

Pearlbond™ TPU – Superior Bonding Solutions for Hot Melt Adhesives

March 2017

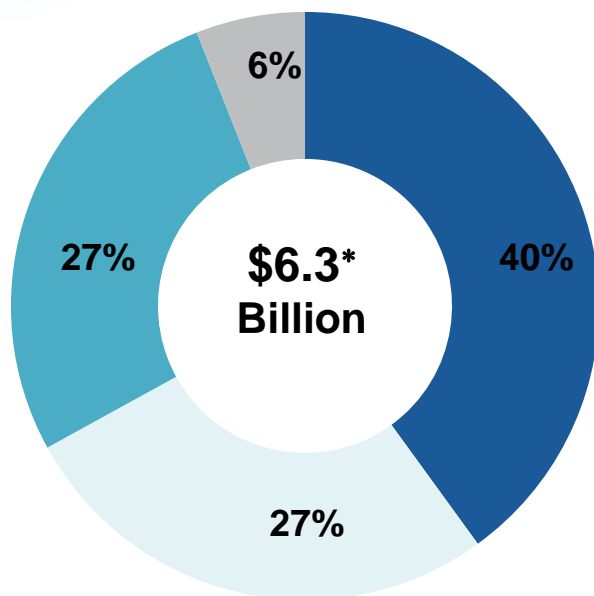
Pearlbond Thermoplastic Polyurethane (TPU) Technologies for Thermobonding



Balanced International Presence

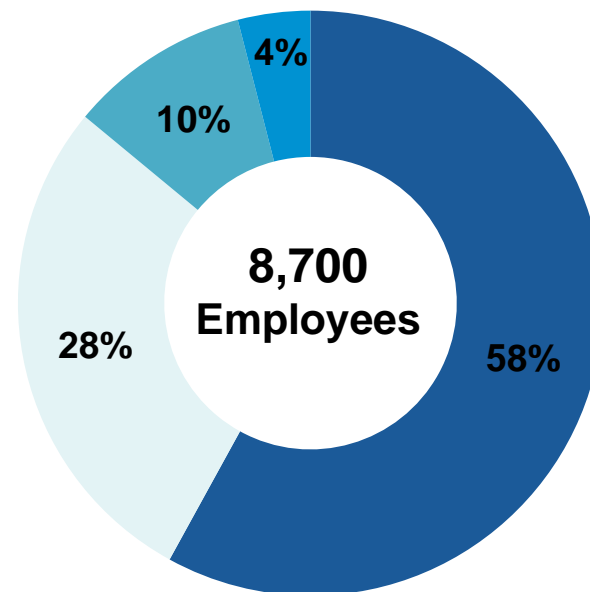
We're a truly global company – as a company, and as individuals, we strive every day to fulfill our mission

Consolidated Revenues



■ North America ■ Europe ■ Asia/ME ■ Latin America

Worldwide Employees



*2017 revenues

Company at a Glance

Businesses



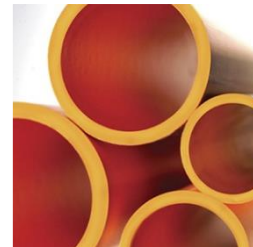
LUBRIZOL ADDITIVES

The global leader in performance
additives for automotive and
industrial lubrication



LUBRIZOL ADVANCED MATERIALS

A leader in polymer-based
technology for consumer and
industrial applications



Lubrizol
Engineered Polymers

Lubrizol

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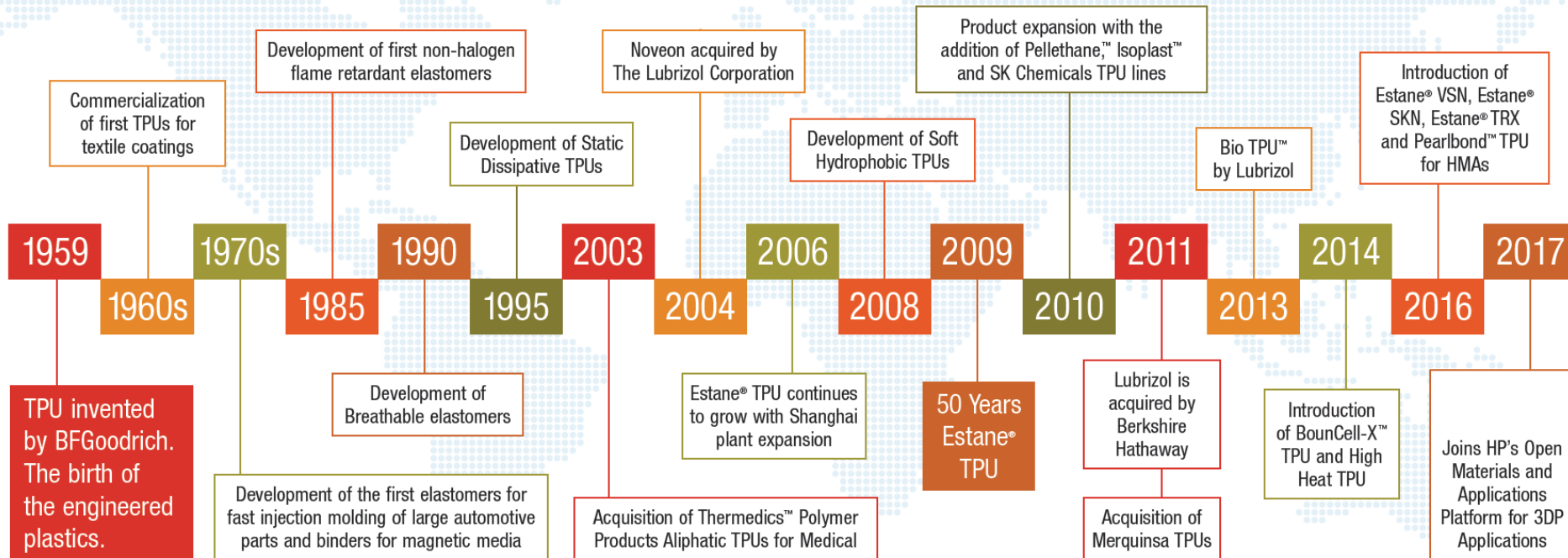
Pearlbond™ TPU is everywhere



Engineered Polymers Timeline

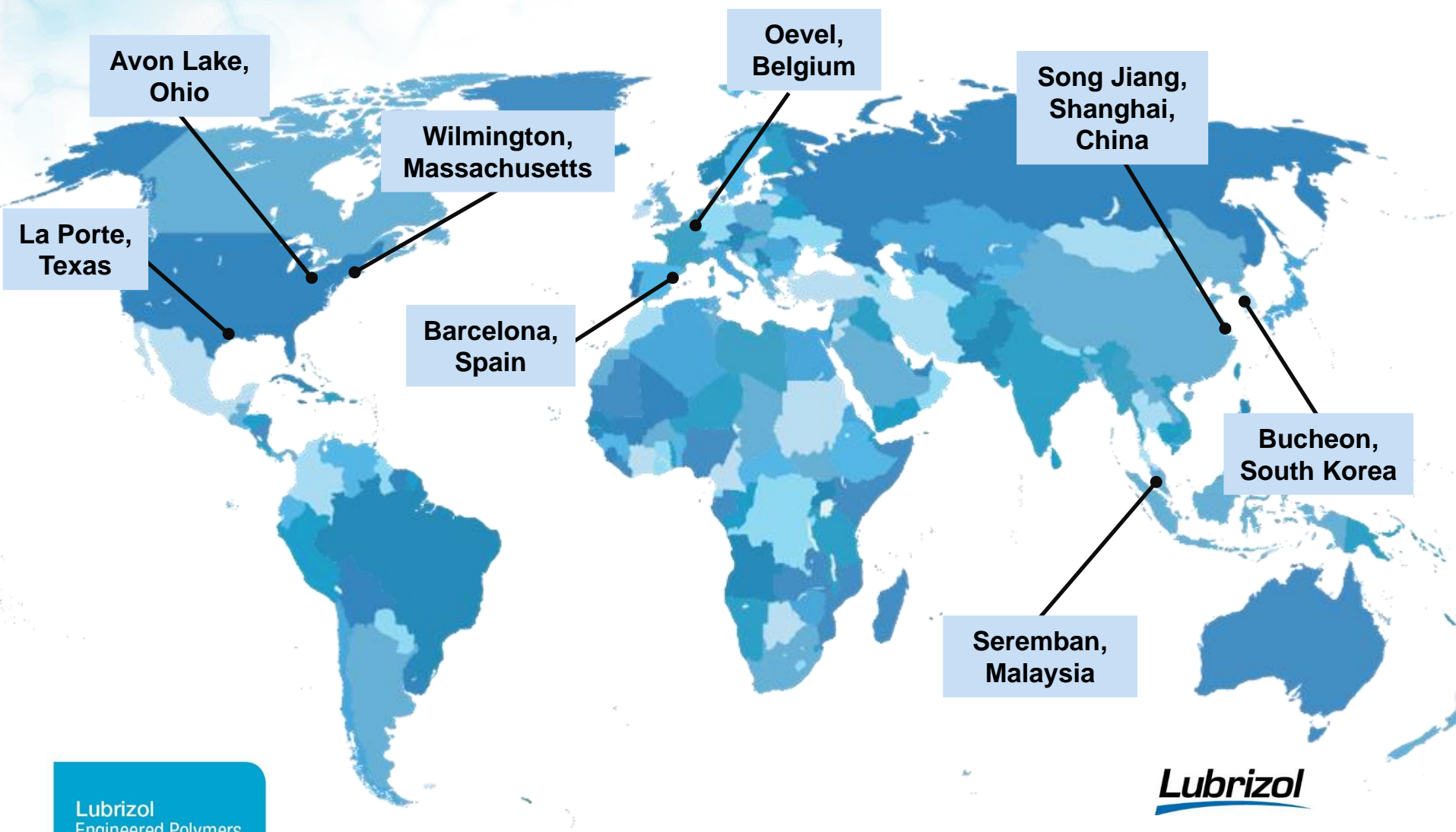
Lubrizol Engineered Polymers History

lubrizol.com/engineered-polymers



Relentlessly Strengthening our Value Propositions

Manufacturing Locations



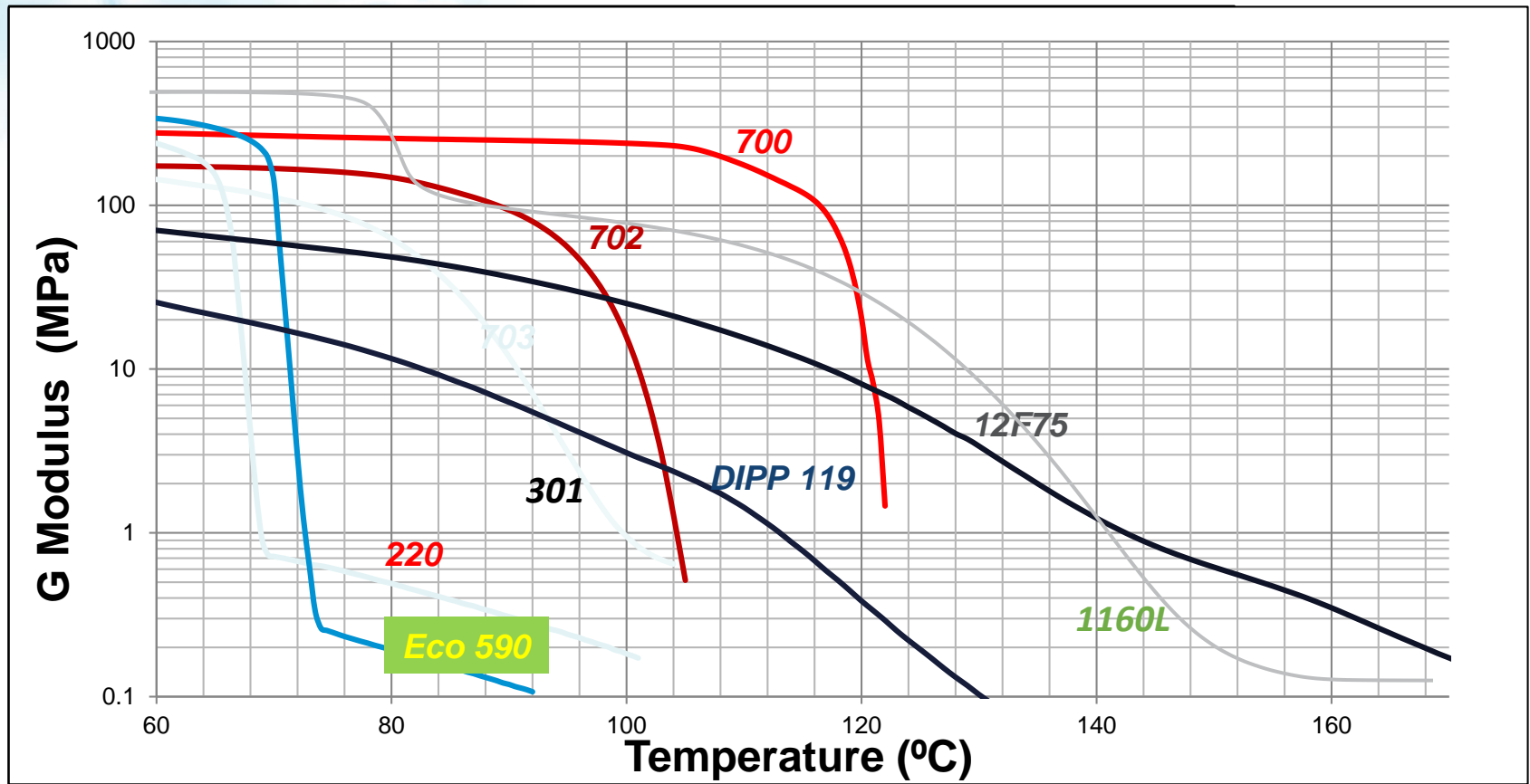
TPU is available in various forms & shapes



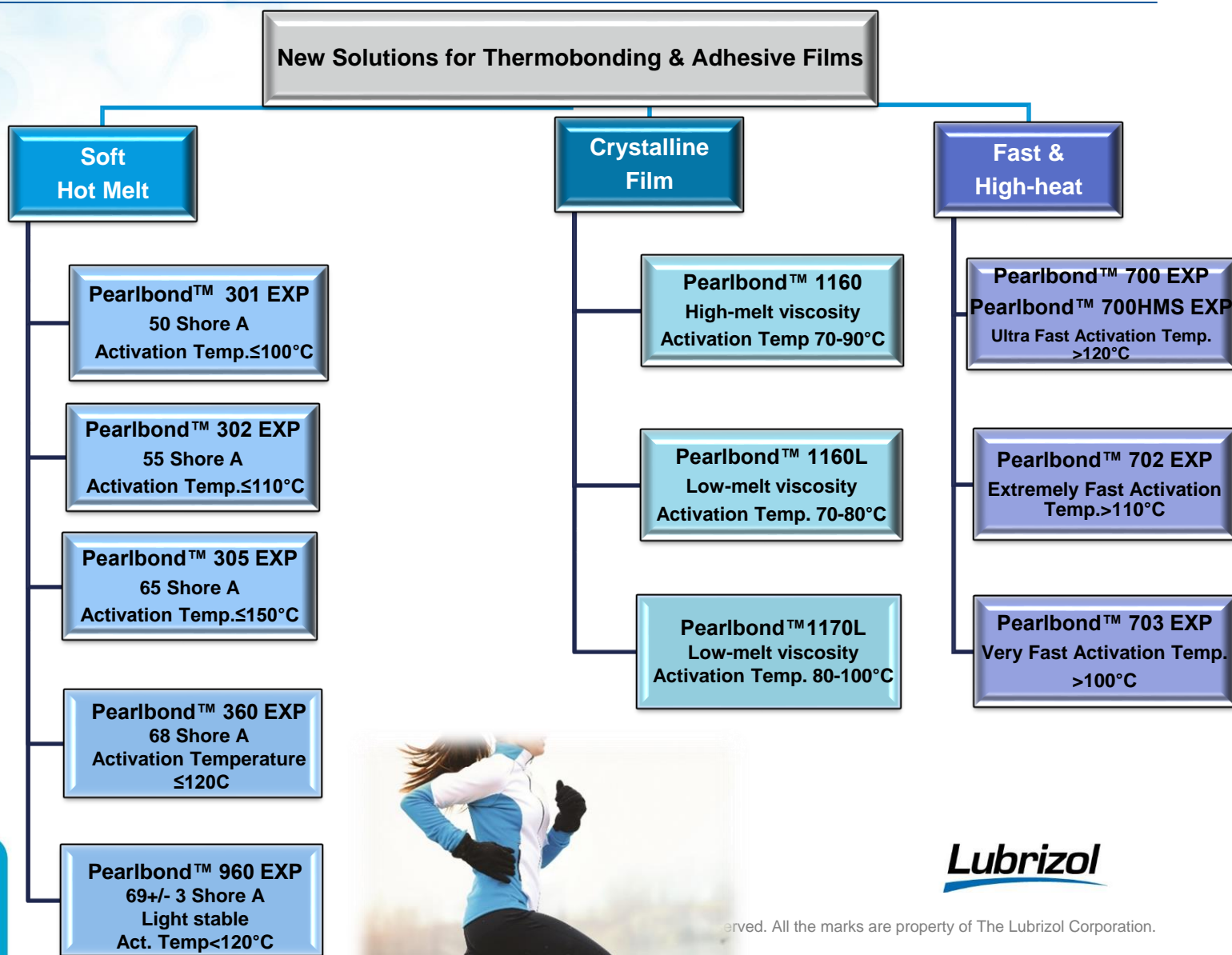
Pearlbond™ TPUs for Hot Melt adhesives



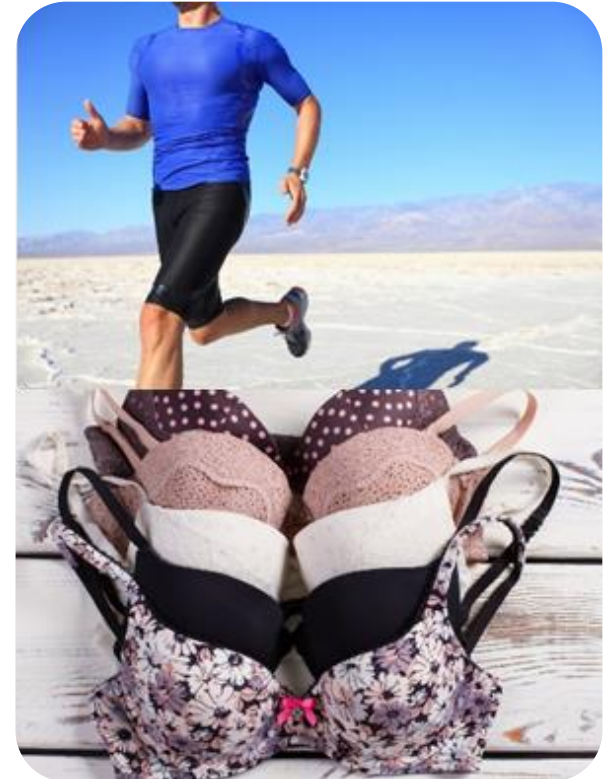
All are Pearlbond™ and so different!



Breakthrough For Thermobonding & Adhesives Film

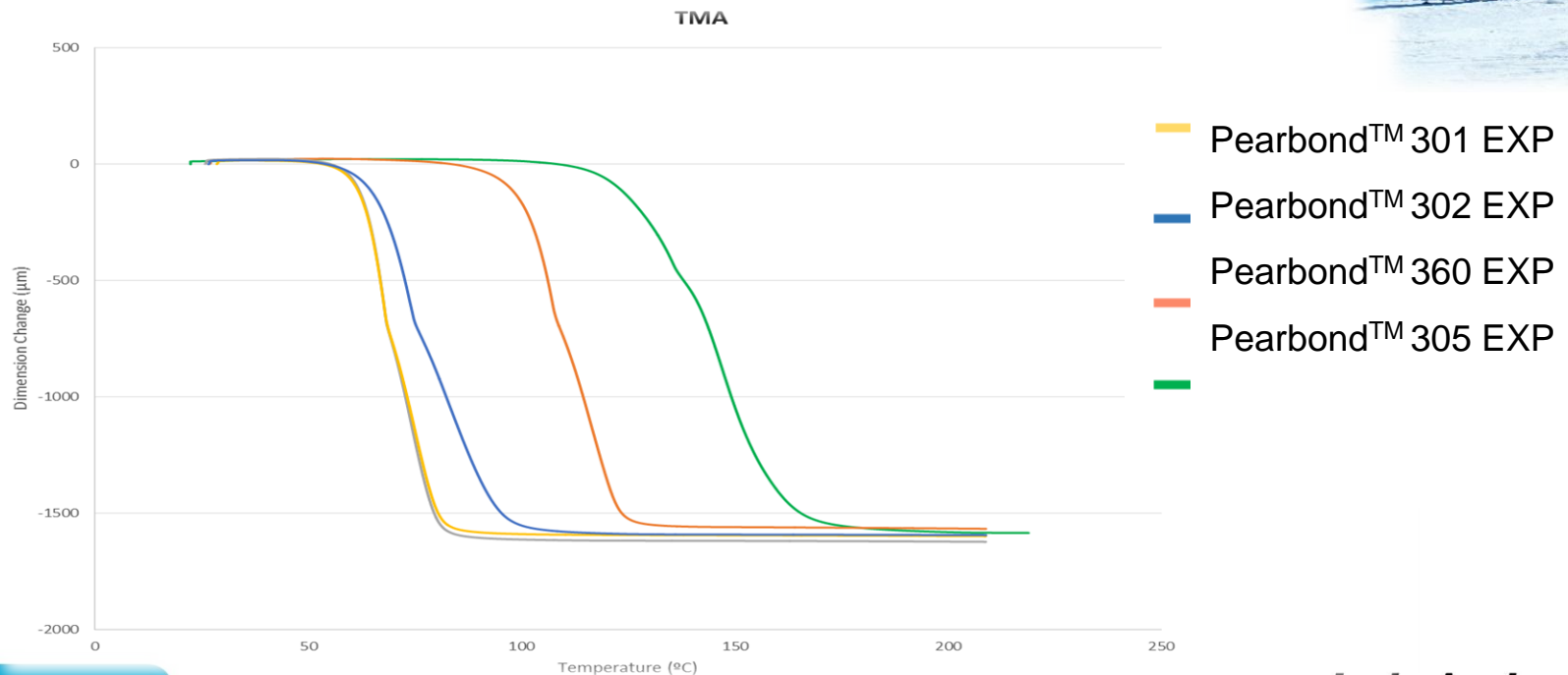


Soft Plasticizer-free TPUs



Soft Plasticizer-free TPU

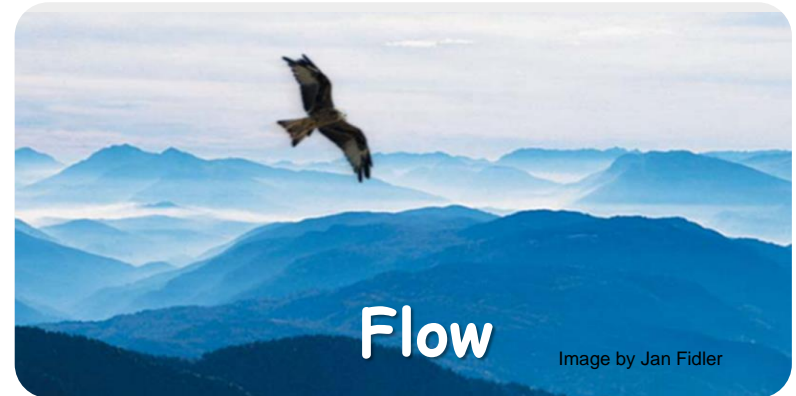
- Superior soft hand feel in textiles
- Can be used as an impact modifier in hard plastics
- Bonds well to various substrates (e.g.: cotton, acrylic and polyester...)
- Very Good Wash Resistance



Soft Plasticizer-free TPUs

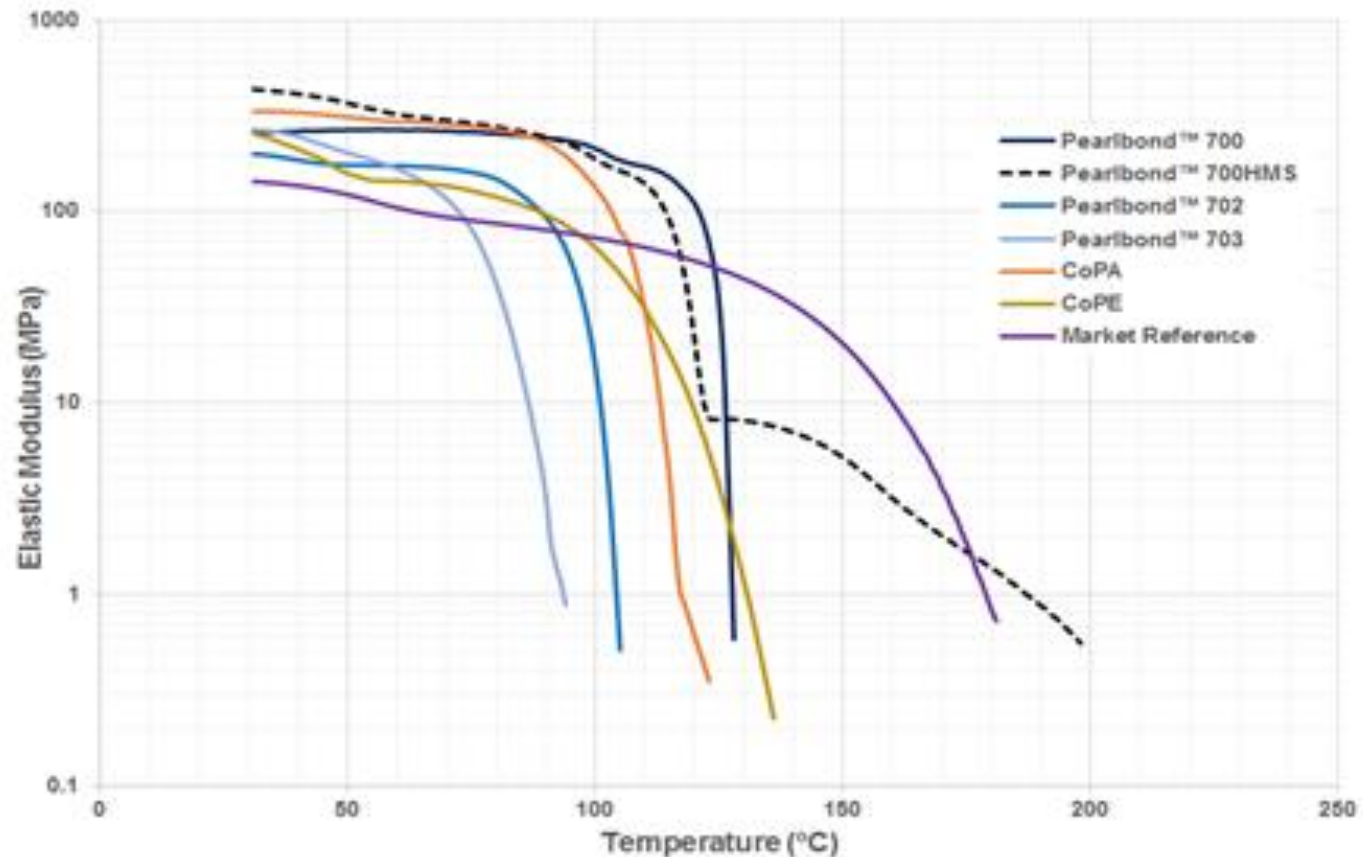
	Pearlbond™ 301 EXP	Pearlbond™ 302 EXP	Pearlbond™ 360 EXP	Pearlbond™ 960 EXP	Pearlbond™ 305 EXP
Shore A hardness	52	55	68	69	64
Tensile Strength (Mpa)	9	14	6	44	24
Elongation @ break (%)	1050	900	915	503	810
Modulus @ 100% Elongation	1.1	1.4	2.0	4.0	2.2
Activation Temperature (°C)	≤100	≤110	≤120	100-160	≤150
Wash Resistance (°C)	<60	<70	≤100	≤100	≤100
Unique Features 	Soft touch. Adapts to body movement.	Low energy stretching. wash resistance	Very good Hydrolytic resistance. Elastic recovery. Breathability	UV-Stable Very good Hydrolytic resistance. Elastic recovery. Breathability	Very good Hydrolytic, heat & chemical resistance. Elastic recovery

Fast and High-heat Resistant Solutions



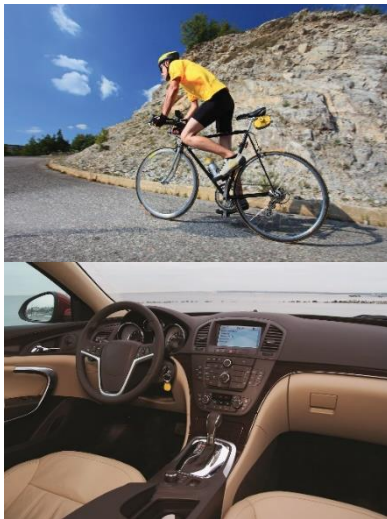
Benefits of Fast and High-heat Resistant Solutions

- Very fast cycle time & no residual tack
- Low coefficient of friction
- Good adhesion to flexible & rigid substrates (metals & plastics)
- Good wash and chemical resistance
- Provide good adhesion to cotton, nylon, polyester fibers and rigid substrates



Adaptive Melt Behavior and Crystallization Rate

	Pearlbond™ TPU 700 EXP	Pearlbond™ 700 TPU HMS EXP	Pearlbond™ 702 TPU EXP	Pearlbond™ 703 TPU EXP
Softening range (MQSA 70A)	100 – 110 °C	130-140	90 – 100 °C	75 – 85 °C
Melting range (MQSA 70A)	115 – 125 °C	175-185	105 – 115 °C	85 – 100 °C
Crystallization rate (MQSA 12A) <i>measured in minutes</i>	Ultra Fast (0.1-2)	Ultra Fast (0.1-2)	Extremely Fast (10-20)	Very Fast (20-40)
Thermoplasticity (MQSA 68A)	Ultra High	Medium	Extremely High	Very High
Glass transition (Tg in °C) (DSC)	-23	-8	-34	-48

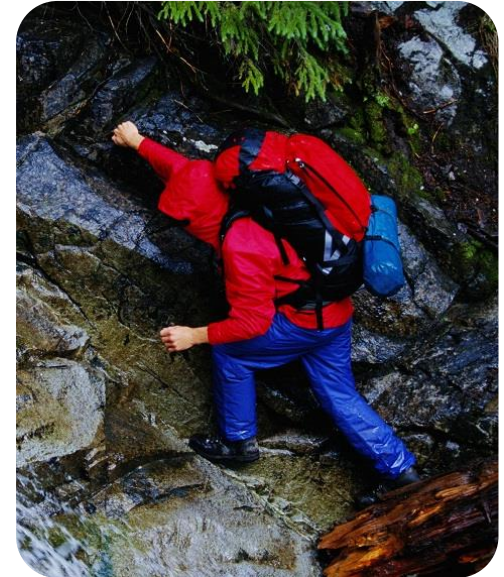


Applications:

- Apparel (seam tapes, heat transfer labels...)
- Filtration
- Automotive interior trim
- Melt spun non-wovens
- Mono-filament adhesives
- Web & net adhesives
- Edge Banding Adhesive
- Chemically-resistant belts
- Footwear Adhesive
- CIPP (Cured-In-Place-Pipe) coating
- 3-D Printing

Crystalline Adhesives

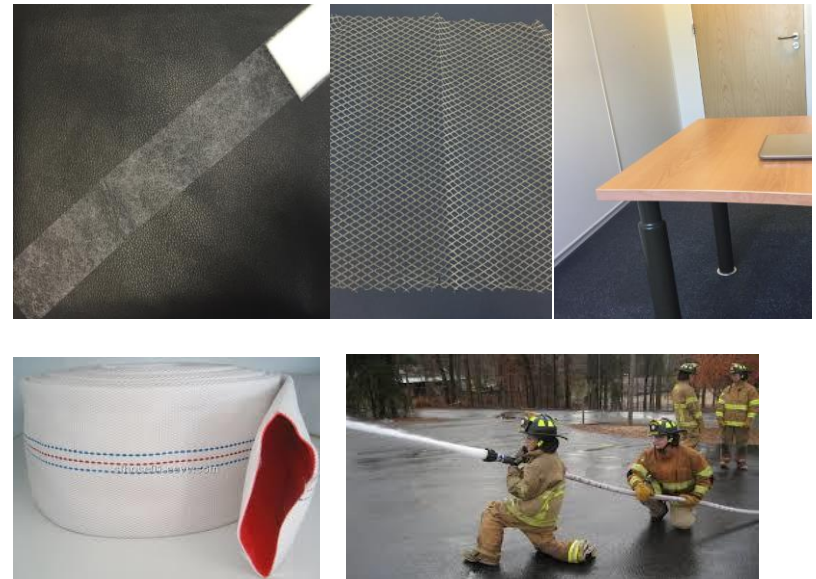
(Low activation temperature & Short cycle time)



Crystalline Adhesives

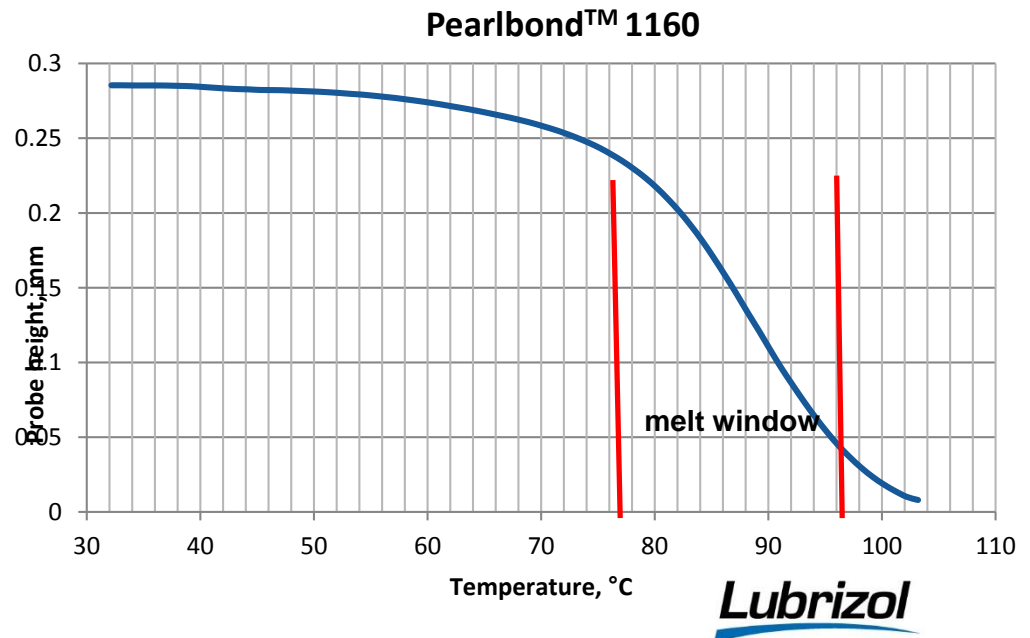
(Low activation temperature & Short cycle time)

- Toluene-free material (no bubble burst during processing)
- Very fast cycle time and a good hand feel in apparel thanks to the low adhesive penetration in fabric
- Bonds very well to PVC, PU, wood, fiberboard, leather and other textile substrates
- Applications:
 - Automotive interior trim
 - Footwear uppers
 - Web & Net adhesives
 - Edge Banding (furniture)
 - PVC/textile fire hose adhesive
 - Apparel (seam tapes)



Crystalline Adhesive to Bond Delicate Fabrics

- Low activation temperature of 70-90°C: Very appropriate for delicate and low temperature-resistant fabrics
- Pearlbond 1160L: TPU with very low viscosity.
- Pearlbond 1170L : increased heat resistance. (10-15°C)



Make Your Choice Now!

Winning Features of Pearlbond™ TPU	301 EXP	302 EXP	305	1160	1160L	1170L	700/700 HMS EXP	702 EXP	703 EXP	360 EXP	960 EXP
High Fabric Wettability	✓				✓	✓					
Low Energy Stretching	✓	✓								✓	
High & Fast Memory										✓	
Resistance To Micro-organisms And Fungus										✓	✓
Breathability										✓	✓
Hydrolytic Resistance			✓					✓	✓	✓	✓
Chemical Resistance							✓				
Low Temperature Activation (≤ 100°C)	✓			✓	✓	✓			✓		✓
Ultra Fast Crystallization Rate							✓				
Extremely Fast Crystallization Rate								✓			
Very Fast Crystallization Rate				✓	✓	✓			✓		
*EU-Food compliant with 10/2011 regulation	X	X	✓	✓	✓	✓	✓	✓	✓	✓	X
*Complies with 21 CFR: 175.105: Adhesives	X	X	X	X	X	X	X	X	X	✓	X
*Complies with 21 CFR: 177.1680: Direct contact Dry food	X	X	X	✓	✓	✓	X	X	X	X	X
*Complies with 21 CFR: 177.2600: Direct contact for repeated use	X	X	X	X	X	X	✓	✓	✓	✓	X

**When used in accordance with requirements & limits –verify compliance on final article.*

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Winning Features of Pearlbond™ TPU	301 EXP	302 EXP	305	1160	1160L	1170L	700/700 HMS EXP	702 EXP	703 EXP	360 EXP	960 EXP
Heat Transfer Labels	✓				✓	✓	✓	✓	✓		✓
Mono-Filament Adhesives							✓	✓			
Web Adhesives				✓	✓	✓	✓				
Net adhesives	✓	✓		✓							
Filtration Adhesive							✓				
Automotive interior Trim Adhesives				✓	✓	✓	✓	✓	✓		
Intimate underwear	✓	✓	✓							✓	
Apparel Seam Tapes & interlinings	✓	✓	✓	✓	✓	✓				✓	✓
Chemically resistant Belts							✓				
CIPP							✓				
Fire hose Adhesive				✓	✓	✓					
Polyether Tie coat (DMF-free) Inflatables & Belts										✓	

Make Your Choice Now!

Winning Features of Pearlbond™ TPU	301 EXP	302 EXP	305	1160	1160L	1170L	700/700 HMS EXP	702 EXP	703 EXP	360 EXP	960 EXP
Cotton	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Polyester	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nylon	✓	✓		✓	✓	✓		✓	✓	✓	✓
Spandex									✓	✓	✓
Aramid	✓										
Silk	✓										
linen	✓										
Leather	✓			✓	✓	✓			✓	✓	
Aluminum				✓				✓	✓		
Aluminum/Steel (Metal blend)								✓	✓		
Steel								✓	✓		

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For more information:

<https://www.lubrizol.com/Engineered-Polymers/Markets/Adhesives.html>

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