FP PIGMENTS

Optimising TiO_2 in Coatings systems

and

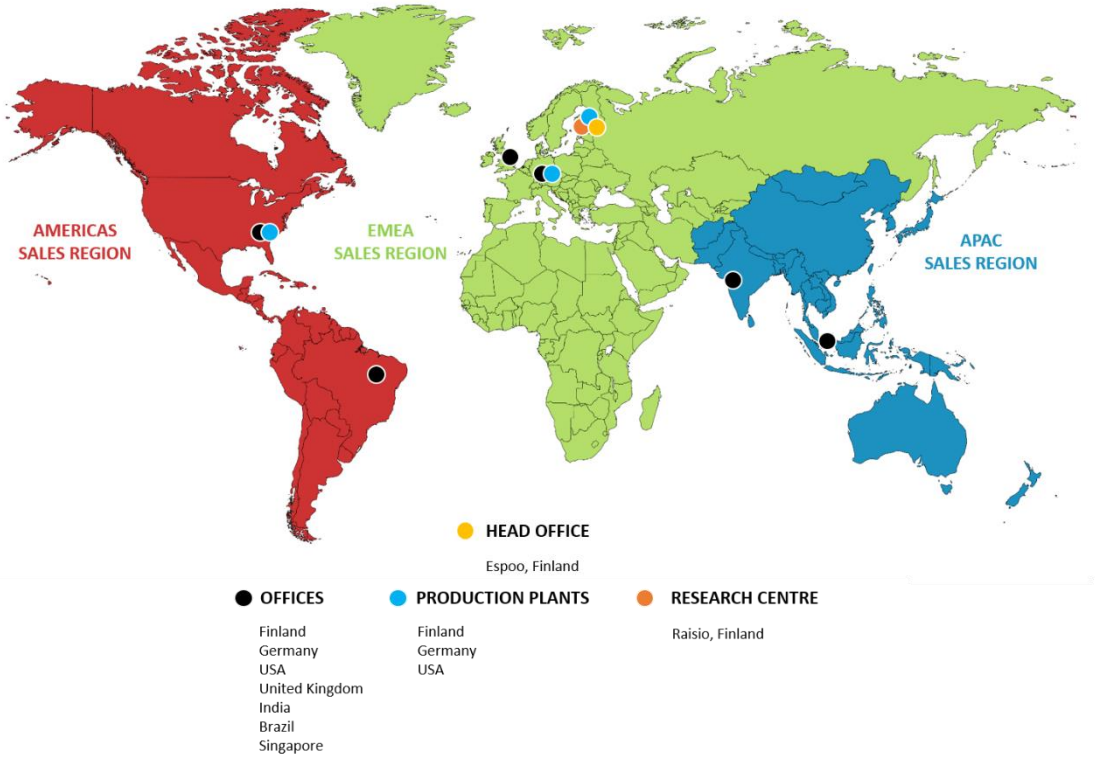
Introducing FP-440

The Next Generation in
FP-Opacity Pigments™ Technology

FP-Pigments

FP-Pigments are a global manufacturer of opacity pigments and speciality minerals for the coatings, plastics, paper and printing ink markets.

Our innovative, patented products enable the coatings producer to make significant raw material savings while maintaining or improving coating properties.



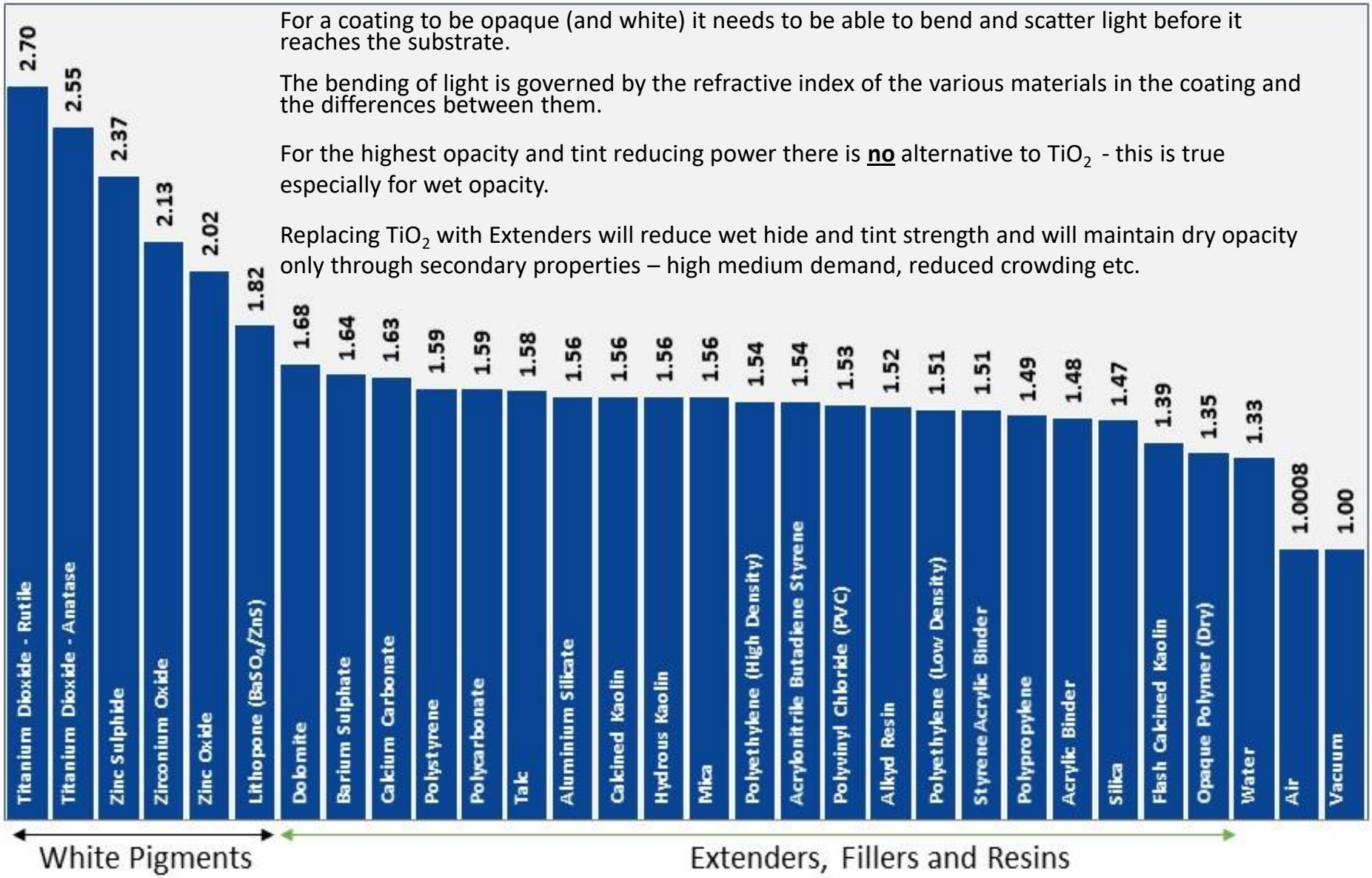
Importance of Refractive Index

For a coating to be opaque (and white) it needs to be able to bend and scatter light before it reaches the substrate.

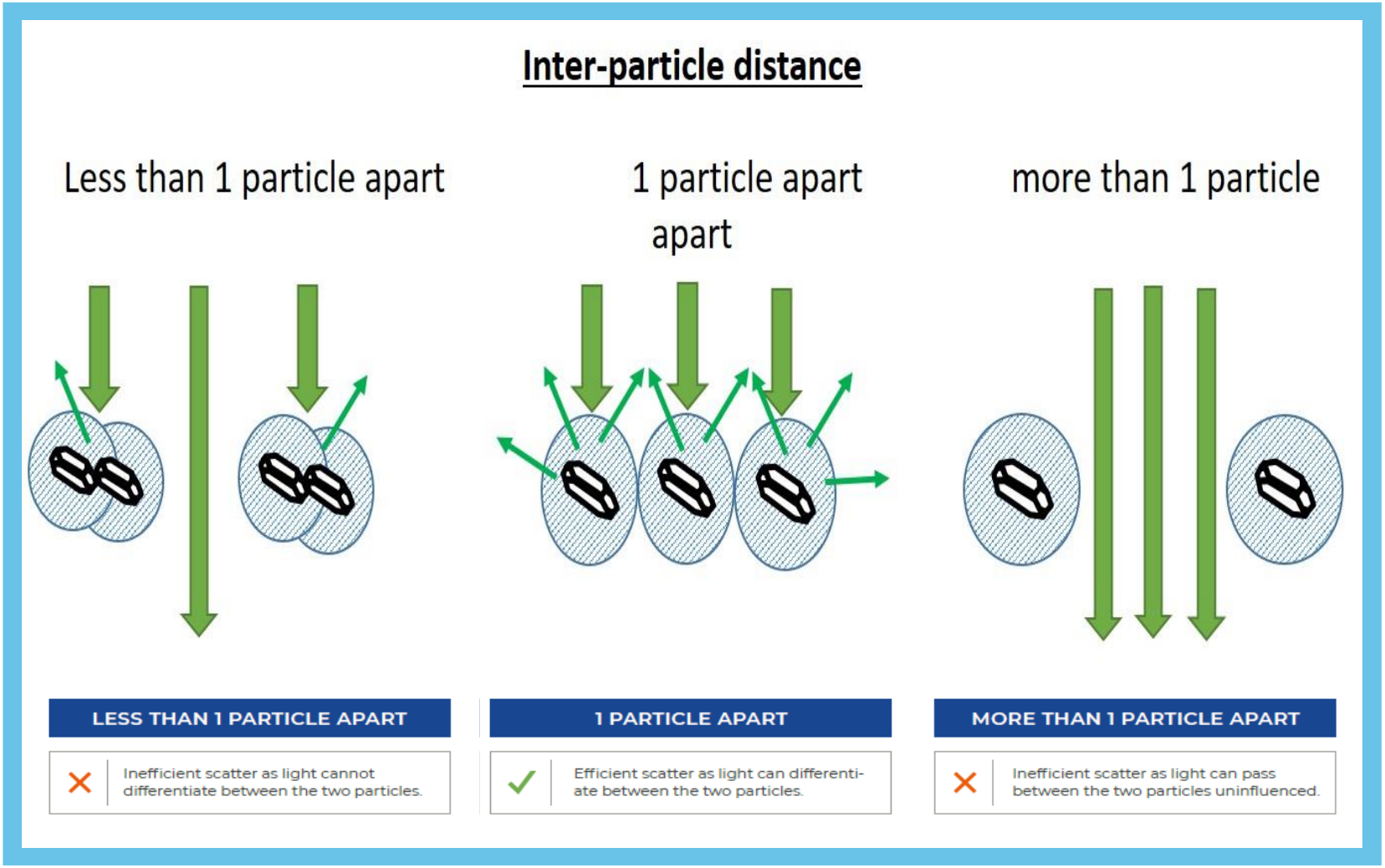
The bending of light is governed by the refractive index of the various materials in the coating and the differences between them.

For the highest opacity and tint reducing power there is **no** alternative to TiO_2 - this is true especially for wet opacity.

Replacing TiO_2 with Extenders will reduce wet hide and tint strength and will maintain dry opacity only through secondary properties – high medium demand, reduced crowding etc.

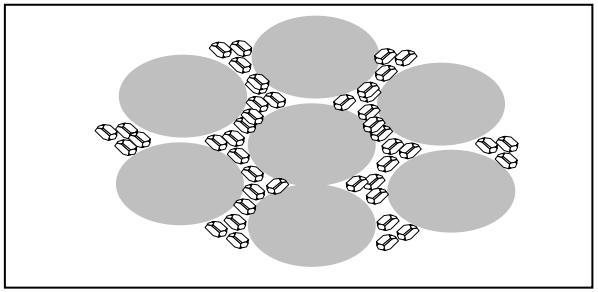


Importance of “Spacing” TiO_2



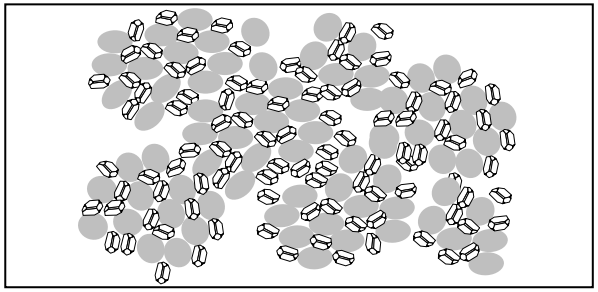
TiO_2 Crowding in matt paint films

Cheap, coarse fillers



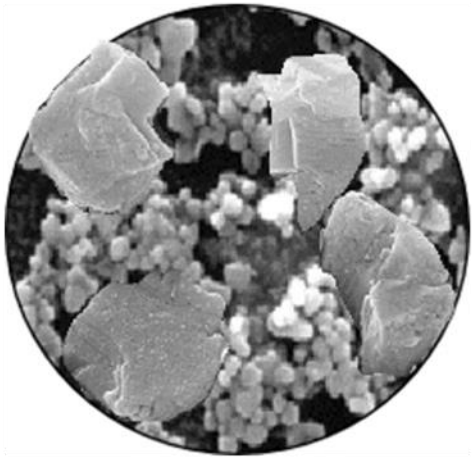
5µm Extender

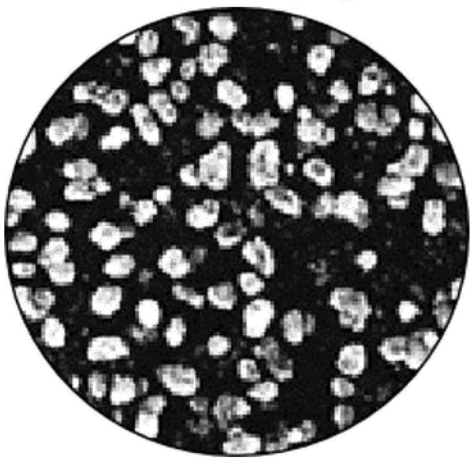
More Expensive, fine extenders



0.8µm Extender

Pigment crowding reduces as Extender particle size decreases

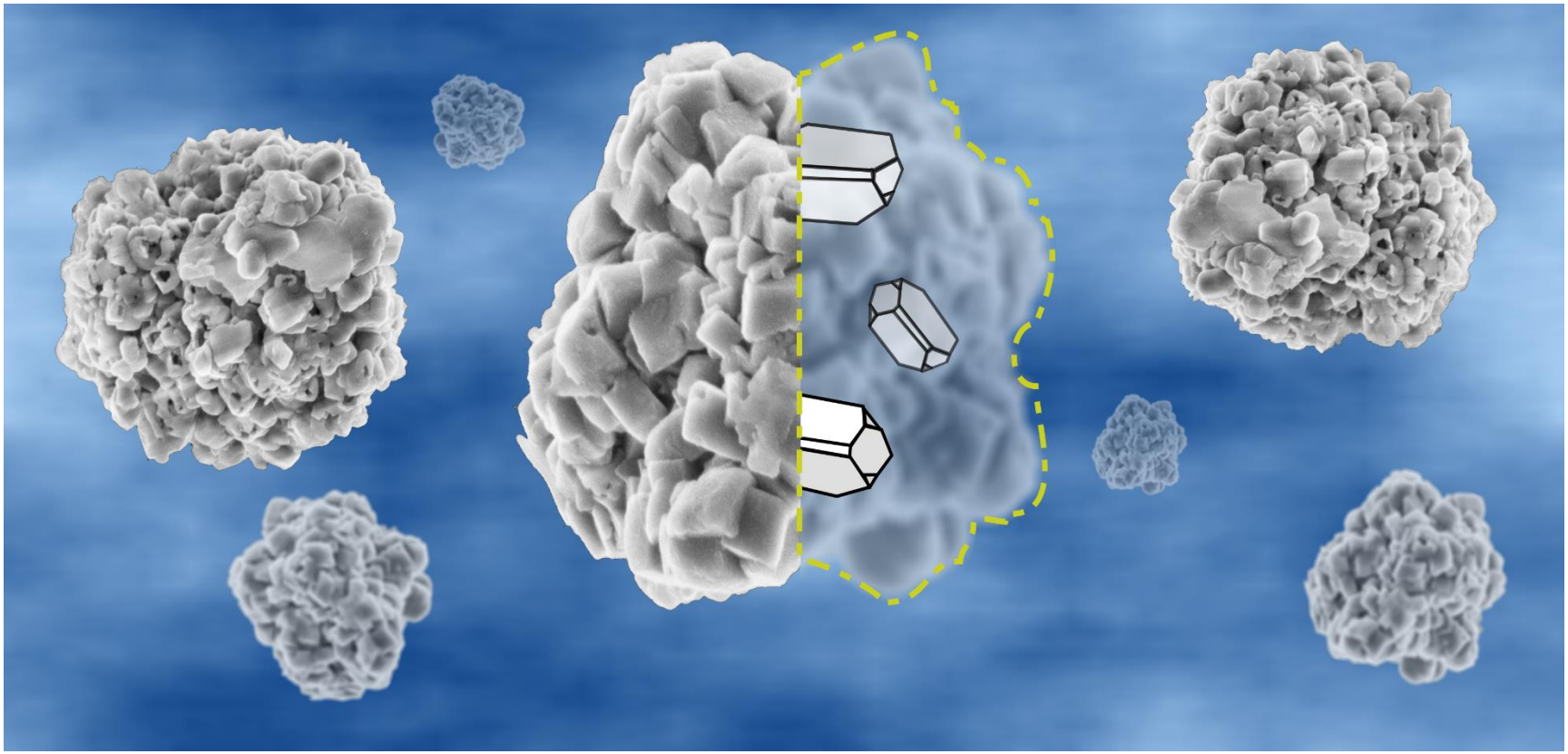




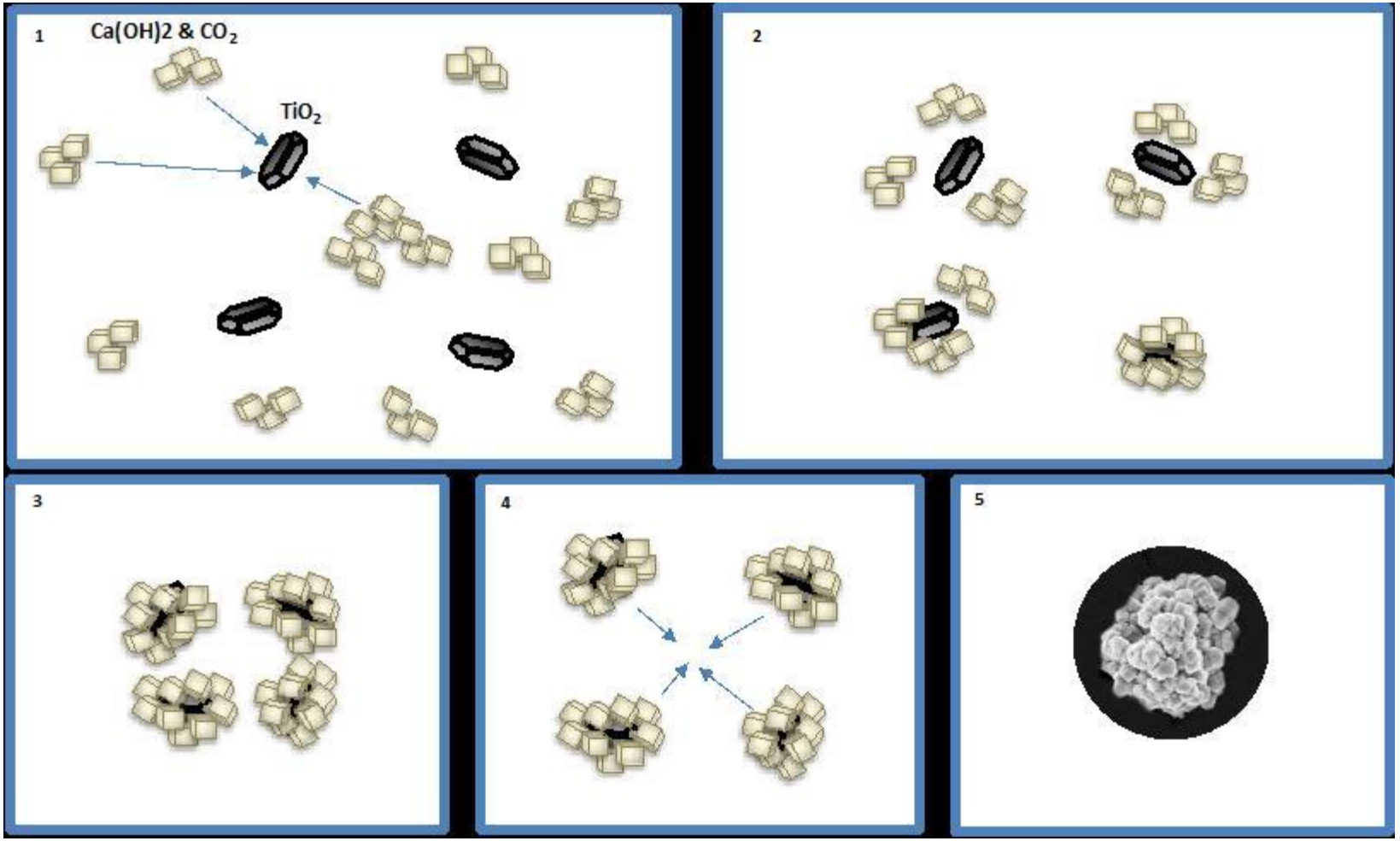
Product Concept

FP-Pigments produce composite pigmentary products for the paints, plastics, inks and paper industries

- These composite pigments are designed to provide significant improvements in the optical properties of coatings whilst maintaining other coating requirements

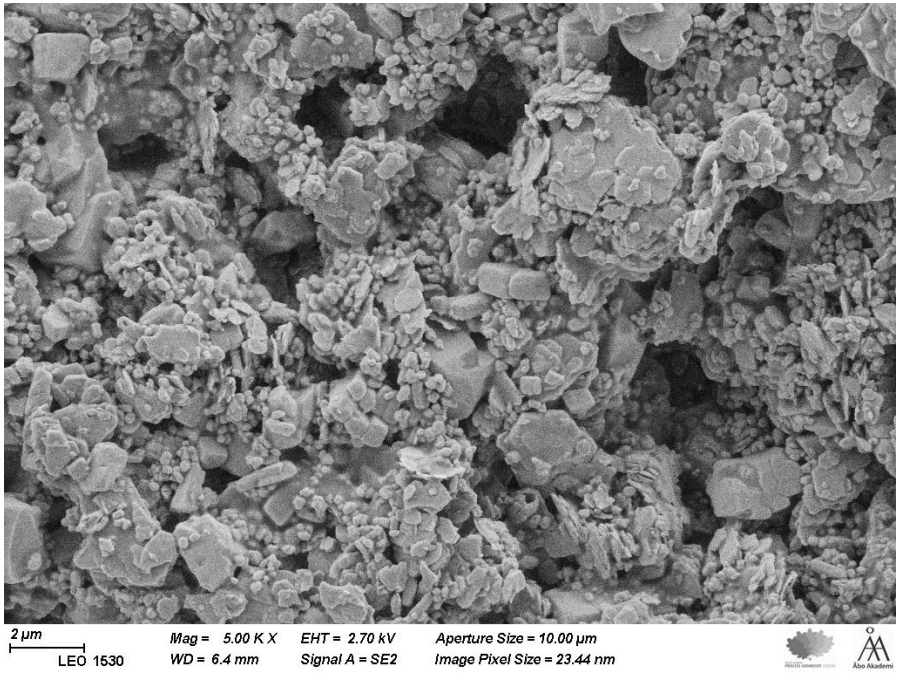


FP-Opacity Pigment™ Design

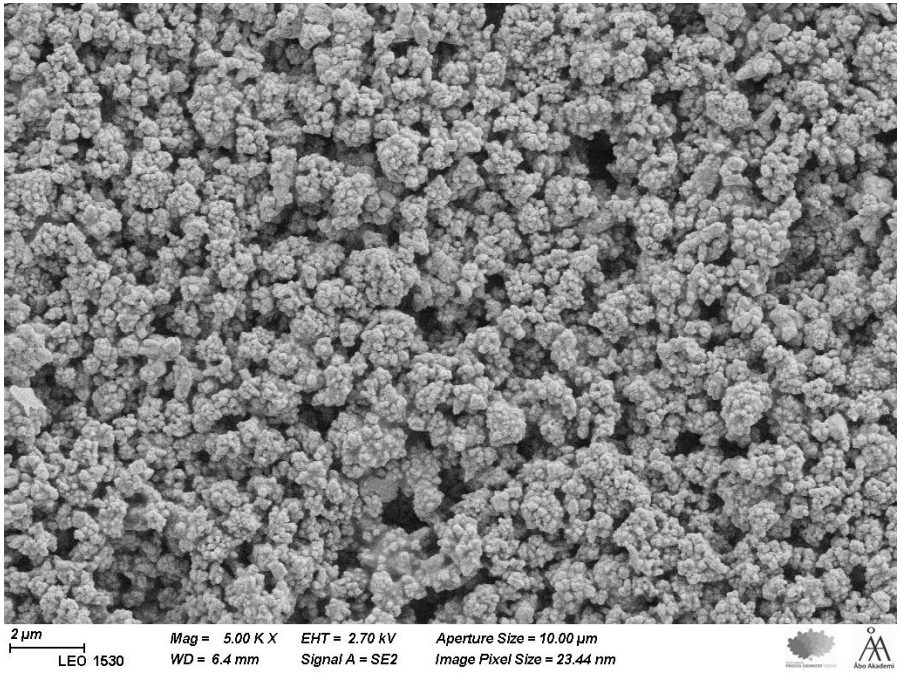


The video of the process can be found at
https://www.fp-pigments.com/wp-content/uploads/Animation-6.mp4

SEM Images of Standard and Model Paints



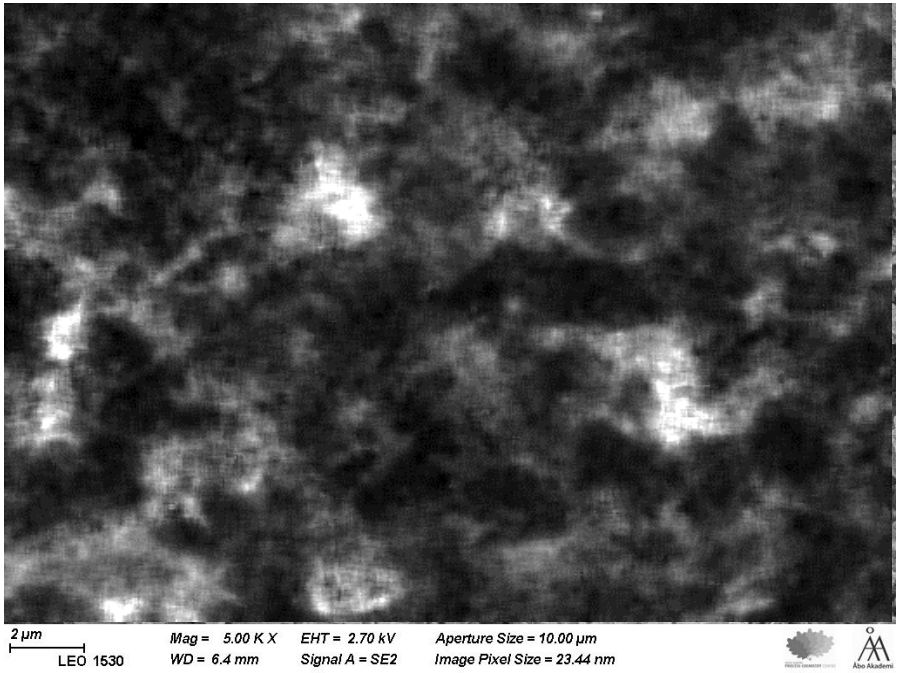
High Quality Matt Paint
75% PVC, 10% TiO_2 vc 65% Extender vc: Chalk and Calcined Clay



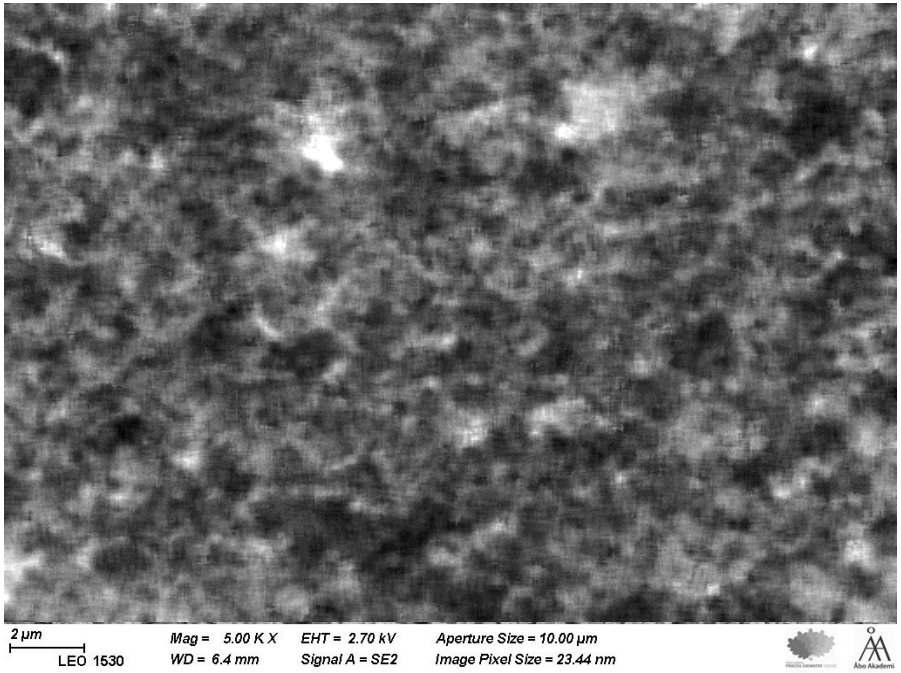
FP-Opacity Pigment™ Model Paint
75% PVC, 10% TiO_2 vc, 65% Extender vc: PCC from FP-Opacity Pigment™ Composite

	Standard	FP-Opacity Pigment™
Contrast Ratio @15m^2/l	96.7	98.2
Spreading Rate @ CR=98%	11.4	15.9
Scatter	144	234
Scatter per unit TiO_2	17	26

TiO_2 Distribution Analysis



High Quality Matt Paint
Elemental Mapping (Ti Analysis)



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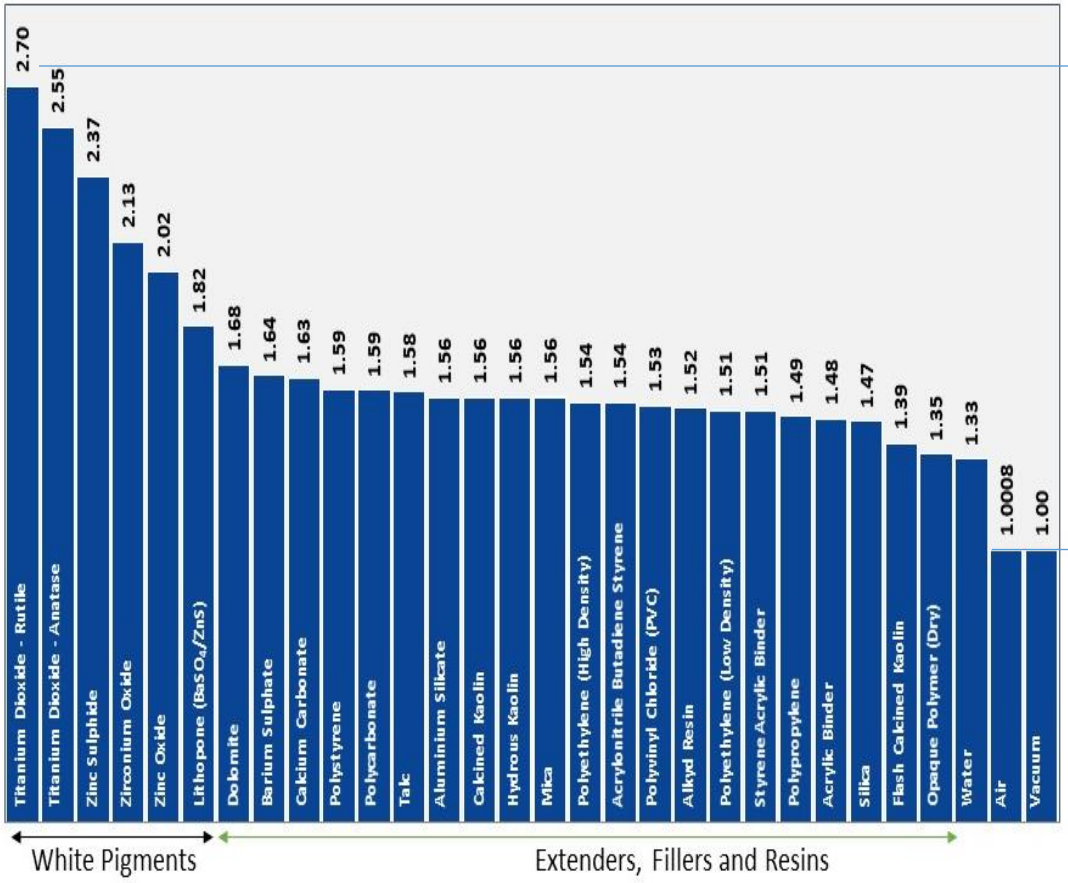
FP-Pigments – New Development FP-440



It is well understood that the difference in refractive index is a major influence on light scatter.

High PVC Paints rely on it.

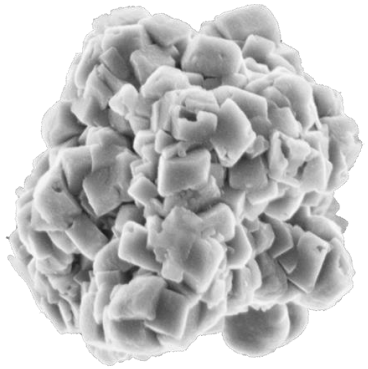
The optimum difference that can realistically be achieved is between Rutile TiO_2 and Air.

FP-Pigments R&D looked to combine our proprietary and original particle spacing technology with the management of air inclusions inside our stable manufactured FP-Pigments particle.

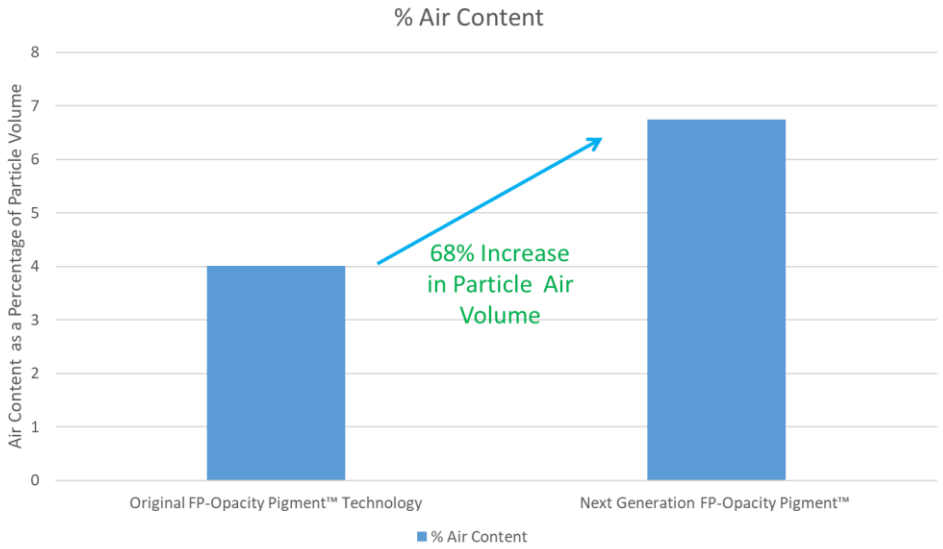
A new product was thus launched in 2020.

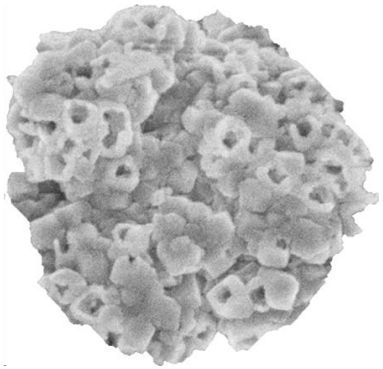
FP-Pigments FP-440

In 2020, FP-Pigments introduced some new process changes which have enabled us to make particles with an improved uniform size and which contained additional entrapped air alongside the optimally spaced TiO_2. Together, these improvements have further enhanced the scatter per unit TiO_2 employed.



Original
Opacity Pigment™

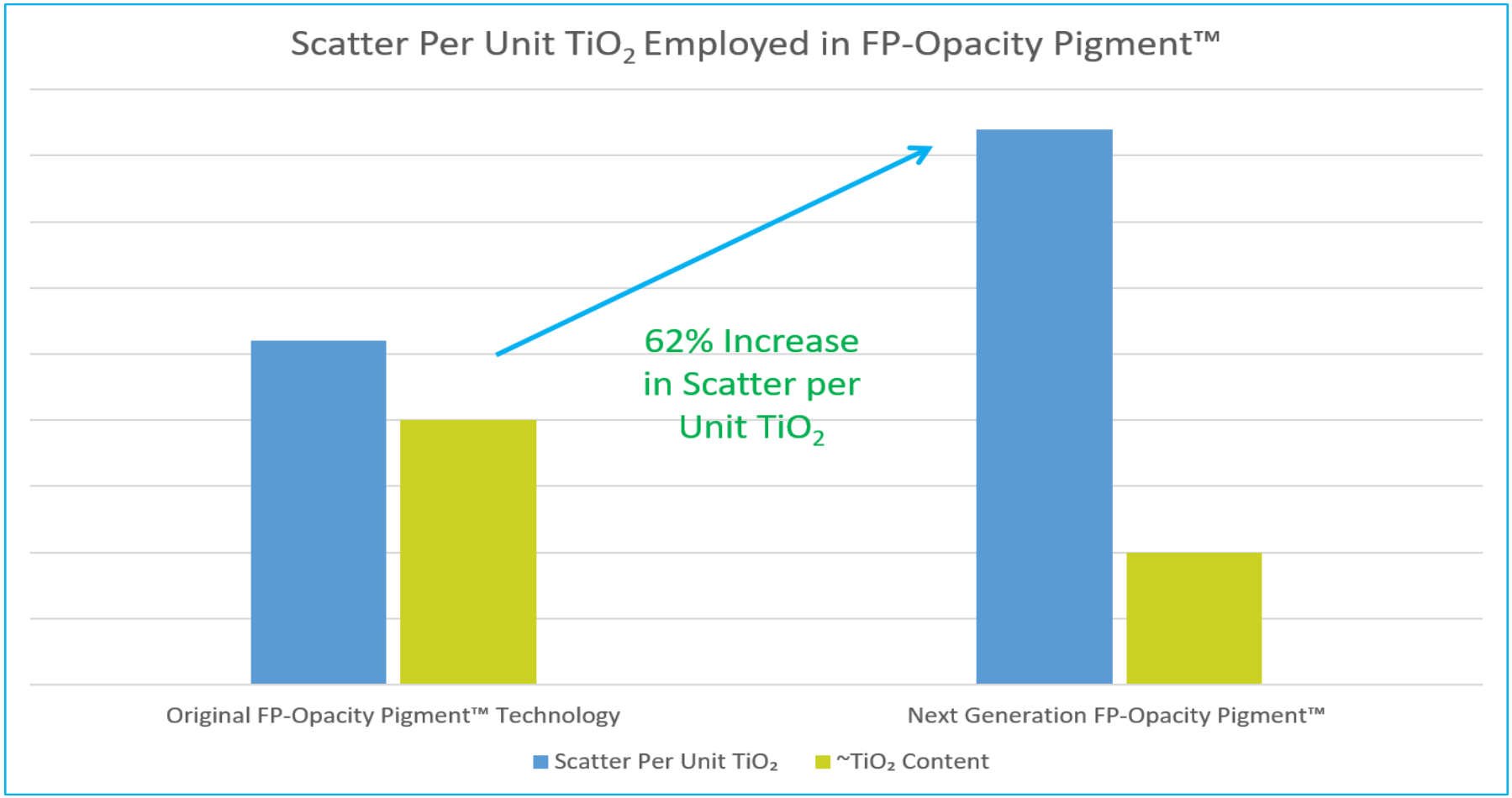




Next Generation
Opacity Pigment™

FP-440 is one of the first products of this next generation family of FP-Opacity Pigments™- specifically designed to enhance the amount of air and the air/TiO_2 ratio in the particle to produce the optimum light scatter for the minimum TiO_2 used.

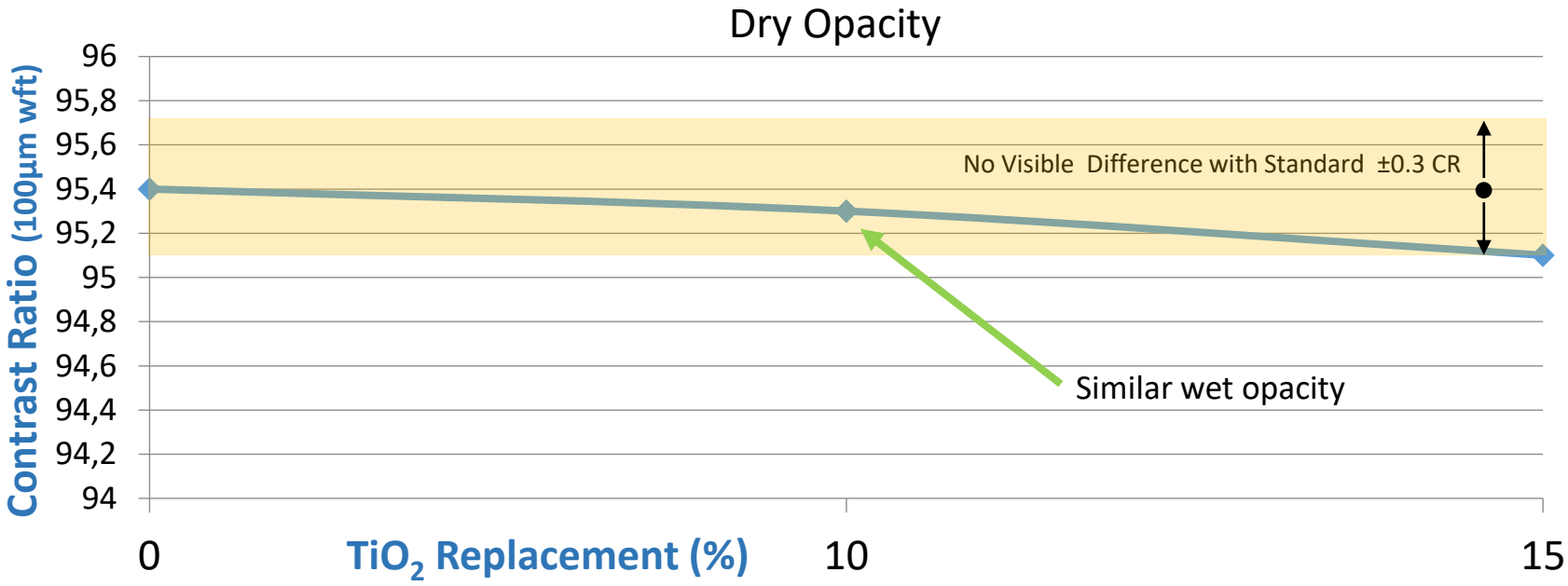
Effect of incorporated air on Scatter



FP-440 is thus designed to give the same level of performance as FP-460 in High PVC Paints, Powder Coatings and certain plastics applications. All at a lower TiO_2 level and hence lower cost

European High Quality Interior Matt

PVC	TiO_2 wt%	Extenders used
68%	10%	GCC, Calcined Clay

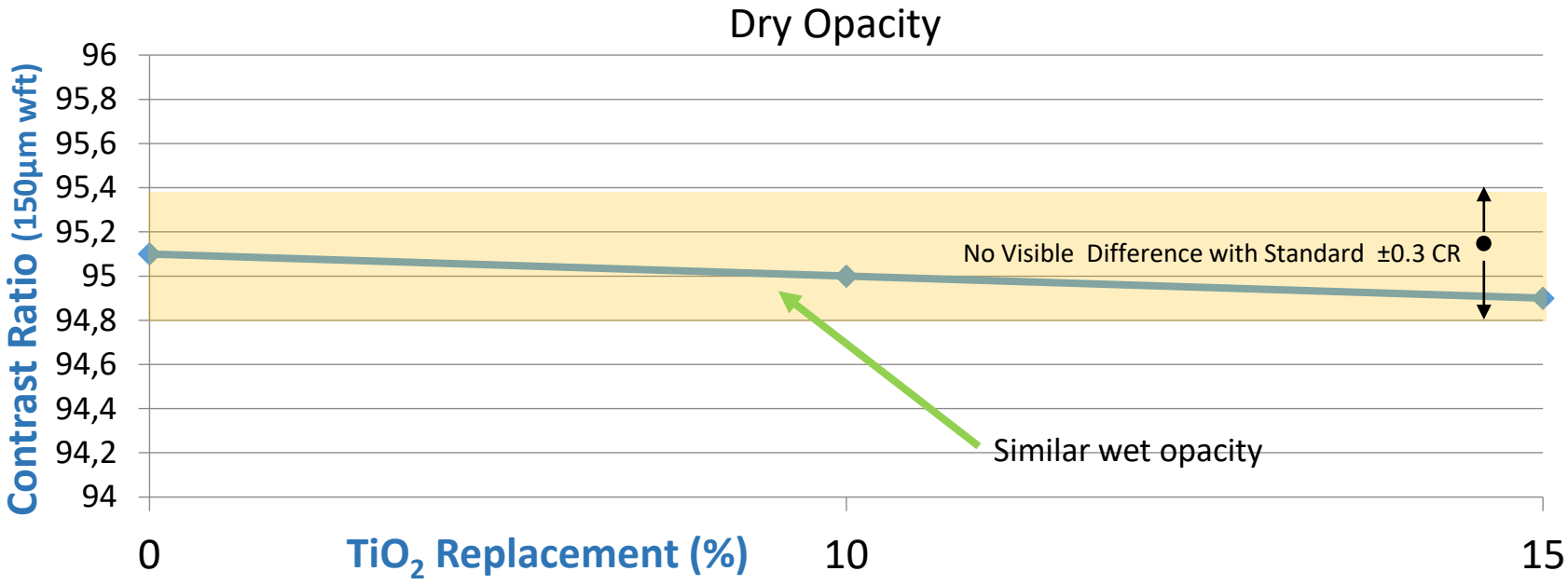


10%-15% replacement of TiO_2 gives similar dry opacity at an estimated cost saving of ~0.02-0.03 Euro/L

	CR $10\%_R$	CR $15\%_R$	WH $10\%_R$	WH $15\%_R$
Std	95.4	95.4	47.4	47.4
FP-440	95.3	95.1	47.1	46.9

Typical DIY Matt Product

PVC	TiO_2 wt%	Extenders used
79.6%	5	GCC, Calcined Clay, Kaolin

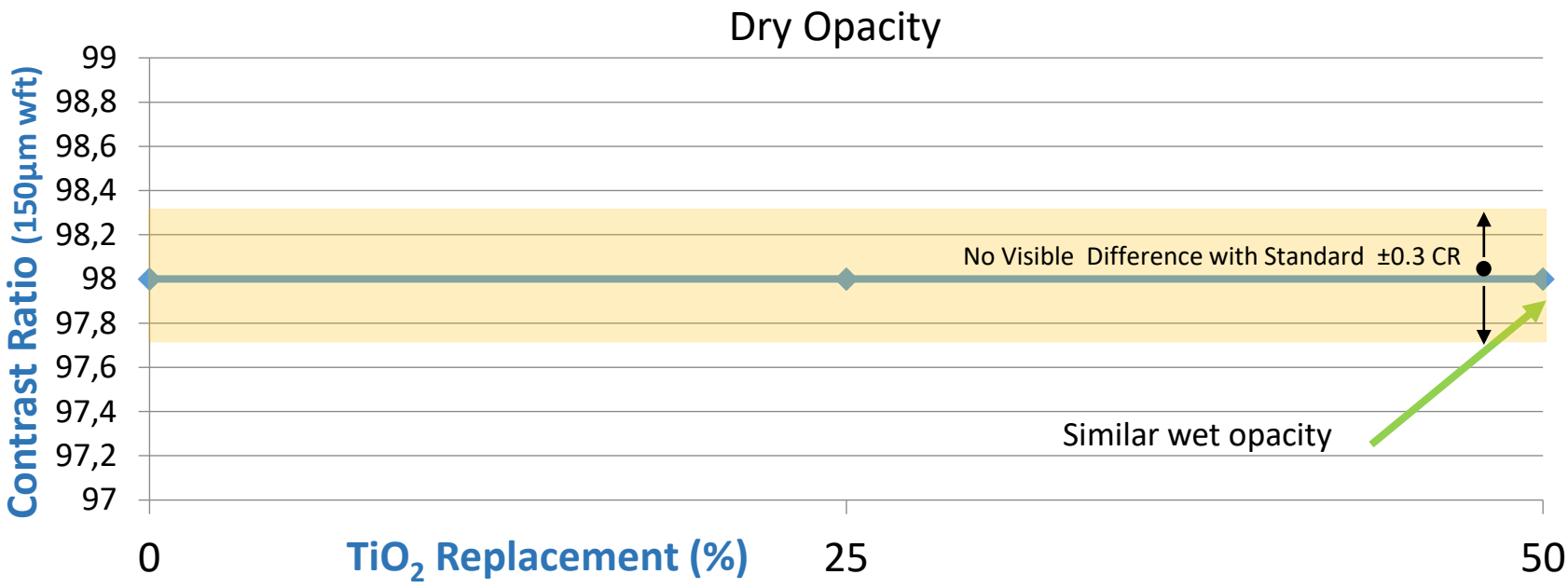


10% and 15% replacement of TiO_2 gives similar dry opacity an estimated cost saving of 0.01-0.02 Euro/L

	CR $10\%_R$	CR $15\%_R$	WH $10\%_R$	WH $15\%_R$
Std	95.1	95.1	46.4	46.4
FP-440	95.0	94.9	46.0	45.9

Distemper/Economy Paint

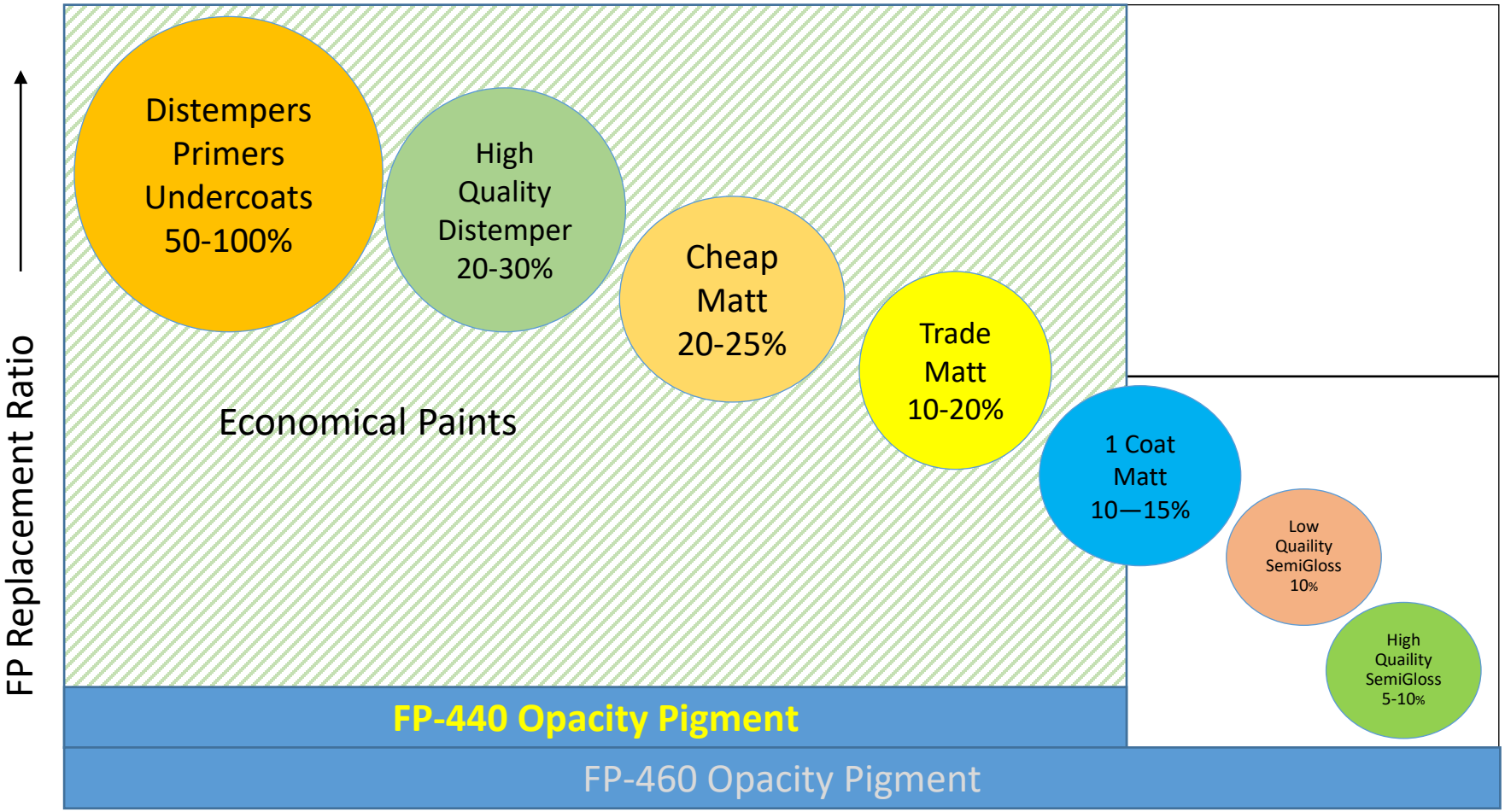
PVC	TiO_2 wt%	Extenders used
92.9%	0.5	GCC, Calcined Clay, Kaolin, Talc



25% and 50% replacement of TiO_2 gives similar dry opacity an estimated cost saving of 0.06-0.07 Euro/L

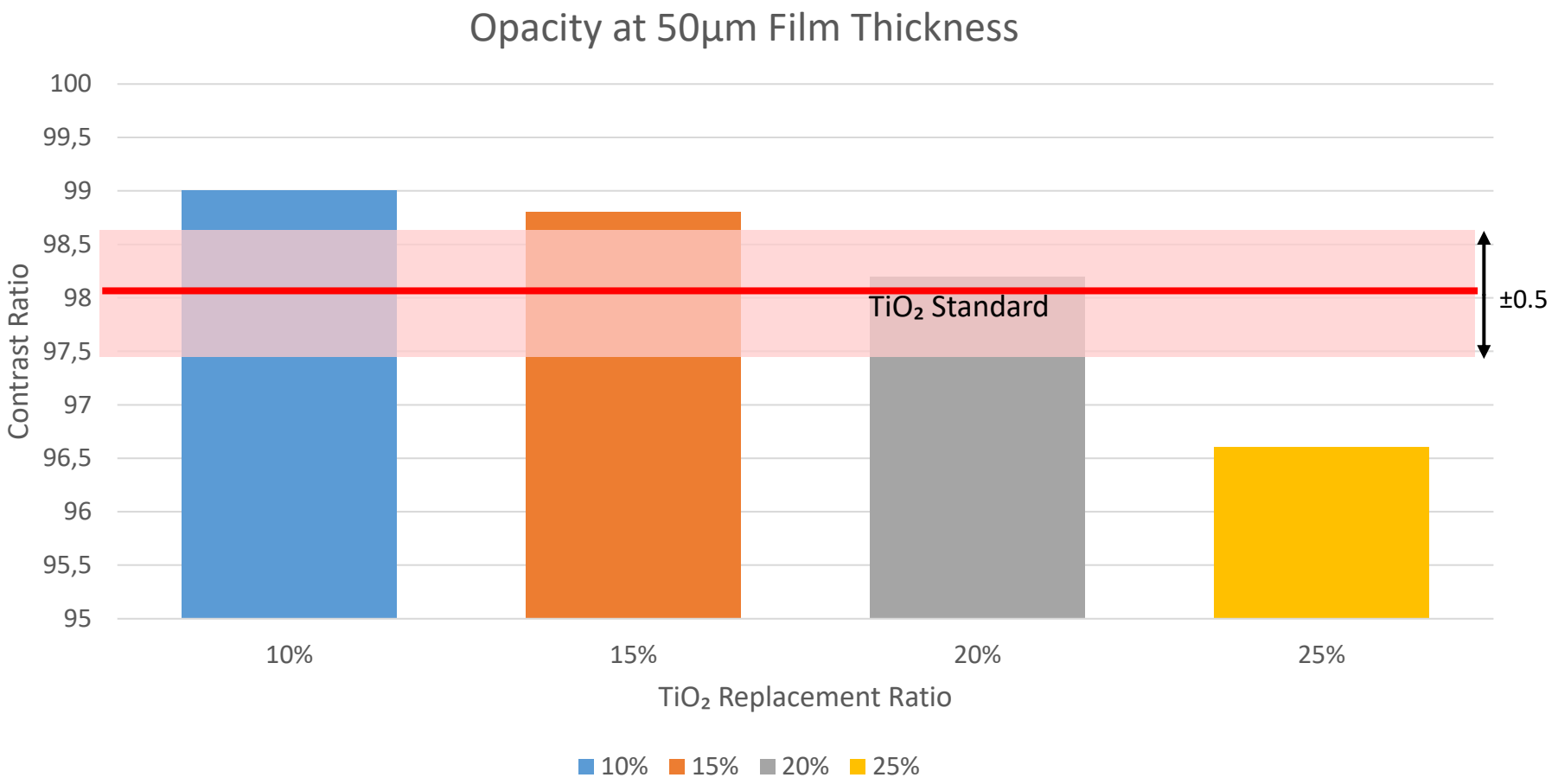
	CR 25%$_R$	CR 50%$_R$	WH 25%$_R$	WH 50%$_R$
Std	98.0	98.0	36.3	36.3
FP-440	98.0	98.0	36.6	36.4

FP replacement ratios across a range of formulations



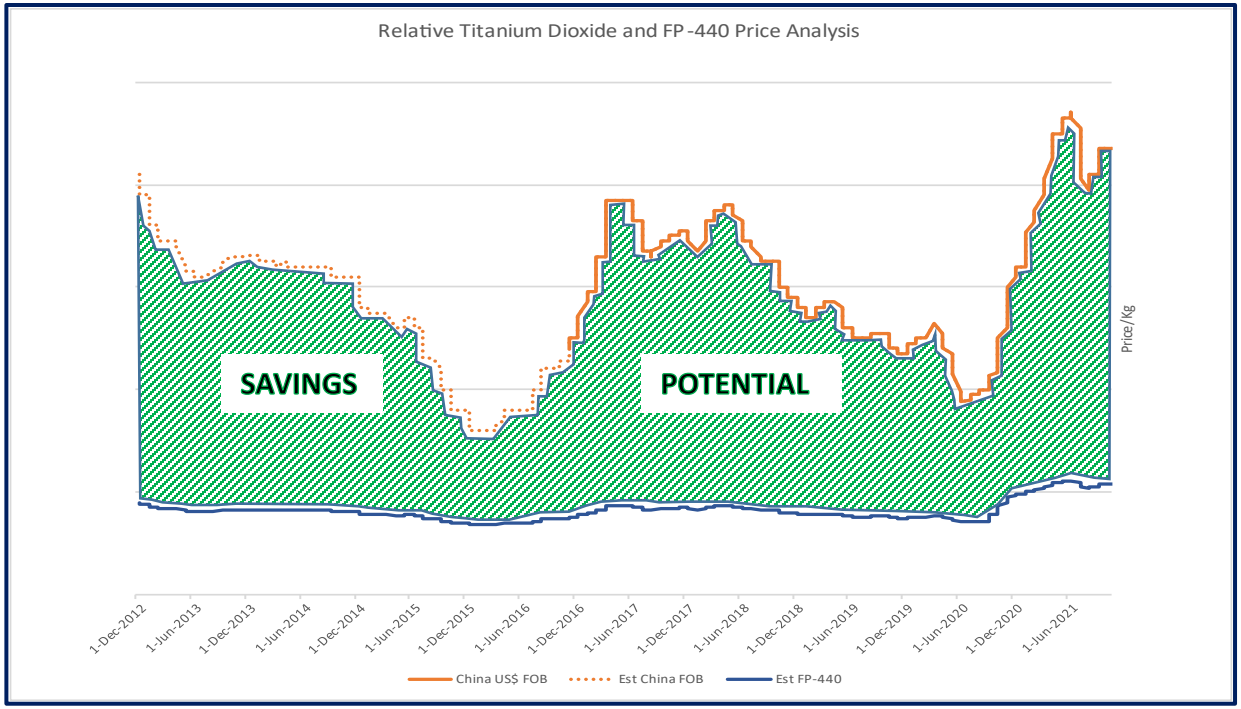
Increasing Paint Quality – Increasing TiO_2 content/Decreasing PVC ⟶

Powder Coatings - Opacity



The use of FP-Pigment in powder coatings initially improves the opacity. 10-20% replacement is possible before the opacity starts to reduce.

Cost Advantage of Using FP-Opacity Pigment™



Titanium Dioxide price varies over time, often increasing very rapidly. FP-440 Opacity Pigment™, whilst providing equivalent performance in these formulations, is almost immune to these market fluctuations. The potential savings will depend on the TiO_2 replacement ratio achieved.

FP-440 Carbon Footprint

- The carbon footprint , cradle to gate, was externally assessed in accordance with the LCA Standards ISO 14040 and ISO 14044.
- Using figures for the carbon footprint of titanium dioxide published by the Titanium Dioxide Manufacturers Association together with figures from the Ecoinvent database, we have calculated the level of carbon dioxide released when manufacturing FP-Pigments Opacity Pigment.

Carbon Dioxide Emissions
for
FP-440 Opacity Pigment™
are
1.6 t CO_2 / t of FP-440

A 67% Reduction in Carbon Footprint
compared to a tonne of TiO_2

FP PIGMENTS

FP-Pigment in various coatings applications.

- ✓ No compromise on Opacity and Whiteness
- ✓ Significantly Lower cost across the TiO_2 price cycle.
- ✓ Improved output for the same amount of TiO_2
- ✓ Lower Carbon Footprint

Thank You!

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