Hybrid Mineral Based Matting Aid for Sustainable Powder Coatings Applications

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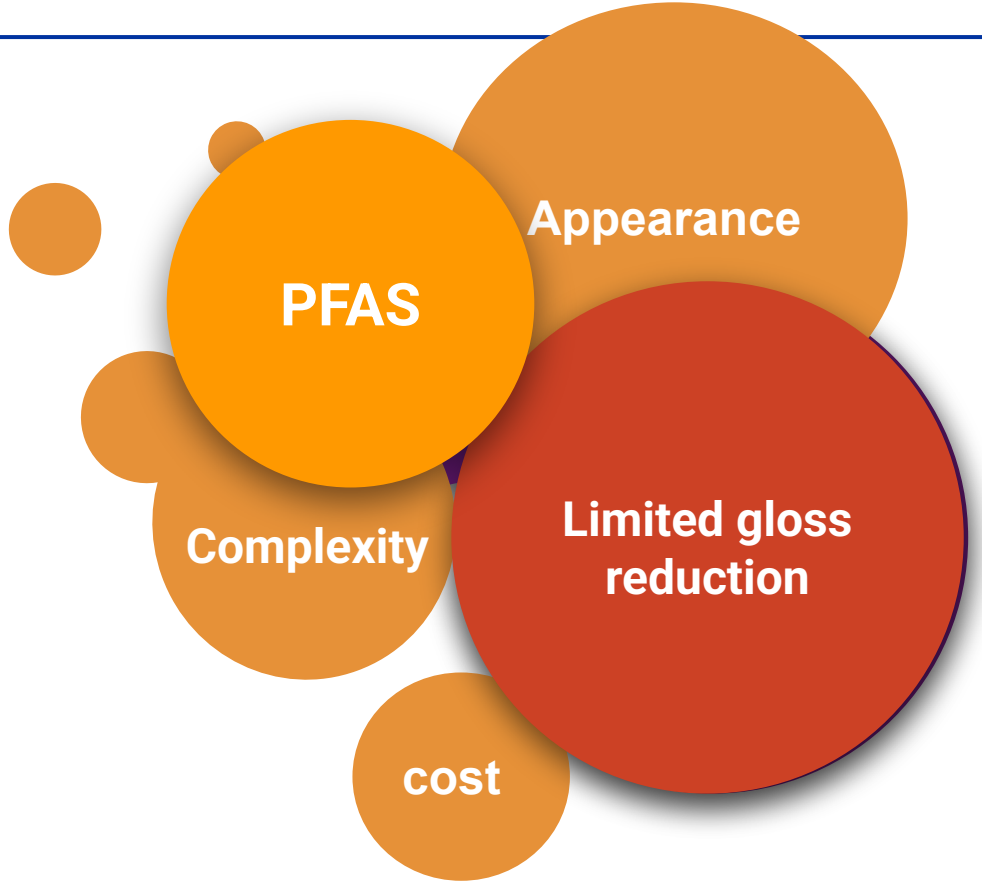
Why a new matting aid is needed

Fillers (CaCO3, Wollastonite)

Waxes

Mix of polymers

Hybrid mineral matting aid



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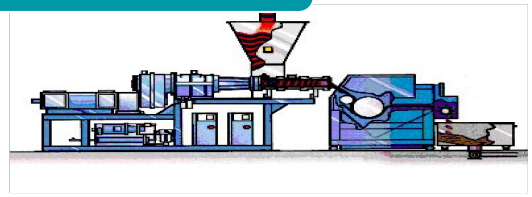
Powder Coating Manufacturing Process

Pigment and Additive weighting

Dry premix

Compounding process



Extrusion, cooling and chipping

Jet Milling/Grinding

Sieving and Classification

Commercial Powder

Post-add process

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Imerys matting solutions

EMP Mineral

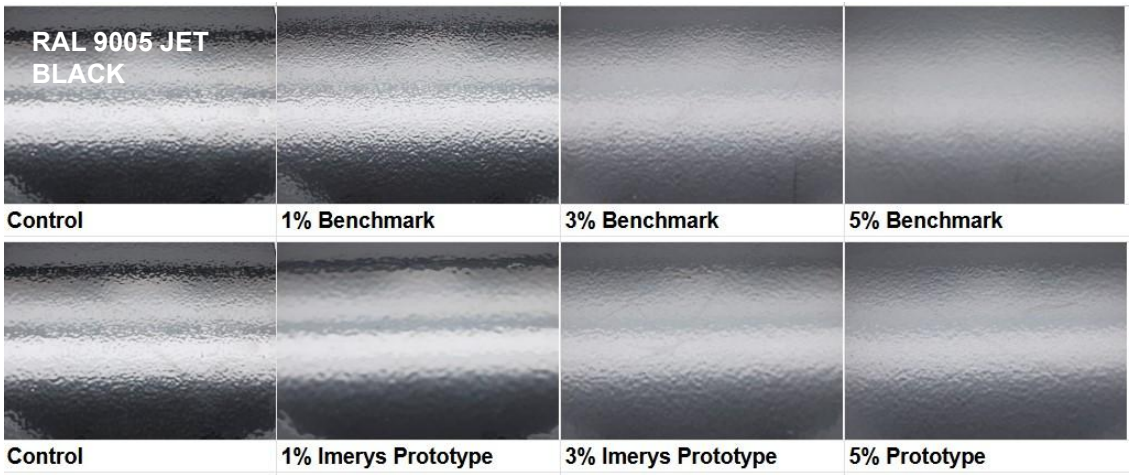
+

Surface engineering

Benchmark

Imerys matting aid

Post-add



Materials type	Morphology	Median Particle size (Laser, u)	Loose Bulk Density (lb/ft3)	Sp. Gravity	Brightness (L*)	Oil absorption (g /100 g)
Modified amorphous alumina silicate	Lameller/3D structure	17.0	5.9	2.3	94	140-160

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Imerys matting solutions

Compounding Process
Standard TGIC

Control Black
60 Gloss: 87

Black w/ 5wt%
Imerys matting aid
60 Gloss: 56

Black w/ 10wt%
Imerys matting aid
60 Gloss: 38

Compounding Process
Polyester/Epoxy Low Cure

Control Black
60 Gloss: 94

Black w/ 5wt%
Imerys matting aid
60 Gloss: 67

Black w/ 10wt%
Imerys matting aid
60 Gloss: 44

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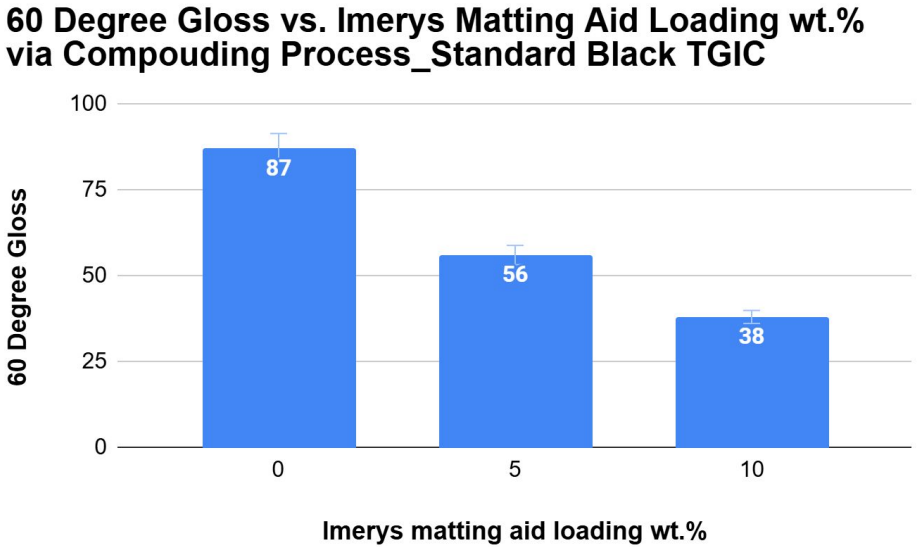
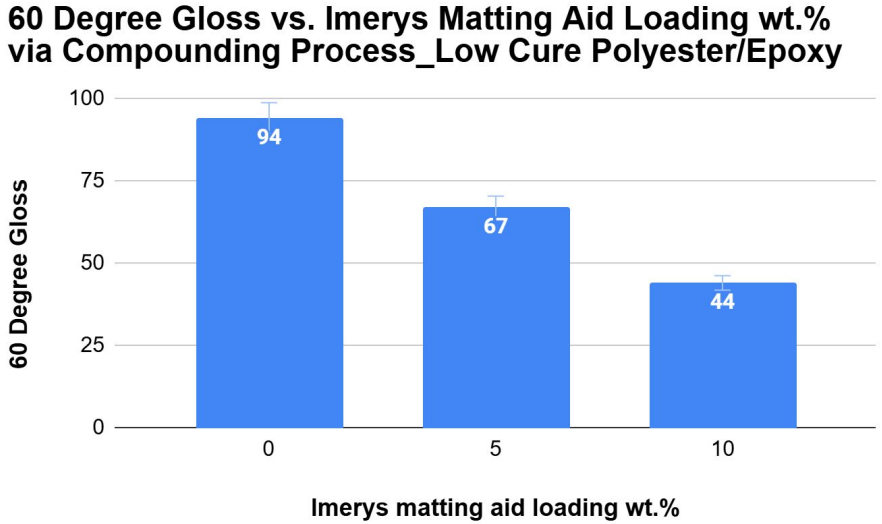
Imerys matting solutions_Compounding process





By incorporating Imerys matting aid into the powder coating formulations via compounding process, 50GU reduction can be achieved by 10 wt% addition.

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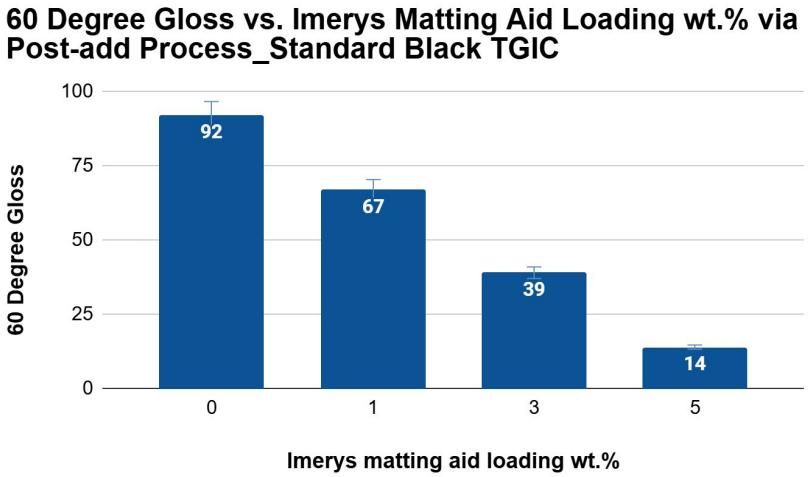
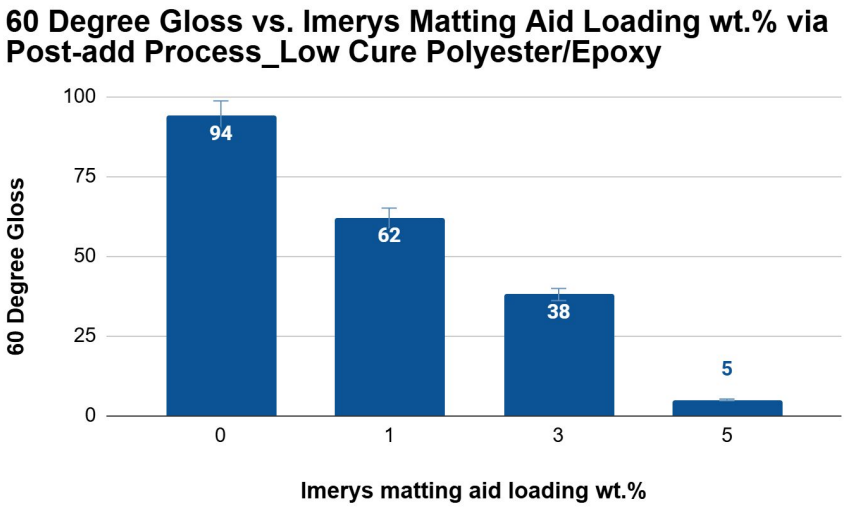
Imerys matting solutions_ Post add process





By incorporating Imerys matting aid into the powder coating formulations via post-add process, >75GU reduction can be achieved by 5 wt% addition.

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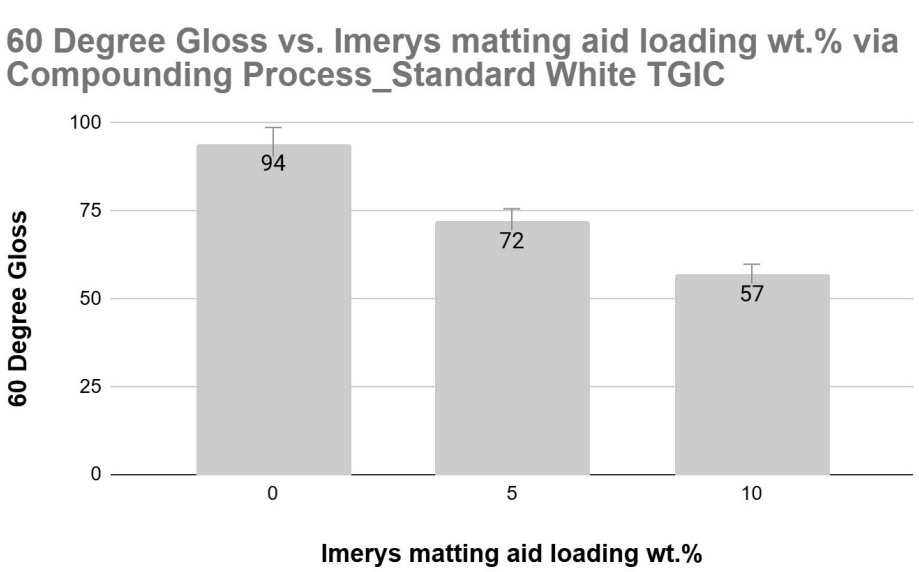
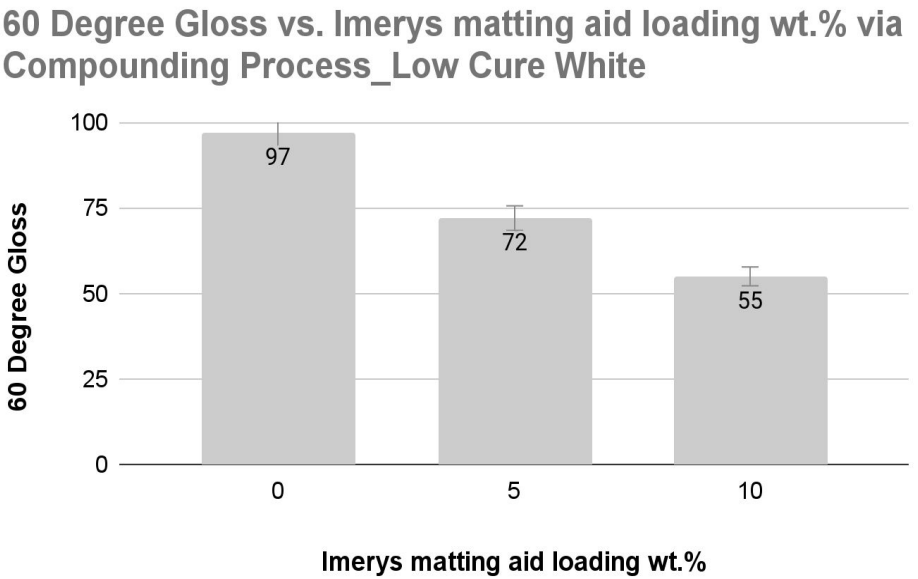
Matting aid performance in white powder coating via compounding process





By incorporating Imerys matting aid into the white powder coating formulations via compounding process, 40GU reduction can be achieved by 10 wt% addition.

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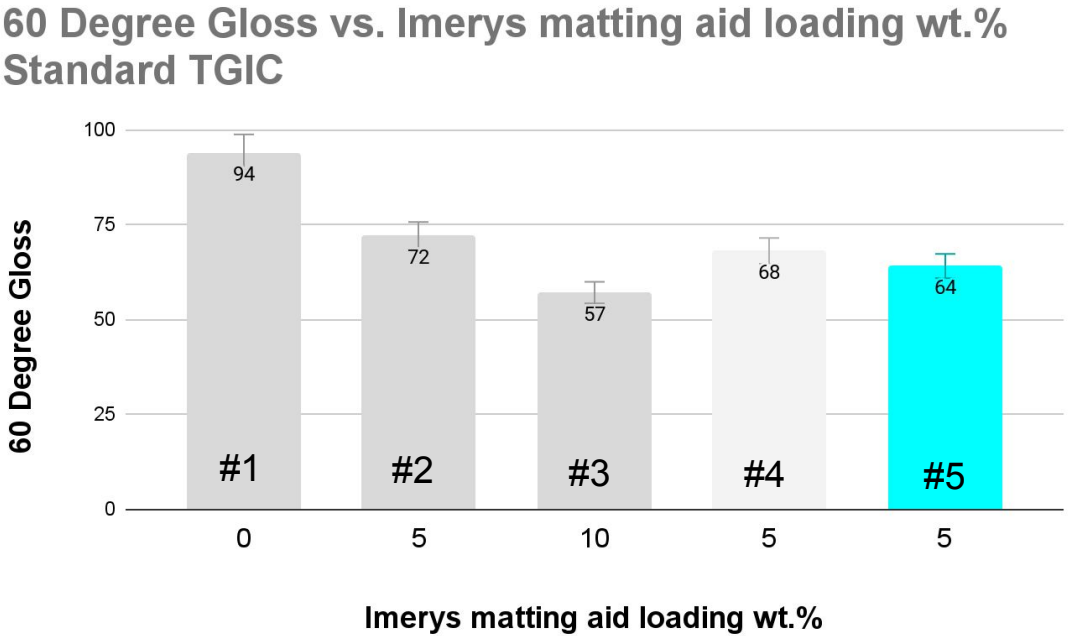
Matting aid performance in white powder coating via compounding process



Potential opportunities:

- **TiO2 replacement**
- **Resin replacement**

Formulations:
#1: Standard TGIC White
#2: 5wt.% Imerys matting aid by partially replacing supermite
#3: 10wt.% Imerys matting aid by partially replacing supermite
#4: 5wt.% Imerys matting aid by partially replacing TiO2
#5: 5wt.% Imerys matting aid by partially replacing polyester resin

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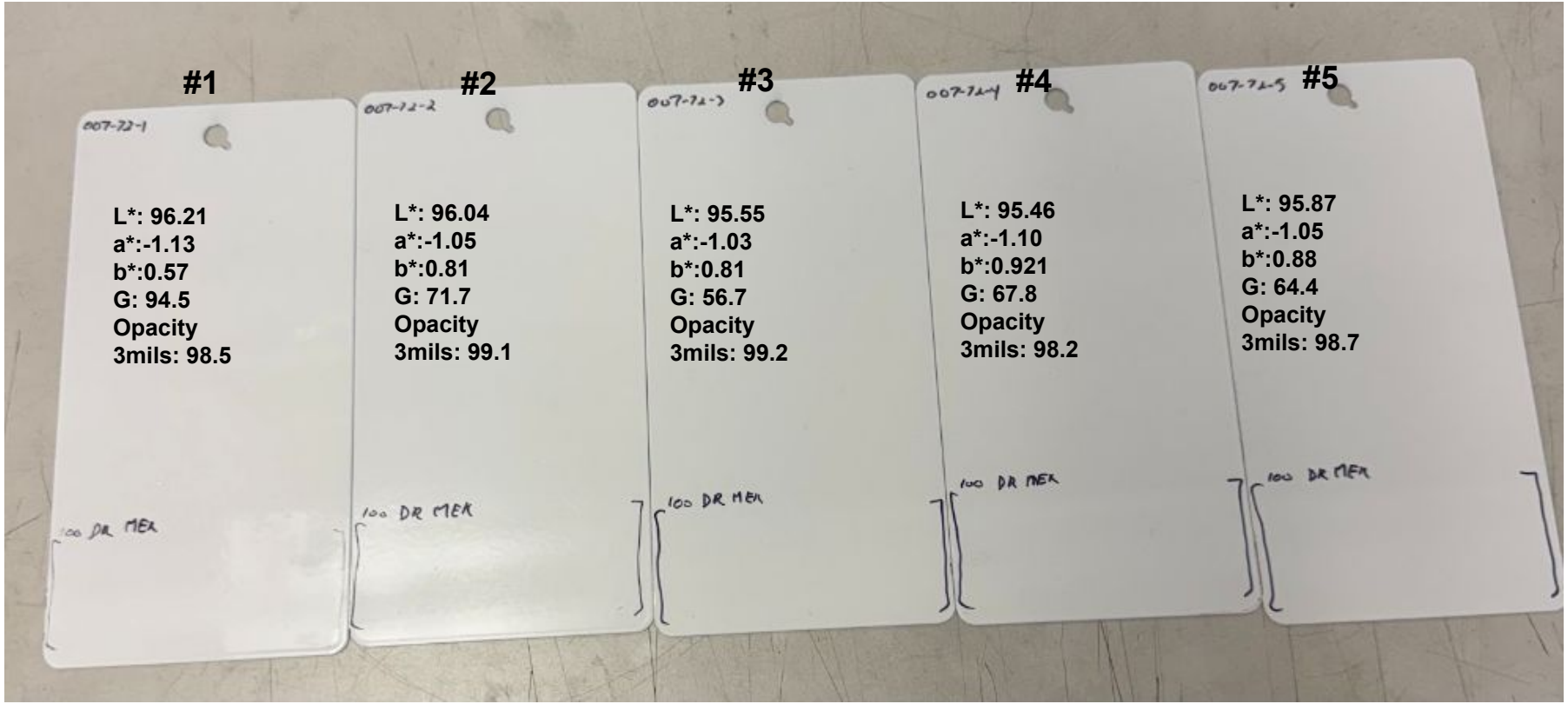
Matting aid performance in white powder coating via compounding process



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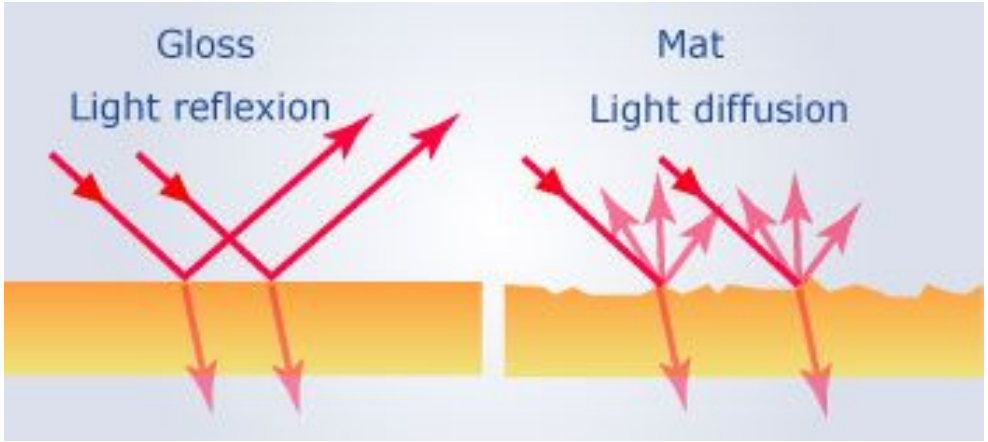
Matting effect



- Matting can be defined as a **physiological-optical phenomenon** produced by the surface of an object
- Surface morphology: **micro roughness**

https://coatings.specialchem.com/coatings-properties/matting

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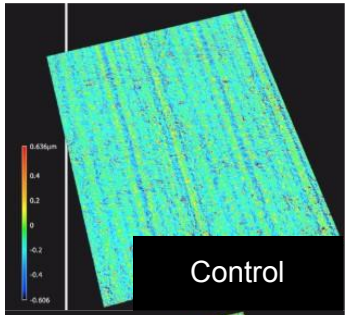
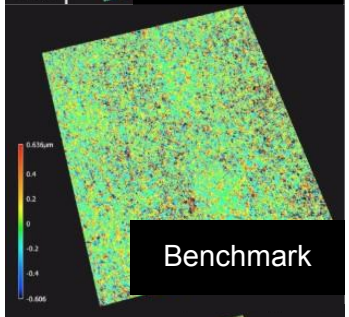
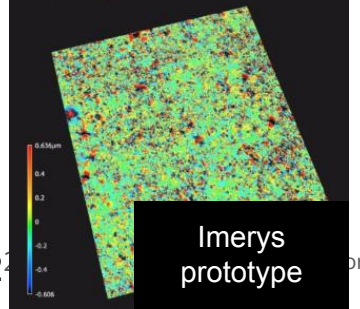
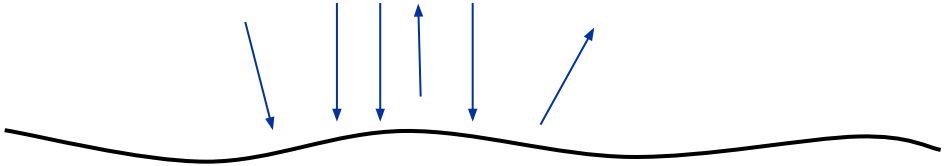
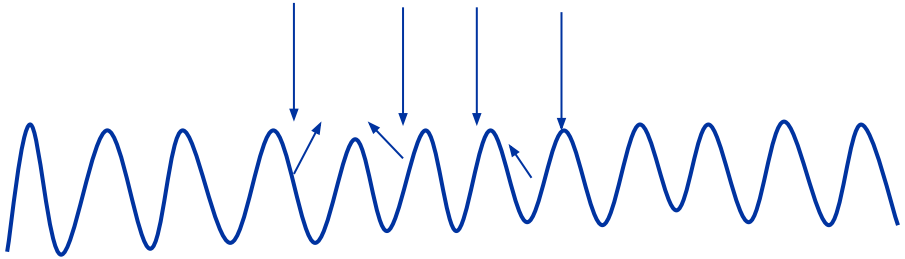
Powder coating surface roughness comparison

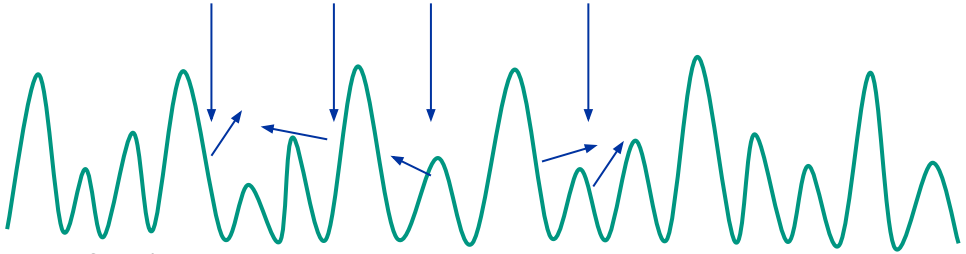




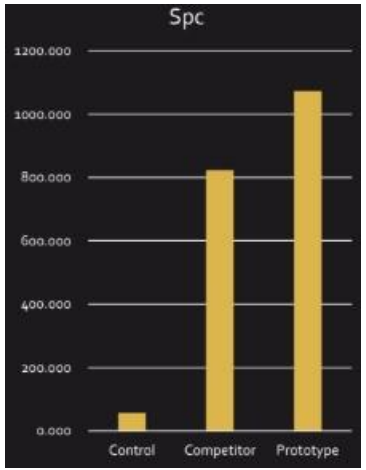








Spc (Arithmetic Mean Peak Curvature)



sharper peaks
and valleys

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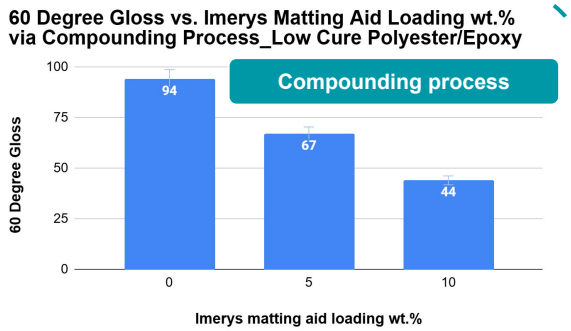
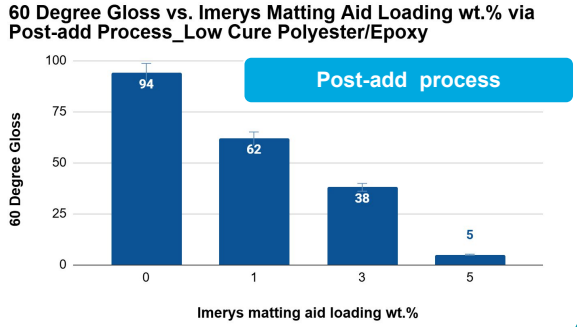
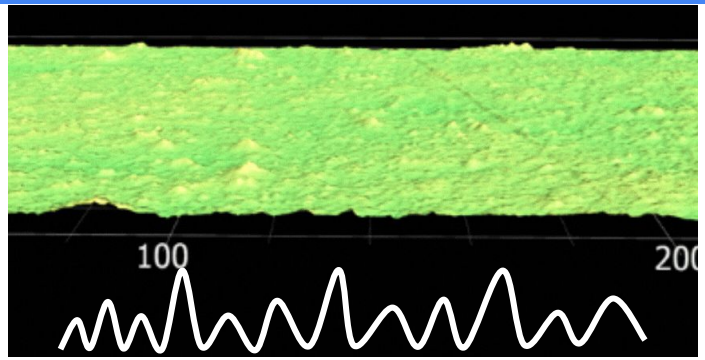
4257 Matting Aid for Thermoset Powder Coatings



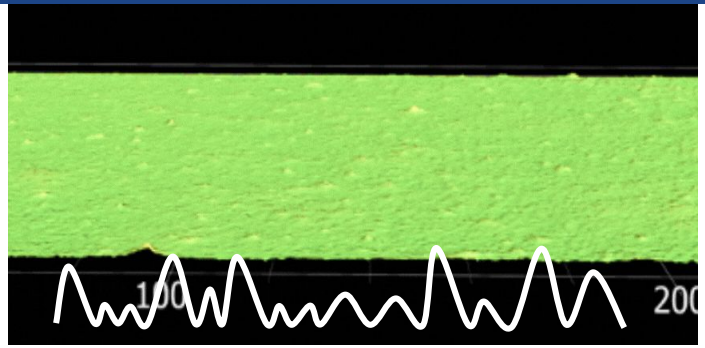
Low Cure



More uniform peak heights with less height variations via compounding process



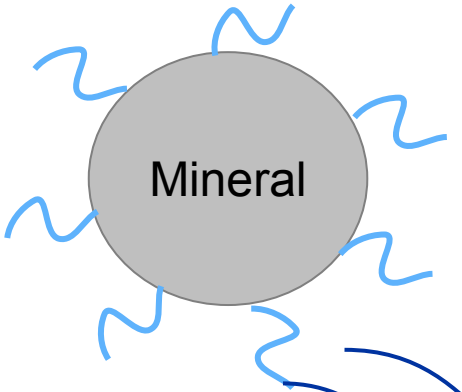
More scatteredly distributed peaks heights with more height variations via post-add process

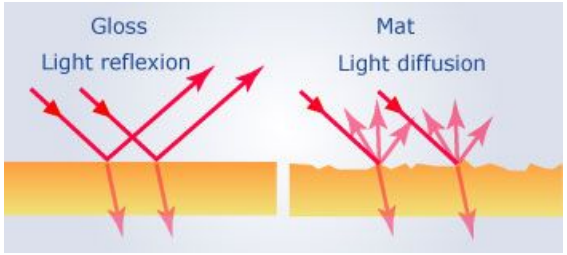


Imerys Hybrid Mineral Matting Aid

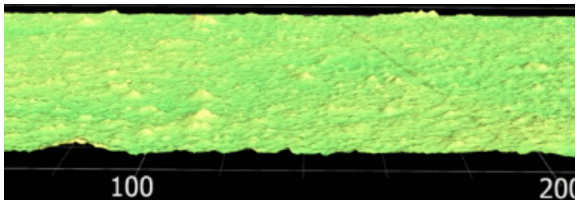
Super hydrophobicity at the surface

Mineral structure in the core

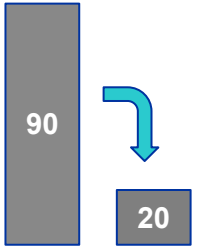




Diverse microscopic surface roughness



60° Gloss



- Low carbon footprint
- Eco friendly chemistry (PFAS free)
- Not sensitive to temperature
- Thermally stable up to 300C
- Water resistance

?

TiO2 reduction
Resin reduction

UV powder, white powder coatings, clear powder coating, etc.

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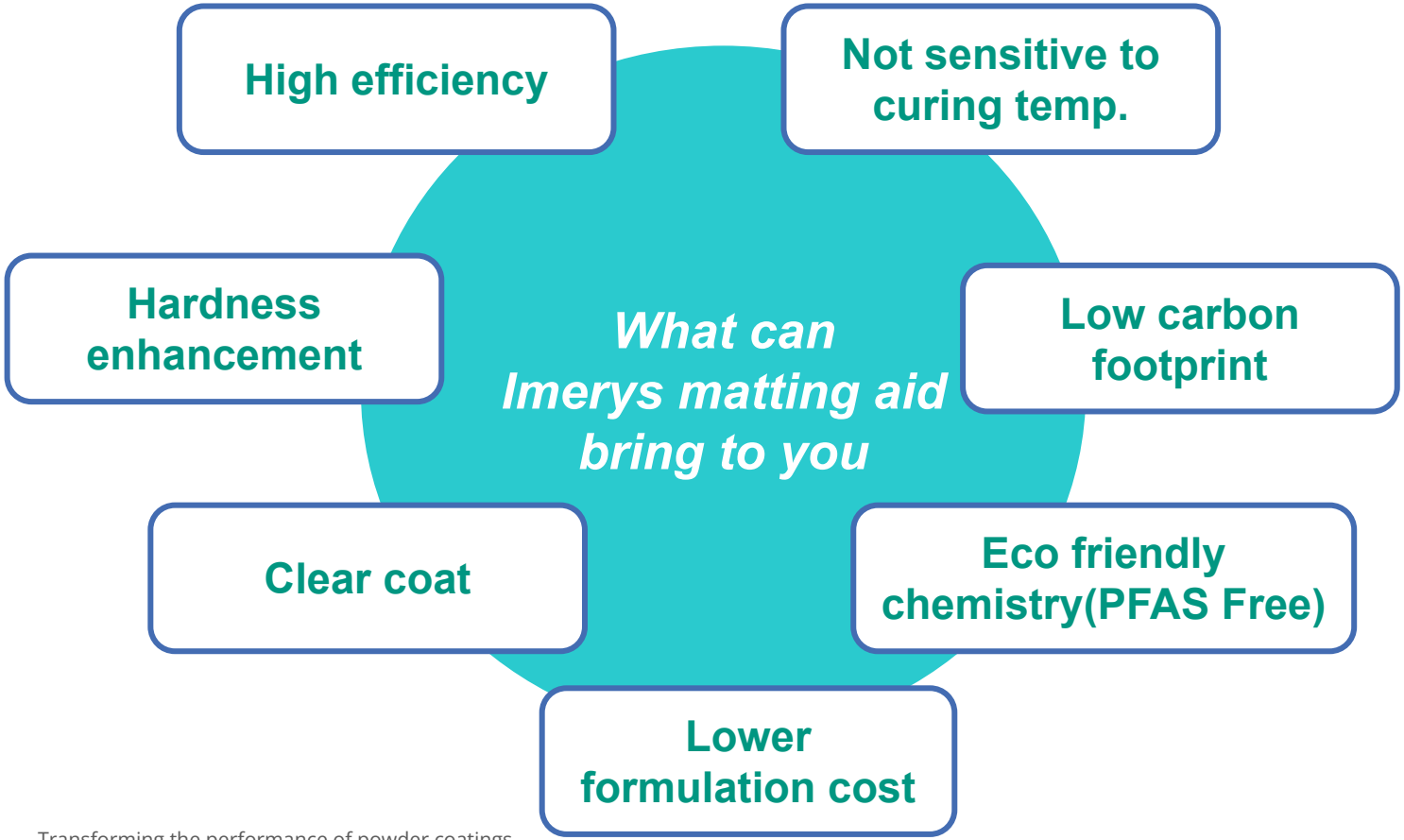
Imerys Matting Aid Advantages



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Powder Coating Formulations

Standard Polyester-TGIC Black

Materials	Weight
Polyester resin	337.13
Crosslinker	25.38
Flow agent	5.00
Degassing agent	2.50
Filler	125.00
Carbon black	5.00
Total weight	500.00
Curing conditions	200C 15 mins

Low Cure Polyester/Epoxy Black

Materials	Weight
Polyester resin	181.25
Epoxy resin	181.25
Flow agent	5.00
Degassing agent	2.50
Filler	125.00
Carbon black	5.00
Total Weight	500.00
Curing conditions	140C 15 mins

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Powder Coating Formulations

Standard Polyester-TGIC White

Materials	Weight
Polyester resin	272.03
Crosslinker	20.48
Flow agent	5.00
Degassing agent	2.50
TiO2	150.00
Supermite	50.00
Total weight	500.00
Curing conditions	200C 15 mins

Low Cure Polyester/Epoxy White

Materials	Weight
Polyester resin	146.25
Epoxy resin	146.25
Flow agent	5.00
Degassing agent	2.50
TiO2	150.00
Supermite	50.00
Total Weight	500.00
Curing conditions	160C 20 mins

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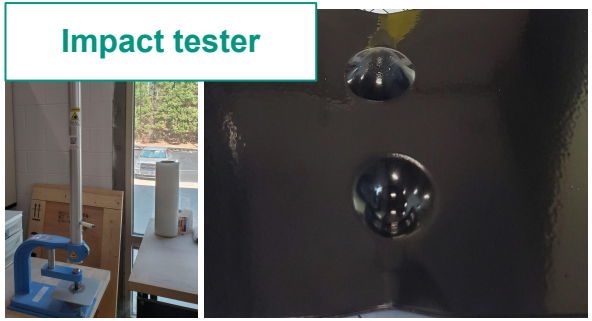
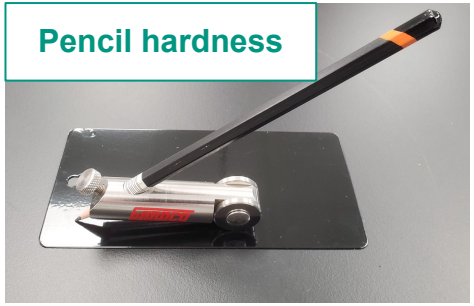
Performance Characterizations

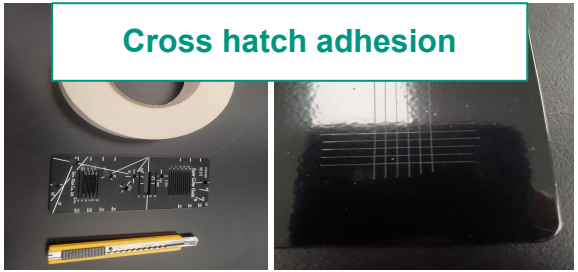
BYK gloss meter

Impact tester



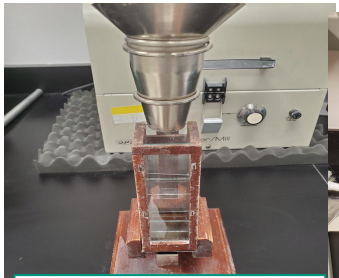


Pencil hardness

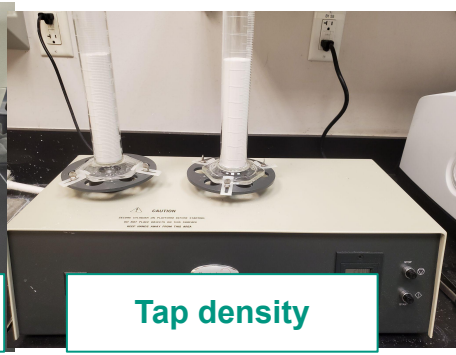


Cross hatch adhesion

Melt flow



Bulk density



Tap density

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