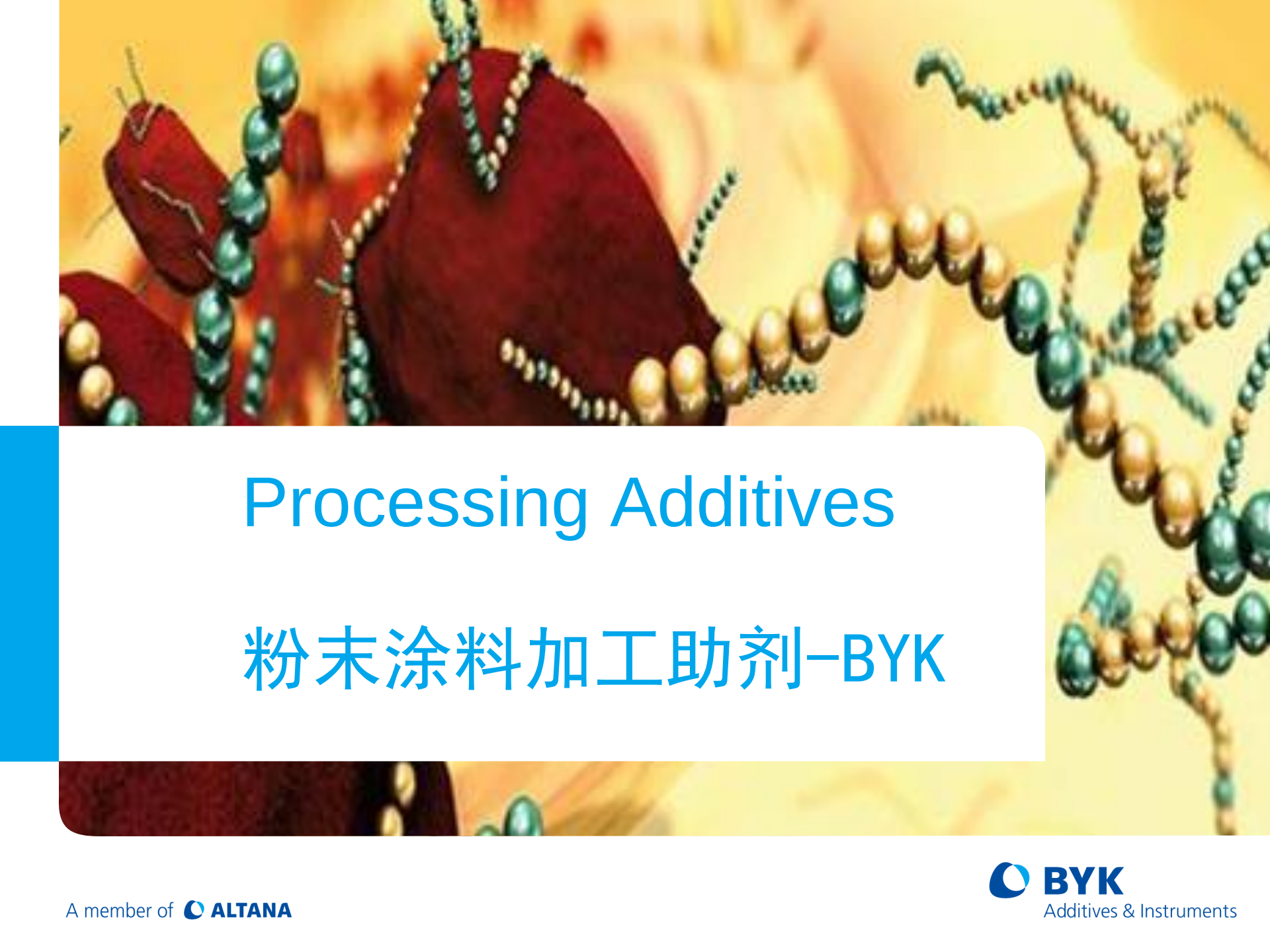


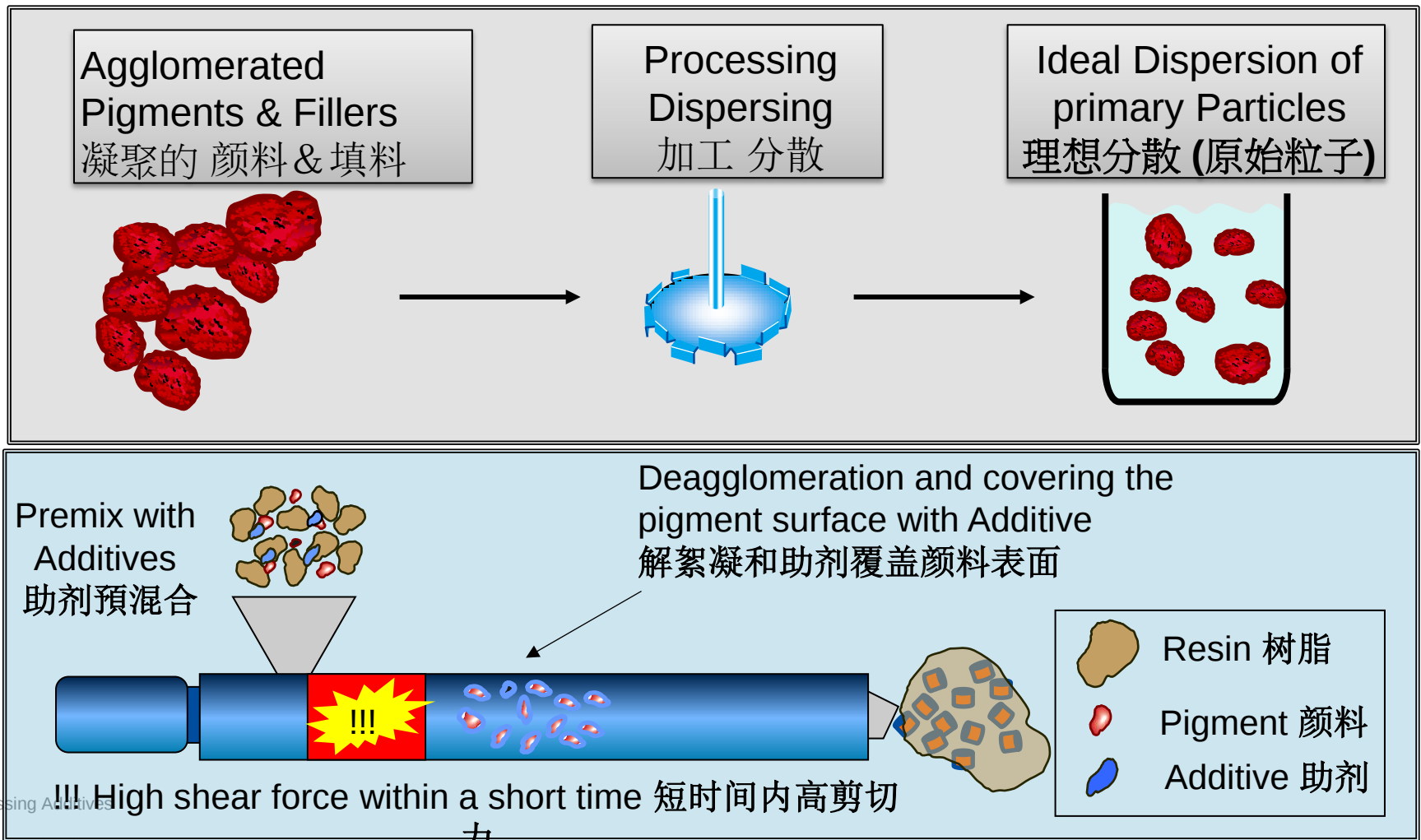


Processing Additives

粉末涂料加工助剂-BYK

Essential Requirements in all Coating Materials

所有涂层材料的基本要求



Processing Additives

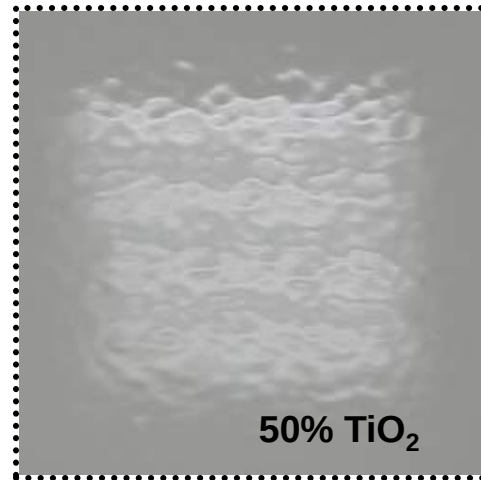
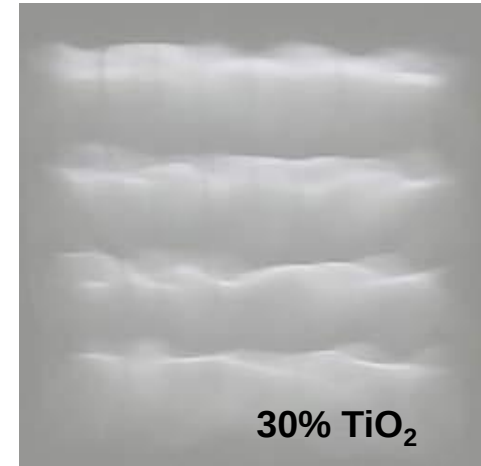
16 August, 2016
Page 2
Powder Seminar
BYK-Chemie GmbH

Problem: Pigment / Filler Acceptance

问题：颜料/填料的接受性

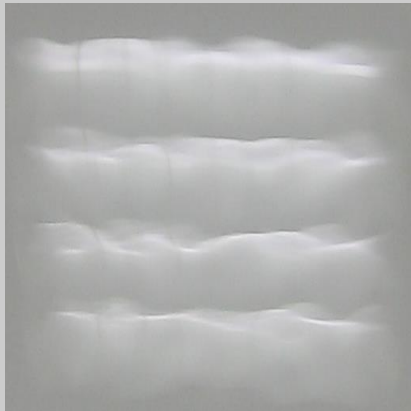
Visual conclusion of poor pigment acceptance 颜料接受性差的外观效果

- Low Gloss 低光泽
- Poor Leveling 流平差
- High Haze 高雾影
- High Viscosity 高粘度

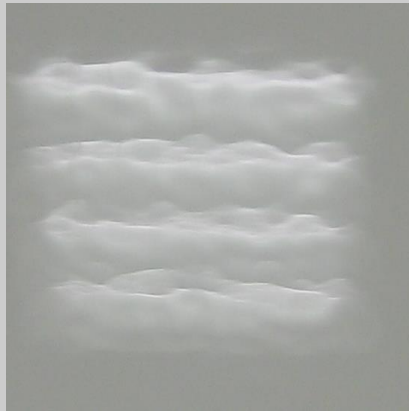


Control Formulation – Visual Consideration

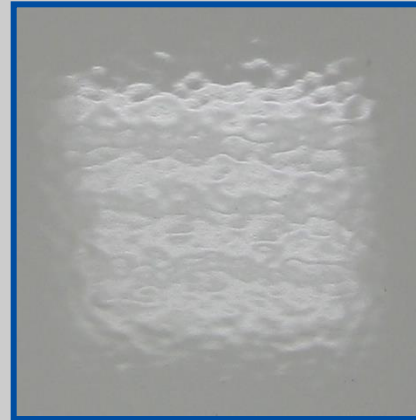
不同钛白含量的粉末涂料 – 不含加工助剂



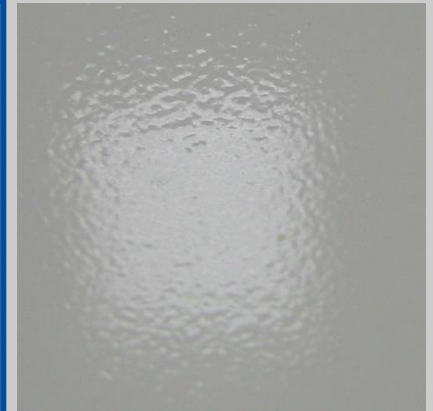
30% TiO₂



40% TiO₂



50% TiO₂



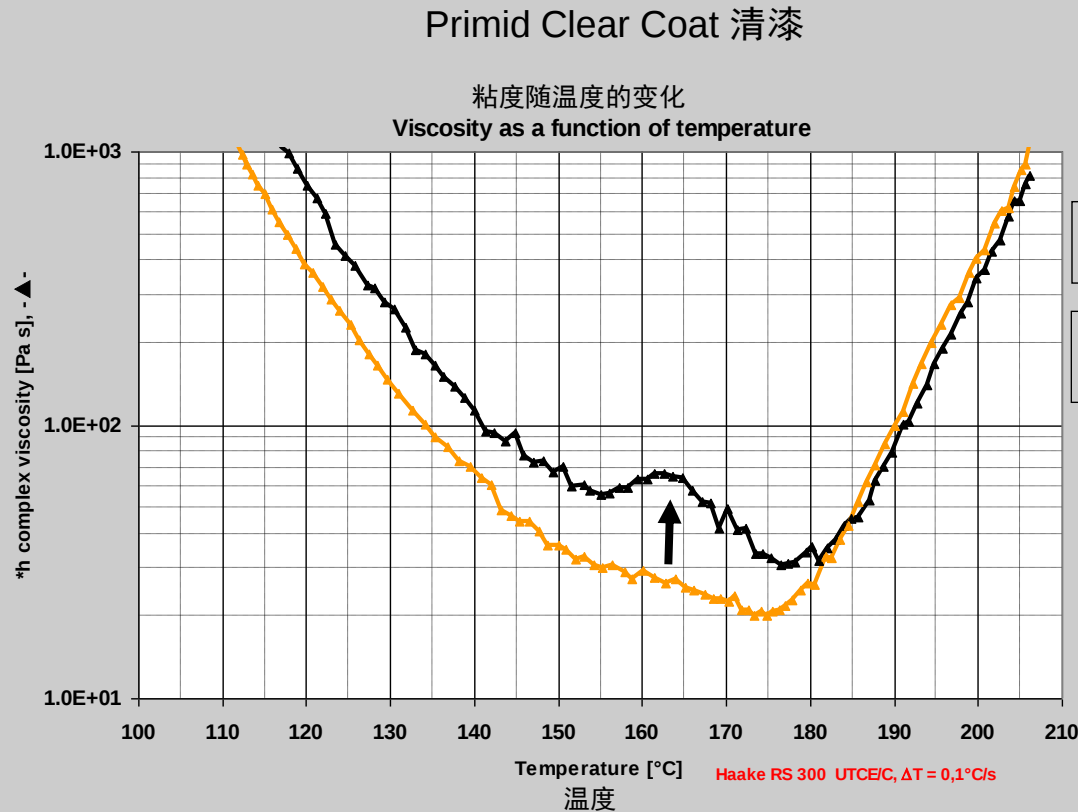
60% TiO₂

Polyester/β-Hydroxyalkylamide

BYK-368 P High Performance Leveling Additive

Viscosity Influence of Carbon Black in a Primid Powder Coating System

炭黑对粘度的影响 – Primid 粉末涂料体系



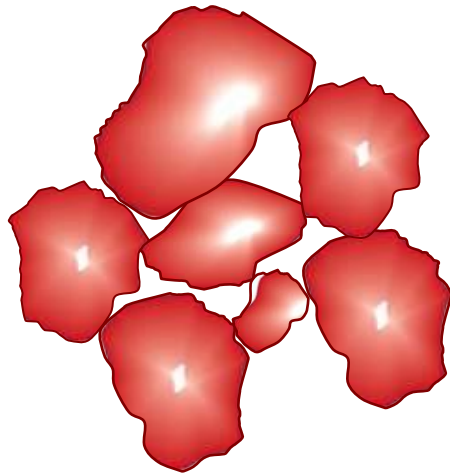
Control Clearcoat without Carbon black
Control with Carbon Black 1% FW200

不含炭黑的清漆
含有1% FW200 (炭黑)

Small amounts of carbon black pigment will increase
the melt viscosity of powder coatings
少量的炭黑颜料也会增加粉末涂料的熔融粘度

Extrusion of Pigments and Fillers 颜料和填料的挤出

Agglomerate Flocculate
絮凝的附聚体



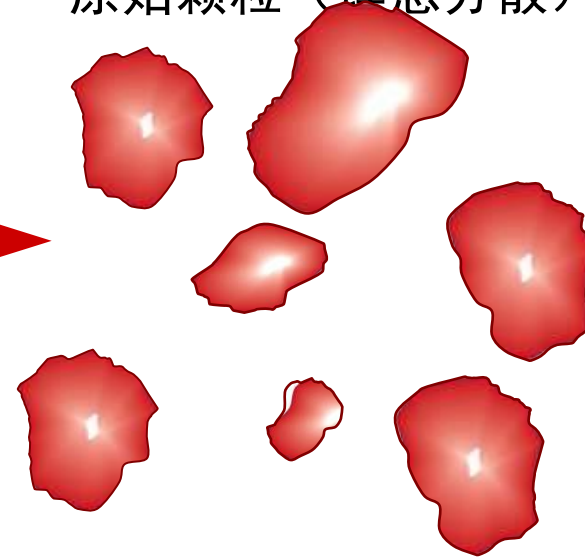
Dispersion 分散



Flocculation
絮凝

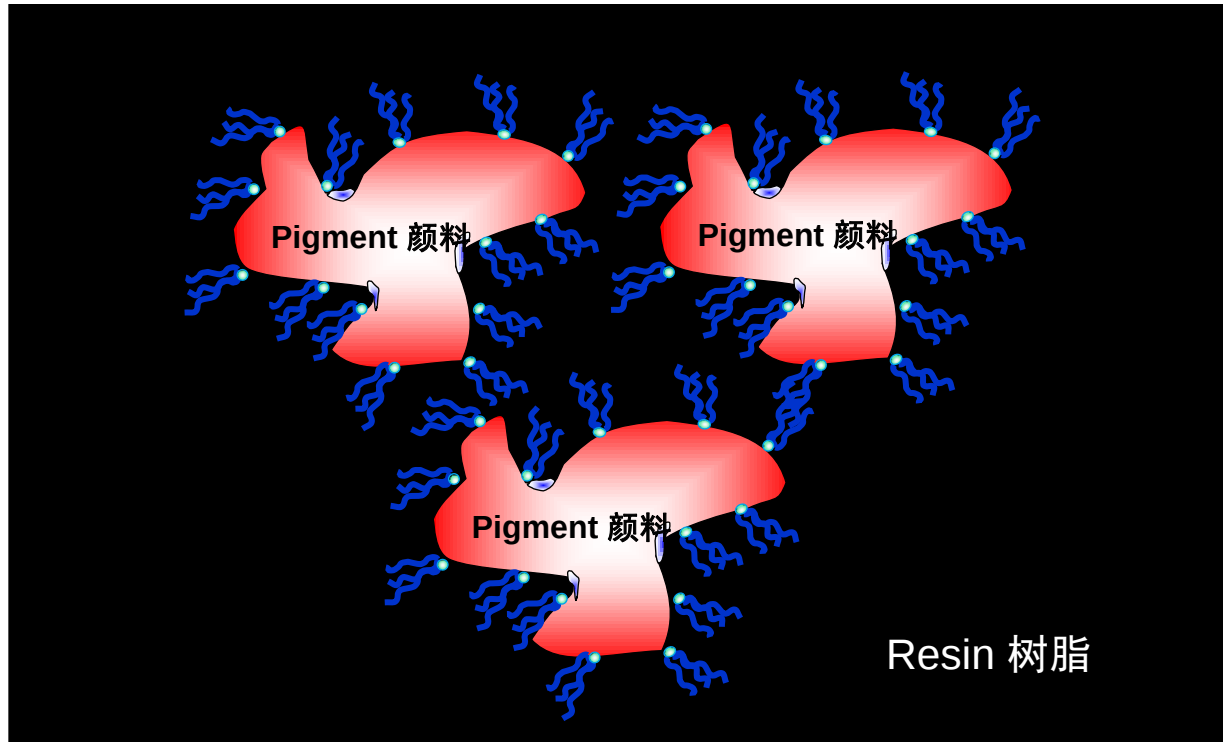


Primary Particles
(Ideal dispersion)
原始颗粒 (理想分散)



Processing Additive: Improved Pigment Stabilization

加工助剂：改善颜料稳定



Result: - no agglomeration better DOI
结果 -无附聚

更好的DOI

Product Range of Processing Additives for Powder Coatings

粉末涂料的 加工助剂

BYK 3950 P – general use / Fillers 一般使用/填料

BYK 3951 P – mainly for TiO_2 主要对钛白粉

BYK 3955 P – mainly Carbon Black 主要对炭黑

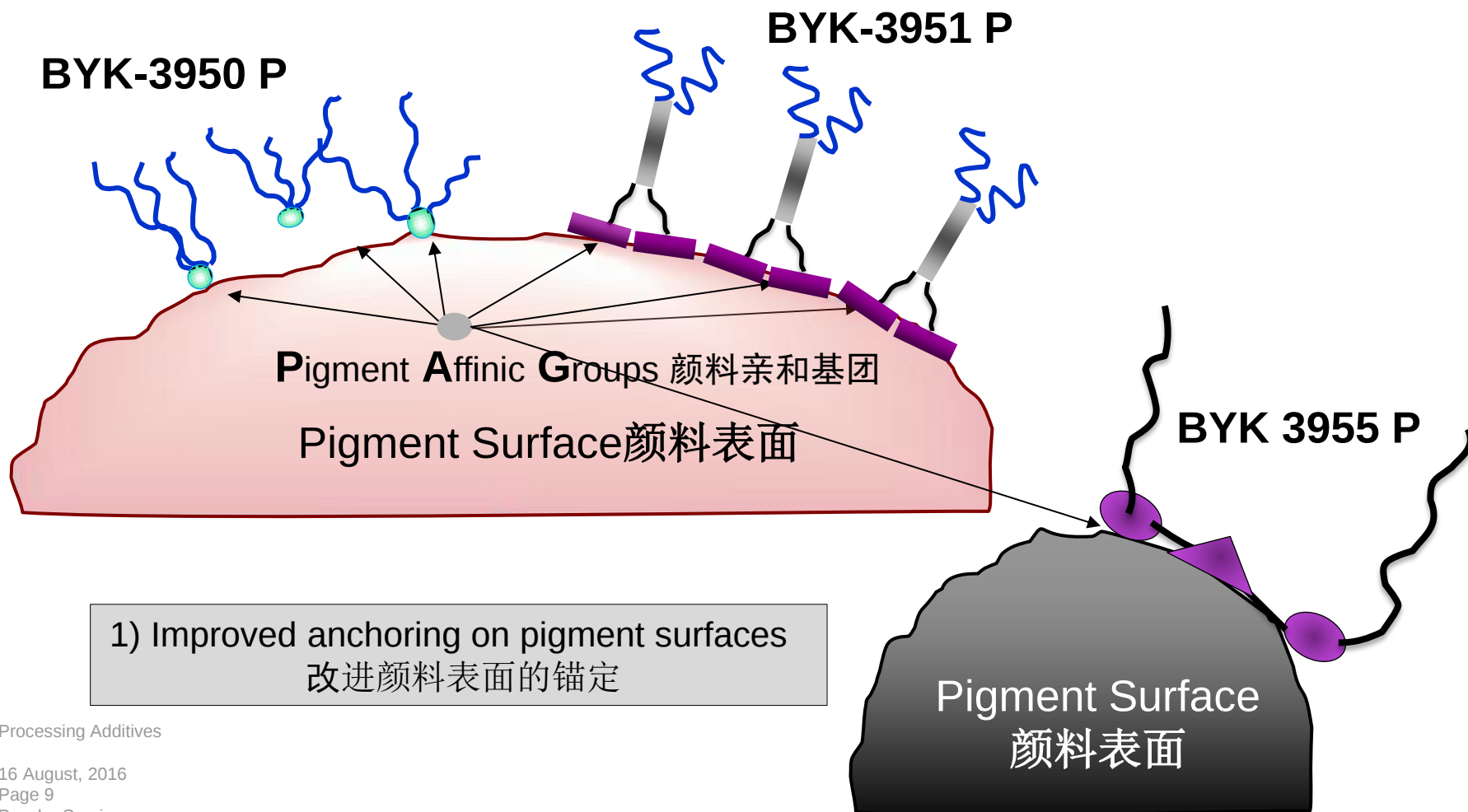
Disperbyk 2200 – Black / Organic 炭黑 / 有机

More... 期待更多新产品.....

Processing Additives – Functionality

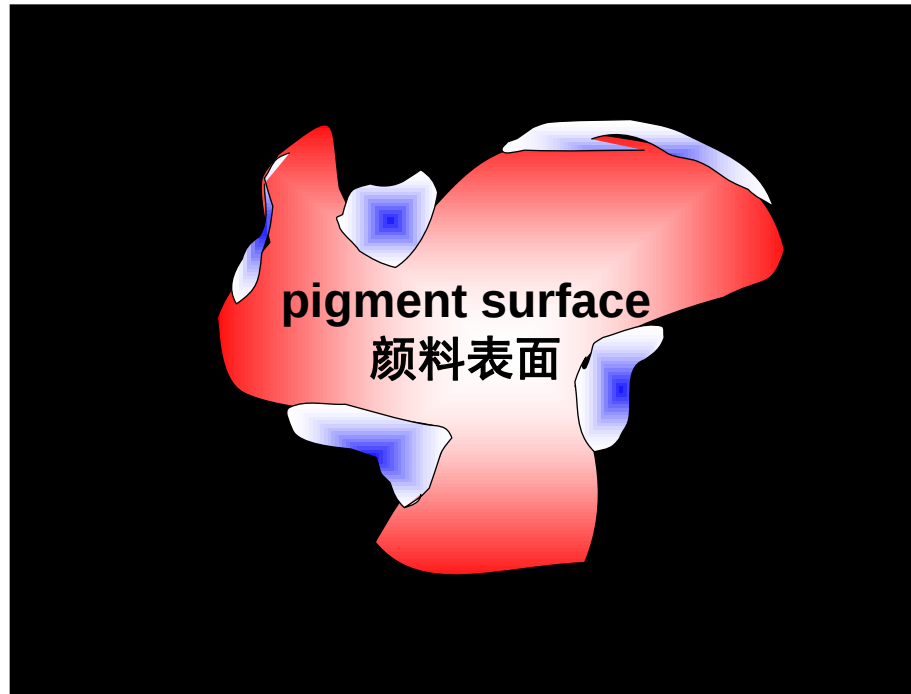
加工助剂-功能

2) Improved compatibility / easier dispersion in resin system
改进相容性 / 树脂体系 更易分散



1) Improved anchoring on pigment surfaces
改进颜料表面的锚定

Inefficient Pigment Wetting of the Resin! 树脂的颜料润湿效率低



 adsorbed air 吸附的空气

 Resin 树脂

Problem: Adsorbed air remains on the pigment surface!
问题：吸附的空气留在颜料表面！

Processing Additives

16 August, 2016

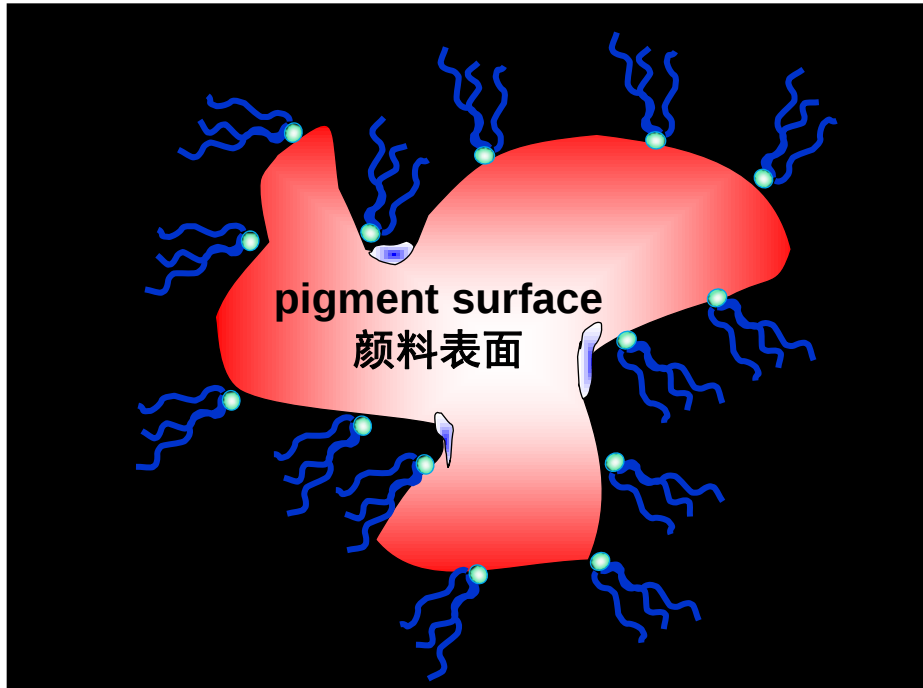
Page 10

Powder Seminar

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Processing Additives: Improved Pigment Wetting

制程助剂：改善颜料润湿



 Processing Additive
to improve pigment wetting
用于改善颜料润湿的制程助剂

 adsorbed air 吸附的空气

 Resin 树脂

Result: Less adsorbed air and better out gassing of the powder coating
结果：减少吸附的空气 改善粉末涂料的脱泡性

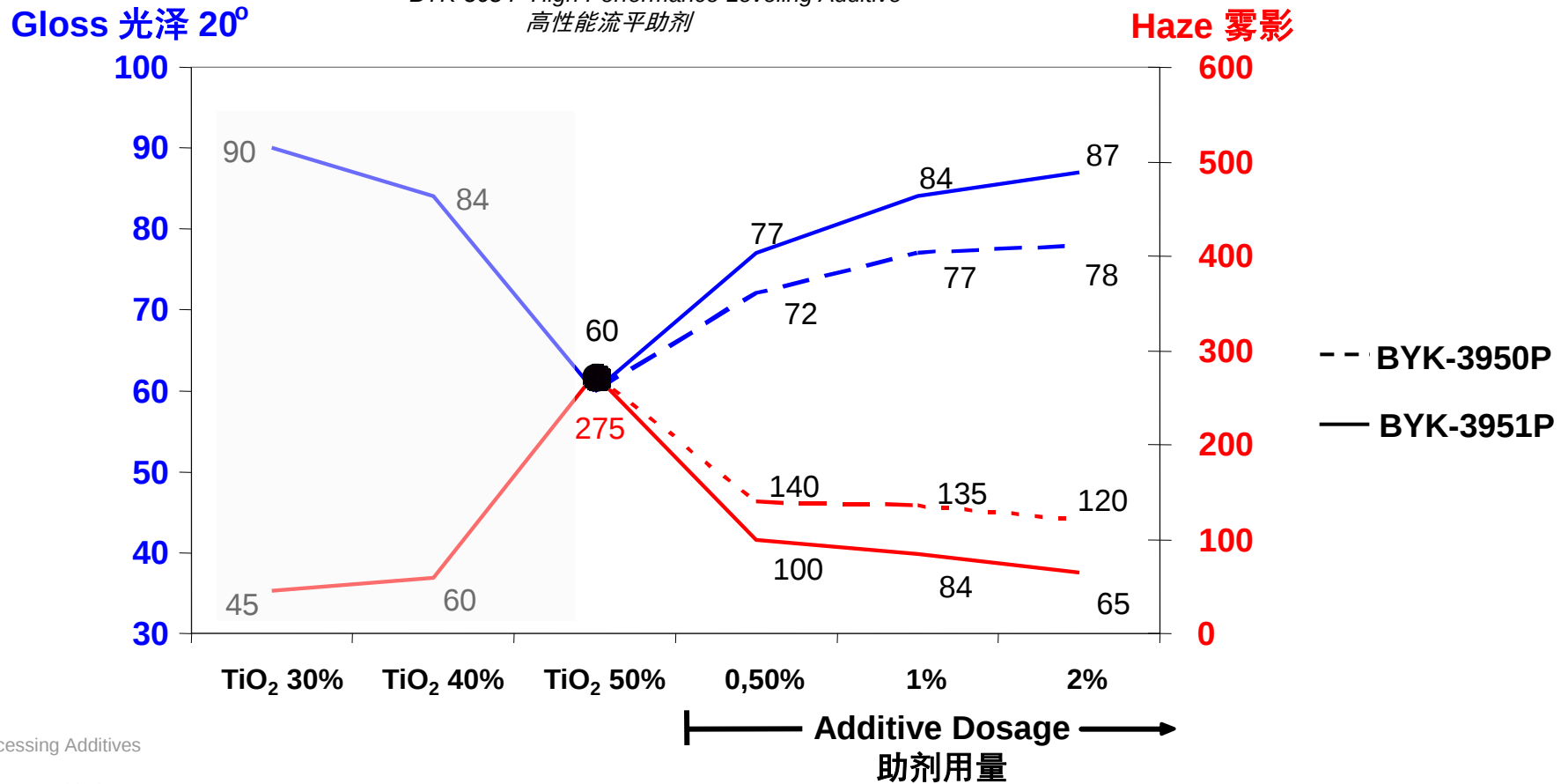
Processing Additives

16 August, 2016
Page 11
Powder Seminar
BYK-Chemie GmbH

Processing Additives: Improve Gloss and Haze

加工助剂：改善光泽和雾影

Polyester 聚酯/ β -Hydroxyalkylamide β -羟烷基酰胺
 BYK-368 P High Performance Leveling Additive
 高性能流平助剂

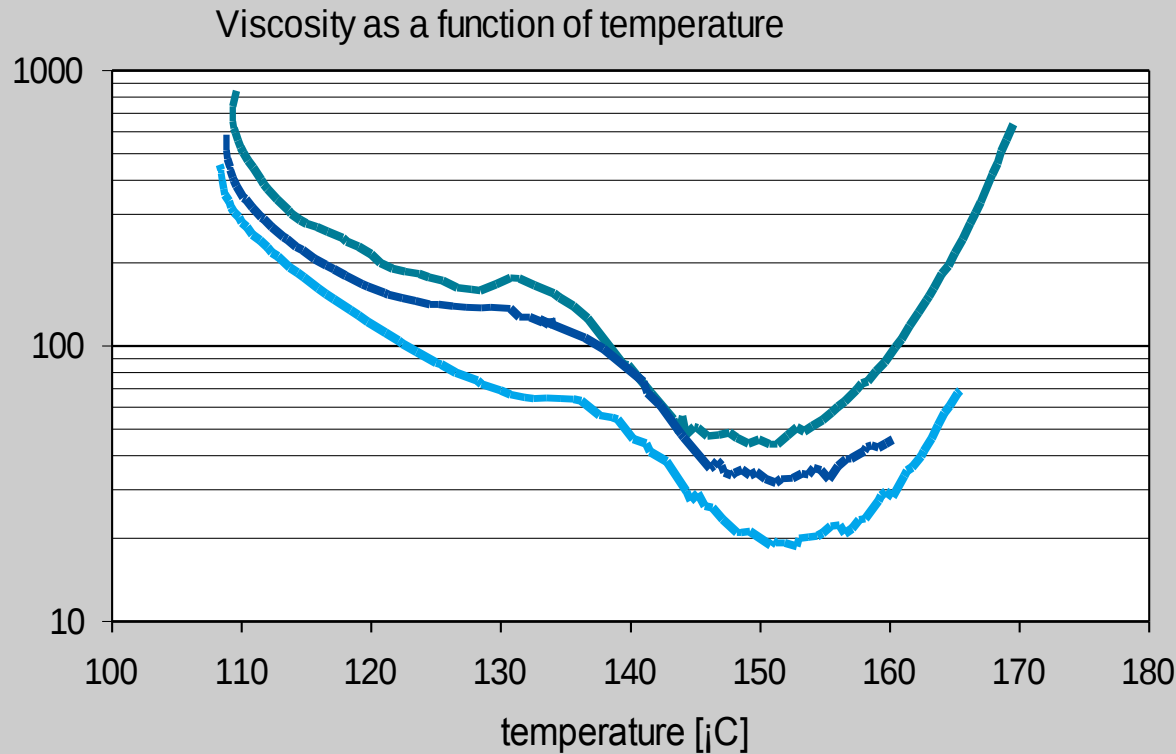


Processing Additives

16 August, 2016
 Page 12
 Powder Seminar
 BYK-Chemie GmbH

Viscosity Behavior with BYK-3950 P and BYK-3951 P

粉末涂料升温过程中的粘度变化曲线



- Control 50%
- BYK-3951 P
- BYK-3950 P

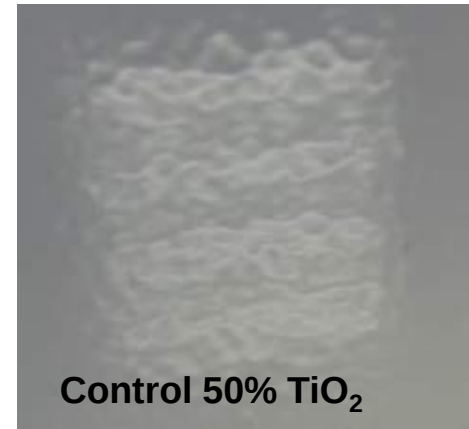
Dosage: 1% additive

Polyester/ β -Hydroxyalkylamide
BYK-368 P High Performance Leveling Additive

Processing Additives: BYK-3950P, BYK-3951P 加工助剂

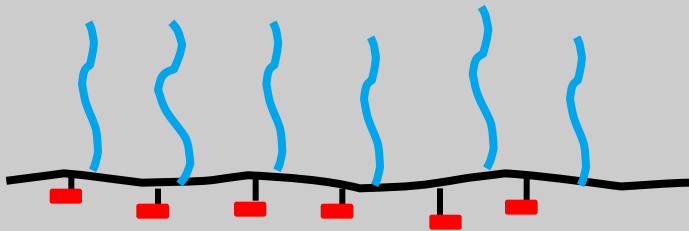
New Additive Technology 新的助剂技术

- Extrusion process more efficient
挤出过程更加有效
- Improve pigment filler acceptance
改善颜料填料接受性
- Improve DOI (gloss, haze, leveling)
改善DOI（光泽、雾影、流平）
- And ...



Comparison of Chemical Structure 化学结构的对比

BYK Processing Additives 毕克化学加工助剂

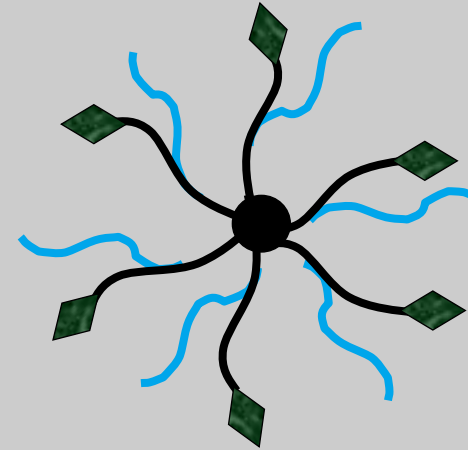


Linear Structure:
线性结构

BYK-3950 P

BYK-3951 P

For inorganic pigments and fillers
用于无机颜料和填料



Spherical Structure:
球形结构

Copolymer with special pigment affinic groups
拥有特殊颜料亲和基团的共聚物

BYK-3955 P

for carbon black
用于炭黑颜料

Why Need a Processing Additive for Carbon Blacks?

为何需要针对炭黑的加工助剂

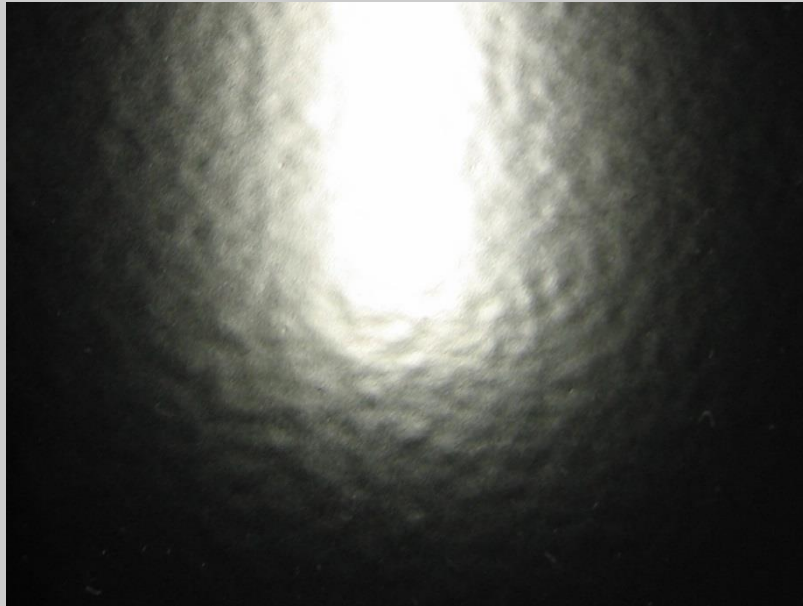
- Fine pigment particles with a high BET-surface e.g. carbon black pigments have a high oil absorption and therefore bond a high amount of resin.
粒径小颜料颗粒拥有较高的 EBT 比面积。例如炭黑颜料的吸油量较高，因此也会吸附大量树脂
- An inefficient wetting and dispersing of carbon black pigments in powder coating resins will result in a:
- 当炭黑颜料在粉末涂料树脂中的润湿分散不充分时，会导致：
 - difficult and inefficient extrusion
挤出困难且效率较低
 - bad DOI (Gloss/haze)
鲜映性较差（光泽/雾影）
 - poor leveling 流平不佳
 - rough surface 表面粗糙
 - ...



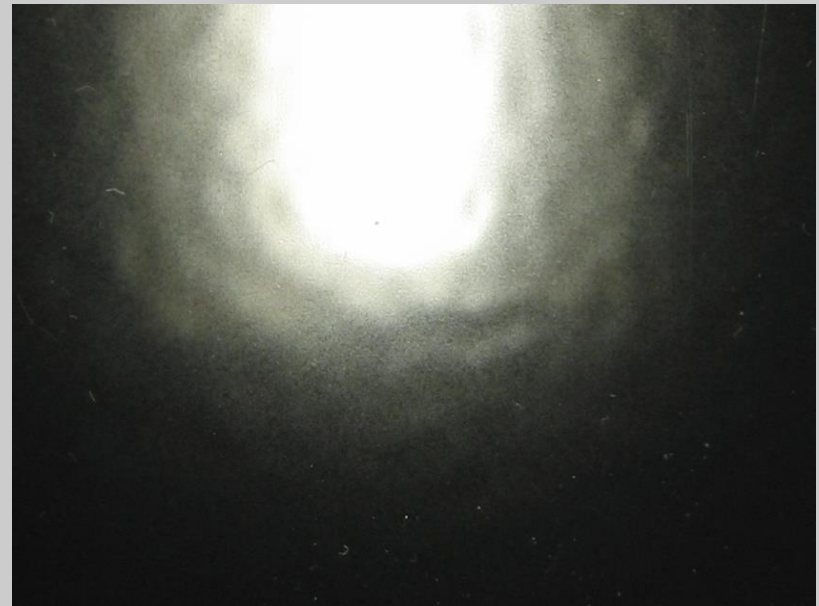
BYK-3955 P

Better DOI Performance in a Primid Powder Coating

最佳的鲜映性 – Primid 粉末涂料



Control
空白



1% BYK-3955 P

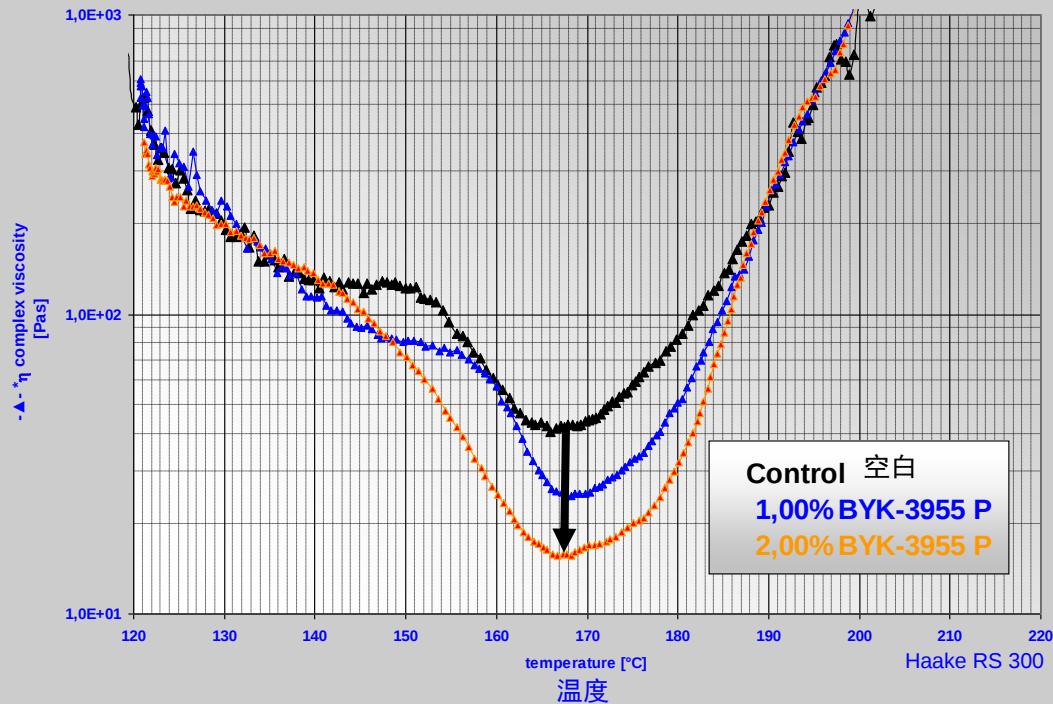
BYK-3955 P improves the DOI (gloss / haze / leveling)

BYK-3955 P 提高鲜映性（光泽 / 雾影 / 流平）

BYK-3955 P

Viscosity Reduction by Improved Pigment Wetting

改善颜料润湿从而降低粘度



Primid Powder Coating
Primid 粉末涂料

Improved dispersion, improved wetting of the carbon black pigment.

As a result the viscosity will be reduced

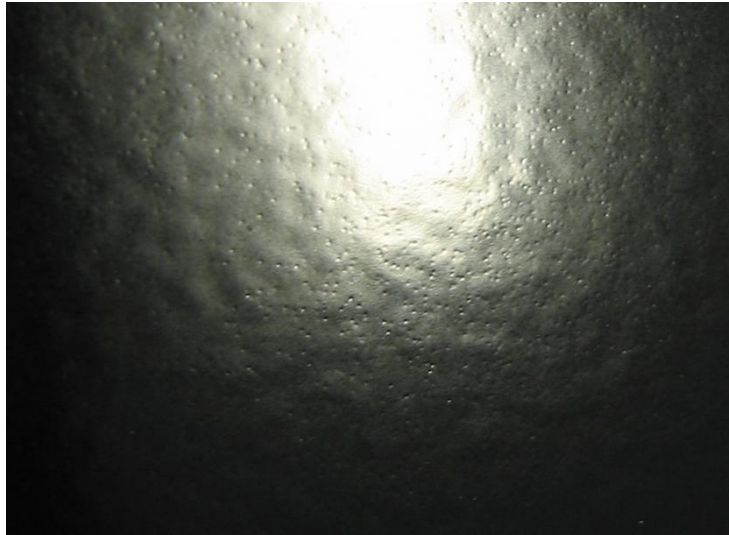
改善分散，提高炭黑的润湿效果，粘度得以降低

Example: BYK-3955 P

Improved degassing Properties and DOI

改进脱气性和鲜映性

System: Hybrid 70:30



Control without benzoine
= pinholes
空白,
不含安息香=针孔



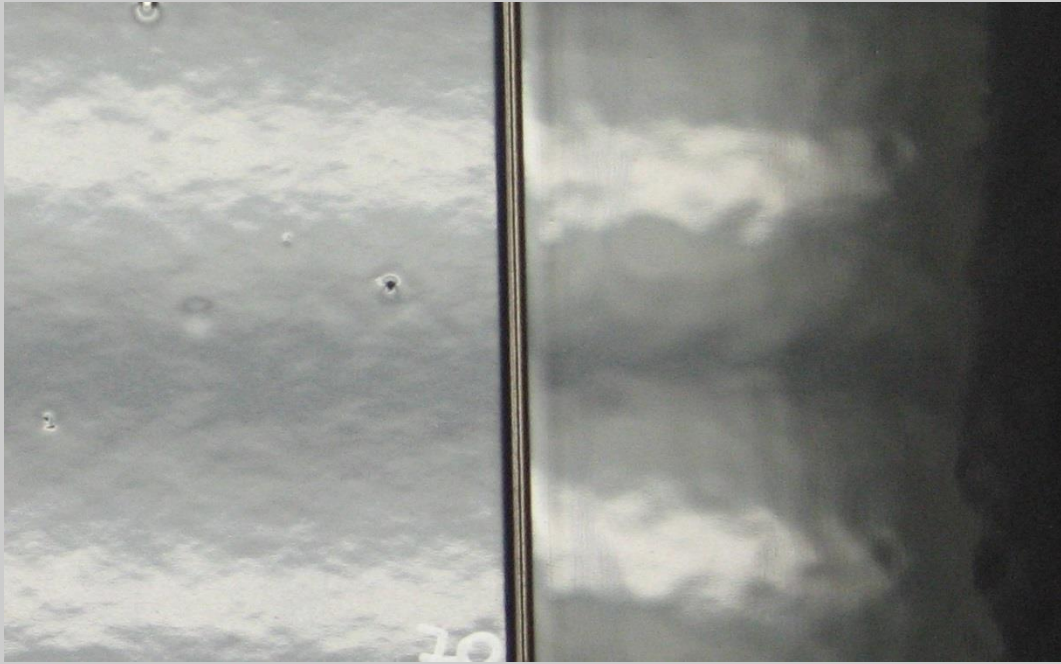
without benzoine
plus 1% BYK-3955 P
= improved degassing

不含安息香,
含1% BYK-3955P = 改进脱气性

BYK-3955 P

Best Optical Appearance in an Acrylic Powder Coating

最佳的外观效果 – 丙烯酸粉末涂料



Control
空白

1% BYK-3955 P

Improved DOI, out gassing and chargeability in acrylic powder coatings

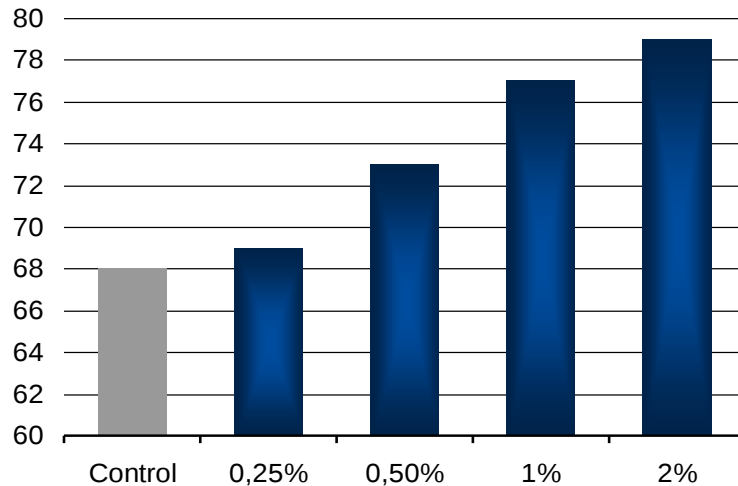
改善粉末涂料的鲜映性、脱泡性和带电能力

Visible & Measurable Improvements

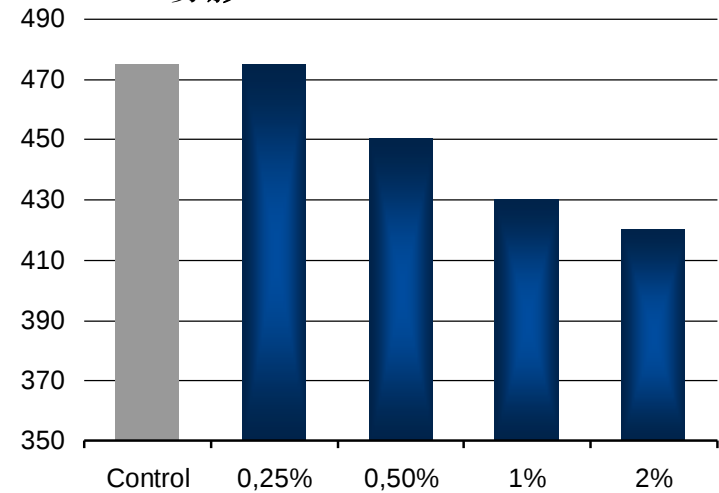
可见和可衡量的改进



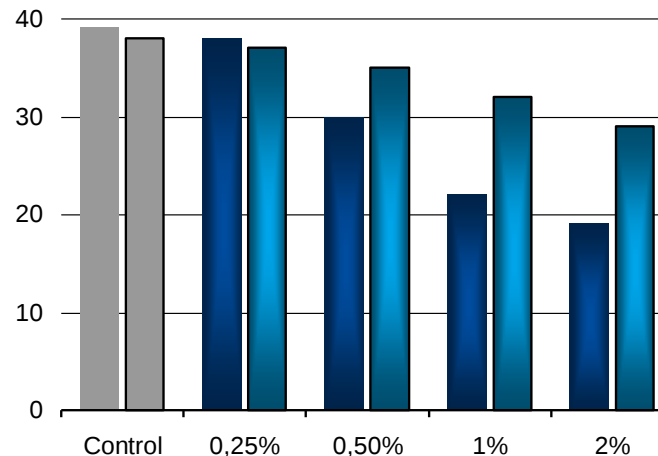
Gloss 光泽60°



Haze 雾影



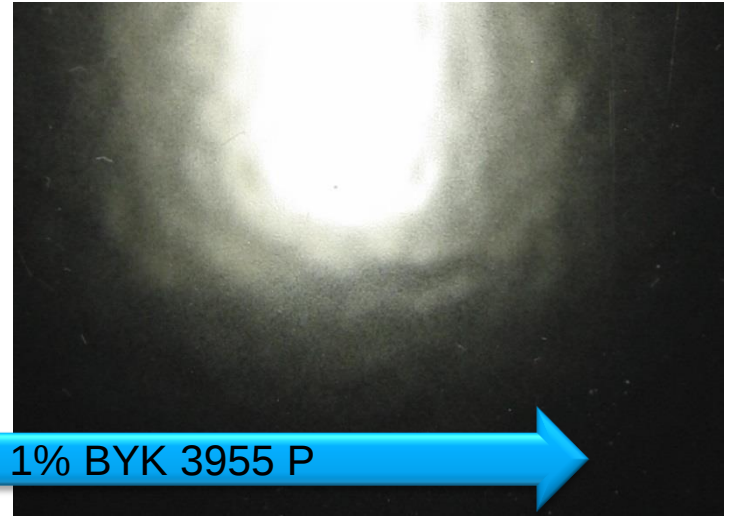
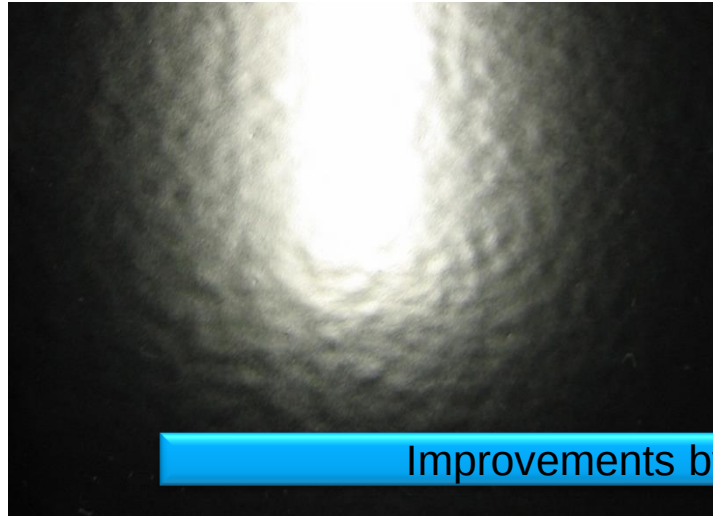
Leveling (LW / SW) 流平



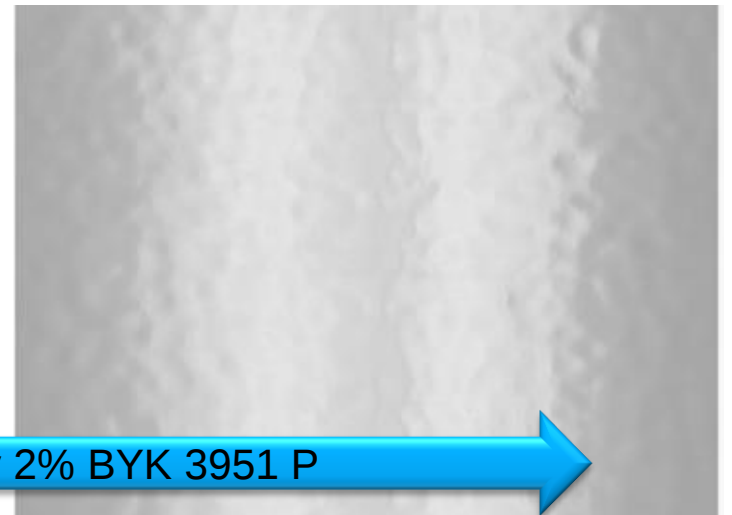
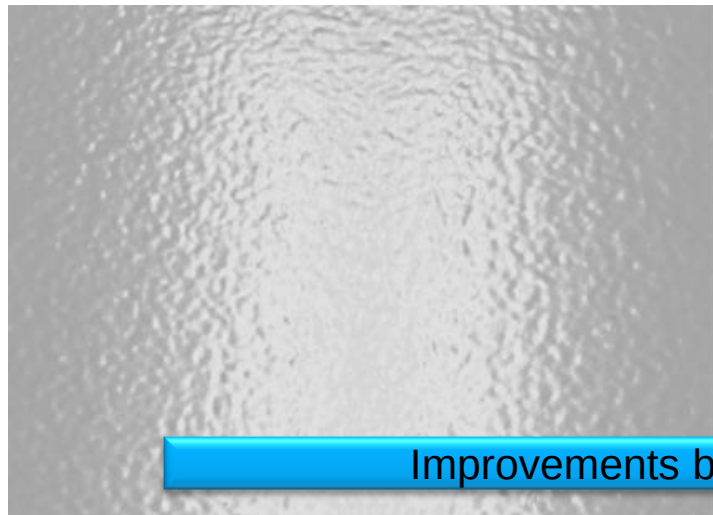
Processing Additives

16 August, 2016
Page 21
Powder Seminar
BYK-Chemie GmbH

BYK 3955 P for Black 炭黑 and BYK 3951 P for White 二氧化钛



Improvements by 1% BYK 3955 P



Improvements by 2% BYK 3951 P

Overview Product Line 产品系列一览

Processing Additives 加工助剂

Product 产品名称	Properties 特性
BYK-3950 P	Inorganic pigments and fillers BaSO ₄ , CaCO ₃ ... general use 用于硫酸钡、碳酸钙等无机颜料和填料，一般应用
BYK-3951 P	Inorganic pigments and fillers low cured and UV powder coatings 无机颜料和填料，低温固化和 UV 粉末涂料
BYK-3955 P	Pigment affine groups are suitable for : 颜料亲和基团适用于： - carbon black pigments 炭黑颜料 - fillers 填料 Suitable for all powder coating resins 适用于所有粉末涂料树脂

Combinations of processing additives are possible
加工助剂也可以配合使用

Processing Additives – Dispersing Additives

Further developments

加工助剂的进一步发展

Chemistry 化学

High MW copolymer with pigment-affinic groups
颜料亲和基团高分子量共聚物

Non-volatile matter 固成份 100%

Delivery form Pellets
供货形式 粒料

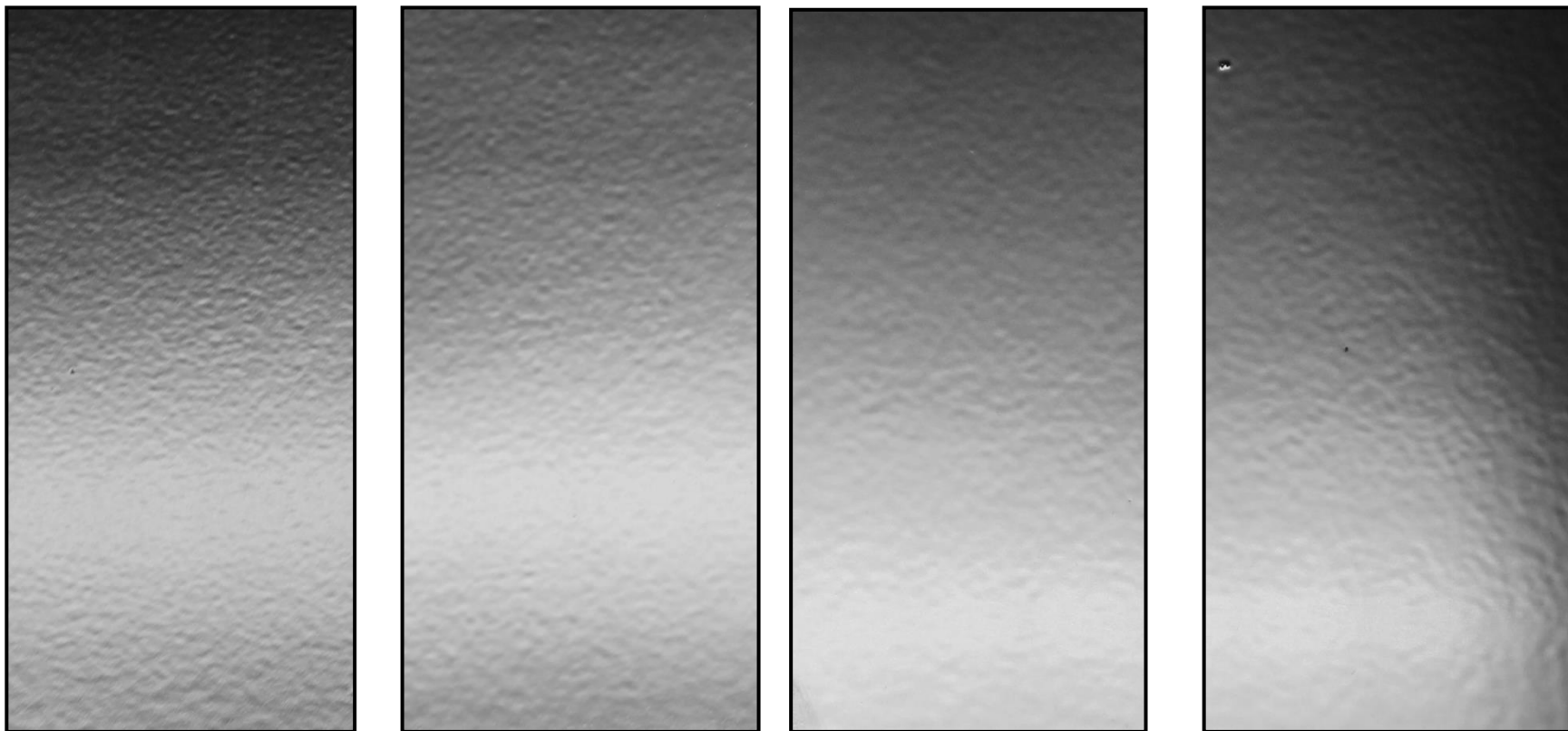
Melting point 54 °C (129°F)
熔点



DISPERBYK 2200 and BYK-LP N22216

Improved leveling in a Polyester/HAA system

DISPERBYK 2200和BYK-LP N22216 改进聚酯/HAA体系流平性

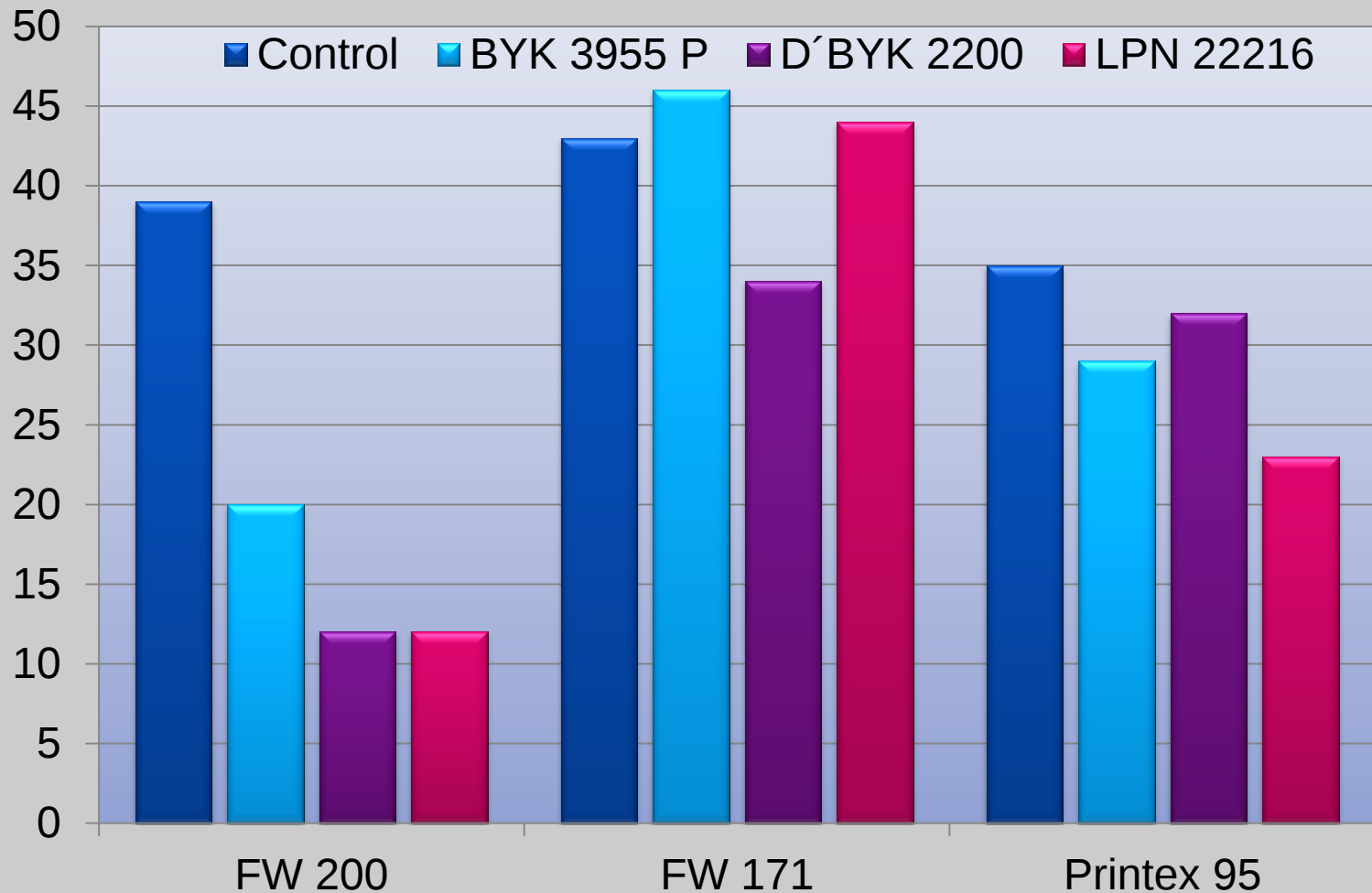


Control 空白	1% BYK 3955 P	1% D'BYK 2200	1% LPN 22216
	63% active 活性	100% active	100% active

DISPERBYK 2200 and BYK-LP N 22216 / (HY)

Comparison of different pigment types – LW

混合粉体系, 不同助剂对颜料的比较 – (長波流平)



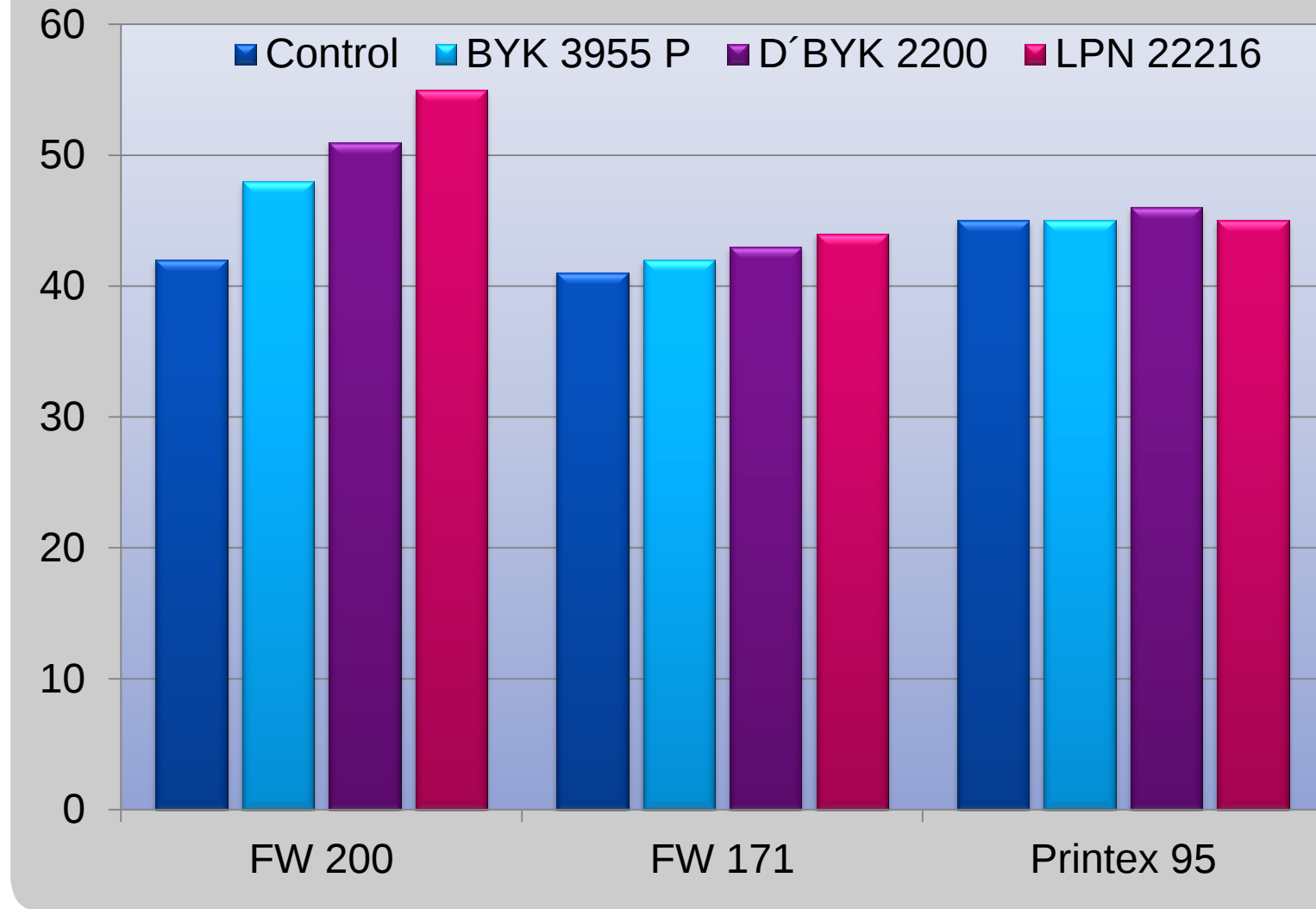
Processing Additives

16 August, 2016
Page 26
Powder Seminar
BYK-Chemie GmbH

DISPERBYK 2200 and BYK-LP N 22216 / (HY)

Comparison of different pigment types – Gloss 20°

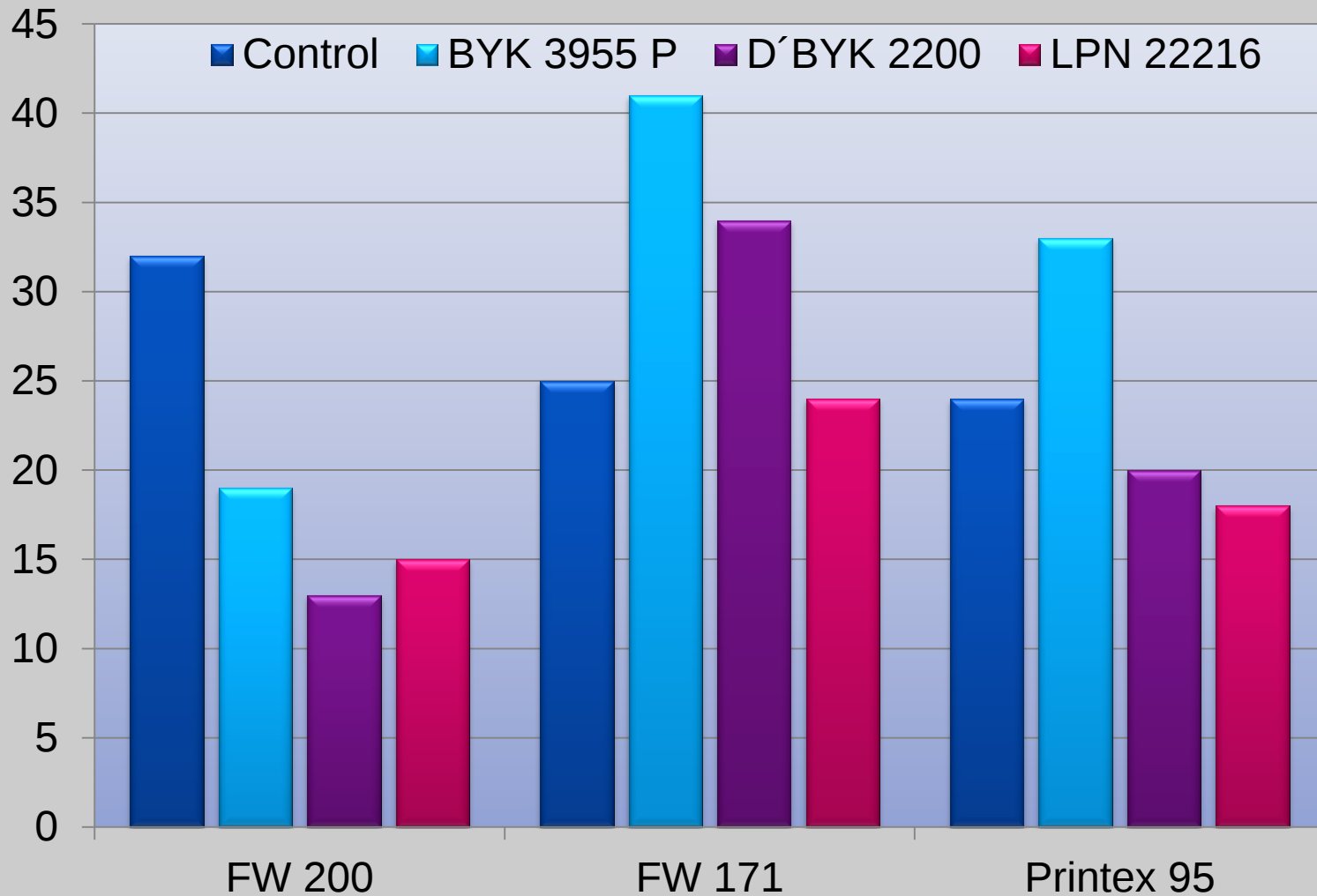
混合粉体系, 不同助剂对颜料的比较 – 光泽20°



DISPERBYK 2200 and BYK-LP N 22216 / (HAA)

Comparison of different pigment types – LW

HAA体系, 不同助剂对颜料的比较 – (長波流平)



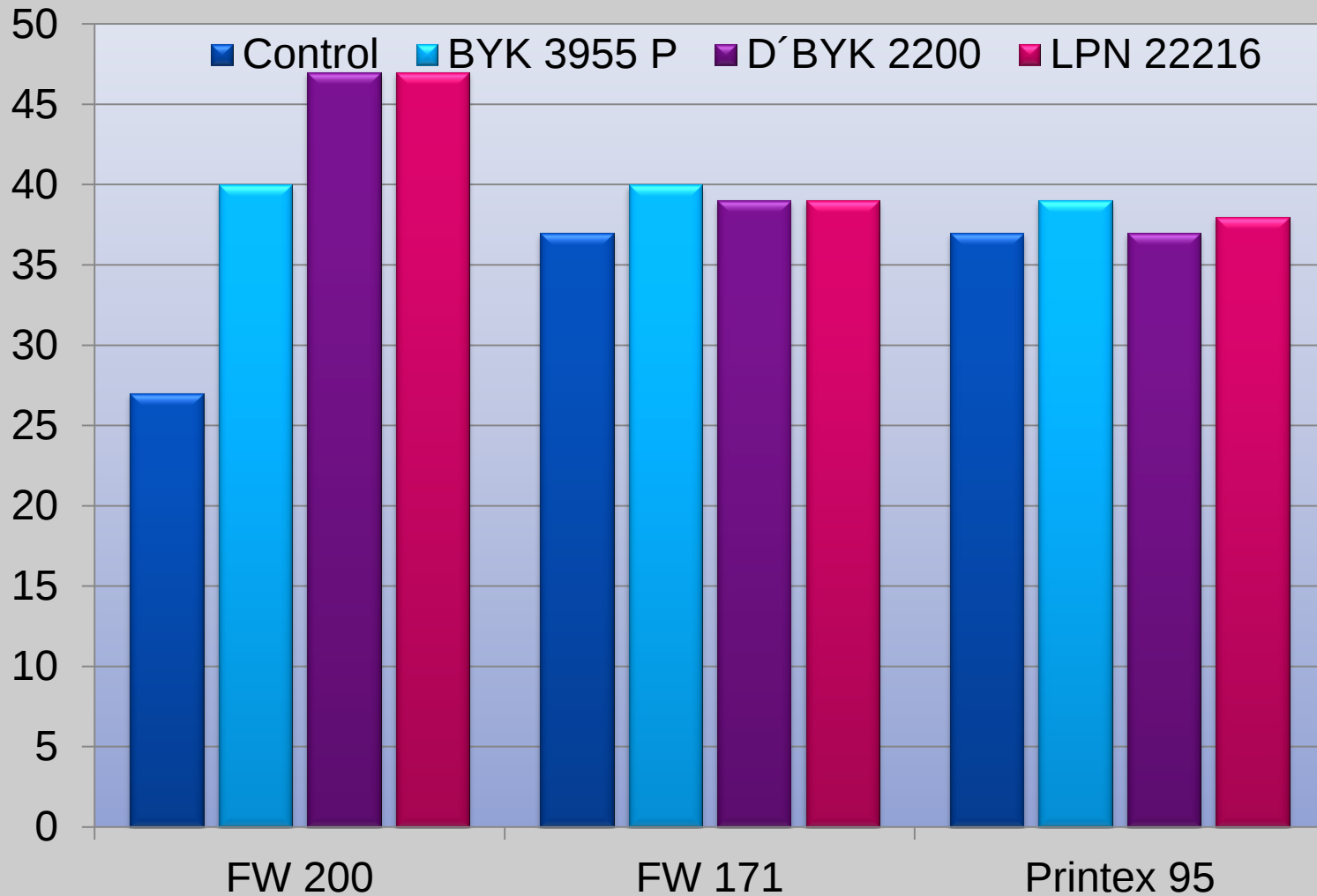
Processing Additives

16 August, 2016
Page 28
Powder Seminar
BYK-Chemie GmbH

DISPERBYK 2200 and BYK-LP N 22216 / (HAA)

Comparison of different pigment types – Gloss 20°

HAA体系, 不同助剂对颜料的比较 – 光泽20°

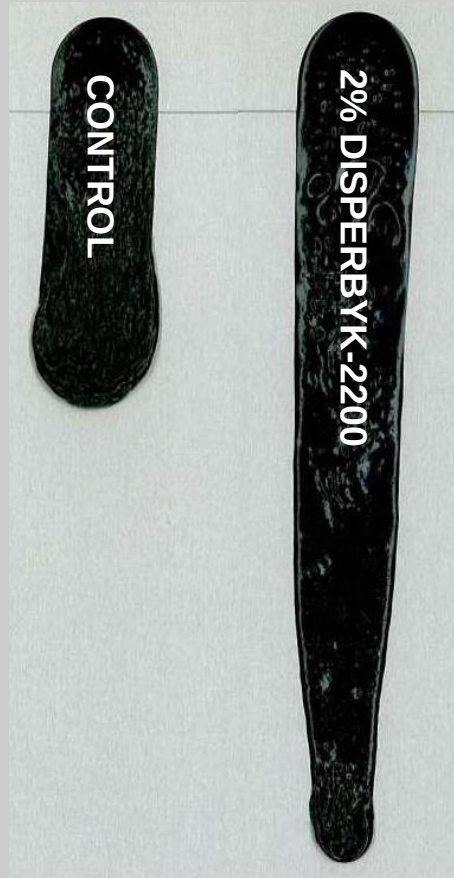


DISPERBYK 2200 in Powder Coatings

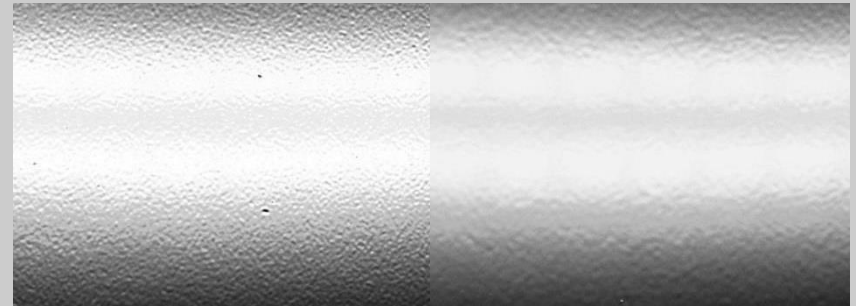
Improved Viscosity and improved DOI

DISPERBYK2200 改进粉末涂料 粘度和鲜映性

Efficient viscosity reduction leads to enhanced distinctness of image (DOI)
有效的粘度降低 导致鲜映性提升



Polyester / Epoxy (Hybrid)



Control

+ 2% DISPERBYK-2200

Polyester / β -HAA



Control

+ 2% DISPERBYK-2200

Processing Additives – different delivery form Solid Pellets vs. Silica Carrier

加工助剂-固体颗粒与二氧化硅载体的供货形式



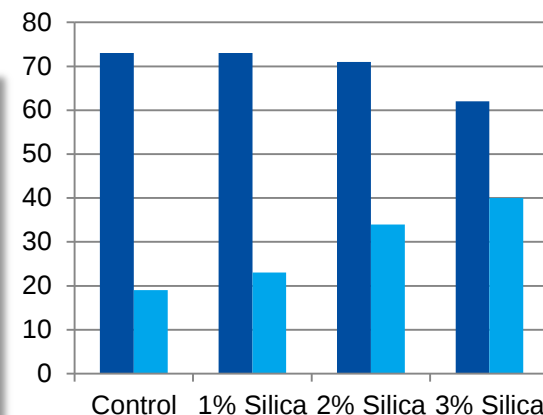
- 100% solid active substance
100% 固体活性物
- Melting point ($< 100^{\circ}\text{C}$ = < Extruder!)
熔点 ($< 100^{\circ}\text{C}$ = < 挤出机!)
- Variable dosage (dependent on T_g)
可变添加量 (依 T_g 点定)
- Max. 65% active substance
> 65% 活性物
- Liquid active substance, but solid carrier!
液体活性物质, 但 固体载体!
- Max. dosage 2% 添加量 < 2%

Influence of Silica Carrier 二氧化硅载体的影响

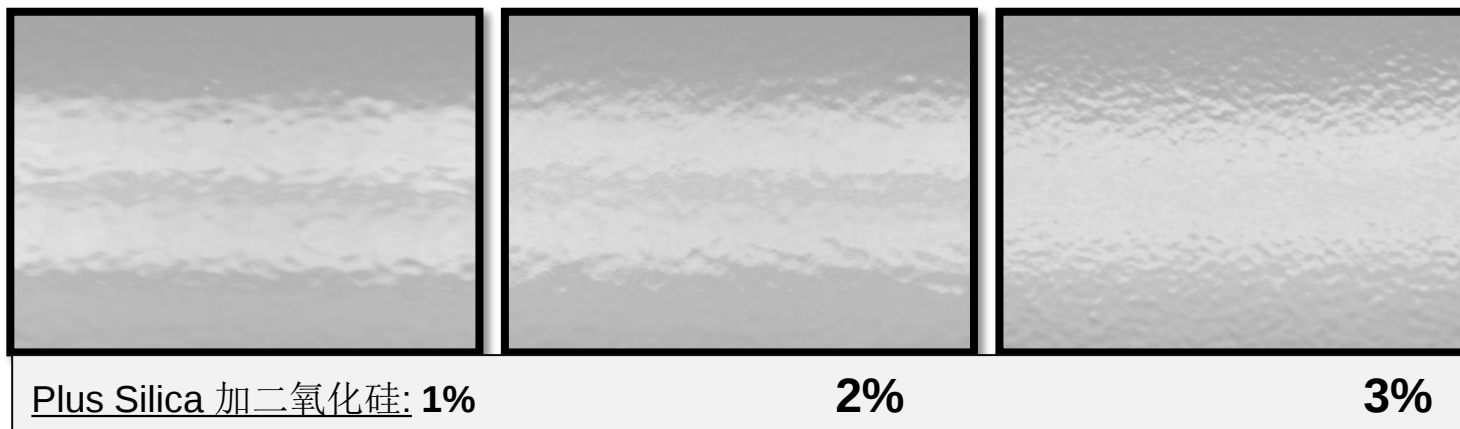
Additives on silica carrier are limited regarding maximum dosage. But for organic pigments a higher dosage might be necessary. (calculated on the surface area of the pigment types!)

二氧化硅载体助剂 有最大用量的限制。
但是对于有机颜料用更高的剂量可能是必要的 (以颜料类型的表面积计算)

■ Gloss 20° ■ LW



Control 1% Standard Additive 标准的助剂



Negative Influence on flow properties = limitation in dosage!

Gloss reduction & increased orange peel!

对流动性的负面影响=限制剂量! 光泽降低及橘皮增加!

Processing Additives for Organic Pigments

有机颜料的加工助剂

Additives on silica carrier are limited regarding maximum dosage.
But for organic pigments a higher dosage might be necessary
(calculated on the surface area of the pigment types!)

二氧化硅载体助剂 有最大用量的限制。但是对于有机颜料用更高的剂量可能是必要的（以颜料类型的表面积计算）

For organic pigments a higher dosage might be necessary!
对于有机颜料用更高的剂量可能是必要的



Best choice for organic pigments: 有机颜料的最佳选择:

- Solid Additives 固体助剂
- 100% active substance 100%活性物质
- Melting point below Extruder conditions
熔点 低于挤出机挤出条件
- W&D Additive with pigment affine groups
润湿和分散助剂有颜料亲和基团

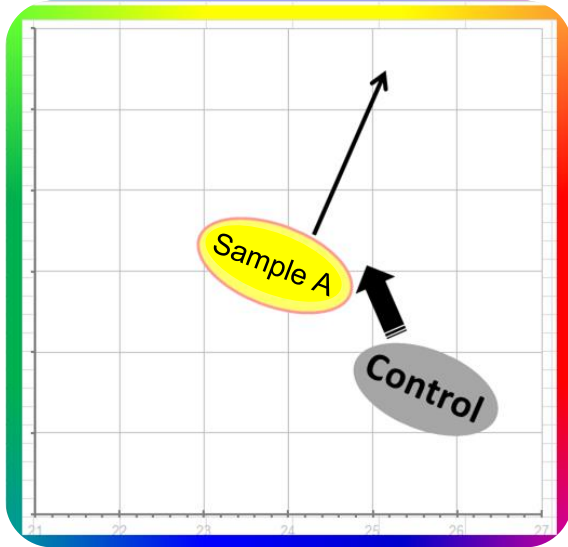
⇒ **DISPERBYK 2200 can be an option** 是一选项

Provisional Lab Samples – Variation of polymeric W&D Additives with Pigment affine Groups

暂定实验室样品 – 含颜料亲和基团的不同加工助剂

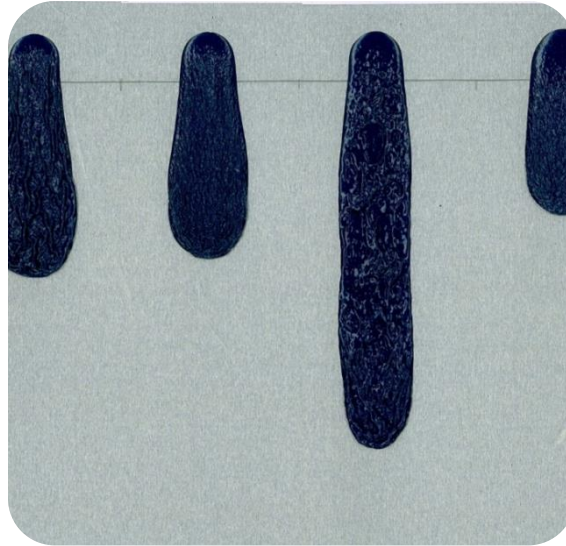
LPN Sample A

- M.P. = 65°C
- Solid



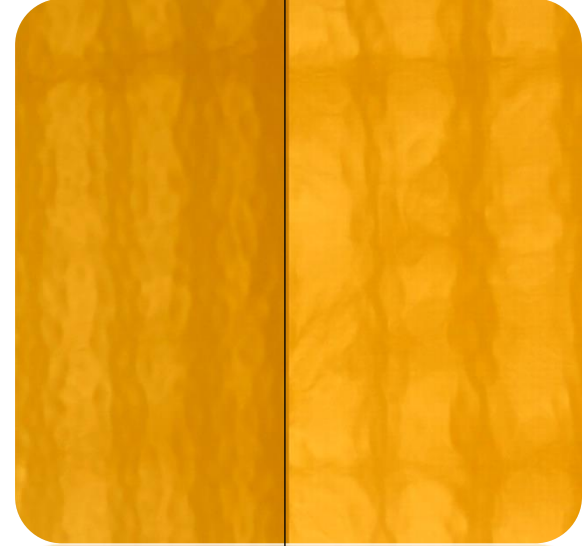
LPN Sample B

- M.P. = 65°C
- Solid



LPN Sample C

- M.P. = 65°C
- Solid



Processing Additives

16 August, 2016
Page 34
Powder Seminar
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Thank you for
your attention.