

# 2009

Flexible Packaging Symposium  
Trends and Technology Developments



## Performance Flexible Packaging Laminates via Extrusion Coating

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# Performance Flexible Packaging Laminates via Extrusion Coating

## Today's Agenda

- **Technology Introduction and Products**
- **Flexible Packaging Laminates -- Key Requirements**
- **Specific examples of Enhanced Polyethylene (EPE) Sealant for Flexible Packaging laminates versus conventional laminates**
- **Processing Performance of Extrusion coating EPEs**
- **Summary**

## Technology introduction and products (1/2)

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- Extrusion coating -The economic way of combining web based materials at high speeds
- Developments in Extrusion Coating machinery- New Coex & Tandem Extrusion Coating lines opens up opportunity for Flexible packaging laminates with varying ply's
- New polymers offer LDPE rheologies and provide almost equivalent extrusion performance
- Designed polymers have steady low neck-in and very high draw-down properties

## Technology introduction and products (2/2)

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- ELITE™ Enhanced Polyethylene Resins provide a single material solution that goes beyond the traditional combination of performance attributes
- DOW HDPE resins offer the superior WVTR, Stiffness and down gauging capabilities.
- AFFINITY™ Polyolefin Plastomers known as high performance sealant polymers for a number of years
- VERSIFY™ Plastomers and Elastomers are a versatile family of specialty propylene-ethylene copolymers with an outstanding combination of excellent optics, sealing and hot tack performance..
- PRIMACOR™ Copolymers is designed to be a high-performance sealant and adhesive for demanding products .
- AMPLIFY™ Functional Polymers offer a unique range of properties and enhanced performance to compounding and polymer modification, adhesives, tie layers, and more.

# Broad Product Portfolio

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<b>Grade</b>	<b>“CODE”</b> <i>[ TAPPI paper ]</i>	<b>I2</b>	<b>Density</b>	<b>Key Attribute</b>
<b>ELITE 5800G</b>	<b>EPE 1211</b>	<b>12</b>	<b>0.911</b>	<b>Performance sealant</b>
<b>ELITE 5811G</b>	<b>EPE 820</b>	<b>8</b>	<b>0.920</b>	<b>Performance sealant</b>
<b>ELITE 5815G</b>		<b>15</b>	<b>0.910</b>	<b>Performance sealant</b>
<b>XDMDA-8810 NT7</b>	<b>HD 1140</b>	<b>11.5</b>	<b>0.940</b>	<b>Stiffness /WVTR</b>
<b>AFFINITY PT 1451G1</b>	<b>POP 702</b>	<b>7.5</b>	<b>0.902</b>	<b>Performance sealant</b>
<b>LDPE PT 7007</b>	<b>PE 718</b>	<b>7.5</b>	<b>0.918</b>	<b>Sealant</b>
<b>LDPE PG 7004</b>	<b>PE 421</b>	<b>4.5</b>	<b>0.921</b>	<b>Sealant</b>
<b>DP 5010.01</b>		<b>8.5</b>	<b>0.897</b>	<b>Performance sealant</b>
<b>PRIMACOR 3003</b>		<b>7.8</b>	<b>0.935</b>	<b>Performance tie layer</b>
<b>AMPLIFY 101</b>		<b>6</b>	<b>0.931</b>	<b>Tie layer</b>
<b>AMPLIFY 103</b>		<b>21</b>	<b>0.930</b>	<b>Tie layer</b>

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# Flexible Packaging Laminates

Key Requirements	Performance Benefits through extrusion coating
<b>Sealing Properties</b>	
<ul style="list-style-type: none"> <li>• Low heat seal initiation temperature</li> <li>• High heat seal strength</li> <li>• Excellent seal through contamination</li> <li>• Good hot tack performance</li> </ul>	<ul style="list-style-type: none"> <li>• High Packing Speed</li> <li>• Pack Integrity</li> </ul>
<b>Barrier Properties</b>	
<ul style="list-style-type: none"> <li>• Barrier retention of metallized substrate</li> <li>• Improved Barrier Performance</li> </ul>	<ul style="list-style-type: none"> <li>• Good bond strengths without loss of barrier properties due to metal cracking</li> </ul>
<b>Taste &amp; Odor</b>	
<ul style="list-style-type: none"> <li>• Low taste and odor</li> <li>• FDA compliance</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced taste and odor performance</li> </ul>
<b>Productivity</b>	
<ul style="list-style-type: none"> <li>• Faster conversion rates</li> <li>• Faster Turn around</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce unit operations for combining web</li> <li>• Replace thin blown films</li> <li>• Faster turn around after laminate is made</li> </ul>

**Change the Game**

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# 2ply PET / PE Sealant Laminate

## Example 1 \_ PET PE Sealant :

PET -10 $\mu$  / 8 $\mu$  LDPE / **12 $\mu$  EPE 820**

Sealant ( 25  $\rightarrow$  12 Microns)

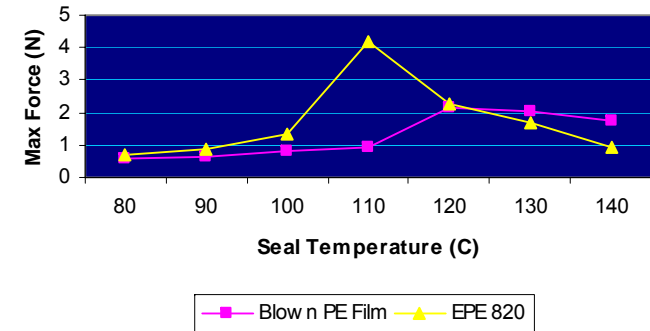
### Advantages

- Reduce Unit Operations
- Softer Laminate than incumbent

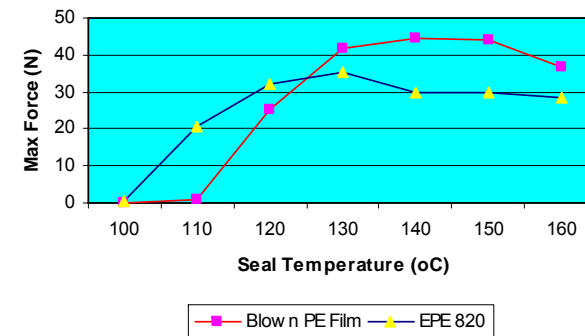
### Conclusions

- EPE 820 with 20% reduced gauge offers earlier seal initiation Versus a Blown film sealant
- Higher hot tack strength with lower gauge
- Slight drop in WVTR

Hot Tack Strength



Heat Seal St



	WVTR (gm/m2/day)
10 $\mu$ PET /25 $\mu$ PE film	7.18
10 $\mu$ PET /8 $\mu$ LDPE/12 $\mu$ EPE 820	17.2

# 3ply BOPP/Met PET/PE Sealant Laminate

## Example 2 \_ BOPP/MET PET/PE Sealant :

BOPP -15 $\mu$  / 8 $\mu$  LDPE/ Met PET -12 $\mu$  / 8 $\mu$  LDPE / 15 $\mu$

**EPE 820 or POP 702**

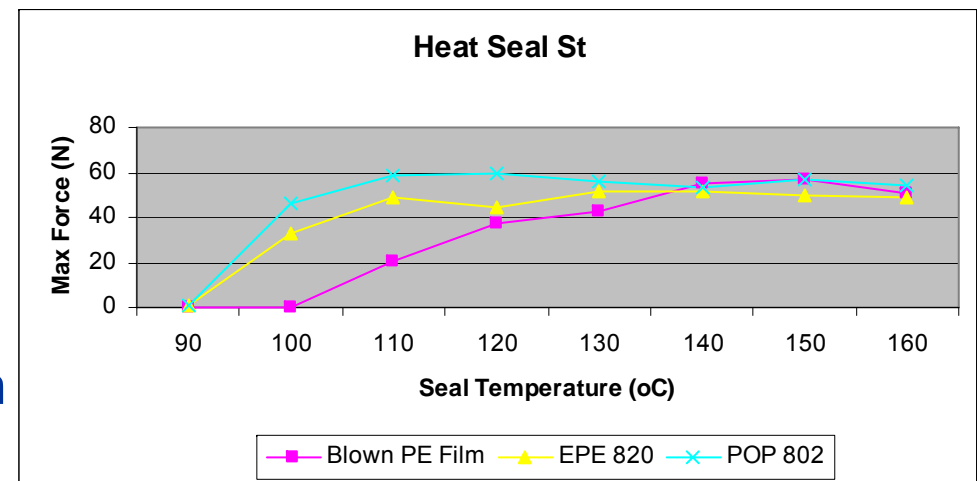
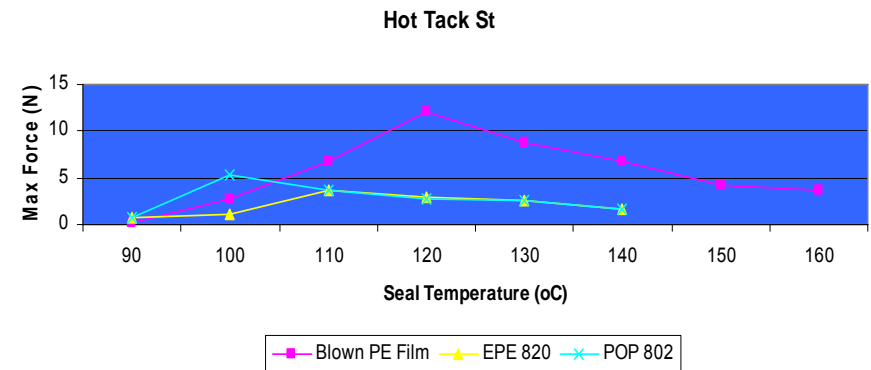
**Incumbent 25 micron Blown film sealant**

### Advantages

- Reduce Unit Operations from 3 to 1
- Softer Laminate leading to Superior barrier than incumbent
- Better taste and odor
- Faster turn around/no curing

### Conclusions

- Lower SIT higher pkg. speed
- Optimum hot tack for N2 flushed pouch
- One shot 3 ply laminate
- Higher shelf life of packed product



# 2ply Laminate with HDPE

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## Example 3 \_ BOPP/PE

BOPP-18 $\mu$  / 12 $\mu$  HD 1140

### Advantages

- Enhanced WVTR
- High Stiffness

### Conclusions

- HDPE on a conventional Coating line would Help improve the stiffness & WVTR.

		BOPP/HD	BOPP/PP
<b>MODULUS</b>			
Secant Modulus @1% -MD	MPa	1342.3	1201.1
Secant Modulus @2% -MD	MPa	1025.3	879.5
Secant Modulus @1% -TD	MPa	2287.3	1809
Secant Modulus @2% -TD	MPa	1591.4	1247.1
<b>PROFILE</b>	mm	0.03	0.03
<b>WVTR</b>	g/m <sup>2</sup> /day	6.49	7.85

# 2ply Laminate with HDPE & PE Sealant

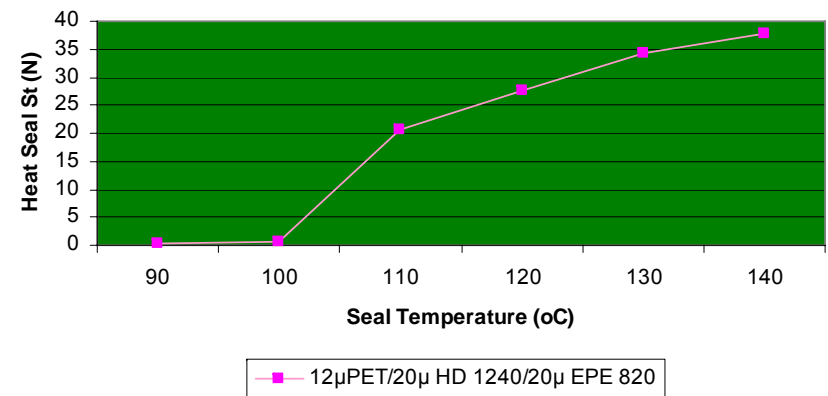
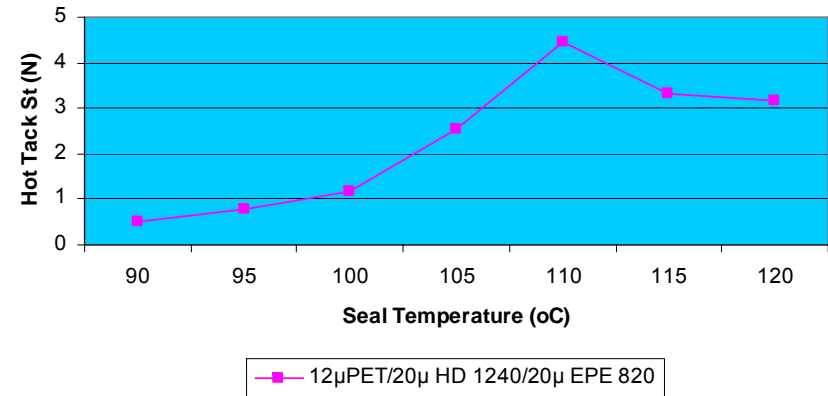
**Example 4 \_ PET/PE Sealant :**  
**12μPET/20μ HD 1140/20μ EPE 820**

## Advantages

- Excellent Hot Tack / Heat Seal performance
- Improved WVTR
- Enhanced Stiffness

## Conclusions

- Combination of Sealing and Stiffness via EC route. Excellent Hot tack & WVTR.



12μPET/20μ HD 1240/20μ EPE 820	UNIT	VALUE
WVTR	gm/m <sup>2</sup> /day	9.32

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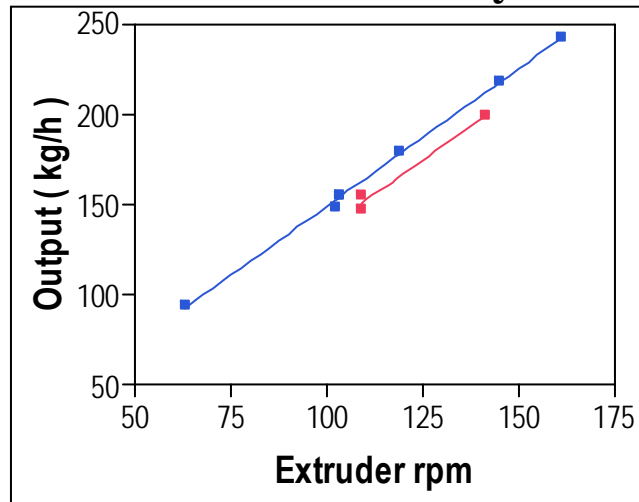
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# Conversion Data

## LDPE versus EPE

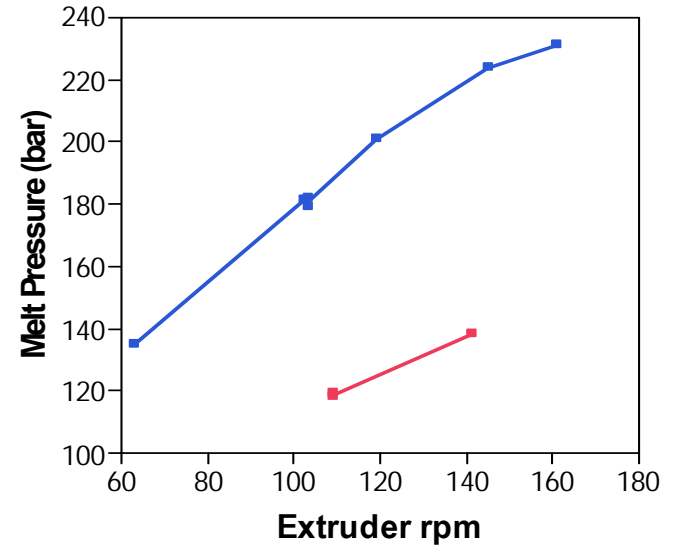
Extrusion efficiency



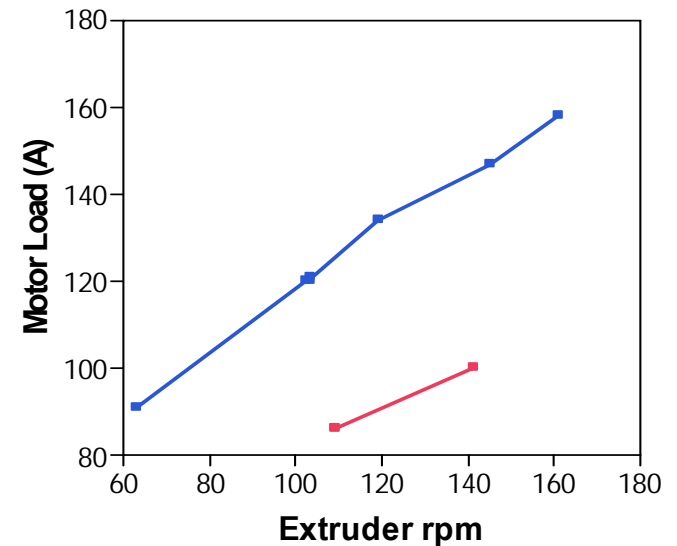
### Material

■ EPE 820

■ PE 421



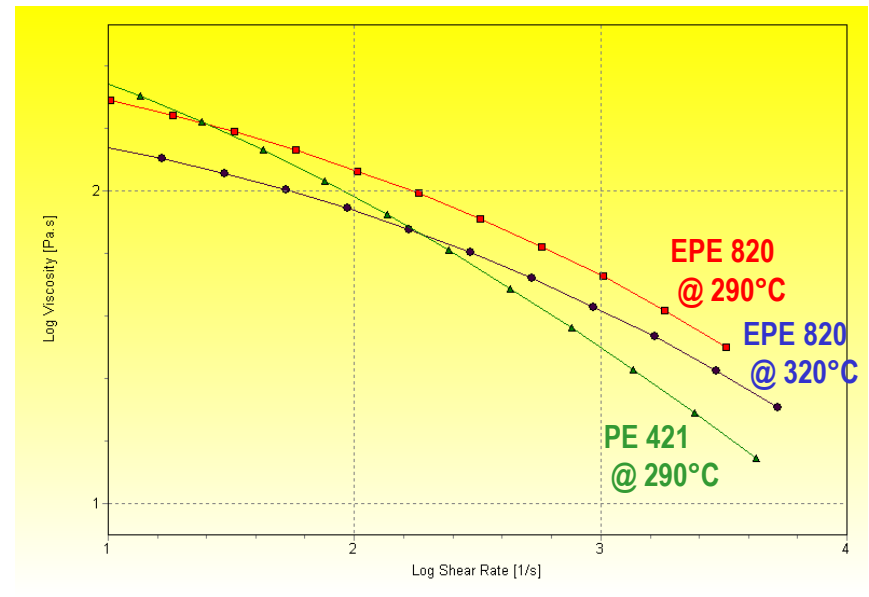
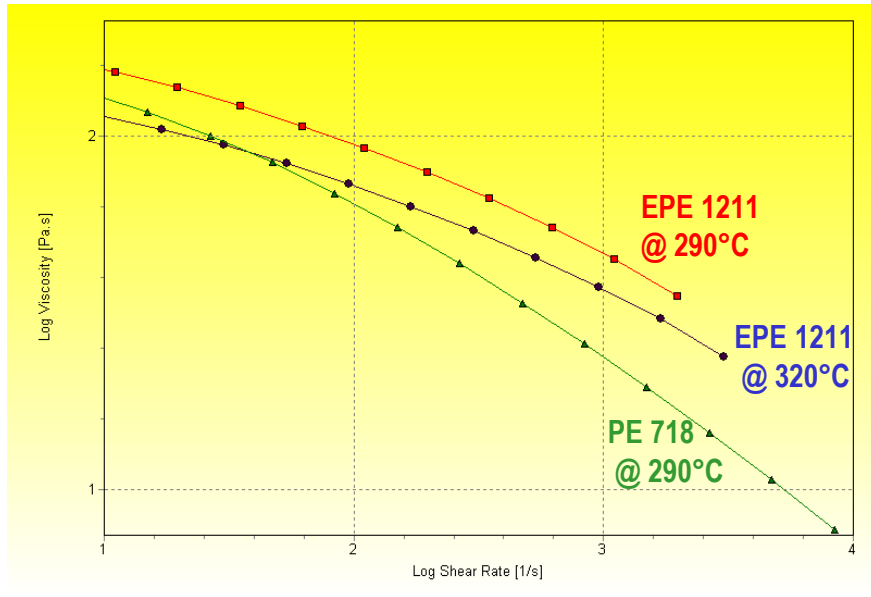
Extruder load



### Conclusion:

- EPE versus LDPE allows for 10% higher specific throughput
- Higher Melt pressure and Motor Load to be partially compensated by the reduced gauge

# Rheology



## Conclusion:

- EPE is less shear thinning than LDPE but allows to extrude more favorable than any commercially available linear polyethylene
- Homogeneous melt flow in feed-block co-extrusion and flat die operation possible

# Summary

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If you are committed to ...

- ... change to extrusion based laminates from blown film
- ... one shot process
- ... functional layer properties
- ... high performance sealing
- ... high structure integrity
- ... faster turn around
- ... better barrier retention
- ... and more

specify the use of EPE, enjoy ...

- ... lowest coating weights
- ... sealing at low temperatures
- ... enlarging the hot-tack window
- ... offer tailored barrier properties
- ... good mechanicals
- ... extrusion similar than LDPE
- ... controlled neck-in

**and change the game**





**Thank You**

**PRESENTED BY  
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