

# UV FUNCTIONAL COATINGS FOR AUTOMOTIVE DISPLAYS

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# Coating Capabilities of UV / EB Curing

- Hardwood and Engineered Flooring
- Kitchen Cabinetry and Furniture
- Wood Windows
- Patio Doors
- Fiberglass Entry Doors
- Interior Doors
- Furniture
- Shutters and Blinds
- Plastic Tubes
- Personal Care Products
- Reflective Headlights



# PPG Electronic Materials Coatings Portfolio



## Transparent Coatings for Glass and Plastic Displays

Easy-to-clean surfaces

Slippery feel

Better readability under direct light

Better definition of image

Increased scratch resistance



## Decorative Coatings

2K polyurethane solventborne  
and waterborne

UV-curable

Powder

Electrocoat



## Conductive Electronic Materials

RFID shielding

Printed circuits

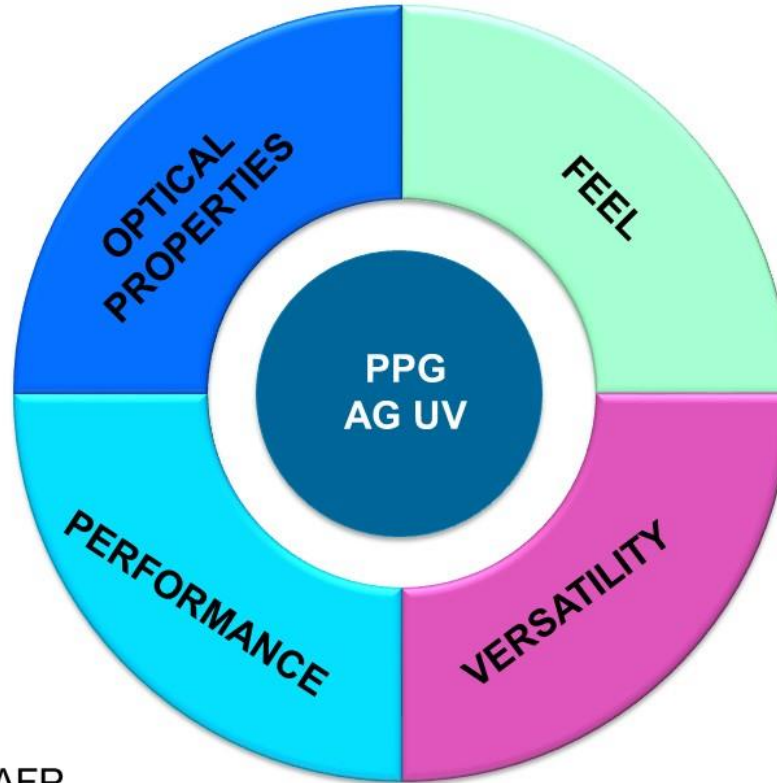
# Electronic Materials

- Burnish resistant Low Gloss UV technology
- Stain resistant coatings for light colored substrates
- Keyboard coatings
- Anti-fingerprint
- Soft touch for PC/carbon fiber substrates
- Flexible coatings portfolio
- UV monocoat
- UV silk/soft touch clear coat
- UV technology expansion to Automotive Display market



# Anti Glare (AG) UV Coatings for Display

- Gloss/ Haze
- Transmittance
- Color
- Definition



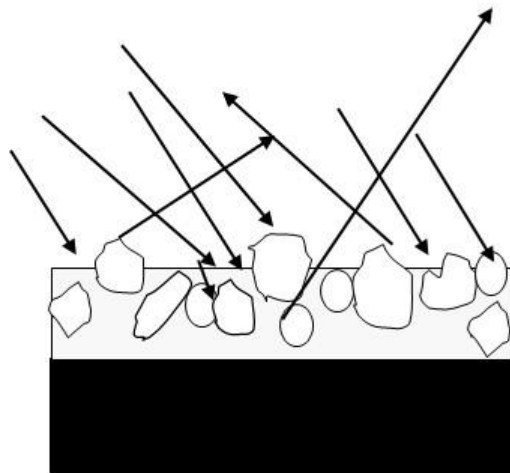
- Quantitative measurement
- Range of available feel
- Capability to customize feel

- Excellent durability
- Scratch resistance
- Chemical resistance
- Functionality, anti-stain, AFP

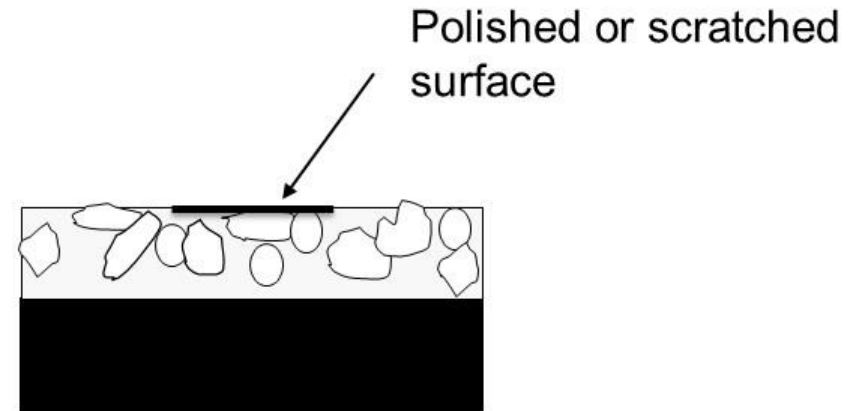
- Application –Spray, Roll, Flow
- Different substrates
- Robust application



# Optical Properties



Abrasion



## CONSIDERATIONS

- Particles size
- Particles shape
- Refractive index
- Hardness
- Color
- Specific gravity



Alternative Anti Glare  
Mechanism

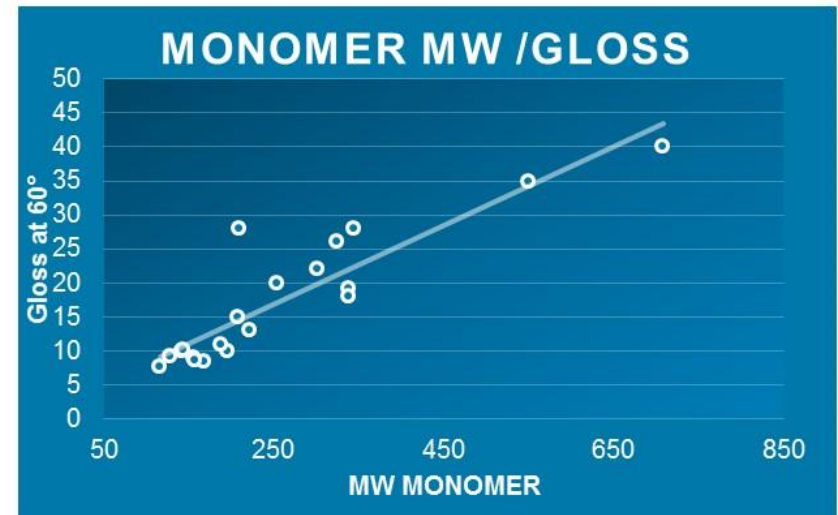
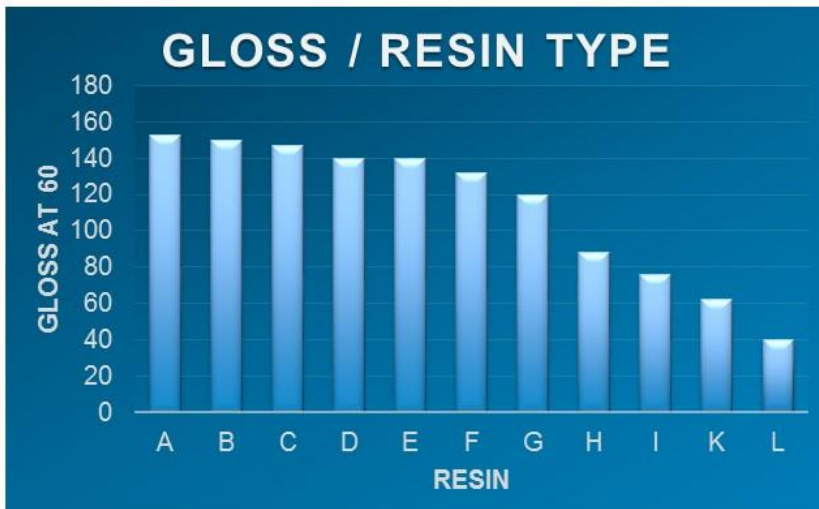
# Performance

## PROPERTIES

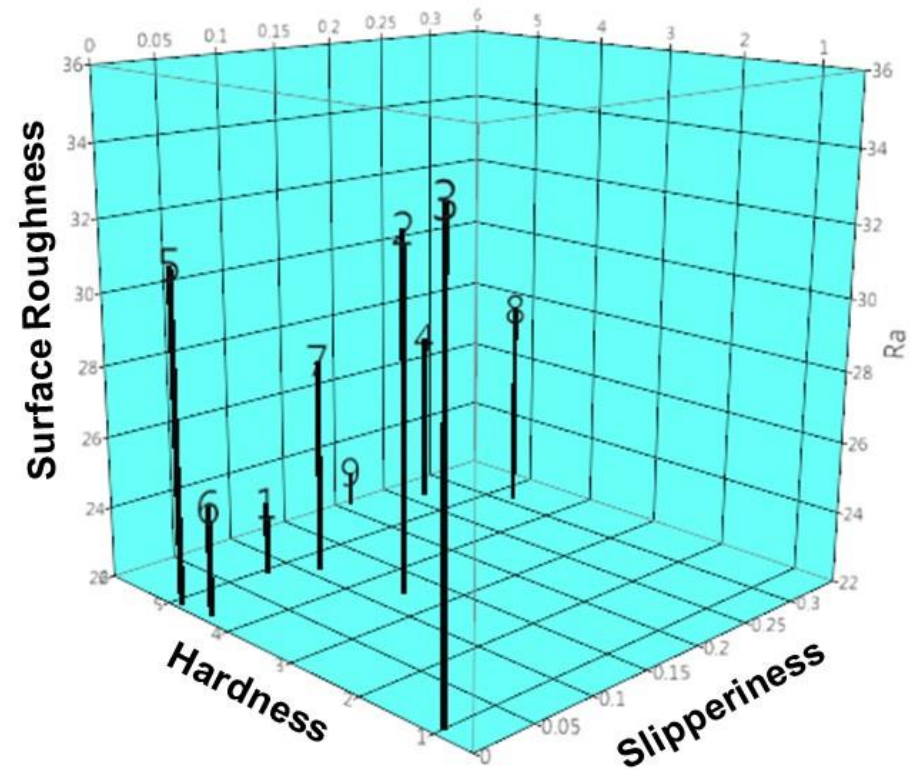
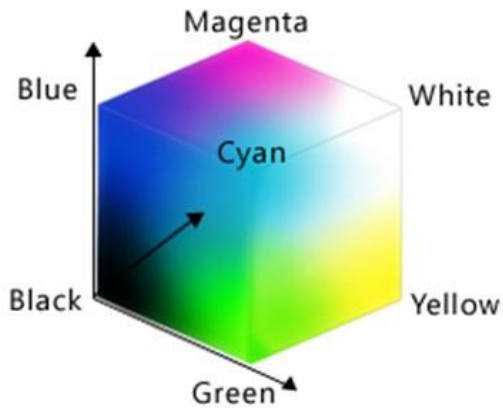
- Excellent durability
- Scratch resistance
- Chemical resistance
- Functionality, anti-stain, AFP

## PROPRIETARY RESINS

- High functionality
- Flexibility
- Easy to matt oligomers / monomers
- Anti-fingerprint abilities



# Feel

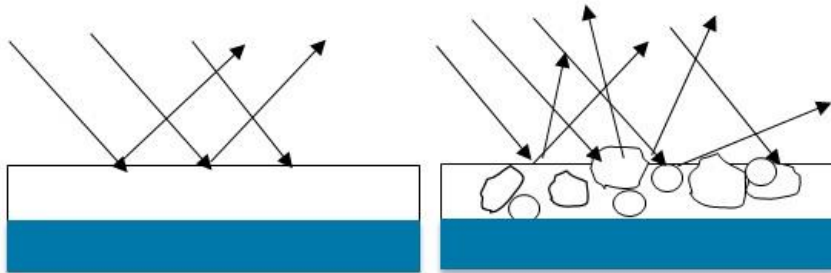


## Quantitative Characterization of "Feel"

- Fisher Microhardness
- Coefficient of Friction
- Surface Roughness



# Anti-glare (AG) UV Curable Coating for Plastic Displays

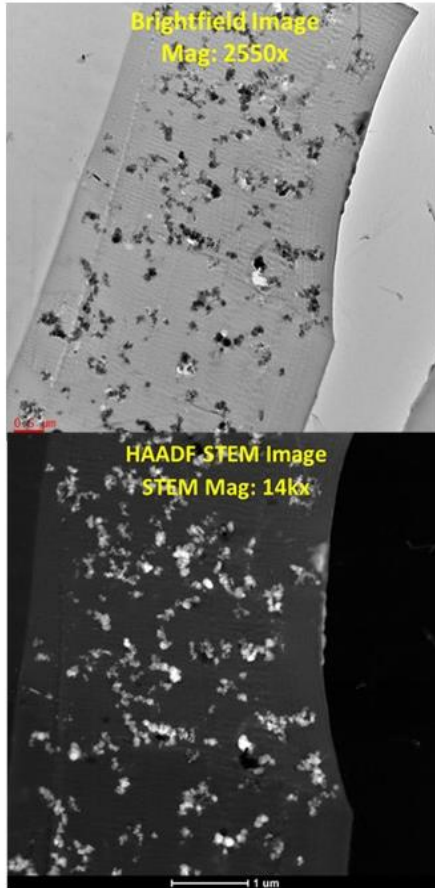


- **Single coating featuring a combination of hard coat, anti-glare, and EC coating performances**
- **Outstanding optical quality**
- **Excellent abrasion**
- **Tunable gloss and haze**
- **Easy to clean**
- **Easy for applications using roll to roll coating, flow coating and spray coating**

# Performance of UV AG Coating for Plastic Display

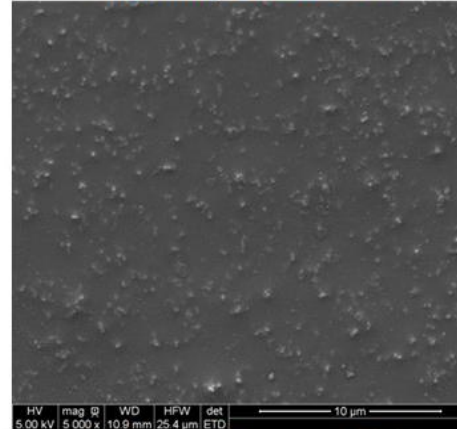
Coating	UV curing AG coatings	
Tunable gloss (GU)	40 to 100	
Tunable haze (%)	5 to 20	
Transmission (%)	> 89	
Surface roughness Ra (µm)	0.1 to 0.3	
Pencil hardness ( 750 g)	> H (on PC)	
	> 4H (on PET, Triacetate)	
	> 4H (on PMMA)	
Adhesion	5B	
Film thickness (µm)	4 to 8	
Initial DI water contact angle (WCA) (°)	109	
#0000 Steel Wool Wear Durability, 1kg load		
Haze (%)	5 to 15	15 to 17
Abrasion cycles (WCA > 90°) with 20mm x 20mm wear head	1000	1000
Abrasion cycles (WCA > 85°) with 10mm x 10mm wear head	1000	300

# Structure of AG UV Coating for Display

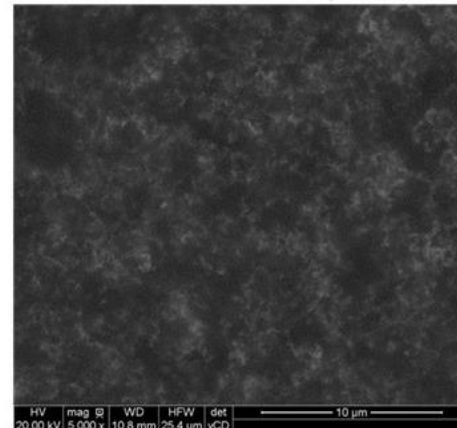


Cross Sectional TEM  
Brightfield and HAADF  
STEM Images

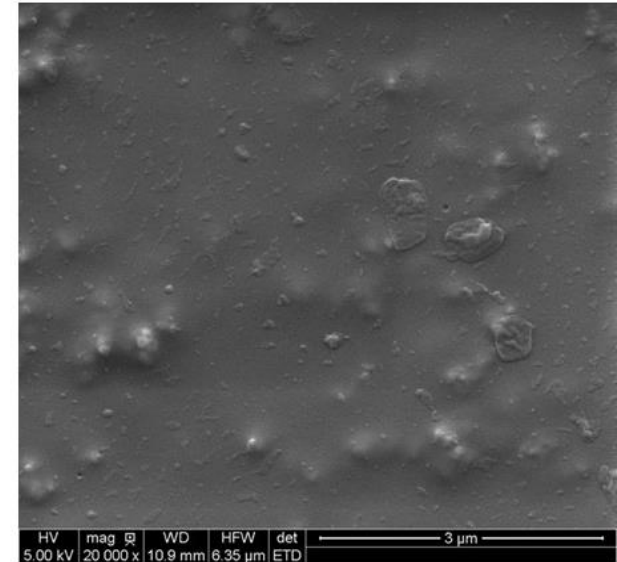
Secondary Detector, 5kV



Backscatter Detector, 20kV



FESEM Surface Images  
Magnification of 5kx



Secondary Detector FESEM  
Surface Image Collected at  
Magnification of 20kx

# Versatility

- Application – spray, flow and roll

DFT	Flash Off	UV Density (Nitrogen pad preferred)
5~7 $\mu\text{m}$	50~60°C-5~10min	900~1200mJ/cm <sup>2</sup>

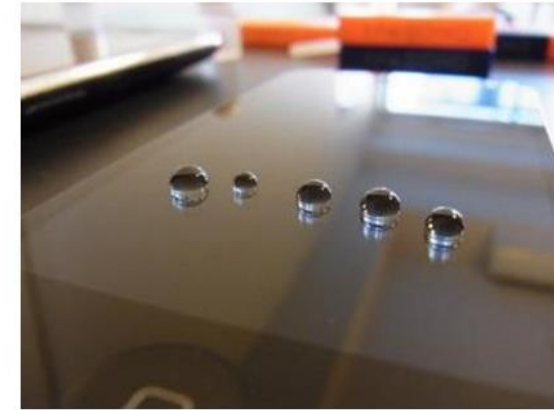
- Various substrates – PC, PMMA, PET, Triacetate
- Robust application window
- Gloss stability

# Transparent UV Hard Coating for Plastic(PMMA/PC)

## Coating System

High gloss UV clear coat

Substrates: PC, PMMA,PET



## KEY FEATURES

- Good leveling & adhesion
- High scratch resistance(Steel wool)
- Good pencil hardness
- No cracking after CNC
- Easy clean and mark pen performance.

Confidential information



# UV Silk/Soft Touch Clearcoat

## Coating System

Silk Feel Coatings

Basecoat

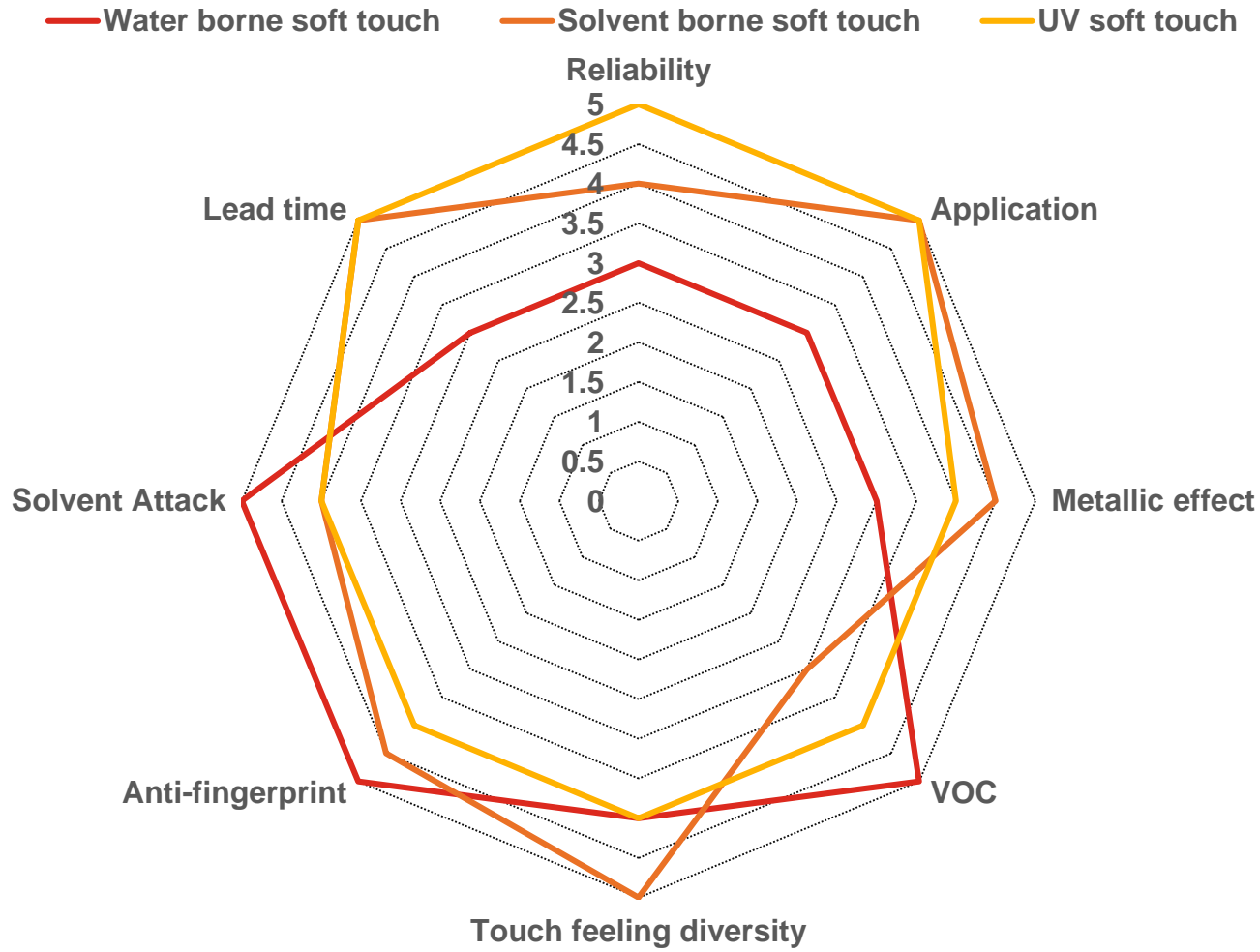
Substrates: PC, PC/ABS



## KEY FEATURES

- Silky and Soft Feeling
- Good scratch resistance
- Good stain resistance
- No Pot life issue

# Water-borne, Solvent-borne and UV Soft Touch



\*Higher is better

# UV Monocoat

## Coating System

UV mono coat (tinted)

Primer (if needed)

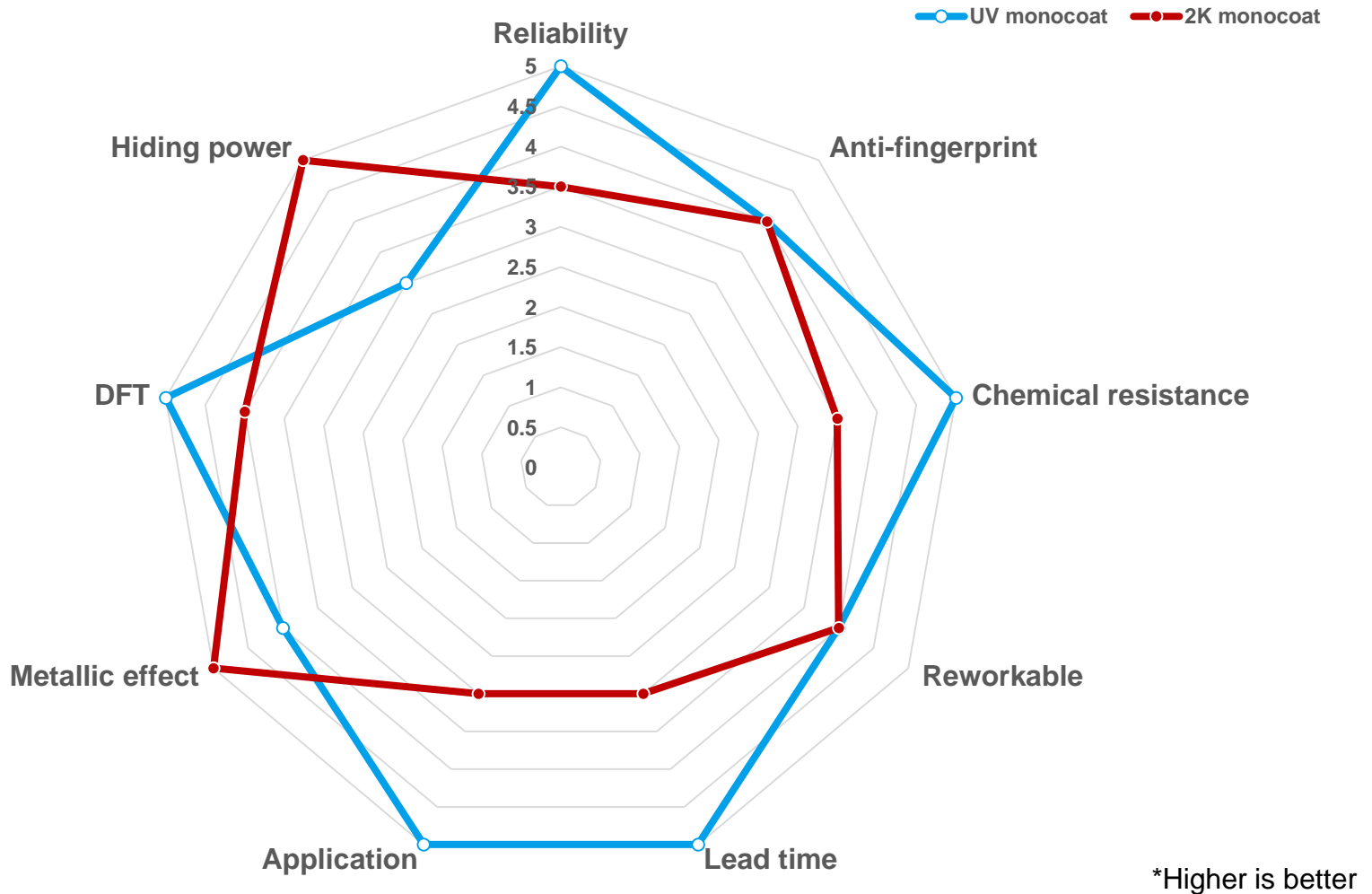
Substrates: Mg/ Al and Metal and Plastic (PC+GF)



## KEY FEATURES

- Shorten cycle time of manufacturing (without overbaking)
- High scratch performance
- Good abrasion test performance
- Better chemical resistance
- No pot life issue
- Low film build

# UV Monocoat vs 2K PU Monocoat





We protect and beautify the world™

**THANK YOU**