

# We will start soon...

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Your **hosts** for this call

**Additives for Water  
Based Automotive  
Coatings  
Product Highlights**



**Lars Hoffmann  
Presenter**



**Andrea Schamp/  
Kerstin Schurig  
Chat**



# Additives for Water Based Automotive Coatings – Product Highlights

Lars Hoffmann  
Technical Sales Additives EMEA  
May 22th, 2020

 **BASF**  
We create chemistry



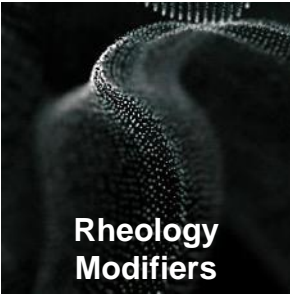
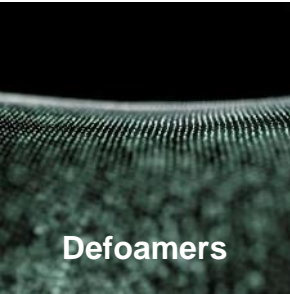
**Lars Hoffmann**

**Technical Sales  
Formulation Additives  
EMEA region**

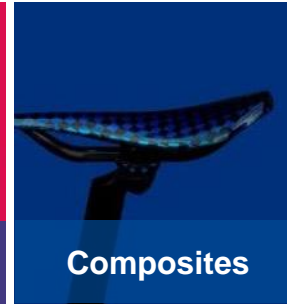
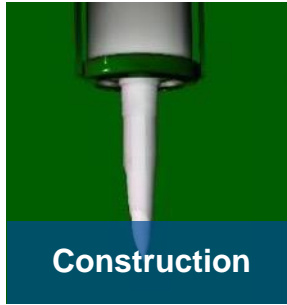
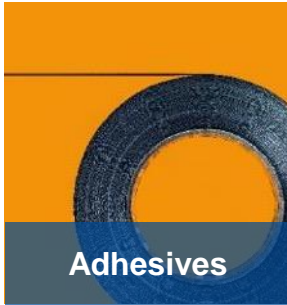
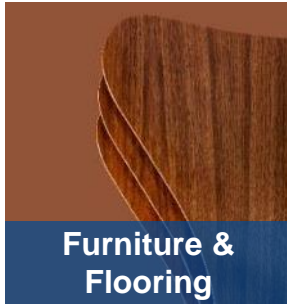
# Agenda

1. Introduction
2. Automotive Market & Trends
3. Formulation Additives for Automotive Coatings
4. Best Jetness with Carbon Black Pigments -  
Next Generation of Pigment Dispersing Additives
5. Summary

# Our comprehensive portfolio enables solutions for various industries



BASF is the premiere provider of **Performance & Formulation Additives** for the paints and coatings industry



# Strong brands to empower your business

Water-based brands	Application	Solvent-based* brands
Dispex <sup>®</sup> / Dispex <sup>®</sup> Ultra	DISPERSING AGENTS	Efka <sup>®</sup>
Foamaster <sup>®</sup> / FoamStar <sup>®</sup>	DEFOAMERS	Efka <sup>®</sup>
Rheovis <sup>®</sup> (organic) / Attagel <sup>®</sup> (clays)	RHEOLOGY MODIFIERS	Efka <sup>®</sup>
Hydropalat <sup>®</sup>	WETTING AGENTS	Efka <sup>®</sup>
Loxanol <sup>®</sup>	FILM-FORMING AGENTS	Efka <sup>®</sup>
Tinuvin <sup>®</sup>	LIGHT STABILIZIERS	Tinuvin <sup>®</sup>
Irganox <sup>®</sup>	ANTIOXIDANTS	Irganox <sup>®</sup> / Irgafos <sup>®</sup> / Irgastab <sup>®</sup>

\*Efka<sup>®</sup> includes also High Solids and 100% Solid Systems

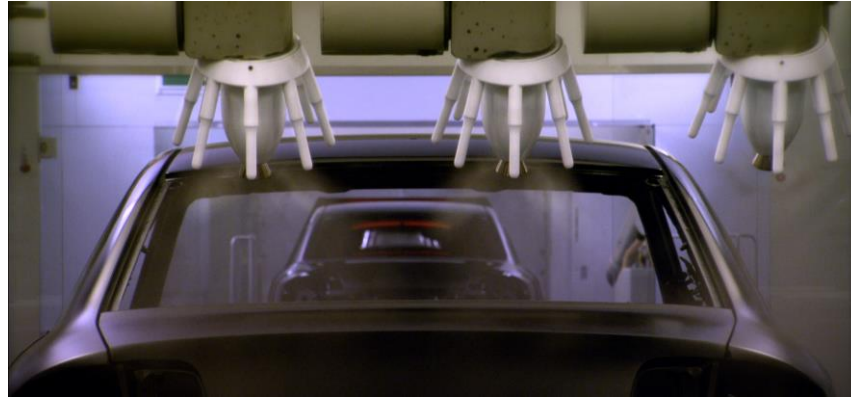


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# Technologies: Refinish vs. OEM

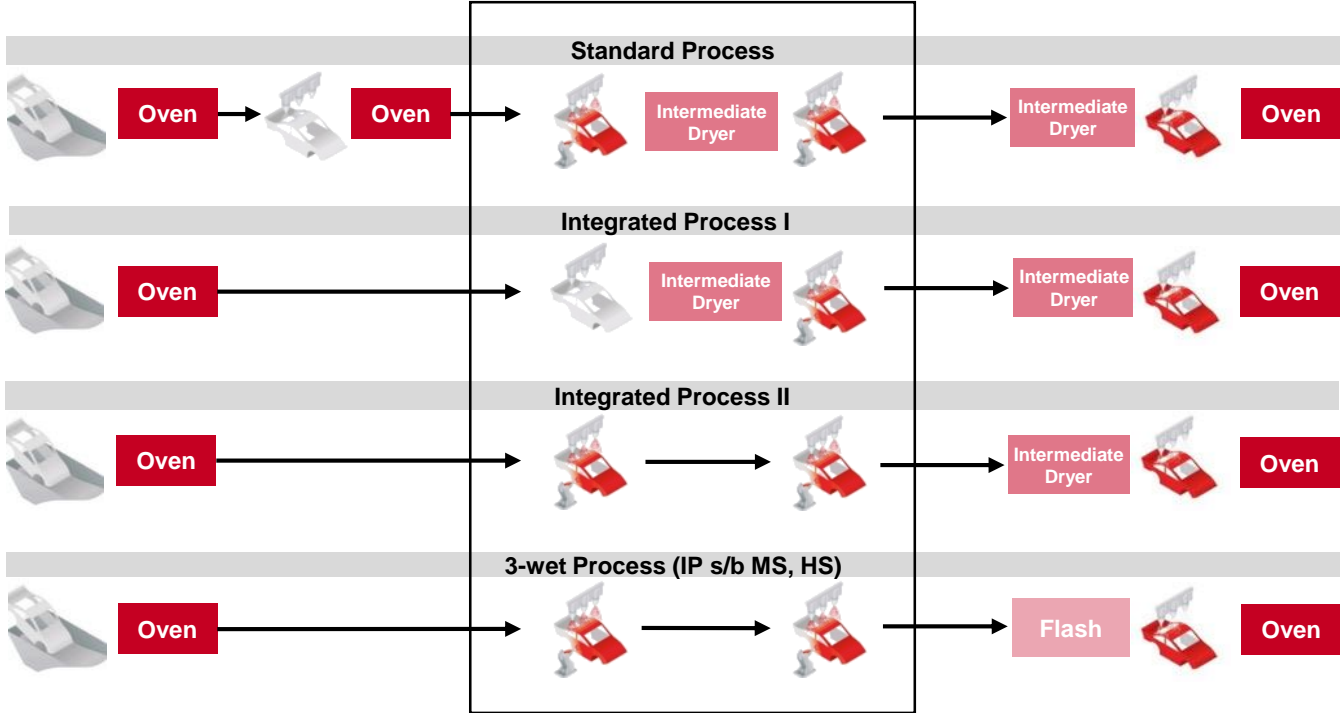
## Focus: Europe



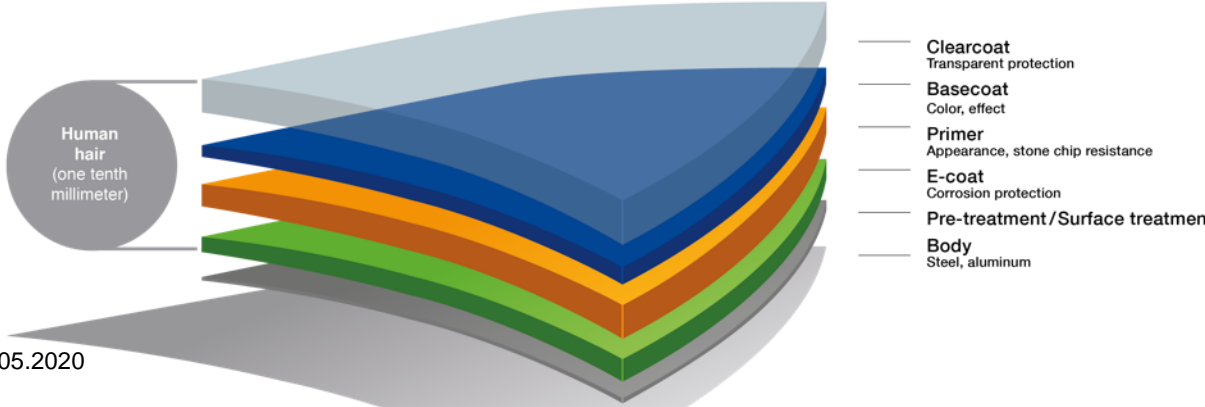
Application	Electrostatic bell application as well pneumatic stray gun	Pneumatic spray gun (manually)
Environmental requirements	Reduction of carbon dioxide and energy	Reduction of VOC
Market trends	Primer-free processes	High-solids and wb systems
Coatings technologies	Primers: sb/wb Basecoats: wb Clearcoats: sb	Primers: sb/wb Basecoats: sb/wb Clearcoats: sb
Curing conditions	High bake (80°C)120°C-160°C	Low bake Max. 70°C



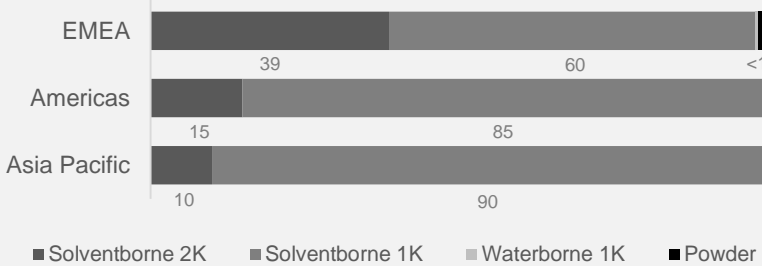
# OEM Automotive Coatings Market



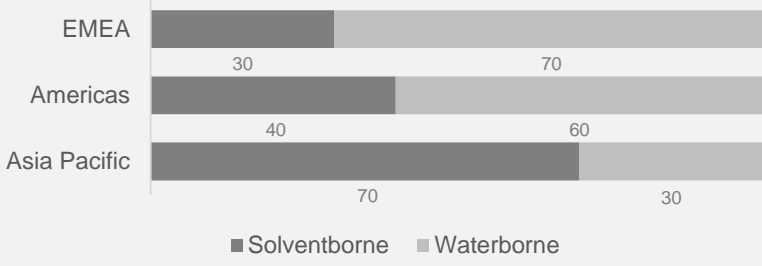
© BASF Coatings



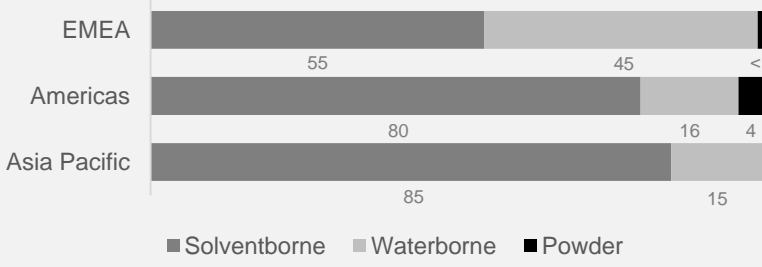
Proportion of Clearcoat Technologies used by region



Proportion of Basecoat Technologies used by region



Proportion of Primer Surface Technologies used by region



Global Industrial Coatings Markets  
2010 – 2020 © PRA 2011



# Trends in Automotive Coatings

## Shorten Process Line

- ❑ Flash-less
- ❑ Primer-free
- ❑ In-line Process
- ❑ EcoPaintJet

## VOC & CO<sub>2</sub> reduction

- ❑ Water based systems
- ❑ 2-wet & 3-wet, integrated process
- ❑ Low temp. curing
- ❑ 1K High solid

## Class A Surface

- ❑ Scratch resistance
- ❑ Maintain showroom finish
- ❑ High Chroma
- ❑ Easy-to-Clean
- ❑ Deep black (Jetness)



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# Recommended Additives for Water-based Automotive Coatings



- Clearcoat  
Transparent protection
- Basecoat  
Color, effect
- Primer  
Appearance, stone chip resistance
- E-coat  
Corrosion protection
- Pre-treatment/Surface treatment
- Body  
Steel, aluminum

\*Highly recommended

#Contains silicone

## Topcoat/Clearcoat

<b>Dispersing Agents</b>	Dispex® Ultra PX 4275 / 4575* / 4585* / 4290
<b>Defoamers</b>	FoamStar® ST 2454 FoamStar® SI 2293#
<b>Wetting Agents</b>	Hydropalat® WE 3120 / 3221*#
<b>Leveling Agents</b>	Hydropalat® WE 3370*
<b>Rheology Modifiers</b>	Rheovis® HS 1162 Rheovis® PU 1191* / 1250

## Primer

<b>Dispersing Agents</b>	Dispex® Ultra PA 4550 Dispex® Ultra PX 4575* / 4585*
<b>Defoamers</b>	FoamStar® ST 2400* / 2454#
<b>Wetting Agents</b>	Hydropalat® WE 3120 / 3221# / 3323* / 3650*
<b>Leveling Agents</b>	Hydropalat® WE 3370*
<b>Rheology Modifiers</b>	Rheovis® AS 1130* Attagel® 50

## Basecoat

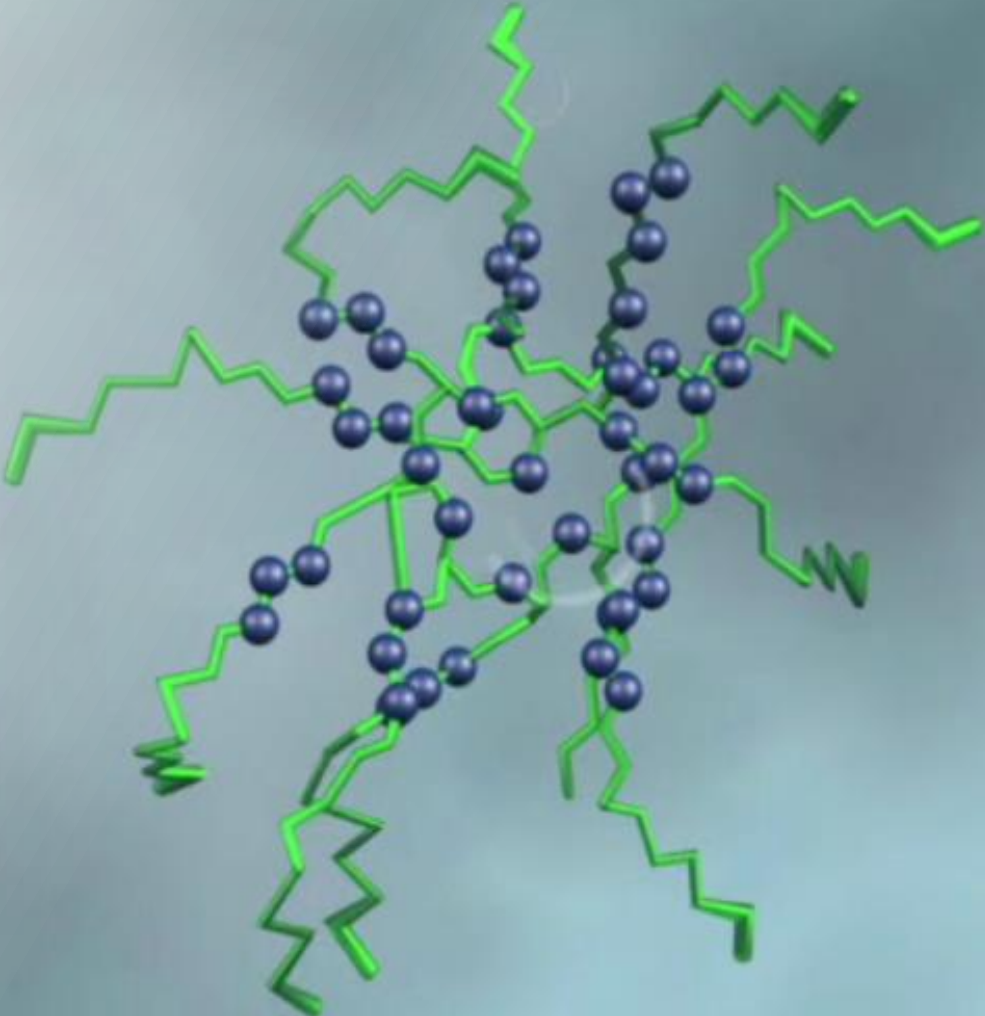
<b>Dispersing Agents</b>	Dispex® Ultra FA 4416 Dispex® Ultra PA 4550 Dispex® Ultra PX 4275 / 4575* / 4585* / 4290
<b>Defoamers</b>	FoamStar® ST 2400* FoamStar® SI 2210 / 2216#
<b>Wetting Agents</b>	Hydropalat® WE 3120 / 3323* / 3650 / 3221*#
<b>Leveling Agents</b>	Hydropalat® WE 3370*
<b>Rheology Modifiers</b>	Rheovis® AS 1130* Rheovis® PU 1191 / 1250*

## E-coat

<b>Wetting Agents</b>	Hydropalat® WE 3120 / 3650
<b>Plasticizers</b>	Efka® PL 5651* Loxanol® PL 5060

# BASF Formulation Additives

## FoamStar® hyper-branched polymers



# FoamStar® ST 2400

Highly efficient star molecule-based defoamers



## Application:

FoamStar® ST 2400 is star-polymer molecule compounded in an enhanced mineral-oil system. They are suitable for water-based industrial and automotive coatings. FoamStar® ST 2400 can also be used as a defoamer for water based pigment concentrates. It shows broad compatibility to various resin systems and is suitable for clear and pigmented systems.

## Sustainability highlights:

- Low odor
- Low VOC

## Performance highlights:

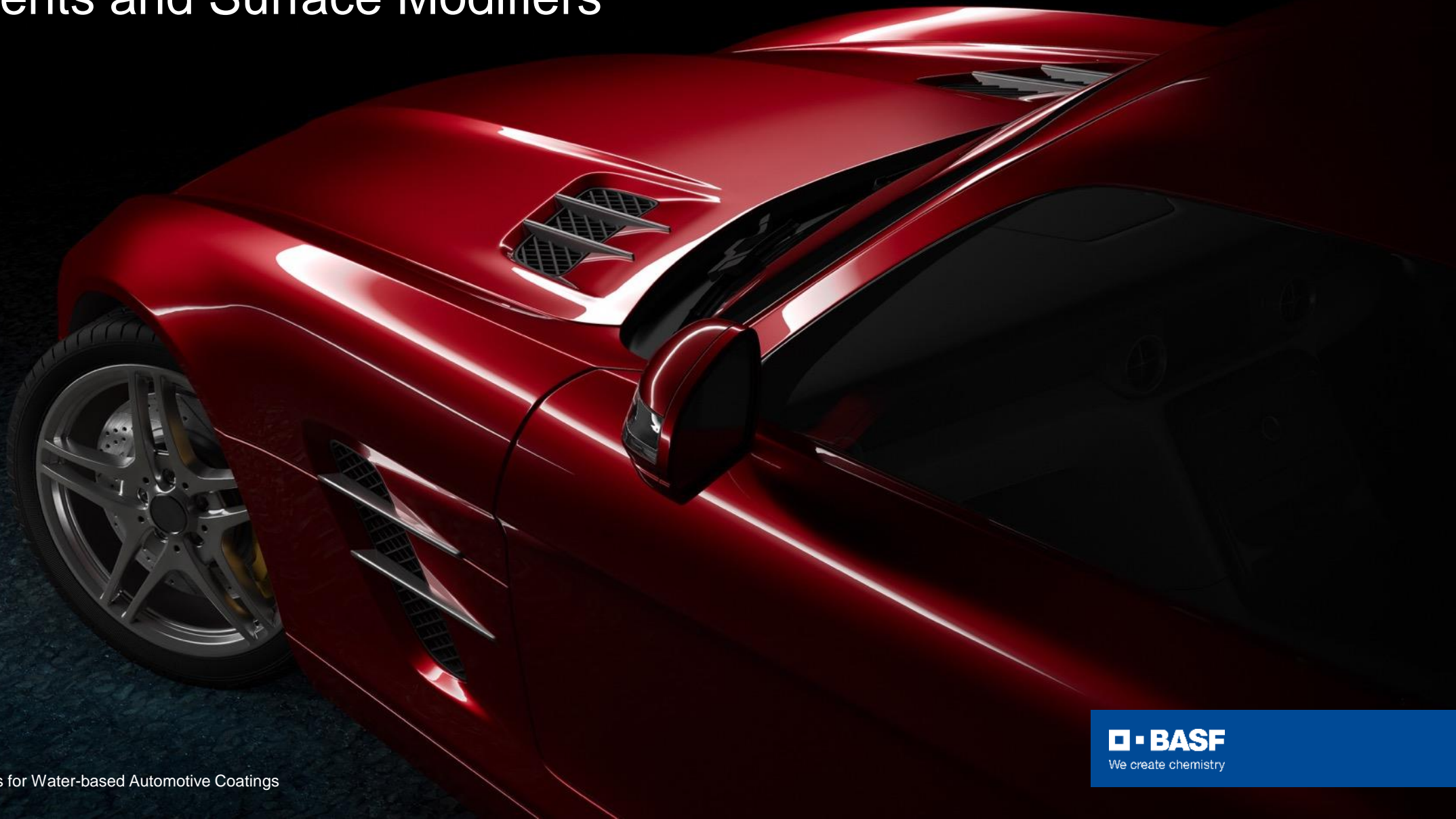
- Efficient at eliminating micro foam
- Extremely fast bubble-break versus conventional mineral oil defoamers
- Excellent long term defoaming performance
- Easy to incorporate enable to use as a post additive
- Silicone free

## Characteristic Values:

Appearance	Opaque, off-white liquid
Dispersibility (10% in water)	non-dispersible
Density at 20°C	~0.86 g/cm <sup>3</sup>
Viscosity	700 cPs

# BASF Formulation Additives

## Wetting Agents and Surface Modifiers



# Hydropalat® WE 3323

Excellent wetting agent based on Star-Polymer Technology with defoaming properties for water-based coatings



## Application:

Hydropalat® WE 3322 and WE 3323 are hyperbranched wetting agents designed for high end water-based applications for wood, plastic, metal substrates, ink and OPV coatings. Hydropalat® WE 3322 and WE 3323, in addition to their outstanding wetting properties, do not stabilize foam and can act as a defoamer in many coating.

## Sustainability highlights:

- free of silicones, alkyl phenol ethoxylates
- APEO free
- VOC free cc to EU Ecolabel 2014/312/EU

## Performance highlights:

- Excellent substrate wetting
- Designed for high end applications
- Low foaming / defoaming properties
- Gloss improvement

## Characteristic Values:

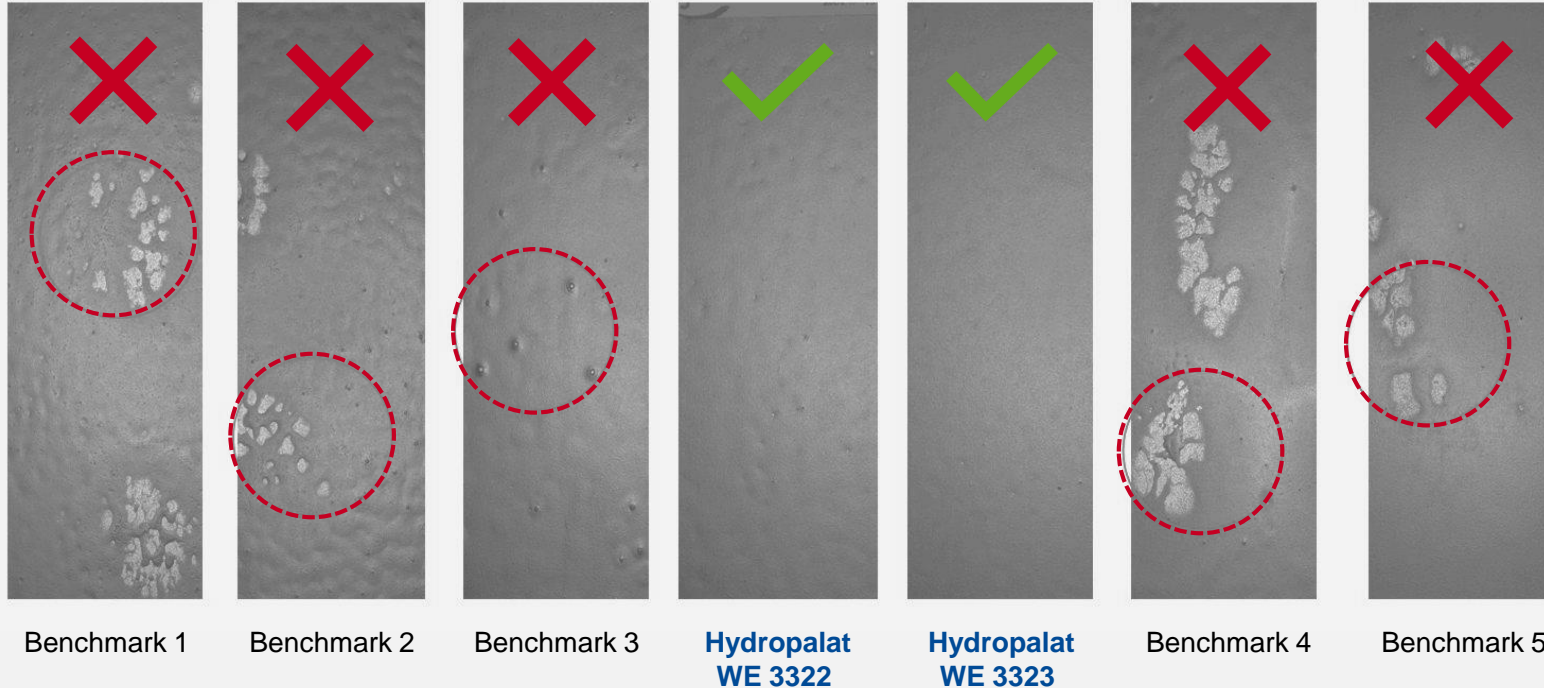
Appearance	Clear yellow liquid
Density	~ 1.00 g/cm <sup>3</sup>
Active matter	~ 100%
Color, Gardner	max 7.0



# Hydropalat® WE 3323

Excellent wetting agents with defoaming properties for water-based coatings

A gray PUD formulation was applied to contaminated cold rolled steel.



## Test results

- Only the coatings containing Benchmark 3, Hydropalat WE 3322 and Hydropalat WE 3323 can coat over the contaminated steel
- The coating with Benchmark 3 contains foam bubbles on the surface.

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# BASF Formulation Additives

## CFRP Dispersing agents

**CFRP**

**Controlled Free Radical Polymerization**

$10^{-10}$  m scale

26.05.2020

# Chemistry

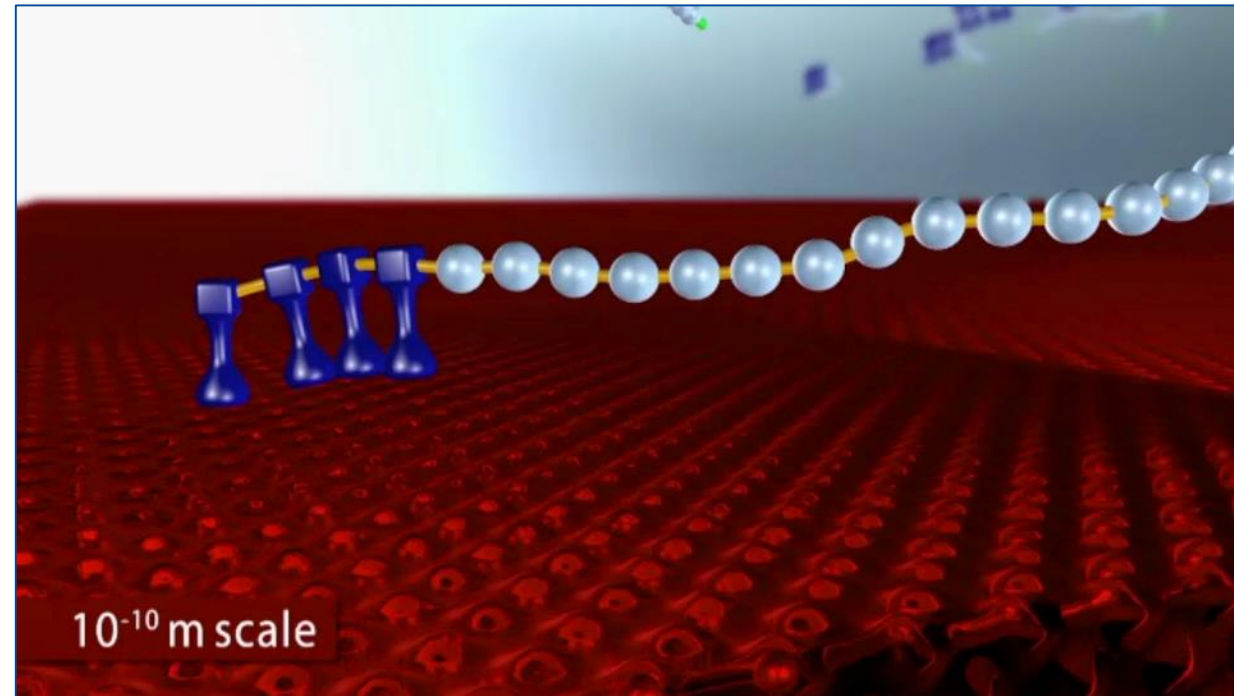
## Benefits of CFRP technology

### Well defined structures → higher efficiency

- Excellent flocculation resistance
- Consistent colour development

### Well defined structure of polymeric backbone

- Low mill base viscosity and high pigment loading
- Tuneable compatibility



# Dispex® Ultra PX 4585

VOC-free, dispersing agent for wb systems with benchmark performance in carbon blacks and in organic pigments



## Application:

Dispex® Ultra PX 4585 sets new standards in achieving highest jetness for carbon blacks and in stabilizing many difficult to disperse organic pigments. This dispersing agent is based on a unique technology which enables precise design of polymer structure, Controlled Free Radical Polymerization technology (CFRP).

## Sustainability highlights:

- VOC-free acc. to EU 2004/42 method
- APEO-free
- Low odor

## Performance highlights:

- Excellent jetness for carbon black pigments
- Benchmark performance for carbon black and organic pigments
- Strong viscosity reduction in high pigment concentration in grinding stage
- Improved pigment affinity and stability
- Particularly recommended where high transparency is required
- Broad compatibility in water-borne systems

## Characteristic Values:

Appearance	Clear, slightly yellowish liquid
Color	<=9
Solids	~ 50%
Amine number	~ 20 mg KOH
VOC	< 0.1 acc. to EU 2004/42 (b.p. > 250°C)

# Coloristics of PBk7: How black is black?

## Three metrics to quantify color quality

### ■ Blackness $M_y$

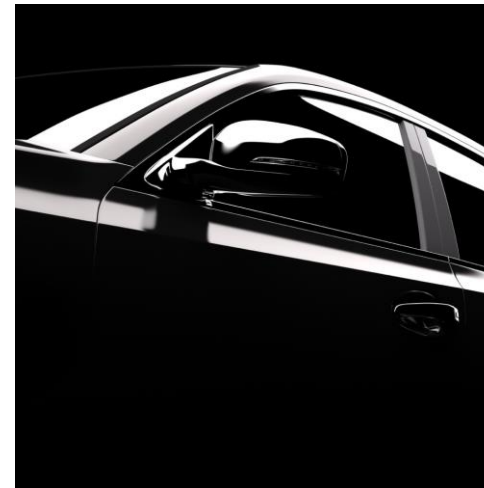
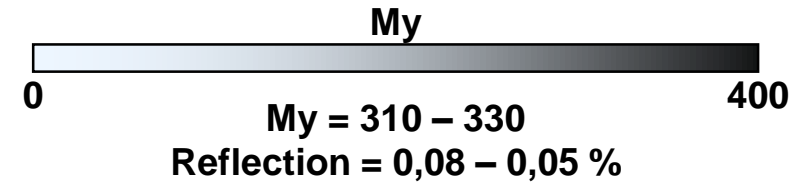
- ▶ degree of blackness, directly related to the reflectance

### ■ Jetness $M_c$

- ▶ color dependent black value

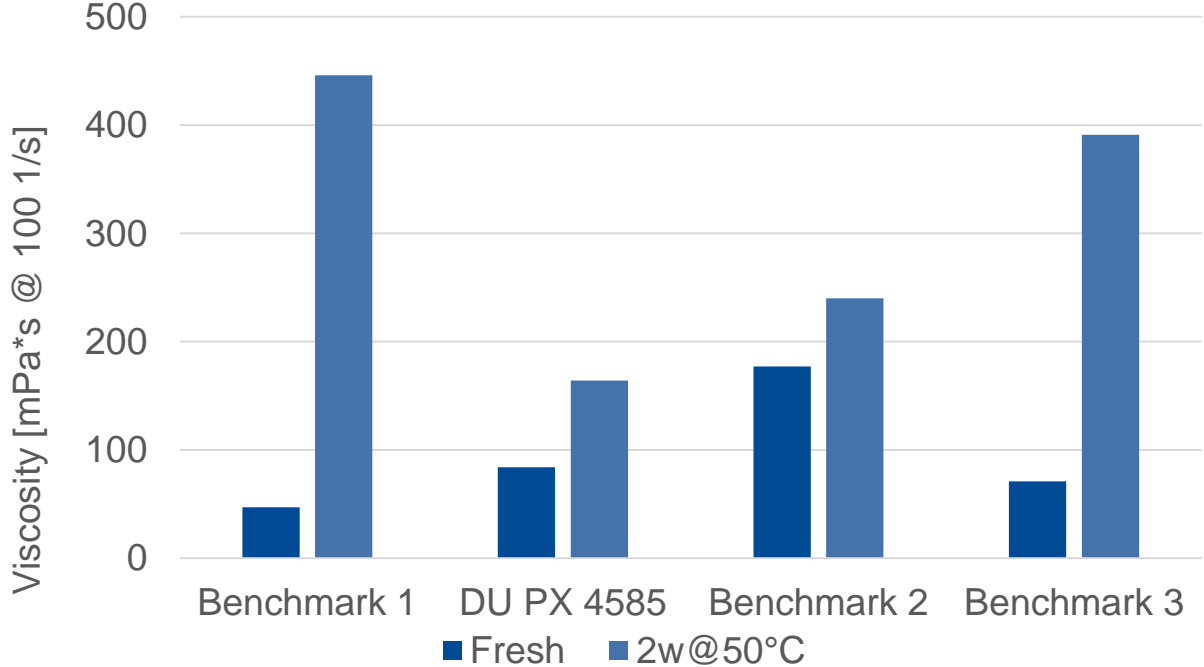
### ■ Undertone $DM_{cy}$

- ▶ How neutral are black pigment and binder
- ▶  $DM_{cy} < 0$  → brown-reddish undertone
- ▶  $DM_{cy} = 0$  → perfectly achromatic or neutral
- ▶  $DM_{cy} > 0$  → **bluish undertone (often preferred)**



# Colour Black FW 255

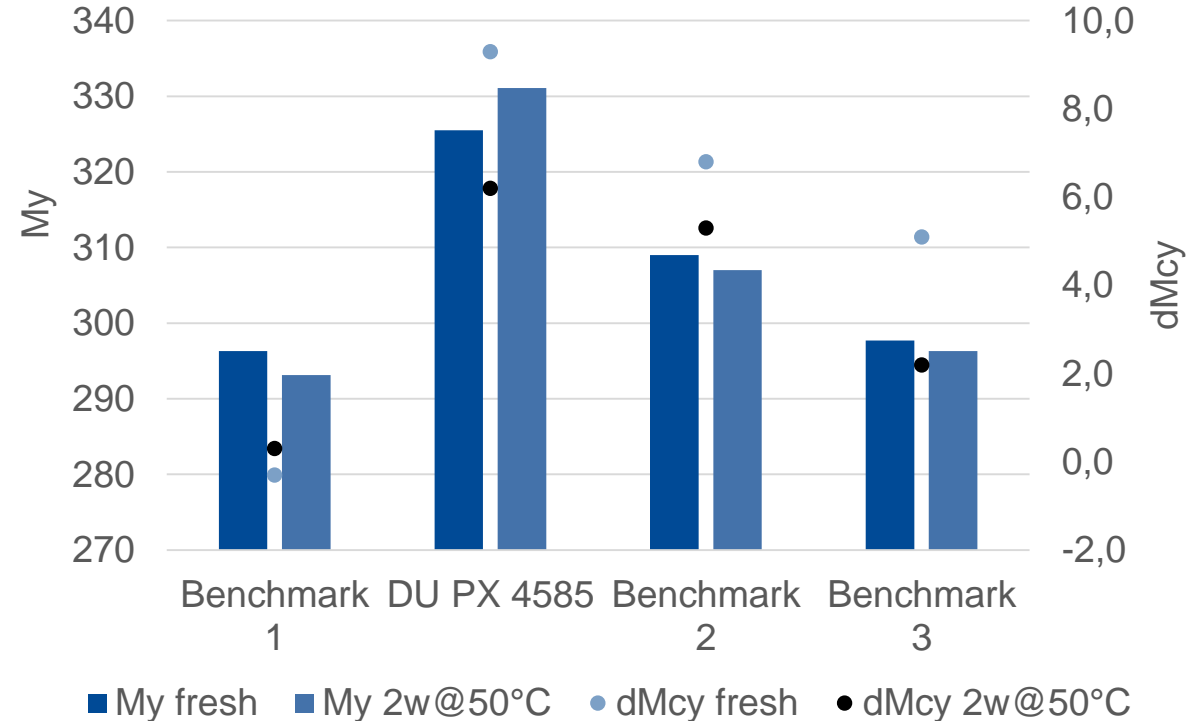
## RFPC mill base viscosity Colour black FW 255



DoP = 90%, pigment load = 17%

Low mill base viscosity and excellent viscosity consistency achieved by Dispex® Ultra PX 4585.

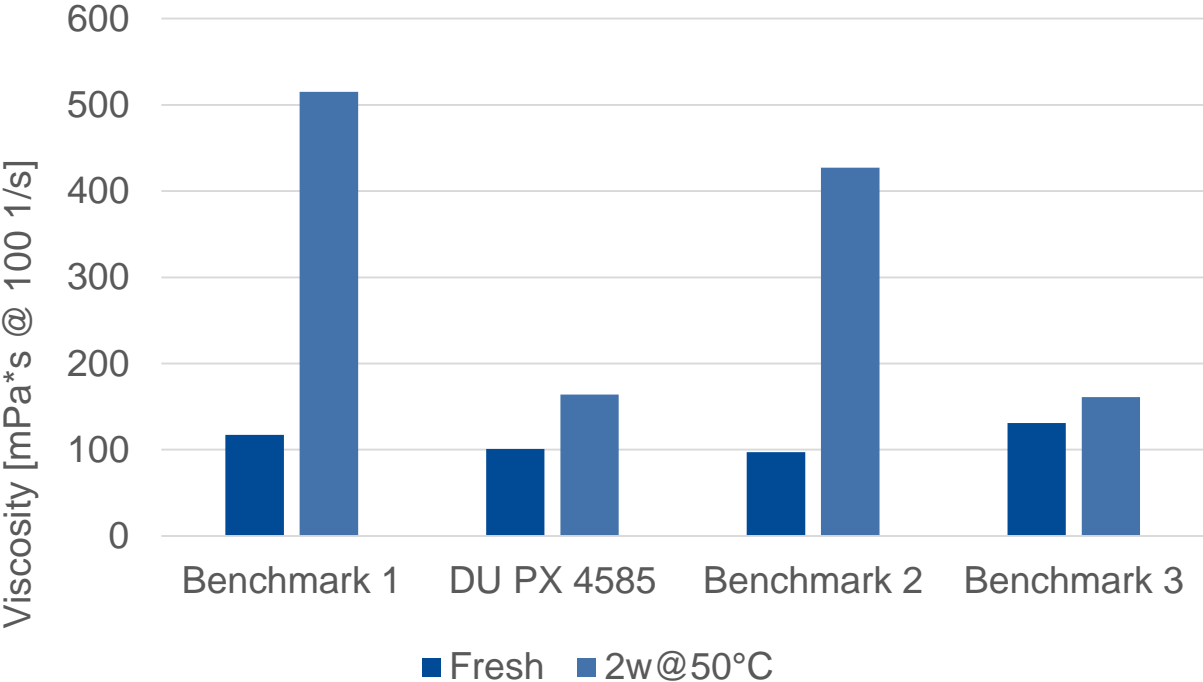
## Jetness development with FW 255 RFPC tested in Basonol AC 1120W



Dispex® Ultra PX 4585 provides significant higher jetness and blueish undertone.

# Colour Black FW 200

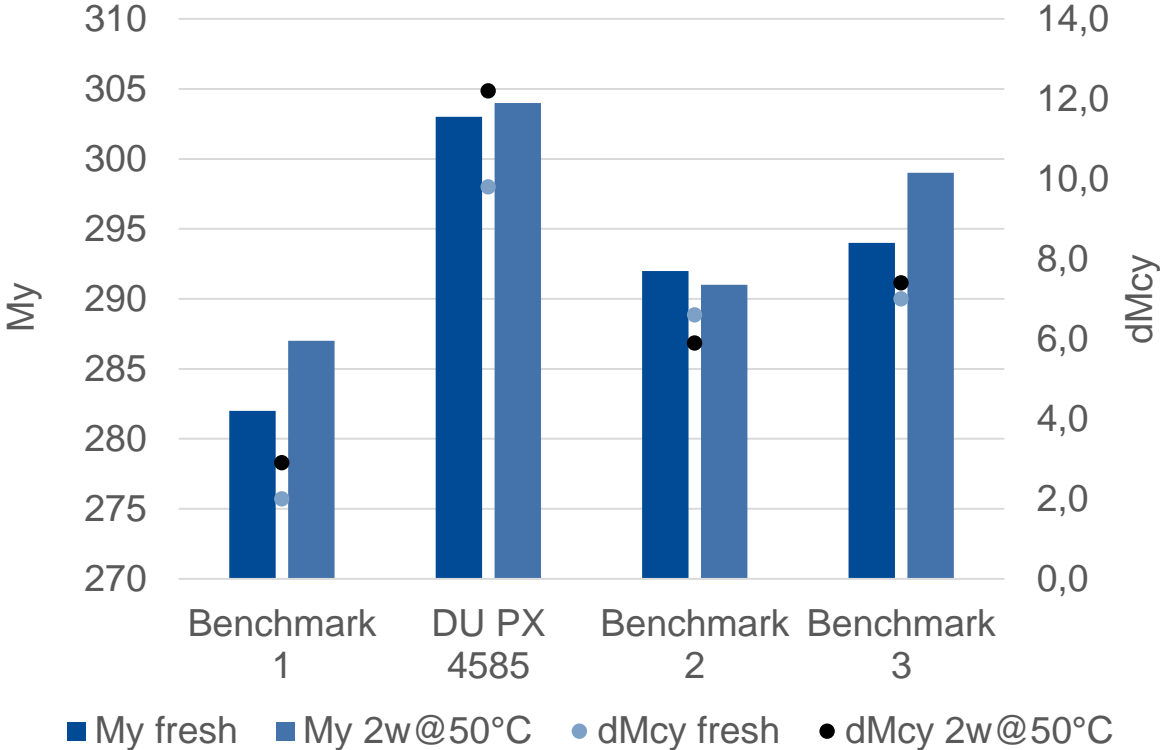
## RFPC mill base viscosity Colour black FW 200



DoP = 90%, pigment load = 17%

Dispex® Ultra PX 4585 provides low mill base viscosity and excellent storage stability.

## Jetness development with FW 200 RFPC tested in Basonol AC 1120W



Dispex® Ultra PX 4585 enables high jetness and blueish undertone.



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# Summary

- BASF provides a comprehensive portfolio of Formulation Additives for automotive coatings.
- **FoamStar ST 2400** is a silicone-free mineral oil based defoamer that eliminates micro foam and shows long term defoaming performance for **defect free surfaces**.
- **Hydropalat WE 3323** is based on patented star-polymer technology that provides excellent substrate wetting and additional defoaming properties to **reach Class A appearance**.
- **Dispex Ultra PX 4585** is the first choice for deep black, **high jetness** automotive coatings with **blueish undertone** and excellent storage stability.



# Contacts



## **Dr. Sascha Oestreich**

Head of Technical Sales Formulation Additives

Phone: + 49 211 7940-9028

Mobile: +49 173 5396101

[sascha.oestreich@basf.com](mailto:sascha.oestreich@basf.com)



## **Lars Hoffmann**

Technical Sales Formulation Additives

Phone: +49 621 60-92208

Mobile: +49 172 7470244

[lars.hoffmann@basf.com](mailto:lars.hoffmann@basf.com)



## **Andrea Schamp**

Marketing Formulation Additives Europe

Phone: +49 211 7940-2605

Mobile: +49 173 5936561

[andrea.schamp@basf.com](mailto:andrea.schamp@basf.com)

There is more to come...

# Next series of Webinars starting June 3<sup>rd</sup> / 4<sup>th</sup>

Formulation Additives for improved adhesion: **June 3 & 4**

Alternatives to Tinuvin 328: **June 9 & 10**

Formulation Additives for interior paints: **June 17 & 18**

Formulation Additives for composites: **June 24 & 25**

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We create chemistry