Silicone Solution Introduction

Silicone Masterbatch

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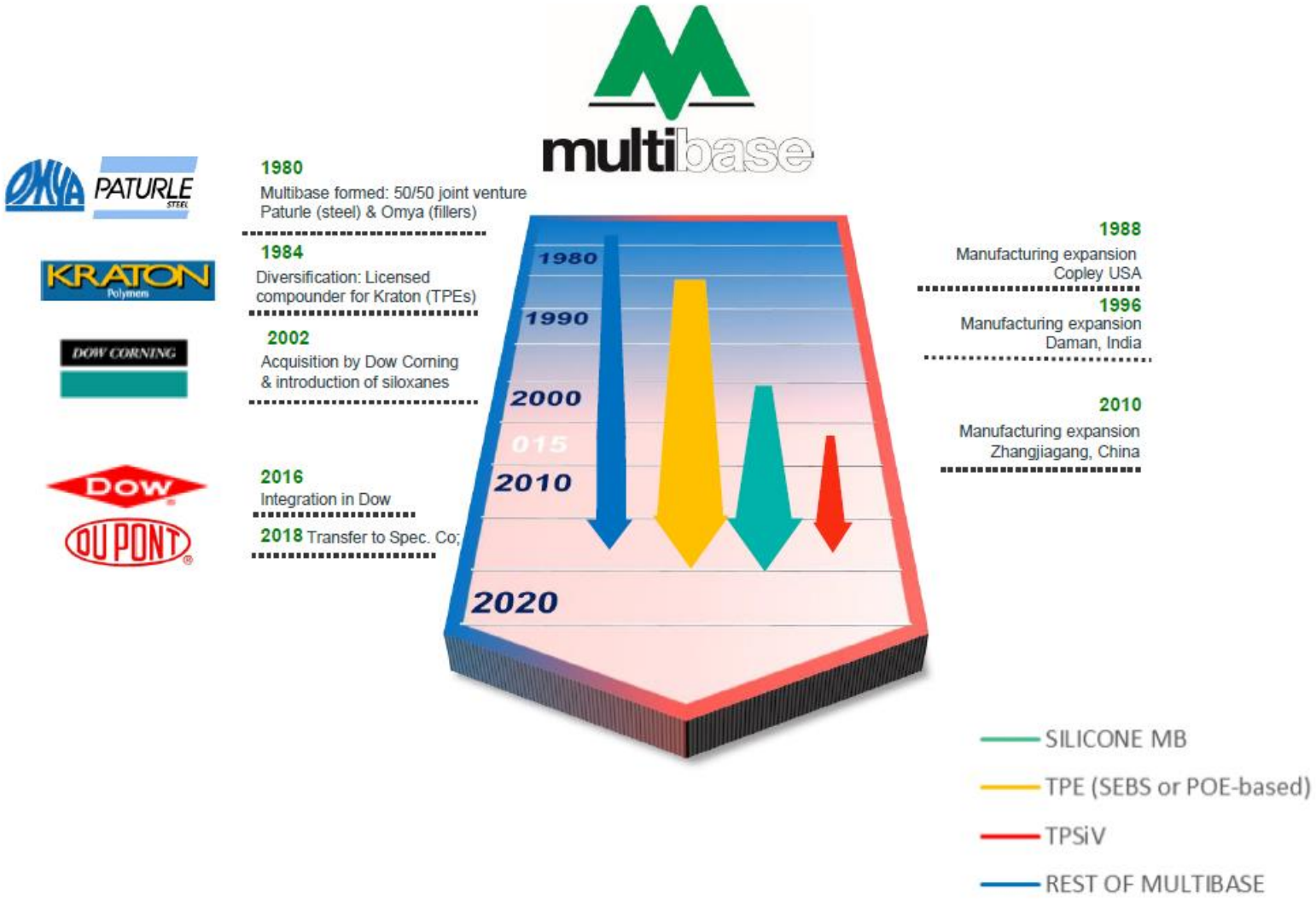
Agenda

- Introduction of Multibase
- SiMB

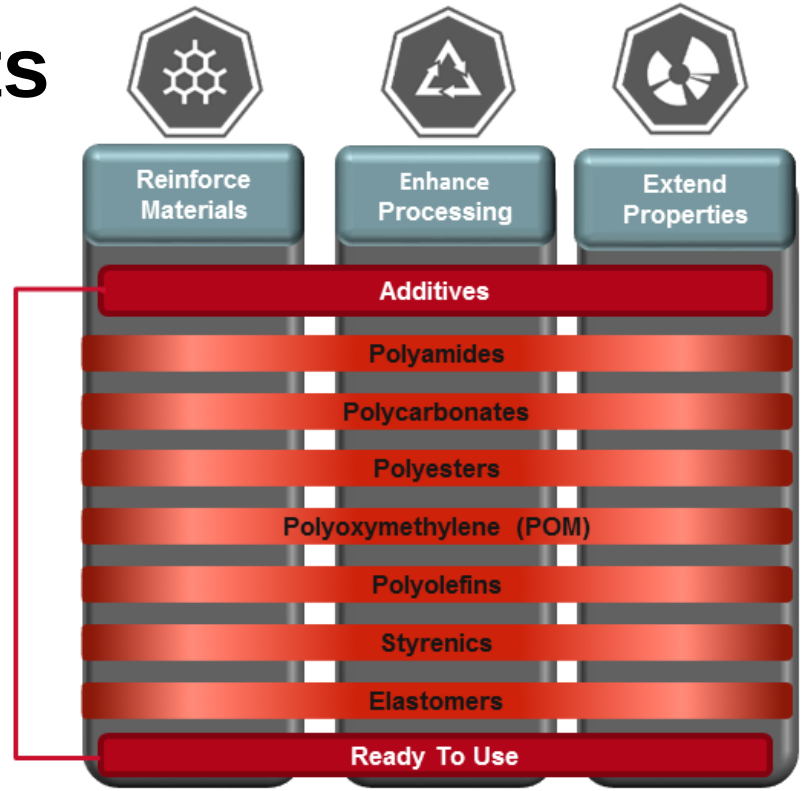
Multibase

Introduction and product line-up

Multibase innovation evolution through its owners



Materials, Solutions and Markets



Transportation	Industrial	Consumer	Electrical/ Electronics	Medical
				
Complementary products and value chain participation; more complete solutions for multi-material platforms.	Helping customers achieve higher manufacturing yields, productivity, quality and durability.	Enabling innovative and flexible designs that can be manufactured efficiently, safely and sustainably.	Helping deliver and distribute electrical power and electronic data efficiently, safely and reliably.	Delivering solutions that enhance drug delivery methods and pharma processing.

SiMB

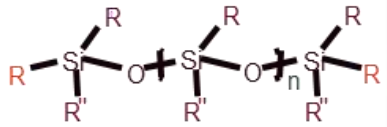
Silicone Masterbatch

What are siloxane masterbaches (SiMB)?

SiMB = Masterbatch, composed of:

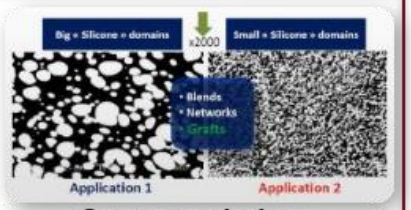
Mw = 250	1 cSt
Mw = 1,000	10 cSt
Mw = 5,000	100 cSt
Mw = 25,000	1,000 cSt
Mw = 55,000	10,000 cSt
Mw = 100,000	100,000cSt
Mw = 300,000	10,000,000cSt

50%,
40%
25%



UHMW PDMS (Fluids/Gums)

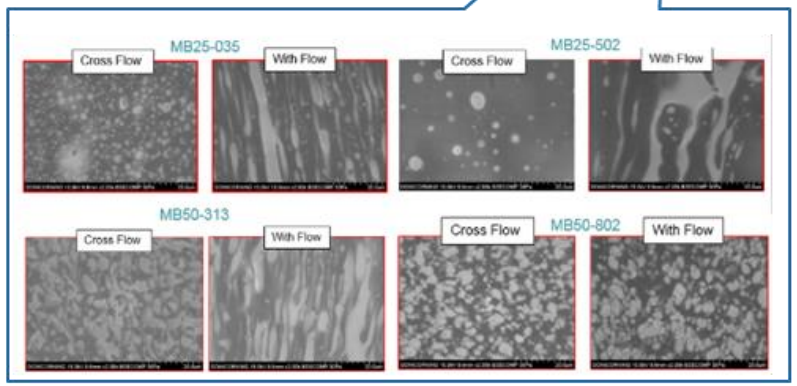
+

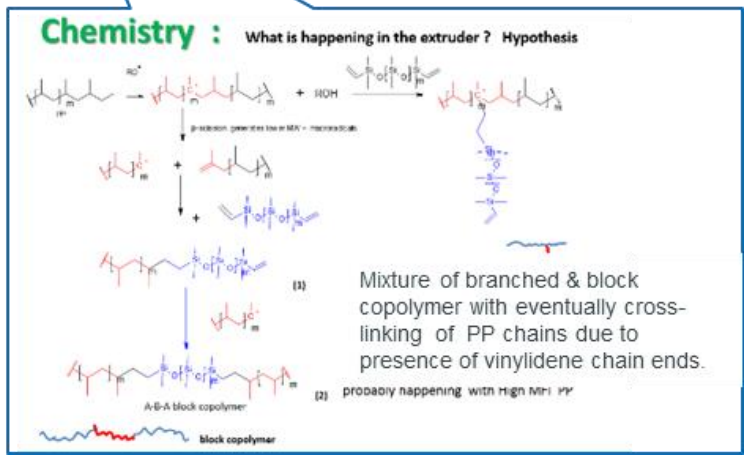


Compounded or reactively extruded with a Thermoplastic carrier
PP, PE, HIPS, POM, ABS, PA,..

=

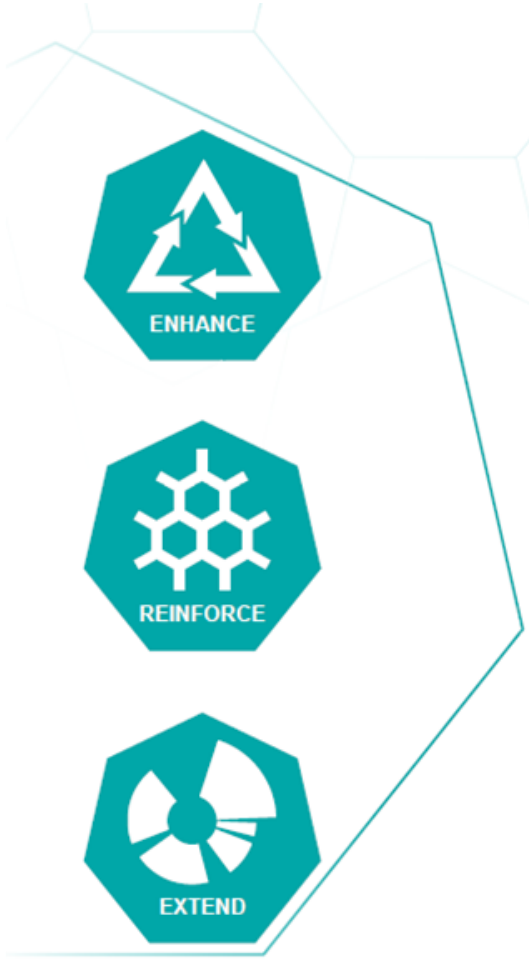
Free Flowing Pellet Masterbatches





Our products improve materials in three ways

Our customers, and often their customers, can expect **multiple benefits** from our solutions, most often without **negative effect on physical properties.**



***Dow Corning*® brand additives help increase throughput and productivity, and they reduce torque, thereby improving your processing performance.**

Die Droll or Plate-out Reduction • Extruder Throughput Increase • Film Production • Film Slip Improvement • Anti-blocking • Flowability • Mold Release • Higher Throughput • Torque Reduction • Power Consumption Reduction

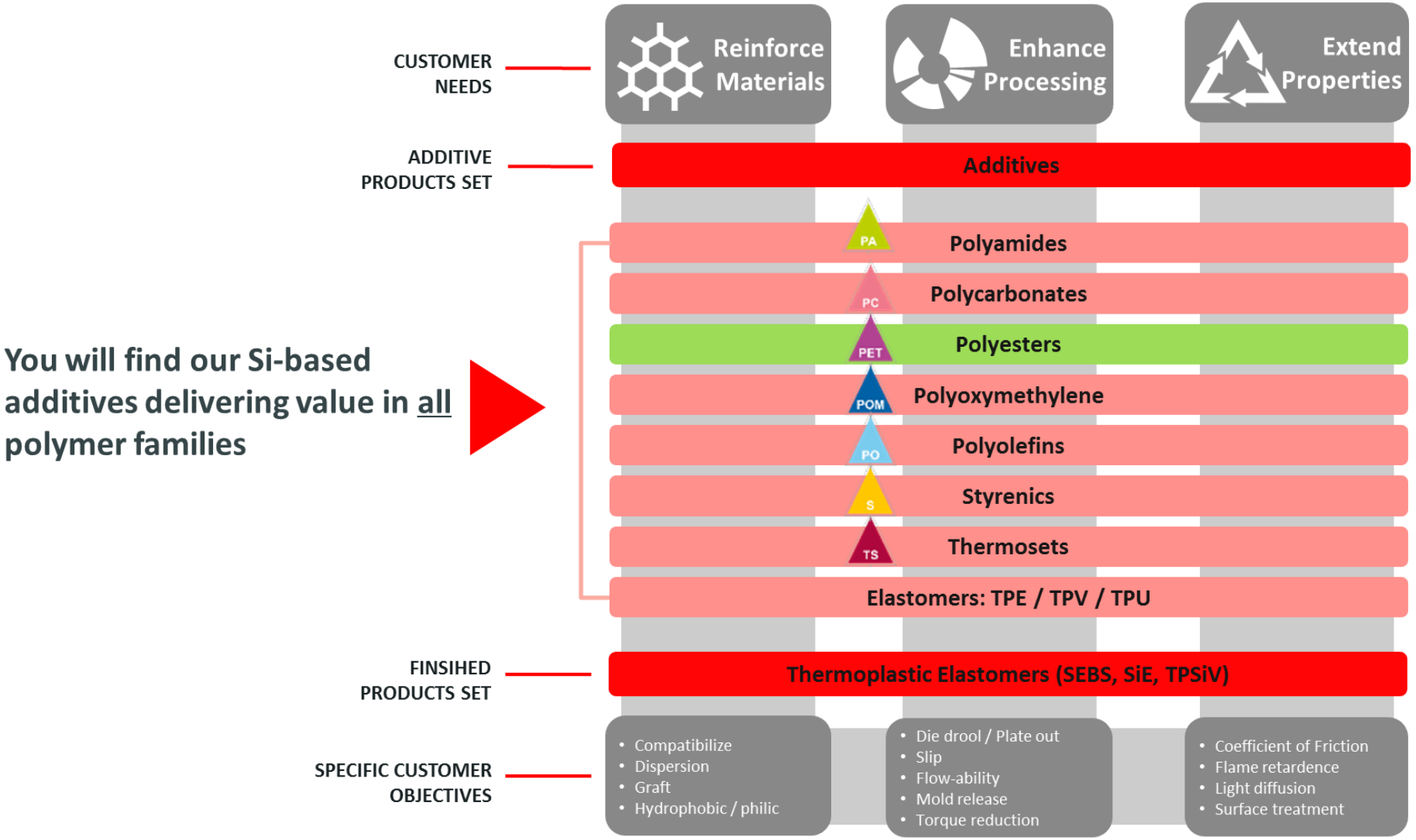
Si Additives help you reinforce mechanical properties, such as filler polymer bonds, impact resistance and improve compatibility of formulations.

Compatibilizer • Dispersion Improvement (dispersion within the compound) • Grafting • Polymer Crosslinking • Hydrophobic Property • Impact Resistance • Impact Modifiers

Extending surface quality, flame retardant performance and the consistency of light diffusion helps you create high-performing products.

Coefficient of Friction (increased slip) • Flame Retardancy • Light Diffusion • Surface Treatment (scratch, wear, mar) • Surface Look & Feel Quality

Our fit in polymer compounds



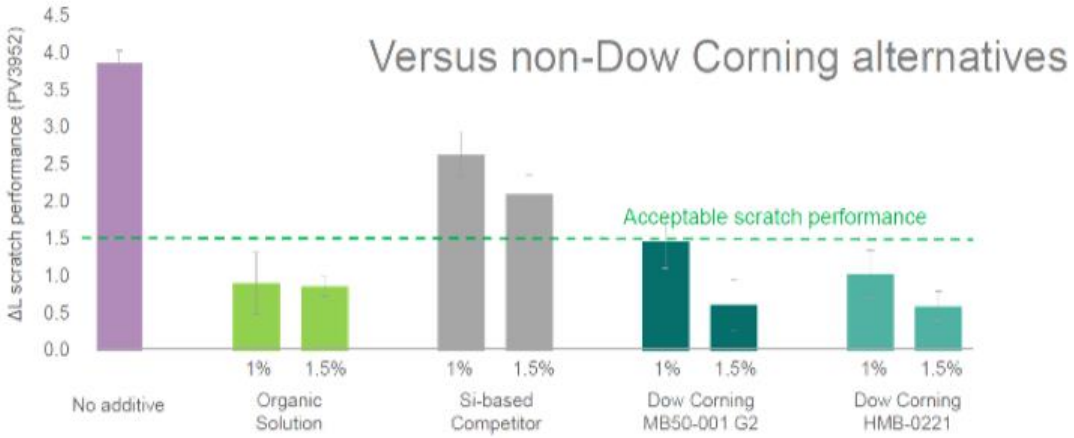
Extend Property

- Silicone Masterbatch for Anti scratch performance

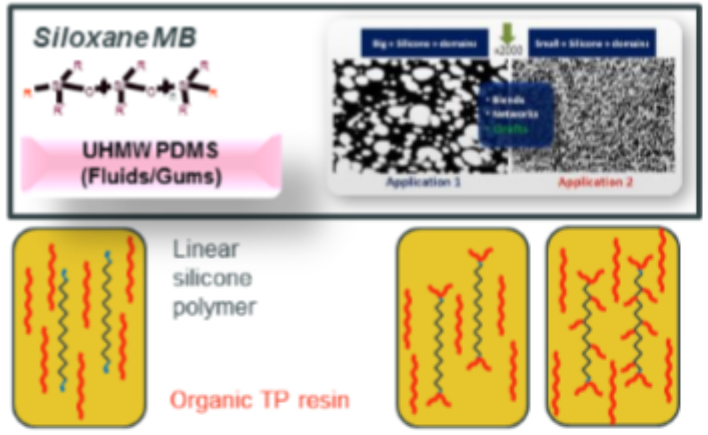
  MB50-001

  MB50-001 G2

  HMB-0221



Relation between PDMS structure and surface properties

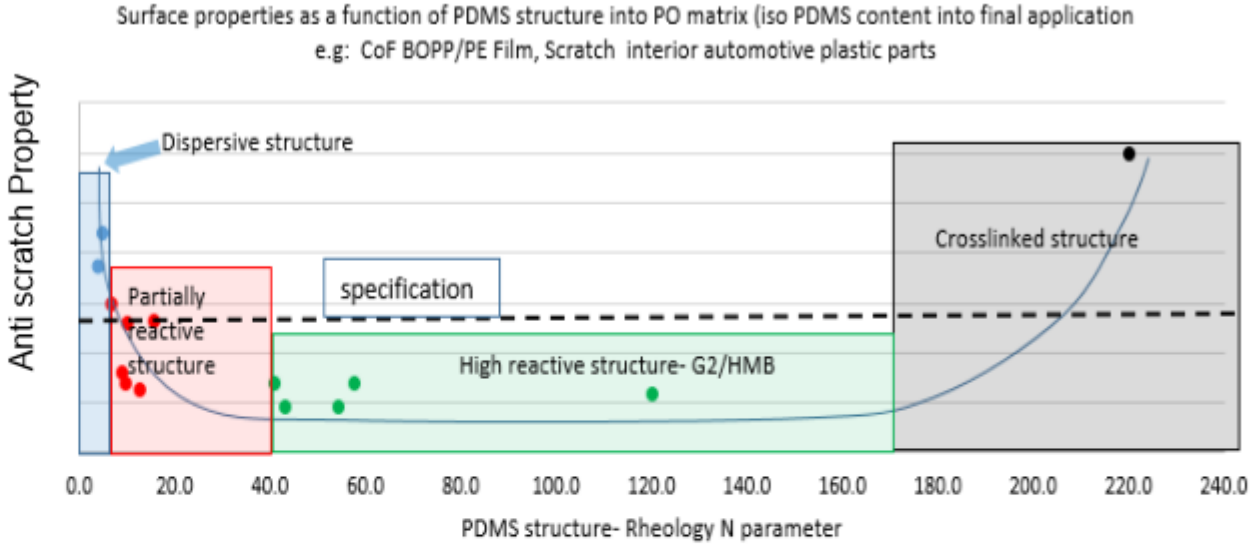


Pure blends
Si-Polymer & HCR

Silicone polymers distributed in a thermoplastic resins (w/o reactions)

Reacted blends and "hyperbranched"

Reaction product of Silicone polymers and TP carrier



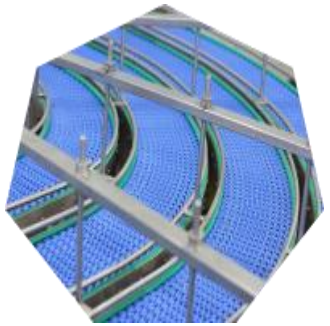
MB50-001 MB50-001 G2 HMB-0221 *PP offerings*

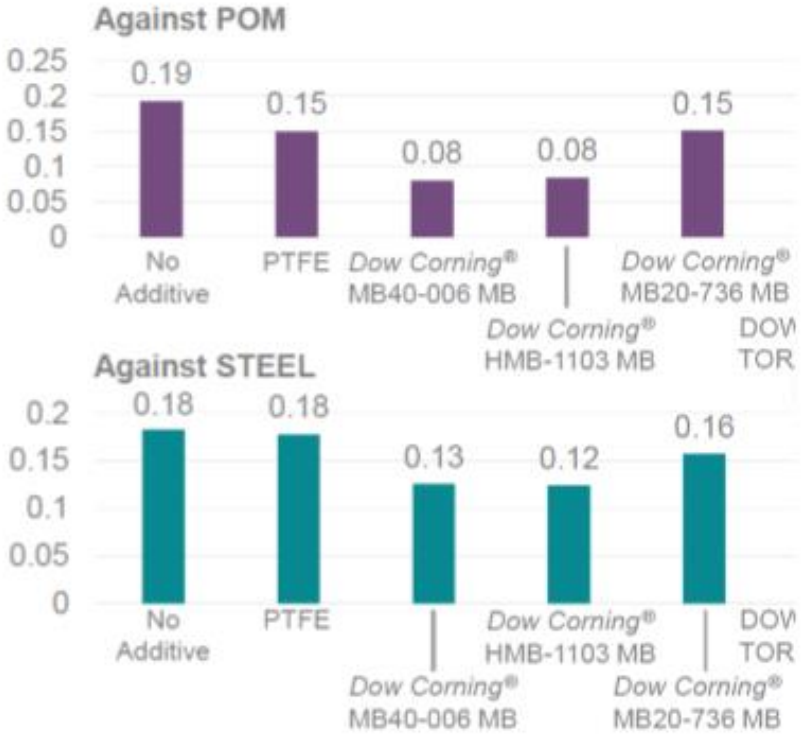
MB40-006 HMB-1103 HMB-1903
MB20-736 *POM offerings*

SiMB efficiency is governed by PDMS structure created by compounding process and its chemistry.

Extend Property

- POM Additives for low CoF, improved processing, noise reduction
  MB40-006
  HMB-1103
  MB20-736



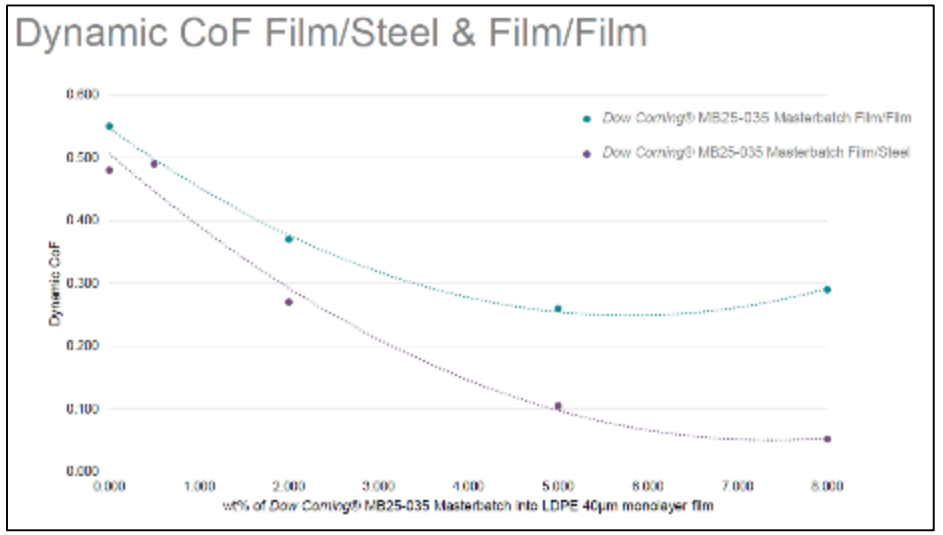


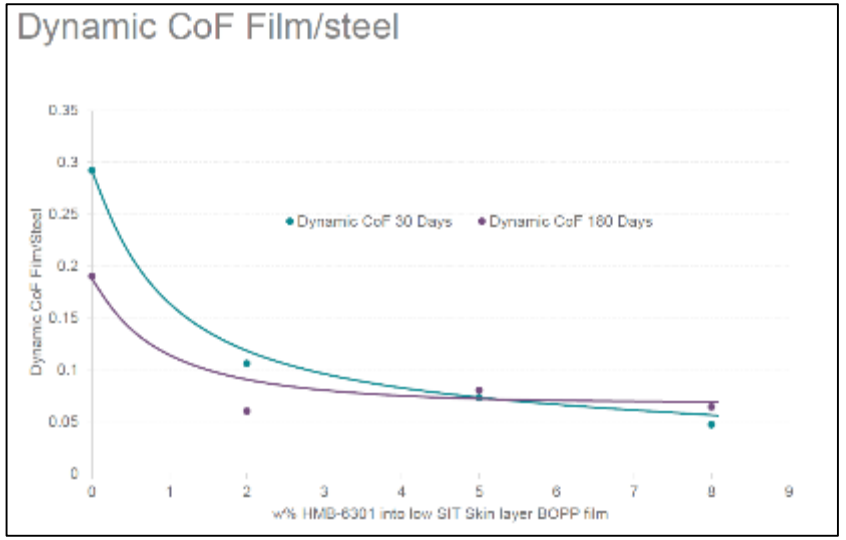
Extend Property

- Masterbatch additives for low CoF in film

  MB25-035 – PE Film
  FDA /GB Approved

  HMB-6301 – BOPP Film
  FDA Approved

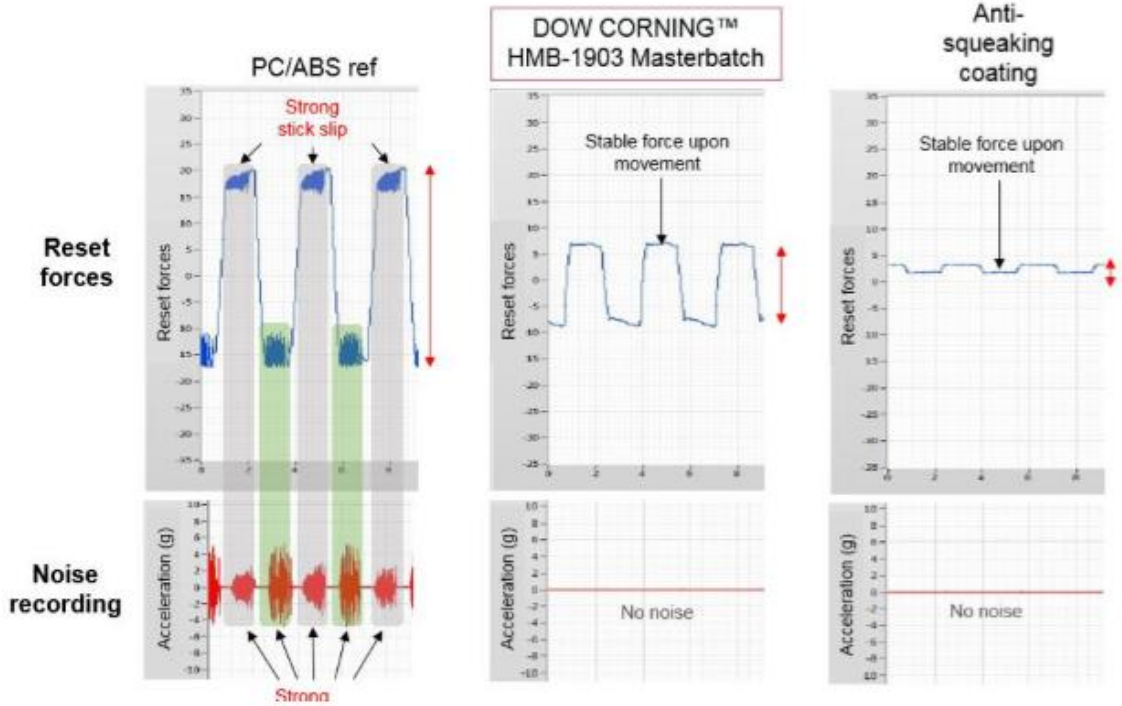


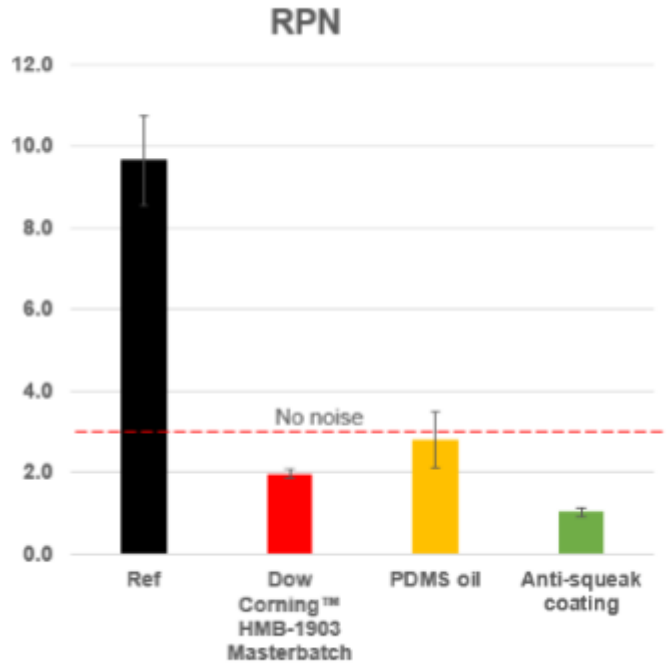


Extend Property

- SiMB for anti-squeaking performance

  HMB-1903





Enhance

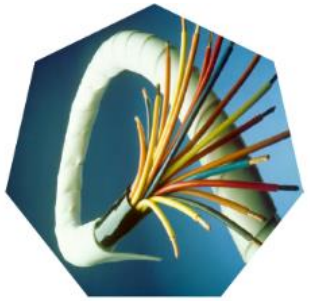
- Si Additives for low improved processing

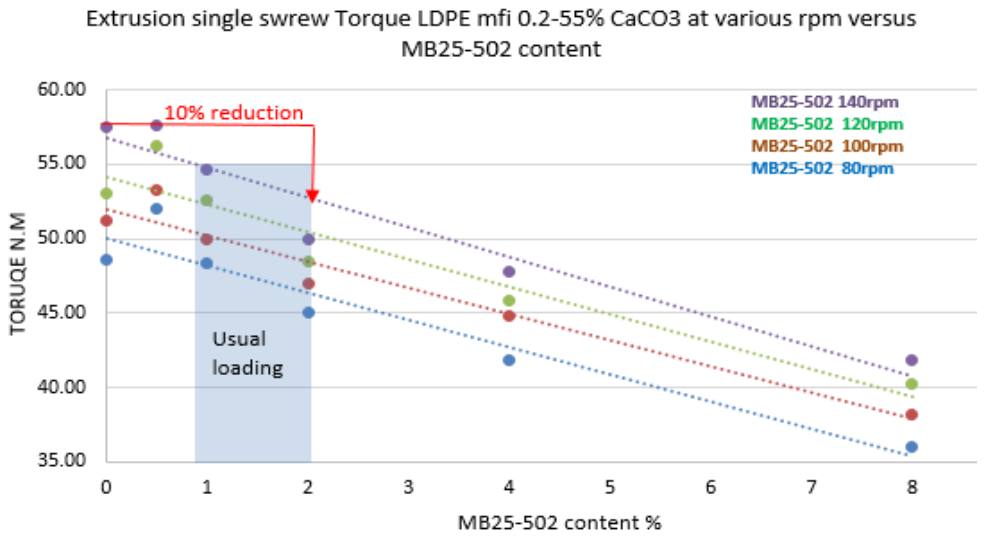
  MB50-011 (pellet)

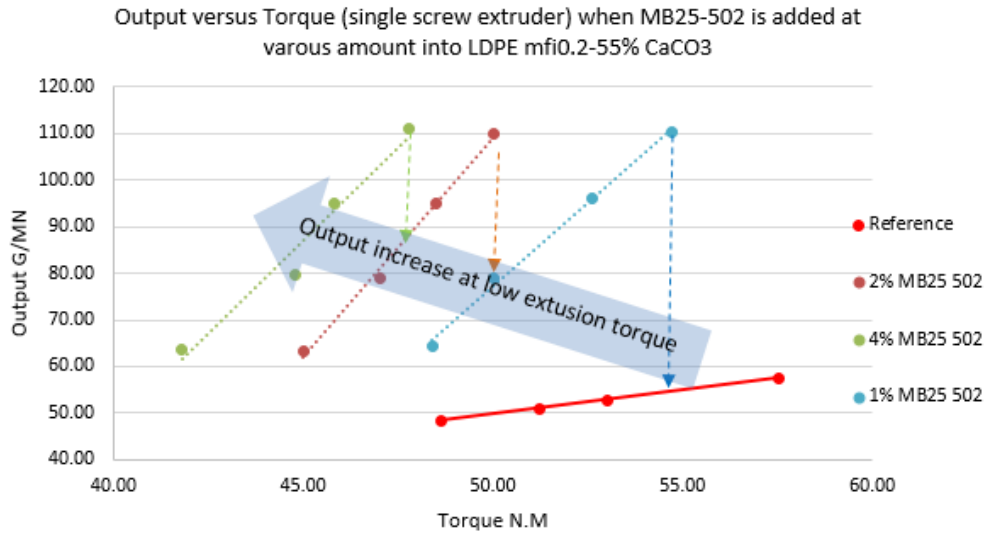
  MB25-511 (pellet)

  MB50-002 (pellet)

  MB25-502 (pellet)

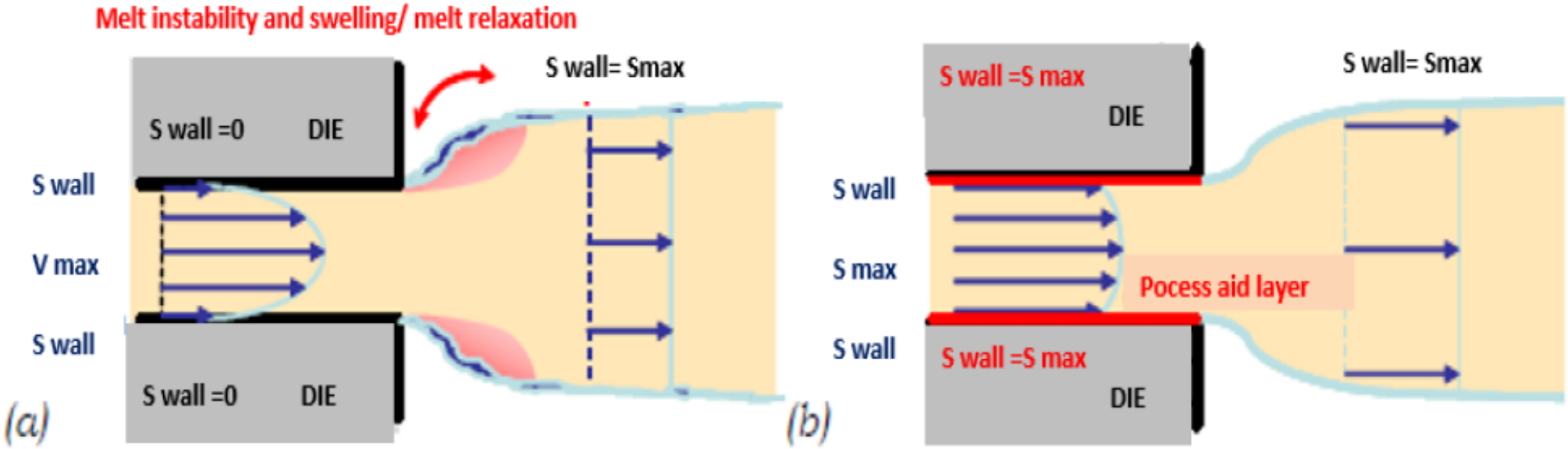






SiMB as processing aid agent

Processing aid effect on flow speed (S) of a melt phase extruded through a die: Shear and Flow speed gradient decrease

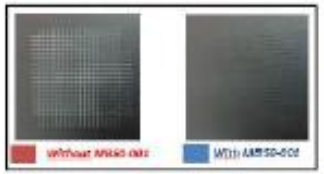


Claire Dubrocq-Baritaud Ingenieur SPCI ,thèse MECANISMES D'ACTION DE « POLYMER PROCESSING AIDS FLUORES DURANT L'EXTRUSION D'UN POLYETHYLENE BASSE DENSITE LINEAIRE : ETUDES EXPERIMENTALES ET INTERPRETATIONS; 17-12-2008, Ecole Nationale Supérieure des Mines de Paris

SiMB Main Applications

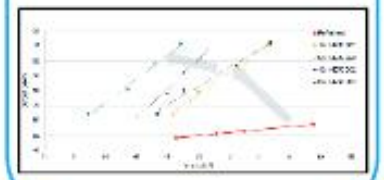
Scratch Improvement

- ✓ Talc Filled TPO
- ✓ Auto Interior
- ✓ Injection Molded in color
- ✓ Reactively extruded additive is most efficient



Process Aid for W & C

- ✓ Highly-filled PE extrusion formulations
- ✓ Reduced torque
- ✓ Increased through put
- ✓ Reduced die build up



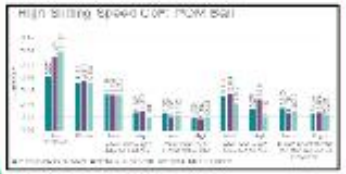
Slip Aid Optical Ducts

- ✓ Target very low CoF
- ✓ Allows improved installation
- ✓ Eliminates mess associated with external lubricants
- ✓ PE & PA wire & cable jacketing

% SiMB	COF (Belcore test)
Without additive	0.2
4% MB50-002	0.08
5% MB50-002	0.05

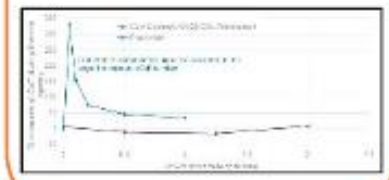
Moving Parts

- ✓ Minimize friction on mating plastic parts
- ✓ Target very low CoF
- ✓ Lowers noise
- ✓ Maintains print and paint ability
- ✓ POM, GF PA



Film Slip Aid

- ✓ Non-migratory slip aid over time and temp
- ✓ Minimal impact to other properties
- ✓ Maintains printability and metallization
- ✓ PE blown film, BOPP



Silicone Masterbatch Grades

Products*	Extend	Enhance	Reinforce	Polymer Phase	Compatibility	Siloxane Concentration
Ultra-High Molecular Weight PDMS						
MB50-001	■	■		PPH	PP, PE, TPO, TPE, TPV	50
MB50-001 G2	■	■		PPH	PP, PE, TPO, TPE, TPV	50
HMB-0221	■	■		PPH	PP, PE, TPO, TPE, TPV	Proprietary
MB50-002	■	■		LDPE	PA, PP, PE, TPO, TPE, TPV	50
MB50-004	■	■		HIPS	PS, HIPS, ABS, SAN	50
MB50-007	■	■		ABS	PS, HIPS, ABS, PC-ABS, SAN	50
MB50-008	■	■		SAN	PS, HIPS, ABS, PC-ABS, SAN, PVC	50
MB50-011	■	■		PA6	PA	50
MB50-012	■	■		PET	Polyester	50
HMB-1103	■	■		EMA	POM, PA, PET, PBT, PP, PE, PVC	Proprietary
MB40-006	■	■		POM	POM	40
MB50-010	■	■		COPE	Polyester	50
MB50-017	■	■		TPU	TPU	50
Ultra-High Molecular Weight Functionalized PDMS						
MB25-301	■	■	■	PPH	PP, PE, TPO, TPE, TPV	25
MB50-321	■	■	■	PPH	PP, PE, TPO, TPE, TPV	50
MB25-381	■	■	■	Terpolymer	PP, PE, TPO, TPE, TPV	25
MB25-302	■	■	■	LDPE	PP, PE, TPO, TPE, TPV	25
MB50-313	■	■	■	LLDPE	PP, PE, TPO, TPE, TPV	50
MB50-314	■	■	■	HDPE	PP, PE, TPO, TPE, TPV	50
MB50-320	■	■	■	EVA	EVA, PVC	50
MB50-315	■	■	■	PC	PC, PC-BLEND	50