Sustainable technology enhances the future of colorant tinting systems

Vibrantz Technologies

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We bring color, performance and vibrancy to life.

We benefit from three strong histories.

Vibrantz companies have **over 300 years of combined expertise** in advanced materials, color solutions and performance coatings.

PRINCE

1858: Prince legacy began when Prince Manufacturing Company was formed as a colorants and additives supplier to the North American brick industry.

Via organic growth and 20+ acquisitions, Prince grew to serve customers in a variety of advanced minerals and chemicals markets around the world.

FERRO

1919: Ferro began as three founders set out to modernize porcelain enameling and incorporated Ferro Enameling Company.

Over 100+ years, Ferro grew though strategic product development, market expansion and unique expertise in color and glass science, particle engineering and surface application technology.

Chromaflo Technologies

2012: Chromaflo Technologies was created from the merger of the Colortrend Group (with roots back to the early 1900s) and Plasticolors, Inc.

Over a 10-year period, Chromaflo made multiple strategic acquisitions to become a premier global provider of colorant and color systems to the coatings and thermoset plastics markets.

VIBRANTZ TECHNOLOGIES™

Agenda

- Introduction – A brief history
- Regulatory initiatives
- How it works
- Sustainability profile
- Performance benefits
- The Future and beyond

Introduction

A brief introduction into the life of colorant technology and a focused view on the product of the future.

Where did we begin?

The Stone Age

Pigments	Vehicles
• Mineral oxides • Ochre • Manganese • Umber and sienna • Kaolin and calcite • Charcoal	• Cave water • Vegetable juice • Animal fats, blood, bone marrow, and albumen • Sap • Milk

Figure 2: Rocks producing earth colors.[2]

Figure 3: Lascaux cave paintings in France.[3]

14th to 17th Century colorants

The Renaissance

Pigments

- Mineral oxides
- MMOs/CICPs
- Lake colors

Additives

- Egg yolk
- Amber

Vehicles

- Water
- Milk
- Oil (linseed)
- Beeswax

Figure 4: Dome ceiling Renaissance painting.[4]

Figure 5: Female porphyrophra polonica, or cochineal insect.[5]

Figure 7: Red barn[7]

Figure 6: Pigment extracted from woad plant.[6]

Mid-18th Century to today

The Industrial Revolution and beyond

Pigments

- Cobalt/Cerulean
- Chromium
- Verdigris/Viridian
- Cadmium
- Vermilion
- Zinc, Titanium
- Mars

Additives

- Solvents
- Fillers
- Dispersants
- Defoamers
- Biocides

Vehicles

- Linseed, coconut, soybean oils
- Alkyds
- Acrylics
- Epoxies
- Polyurethanes

Figure 8. 1700s paint mill established by Thomas Child utilizing a granite trough and ball.[8]

Figure 9. (Left) Sherwin Williams Shade K, the first premixed paint created by Philip Steyer in 1880. (Right) Sherwin Williams shade card for prepared paints.[10]

Figure 10. Color Wall for expanded color options of the 21st century.[9]

Groundbreaking innovation

Vibrantz's newest technology

Constituent	Component	Liquid Colorants	Product
Solvent	Water	X	
	Humectant	X	
Binders	Resin	X	
Additives	Dispersants	X	X
	Defoamer	X	X
	Rheology Modifiers	X	
	Biocides	X	
Pigments	Dry pigments	X	X

Figure 11. Variety of new product samples

Evolution of tinting systems

In-plant color tinting

Figure 12. In-plant colorant addition.[25]

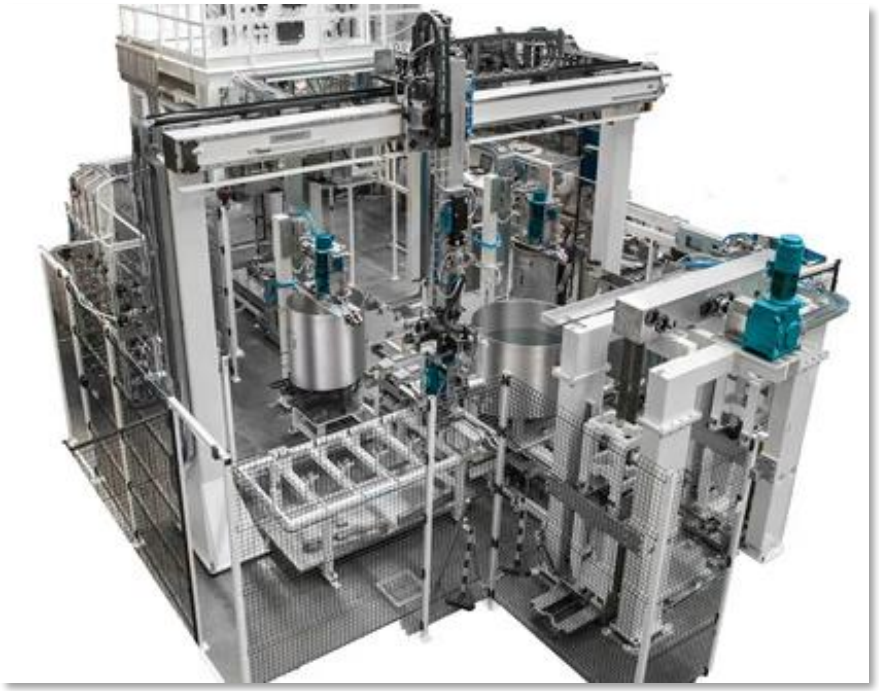


Figure 13. Automated In-plant batch and color addition by Dromont.[25]

Evolution of tinting systems

Point of Sale

Figure 14. Point-of-sale (POS) Colortrend colorant first introduced in the 1950s (left). Kem Colormeter Mixing Machine dispenser by Sherwin Williams, 1959.[26]

Figure 15. Point-of-sale (POS) Colorant evolution of mobile selection, expanded options, and automated tinting.

Groundbreaking innovation

Tinting and maintenance

Figure 16. Traditional colorant tint system colorants (top left), dispenser (bottom left), and canisters (right)

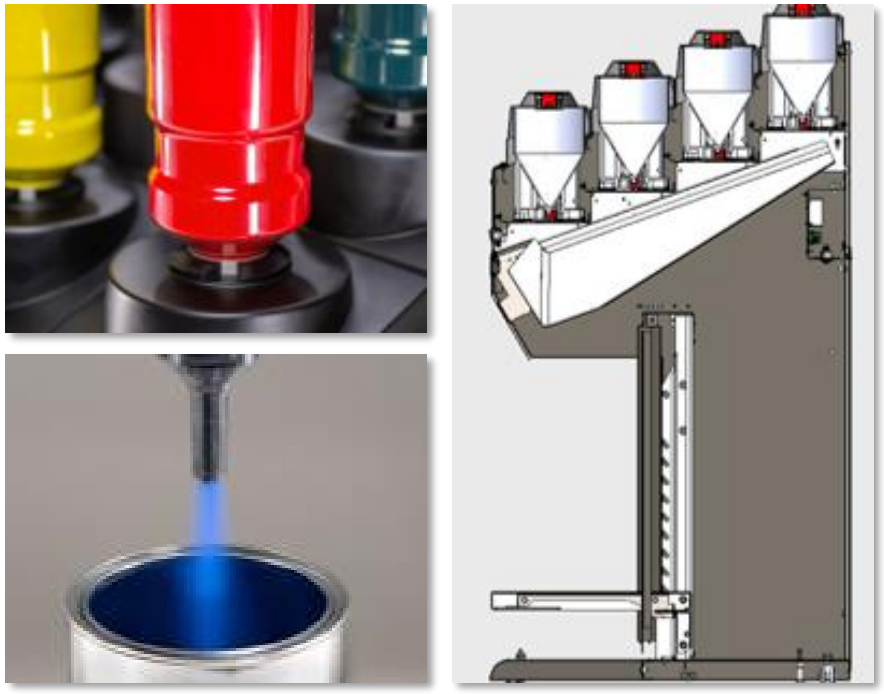


Figure 17. New tint system concept (left), dispenser (middle), and dispensing unit (right)

Regulatory initiatives

An onslaught of regulatory changes has cascaded throughout the industry, requiring coatings manufacturers to adapt to more stringent formulation requirements.

Legislative initiatives shaping colorant development

Regionally pushed regulations

TSCA (1976): identify and control potentially dangerous chemicals

Rule 1113: Amended February 5th 2016 (SCAQMD)	
Rule 1113: Architectural coatings	Rule 1113 (c)(4)(B): Colorants

European legislation for Paints and Coatings	
(BPR) (EU) No.528/2012	REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) (EC) No 1907/2006:

Increasing regulations call for high-performing, sustainable tinting solutions

Some of the common obstacles using VOC- | APEO- free colorants

Colorant properties	Point of sale equipment
The absence of VOCs can negatively impact colorant properties by causing: • Mold formation • Increased sedimentation • Extended colorant drying times • Additional thickening	Various challenges can occur when utilizing VOC-free colorants in PoS equipment like: • Blown tubes or hoses • Cross contamination of colorants • Increased mistints due to tip clogging • Reduced customer satisfaction • Increased machine maintenance

How does it work?

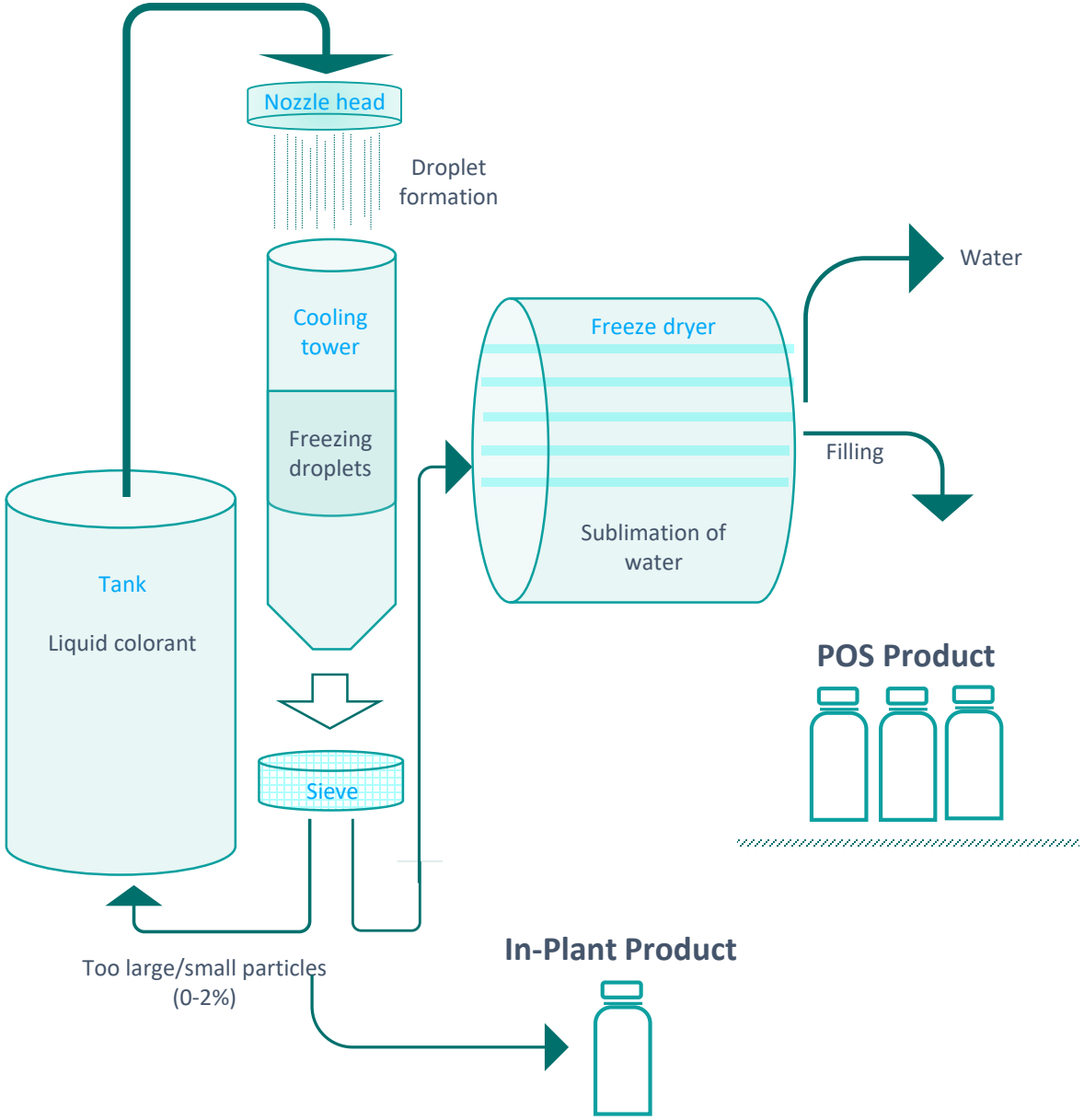
A behind-the-scenes look at the industry’s first and only volumetrically dosed tinting system of solid colorants.

Our production process is unique

The future of freeze-dried colorants

Step-by-step process

1. Liquid colorant: Feed
2. Drip-cast process generating liquid droplets of uniform size
3. Freezing droplets to solidify the liquid in a cold nitrogen counter flow
4. Sieving (agglomerates and broken product)
5. Freeze-drying
6. Filling in dedicated (cartridges)



Groundbreaking innovation

Incorporation just requires water

Sustainability profile

This product helps to meet the challenging demand of customer driven sustainability goals, increased service demands, and limited availability on spare parts within the market.

Our carbon footprint

We expect to have our lifecycle analysis results available Q1 2025

Raw material	Distribution	Vibrantz	Distributor	Service	Waste
• No biocides • No humectants • No rheological modifiers	• Neutral		• More efficient freight • Less fuel • Solid vs liquid • (no water to ship)	• Less energy • Less traveling • Less spare parts	• Shelf life • Container mgmt
		• More energy • Nitrogen			

This product provides a better sustainability profile compared to traditional tinting systems. As a solid, the product is formulated without biocides or VOCs and the colorants will not dry out, thicken or sediment.

Removing water means the product can be formulated with no additional additives. As an easier to use biocide-free solution, this product protects against future regulations.

- Biocide-free
- 100% recyclable packaging
- Reduced waste (no remaining product inside containers)
- Extended shelf life of colorant (4 years+)

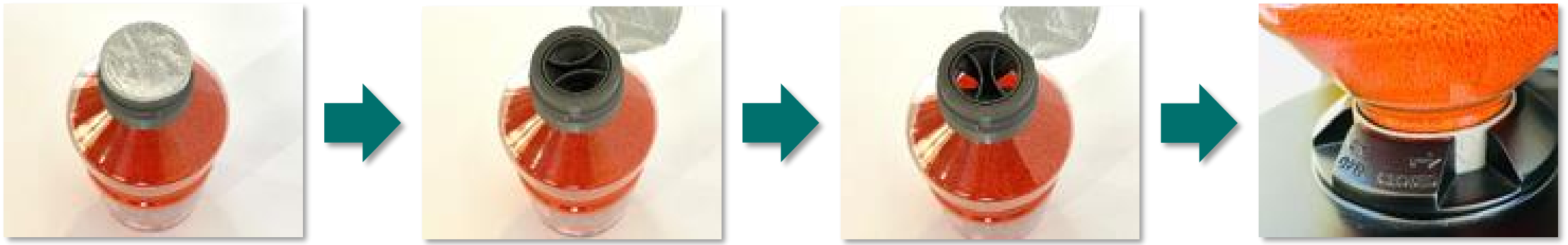
Ease of use contributes to cleanliness, energy efficiency, and less spare parts and maintenance

Simple to use, operator can exchange key component within a few minutes

Removing the dosing unit is clean and convenient

Cartridge packaging, enables refill in a few seconds

Remove the seal of the cap in just one pull



Open the bottle by turning clockwise from closed

Uniquely designed as a plug and play technology that requires low maintenance.

Performance

Unveiling the ultimate tinting hub: Dive into enhanced performance, consolidated lines, and seamless solutions.

Benefit: Enhanced performance

The uniformed shape and narrow particle size distribution offers superior tinting accuracy and less mistints. Each particle is a tiny spherical mass that is highly soluble in existing paint processes.

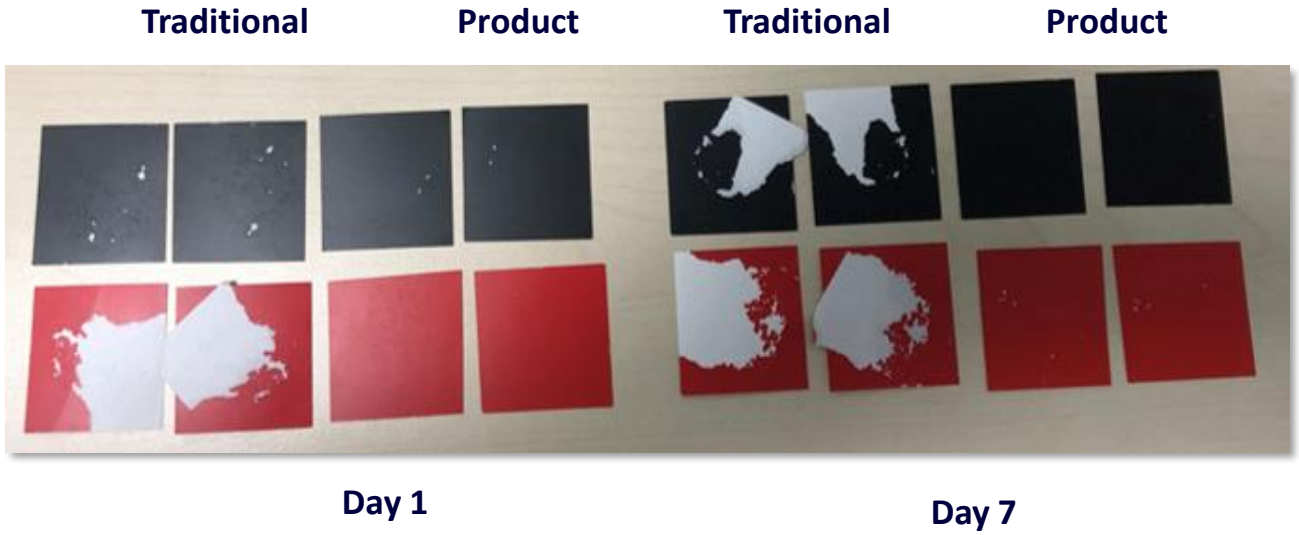
The need for fewer additives makes the product easier to use and minimizes the impact on important properties of the end-use paint.

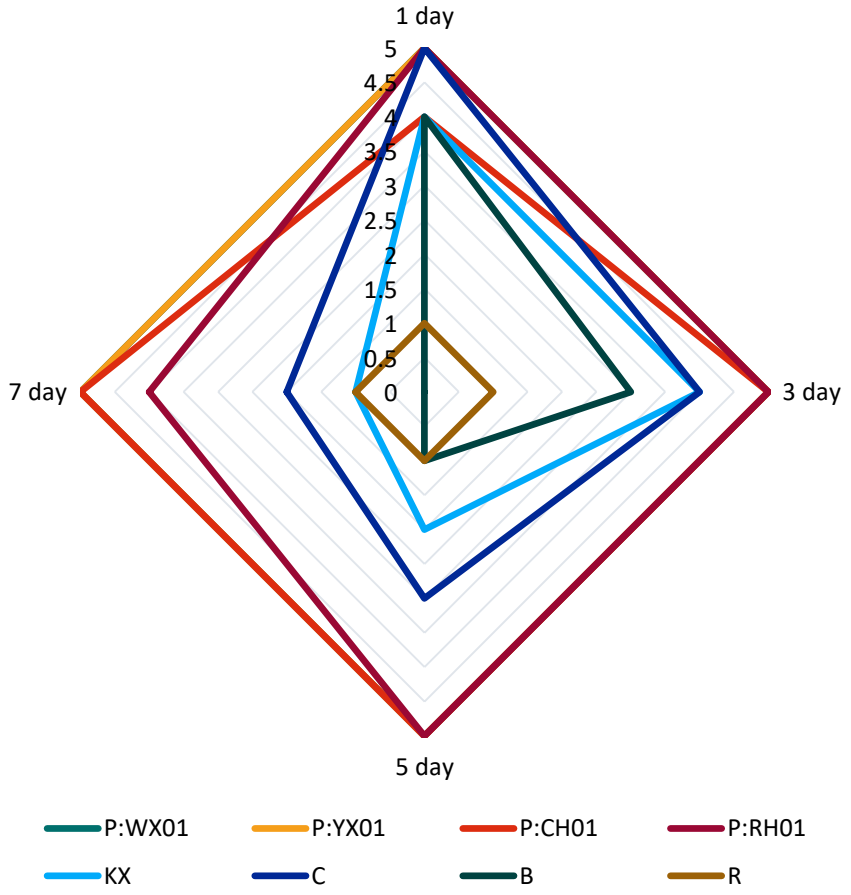
- Improves blocking
- Increases compatibility
- Improves viscosity drop
- Retains gloss
- Improves film hardness

Performance varies by base, but significant physical properties gains across the board.

Benefit: Enhanced performance

Block Resistance



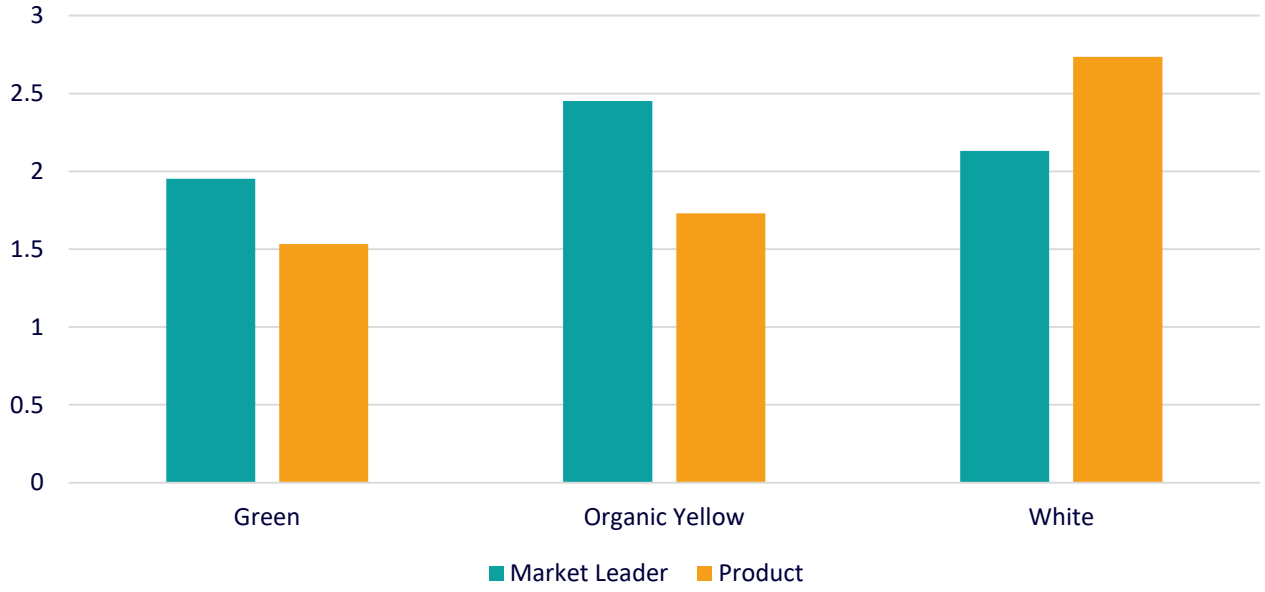


Film properties enhanced with minimal additives.

Benefit: Enhanced performance

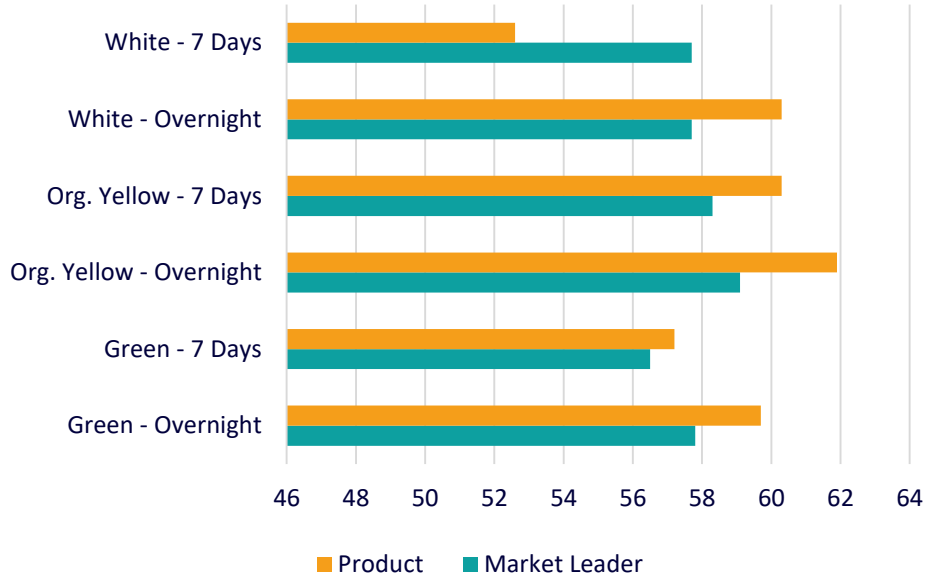
Surfactant Leeching: Customized test | Gloss Retention @ 60°

Base: Accent
Loading: 12 ounces
Application: Brush
Substrate: Metal Container
Unit of measure: mL(s) of additive(s)



Surfactant Leeching

Base: Accent
Loading: 12 ounces
Application: 3 Mil
Substrate: Leneta 3B
Unit of measure: GU

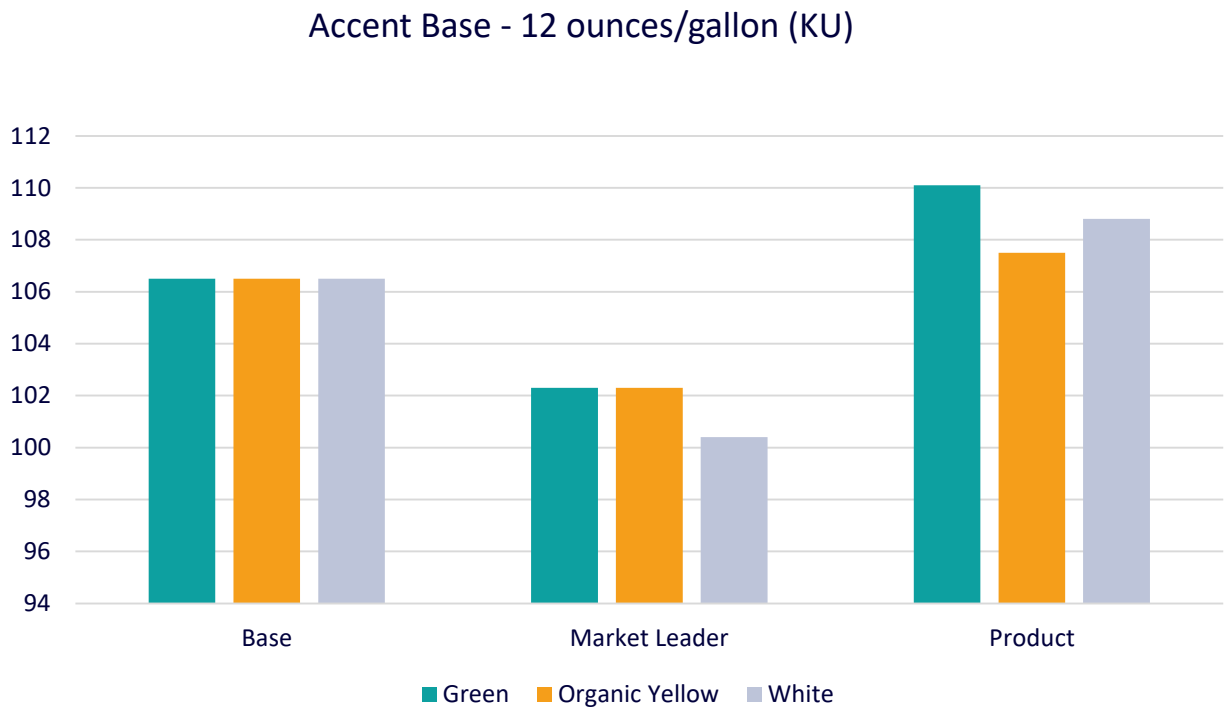


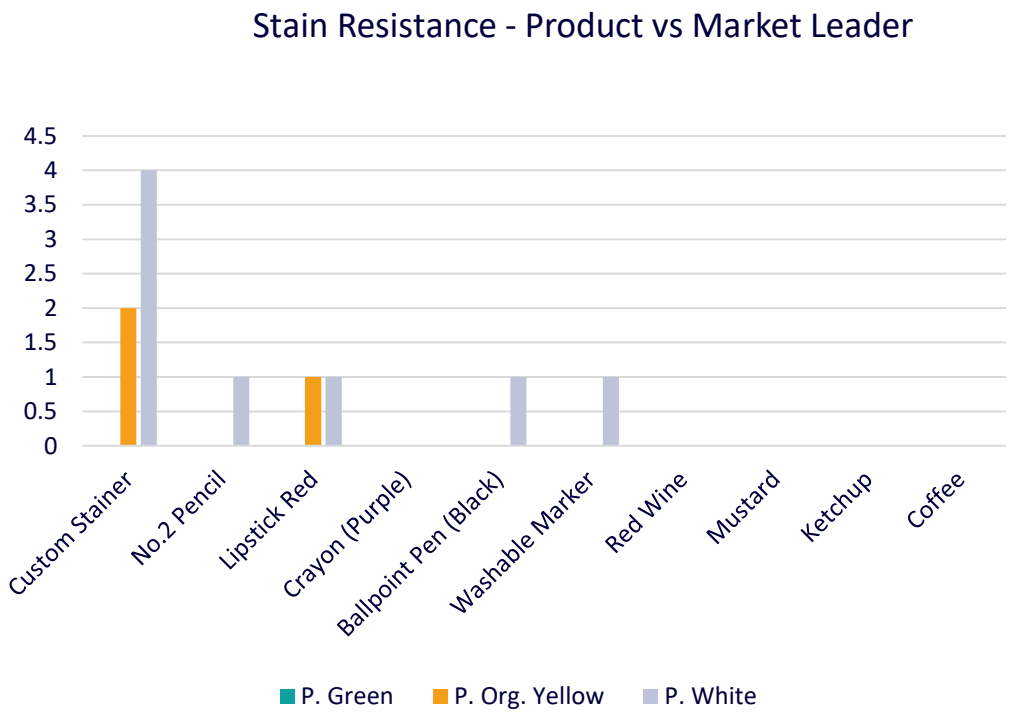
Gloss Retention @ 60°

Film properties enhanced with minimal additives.

Benefit: Enhanced performance

Viscosity Drop – Accent Base (12 ounces/Gallon) in KU





This product is specifically designed to increase performance by offering low impact on paint properties.

The future and beyond

As we prepare to scale up to a full facility and expand our Color Index offerings, we're keeping a long-term perspective in mind.

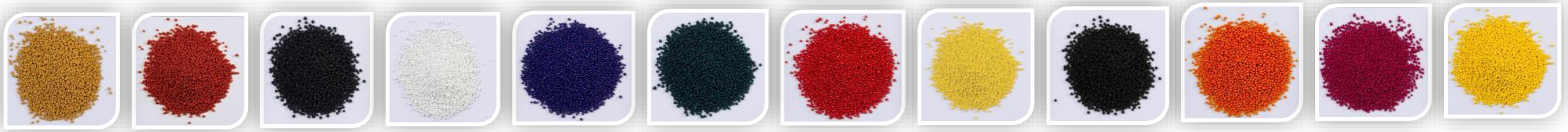
We’re building a new facility dedicated to our newest technology

This site will be located adjacent to our existing colorant facilities in Sittard, Netherlands

Current & Future pigment selection

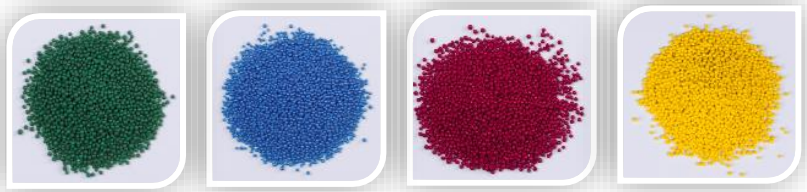
Main colorants for water-based architectural and industrial applications

Current selection of 12 colorants make it possible to tint almost every shade.



PY 42 **PR 101** **PBk 7** **PW 6** **PB 15:3** **PG 7** **PR 254** **PY 184** **PBk 33** **PO 73** **PR 122** **PY 74**

Façade tinting



PG 17 **PB 28** **PV 23** **PY 138**

R&D Pipeline

PBr 29 **PBk 26** **Trans. Oxides** **PR 168** **PBr 7**

Point-of-sale and in-plant tinting

POS and in-plant products are available - Same recipe and identical color standard (except for particle size distribution)

VIBRANTZ TECHNOLOGIES™

Special Thanks:

Katelyn Bevilacqua – Color Scientist

Caitlin Ramsey – Sr. Marketing and Communications Manager

Sarah Stoudenmire – Sr. Graphic Designer

Michael Mancuso – Jr. Graphic Designer

We bring color, performance and vibrancy to life.

Questions?

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