

# CABOT Low Odor Presentation

CERTECH Webinar

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# CABOT AT A GLANCE

Global specialty chemicals and performance materials company

FOUNDED	HEADQUARTERS	EMPLOYEES	PLANT LOCATIONS	COUNTRIES	FY 2020 SALES
1882	BOSTON, MA, USA	~4,500	44	20	\$2.6 Billion

## OPERATING SEGMENTS

#1 or #2 Business Positions

Reinforcement  
Materials



Performance  
Chemicals



Purification  
Solutions



Strong commitment to sustainability



Broad portfolio of solutions and technical expertise that enable application innovation

- ◆ Core performance additives
- ◆ Strategic downstream formulations

# GLOBAL DEVELOPMENT AND PRODUCTION LOCATIONS



- manufacturing sites
- sales sites
- manufacturing affiliates
- ★ global headquarters
- ★ regional headquarters

**45 manufacturing sites** in 21 countries, all with local management teams  
**30 sales locations** in 20 countries

**5 masterbatch sites** across the globe

**2 plastics applications lab**

# Vehicle Interior Air Quality (VIAQ)

VIAQ is always one the most concerning issues in Automotive



**Consumer Demand**



**Government Regulations**



**OEM Response**



**Impact on Raw Materials (Low VOC)**

# Regulations in Different Countries

Government shows strong determination to improve VIAQ

Limit in the car (mg/m <sup>3</sup> )	Korea KOR	Japan JAMA <i>Non-mandatory</i>	China 27630-2011	China 27630-2017
Benzene	0.03	-	0.11	0.06 ↓
Toluene	1.00	0.26	1.10	1.00 ↓
Ethylbenzene	1.60	3.80	1.50	1.00 ↓
Xylene	0.87	0.87	1.50	1.00 ↓
Styrene	0.30	0.26	0.26	0.26 →
Formaldehyde	0.25	0.1	0.10	0.10 →
Acetaldehyde	-	0.048	0.05	0.20 ↑
Acrolein	-	-	0.05	0.05 →

## GB/T 27630-2017 Evaluation Guidelines for Air Quality in Passenger Vehicles

- ◆ Future mandatory standard
- ◆ Probably the strictest standard worldwide
- ◆ Included into **China 6** (July, 2020,)
- ◆ Japan, Korea likely to further tighten regulations as well

*Emission of harmful and toxic VOCs is the primary concern in VIAQ*

# Volatile Organic Compounds (VOCs)

## Classification of VOCs & How to measure

Boiling point	Term	Examples	Item	Method
<50°C	Very Volatile Organic Compounds ( <b>VVOC</b> )	Formaldehyde (-21°C) Acetaldehyde (20°C)	<b>Odor</b>	Olfactory
>50°C <260°C	Volatile Organic Compounds ( <b>VOC</b> )	Benzene (80°C) Toluene (110°C) Styrene (145°C)	<b>Fogging</b>	Photometric Gravimetric
>260°C <400°C	Semi Volatile Organic Compounds ( <b>SVOC</b> )	BHT (265°C) Di-n-butyl phthalate (340°C) Di n-ethylhexyl phthalate (390°C)	<b>TVOC</b>	Head-space Bag method Thermodesorption
>400°C	Particulate Organic Matter ( <b>POM</b> )	Polychlorinated biphenyl	<b>Aldehydes /Ketones</b>	Spectrometer HPLC

# Evolution of Emission Requirement of OEMs

## VW50180 - Components in the Vehicle Interior - Emission Behavior

	Part designation and material	Emission limit PV3341 (µgC/g)	Fogging limit PV3015 (mg)	Odor test PV3900		Formaldehyde emission PV3925 (mg/kg)
				Variant 2 - 40°C	Variant 3 - 80°C	
<b>2007</b>	General requirements	50	2	3.0	3.5	10
<b>2015</b>	General requirements	50	2	3.0	3.5	5
	PP injection-molded parts	40	0.5	3.0	3.5*	3
<b>2019</b>	General requirements	50	2	3.0	3.5	5
	PP injection-molded parts	50	-	-	3.5*	-

*Note: Odor grade "4.0" applied temporarily and expected to be graded to 3.5 soon*

# VIAQ Testing by OEMs

How OEMs control interior emission

EMISSION



## Whole Vehicle

- ◆ Static sampling
- ◆ Dynamic sampling
- ◆ HJ/T 400-2007
- ◆ ISO 12219-1
- ◆ PV 3938...



## Assembly/parts

- ◆ 1m<sup>3</sup> small chamber
- ◆ Micro-scale chamber
- ◆ Bag method
- ◆ ISO 12219-4, VDA-276...
- ◆ ISO 12219-3, CS 13398...
- ◆ ISO 12219-2, NES M0402...



## Material/parts

- ◆ Odor
- ◆ TVOC
- ◆ Fogging
- ◆ Aldehydes/Ketones
- ◆ PV 3900, GMW 3205...
- ◆ PV 3341, GMW 8081...
- ◆ PV3015, VCS 1027,2719...
- ◆ PV3925, VCS 1027,2739...



# Odor Testing Methods

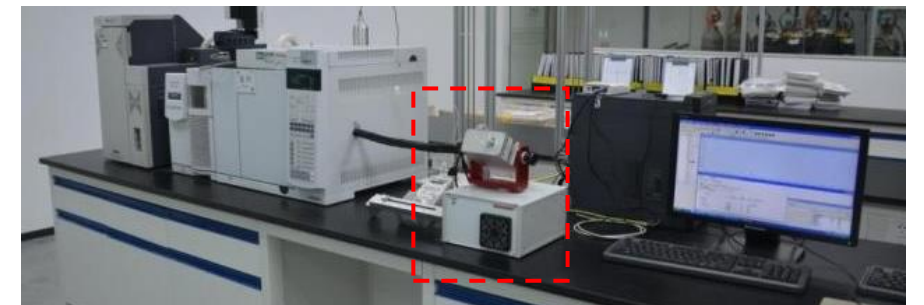
Olfactory method is currently applied by OEMs\*

## ◆ Olfactory method

- ◆ Easy to perform
- ◆ Subjective evaluation
- ◆ Currently applied by OEMs

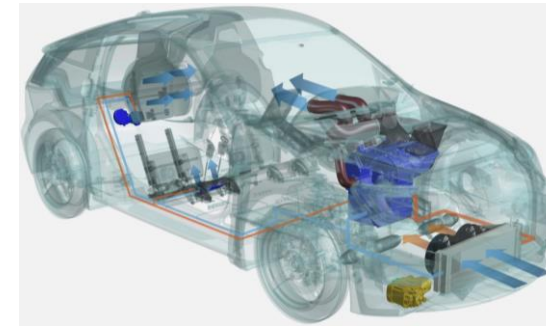
## ◆ Electronic method

- ◆ Recognition of odorant (GC-Olfactometry)
- ◆ High cost
- ◆ Precision issue



# Major Applications for Low Odor

Instrumental panel and HVAC systems typically cause lots of odor issues in Vehicles



## Typical requirements

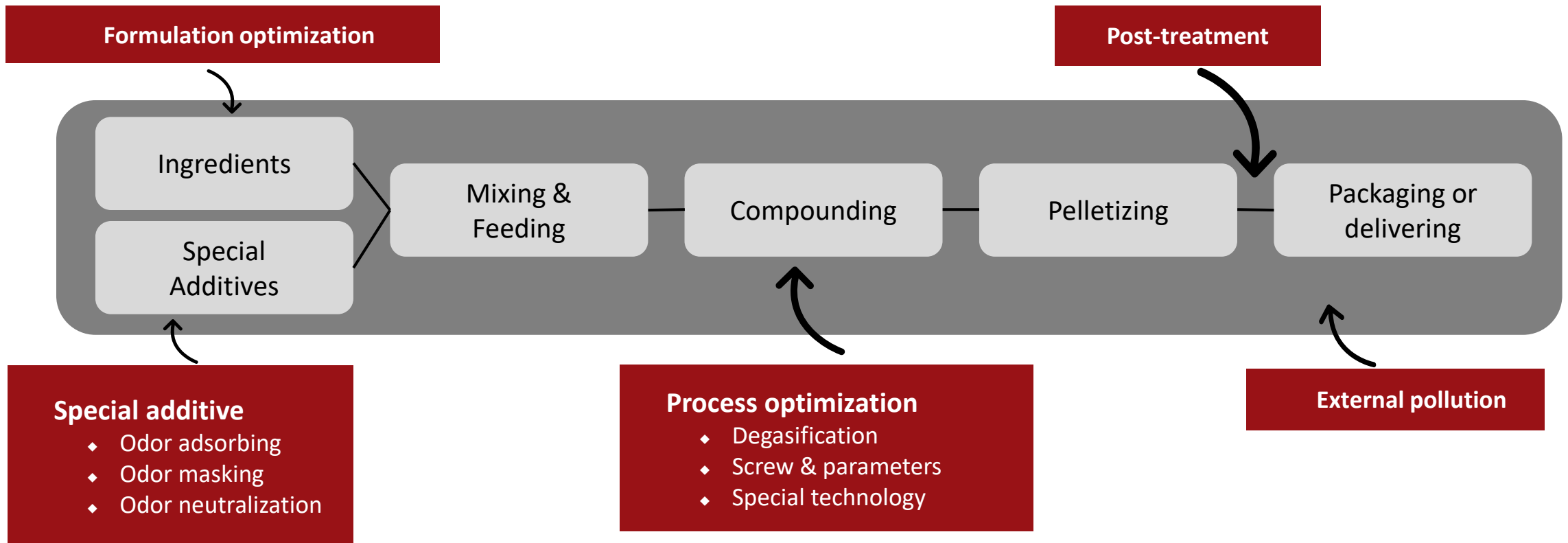
- ◆ Low Odor
- ◆ Low fogging
- ◆ Color / Color matching to match OEM requirement
- ◆ Scratch

## Typical requirements

- ◆ Low Odor
- ◆ Low fogging
- ◆ Thermal resistance

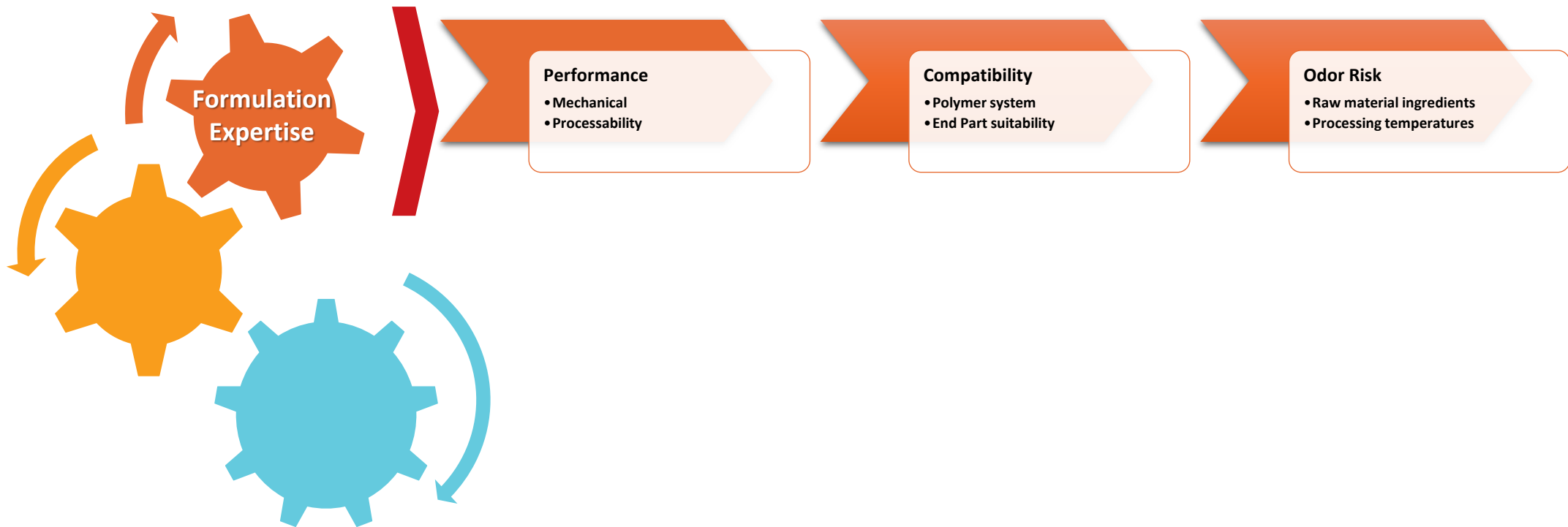
# Odor Reduction Technology in Compounding

Technology that could be introduced during the compounding



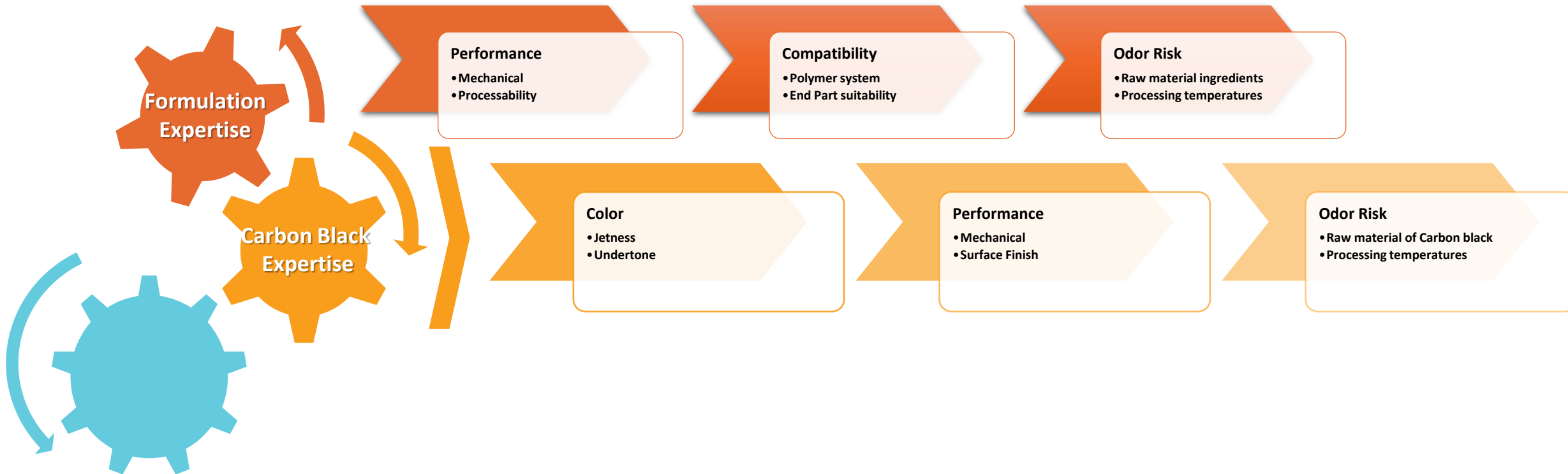
# CABOT Low Odor Technology

Low Odor Masterbatches are mainly driven by our formulation technology, carbon black expertise and processing know-how



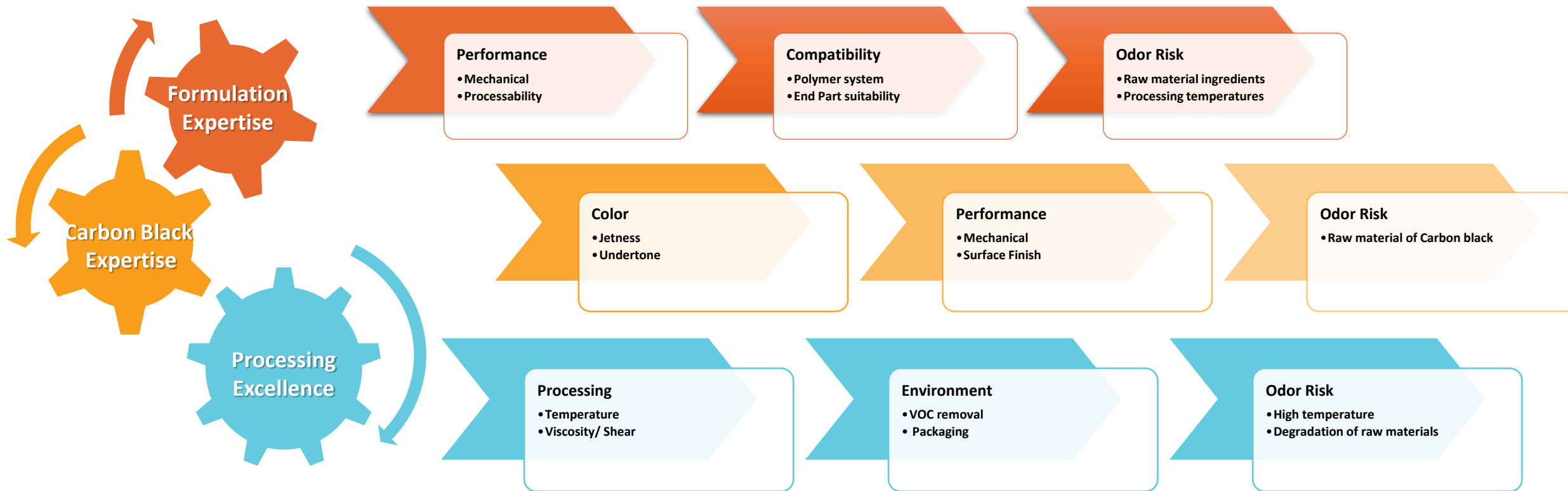
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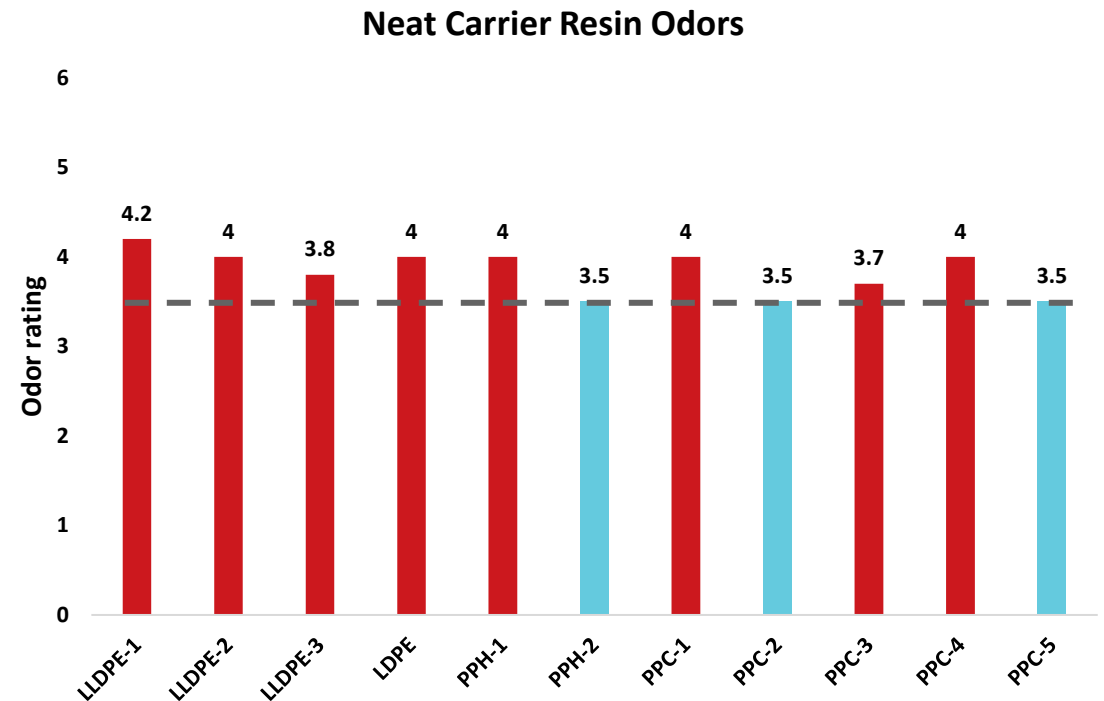
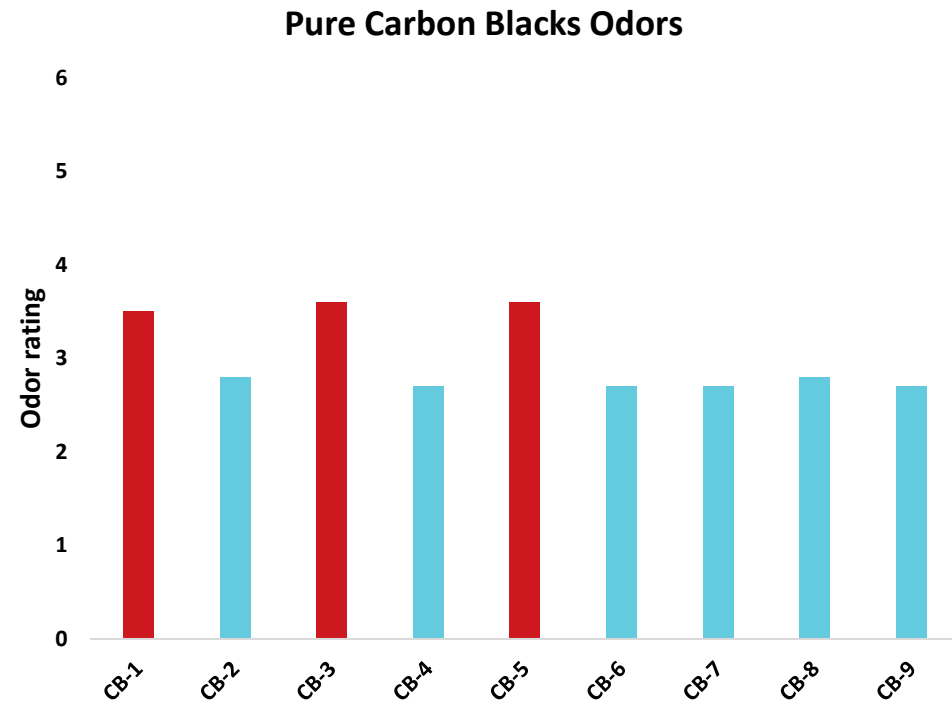
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# Low Odor MB Development

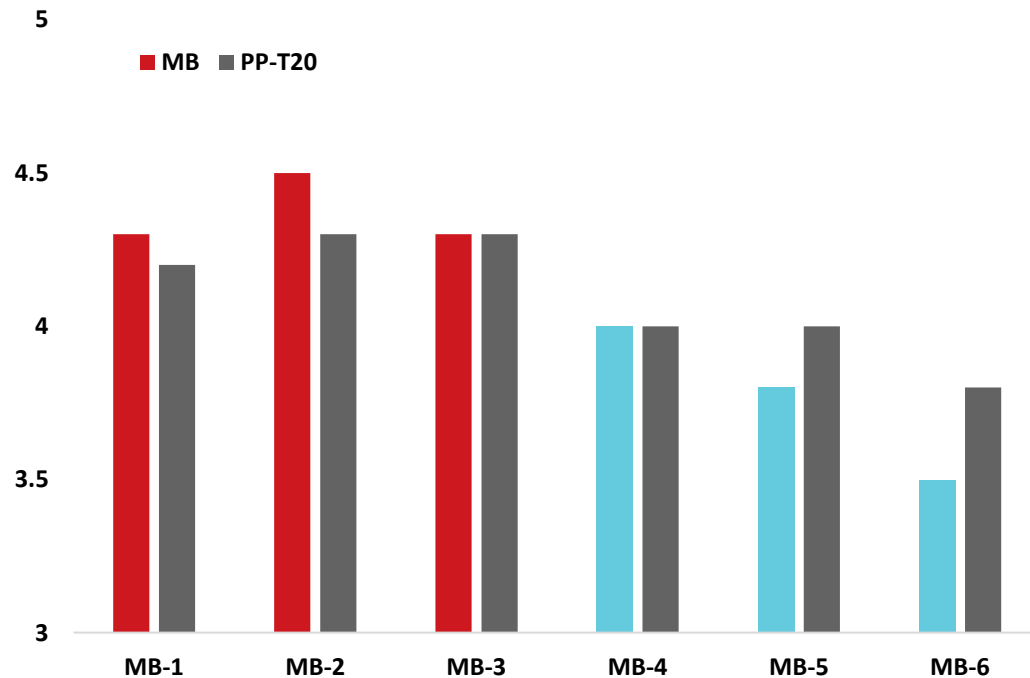
## Odor rating of Carbon Black & Carrier Resin



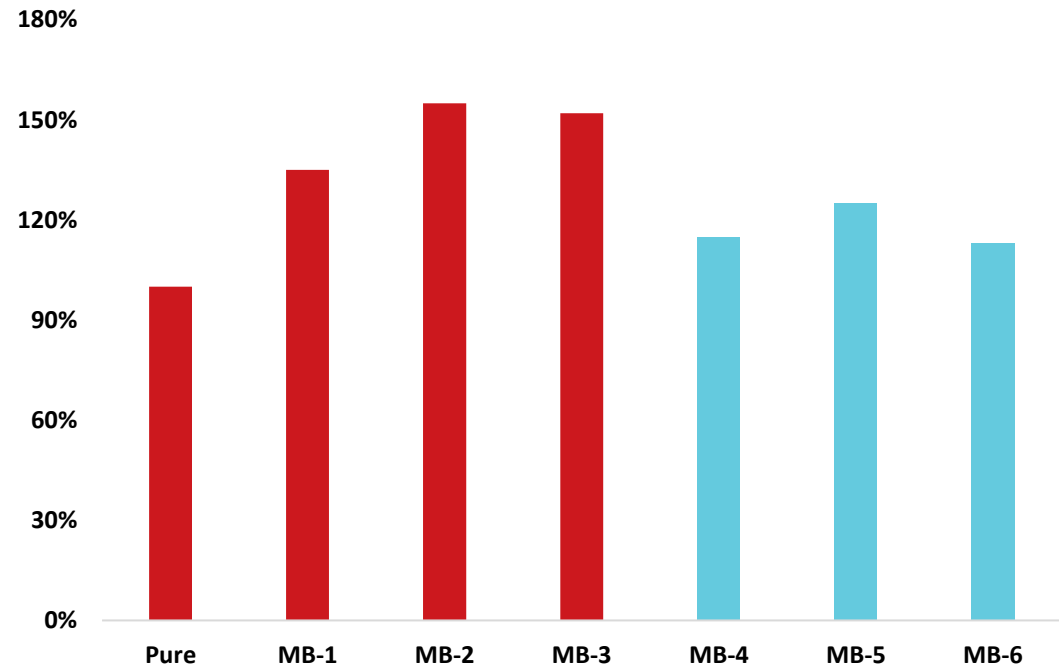
# Low Odor MB Development

Odor & VOC performance of MB & MB in PP-T20 (PPC+15%POE+20%Talc+2%MB)

Odor performance of MB & MB in PP-T20 compound



VOC increment of adding MB into PP-T20 compound

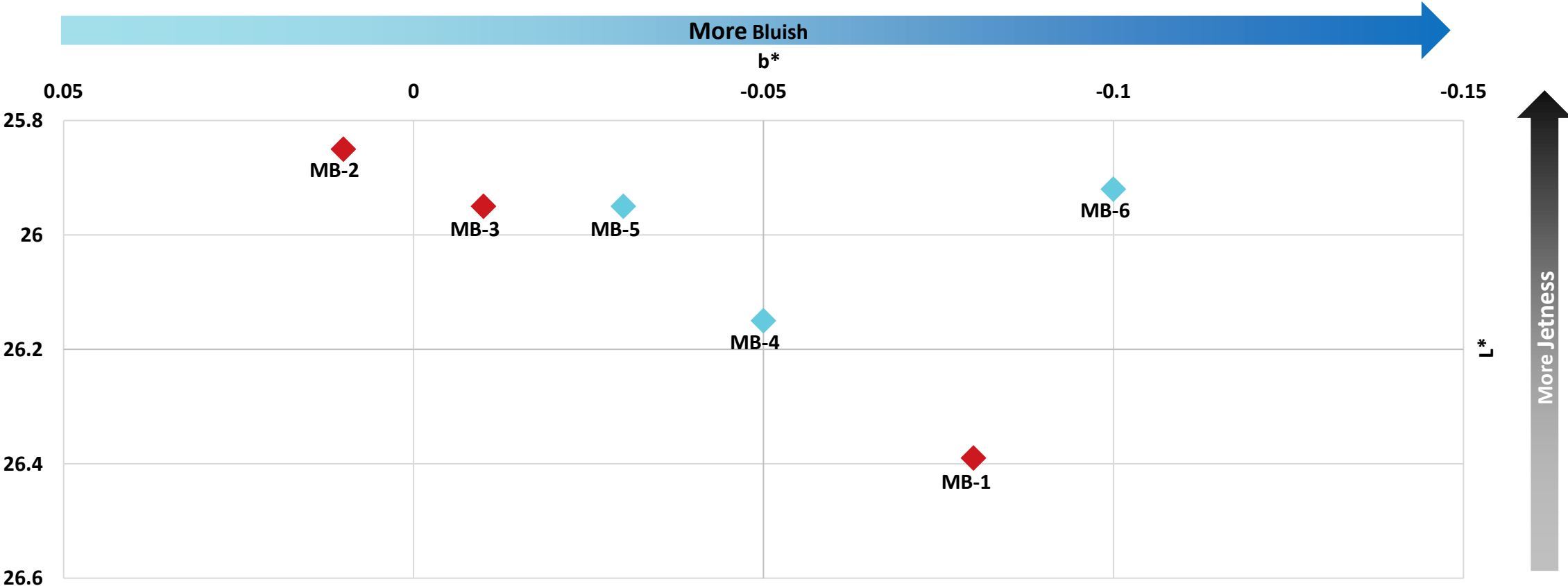




# Color Performance in PP-T20

Updated portfolio for PP compound providing low odor, high jetness & bluetone

Color Performance in PP-T20 (PPC + 15%POE + 20%Talc + 2% MB)



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