



DuPont Packaging Solutions

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Application Development Leader, TMENA
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Our Agenda today

- **Who are we ?**
 - DuPont
 - Packaging and Industrial Polymers
- **Concept of collaboration**
- **Key Drivers In The Flexible Packaging Market**
- **Value Of New Machine Concepts**
 - Traditional processing (Cast- and blown film)
 - Triple Bubble[®]
- **Value for you**



Our Purpose

DuPont is a Science Company

We work collaboratively to find sustainable, innovative, market-driven solutions to solve some of the world's biggest challenges, making lives better, safer, and healthier for people everywhere.

DuPont Segments, Businesses and Core Markets



DuPont Agriculture

DuPont Pioneer | Crop Protection

Core Markets:

Seeds | Agricultural Chemicals



DuPont Nutrition & Health

Core Markets:

Food & Nutrition Products



DuPont Industrial Biosciences

Core Markets:

Industrial Enzymes | BioBased Materials



DuPont Electronics & Communications

Core Markets:

Photovoltaics | Consumer Electronics |
Advanced Printing | Displays



DuPont Performance Chemicals

Titanium Technologies | Chemicals &
Fluoroproducts

Core Markets:

Industrials & Chemicals | Construction |
Specialties | Plastics | Transportation



DuPont Performance Materials

Performance Polymers |

Packaging & Industrial Polymers

Core Markets:

Transportation | Industrial | Packaging |
Electrical/Electronics



DuPont Safety & Protection

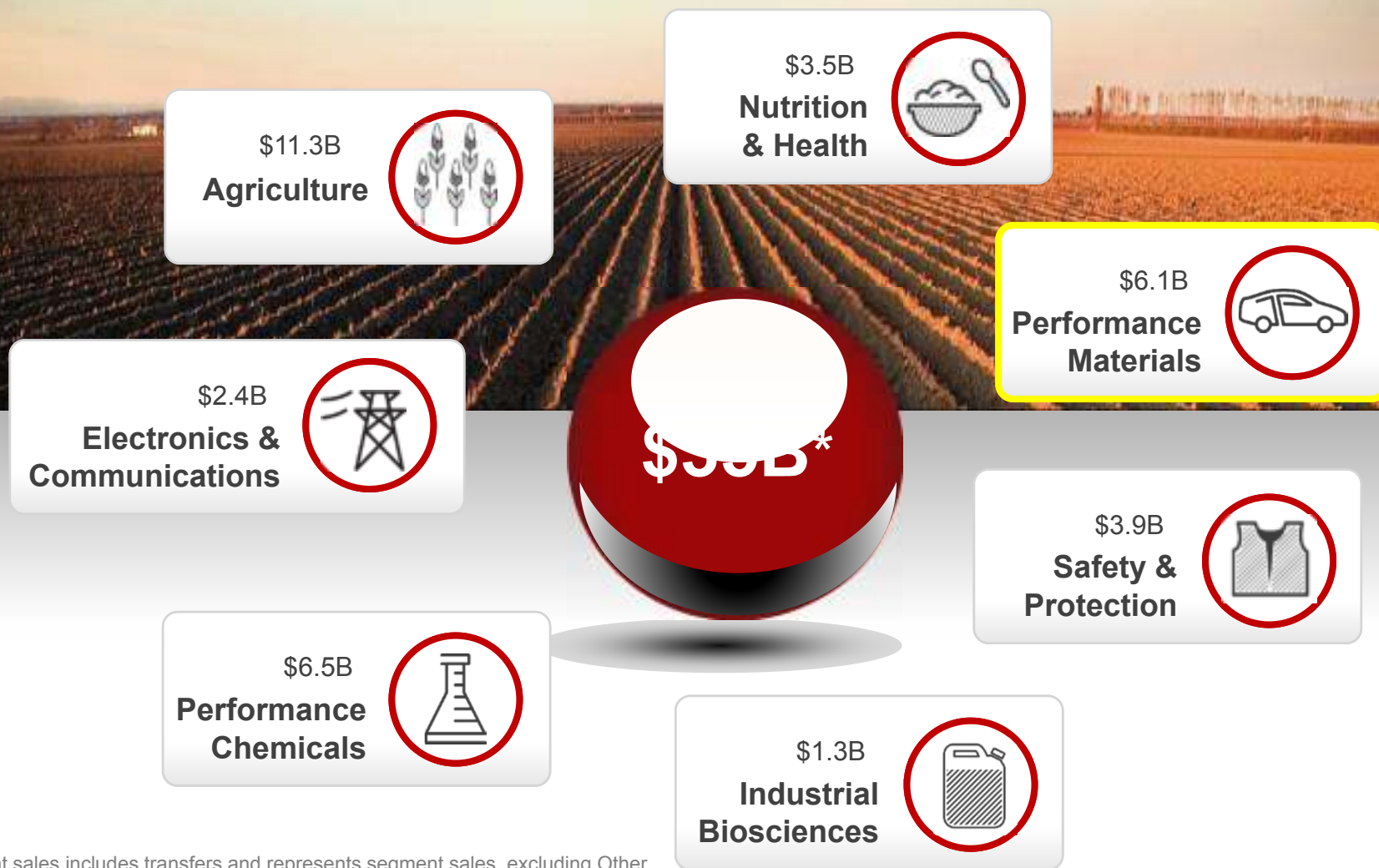
Protection Technologies | Building
Innovations | Sustainable Solutions

Core Markets:

Industrial | Construction | Military & Law
Enforcement | Transportation | Consumer



DuPont 2014 Segment Sales



* Segment sales includes transfers and represents segment sales, excluding Other.



13 INNOVATION CENTERS



**DuPont scientists and experts foster collaboration
around the globe.**



Packaging & Industrial Polymers Product Categories

Sealants

- Appeel® Lidding Resins
- DuPont™ 20's Polyethylene Resins
- Elvaloy® AC Acrylate Copolymer Resins
- Elvax® Ethylene Vinyl Acetate Resins
- Nucrel® Acid Copolymer Resins
- Surlyn® Ionomer Resins

Adhesives

- Bynel® Adhesive Resins
- Elvaloy® AC Acrylate Copolymer Resins
- Elvax® Ethylene Vinyl Acetate Resins
- Nucrel® Acid Copolymer Resins

Barrier Technology

- Selar® PA Amorphous Nylon Resins

Molding & Forming Resins

- Surlyn® Ionomer Resins
- Biomax® PTT Polytrimethylene Terephthalate Resins
- DuPont™ 20's Polyethylene Resins

Modifiers and Processing Aids

- Biomax® Strong & Biomax® Thermal Modifier Resins
- Booster™ Throughput Enhancer
- DuPont™ DPE 6611 Purge Resin
- Elvaloy® and Elvaloy® AC Acrylate Copolymer Resins
- Conpol® Masterbatch Resins
- Fusabond® Compatibilizer Resins
- Entira™ AS Anti Static Modifier Resin



Food & Beverage Packaging

Food security and consumer convenience are key drivers for growing global demand

Meat Packaging

Improved safety
and shelf-life



Dry Foods Packaging

Waste reduction and
productivity improvements

Dairy Packaging

Easy-open and consistent

Beverages

Improved shelf life

Trends and Growth Drivers

Food Security

Extend shelf life, improve safety

Convenience

Portion control

Re-sealable Structures

Reduce waste, consumer convenience

Emerging Middle Class

Higher consumption of processed foods
in developing regions

Equipment Innovation

Creating challenges and opportunities
for differentiated functional resins

Reduce, Recycle

Driving flexible, down-gauging,
recycling, renewables

Appeel®

Bynel®

Elvaloy®

Elvax®

Nucrel®

Surlyn®

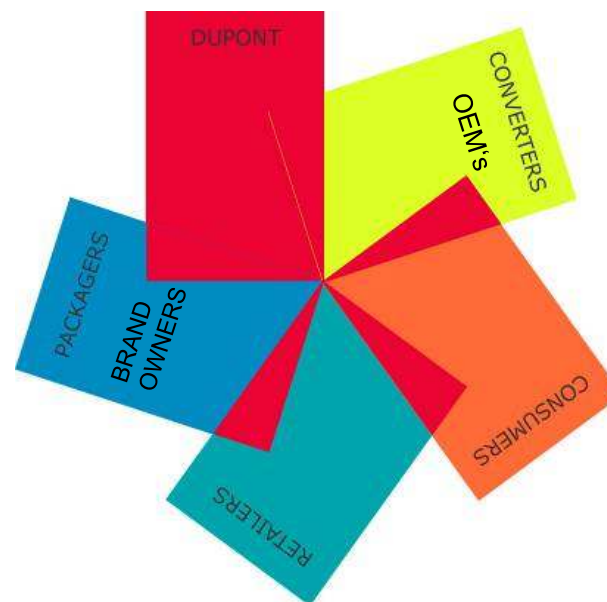
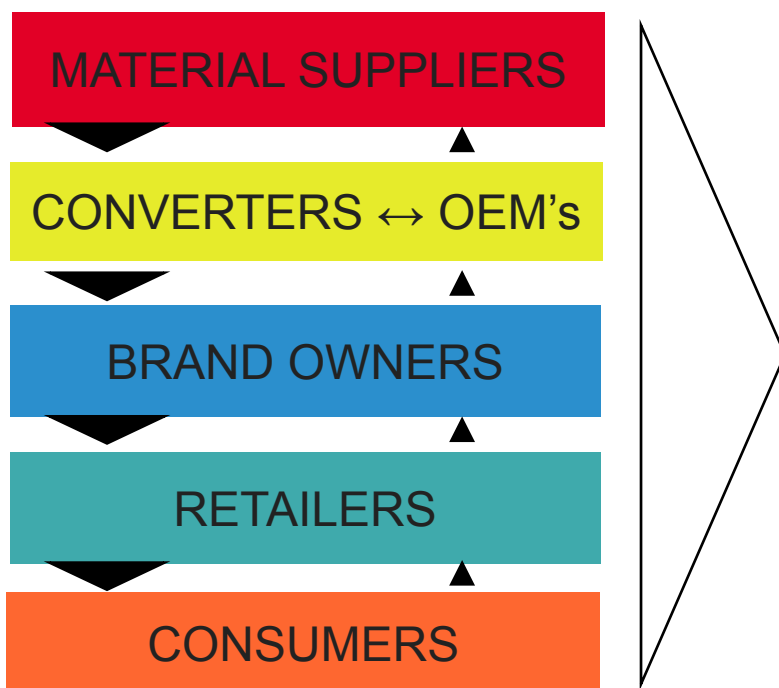


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Traditional Approach

Our Integrated Approach



Limited collaboration and innovation,
low value and high cost

More innovation, increased speed to
market, higher value and lower cost





Key drivers in the flexible packaging market

- **Reduce packaging weight**
- **GHG and CO₂ reduction**
- **No compromise on quality and performance**
- **Less defects in production, filling, transport and POS**
- **Peace of mind concept**
- **Best possible consumer perception**



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Let's see What OEM and Converters are doing !!!



Value of new machine technology

- **THE Standard:**
 - 3, 5 and 7 layers in cast- and blown-film
- **What is the value of 9, 11 and maybe 13 layer cast- and blown-film lines**
- **Orientation technologies: Innovation or old stuff?**
 - Tenter frame
 - Triple Bubble®

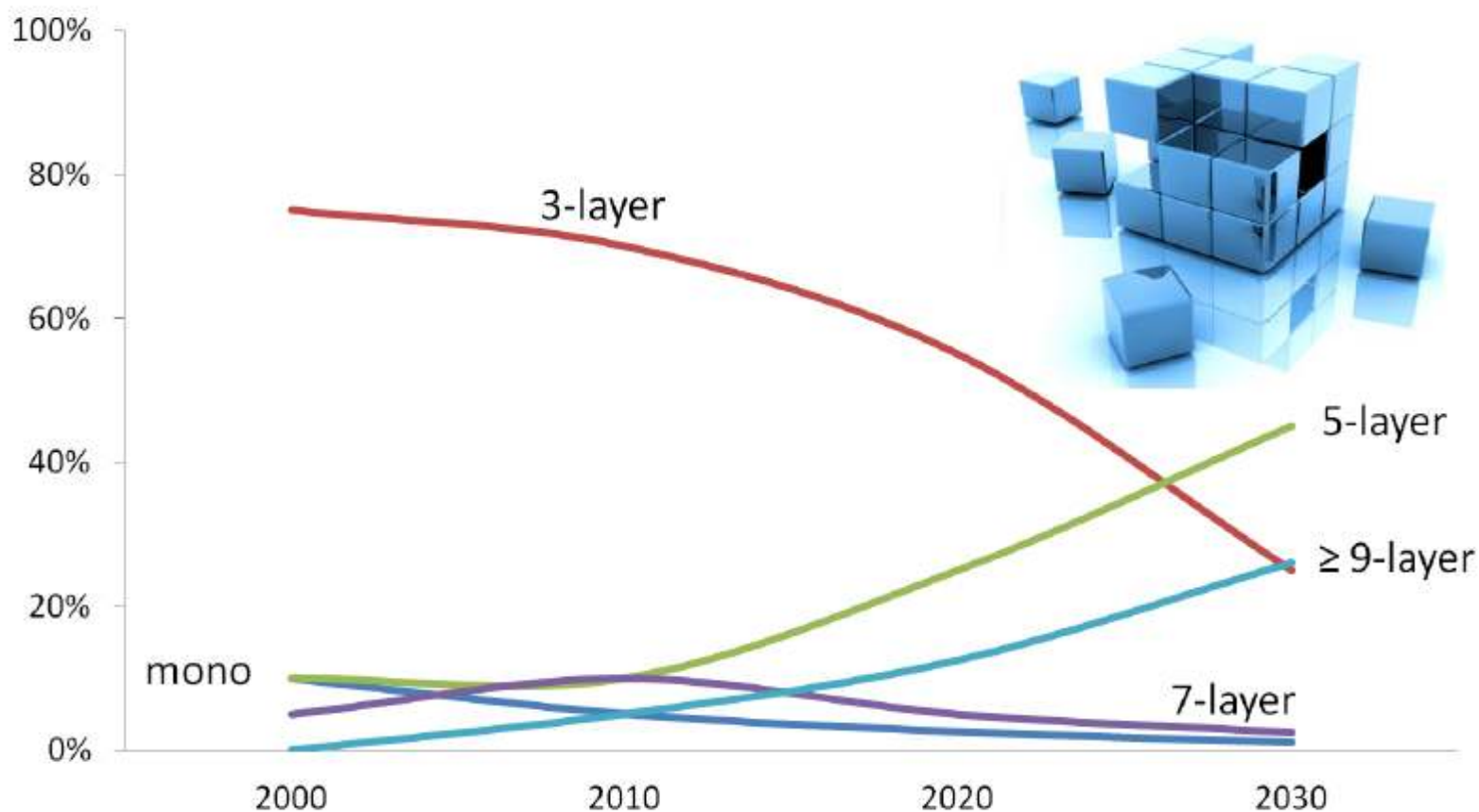
Questions:
What are the drivers?
Why is this of interest for a raw material producer?

Trends in Blown Film

Blown Film Machinery

New Machine Types Development – RK Estimate

Reifenhäuser
KIEFEL EXTRUSION



Courtesy of Reifenhäuser-Kiefel Extrusion



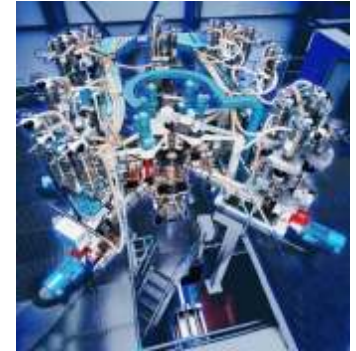
9 and more layer cast- and blown film

What is the value proposition?

- **Split the outer layers**
 - Use less of expensive raw materials
 - Use the best possible material as a sealant
 - Use lower cost materials as bulk layers
- **More freedom on structure design**
 - Downgauging due to smart use of raw materials
 - Option for new innovative structures
 - Asymmetrical barrier structures
- **Bottom line: Cost reduction**

Triple Bubble® Downgauging*

- **Requires a round and almost fully amorphous film.**
- **Simultaneous biaxial orientation in a kind of blown film coextrusion technique making it possible to use very dissimilar polymers in one structure**
 - Up to 13 layers
- **Designed to produce extremely thin yet very tough films which can either shrink (shrink bags) or offer superior dimensional stability for high quality prints in sachets, lids, etc.**
 - Up to 50% thinner than standard adhesive laminates
 - Bi-orientation considerably enhances barrier and mechanical performance of the film



* Triple Bubble® is a registered trademark of Kuhne Anlagenbau Germany

Reduce packaging weight

Help make a serious saving

Less Water **Less Packaging** **Less Energy**

Future Friendly

TURN TO 30

ARIEL

FAIRY

Flash

Lenor

WaterWise

Waste Watch

energy saving trust

Ariel – Ariel Turn to 30, energy saving and brilliant cleaning. Fairy Liquid – SAVE BOTTLES Longer-Lasting for less Packaging. Flash – Flash works even in cold water; brilliant cleaning and energy saving. Fairy Active Bursts – Choose eco cycle with Fairy for energy savings and brilliant cleaning. Lenor – Lenor concentrate uses 70% less packaging per wash when compared to regular Lenor.

Len Sauers, PhD
Vice President, Global Sustainability
The Procter & Gamble Company



Reduce packaging weight

Basic principles for Blown film: FFS

Standard is often:

- **Stiff outer layer (PA) and soft sealant (PE, m-PE, PP)**
- **PA/...../m-PE**

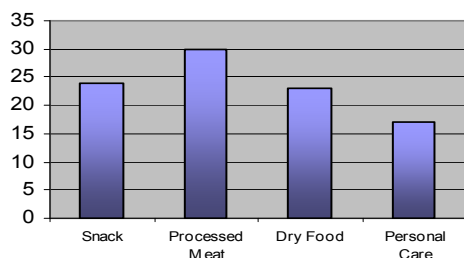
New structure design:

- **Stiff outer layer = Standard**
- **Stiff Sealant = Surlyn® = NEW !!!**
- **PA/...../SURLYN®**
- **Results: Stiffer structures**
- **Allows downgauging and keep performance**

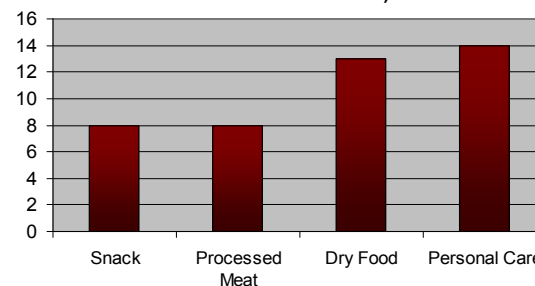


Downgauging with Surlyn®

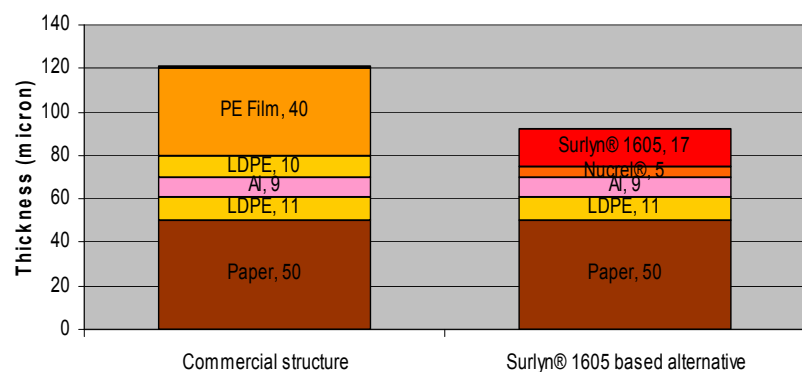
Reduced Weight
(% Weight Reduction)



Reduced Cost
(% Cost Savings compared to standard structures)

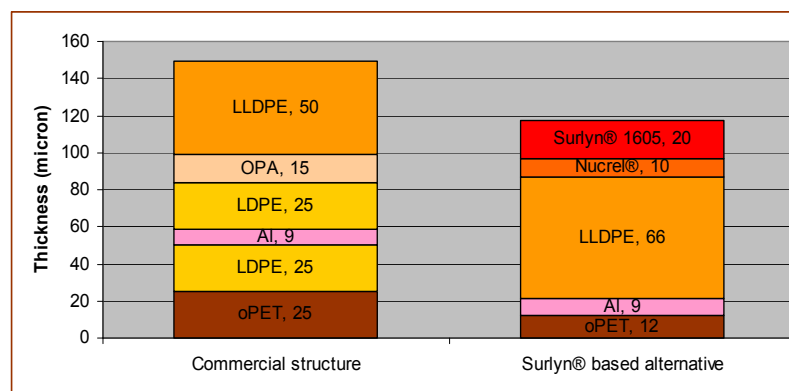


Dry Food: Paper Based sachets



23% Weight Reduction

Personal Care : Liquid soap sachet



17% Weight Reduction



**What are the other applications that
DuPont is aligned with Key drivers ?**

What are the values for you ?



DuPont™ Appeel® Peelable Sealant resins

Value Proposition:

- **Consumer Satisfaction**
 - **Controlled peel force**
 - **No tearing of lids**
 - **No deformation on Pots**
- **Lower Packaging Cost**
 - **Improved line efficiency**
 - **Reduction of leakers and re-work**
- **Reduced Environmental Footprint**
 - **Solventless sealant system**
 - **Lower seal temperature**





Easy Open Pouches using SURLYN® Burst Peel Concept

•SURLYN® Burst Peel concept :

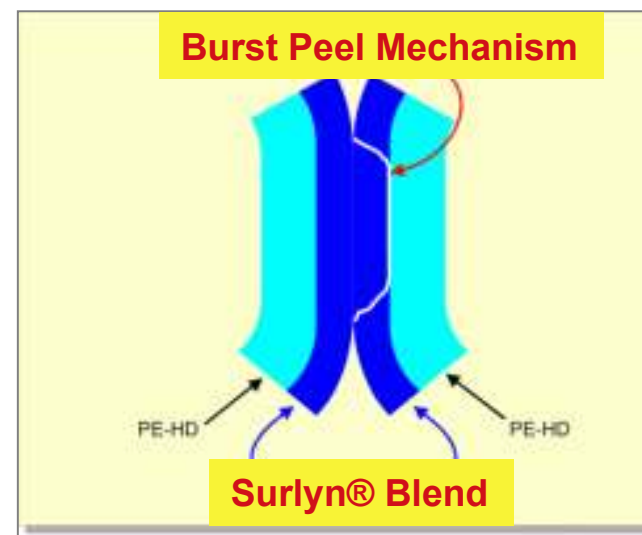
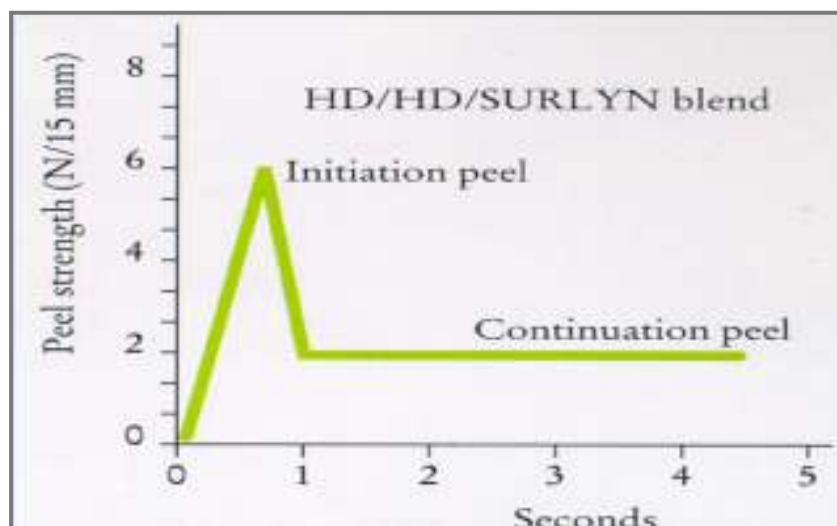
- Special combination of SURLYN and HDPE provides an easy open mechanism by controlled delamination

•Properties:

- Outstanding Heat Sealing Properties (Hot-Tack)
- Strong peel initiation Force
- Perforation and abrasion resistance

Benefits :

- Faster line speed
- Transport safety
- Easy-open
- No tear propagation outside seal area





Dual Compartment Pouch with Frangible Seal

A Breakthrough in On-the-Go Food Packaging

- A pouch with two or more compartments, separated by a frangible seal.
- Squeezing the pouch bursts the internal seal allowing the content of the compartments to mix, without disturbing the outside seal.



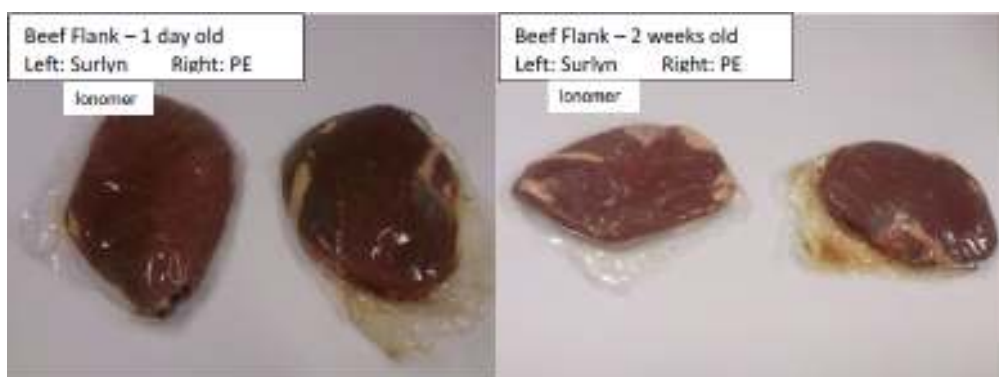
When you think of Frangible Pouch, think:

- ✓ **FOOD SECURITY**
- ✓ **LONGER SHELF-LIFE WITHOUT REFRIGERATION**
- ✓ **FAST AND CLEAN MIXING**

Improvement of odor and appearance in meat packaging

Vacuum packed meat is a growing trend, is reducing packaging size and increasing shelf life , BUT

- Color will change from red to purple
- Meat loses drip
- Micro organism will grow
- Release of a vacuum smell odor



Surlyn® Provides in Meat packaging when used as a sealant

- Excellent secondary sealing
- Superior meat adhesion and less drip loss
- Lower Odor through slower bacteria growth
- And eventually a potential to increase shelf life
- Together with conventional sealant properties such as
- Superior Hot Tack and Sealing through contamination
- Transparency

Collaboration is Central to Our Success

Traditional Approach



Our Approach



We have the science capabilities and disciplined processes to meet customer needs and help customers grow.



THANK YOU !!!



The miracles of science™

The technical data contained herein are guides to the use of DuPont resins. The advice contained herein is based upon tests and information believed to be reliable, but users should not rely upon it absolutely for specific applications because performance properties will vary with processing conditions. It is given and accepted at user's risk and confirmation of its validity and suitability in particular cases should be obtained independently. The DuPont Company makes no guarantees of results and assumes no obligation or liability in connection with its advice. This publication is not to be taken as a license to operate under, or recommendation to infringe, any patents.

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