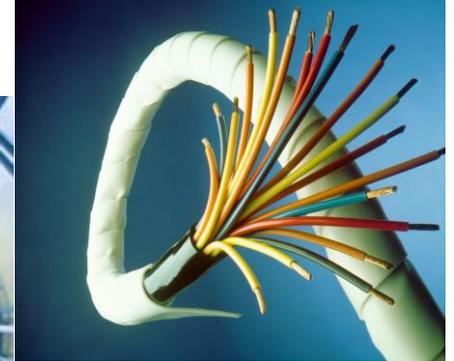
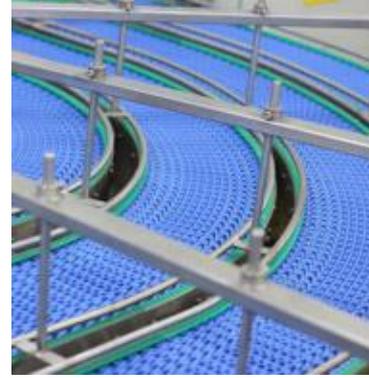


May 23, 2018

DOW CORNING™ HMB-1903 MASTERBATCH

Anti-squeak Additive for Styrenics



Rerat Vincent

Senior TS&D professional / Plastics



PC/ABS

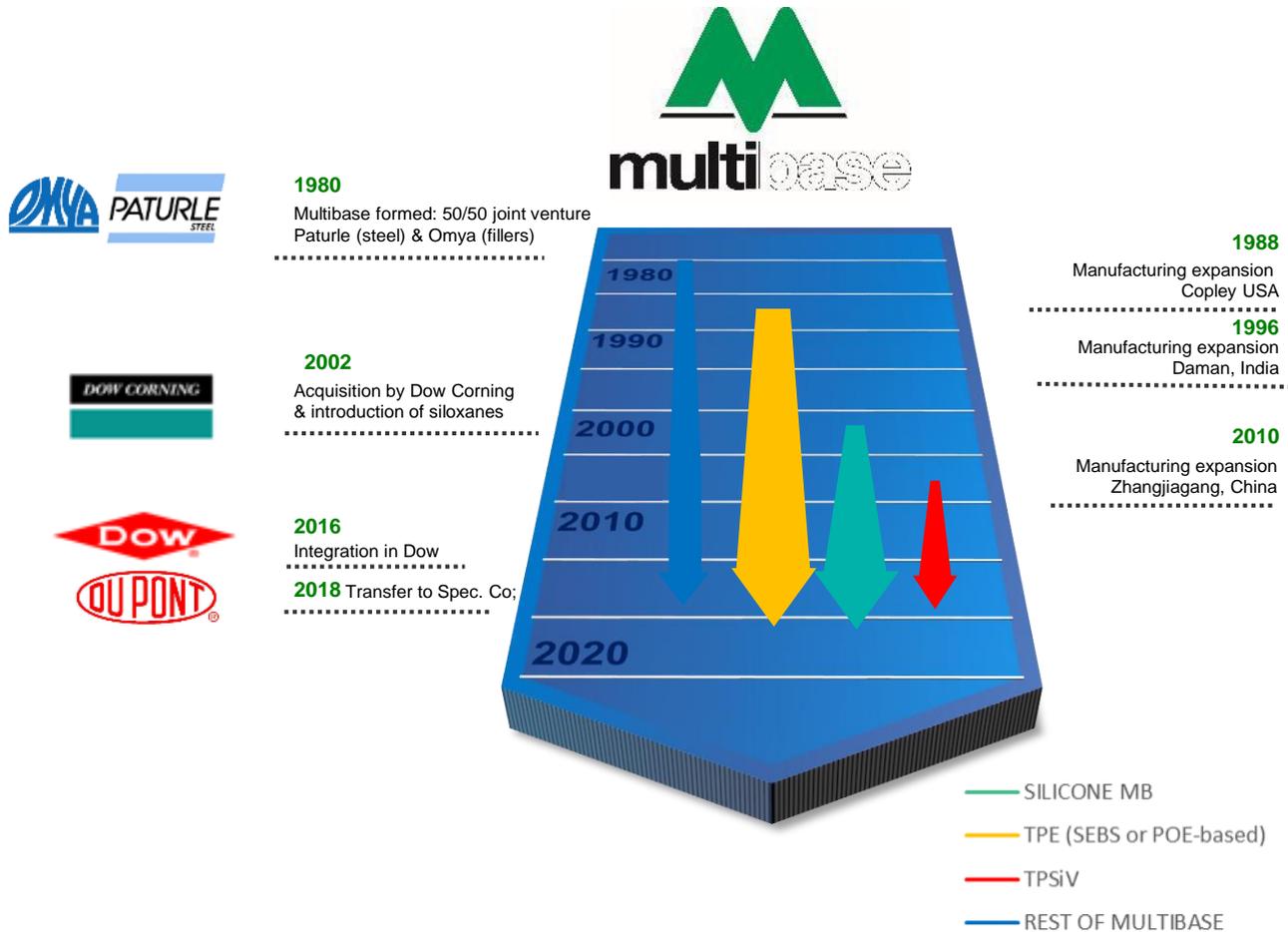


EXTEND

Agenda

- Multibase DuPont
- Market trends and needs
- What is squeaking noise and how to avoid it?
- Dow Corning approach
- DOW CORNING™ HMB-1903 Masterbatch features and benefits
- Technical results
- Conclusions

Multibase Innovation Evolution Through Its Owners

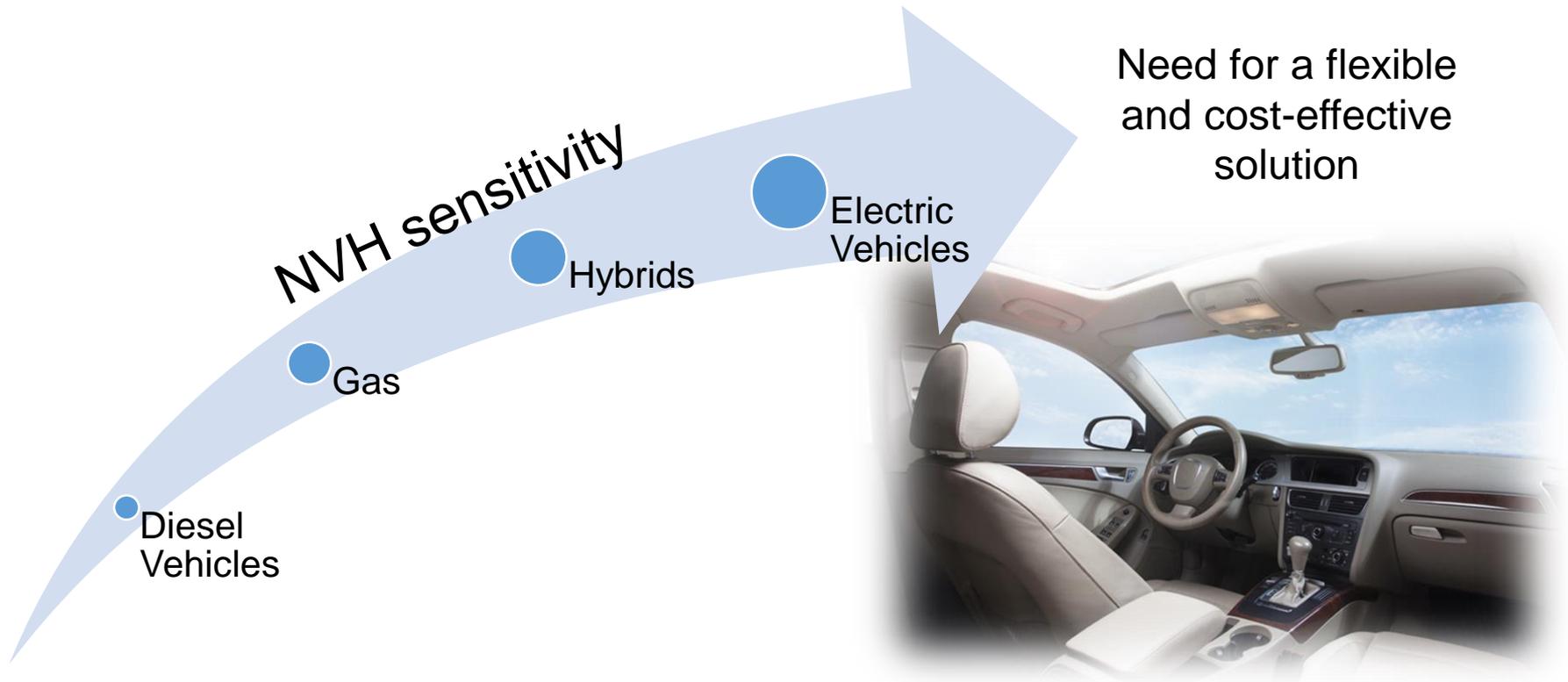


Key Locations

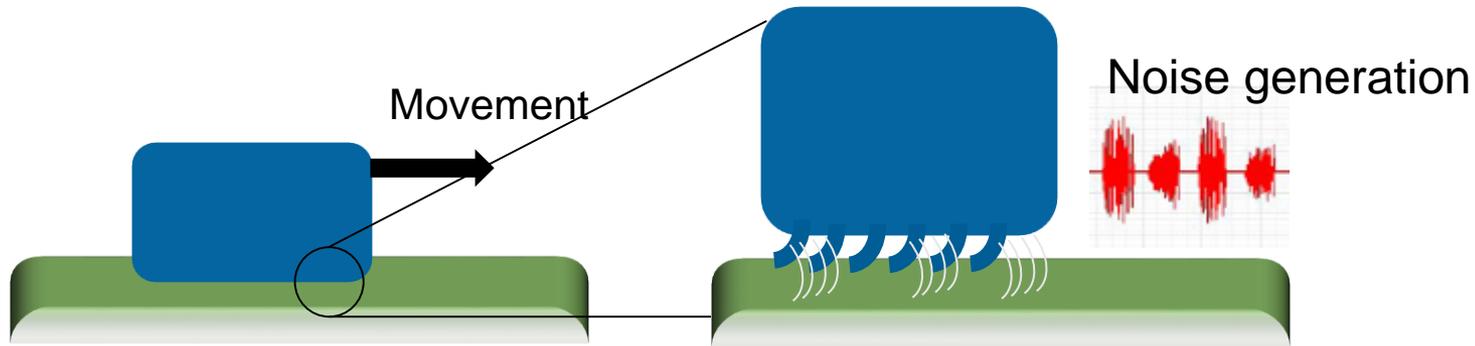


Market Trends and Needs

- Evolution of automotive industry delivers more quiet cars
- Car interiors become a haven for relaxation and entertainment
- Industry strives to reduce noise, vibration and harshness



What is Squeaking Noise?



■ Squeaking noise depends on several factors through complex interactions:

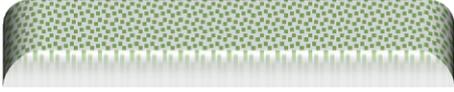
- Surface energy
- Surface roughness
- Surface hardness

■ How to measure it: ASTM 230-206

RPN	Comments
1-3	Non-squeaking material pair
4-5	Risk of squeaking long-term
6-10	Audible squeaking development



Existing Solutions for Noise Vibration Harshness (NVH)

		
<p>Ani-friction coating External lubricants</p> 	<p>Very stable anti-squeaking properties No impact on mechanical properties</p>	<p>Post treatment Time and capital intense Low flexibility Sensitive to cracks (coating) Washes out upon usage (lub) VOCs (lub)</p>
<p>Felt Application</p> 	<p>Very stable anti-squeaking properties No impact on mechanical properties</p>	<p>Post treatment Time and capital intense Low flexibility</p>
<p>Ready to use ABS-like</p> 	<p>Very stable anti-squeaking properties No post-treatment Drop-in solution</p>	<p>Binding to fixed formulations No formulation flexibility</p>
<p>Additivation</p> 	<p>Very stable anti-squeaking properties Long-term stability Flexible formulation to meet specific needs No post-treatment</p>	<p>Formulation Good dispersion needed</p>

New DOW CORNING™ HMB-1903: Features and Benefits

Anti-squeak silicone additives potentially suitable for automotive, transportation, consumer, construction and appliance applications

- Anti-squeaking (RPN \leq 3, ASTM 230-206)
- Efficient replacement of traditional anti-squeaking coatings, external greases and felt
- Improved production flexibility
- Improved wear resistance
- Permanent
- Easy flowing pellets
- For compounding and injection molding
- Free-up design capabilities
- Reduce total cost of ownership
- Good surface finishing
- Most suitable for PC/ABS blends

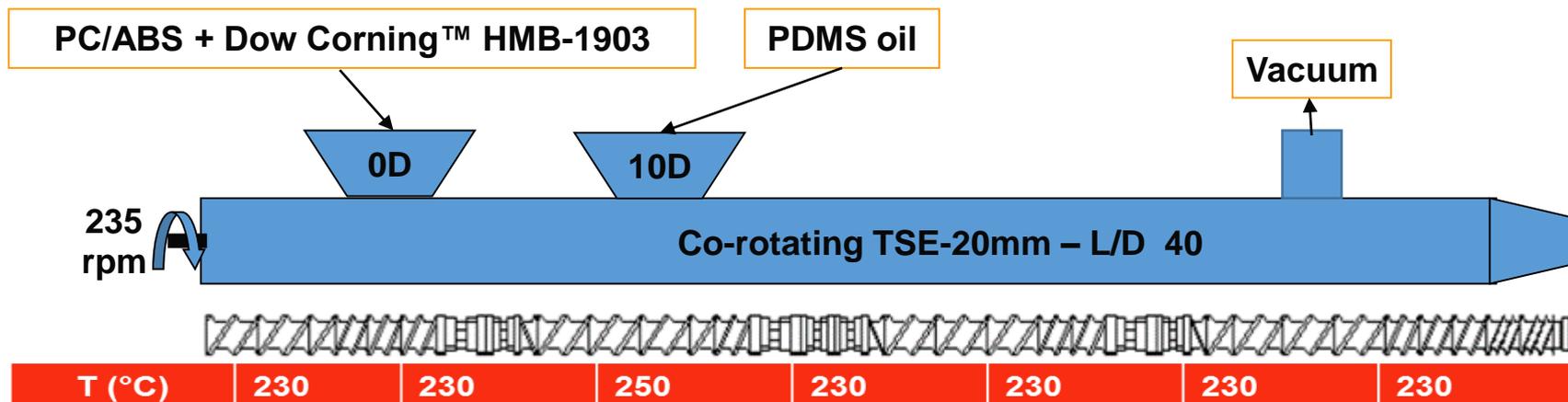
	DOW CORNING™ HMB-1903 Masterbatch
Physical form	Pellets
Process	Extrusion (recommended) – typical styrenic screw profile
	Injection molding direct dilution – recommended with good counter-pressure or mixing head
Recommended usage level	3-5 wt%

Formulations & Benchmarking - Compounding

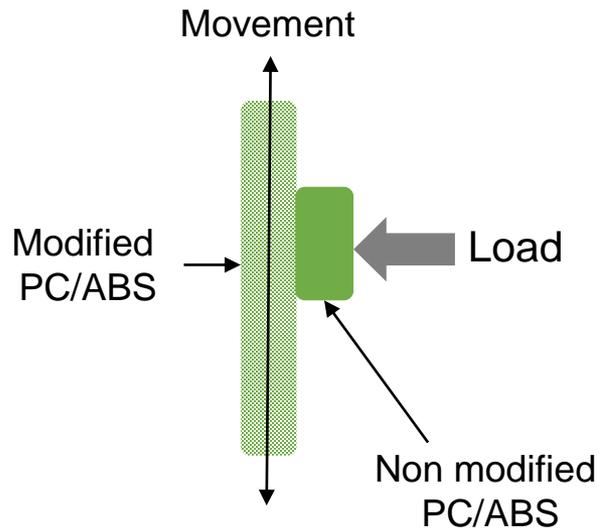
benchmarking	comments
Dow Corning™ HMB-1903 Masterbatch	4 wt% compounded
Anti-squeaking coating	5min 50° C drying - 20microns*
PDMS oil**	2wt% compounded

*Plates were first cleaned with L-13 and then sprayed with UV anti-friction coating with a thickness of 20 µm. Plates were put in oven for 5 minutes at 50° C. This water-based coating contains 42% of PTFE. This coating is an anti-noise, anti-friction coating for automotive industry (interior application) that can be sprayed or brushed.

**1000 cst PDMS oil

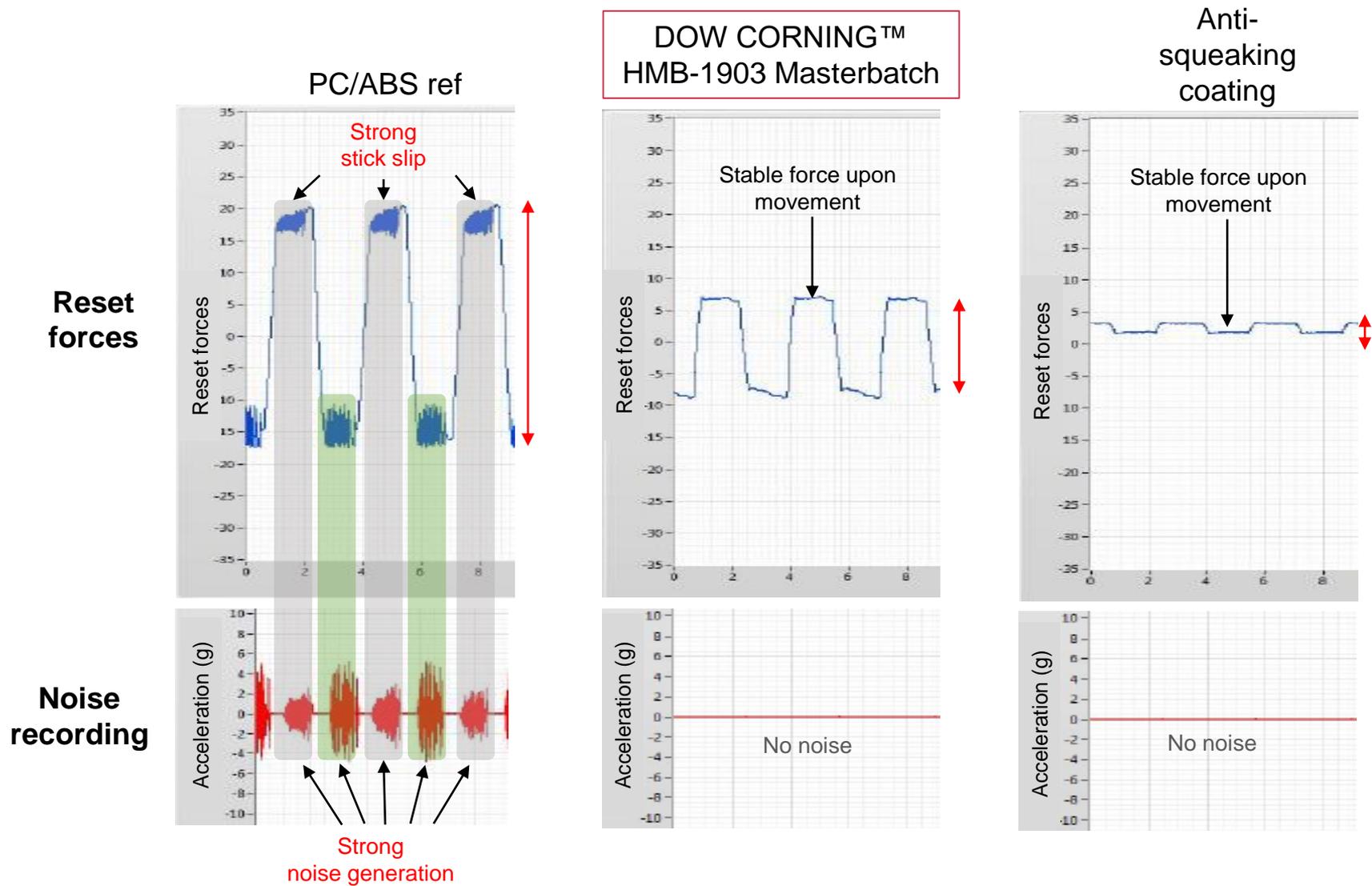


Anti-squeaking Measurements Set-up



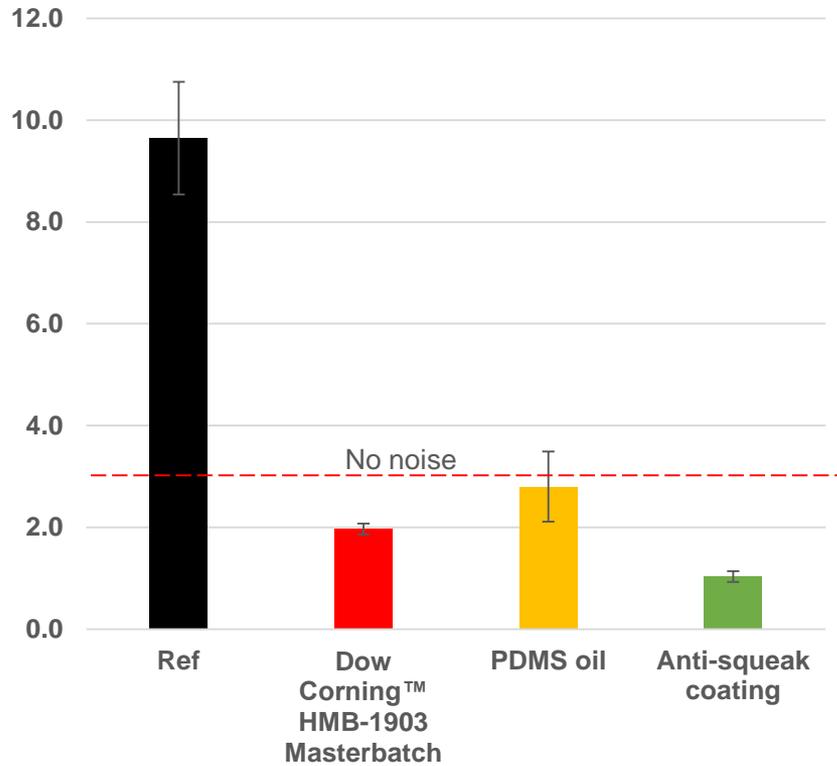
Squeak testing conditions	High load/high speed long term
Contact area	(12,5cm ²) 2.5x5cm
Speed (mm/s)	4
Load (N)	40
Cycle	4050
Length (mm)	5
temperature	23°C (+2°C)
RH	50% (+5%)

New DOW CORNING™ HMB-1903: Anti-squeaking Performances

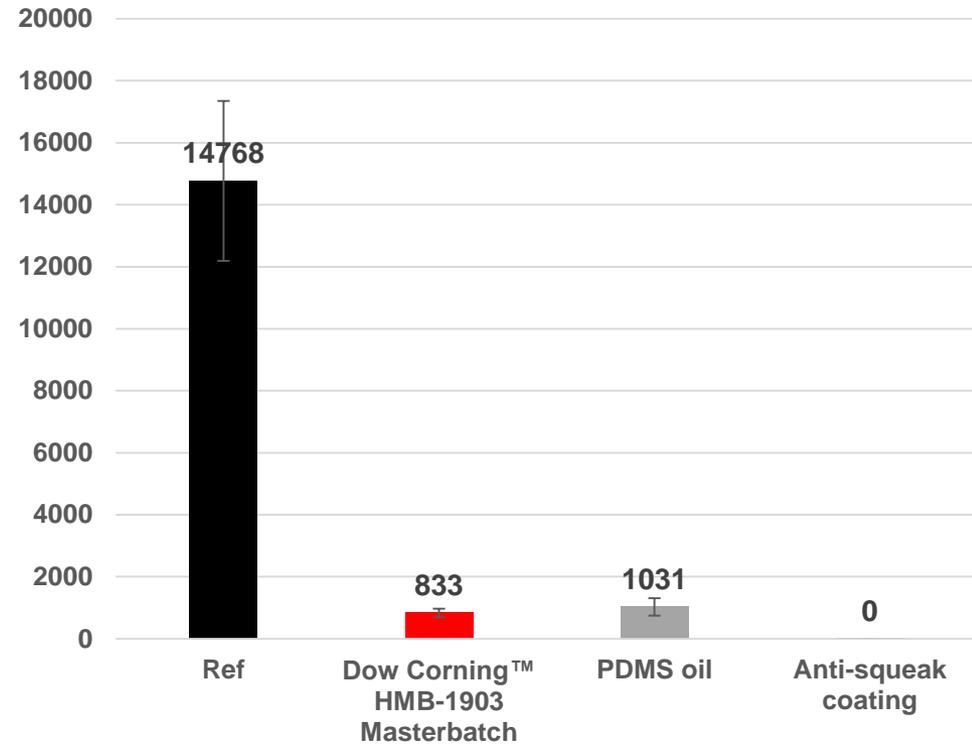


New DOW CORNING™ HMB-1903: Anti-squeaking Performances

RPN

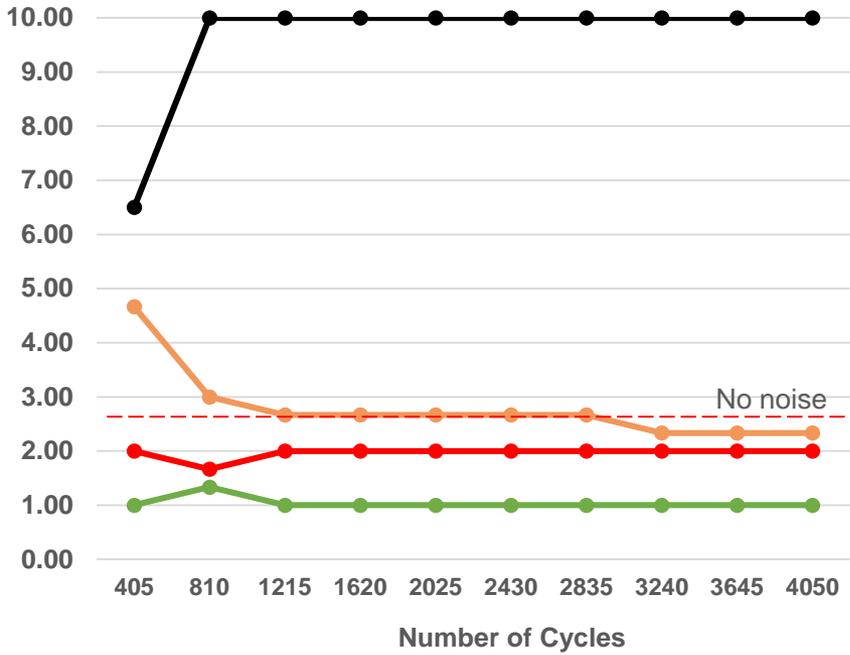


IMPULSE (counts)



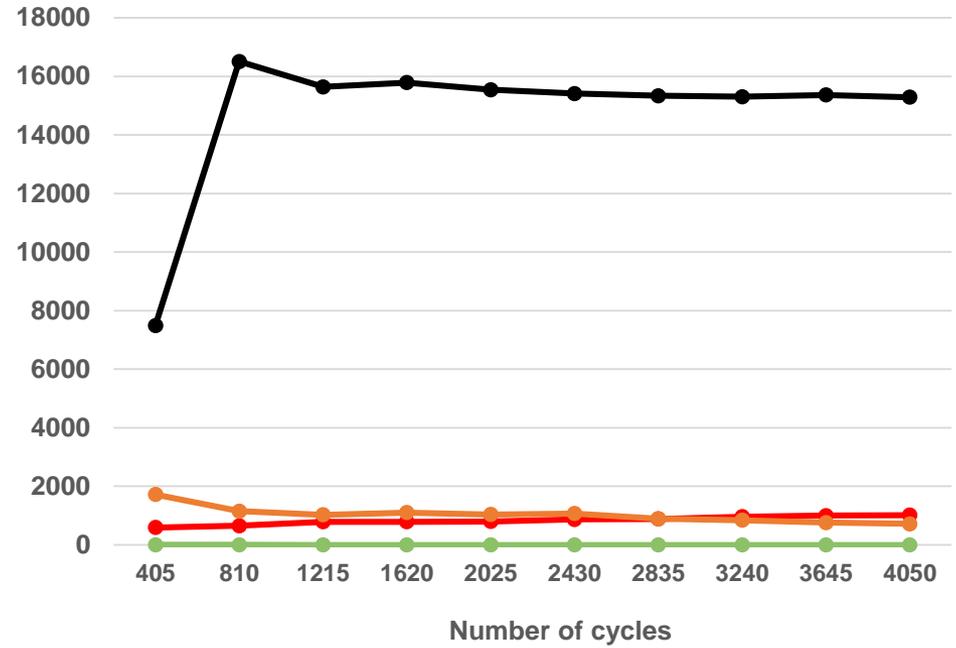
New DOW CORNING™ HMB-1903: Anti-squeaking Performances

RPN Evolution



- Dow Corning(TM) HMB-1903 Masterbatch
- PDMS
- Anti-squeak coating
- ref

Impulse Evolution (counts)

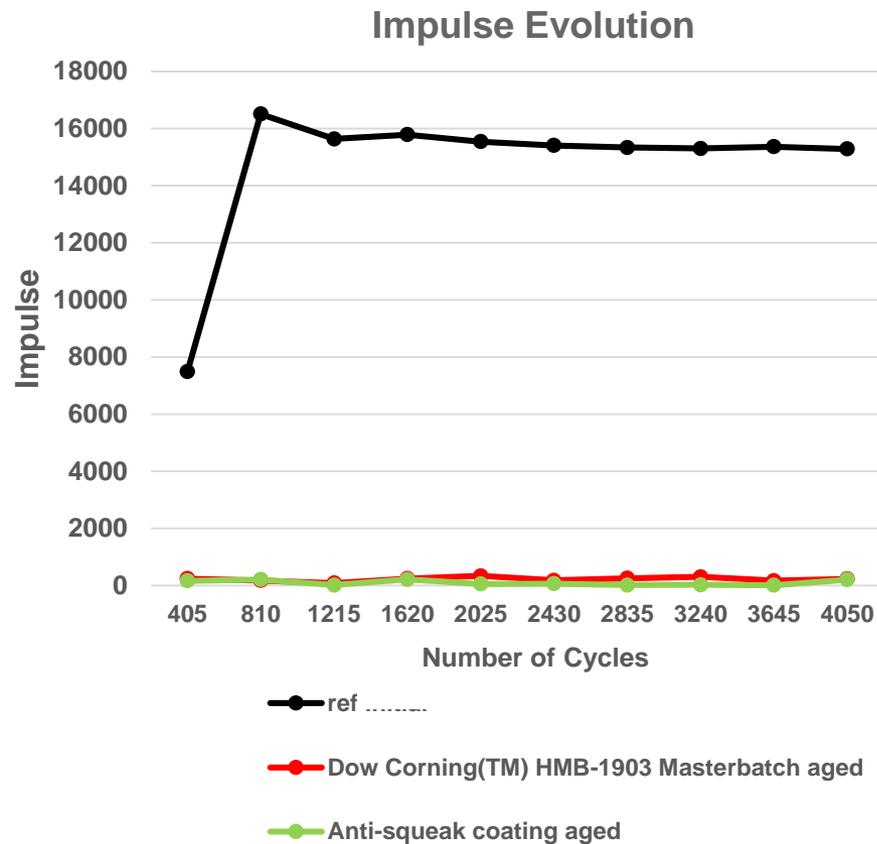
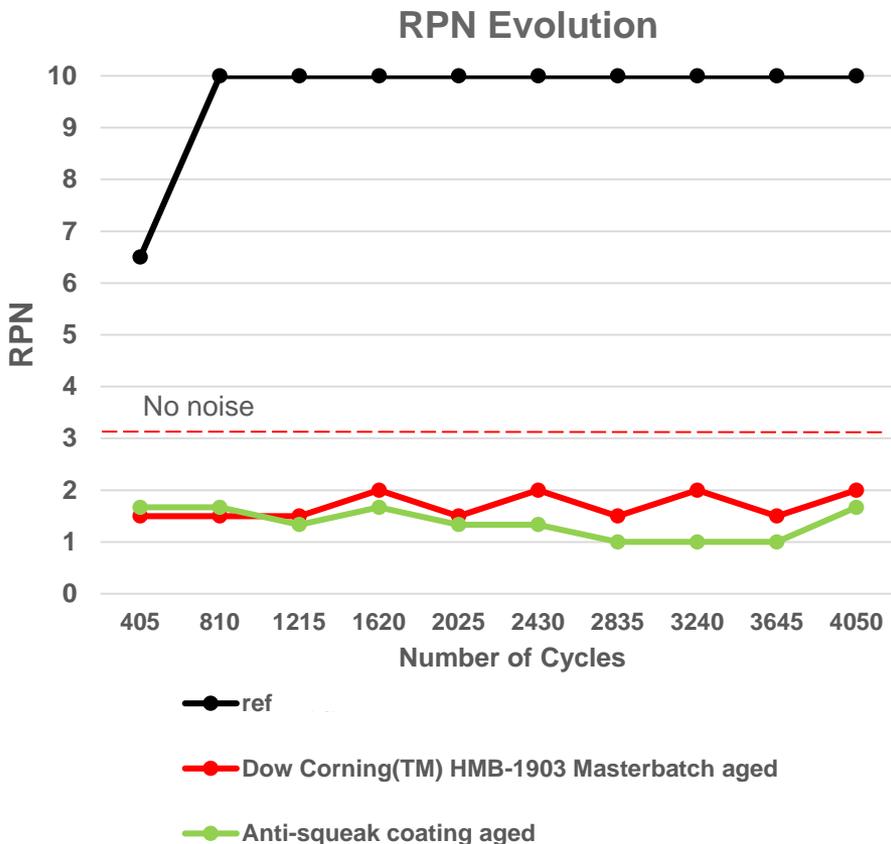


- Dow Corning(TM) HMB-1903 Masterbatch
- PDMS
- Anti-squeak coating
- ref

Addition of DOW CORNING™ HMB-1903 Masterbatch delivers anti-squeaking performances close to that of best-in-class coating solution.

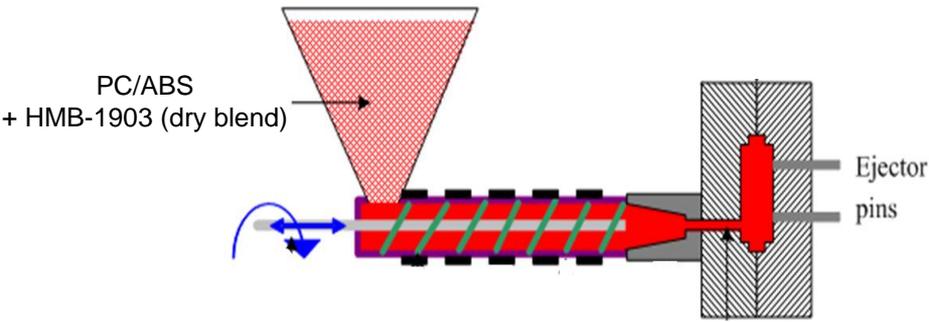
New DOW CORNING™ HMB-1903 Shows Good Aging Performances

Aging conditions: hot air / 60°C / 1500hrs



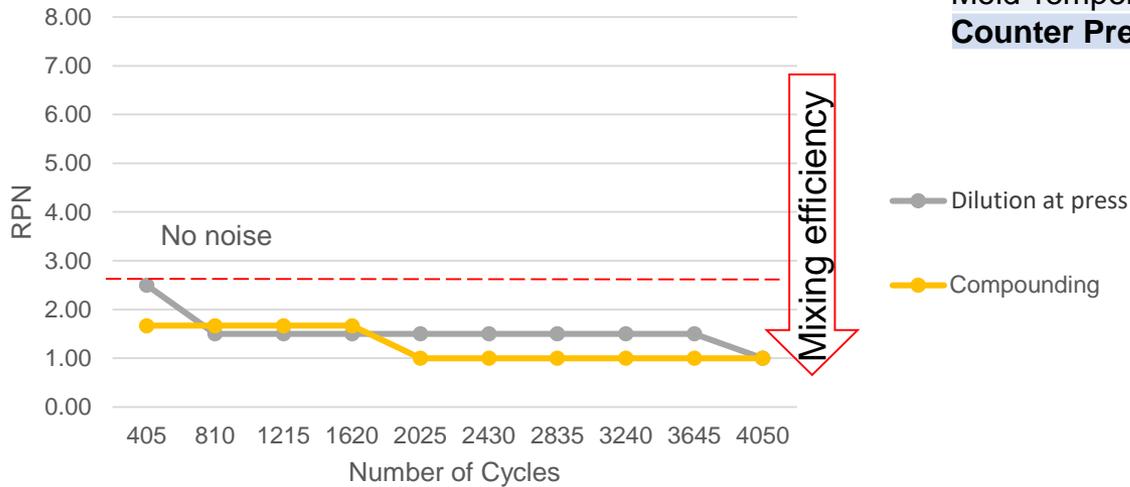
New DOW CORNING™ HMB-1903 Masterbatch delivers stable RPN<3 performances upon aging, comparable to anti-squeak coating.

Squeak Evolution With Time – Direct Press Dilution



Injection Molding Parameters		
	Value	Unit
Maximum Moisture Content	0.02	%
Melt Temperature	260	°C
Nozzle Temperature	270	°C
Front - Zone 3 Temperature	270	°C
Middle - Zone 2 Temperature	270	°C
Rear - Zone 1 Temperature	270	°C
Mold Temperature	80	°C
Counter Pressure	250	bars

RPN evolution vs cycles

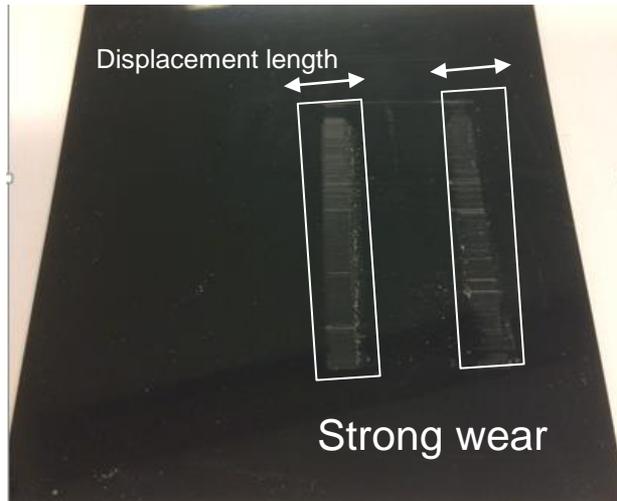


Good mixing during direct press dilution delivers performance close to that of compounding

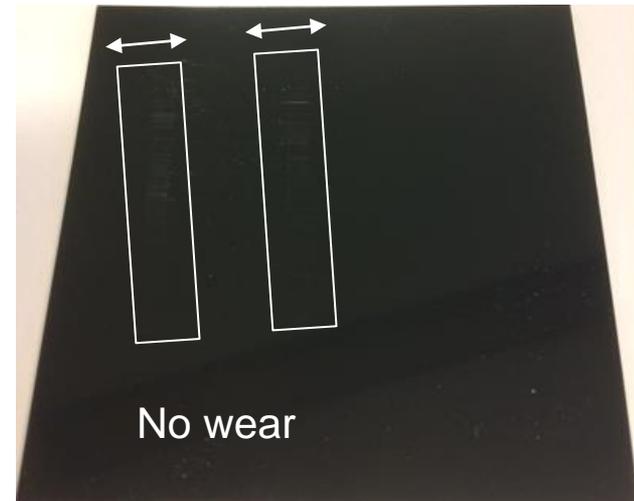
↳ Increased flexibility toward part manufacturer

New DOW CORNING™ HMB-1903 Improves Surface Wear

PC/ABS

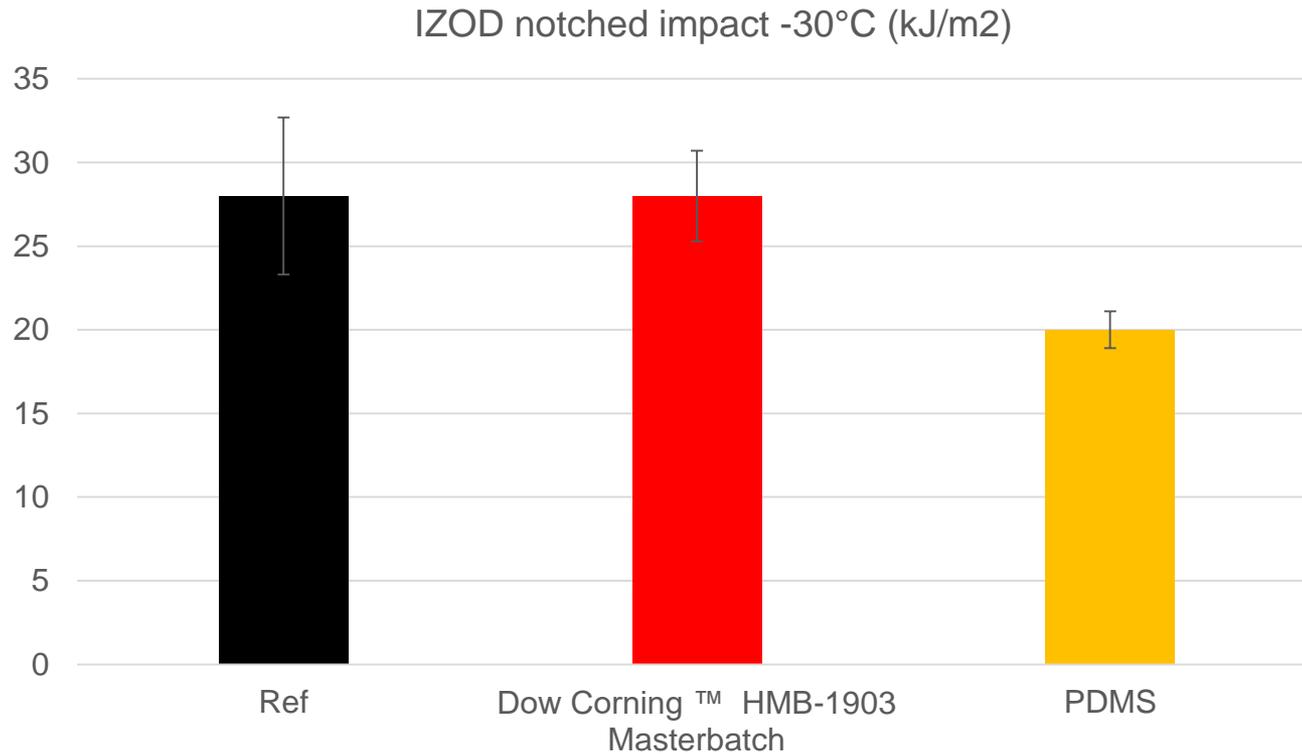


DOW CORNING™ HMB-1903
Masterbatch (4wt%)



DOW CORNING™ HMB-1903 Masterbatch dramatically improves abrasion resistance with almost no visible wear after 4050 squeak test cycles.

New DOW CORNING™ HMB-1903 Maintains Impact Performance



DOW CORNING™ HMB-1903 Masterbatch helps to maintain critical low temperature impact performances.

Conclusion

New patent-pending DOW CORNING™ HMB-1903 Masterbatch features in ABS and ABS blends:

- Excellent anti-squeaking performances following ASTM230-206
- Excellent anti-squeaking performances upon hot air aging
- Maintains critical low temperature impact performances
- Cost-efficient replacement to less flexible solutions (e.g. coatings, external greases, felt or ready-to-use chemically modified PC/ABS)
- For compounding or direct press-dilution
- Improved wear resistance
- Offers new design flexibility



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Thank You

