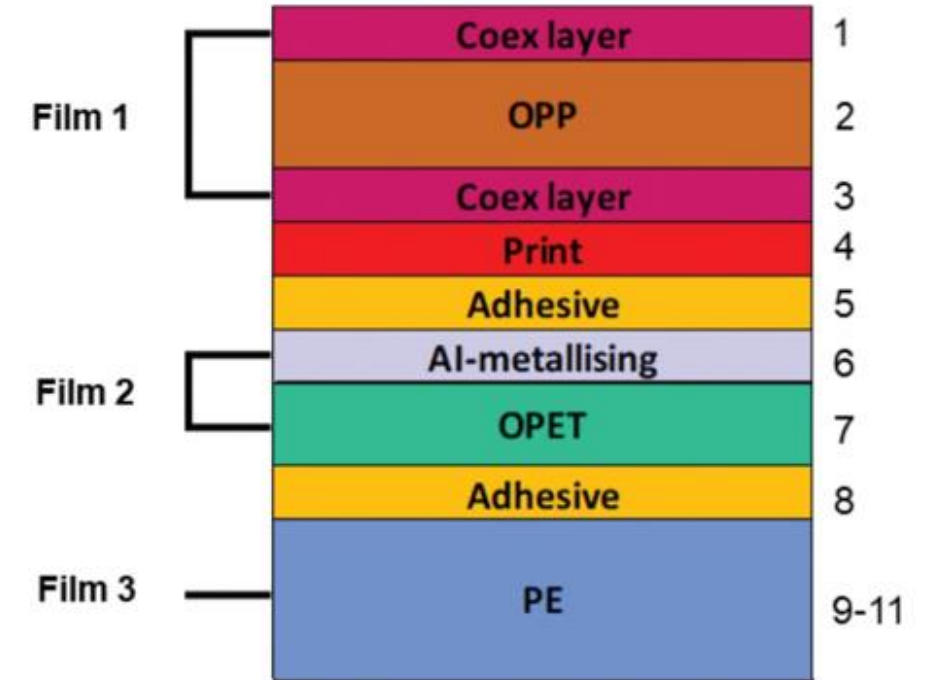
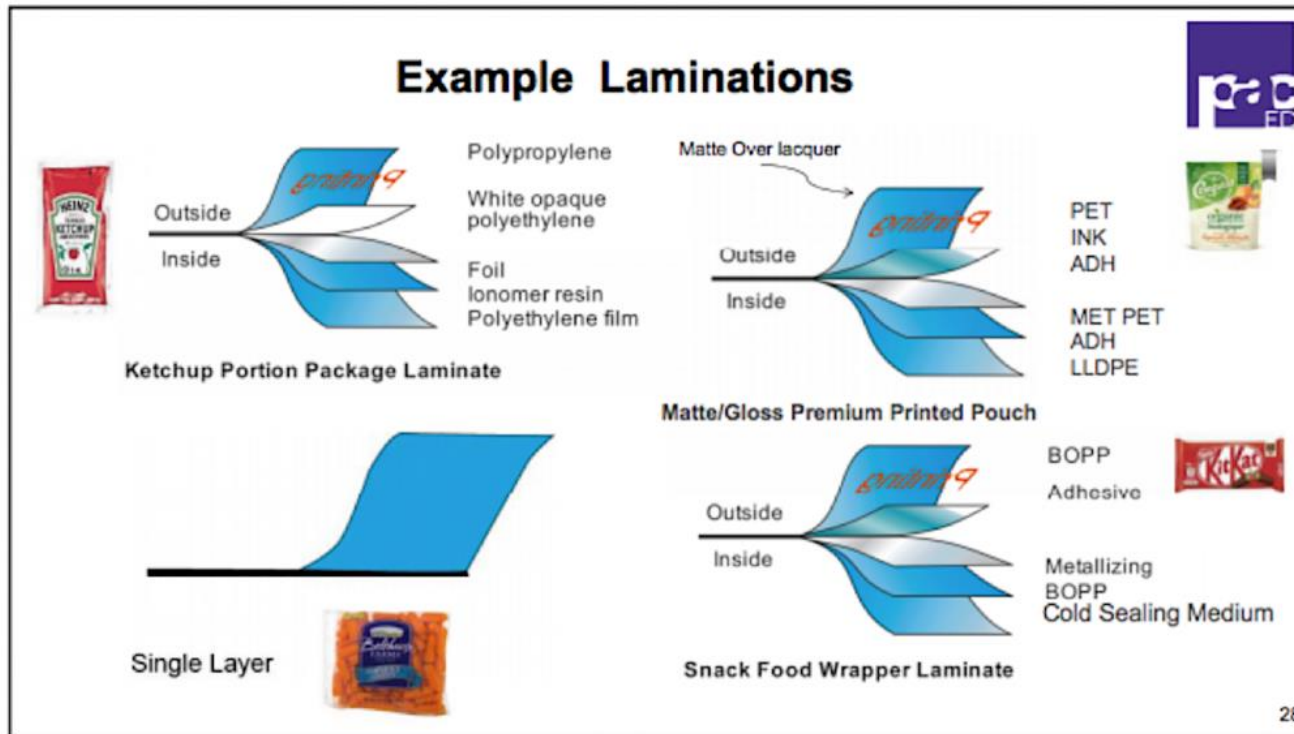
# Customer Requirements

## Packaging Standards

- Leverage predetermined standards where possible as opposed to creating your own. (i.e. ASTM)

**Innovate and measure with these standards in mind.**

# Flexible Packaging Structures - Layers





# Flexible Packaging Structures - Materials

Material	Polyester (PET)	Nylon (6 / 6,6)	Polypropylene (PP, OPP)	Cellulose (CLS)
<b>Description</b>	A durable but affordable film that is highly versatile	A high viscosity thermoplastic that holds its properties well under heat	Cost-effective film with high melting point, tensile strength, and clarity; most used film in food and beverage packaging	A plastic-free film made of wood pulp
<b>Common Uses</b>	Food packaging; industrial; electrical, etc...	<b>Mechanical barrier</b> ; tear resistance; good oxygen barrier	<b>Alternate layer construction</b> ; sterilization and boiling applications; moisture barrier	Eco-conscious packaging; <b>easy tear applications</b>
Material	Polyethylene (PE, LDPE, HDPE)	Metalized Barrier (METPET, VMPET, MET-OPP)	Aluminum (AL) Foil	Ethylene-Vinyl Alcohol Copolymer (EVOH)
<b>Description</b>	A pliable, elastic film often combined with other materials; varies greatly depending on polymer chains	Created by coating film with a thin metallic layer (typically aluminum)	Highly effective but expensive metal film that extends shelf life	A flexible, clear plastic with excellent crack resistance; can also be a coating
<b>Common Uses</b>	Acidic/basic products; chemical packaging; <b>heat seal layer</b>	<b>Moisture and gas barrier</b>	<b>BEST Moisture and gas barrier</b> ; ranges from 2-40 microns; dead fold	Gas barrier

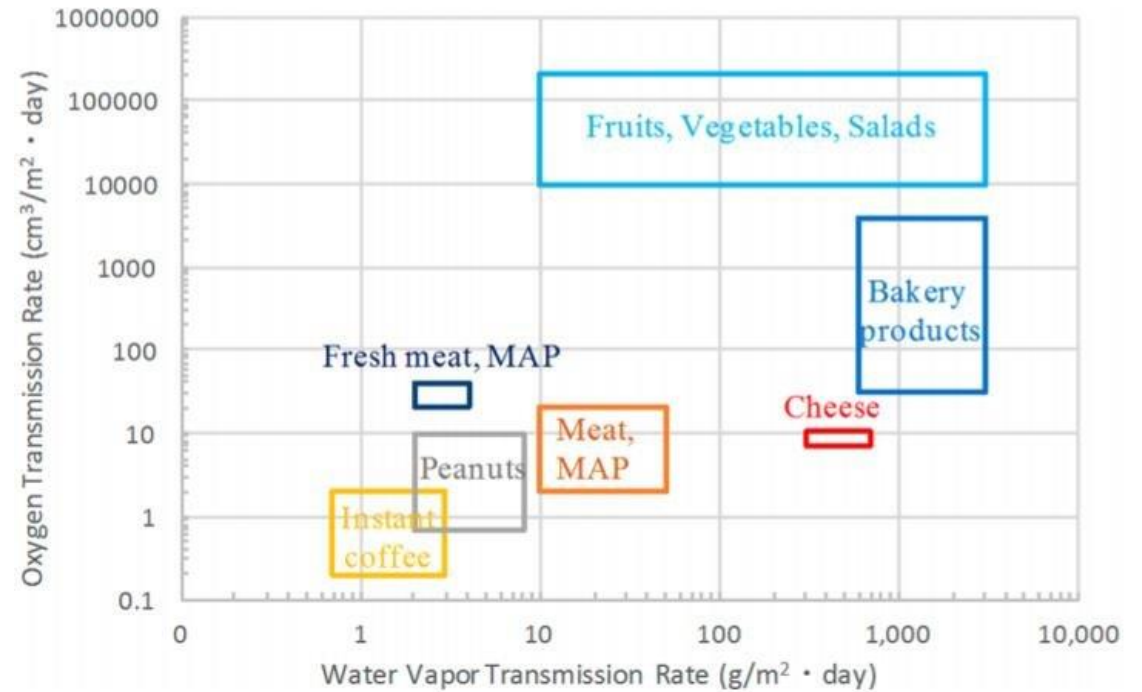
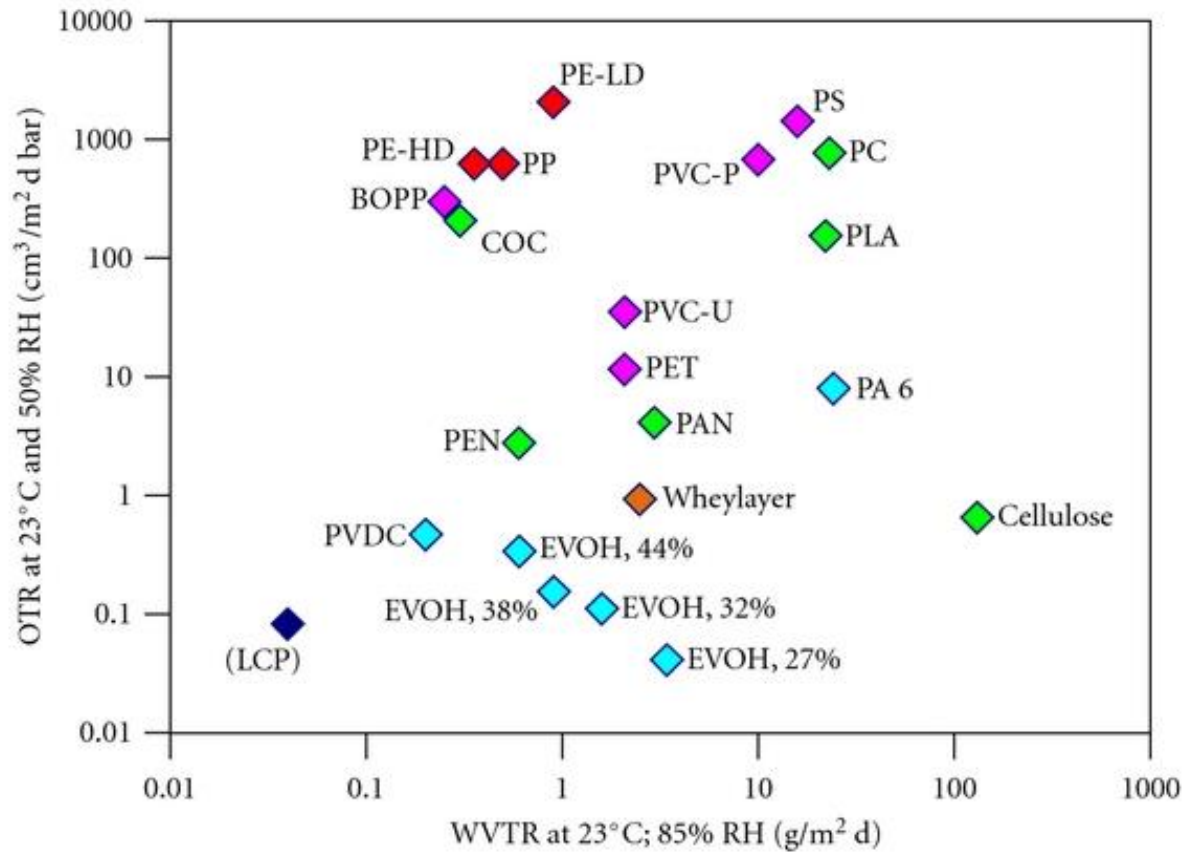
# Flexible Packaging Structures - Materials

	Tensile strength @ Break (psi)	Elongation @ Break (%)	Melting Point (C)	Density (g/cm <sup>3</sup> )	Heat Shrinkage (%) (150C @ 30 min)	Surface Energy (Dyne)	WVTR (g/100in <sup>2</sup> /24hrs)
Polyester (PET) @ 48ga	40,000	115	260	1.23-1.38	2.0	30-32	1.0 – 1.3
Nylon 6,6	6,000 – 12,000	60	269	1.15	Continuous service temperature 200 - 210F	>40	3.72 - 500
Polypropylene (PP) @ 80ga	25,000	95	161	0.905	MELTS	29-32	0.20 - 0.40
Polyethylene (PE) @ 80ga	5,800-7,000	600	110	0.91-0.97	MELTS	31-32	0.3 – 1.5
Cellulose (CLS)	5,000 – 8,000	20	265	1.5	-	40-46	0.3-0.5
Aluminum Foil	13,000-100,000	8	660	2.71	STABLE	>45	0.05

# Flexible Packaging Structures - Barriers

Barrier Type	Description	Common materials	Common Applications
Moisture	Prevents the transmission of liquids, vapors, and humidity	OPP, METPET, AL	Powders
Gas	Prevents the transmission of oxygen and other gases	EVOH, AL, METPET	Dehydrated goods, chips
Mechanical	Prevents the structure from being punctured or crushed	PET, Nylon	Nuts, frozen goods
Light	Prevents UV radiation from penetrating the structure	PAPER, AL, METPET, INK	Salty snacks, fat
Chemical	Prevents caustic substances from leeching through the package	PE, LDPE, HDPE	Cosmetics, cleaning solutions

# Flexible Packaging Structures - Barriers



# Final Thoughts on Successful Entry

- Partner with people that will help you learn, challenge your thinking, and provide ongoing support.
- You don't simply "train someone up" in flex pack. Learning will happen by exposure and osmosis.
- Risk rolls uphill in the value chain; be careful about your food safety decisions.
- Crawl, walk, run. Flex pack is hard but very rewarding!

Thank You!

