New Eco & Sustainable Paint Process: One year results after its first introduction in DPCA plant Wuhan (China)

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Summary

1. NEW PROCESS WUHAN 3
2. NEW PAINT TECHNOLOGIES
3. LINE RESULTS
4. CONCLUSION
Vision: GREEN AND EFFICIENCY

- Green Pretreatment
- IPP 2 + 2k Clearcoat
- New Ecoat Powernics 1400
- Quality Meet PSA Standard
- Green Tech.
- Low Investment and Running Cost
NEW PROCESS  WUHAN 3

Targets of these choices:

- **Reduce costs**
  - Decrease footprint and investment.
  - Simplified and standardized paint process
  - Lower cost to operate
  - Lower lead time

- **Superior leadership in quality**
  - Appearance, durability, scratch
  - Process robustness

- **Best environmental performance:**
  - Lower VOC emissions
  - Reduced resource consumption
  - No heavy metals in process

*First Time to produce car bodies with a Green PT and a Compact Process together.*
New technology of BK-NP is used in DPCA III

**IPP Primerless:**
- Decrease footprint
- Simplified and standardized paint process
- Lower cost to operate
- Lower lead time

**Powernics Ecoat:**
- Excellent Appearance
- Low Roughness
- High Throwing Power

**2K HD clear-coat:**
- Excellent Appearance
- and outdoor performance
DPCA chose powernics 1400 serie

*Excellent Appearance, Low Roughness*

*Steel Panel Ra vs ED Ra, cutoff 2.5 mode*
E-coat powernics 1421

Deposit Efficiency

The Validation of this E-coat technology is done with the major European Car Manufacturers
Primerless system = Compact Paint System without primer and with wet/wet application

**Advantages**
- Cost reduction
- VOC reduction

**Technical difficulties**
- Retention of optimal primer function
  - UV opacity
  - Mechanical properties
- Appearance
  - Leveling effect
- Wet / wet application
  - Multi layer chemical compatibility
NEW PAINT TECHNOLOGIES

B&K was precursor → 1st patent in 1995.

2 concepts & 3 technologies available in primerless.

→ All of which were developed and supplied by B&K.

Concept 1: Colored BC in 2 layer replacing both primer and BC

→ 2K or 1k technology

→ Developed by B&K for:
  - PSA
  - PPC Generation 1
  - Volkswagen → 2010

Concept 2: Pre-coat + BC in 2 layers

→ Developed by B&K for:
  - PSA
  - PPC Generation 2
  - BMW → IPP
  - Audi → 2010 V
  - Daimler → IP2
  - 3W → 2010V
Process sequence:

| E-Coat | Oven | Base-Coat 0 | Interior | Base-Coat 1/2 | Flash off | Clear-Coat | Oven |
NEW PAINT TECHNOLOGIES

Conventional

- Clear coat 40 µm
- BC 12-20 µm
- Primer 30 µm
- E coat 15-18 µm
- Phosphate PT 2 µm

IPP

- 2K clear coat 40 µm
- B2 4-8 µm
- B1 8-13 µm
- B0 12-14 µm
- E coat 15-18 µm
- Oxsilan PT < 40-100nm

W/W application

Paint system composition

- Shade
- Stonechipping
- UV opacity
- Surface leveling
B&K development comprised of B&K resin technology

Challenges:

- **B0**: med/high thickness
  - low structure viscosity
  - low shrinkage

- **B1/B2**: low thickness
  - high structure viscosity
  - high shrinkage

**Difficult compatibility (B1 in B0)**
Challenge for superior appearance

→ Technical solution:
  Use of B&K microgel technology to adjust the visco-elastic properties

Advantage:

- Application control
- Drying control
- Stability
- Good compatibility between B0 and B1/B2
2K technology: HD Clearcoat generation

- Increased crosslinking density of the CC

> functional acrylic polymer

Surface hardness customized

NCO + HO → Polyurethane

- Aliphatic Isocyanate
- Hydroxyl acrylic
- SCA acrylic: rheology control
- HDI: scratch
- IPDI: hardness

Polyol with increased crosslinking density. HD technology

- 2K-PUR, flexible HDI type
- 2K-PUR, semi-hard HDI/IPDI blend
- 2K-PUR, hard IPDI type

Chemical resistance (H2SO4, Gradient oven [°C])
2K technology : HD Clearcoat generation

Functional results :

Chemical resistance improved in gradient oven (solvent, acid, soda, pancreatin).

Standart technology : first damages from 40°C

HD technology : temperature leads to first damages over 55°C

Scratch resistance : Gloss after crockmeter test over 75 UB on black color.

Car wash resistance: Gloss after test over 75 UB on black color.
2K technology : HD Clearcoat

**Wheathering resistance:**

- No surface damages after more than 1500 hours in QUV test or 4000 hours in WOM test.
- Resistance to scratches and chemicals is preserved during many years.
- Natural resistance provided by polyurethane crosslinking and hydrogen bridges.

Nearly no loss of chemical and scratch resistance after 3 years of natural exposure.
**E-coat** Appearance request for premium appearance:

- Appearance Lw Vertical ≤ 30, Lw Horizontal ≤ 35
- Roughness Ra ≤ 0.3

**ED Roughness Ra**

**LONGWAVE OF ED**
**Topcoat appearance standard (4R):**

- Appearance LW Vertical ≤ 10, LW Horizontal ≤ 5
- Appearance Sw ≤ 30

**Appearance LW**

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Technical requirement & result

- PSA target: LWH < 5  LWV < 10  SW < 30

- Line introduction:
  - Dedicated team with local and expat specialists
  - Laboratory validation of product with exact line configuration

- B&K experience from PSA Sochaux launch in 2012
  - 8 IPP colors + 2K CC in line

- Results:
  - NP Powernics 1421 Ecoat + B&K IPP + B&K 2K CC
  - Appearance = PSA Target
**CONCLUSION**

**PSA Sochaux: SOP 2012 > 400 000 car produced**  
B&K supplier of IPP BC and 2K HD clearcoat  
→ PSA target reached

**PSA (CAPSA) Shenzhen: SOP 2013 > 100 000 car produced**  
B&K supplier of IPP BC and 2K HD clearcoat  
→ PSA target reached

**PSA (DPCA) Wuhan: SOP 2013 > 250 000 car produced**  
B&K supplier of Ecoat, IPP BC and 2K HD clear-coat  
→ PSA target reached

To be continued with:  
**Dongfeng Wuhan: SOP 2014 – 200 000 car/year capacity**  
B&K supplier of Ecoat, IPP BC and 2K HD clear-coat  
**PSA Mulhouse: SOP 2015 – 400 000 car/year capacity**  
B&K supplier of Ecoat, IPP BC and 2K HD clear-coat  
→ First Ecoat line for B&K in Europe!
Thank you

Gracias

Merci