

New High-Performance SURPASS[®] Linear PE Film Resins from NOVA Chemicals



Dan Ward
Maack SPF 2007
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Discussion Topics

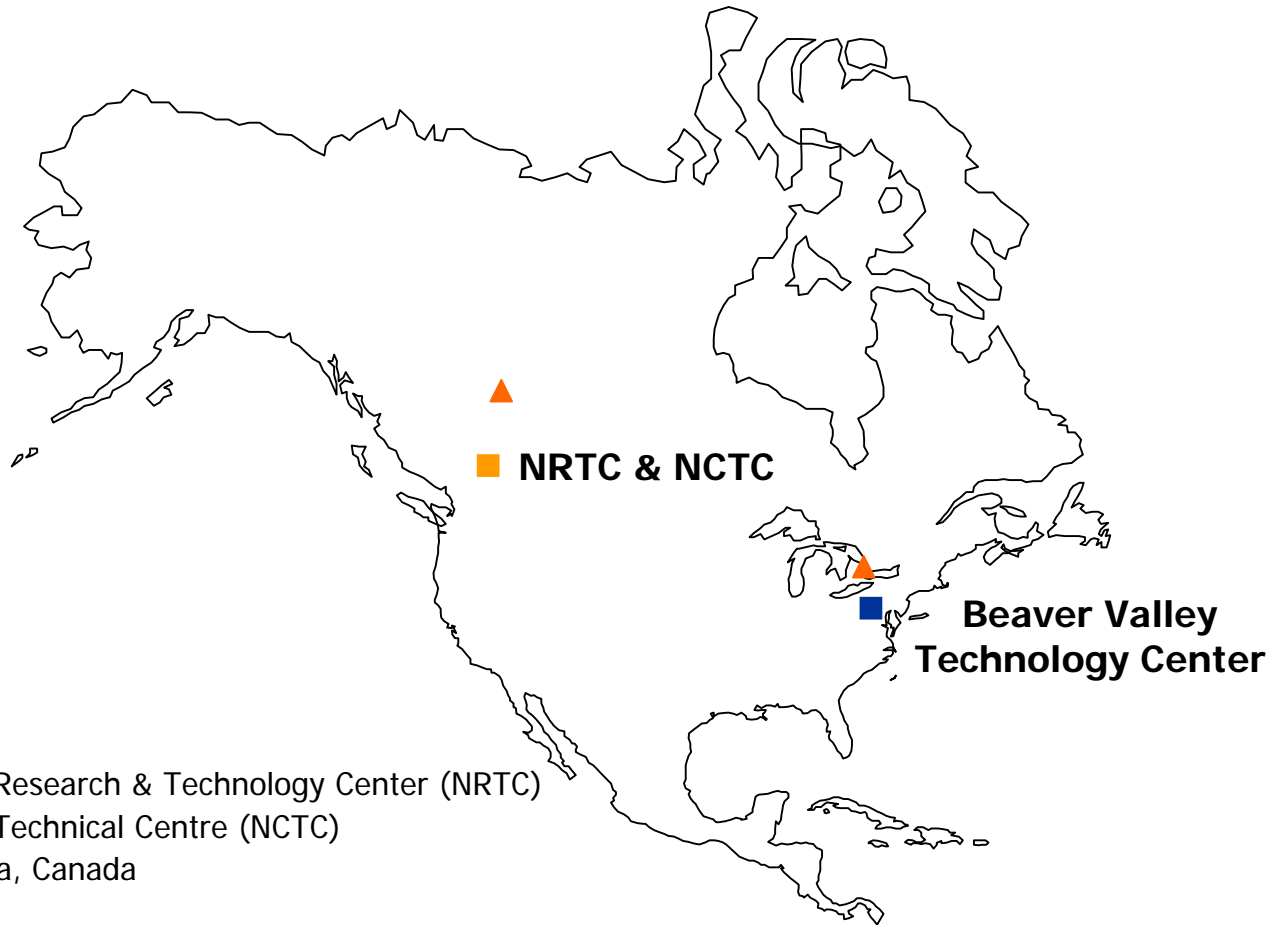
- Overview of NOVA Chemical's ADVANCED SCLAIRTECH™ Process and Octene LLDPE products.
- SURPASS® HPs167-A High Barrier sHDPE homopolymer
- SURPASS® FPs016-C Versatile Octene sLLDPE

NOVA Chemicals Business Units after expansion of JV with INEOS

NOVA Chemicals		Expanded JV
Olefins/Polyolefins	Performance Styrenics	
Ethylene	ARCEL [®] Resin	Styrene Monomer
Co-Products	New Business Ventures	Solid Polystyrene
Polyethylene	Expandable Polystyrene	DYLARK [®] , ZYLAR [®] , NAS [®] Avantra [®] Specialty Polystyrene
Advanced SCLAIRTECH [™] Polyethylene	Styrene Monomer Equity Position	European Solid and Expandable Polystyrene

* Avantra is a registered trademark of INEOS

Research & Technology Centers

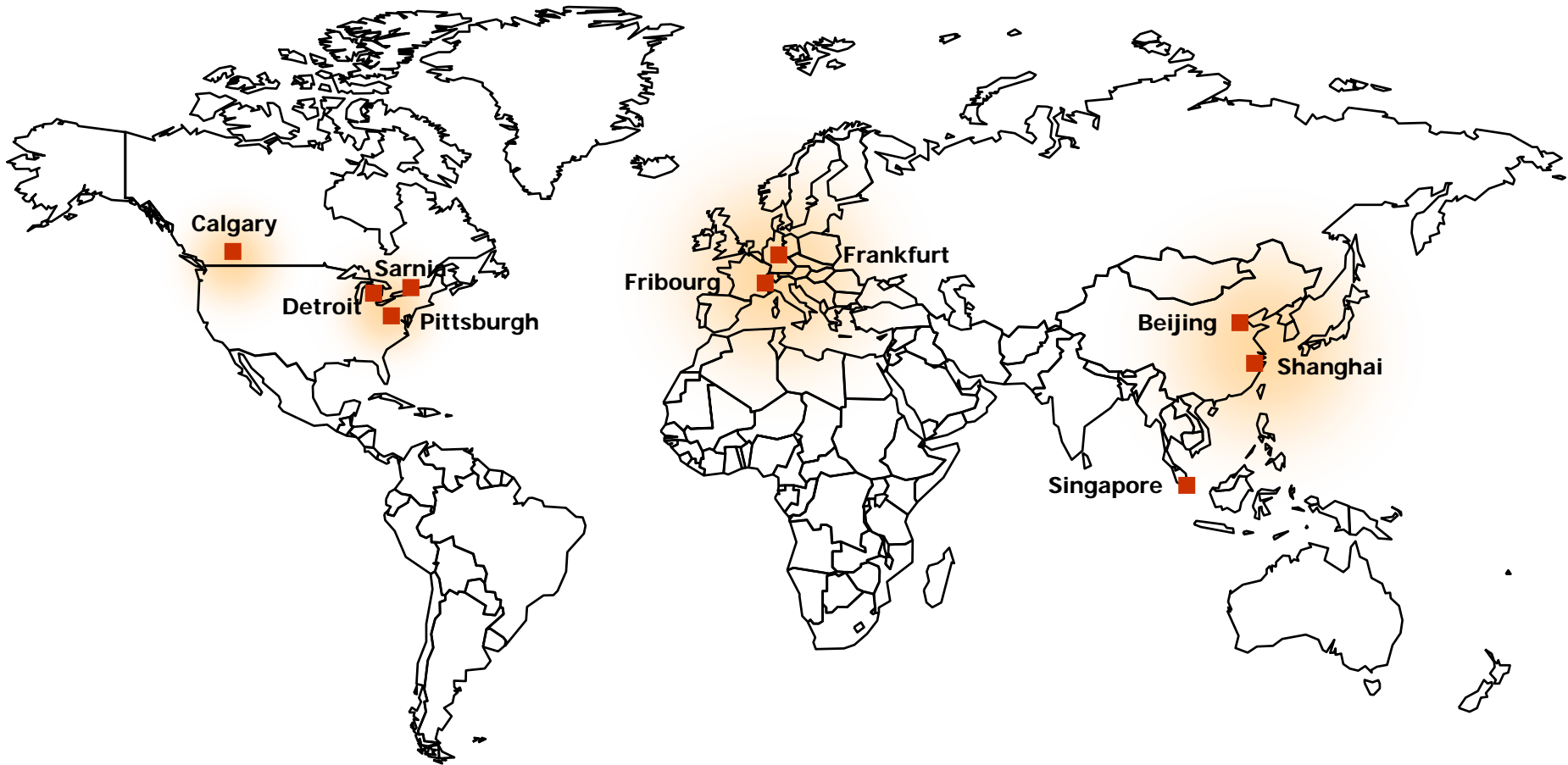


■ NOVA Chemicals Research & Technology Center (NRTC)
■ NOVA Chemicals Technical Centre (NCTC)
— Calgary, Alberta, Canada

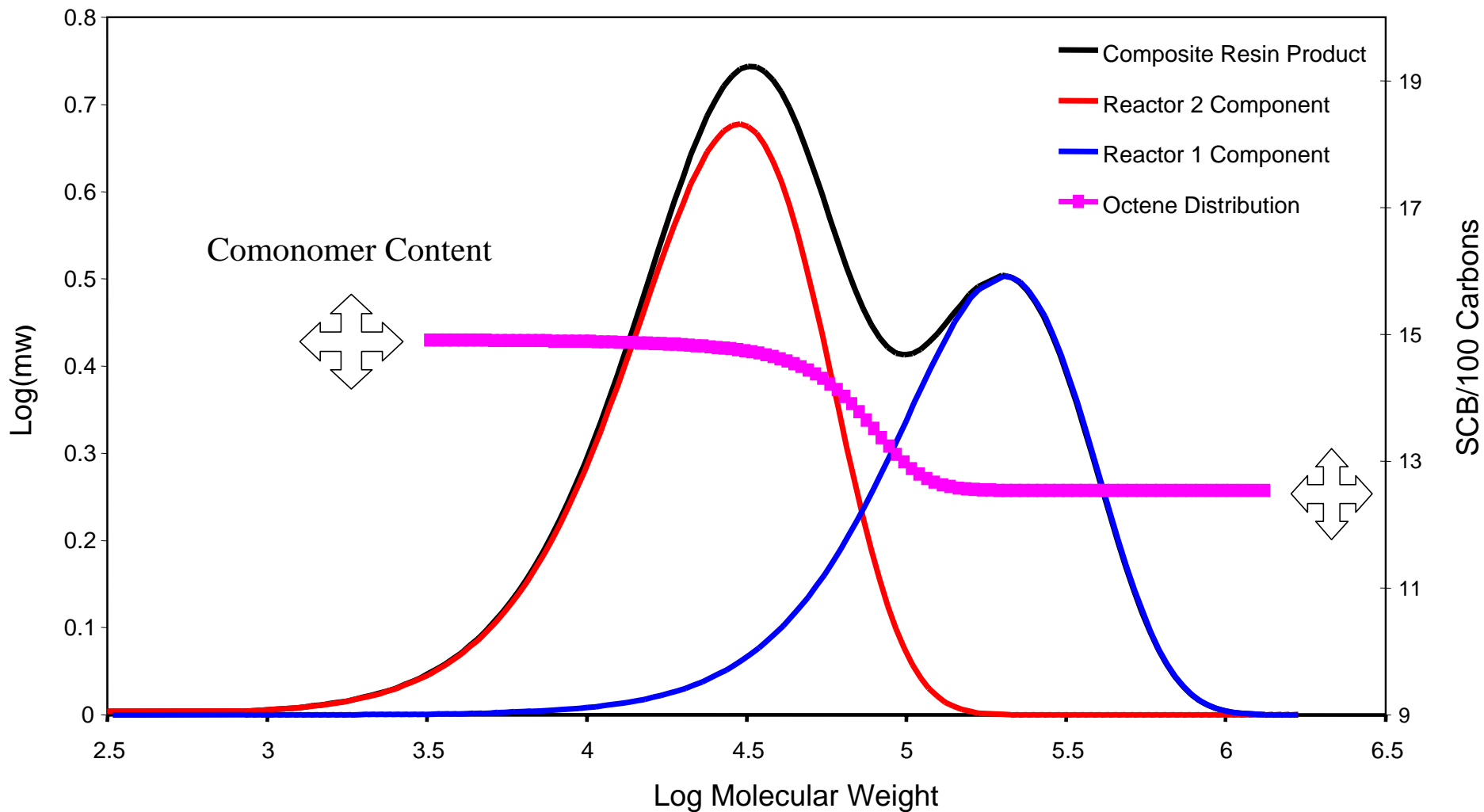
■ Beaver Valley Technology Center & Pilot Plant
— Monaca, Pennsylvania, USA

▲ NOVA Chemicals Ethylene/PE Manufacturing Sites

Sales Offices



ADVANCED SCLAIRTECH™ Dual Reactor Capability



SURPASS® FILM RESINS MADE FROM ADVANCED SCLAIRTECH™ PROCESS TECHNOLOGY

- SURPASS® HPs167-A
- SURPASS® FPs016-C

SURPASS® HP167-A

High Barrier sHDPE Homopolymer

- Polyethylene: sHDPE Homopolymer
- Catalyst: NOVA Chemicals Single Site Catalyst
- Density: 0.966 g/cm³
- Melt Index: 1.2 dg/min
- MVTR: 3.7 grams/meter²-day

Measured on 25.4 µm monolayer blown film following ASTM F1249-06.

HDPE Permeability is Affected by Processing Conditions

Draw rate

Blow up ratio

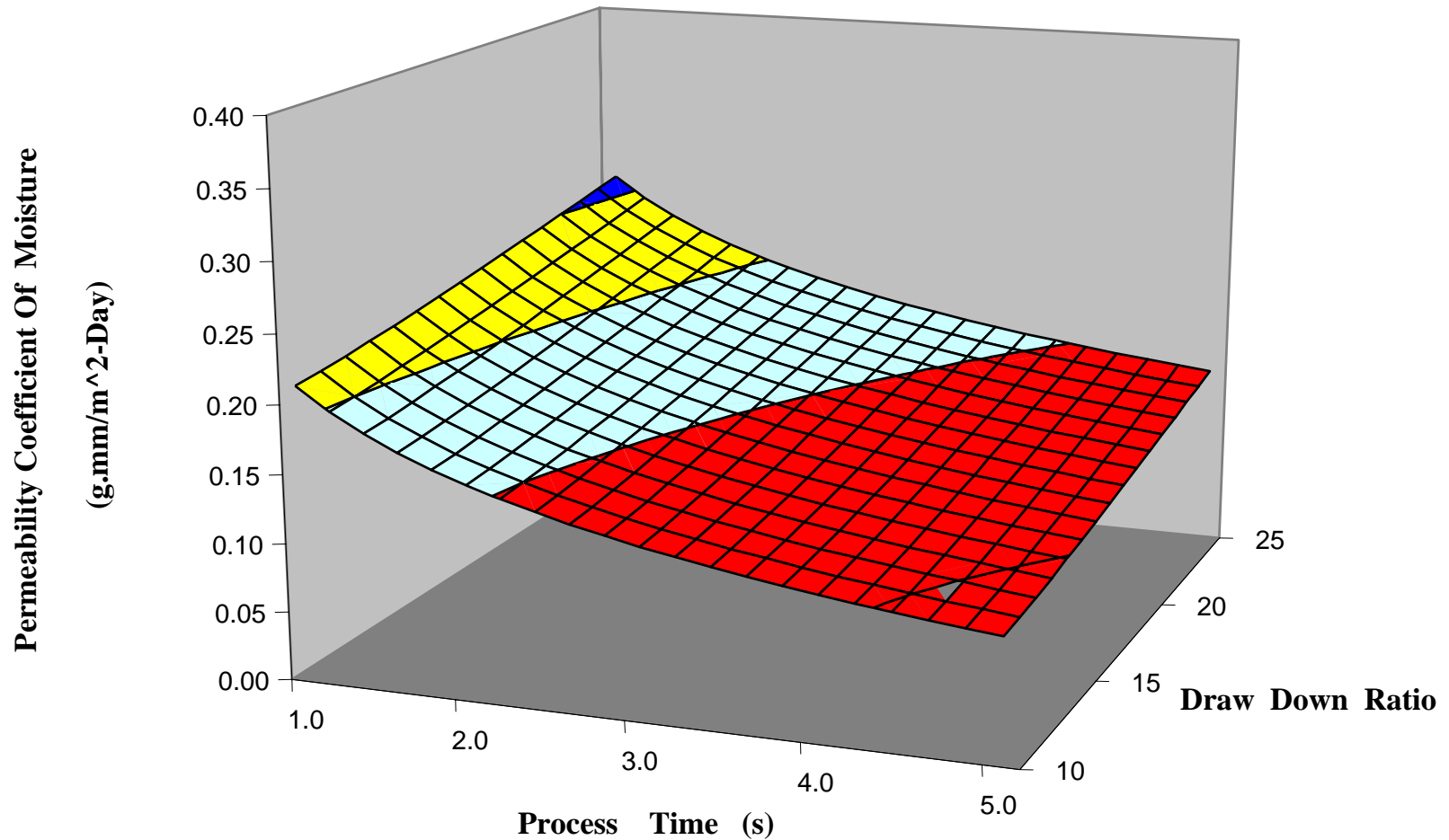
Process Time



Melt Temperature

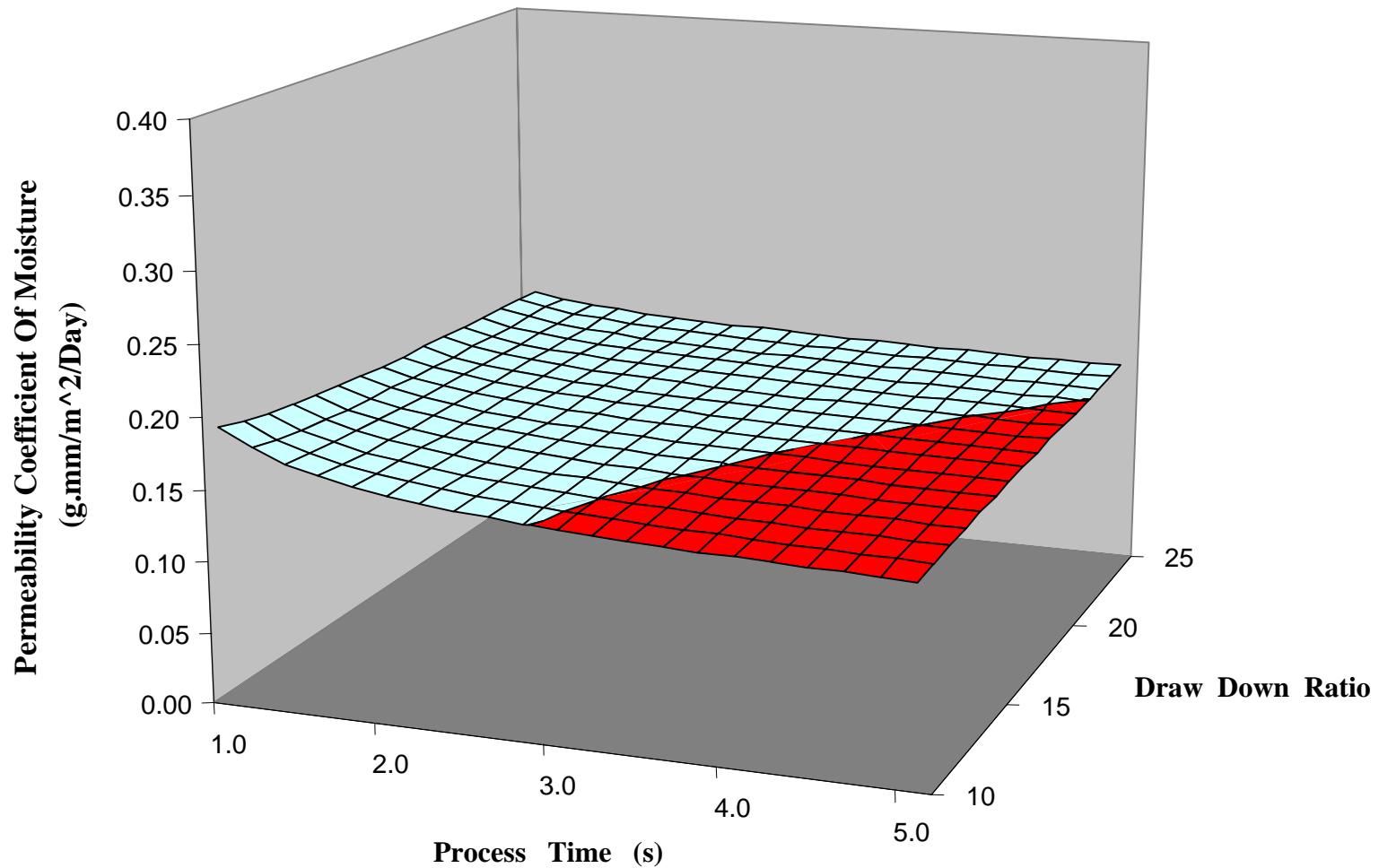
Frost Line Height

Moisture Barrier Of Conventional HDPE 35 mil Die Gap



Moisture Barrier Of HPs167-A

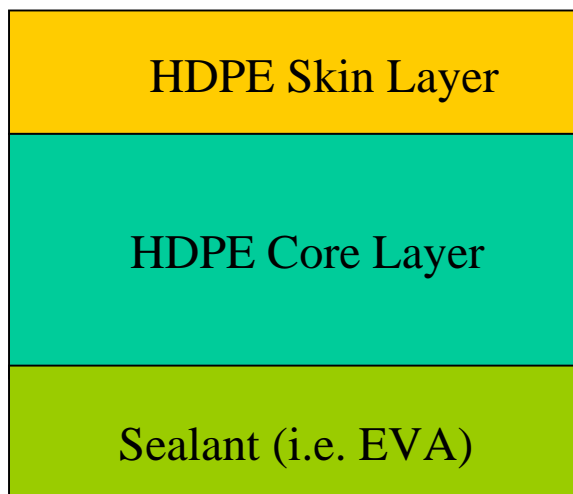
35 mil Die Gap



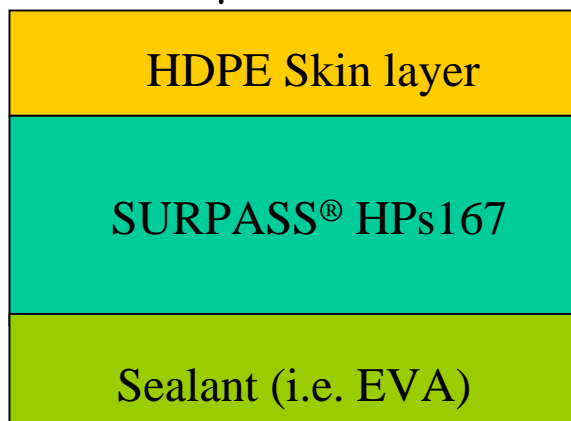
SURPASS® HPs167-A Film Application Successes

High Moisture Barrier Liners for Bag-in-box dry foods

50 µm Conventional Film



SURPASS® HPs167-A Core
45 µm film



Equivalent MVTR and Stiffness

SURPASS® FPs016-C

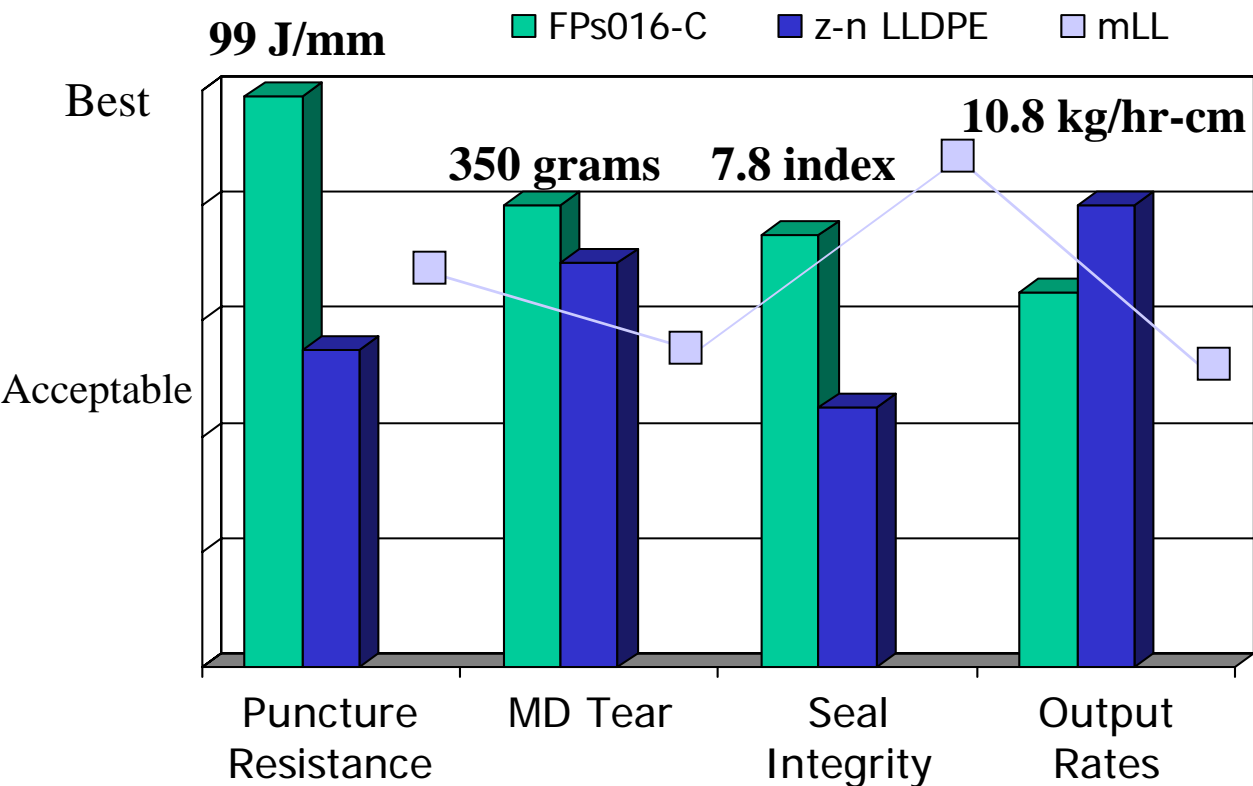
Versatile Octene SSC LLDPE Film Grade

- 0.65 dg/min Melt Index, 0.916 g/cm³ Density
- Bimodal MWD: Enhanced Processability
- Features
 - Designed for high melt strength, high output applications
 - High and balanced toughness (dart, tear and puncture)
 - Unique properties for use in high barrier coex films

SURPASS® FPs016-C Film Application Successes

High strength bags and industrial films

“The weakest property dictates failure mode”



SURPASS® FPs016-C Film Application Successes

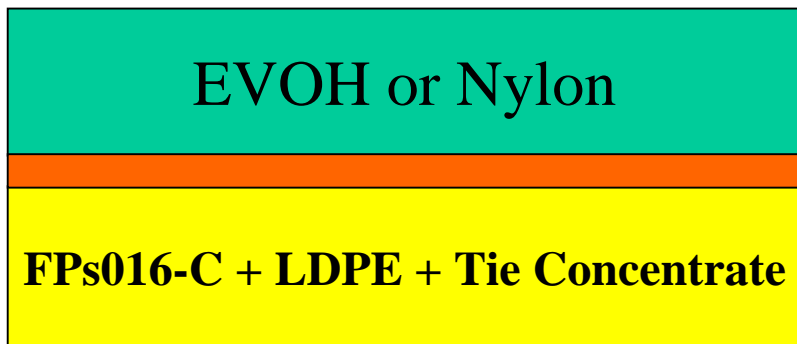
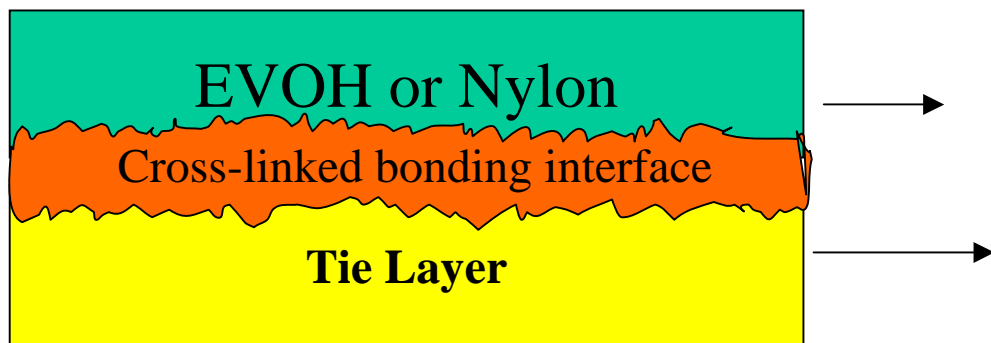
Tie-Concentrate blending resin and sealant for high-barrier coextrusions

Extruder	Material	Gauge (microns)
1	Nylon 6/6-6	15
2 & 3	FPs016-C + LDPE + 20% tie concentrate	30
4	Nylon	7
5	EVOH	10
6	Nylon	8
7	FPs016-C + LDPE+ 20% tie concentrate	5
8 & 9	FPs016-C + 20% LDPE	25

Total = 100 microns

SURPASS® FPs016-C Film Application Successes

Improved interfacial clarity in EVOH and Nylon Blown Film Coextrusions

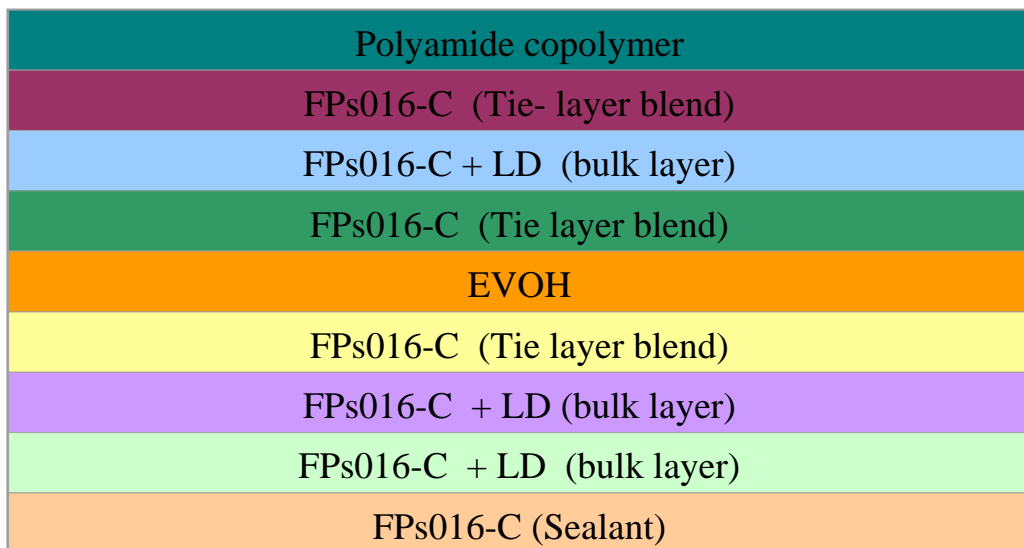


More uniform interface = Better optics

SURPASS® FPs016-C Film Application Successes

Interior layer for coextruded thermoforming webs

9 Layer Structure Design



FPs016-C structure had improved optics and thermoformability with fewer leakers compared to butene LL control

Summary

- ✓ SURPASS® HPs167-A is a new class of sHDPE homopolymer that provides exceptional moisture barrier and other properties.
- ✓ SURPASS® FPs016-C is a new sLLDPE with high versatility for broad usage and a balance of high tensile, dart and toughness.
- ✓ NOVA Chemicals' unique technology, manufacturing capabilities and supply position will put us at the innovation forefront developing tomorrow's innovative polymer products.

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