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Mr Ulich
Vongrianthong
Business Manger
Specilaty, Asean
Klöckner Pentaplast



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- **Substrates and their usage**

- Exploring shrinkable film types and their characteristics
- Understanding usage considerations
- Performance requirements and special feature films



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- *Choosing the Right Shrink Label*
- *Substrate Can Be Confusing*

Polymer choice,



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PVC

White Opaque

oPS

Polyolefin

PETg

Hybrid/Multilayer

Polymer choice, each with unique properties,



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Squeezability

PVC

Shrink Force

White Opaque

Print Quality

oPS

Max Shrink

Natural Shrinkage

Polyolefin

Scuffing

PETg

Smiling & Frowning

Hybrid/Multilayer

Relaxation

Polymer choice, each with unique properties,
and other project-specific considerations



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Squeezability

My products get banged up in shipping

My container has an oddly-shaped nozzle
PVC

Shrink Force

White Opaque

Print Quality

My product is light-sensitive

oPS

*I need something that will
stand out on the shelf*

Max Shrink

I have to be able to recycle

Natural Shrinkage

My customers want to see the product

Polyolefin

*My containers are filled
before labels go on*

Scuffing

PETg

Smiling & Frowning

*My top-shelf product can't
have a sloppy label*

Hybrid/Multilayer

My customers hate crinkling

Relaxation

Polymer choice, each with unique properties,
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Relaxation

So let's take a step back

*...and Start with
The Container*



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Fundamental Questions



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What is the Max Shrink required?

High or low Shrink Force?

Shrink Tunnel effects?

What other things do I need to consider?



Max Shrink required



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The Formula:

1
$$\frac{\text{Container Shape Narrowest Diameter}}{\text{Widest Diameter} + \text{LF oversize}}$$

Container Contours

% Shrink Needed

And then add a couple of % for “safety”



Shrink force considerations



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Container contours/ribs

Container wall thickness

Full or empty container

Tunnel type



Shrink tunnel effects



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‘Relaxation’

Smiling/Frowning

Wrinkles



Other considerations



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Does the Brand Owner accept PVC?

Is light blocking required?

Is ultraviolet detection required?

How will the product be transported?

Recyclability





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Label Film Types & Characteristics

PVC(Polyvinyl Chloride)

Characteristics

“Old reliable”: PVC is the traditional mainstay of film labels

Processes and handles well

Accepts all kinds of printing

Can meet UV protection & optical brightener needs

May not conform to brand's environmental standards

Technical Details

Shrinkage: 50%-60%

Shrink Force: Moderate

Relaxation: Poor

Smile/Frown Resistance: Poor

Scuff Resistance: Fair

Squeezability: Poor

Natural Shrinkage: Good

Printing: Good



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PETg(Polyethylene Terephthalate, glycol-Modified)



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Characteristics

Clear Film

Has highest max shrinkage of all films

Commonly used when PVC isn't an option

Processes and handles well

Excellent printing surface

Can meet UV protection & optical brightness needs

Works well in steam tunnels

Technical Details

Shrinkage: 75%+

Shrink Force: Moderate to High

Relaxation: Poor

Smile/Frown Resistance: Depends on grade

Scuff Resistance: Excellent

Squeezability: Poor

Natural Shrinkage: Good

Printing: Excellent

White Opaque(non-clear PETg)



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Characteristics

Several versions on market

Glossy and matte options

Needs surface printing & over-print varnish

Black reverse (printed or BiColour) needed for light blocking

Technical Details

Shrinkage: 75%+

Shrink Force: Moderate to High

Relaxation: Poor

Smile/Frown Resistance: Depends on Grade

Scuff Resistance: Excellent

Squeezability: Poor

Natural Shrinkage: Good

Printing: Generally good, but matte versions sometimes have challenges in rotogravure

OPS(Oriented Polystyrene)



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Characteristics

Clear film with niche uses

Less "vibrant" printing than PET

Tricky to process; very delicate handling required

Needs care when printing with solvents, roto-gravure printing requires less acetate as it attacks OPS

Good in Hot Air Tunnels

Weak product resistance against oils and chemicals

Technical Details

Shrinkage: 55%-65%

Shrink Force: Very Low

Relaxation: Excellent

Smile/Frown Resistance: Excellent

Scuff Resistance: Poor

Squeezability: Excellent

Natural Shrinkage: Poor

Printing: Needs Care

PO(Polyolefin)

Characteristics

Clear, floatable film with moderate clarity

Prints reasonably well; needs corona treatment

Generally chosen for APR (US) or EPBP (EU) recyclability
shrink sleeve standards for PET containers

Sometimes chosen for other properties, such as anti-
“crinkling”

Technical Details

Shrinkage: 50%-60%

Shrink Force: Low

Relaxation: Good

Smile/Frown Resistance: Excellent

Scuff Resistance: Poor

Squeezability: Excellent

Natural Shrinkage: Fair (but needs care)

Printing: Good



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Hybrid/Layered(Multi-Polymer)



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Characteristics

Clear film combining advantages of PET & oPS

Excellent printing surface

Good in Hot Air Tunnels

Good product resistance against oils and chemicals

Technical Details

Shrinkage: ~65%-70%

Shrink Force: Low

Relaxation: Good on HDPE containers

Smile/Frown Resistance: Very Good

Scuff Resistance: Excellent

Squeezability: Good

Natural Shrinkage: Fair

Printing: Excellent

Summary of Film Characteristics



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| | Shrinkage | Shrink Force | Relaxation | Smiling | Scuffing | Squeezing | Natural Shrinkage | Printing |
|---------------------------------|-----------|---------------|------------|------------------|-----------|-----------|-------------------|------------|
| <i>PVC</i> | 55%-65% | Moderate | Poor | Poor | Fair | Poor | Good | Good |
| <i>PETg (inc. White Opaque)</i> | 75%+ | Moderate-High | Poor | Depends on Grade | Excellent | Poor | Good | Excellent |
| <i>oPS</i> | 55%-65% | Very Low | Excellent | Excellent | Poor | Excellent | Poor | Needs Care |
| <i>Hybrid/ Layered</i> | 65-70% | Low | Good | Very Good | Excellent | Good | Fair | Excellent |
| <i>PO</i> | 50%-60% | Low | Good | Fair | Poor | Good | Needs Care | Good |



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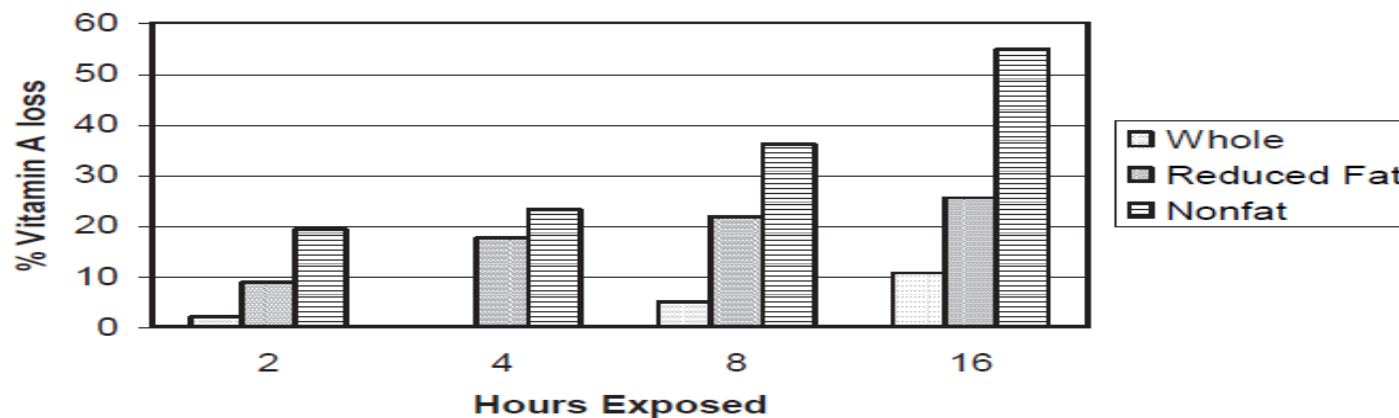
Sample Decision Journey

If you are looking for

- Extending Shelf life
- Reducing extra flavor
- Reducing extra Vitamin
- Minimizing off flavor







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European Model - Total Packaging Cost



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| Rough Cost comparison |  |  |  |  |
|-----------------------|---|--|---|---|
| | Transparent PET | TiO ₂ Pigmented HDPE | Multilayer HDPE | Transparent PET + barrier film (eklipse™) |
| Light Transmission | 90% | 10% | 0% | <1% |
| Shelf Life | 5 Days | 10 Days | >21 Days | >21 Days |
| Cost per 1000 pcs | €85 | €100 | €120 | ? |

*Source: University of Kempten/Fraunhofer Institute, Freising

Answer

- Barrier bottle
- Barrier film



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Existing white PET / HDPE bottle NOT 100% light Barrier



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❑ White PET bottle

- High ratio bottle defects in blowing process
- Lower the line speed to reduce the high ratio defect
- Not 100% light barrier
- The more TiO_2 you put, the higher bottle cost would be



❑ White HDPE bottle

- Sleeve loose feeling (relaxation issue)
- Not 100% light barrier
- To gain the same light barrier effect, the wall of HDPE bottle is much thicker than PET bottle, this makes HDPE bottler cost higher
The more TiO_2 you put, the higher bottle cost would be

White Opaque PETG Works Can Really Help You With Visual Effect & Light Blocking



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- White opaque petG film has 76% high shrinkage Very good light barrier property
- Differentiate your label image
- Provides premier packaging image
- Ideally for labelling on dairy related products



Cases in commercial supply



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Thanks you
&
See you at Booth # H98C29