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POWDER COATED TOUGH

The Official Publication of the Powder Coating Institute®

Playing with Color IS SERIOUS BUSINESS

INSIDE:

July/August 2018

Powder Coating Institute

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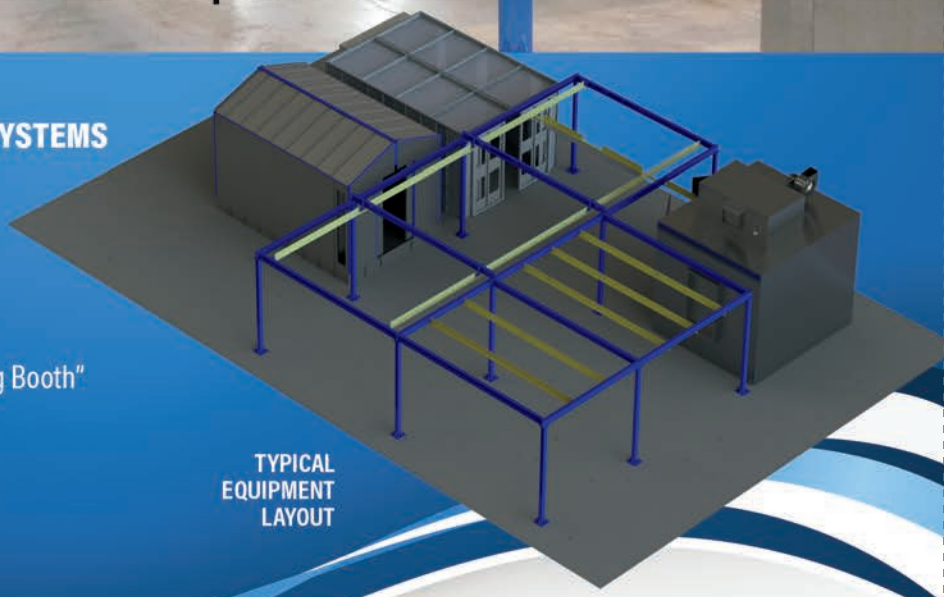

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POWDER COATED TOUGH
The Official Publication of the Powder Coating Institute®
Volume 12 • Number 4 [July-August 2018

FEATURES >>

Photo credit, below: Q-Lab Corporation

COLUMNS >>

DEPARTMENTS >>

Powder Coating Institute

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Contact The Powder Coating Institute at **800-988-COAT** for more information about the many benefits of becoming a member. Or visit **www.powdercoating.org** to see what we are all about.

Members as of June 6, 2018

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Zippo Manufacturing Company
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DIRECTOR'S MESSAGE >>

Trena Benson

Everyone's Working Hard

The current state of our economy indicates continued positivity, and according to the National Association of Manufacturers (NAM), "regional manufacturing surveys have continued to reflect optimism about activity and the outlook for the next six months." A recent Gardner Business Index noted that "finishing activity and business conditions reported through the first quarter of the year suggest that 2018 will be a very strong year for the finishing industry."

When I speak to our members, they seem to be in a more forward-thinking mode and optimistically engaged in strategic planning and capital improvement. Strong demand for consumer goods will continue to drive further growth, especially as manufacturers look to powder coatings as a sustainable finishing option for their products.

It's a great time to join efforts with PCI. Not only can the networking opportunities be effective in building the relationships needed to help make wise decisions in the expansion process, our training curriculum will help your employees strengthen their knowledge and skills. Making investments, such as training, in your employees has become critical as the manufacturing sector struggles to fill their employment needs. In an article by Buckley Brinkman in *Industry Today*, he states that companies need to be rethinking their value propositions, "investing in new technology, and finding new ways to fully engage the people working with you. Few organizations will find it possible to grow by simply maintaining the status quo." Training and employee development is a vital step in the process of engaging employees, resulting in a well-trained and confident staff, poised for innovation and growth.

PCI continues to work hard on its mission to promote powder coating technology and we have a lot of projects in progress. Our committees are working to generate our 2019 editorial calendar for *Powder Coated Tough*, analyze the benefits of and increase membership, update some of our Technical Briefs, promote our updated PCI 3000/4000 Certification programs, develop the 2019 calendar for our Powder Coating 101 and 202 Training Workshops, help select scholarship recipients, and generate and promote PCI's videos, just to name a few. We have a lot of work to do. If you are looking for a place to plug-in, call or email me (859-525-9988, trena@powdercoating.org). I am more than happy to discuss the best place for you and your expertise.

As I write today, our staff is working on the final details for the PCI/CCAI Annual Meeting and has already started the planning for the Powder Coating 2019 Technical Conference in Orlando, April 1-4, 2019. The Call for Presentations is open and closes August 15. Our staff also works hard on providing the most current industry insights with each issue of *Powder Coated Tough*. We certainly hope you are enjoying our publication.

Trena Benson, Executive Director
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Powder Coated Tough
Volume 12 • Number 4

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PowderPerspective

PCI's Powder Coating 2019 Heads to Orlando >>

The Powder Coating Institute (PCI) is eager to announce the Powder Coating 2019 Technical Conference & Tabletop Exhibition will be held April 1-4, 2019 at the Renaissance Orlando at SeaWorld®. "We are very excited about the location selected for PCI's Powder Coating 2019, the Renaissance Orlando at SeaWorld®," states PCI's Executive Director, Trena Benson. "Following the very positive comments about Powder Coating 2018 and the increased attendance, we are enthusiastic about getting to work on PCI's next technical conference. Continuing to deliver outstanding education to the powder coating industry is a top priority for us. We hope everyone will mark their calendars now and plan to join us next year for another great conference at a terrific location."

The Renaissance Orlando at SeaWorld® is an easy fly-in destination with service from across the USA and around the world and is ideally located near many theme parks and restaurants in the Orlando area.

The four-day event will kick off with PCI's popular Powder Coating 101: Basic Essentials Workshop to be held April 1 and 2. The workshop includes a comprehensive agenda that covers all the basics of powder coating operations. It is conducted by PCI member company experts in a non-commercial setting. Workshop attendees will enjoy a discount when registering for the technical conference and exhibition as well.

The Technical Conference and Tabletop Exhibition will immediately follow the Powder Coating 101 Workshop on Wednesday, April 3 through Thursday, April 4. Complete with general sessions and concurrent technical programming, attendees will have access to a variety of powder coating information as well as personal interaction with suppliers. A recent conference attendee remarks, "There was a great variety of sessions addressing the many facets of finishing that I will utilize in my career." The Call for Presentations for the 2019 program is open through August 15 at www.powdercoating.org/CallforPapers. There will also be social activities and ample networking time with tabletop exhibitors and speakers.

The tabletop display area will feature powder coating manufacturers, powder coating application equipment companies, systems houses, chemical suppliers and various services that support the powder coating industry. Tabletops and sponsorship opportunities are now available. Last year's sponsors and exhibitors have the opportunity to select first.

Don't miss this unique opportunity to learn from the best in the powder coating industry. Save the week of April 1-4, 2019 and plan to join us in Orlando, FL, for PCI's Powder Coating 2019 Technical Conference. Visit www.powdercoating.org/PC19 for sponsorship and registration information.

PLACES TO BE

JULY
30-AUGUST 1
International Finishing & Coatings Summit
Atlanta, GA

AUGUST
7-8
Powder Coating 101: Basic Essentials
Rockwall, TX

SEPTEMBER
18-19
Powder Coating 202:
Optimizing Your Powder Coating Operation
Amherst, OH

OCTOBER
4-5
Powder Coating 101: Basic Essentials
Hillsboro, OR

NOVEMBER
6-8
FABTECH 2018
Atlanta, GA

DECEMBER
4-5
Powder Coating 202:
Optimizing Your Powder Coating Operation
Westland, MI

2019

APRIL
1-4
Powder Coating
2019 Technical Conference
Orlando, FL

For more information and/or to register to any of these events, go to www.powdercoating.org and click on the Events tab.

People in Powder >>


Dietz

Powder Coating Veteran, Craig Dietz, Retires

After a career in powder coating spanning three decades, Axalta's Craig Dietz retired in May. A Penn State graduate, Craig moved to North Carolina in 1981, where he began his career serving in several sales roles before accepting an area manager position with Fuller-O'Brien in 1987.

Over the duration of his career, the company would go through numerous acquisitions, the last of which was Axalta's purchase of DuPont in 2013. Through all the changes, Craig remained a constant in the organization, relocating from North Carolina to Texas, accepting additional responsibilities in sales, marketing and product management, as well as a variety of promotions along the way. Craig finished his career as Product Manager, Powder Coatings North America, a position he held since 2013 when Axalta placed greater emphasis on this function.

In addition to dedicating 30+ years of his career to one organization, Craig was a major contributor to PCI. Elected to the Board of Directors in 2014, he served as an active board member and Chair of the Promotions Committee until his retirement.

Many have benefitted from Craig's leadership and commitment to both PCI and the powder coating industry. We are grateful for his contributions and wish him many years of well-deserved happiness, health and relaxation. Congratulations Craig!


Severson

TCI Powder Coatings Announces Promotion of Dave Severson to Director of Sales

TCI Powder Coatings is pleased to announce the promotion of Dave Severson to the newly created position of Director of Sales. For the past 2 years as Segment Manager, Dave has helped to transform TCI into a segment driven business leading both our Automotive and TruCoater™ efforts.

"Dave is a consummate professional with a team-oriented, people- and customer-first focus, and this change will increase support to both our organization and customers," Jack Bostock, TCI Vice President, Sales and Marketing said.

Prior to TCI, Dave worked in commercial leadership positions with Valspar, Ashland Chemical and HB Fuller. Dave is a graduate of the University of Minnesota and is based in Columbus, OH.


Levine

Gema Adds Territory Manager

Gema USA Inc., is pleased to announce the addition of Allen Levine as a Territory Manager. Allen's background in sales and technical support within the Gema Distribution Network will add tremendous value to customers and industry partners within his region. With over 10 years of experience in the powder coating industry, customers will benefit from his experience and knowledge of powder coating materials and equipment to provide excellent application expertise and solutions.


Owed

John Owed Joins Col-Met EFS as Director of Sales & Marketing

John Owed has joined the Col-Met team as Director of Sales and Marketing for all its product lines in the industrial and automotive industries. John joins the Col-Met/RP Arrestors team with significant experience in the finishing industry. Prior to joining Col-Met/RP Arrestors, he spent thirty-six years with ITW / Carlisle Fluid Technologies (BGK, Binks, DeVilbiss, Ransburg, MS Powder) in key managerial roles. Over the years at Carlisle, John was very successful in guiding the development of new and innovating products, all the while growing relationships with its distribution, integrator and international partners to bring these new products to the finishing market. "To further strengthen our relationship with our distribution channel we sought out a Director of Sales and Marketing that shares our same vision of bringing high-quality products and innovative solutions to our distributors," said Eric Jones, Founder, and CEO.


Flasher

Gema's Phil Flasher Promoted to Engineering Manager

Gema USA Inc., is pleased to announce the promotion of Phil Flasher to the position of Engineering Manager. With over 20 years' experience with the Gema team, Phil brings a wealth of application expertise, product knowledge, and customer involvement to this position. Phil will be responsible for management of the project engineering team, supervision of systems and retrofit engineering, and directing the Gema customer application lab.

Say Hello to PCI's Newest Members >>

Auxiliary Equipment

MAXAIR Systems
Irvine, CA • 949-936-2066
www.maxair-systems.com

Custom Coaters

Emerald Corporation
Grand Rapids, MI • 616-485-4070
www.emeraldcorporation.com

Larsen Manufacturing
Mundelein, IL • 847-970-9600
www.larsenmfg.com

Mansfield Powder Coating
Mansfield, TX • 817-247-1211
www.mansfieldpowdercoating.com

Nyhus Enterprises, LLC
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www.nyhusenterprises.com

Skagit Powder Coating
Mount Vernon, WA • 360-428-0413
www.skagitpowdercoating.com

Surtech Industries
York, PA • 717-767-6808
www.surtech-ind.com

Thomarios
Copley, OH • 330-670-9900
www.thomarios.com

OEM

Mallory Metal Products
Santa Teresa, NM • 575-589-2130
www.mallorymetal.com

PCI Launches OEM Video Highlighting Manufacturers >>

Dedicated to the promotion of powder coating technology, the Powder Coating Institute (PCI) introduced the first release in a series of videos promoting powder coating technology to manufacturers. In the video, several original equipment manufacturers share the benefits they enjoy in using powder technology for their products.

Powder coating is a tougher, more durable finish with lower applied cost, operational cost and reject rates. For manufacturers, powder coating provides an impressive economic value while offering the best finish quality. "Powder coating is a finishing process that positively impacts our environment," states Trena Benson, PCI Executive Director, "In addition, it exhibits excellent corrosion resistance and weatherability, making it an outstanding finish and a clean choice for manufacturers."

PCI videos can be viewed on the official PCI YouTube page and a link can be generated to place them on your own website or share on social media. Visit www.youtube.com/PowderCoatingInstitute to share our videos.

New FISCHER Chicago Sales and Service Facility >>

Exciting things are happening at Fischer Technology. FISCHER is proud to announce the opening of their Chicago Sales and Service facility. Craig Kuchta, the new Fischer Representative and Technical Advisor for this office, has 20+ years of technical instrumentation sales and support of products by manufacturers such as Siemens, Honeywell and Wika. Please contact him for any measurement problems you may be facing.

Fischer's regional offices support their complete line of test and measurement instrumentation. Service such as onsite recertification of hand held and bench top coating thickness gauges, nanoindentation and X-ray fluorescence instruments, including repairs and preventive maintenance, is also available from all locations across the country.

Got News?

Send it to editor@powdercoating.org

Metaltech Products Inc. Celebrates 20th Anniversary >>

Metaltech is celebrating its 20th year in business **in** June at its facilities in Eldridge, MO. The company is owned by Darrel and Dana Bishop, its first two employees when Metaltech opened its doors on June 1, 1998.

Darrel Bishop gained much of his manufacturing and management know-how by working his way up at Marathon Electric in nearby Lebanon, MO, and later at Electrovert, which is now ITW EAE of Camdenton, MO.

At Electrovert in late 1997 the company was having trouble finding a reliable and cost-effective vendor for large machine frames. "I think this was when the light bulb went off in my head, and I had a reason to move forward with my dreams of owning my own company," Darrel Bishop says. "At this point, I had a potential customer right out of the gate, and I could fulfill their need by giving them something they could not get."

The Bishops built a 4,000-square-foot facility on Route E in Eldridge and began to fill it with the tools of the trade—mig and tig welders, a hydraulic ironworker, a band saw, a drill press and various hand tools. Their first hire was Tony Evans, who was known as the best metal fabricator in the area.

Other employees soon joined the team, bringing their own skills and a willingness to learn. Metaltech purchased Ozark Sheetmetal in 2001, absorbing its equipment and workforce, and opened Powder Paint, Inc. in 2003.

"At Metaltech, we believe that in order to stay competitive in manufacturing and give customers the quality of product they expect, it is necessary to have the latest technology, the best processes and the best people," Darrel Bishop says.

The company has expanded its services considerably since the early days. Now with more than 80 employees and 68,000 square feet of space, Metaltech offers everything from complete custom fabrication components, weldments and assemblies and CNC machining to laser cutting, robotic welding, and powder coating. Metaltech is ISO 9001:2015 Certified.

Register Now for the International ThermProcess & International Finishing & Coatings Summits >>

Developed to help executives stay on top of the **latest trends**, innovations and issues affecting their manufacturing operations, ITPS and IFCS bring together an impressive and diverse group of business speakers from July 30 – August 1, 2018, at the InterContinental Hotel Buckhead Atlanta.

Co-sponsored by the Industrial Heating Equipment Association (IHEA) and the Chemical Coaters Association International (CCAI), Summit organizer Anne Goyer states, "This combined event will provide a unique platform for industry intelligence and collaboration that drives manufacturing excellence. There is no other event like this in North America for executives in these manufacturing segments."

Two joint general sessions will feature presentations that appeal to all manufacturing executives, while two breakout sessions will focus on topics specific to the industrial heating and industrial finishing and coatings segments. Combined with an array of social and networking activities, this is a must-attend event for thermprocess and finishing and coatings executives.

Featured general session presentation topics include:

- Factories of the Future: What Does the Future Workforce Look Like?
- Trends in Additive Manufacturing
- Manufacturing USA Initiatives: What They Are and How You Can Benefit
- Trump's Washington: The New Normal?
- Driving Consistent Performance Excellence
- Cybersecurity: Keeping Your Business Secure
- Managing in an Unpredictable Economy
- OEM Manufacturing Perspective
- Transitioning Your Business to the Next Generation

Speakers come from an array of outstanding companies including:

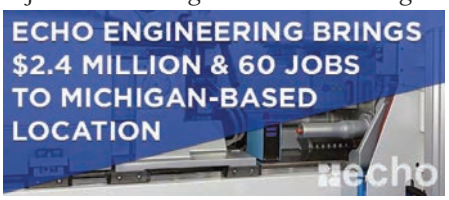
- Intel Corporation
- John Deere
- General Electric
- AGCO

- Mercury Marine
- Honeywell Thermal Solutions
- U.S. FBI
- Trane
- CareerWise Colorado
- The Brainzooming™ Group

Registration discounts are available for PCI, IHEA, CCAI, MTI, CECOF, JIFMA, VDMA, Electrocoat Association and WiM members. For complete Summit information, including hotel reservations and to register, visit www.itps-ifcs.com.

Echo Engineering Brings $2.4 Million and 60 Jobs to Michigan-Based Location >>

Echo Engineering is investing $2.4 **million into 60+ full-time jobs** with additional real estate and automated manufacturing equipment in the recently acquired plastic injection molding facilities in Michigan.



The two facilities, located in Monroe and Frenchtown Township, are expected to grow by 30% in the next year with the support of Echo's investment and a $210,000 performance-based grant received from the Michigan Business Development Program.

The investment focuses on providing additional operations capacity including injection molding machines with automated robotics, increasing warehouse facility capacity, and growing teams to support the daily operations at the Michigan locations. According to Echo's CEO, Kingdon Offenbacker, "To date, since we made the acquisition, in the first six months we have added 21 full-time positions, and we have already invested more than $1 million." Echo currently has 83 employees at this location.

Echo Engineering acquired Ammex Plastics in October 2017 to create additional manufacturing capabilities for its customers. The full-service plastic components manufacturer primarily supports the automotive industry for custom plastic component technologies including clips, mounts, and fittings for fluid routing, fastening, and suspension systems.

The Michigan Business Development Program is part of an incentive program from the Michigan Strategic Fund, and is in cooperation with the Michigan Economic Development Corp. This program supports local businesses, including manufacturing facilities, by pushing for growth within the state in hopes of creating job opportunities.

AkzoNobel's Largest Powder Coatings Plant Opens In China >>

Production has started at AkzoNobel's new powder coatings plant in Changzhou, China. The facility – one of the largest of its kind in the world – is located at an existing site and will help to further strengthen the company's undisputed global leadership position in the powder coatings market.

The result of nearly €40 million of investment, the Changzhou plant will supply an extensive range of Interpon and Resicoat products to meet growing demand for more sustainable coatings solutions. Key markets include the automotive, architectural and general industrial sectors.

"China is a high priority region for us and the new facility is part of ongoing plans to optimize our production and investment strategy, based on increasing demand," explained Ruud Joosten, AkzoNobel's Chief Operating Officer. Added Daniela Vlad, Director of AkzoNobel's Powder Coatings business: "This new plant will help us develop Changzhou into a hub for the powder coatings industry in China and create more value for customers by providing customized solutions."

Reflecting the sustainable nature of the powder coatings it produces, the new Changzhou plant itself is a living demonstration of AkzoNobel's strong commitment to sustainability. In addition to supplying only VOC and solvent-free products, the plant also uses advanced technology such as a vacuum drum waste water recycling system. This helps to achieve full recycling of waste water and zero waste water emissions.

Meanwhile, the strategic position of the site enables it to collaborate with one of AkzoNobel's largest technology centers – based in Songjiang, Shanghai – which carries out research on formulas and solutions customized for local needs.

Color & Gloss Measurement

Sandra Weixel,
BYK-Gardner, Germany

When comparing two samples with the same pigmentation, but different degrees of gloss, the one with the higher degree of gloss is visually perceived as darker and more saturated than the matte sample. For this reason, it is very important to measure both surface effects separately.

Otherwise, the visible difference may be interpreted as a difference in color, although the real difference is in the gloss. For the manufacturer, the changes necessary to adjust the color are different from a gloss correction. The hue (color) is influenced mainly by the type or amount of pigmentation. Gloss is dependent on the utilized matting agents and baking temperature.

Gloss Measurement

The images in Figure 1 illustrate how light is reflected off surfaces of differing gloss. On the first surface, part of the incident light ray is directly reflected and is influencing the image forming quality of the surface, i.e., how glossy and brilliant a surface appears. In the case of smooth, high gloss surfaces, the law of reflection is valid: angle of illumination = angle of reflection. The image of a reflected object can be seen distinctly. In the case of rougher surfaces, the light is not only reflected in the direction of specular reflection, but also diffusely reflected in other directions.

The angle of illumination highly influences the measurement results. In order to evaluate the whole range from high-gloss to matte surfaces, three different angles of illumination are defined, which means three different measuring ranges (Fig. 2).

In order to differentiate the gloss of the samples, it is necessary to select the appropriate measuring geometry. First, the test specimen is measured with the 60° geometry. The 60° geometry should be used if the gloss reading is between 10 and 70 units. If the 60° gloss is higher than 70 units, the 20° geometry will be advantageous. If the 60° gloss is lower than 10 units, the 85° geometry should be used.

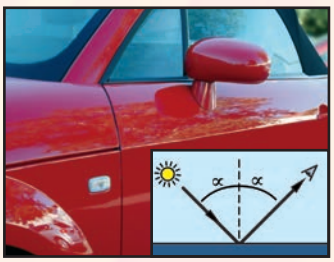
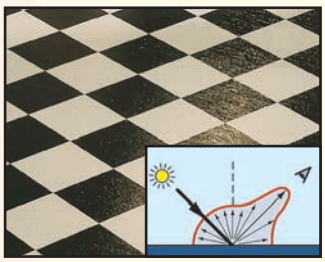


Fig. 1. High gloss.



Matte to semi-gloss surfaces.

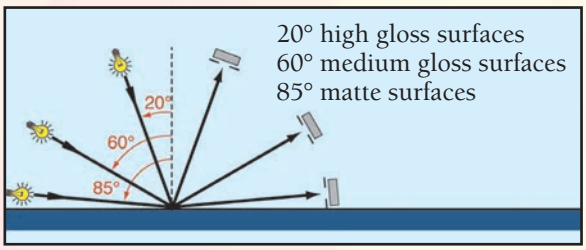


Fig. 2. Most common gloss geometries for measuring high – low gloss surfaces.

Color Measurement

The part of the incident light which is not directly reflected penetrates the coating and is absorbed or diffusely scattered by the pigments within the mass of the material. This scattered light exits the coating and is uniformly scattered in all directions. The diffused component causes the color impression.

Visual perception of color is very subjective and has shortcomings. One such shortcoming is that with increasing age, the eye gets fatigue and the lens turns yellowish; consequently, an elder person judges colors to be more red and more yellow. Secondly, our mood influences our color perception. Such things as bad traffic, an auto accident, or a disagreement may affect our visual impression differently than if we are in a good mood. It is also proven that color vision is dependent on gender. The inherited types of color vision defects are far more common in men than in women, with a sex-linked, recessive gene causing them. Men who inherit a single such gene will show some form of color deficiency. Women, on the other hand, must inherit the gene from both parents to be affected. Only about 0.5% of women have defective color vision, while approximately 8% of men will show some form of deficiency. The most common defect is the red/green blindness. One should take into consideration that the phrase "color blind" is misleading. Humans who see only shades of gray are very rare. Thus, the first step for an objective color control procedure is to standardize the observer.

Observer

Reflected light from a colored object enters the human eye through the lens and strikes the retina. The retina is populated with three different types of light-sensitive receptors: one which reacts to red light, another to green light, and a third to blue light. Together they stimulate the brain to produce the impression of color. To determine the sensitivity of the receptors, systematic visual tests were done by the CIE (Commission Internationale de Éclairage) in 1931 and 1964. Based on the results, the 2° and 10° observer were standardized (Fig 3), representing a small and large field of view, respectively. When viewing a sample, the eye integrates over a large area, which correlates best to the 10° observer.

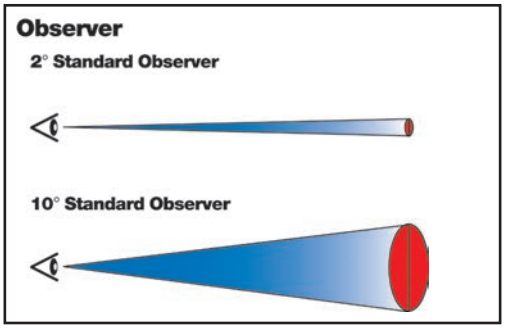


Fig. 3. Small and large field of view representing the 2° and 10° standard observer.

Light Source

Color also changes with lighting conditions. Different light sources cause different appearance: daylight represents a sunny day without clouds, incandescent light simulates a warm atmosphere, like at home, and a cool white light simulates a department store atmosphere. Therefore, standard illuminants have to be agreed upon and used. The prerequisite of a light source to be usable for color evaluation is to continuously emit energy throughout the visible spectrum (400 to 700 nm). The CIE standardized light sources by the amount of emitted energy at each wavelength, which equals the relative spectral power distribution.

The most common illuminants are D65 to simulate natural daylight, illuminant A to represent incandescent or tungsten light, and F2 or F11 representing a fluorescent department store light source (Fig. 4).

Object

Light source and observer are defined by the CIE and their spectral functions are stored within color instruments. Optical properties of an object are the only variables that need to be measured. Modern color instruments measure the amount of light reflected by a colored sample. This is done at each wavelength and is called the spectral data.

For example, a black object reflects no light across the complete spectrum (0% reflection), whereas an ideal white specimen reflects nearly all light (100% reflection). All other colors reflect light only in selected parts of the spectrum. Therefore, they have specific curve shapes or fingerprints, which are their spectral curves.

In the graphs on the next page, typical spectral curves for a red, blue and green sample are shown (Fig. 5).

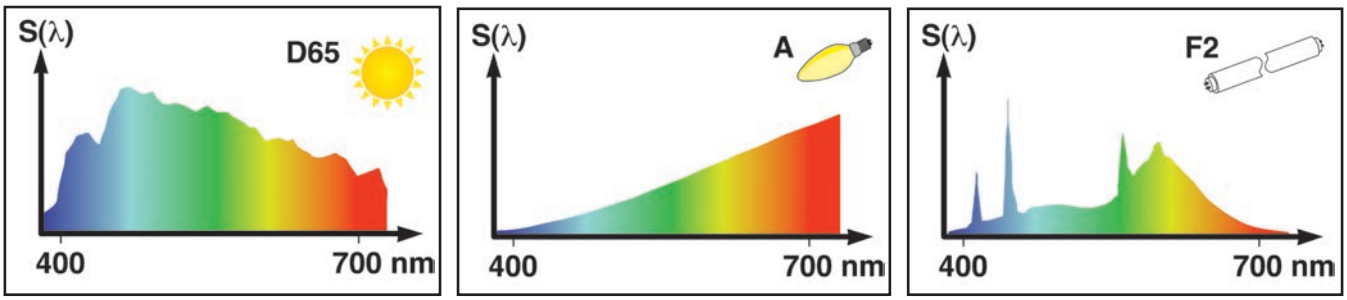


Fig. 4. Spectral power distribution for standard illuminants D65 – A – F2.

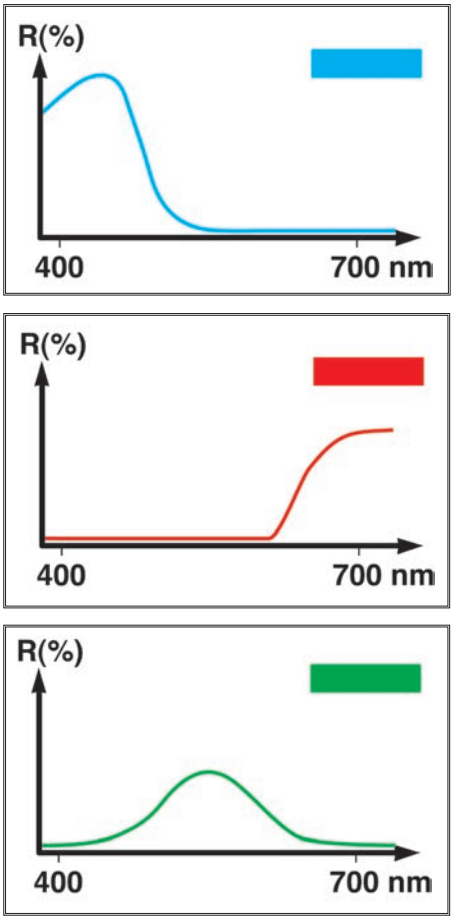


Fig. 5. Typical reflectance curves for blue, green and red samples.

Color Systems

Color systems combine data from three elements: light source, observer, and object. They are the tools to communicate wand document color and color differences. The system, which is recommended by the CIE and widely used today, is the CIE Lab system (Fig. 6)

It consists of two axes, a* and b* which are at right angles and represent the hue dimension or color. The third axis is the lightness L*. It is perpendicular to the a*b* plane. Within this system, any color can be specified with the coordinates L*, a*, b*. Alternatively, L*, C*, h° are commonly used. C* (Chroma) represents the intensity or

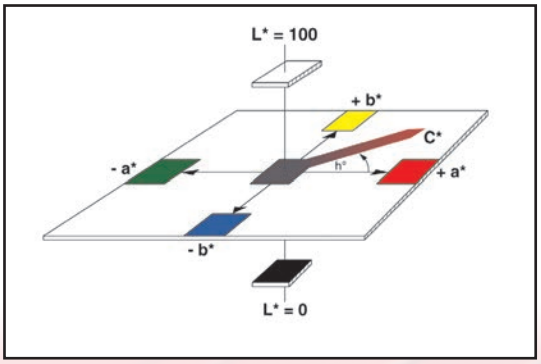


Fig. 6. CIE Lab color system – defined in 1976

Until now, two separate instruments – a gloss meter and a spectrophotometer – were needed to measure color and gloss of an object. Today's modern technologies allow for both measuring systems in one instrument.

saturation of the color, whereas the angle h° is another term to express the actual hue.

To keep a color on target, a standard needs to be established and the production run is compared to that standard; a typical customer / supplier situation. Therefore, color communication is done in terms of differences rather than absolute values. The total change of color, ΔE*, is commonly used to represent a color difference.

$$\Delta E^* = \sqrt{(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2}$$

The same ΔE* value can be obtained for two sample sets, and yet they look completely different. To determine the actual change in color, the individual colorimetric components ΔL*, Δa*, Δb* or ΔL*, ΔC*, ΔH* need to be used.

The calculation and interpretation of the differences are determined as shown in Figure 7 below. The color differences must be agreed upon between customer and supplier. These tolerances are dependent both on demands and on technical capabilities.

Until now, two separate instruments – a gloss meter and a spectrophotometer – were needed to measure color and gloss of an object. Today's modern technologies allow for both measuring systems in one instrument.

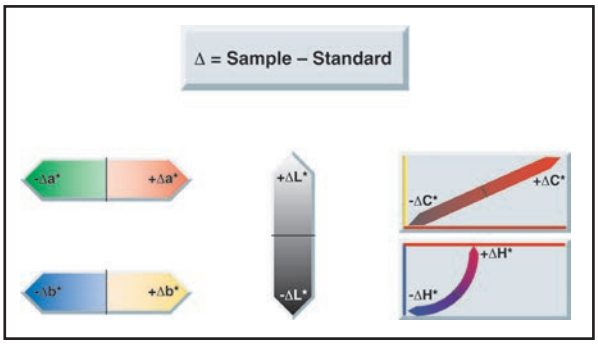


Fig. 7. CIE Lab color system – defined in 1976

Sandra Weixel is product manager color for BYK-Gardner, Geretsried, Germany.

The next several pages are dedicated to job shops in the powder coating industry. Here, we present two PCI custom coater members, Pacific Powder Coating, Inc. and Industrial Coating Solutions. This page is PCI's way to give back to its members while offering *PCT* readers an excellent resource for custom powder coating services. When you turn the page, you will see all of PCI's custom coater members listed alphabetically by state.

Pacific Powder Coating, Inc.

Sacramento, CA
www.pacpowder.com
916-381-1154

PCI 3000 certified:	No
Type of coatings applied:	Thermoset powders
Substrates powder coated:	All metallic substrates, including aluminum
Processes utilized:	Two conveyor lines and two batch systems; the largest batch system is 11'(w) x 8'(h) x 30'(l)
Pretreatment:	Five-stage iron phosphate pretreatment with a non-chrome chromate sealer, and sandblasting
Curing:	Gas-fired convection ovens
End-users/industries served:	Agriculture, medical, architectural, aerospace, electrical, solar, furniture, gaming, manufactured home products, fitness equipment, automotive, and commercial ventilation
Additional capabilities:	Electrostatic powder coating, sand blasting services, assembly and metal fabrication services delivered to Northern California and Bay Area customers

Industrial Coating Solutions

Billings, MT
www.icspowdercoat.com
406-256-1124

PCI 3000 certified:	No
Type of coatings applied:	Thermoset and high-temperature powders, as well as thin-film ceramic coatings
Substrates powder coated:	All metals and some plastics; specialization in coatings for heavy industry manufacturing and architectural steel
Processes utilized:	Two batch powder coating lines; ceramic coating services performed in a separate batch line
Pretreatment:	Three media blasting bays for mechanical cleaning followed by an iron phosphate pressure wash and rinse
Curing:	Two gas-fired curing ovens: 14'(w) x 13'(h) x 42'(l) and 10'(w) x 10'(h) x 30'(l); both ovens are extendable to accommodate larger items
End-users/industries served:	Primarily industrial equipment manufacturing, oil and gas industry, and architectural fabricators; additional segments include automotive, electrical and hobbyist
Additional capabilities:	With two delivery trucks and two 35-foot trailers, pickup and delivery service within a day's drive of Billings is available; ability to lift and maneuver nearly any size and shape of material with six forklifts, ranging in capacity from 4,000 lbs. to 10,000 lbs., as well as seven overhead hoists

CUSTOM COATERS CORNER

Listed alphabetically by state, the following companies are PCI® Custom Coater members as of June 11, 2018.

Alabama

Arlon Mechanical Service Co., Inc. www.manta.com/c/mm8tjmy/arlon-mechanical-service-co
Tru-Line Manufacturing ..... www.trulinemfg.com

Arizona

Anderson Painting Co. ..... www.andersonpaintingco.com

California

Applied Powdercoat, Inc. ..... www.appliedpowder.com
Fusion Coatings, Inc. ..... www.fusioncoatingsonline.com
Ikon Powder Coating, Inc. ..... www.ikonpowdercoating.com
Inland Powder Coating ..... www.inlandpowder.com
Pacific Powder Coating, Inc. ..... www.pacpowder.com
PYR ..... www.pyrsd.com
Star Finishes, Inc. ..... www.starfinishes.com

Colorado

CW Elaborations ..... www.cwelaborations.com
Mile High Powder Coating ..... www.milehighpowdercoating.com
Powder Coating Specialties, Inc. ..... www.powdercoatingspecialties.com
Quality Linings and Painting, Inc. ..... www.qlapi.com
Structural Coatings, LLC ..... www.structuralcoatingsco.com

Florida

Excell Coatings, Inc. ..... www.excellcoatings.com
Pro Powder Coating, Inc. ..... www.propowdercoat.com

Georgia

Georgia Powder Coating, Inc. ..... www.georgiapowdercoating.com
Ray Paul Coating, Inc. ..... www.raypaulcoating.com
Top Gun Powder Coating, LLC ..... www.topgunpowdercoating.com

Hawaii

Maui Powder Works ..... www.mauipowderworks.com
Sunset Powder Coating ..... www.sunsetpowdercoating.com

Idaho

Coatings Plus ..... www.coatingsplusboise.com
Metalcraft, Inc ..... www.metalcraftidaho.com
Premier Powder Coating & Custom Fabrication, LLC ..... www.ppccfab.com

Illinois

Acme Finishing, LLC ..... www.acmefinishing.com
Americana Powder Finishing, LLC ..... www.americanapowder.com
KCP Metal Fabrications, Inc. ..... www.kcpmetal.com
KVF - Quad Corp. ..... www.kvfquad.com
Larsen Manufacturing ..... www.larsenmfg.com
Micron Metal Finishing ..... www.micronmetalfinishing.com
Plastisol Products, Inc. ..... www.plastisolproducts.com
Progressive Coating ..... www.progressive-coating.com
S & B Finishing Co., Inc. ..... www.powdercoatchicago.com

Indiana

Carrara Industries, Inc. ..... www.carraracoaters.com
Creative Coatings ..... www.creativecoatingsinc.com
IDS Blast ..... www.idsblast.com
Kelly Group, The ..... www.thekelly-group.com
Nix Coatings ..... www.nixpowderandpaint.com
Winona Powder Coating ..... www.winonapowder.com

Kansas

HMC ..... www.hmcperformancecoatings.com
JR Custom Metal Products, Inc. ..... www.jrcmp.com
Powdertech, LLC ..... www.powdertechllc.com

Louisiana

Niko Industries ..... www.nikoindustries.com
Quality Works ..... www.qualityworksla.com

Maryland

Chesapeake Coating, Inc. ..... www.chescoat.com
Custom Performance Coating ..... www.customperformancecoating.com

Massachusetts

Diamond Custom Coatings, Inc. ..... www.diamondcoatingsinc.com
Seamless Powdercoating ..... www.seamlesspowdercoating.com
Westside Finishing Co. ..... www.wsfinish.com

Michigan

Emerald Corporation ..... www.emeraldcorporation.com
Kopacz Industrial Painting, Inc. www.manta.com/c/mm21278/kopacz-industrial-painting-inc
PPG Coating Services - The Crown Group Co. ..... www.thecrowngrp.com
Pro Powder, Inc. ..... www.propowder.net

Minnesota

Associated Finishing, Inc. ..... www.associatedfinishing.com
Douglas Finishing ..... www.douglasfinishing.com
JIT Powder Coating Company ..... www.jitpowdercoating.com
Valmont Coatings-Applied Coating Technology ..... www.appliedcoating.com

Missouri

Metaltech Products, Inc. ..... www.metaltechproductsinc.com

Montana

Industrial Coating Solutions ..... www.icspowdercoat.com

New Mexico

Absolute Powder Coating, LLC ..... www.powdercoatingabq.com

New York

Advanced Surface Finishing, Inc. ..... www.advancedsurfacefinishing.com
Deloka, LLC ..... www.deloka.com
Falk Precision ..... www.falkprecision.com
Motion Laboratories, Inc. ..... www.motionlabs.com
Qualicoat, Inc. ..... www.qualicoat.com

North Carolina

R & R Powder Coating, Inc. ..... www.rrpowdercoating.com

Ohio

A Plus Powder Coaters, Inc. ..... www.apluspowder.com
American Woodworking ..... www.americanwoodworking.org
DVUV ..... www.dvuv.com
Greenfield Products, Inc. ..... www.greenfieldproducts.com
PJ's Fabricating, Inc. ..... www.pjsfab.com
Sewah Studios ..... www.sewahstudios.com
Spectrum Metal Finishing, Inc. ..... www.spectrummetal.com
Thomarios ..... www.thomarios.com

Oklahoma

ABITL Finishing, Inc. ..... www.abitl-powder-coating.com
ColorFast Coatings ..... www.ColorFastOK.com
Muskogee Powder Coating ..... www.muskogeepowdercoating.com

Pennsylvania

Advanced Coating Technology ..... www.advancedcoatingtechnology.com
Gill Powder Coating ..... www.gillpowder.com
Ingham's Powder Coating ..... www.inghamspowdercoating.com
Keystone Koating, LLC ..... www.keystonekoating.com
Surtech Industries ..... www.surtech-ind.com

Rhode Island

Teknicote ..... www.teknicote.com

Tennessee

ABJ Custom Powder Coating ..... www.abjcpc.com
Prime Restoration ..... www.primerestore.com
Pro-Kote, LLC ..... www.prokotellc.com

Texas

3P Industries, Inc. www.3pindustries.com
AZZ Metal Coatings ..... www.azzg.com/galvanizing
Coating Specialists ..... www.coatingspecialists.com
Edge Custom Fab ..... www.edgecustomfab.com
Houston Powder Coaters ..... www.houstonpowdercoaters.com
Mansfield Powder Coating ..... www.mansfieldpowdercoating.com
North Basin Coating, Inc. ..... www.northbasincoating.com
Quality Product Finishing, Inc. ..... www.qpfinishing.com

Utah

Powder Coatings of Utah ..... www.pcofutah.com
Silverline Finishing, Inc. ..... www.silverlinefinishing.com

Virginia

ASCO ..... www.asconorfolk.com

Washington

Key Tronic Corp. ..... www.keytronicems.com
Northwest Powder Coatings, Inc. www.manta.com/c/mmlts3j/northwest-powder-coatings-inc
Skagit Powder Coating ..... www.skagitpowdercoating.com

Wisconsin

All-Color Powder Coating, Inc. ..... www.allcolorpowdercoating.com
Classic Coatings, Inc. ..... www.classiccoatings.com
Empire Coatings, LLC ..... www.empire-coatings.com
Everbrite, LLC ..... www.everbrite.com
Jor-Mac Company, The ..... www.jor-mac.com
Kettle Moraine Coatings ..... www.kettlemorainecoatings.com
Nyhus Enterprises, LLC ..... www.nyhusenterprises.com
Schaffer Industrial Finishing ..... www.schafferfinishing.com

Wyoming

Rugged Werx ..... www.ruggedwerx.com

Canada

Aegis Industrial Finishing ..... BC ..... www.aegisfinishing.com
Falcon Powder Coating ..... BC ..... www.falconpowdercoating.com
Monarch Industrial Coatings ..... MB ..... www.monarch-coatings.com
Colourific Coatings, Ltd. ..... ON ..... www.colourificcoatings.com

PCI 3000 Certified companies listed with:
PCI 3000 Certification is an extensive audit program that evaluates a powder coater's business practices, process elements, equipment, and quality control capabilities to produce a high quality powder coated product. Contact PCI at 800-988-COAT for information on certification or visit www.powdercoating.org.

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6540 New Sapulpa Road
Tulsa, OK 74131
Phone: (918)446-5363
www.abitl.com

All-Color Powder Coating Inc.
298 N. Burr Oak Avenue
Oregon, WI 53575
Phone: (608)835-9118
www.allcolorpowdercoating.com

A-Plus Powder Coaters Inc.
1384 Kaufman Ave.
Columbiana, OH 44408
Phone: (330)482-1951
www.apluspowder.com

Georgia Powder Coating
100 Zander Drive
Gainesville, GA 30504
Phone: (770)718-1382
www.georgiapowdercoating.com

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PO Box 3427
Ontario, CA 91761
Phone: (909)947-1122
www.inlandpowder.com

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Lititz, PA 17543
Phone: (717)738-2148
www.keystonekoating.com

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550 Orchard St.
Golden, CO 80401
Phone: (303)278-0406
www.powdercoatingspecialties.com

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8250 East 40th Avenue
Denver, CO 80207
Phone: (303)307-1313
www.qlapi.com

Westside Finishing
15 Samosett St.
Holyoke, MA 01040
Phone: (413)533-4909
www.wsfinish.com

Playing with Color IS SERIOUS BUSINESS

by Paul Mills

When you think of playground equipment, you might envision bright primary colors – a twisty blue slide beside brilliant red monkey bars.

While PlayCore certainly uses many of these traditional, vivid colors in crafting some of the world's most popular play and recreation products, there's also a lot of discussion about the trend toward deeper butterscotch yellows or the shift from tomato-toned reds to those with richer blue hues.

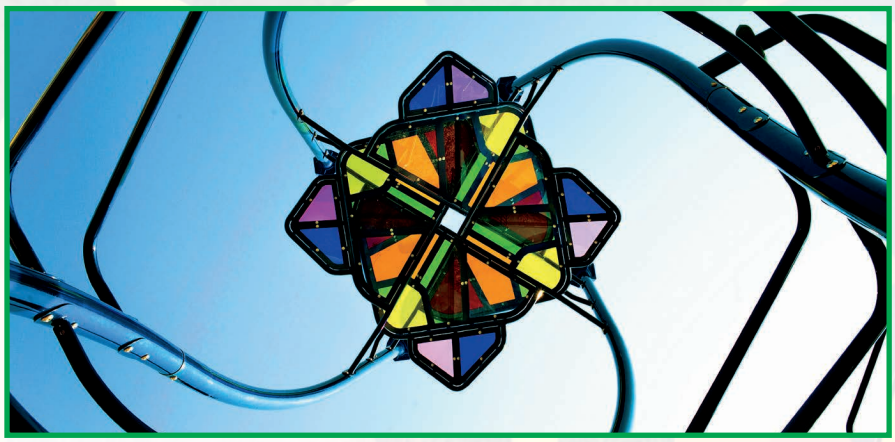
In working with clients like park and recreation directors and landscape architects, the topic often turns to trends in color. "Color plays a huge role in our products," states Anne-Marie Spencer, corporate vice president of marketing for PlayCore. "At a basic level, color creates initial appeal. A playground with creative, fun colors attracts attention and gets people excited," she adds. "But color does so much more. For example, we use color to harmonize with the surroundings, creating an overall aesthetic. There could be a mix of subtle browns or sublime greens that fit a community's preference. On the other hand, a school may want us to use their school colors to help build identity. Tastes are constantly evolving, and we utilize color research, including the published work of color experts such as the Color Institute and Pantone to help us navigate the latest palette trends," explains Spencer.

"We also know that color impacts kids' behavior," continues Spencer. With leading brands such as GameTime, BigToys, Playcraft, Freenotes Harmony Park, and Worlds of Wow, PlayCore thinks of itself as a learning company deeply committed to applied research that helps provide the best play and recreation products for community needs. "When used with intention,

color helps direct a child's attention. For instance, choosing the right colors for treads and risers can help a child more easily navigate a set of stairs. When we watch children play, we see that they use color to help them identify different zones during hide-and-seek, and that color creates visual cues that improve their navigation, physical ability, and other developmental domains. For educators, strategic use of color can help the phys-ed department achieve goals in directing attention to certain components, like with the PlayOn! program, developed with SHAPE America's national fitness standards. We like to say that if 'play is the work of the child,' then color is one of their basic tools."

PlayCore has developed their own sophisticated toolbox to help customers visualize the role of color in their product design. Spencer notes, "Our customers are not always sure about how to use color. The design team system gives them a full 360-degree view that enables them to easily make changes to the palette or add color accents to try on a different look."

Part of the value PlayCore delivers is removing barriers to color and allowing their clients to create a unique design customized to fit their site and express their individuality. Of course, that kind of customization in design requires a flexible production process as well. Each project consists of anywhere from 150 parts for a small bench to well over 1,000 parts for a full-sized play system



that will take up thousands of square feet when assembled. These highly customized projects begin with cutting the metal components that make up each tailored order, measuring and drilling as required, and then welding together a myriad of pieces to create the final shapes. These assemblies can be as large as fifteen feet long, six feet high, and four feet wide, and on an average day, PlayCore powder coats over 2,800 such assemblies.

PlayCore's main powder line is located in the company's 400,000 square-foot Fort Payne, Alabama, production facility, located about an hour south of the corporate headquarters in Chattanooga, TN. The system, originally commissioned and installed by George Koch Sons in 1990, has been continuously improved and upgraded since. Today, the line is staffed by as many as 40 PlayCore operators and technicians, including two lead operators and a paint line supervisor.

At the beginning of the powder process, parts are hung on the line either manually or with the aid of mechanical assistance depending on the part size and weight. At the typical line speed of 11 feet per minute, parts require about an hour and forty-five minutes to complete the nearly 1,200-foot circuit that includes chemical pretreatment, two Nordson powder spray booths (one for primer and one for topcoat) and convection curing. The wide assortment of part shapes and sizes has inspired a range of hook designs engineered to provide uniform coverage, drainage, and stability on the continuously running monorail conveyor system. "Our engineers have been clever and resourceful at designing a system with part fixtures that both increase our efficiency and optimize powder coating uniformity for better performance," explains Michael Cothran, plant superintendent at PlayCore's Southern Fulfillment Center in Fort Payne.

The first stop for fabricated assemblies is the chemical pretreatment process. Depending on the particular design, each PlayCore system can incorporate several different metal substrates, including aluminum, stainless steel, and galvanized steel. These parts often have soils such as

oils, dirt, and smut from manufacturing that need to be removed prior to powder coating. PlayCore uses a four-stage power washer to ensure surface cleanliness with chemistry provided by Madison Chemicals (of Madison, IN). The combination of alkaline cleaners and several rinses provides the corrosion protection needed to withstand the rigors of continued outdoor exposure to sun, rain and snow. After cleaning, the pretreated parts are dried in a gas-fired convection dry-off oven to remove any remaining moisture. Automatic monitoring of the pretreatment process, including coating, line speed, and process temperatures, assure that all parts meet PlayCore's stringent standards.

Next, the powder coating application process begins by applying a 4-6 mil thick primer to all of the welded surfaces in the first application booth. Following the application and cure of the primer coating, a 4-6 mil color powder top coat is applied in a second powder booth. Both the primer and topcoat booths have similar configurations; two successive manual spray stations on each side of the Nordson spray booths. At each manual spray station, operators are equipped with Gema spray guns to uniformly powder coat each part as it travels by. This system allows operators to adjust the spray gun settings to accommodate for changes in powder, part design, and plant conditions.

The majority of PlayCore's parts are coated with TGIC polyester powder supplied by TCI Powder Coatings. To ensure long-term performance, incoming powder is screened for a range of properties, including corrosion resistance, humidity resistance, cure profile, overbake resistance, flexibility, weathering, lead content, specific gravity, recoatability, gloss and color.

"Color is an important element of our product," says Cothran, "and our customer's imagination is the guide! On average, each order uses four to six different colors, but that can vary. Since we are a custom manufacturer all parts are made to order, and we have routinely had orders with many more colors."

To accommodate the high frequency of color changes, PlayCore has developed a procedure that utilizes

an air purge system, so operators can change colors quickly and without risking cross-color contamination. "During each color change, one operator purges the guns and spray equipment while another changes the color hopper," explains Cothran. "We allow enough space on the line when changing colors to ensure that no contamination affects the finished product. The whole process is very efficient, typically taking a total of a minute and a half to change from one color to another." On average, PlayCore changes colors 40 to 50 times each day.

Proper curing is accomplished using a zoned gas-fired convection oven that increases part temperatures in a controlled fashion. First to 350 degrees Fahrenheit for 12 minutes, then 375 degrees for eight minutes and a final bake at 400 degrees for an additional five minutes. After leaving the convection oven, the cured parts are cooled with ambient air and unloaded.

Since powder coating is one of the last steps in the manufacturing chain, as each part is unloaded it is carefully inspected, then bagged or wrapped to prevent damage. The complete set of parts for each order is gathered for shipment to the final destination. PlayCore ships products across the world through a variety of methods and takes care to protect the finish prior to shipping to ensure that each customer is delighted when their play equipment arrives.

Cothran explains that PlayCore takes a number of steps to ensure parts conform to a wide range of high quality standards. "Quality has been incorporated into all aspects of our powder coating process. To assure the highest value and satisfaction for our customers, we manage our quality systems using ISO 9001 guidelines and objectives. Each step of the process is monitored by trained technicians watching for a powder coating process that produces the right hardness, color, gloss, thickness, adhesion, and cure so that each part can deliver long-lasting results." "Our customers invest in a product that is expected to be used by the community for a long time," adds Spencer, "and we are committed to delivering on that expectation."

PlayCore recently achieved PCI 4000 Certification from the Powder Coating Institute, an extensive audit program that evaluates processes and procedures, equipment, maintenance practices and quality control capabilities of a coater to ensure they are capable of producing a high-quality powder coated product.

"Our volume of powder coated parts is increasing as we continue to build our business," says Cothran. "When you visit one of our play and recreation structures throughout the world, you'll notice our commitment to quality," adds Southern Fulfilment Center General Manager, Spencer Cheak. "The community that uses the product on a daily basis counts on us to deliver a smooth, long lasting finish as part of an overall product that stands the test of time. Our teams understand that what we make is used by children and families to promote health, activity, and fun. They take their commitment to these children, families, and communities very seriously."

Cheak points to PlayCore's PCI Certification as evidence of the company's commitment to quality. "We were honored and humbled to receive the Powder Coating Institute's PCI 4000 Certification. To be recognized by a third party for our conscientious manufacturing practices and processes is not only a testament to all the hard work our team puts in to ensure a top-quality product, but an overall assurance of quality that our customers can trust."

Paul Mills is a marketing and business development consultant to industry chemistry and equipment suppliers. He has been a writer for the powder coating industry since 1994. Paul can be reached at 440-570-5228 or via email at pmillsoh@aol.com.

For more information on the companies mentioned in this article, visit their websites:

Gema USA Inc.
www.gemapowdercoating.com

George Koch Sons, LLC
www.kochllc.com

Madison Chemical Co., Inc.
www.madchem.com

Nordson Corporation
www.nordson.com/powder

PlayCore Southern Fulfillment Center
www.playcore.com

TCI Powder Coatings
www.tcipowder.com

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Ask Joe Powder

Rust in Peace

Q Hey Joe:

I am looking at a report that a major company just sent in. The steel parts are showing signs of rust after 24 hours and visible signs of rust after 48 hours in a 5% salt fog solution.

Somewhat new to this world of powder coating – how is this possible? Some holes and slots that have been punched out I can somewhat understand. But when I see aluminum wheels and outdoor items holding up season after season I would have thought the powder coating would hold up longer?

Is there a method of correlation between hours in a salt chamber and what this means to user conditions?

Thanks.

John D

A Hi John,

A properly applied and cured powder coating should last significantly longer than this. Metal cleaning and pretreatment is critical, as is complete coverage. This means the metal must be completely clean – no dirt, oil, fingerprints, etc. Furthermore, a suitable pretreatment must be employed. This can be as simple as a thorough media blast or as complex as a multi-stage phosphate or zirconium/silane process. Expected field exposure dictates the degree of pretreating necessary. Also, if the powder coating isn't completely cured, it will not have the necessary barrier properties to thwart the invasion of water and salt ions through the coating.

Incomplete coverage is an obvious no-no. Standard polyesters should give you a couple years of durability before showing signs of corrosion. Epoxies are significantly better; however, they fade in the sunlight. Hence the best coating systems are comprised of a killer cleaning/pretreatment process followed by an epoxy primer, then an outdoor durable polyester (or even better, a fluoropolymer).

As for correlating salt spray performance to predicting outdoor durability – it's a tricky proposition. Typically, most powders will go 500 hours in a salt fog cabinet before exhibiting any rust. I would guess this equates to somewhere around 18 to 24 months in a continental climate. Coastal environments are much more brutal and harder to correlate. A good epoxy over a good substrate will go 1500 to 2000 hours in salt fog.

I think you have a metal prep and/or process condition problem. Have you checked solvent resistance (an indicator of cure) and film thickness? Let me know, I can offer some suggestions.

Best regards,

– Joe Powder

Oils and Soils

Q Afternoon Joe,

I had a question about powder coating. What is the best powder coating primer to use as a base coat on outdoor iron fencing rails?

We use zinc rich primer as our base and then apply gloss black as a top coat, but the top coat and base are starting to peel off.

Thank you,

Joel M.
Sales/Plant Manager

A Morning Joel,

This sounds like a serious problem. Using a zinc primer should be okay as your base coat (aka primer) as long as it's processed properly. Please ensure that the iron rails are properly prepared before applying the primer. By proper preparation, I am referring to first removing all "oils and soils," then preparing the metal for the best adhesion of the primer. The O&S can be removed by solvent wipe (acetone works well) or alkaline cleaner followed by a clean water rinse. Pretreating the metal is next and can be accomplished by media blasting (remember to use only clean media) or a chemical pretreatment such as iron phosphate or zirconium/silane solution. Clean rinsing with deionized water or water processed through reverse osmosis is recommended to ensure the best surface for the primer to adhere to.

After applying the primer, it is wise to partially cure or "gel" the powder. The best topcoat adhesion is achieved over an incompletely cured primer. So reduce the recommended primer bake time by 50% and proceed to topcoating. Bake the topcoated rails per the recommended powder bake as disclosed on the Product Data Sheet provided by your powder supplier.

If you're still having adhesion issues after following the recommendations above, then I would switch to a non-zinc primer. They work as well as most zinc-rich types and are much easier to spray. In addition, you get significantly more coverage per pound of powder because the specific gravity of a non-zinc primer is considerably lower than that of the zinc rich material. We've seen excellent corrosion resistance of the newer non-zinc primers in our laboratory. Remember that clean, well pretreated metal is essential, as is a partial cure of the primer for optimal intercoat adhesion.

Best of luck,

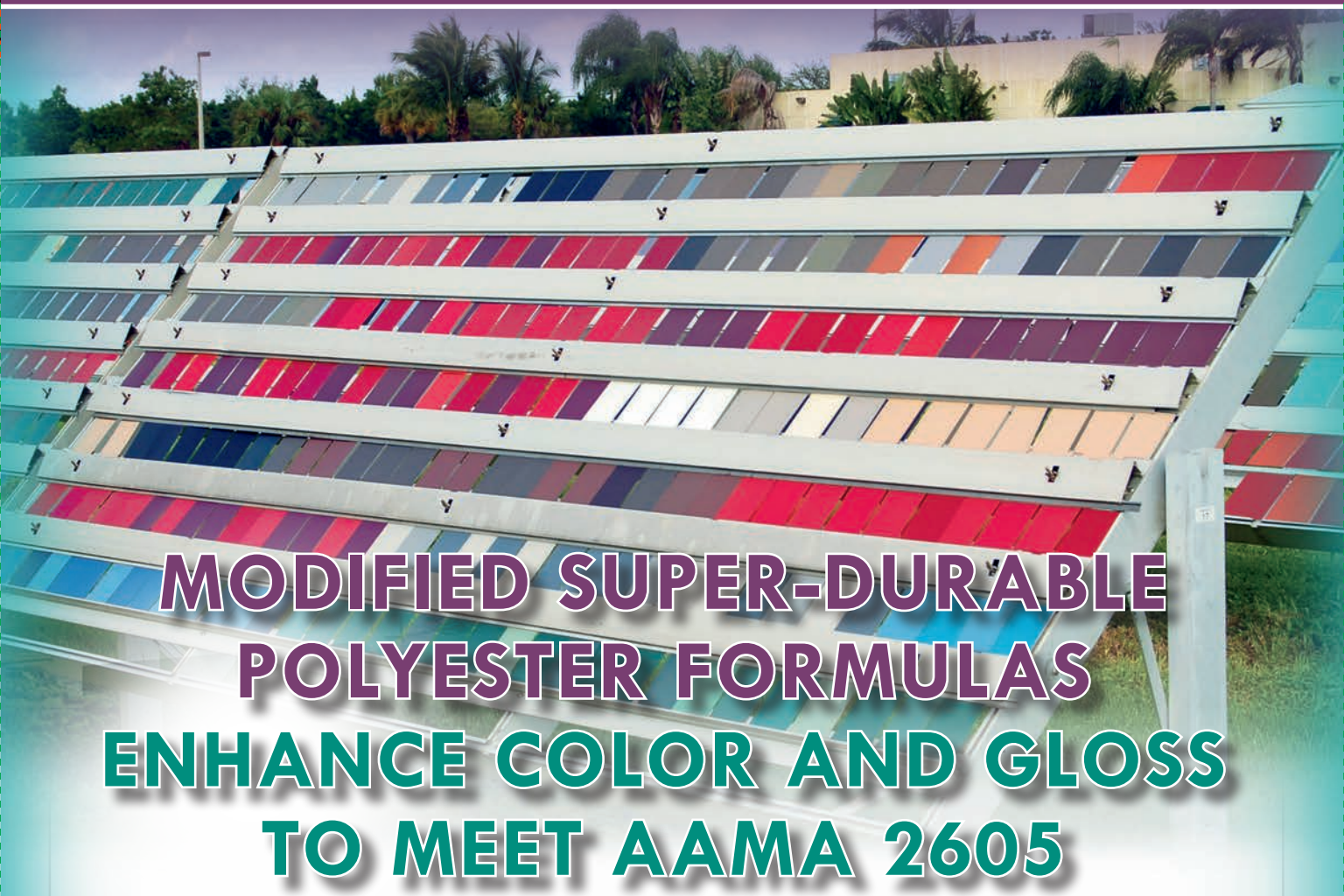
– Joe Powder

Joe Powder is our technical editor, Kevin Biller. Please send your questions and comments to Joe Powder at askjoepowder@yahoo.com.

Editor's Note: Letters to and responses from Joe Powder have been edited for space and style.

Not Your Average Joe...

Each issue, we take the padlock off the PCI® Test-Lab door for a few minutes so our favorite technical editor and "powder guru" Joe Powder can run in the yard. When he's not gnawing on a rawhide bone, he loves to answer readers' questions. Go ahead and send him one at askjoepowder@yahoo.com... he doesn't bite. Maybe it'll end up in the next issue!



MODIFIED SUPER-DURABLE POLYESTER FORMULAS ENHANCE COLOR AND GLOSS TO MEET AAMA 2605

by Hongli Wang, Ph.D. and Shun Saitoh

Photo courtesy Q-Lab Corporation

We often think of technology in terms of software, computers, robotics or other tangible machinery that automates some part of our daily lives.

However, advancements often occur at the atomic or chemical level, bringing us new or improved technologies. Chemists in the powder coating industry continually seek ways to improve the durability and fade resistance of powder coatings. Fluoroethylene Vinyl Ether copolymer (abbreviated as FEVE copolymer) was developed in 1982 by Asahi Glass. FEVE is composed of thermoset polymers, which can be easily processed through the typical thermoset powder coating equipment. Different than polyvinylidene difluoride (PVDF) powder coatings, no liquid nitrogen is needed for obtaining FEVE powders. Thermoplastic PVDF is tricky to process when used as a polymer for exterior durable powder coatings. As a thermoplastic polymer, crystallinity of PVDF changes in the extruder and a managed cooling period is required after compounding. For some applications, such as architectural, this can make FEVE a better choice for powder coatings than other fluoropolymers. FEVE powder coating can be cured at 200 degrees C (392 degrees F) or lower. This is critical for American Architectural Manufacturers Association (AAMA) coatings since aluminum substrates cannot sustain high heat needed by other fluoropolymers, e.g., PTFE and ETFE, for film formation.

FEVE resins have a unique chemical structure, which helps with corrosion, chemical and UV resistance. The vinyl ether groups make FEVE polymers useable as resins for powder coatings by providing high gloss, hardness, transparency, and flexibility, as well as pigment compatibility and adhesion. The vinyl ether groups also allow for functional groups, like hydroxyl groups, to be incorporated into the structure for crosslinkability. Powder coatings based on FEVE have been used in the AAMA 2605 applications.

Over 10 years ago, panels coated with FEVE and super-durable polyester blends were sent to South Florida for outdoor exposure tests (courtesy of Royal DSM N.V.). Gloss and color retention were measured over the duration of the tests. The results are promising for those advocating greater expansion of super-durable polyester powder use in the AAMA 2605 architectural coatings market.

FEVE and Polyester Blend Formulations and the Coating Process

Formulations of typical FEVE white powder coating are shown in Figure 1. In the FEVE/polyester blend formulation, FEVE is substituted with up to 50% by weight of super-durable polyester. The same process conditions for pure FEVE powder coating can be applied to the blends. FEVE and polyester resins are pre-blended together with other ingredients. Extrusion can be done on a twin-screw extruder. Extrusion conditions are: 120 degrees C, 250 rpm, and 50% shear. After milling and sieving, formulated powders are electrostatically coated on the substrate and the coated panels are cured at 200 degrees C for 20 min.

Ingredients	Description	Parts by Weight
FEVE	resin	56
B1530	cross linker	13
BYK360P	flow agent	2
Benzoin	degassing agent	0.4
R960	TiO_2	35
Tinuvin 144	UV stablizer	0.52
Tinuvin 405	HALS	1.04
DBTDL 1/100	catalyst	0.21
Total		108

Figure 1. FEVE white powder coating formulations.

In high durable exterior coating applications, it is a challenge to formulate coatings containing high levels of titanium dioxide (TiO_2). In this case, the detrimental effect of TiO_2 in resin degradation through photocatalytic reaction outweighs the positive role of TiO_2 as a UV absorber. In general, it is even more challenging to formulate powder coatings with high TiO_2 loading than liquid coatings for high durable exterior applications due to the process difference.

Coating Gloss and Accelerated HE-XWM Weathering Test

Gloss is a measure of coating smoothness on the optical scale of 0.5 micron. In AAMA 2605 standards, gloss retention needs to remain 50% or more after exposure to the South Florida weathering test for ten years. To speed up the weathering process, accelerated weathering tests like QUV and Xenon Arc, are normally used for product development. Correlating the results of accelerated tests to natural exposure is challenging.

Coating durability is interpreted by appearance (gloss and color) retention, not degradation (weight loss) even though the latter influences the former. The degree of

influence can vary depending on the grades of TiO_2. As resin degrades on the coating surface, it erodes from the paint and is washed out through cleaning or rain. As a result, Pigment Volume Concentration (PVC) increases and gloss drops. The gloss decrease is especially severe as PVC passes CPVC (Critical Pigment Volume Concentration). Any property of TiO_2 or coating film which affects CPVC will also affect the relationship of resin degradation and gloss reduction.

Accelerated exposure tests were done through a Hybrid Exposure Xenon Weather Meter (HE-XWM), a method developed by Toyota Central R&D Labs., Inc. Testing results from the hybrid system have a very good correlation to the results of South Florida exposure. This is especially true for coatings with high TiO_2 content. Unlike the traditional QUV and Xenon Arc accelerated tests, coating under the hybrid test is also subject to hydrogen peroxide spray. H_2O_2 reacts with electrons being generated through a TiO_2 photocatalytic reaction on the coating surface, producing HO• radicals. HO• radicals contribute to resin degradation. As a result, the radical level is much higher under the hybrid testing conditions than the traditional exposure tests without H_2O_2. The extra free radicals accelerate the degradation rate of the coatings. The total testing time of the hybrid system is only two hundred hours. Unlike QUV or other traditional accelerated weathering tests, HE-XWM test measures coating degradation through TiO_2 photocatalytic reaction.

Correlation of HE-XWM Gloss Retention to Coating Morphology

Figure 2 shows the results of gloss retention at 60 degrees of FEVE/polyester blend powder coatings after being exposed to accelerated HE-XWM and Okinawa natural exposure. Weathering conditions in Okinawa are

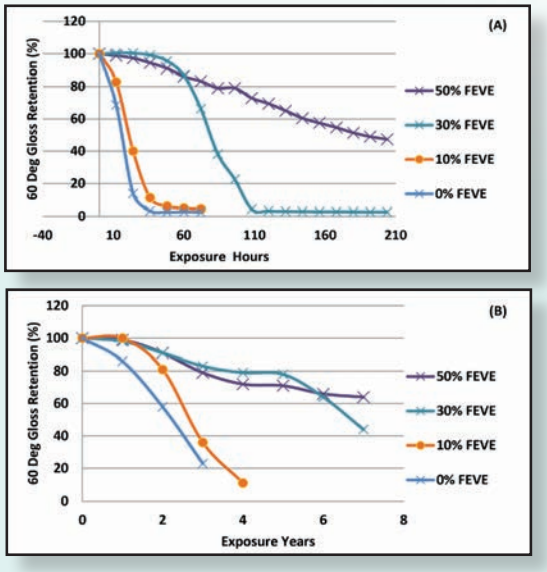


Figure 2. Gloss retention of FEVE/super-durable polyester formulations with different blend ratio (A) HE-XWM and (B) Okinawa.

very similar to South Florida. Results from HE-XWM and Okinawa natural exposure show a good correlation. Super-durable polyester is used in the FEVE/polyester powder blends based on the formulations from Figure 1. FEVE is substituted by polyester up to 50% by weight, which improves the gloss retention of the polyester. Formulations with 50% super-durable polyester result in the best gloss retention. After 200 hours of HE-XWM exposure, the gloss retention remains at 50%. Gloss retention of the same formulation is 64% after being exposed in Okinawa for 7 years.

Performance of the FEVE/polyester blends depends on the choice of the super-durable polyester. Not all super-durable polyesters can be modified by FEVE for an improved performance. The solubility parameter of polyester must be different than that of FEVE. The bigger the difference, the better the chance to achieve the desired structure. Qualified polyester candidates include Uralac® P1550, P1651, P1680 and CRYLCOAT® 4890-0.

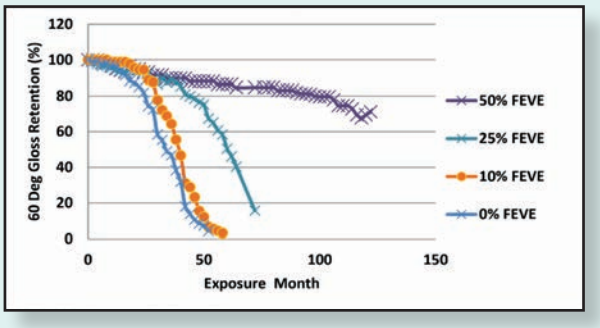


Figure 3. South Florida gloss retention of FEVE/ Uralac® P1550 formulations with different blend ratio.

Fifty percent Uralac® P1550 blending with FEVE passed the ten-year South Florida exposure test with gloss retention above 50% (Figure 3).

Coating morphology analysis was performed using scanning electron microscopy coupled with energy dispersive x-ray spectroscopy (SEM/EDX). Elemental mapping mode is used to test the coating cross section to detect phase separation, and spot mode in EDX is used to detect fluorine (F) and titanium (Ti) on the coating surface. The ratio of normalized atomic percent of F and Ti is used for data analysis.

As seen from Figure 3, when different amounts of FEVE are blended into polyester, cross section coating morphology changes. As learned from Figure 2, formulation with 50% of FEVE shows the best gloss retention. The morphology difference of this formulation, as observed from Figure 4, is a F-rich clear layer formed on the surface of the coating.

In Figure 5, both Formulation A and B contain 50% FEVE. The F-rich clear layer in Formulation A is thicker than that of Formulation B. The F to Ti ratio (F/Ti) of

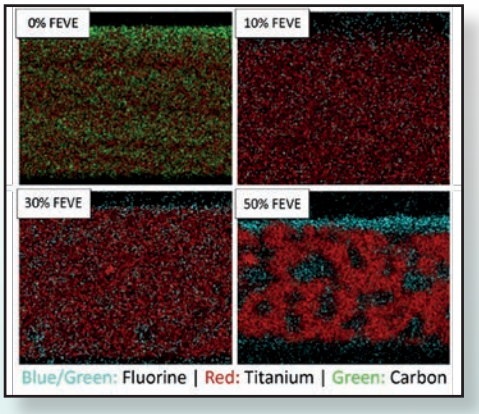


Figure 4. SEM/EDX of coating cross section.

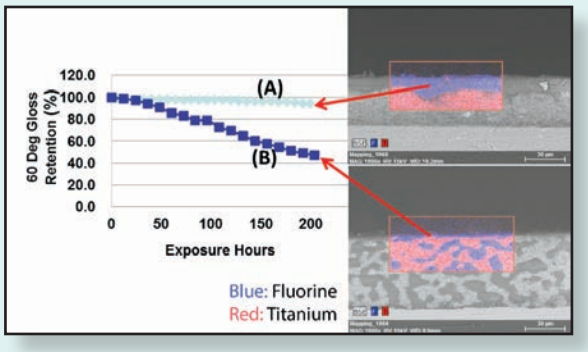


Figure 5. Correlation of HE-XWM gloss retention to coating morphology.

the two formulations detected by EDX using spot mode is different. Surface F/Ti is 32.22 for Formulation A and 9.34 for Formulation B. The thicker the clear FEVE layer, the bigger the F/Ti surface ratio, the better HE-XWM gloss retention.

Possible reasons for the contributions of the surface FEVE layer to gloss retention are:

- TiO_2 photocatalytic reaction is a statistical event. Since little Ti was detected in the top F-rich layer, the probability of indirect resin degradation through TiO_2 photocatalytic reaction on the coating surface is reduced. Indirect resin degradation through TiO_2 photocatalytic reaction is considered as the primary reason for degradation of coatings with resins which are UV stable inherently.
- FEVE is transparent to UV light. But the intensity of the light declines logarithmically due to absorption by resin. In the stratification structure of FEVE and polyester, even though UV can reach to TiO_2 below the F-rich clear layer, its intensity drops.
- The F-rich top layer serves as a barrier for moisture and oxygen, which are the necessary elements for a photocatalytic reaction to happen.
- Even if a photocatalytic reaction happens below the coating surface, it will not impact the surface CPVC, thus limiting the impact on gloss.

When there is stratification structure achieved in the FEVE/polyester blends, dependence of coating durability on the type of TiO_2 is reduced. Most commercially available durable TiO_2 are qualified (Figure 6).

AAMA has three specifications for superior performing organic coatings applied to aluminum extrusions and panels for architectural products: AAMA 2603, AAMA 2604 and AAMA 2605, which is the highest standard. These three specifications apply to progressively stronger levels as indicated by South Florida outdoor exposure and laboratory accelerated testing results. Super-durable polyester powder is widely used in applications which qualify AAMA 2604. FEVE resin is currently the only crosslinking and powder coating process-friendly fluoropolymer which can pass AAMA 2605. Testing shows coatings based on FEVE resin can provide excellent weatherability, corrosion and chemical resistance due to the unique chemistry of the resin. FEVE can form a cost and performance synergy with super-durable polyester through a simple blending process. Coatings based on the FEVE/polyester blends pass the gloss and color retention requirements after exposure to the South Florida weathering test for ten years. This technology makes it possible for a super-durable polyester powder formulation to be modified to pass AAMA 2605 specifications, which is an exciting opportunity for the powder coating market.

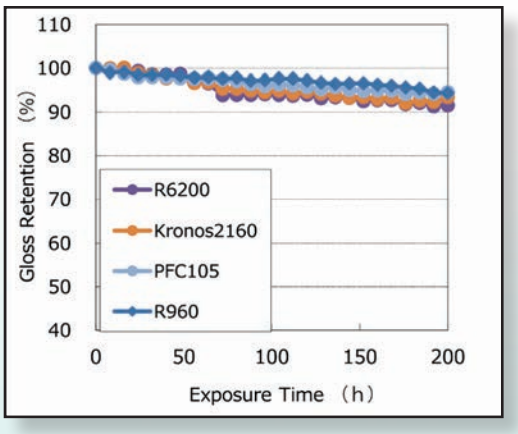


Figure 6. HE-XWM gloss retention of FEVE/ super-durable polyester blends with 50% super-durable polyester using different TiO_2.

Hongli Wang is a senior technical development engineer with AGC Chemicals Americas, USA and Shun Saitoh is a research and development manager at AGC Chemicals, Tokyo, Japan.

Special thanks to Royal DSM N.V. for their assistance with this article.

2018 PC POP QUIZ

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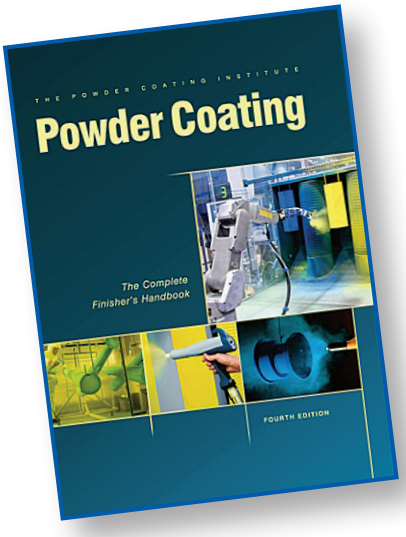


Test your powder coating knowledge interactively with others in our industry and enter for a chance to win a PCI long- or short-sleeved t-shirt!

How it works: We've developed questions that test your powder coating knowledge using a copy of *Powder Coating: The Complete Finisher's Handbook.* PC Pop Quiz questions can be found in each issue of *PCT.*

Put on your thinking cap and then email your answer to editor@powdercoating.org using the subject line "PC Pop Quiz." All correct answers received by the deadline will be entered in a drawing to win an official PCI long- or short-sleeved t-shirt! In each subsequent issue of the magazine, the correct answer and the lucky winner's name will be published.

True or False:

The pigment volume concentration (PVC) in powder coatings is relatively low compared to liquid coatings and seldom exceeds 25%.

Deadline: August 4
Email editor@powdercoating.org
by August 4
for your chance to win!

Good luck!

Brought to you by Nordson

The question for the May/June edition of PC Pop Quiz, along with the answer is:

Q: True or False: Powder coatings are VOC free.

A: The answer is: False. You will often see powder coatings touted as "VOC free." However, that isn't quite accurate. On page 246 of the Powder Coating Handbook you will read that under enhanced conditions, powder coatings as a whole are not VOC free, but because of very low VOC content, powder coating will remain the Best Available Control Technology (BACT) for air pollution. It is more accurate to refer to powder coatings as "virtually VOC-free."

The number of respondents we get for PC Pop Quiz continues to grow! We appreciate all those who took the time to participate.

This month's winner is: Todd Carvell, Keystone Koating, Lititz, PA. The t-shirt you selected is on its way.

Congratulations!

Formulating for Appearance: Colorant Pigments

By Kevin Biller

There are two primary reasons to coat an object – to protect and to beautify. The inclusion of color into a formula satisfies the latter objective.

Before delving into the particulars of pigmentation, a few definitions are in order. Colorant pigments are sometimes referred to as prime or opacifying pigments. Prime pigment differentiates these materials from extender pigments, also known as extenders or fillers, which are used to lower formula costs. Extender pigments ideally impart little or no extraneous effects to the coating including color or opacity. Opacifiers by definition obscure or cover a substrate. Colorant pigment, prime pigment and opacifier are synonymous and can be used interchangeably. We'll use the general term pigment to describe colorant pigments.

What is a Pigment?

Pigments are small, insoluble particles that provide color and opacity. Dyes also provide color; however, they are differentiated from pigments because of their solubility in polymers. Pigment particles provide color and opacity by being dispersed in a medium such as a powder coating binder. Dyes are used in some powder coatings; however, it is relatively uncommon mainly due to their typical lack of opacity and UV durability.

Both pigments and dyes provide color because they inherently absorb certain wavelengths of visible light (ranging from approximately 380 to 730 nanometers). This absorption is observed then processed by the human eye and is interpreted by what humans describe as color. The general range of wavelengths of visible color is depicted in Table 1.

Because pigments are comprised of relatively small particles, they tend to form agglomerates in their natural state. The incorporation of pigments into powder coating binders therefore requires deagglomeration to achieve optimal color development and opacity.

Table 1. The Visible Light Spectrum.

Color	Wavelength Range (nanometers)
Red	700 to 635
Orange	635 to 590
Yellow	590 to 560
Green	560 to 490
Blue	490 to 450
Violet	450 to 400

This deagglomeration occurs through the extrusion process and provides an even dispersion of the pigment particles throughout the powder binder.

The original pigments and dyes used to color paints and coatings were found in nature and consisted of metal oxides found in the earth (e.g. iron oxide) and plant-based compounds (e.g. chlorophyll). These materials varied in quality and purity and are no longer used in industrial coatings.

Organic vs. Inorganic Pigments

The colorant pigments used in powder coatings are synthetically produced and are either organic or inorganic in nature. A number

of distinctions exist between these two classes of materials. Organic pigments tend to provide bright, intense color, whereas inorganic pigments are typically duller and less vibrant. Inorganic pigments are typically based on simple or complex metal oxides and have higher specific gravities and usually lower oil absorption than their organic counterparts. Table 2 depicts some general differences between organic and inorganic pigments.

Color Index

Colorant pigments are classified by a convention established jointly by the Society of Dyers and Colourists (SDC) in the United Kingdom and Association of Textile Chemists and Colorists (AATCC) in the United States. Color Index refers to this system and represents the most commonly accepted taxonomy format in powder coating formulation. The system uses the following format: the prefix is comprised of the first letter "P" which signifies pigment and the subsequent letter(s) identify the color. This prefix is followed by a number, sequentially assigned by when the pigment was recognized by the governing groups. Table 3 shows the most common prefixes used in powder coating formulation.

Pigment Requirements

Besides providing color, pigments must meet the following criteria to be used in powder coatings.

Heat Stability

Not only must they endure the elevated temperatures of the extrusion process, they must also maintain their color and integrity at the bake conditions experienced on the applicators' finishing line. In some cases, pigments must also maintain performance at elevated service temperatures to which a coated object is subjected (e.g. exhaust parts, grills).

Ease of Dispersion

Prime pigments are dispersed throughout the binder during the extrusion process. Pigments are

Table 2. Organic versus Inorganic Pigments: General Characteristics.

Property	Organic	Inorganic
Hue	Clean, Bright, Vibrant	Dull, Less Intense
Specific Gravity	1.2 to 2.9	2.9 to 6.1
Cost	Moderate to High	Low to Moderate
Oil Absorption	Higher	Lower
Particle Size	Smaller	Larger
Color Range	Extensive	More Limited
Heat Stability	Poor to Moderate	Moderate to Excellent
Weathering Resistance	Poor to Very Good	Moderate to Excellent

Table 3. Color Index Prefixes for the Most Common Pigments Used in Powder Coatings.

PB: Pigment Blue	PO: Pigment Orange
PBk: Pigment Black	PR: Pigment Red
PBr: Pigment Brown	PV: Pigment Violet
PG: Pigment Green	PW: Pigment White
PM: Pigment Metal	PY: Pigment Yellow

typically received as agglomerates of primary particles. These agglomerates need to be fractured to provide the most color development. Some pigments are readily dispersed under standard processing conditions, while others are more difficult to disperse.

Non-toxicity

From their inception, powder coatings have been touted as being not only environmentally friendly but also safe to handle. In concert with this theme, the majority of powder formulators have historically avoided using toxic raw materials. A number of pigments exist that are relatively toxic. These include certain metal oxide compounds, such as chrome, lead, cadmium, and molybdenum. Organic pigment technology has given the formulator suitable replacements for all the toxic inorganic pigments. Consequently, toxic pigments are seldom, if ever, found in a powder coating formula.

Pigment Characteristics and Performance

Hue

This characteristic refers to the color of the pigment.

Chroma

This characteristic describes a pigment's brightness or intensity of color.

Tint Strength

This characteristic refers to how much color a given amount of pigment provides when mixed with a white pigment such as titanium dioxide.

Metamerism (metameric failure)

This refers to the phenomenon where a color varies under different light sources. Colors may be perceived to match under one light

but not another. For example, two colors may appear to match under fluorescent light but not sunlight or hal opacify. Some suppliers refer to their pigment grades as transparent or opaque. Higher concentrations give more hiding, usually with increased raw material cost, and in some cases reduced coating smoothness. Opacity can be measured by coating a specialized black and white test panel (see ASTM D6441 test method) at a prescribed film thickness, then observing the color difference between the black portion and the white portion of the panel.

Weatherability

Some pigments can degrade when exposed to environmental elements, whereas others are quite robust. Suppliers qualify their pigments by lightfastness, which is an indicator of resistance to UV light. However, other environmental factors, such as acid rain resistance and corrosion resistance, may need to be evaluated.

Specific Gravity

Powder coatings are sold by weight but used by volume. Higher specific gravity raw materials increase the specific gravity of the finished powder. Higher specific gravity powders in turn provide less coverage per pound (or kilogram) for the applicator. It is important to take this into account when formulating a powder coating. Most organic pigments are relatively low in specific gravity (< 1.8) whereas the inorganic pigments tend to be higher in specific gravity (1.8 to 5.7).

Oil Absorption

This can be defined as how many grams of oil (similar in nature to resin) can be absorbed by 100 grams of a given compound. The oil used in testing has been standardized. Most methods use n-dibutyl phthalate. Details can be found in ASTM D285 or ASTM D1483 test methods. Oil absorption is an important property when formulating a powder coating, as higher oil absorptive materials restrict the melt flow of a powder coating, which can increase the texture of the finished coating.

Cost

In this competitive world it is paramount to provide your customer with a good performing product at a reasonable price. It is therefore requisite to establish an optimum price-performance balance.

Formulating with Colorant Pigments

In nearly all cases, prime pigments are more expensive than the binder system of a powder coating. Therefore it is very important to control the

concentration used in a formula. A formulator strives to provide acceptable hiding at a reasonable coating thickness, which requires a certain minimum concentration. Levels beyond this concentration unnecessarily increase formula raw material cost and can reduce the overall profitability of the powder. Moreover, the smoothness of the coating is usually reduced with higher-than-needed levels of prime pigments. This is because most prime pigments possess a relatively high oil absorption rate.

A reasonable film thickness is roughly 1.5 to 2.5 mils (38 to 55 microns). Difficult hiding colors such as bright yellows and oranges sometimes require thicker films (2.5 to 3.0 mils – 55 to 75 microns) to provide acceptable hiding and appearance.

The ranges noted in Table 4 to the right are merely guidelines. Most formulas require a mixture of prime pigments to achieve the desired color. These mixtures may involve the use of both inorganic and organic pigments of varying strength. It is also very common to incorporate some titanium dioxide and black pigment as an undertone. It is always a good idea to ascertain the hiding of a formula before submitting it to a customer.

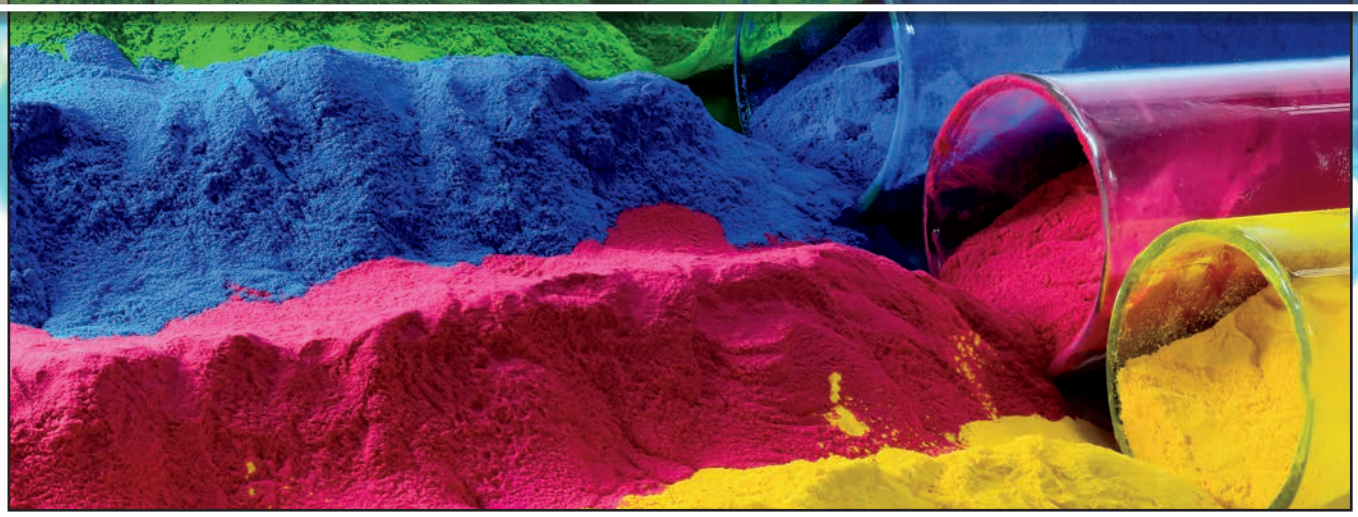
Organic pigments tend to produce the brightest, cleanest colors. They also are usually more expensive than inorganic pigments. It is therefore wise to try to achieve a color using lower cost inorganic pigments where possible. For instance, when shading a pastel color such as a beige, choose a mixture of lower cost yellow and red oxides rather than the more expensive organic red and yellow.

Tinting versus Solid Colors

Choice of colorant pigment is influenced by a formulator's goal in developing that color. When producing vibrant solid colors, the first choice is usually a strong, clean, organic pigment. Whereas when tinting a pastel color, it is usually more practical to incorporate a weaker tint strength material such as an inorganic pigment into titanium dioxide. When tinting, it is very important to adequately disperse and distribute the tint pigments throughout the powder. Strong pigments provide intense color at low concentrations. It is more difficult to ensure that low concentrations are evenly distributed throughout your powder coating. Weaker pigments by their nature require

Table 4. Typical Concentrations of Common Prime Pigments in Powder Coatings.

Pigment	Type	Concentration by Weight
Carbon Black	Organic	0.7 to 3.0%
Carbazole Violet	Organic	3.0 to 5.0%
Phthalo Blue	Organic	1.0 to 4.0%
Phthalo Green	Organic	1.0 to 4.0%
Red Oxide	Inorganic	5.0 to 10.0%
Yellow Oxide	Inorganic	10 to 15%
Red	Organic	5 to 10%
Orange	Organic	12 to 20%
Yellow	Organic	12 to 20%
Pastel Shades	Inorganic	12 to 20%
Titanium Dioxide	Inorganic	30 to 40%



higher concentrations that are easier to distribute throughout the coating during manufacture.

Some formulators choose to pre-blend tinting pigments to ensure more even distribution in their powders. Pre-blending or master-batching involves mixing prime pigment with either a white pigment (usually titanium dioxide) or an extender pigment. Concentration of the prime pigment in the master-batch can practically range between 1.0 and 10.0%.

Satisfying a color requirement is a balancing act involving both artistic ability and knowledge of science. Blending a few pigments to match a color takes a good eye for color in concert with a strong technical appreciation of the pigments selected. Formulating a good color match achieves the beauty aspect of a coating.

Kevin Biller is technical editor of Powder Coated Tough *magazine and president of The Powder Coating Research Group. He can be reached via email at kevinbiller@yahoo.com.*

Spotlight Profiles >> Powder Producers

From functional powder coatings for protective purposes to powders that are used for decorative applications where color, gloss and appearance are the primary attributes, powder coating technology continues to change and improve. The selection of a coating should be undertaken as a cooperative effort between the end user and the powder formulator. A variety of coating types are available, each with its own strengths and weaknesses. This advertising section highlights some PCI members that produce and/or distribute powder coatings. Be sure to let them know you found them in *Powder Coated Tough*!

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Spotlight Profiles >> Raw Materials

Creating robust powder formulations requires a vast library of ingredients. Formulators must learn about and choose from many different components such as resins, pigments, extenders and other additives to achieve the end-use goals for the formula. PCI's raw material suppliers offer solutions to address various product characteristics like gloss, smoothness, film thickness, corrosion resistance, weatherability, smoothness, color, texture, cure temperature, and edge coverage, among many others. This advertising section highlights PCI's raw material and chemical companies who produce products for powder formulators. Be sure to let them know you found them in *Powder Coated Tough*!

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Price Increase Mania

Over the last 12 months, powder producers have been getting hammered with raw material price increases. The latest slew started last spring when the titanium dioxide producers raised prices about $300 per ton (about 14 cents per pound). Titanium dioxide is the pigment that makes everything white, including the majority of powder coatings used in the appliance and architectural markets. Reasons for this revolve around tightened supply due to the revamping of a number of rutile TiO_2 sulfate process plants in China as their government imposes stricter and stricter environmental regulations. This, coupled with increased worldwide demand led by China and India, caused a tightening in the supply of titanium dioxide.

Next, the polyester resin suppliers foisted a modest 4 to 7 cents per pound increase last fall due to an increase in their raw material prices. Hurricane Harvey had thrown the polyester monomer supply off a bit and freight costs were creeping up due to an increase in fuel prices. Polyester resins represent approximately 65% of the base resin used in powder coating products. This accounts for the resin in polyester powder coatings (TGIC and HAA), polyurethanes, and the polyester resin within hybrid formulations.

Then earlier this year, powder coating raw material supply chains were hit with a 24 to 31 cents per pound increase by their epoxy resin suppliers. Reasons given were price increases in key raw materials used to make epoxies. The majority of epoxies used in powders are comprised of two components: Epichlorohydrin and Bisphenol A (BPA). BPA prices have continued to climb due to tight supply and strong demand. China has levied anti-dumping tariffs on Thai-produced phenol, the feedstock for BPA. BPA is a main component in epoxies used in coatings, adhesives, sealants and composites. Just as important, it is the key component in polycarbonate polymers used in electronics, construction materials, automotive components and aviation products. Epoxy resins represent about 20% of the base resins used in conventional powder coatings and nearly 100% of the base resins used in functional powder coatings applied to pipelines and rebar.

So how does this affect the powder coating market? Obviously, the cost to produce a pound of powder has dramatically increased in the past year, and it does not appear that these increases will reverse. While polyester prices may stabilize due to the calming of supply logistics, the price of epoxy resins and titanium dioxide will remain high. The supply of both of these key powder formulation components will remain tight and the demand for them will continue to increase, especially in the Asia Pacific region.

Analysts predict a coatings compound annual growth rate (CAGR) of 6.7 to 7.0% in China and India respectively, whereas the CAGR in North America is a more modest 3.2 to 3.5%. Because of this, an interesting trend has developed. The amount of goods exported from Asia to North America and Europe is declining as the consumption of goods rises in Asia. So production of key raw materials that transitioned 10 to 15 years ago from North America to Asia is now targeted for increased domestic consumption as opposed to export to Western nations.

The long-term effects of these developments are unknown and the burgeoning saber rattling of an evolving trade war between the U.S. and China will add instability and uncertainty to the supply chains that feed the powder coating industry. So far, the U.S. has declared steel and aluminum tariffs mainly directed at China, and China, in turn, has listed 106 product categories slated for tariffs in retaliation. These specialty products range from soybeans to beef to vehicles to an array of specialty chemicals. None of the products listed appear to directly affect the powder coatings industry.

Currently, most powder raw materials produced in China are slapped with a 6.5% tariff. Interestingly, a key ally, South Korea, has had tariffs for the same raw material classes gradually lifted over the past few years, putting them in a stronger position to compete with China.

The powder coating industry is reacting to these developments in their supply chain by increasing pricing of their product lines. Jotun Powder Coatings recently announced an up to 20% across the board price increase. Stateside, other powder producers have followed suit. Looks like the cost of doing business just went up.

Kevin Biller is technical editor of Powder Coated Tough *and the president of The Powder Coating Research Group. He can be reached at kevinbiller@yahoo.com.*

Product Showcase

At ***Powder Coated Tough***, we recognize how important it is to find just the right equipment and services to help your facility run smoothly. This section is designed to showcase the latest products launched by companies working in and around the powder coating industry. All we ask is that when you contact them for more information, let them know you found them in PCI's official publication, *Powder Coated Tough*. If you want to see your new product featured in this section, send your digital press release to editor@powdercoating.org.

Heraeus Launch ATEX Approved Gas Catalytic IR Heaters for Use in Hazardous Environments

Engineers from Heraeus have created a range of heaters that are certified to ATEX II 2G standard.

Equipment in this category can be used in above ground areas in which explosive atmospheres caused by gases, vapors, mists or air/dust mixtures are likely to occur. This development further extends the range of areas in which the advantages of gas catalytic IR can be realized. These include operating costs being reduced by up to 50%, a smaller footprint, improved quality and increased production capacity.

Heraeus Noblelight
www.catalyticovens.com

Color Express™ Powder Program Helps Coaters Improve Operations through Mobile Matching Technology

Sherwin-Williams has announced a new program designed to reduce the time it takes for powder finishers to match, receive, and apply powder. The Color Express program utilizes an affordable hand-held reader to match color against powder products stocked at distribution centers and available at more than seventy Sherwin-Williams locations across North America. The combination of digital technology and locally stocked products can reduce the matching process from weeks down to a few days.

"Our customers often tell us the first shop to match a color wins the job," said Tabitha McLeish, global product line director for Sherwin-Williams. "Pairing digital color matching technology along with Sherwin-Williams' localized support and inventory can add speed to job coaters' operations that can immediately have a positive impact on their business."

Technology to measure and match color has been available for some time. Devices, such as a spectrophotometer, can effectively measure and match color right on-site. However, investing the space and the capital for purchasing and maintaining the equipment just isn't possible. With advances in technology, portable, accurate, and affordable color matching devices are now an option for any operation.

The Sherwin-Williams ColorReaderPRO, powered by Datacolor, allows coaters to incorporate digital color match technology into their operation. The device is simple, self-contained, and calibrated on-site.

Sherwin-Williams
oem.sherwin-williams.com

Kevin Coursin

You Are Not Alone

Sometimes we feel like the Tom Hanks character, Chuck Nolan, in the 2000 movie *Castaway,* where he is stranded alone on a Pacific island after a plane crash. He has no one to talk to except a Wilson volleyball on which he paints a face. If you are new to the powder coating industry it can sometimes feel that you are all alone without anyone to talk to. I want to assure you that this is not the case. One of the major reasons PCI exists is to help anyone with questions on powder coatings, equipment, or best practices.

A younger colleague of mine once told me that he was amazed by the "institutional knowledge" of all his experienced co-workers. I thought about this and agreed this group represented an impressive collective knowledge pool. However, if you look beyond the experience in your own company to an association like PCI, that pool of collective institutional knowledge becomes an ocean of member expertise. And, it's expertise they want to share with others. This is one of the best benefits a PCI membership brings to each member and member company. PCI offers the opportunity to share collective knowledge through workshops, technical conferences, articles in *Powder Coated Tough* magazine, networking, and more.

PCI and its collective membership are here to help and share with you. If you have been in the industry for many years like me, the best thing you can do to help someone new to powder coating is to encourage them to join PCI and take advantage of the many benefits offered by the organization. With the support of PCI we can help newcomers gain that "institutional knowledge."

Remember, you are not alone on an island like Tom Hanks! Allow your fellow PCI colleagues to be your Wilson, giving you comfort and companionship on your journey through your powder coating career.

Kevin Coursin is General Manager of Operations at George Koch Sons, LLC. He can be reached at kcoursin@kochllc.com.

ITPS
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International Finishing & Coatings Summit

ITPS and IFCS are executive level summits designed to bring upper management from manufacturing plants and industry suppliers together for networking and information exchange.

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- Cybersecurity
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American Powder Coatings	630-762-0100	www.americanpowder.com	35
Arkema Coating Resins	919-469-6837	americas.arkemacoatingresins.com/en	15
Axalta Coating Systems	800-247-3886	www.axaltacs.com	26
Bulk Chemicals, Inc.	610-926-4128	www.bulkchemicals.us	39
Col-Met Engineered Finishing Solutions	972-772-1919	www.colmetsb.com	31
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Fischer Technology, Inc.	800-243-8417	www.fischer-technology.com	10
General Fabrications Corporation	800-874-7939	www.gfcfinishing.com	38
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Pneu-Mech Systems Mfg., Inc.	800-358-7374	www.pneu-mech.com	36
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Stepan Company	847-446-7500	www.stepan.com	24
Therma-Tron-X, Inc.	920-743-6568	www.ttxinc.com	9
Troy Chemical Industries, Inc.	440-834-4408	www.troychemical.com	44
Wagner Systems, Inc.	800-473-2524	www.wagnersystemsinc.com	14

PREFERRED SUPPLIERS GUIDE

Make these members of The Powder Coating Institute your preferred suppliers! The following list of companies represents suppliers who know the value of PCI® membership. Organized by category, the following suppliers can help you with your powder coating needs. Members as of June 11, 2018.

Auxiliary Equipment

- ACT Test Panels, LLC ..... www.acttestpanels.com
- Custom Fabricating & Supplies ..... www.customfabricate.com
- DeFelsko Corporation ..... www.defelsko.com
- Echo Engineering & Production Supplies Inc. ..... www.echosupply.com
- Pt Baker Perkins ..... www.bakerperkins.com
- Pt EPSI Masking Solutions ..... www.epsi.com
- BUSS USA ..... www.busscorp.com/en
- BYK-Gardner USA ..... www.byk.com
- Caplugs/Shercon ..... www.caplugs.com
- Datapaq - Fluke Process Instruments ..... www.flukeprocessinstruments.com
- Elcometer, Inc. ..... www.elcometerusa.com
- Fischer Technology Inc. ..... www.fischer-technology.com
- Heraeus Noblelight America LLC ..... www.heraeus-thermal-solutions.com
- IPCO ..... www.ipco.com
- Kolene Corporation ..... www.kolene.com
- Magic Rack / Production Plus ..... www.magicrack.com
- MAXAIR Systems ..... www.maxair-systems.com
- Mighty Hook, Inc. ..... www.mightyhook.com
- MOCAP ..... www.mocap.com
- Pollution Control Products ..... www.pcpconline.com
- Pretreatment Equipment Manufacturing, Inc. (P.E.M., Inc.) ..... www.spraywand.com
- Richards-Wilcox, Inc. ..... www.rwconveyor.com
- RollSeal ..... www.rollseal.net
- TQC-USA, Inc. ..... www.tqc-usa.com
- Uni-Spray Systems, Inc. ..... www.uni-spray.com

Consultants

- Powder Coating Research Group, Inc. ..... www.powdercoatingresearch.com
- Throughput / Bluestreak ..... www.go-bluestreak.com/PCI
- Pt Danick Specialties & Support Inc. ..... www.danickspecialties.com
- Alabama Power Company ..... www.alabamapower.com
- Chemark Consulting Group, Inc. ..... www.chemarkconsulting.net
- Georgia Power Company (Customer Resource Center) ..... www.gpc.com
- Industrial Finishing Solutions LLC ..... www.askIFS.com
- Powder Coating Consultants, Division of Ninan, Inc. ..... www.powdercc.com

Distributors

- Air Power Inc. ..... www.airpower-usa.com
- D & S Color Supply, Inc. ..... www.dscolorsupply.com
- Intech Services, Inc. ..... www.intechservices.com
- Slocum Equipment Inc. ..... www.slocumequipment.com
- Southern Fluid Systems ..... www.southernfluidsystems.com
- Tape Industrial Sales, Inc. ..... www.tapeindustrial.com

Powder Application Equipment

- Gema USA Inc. ..... www.gemapowdercoating.com
- Nordson Corporation ..... www.nordson.com/powder
- Parker Ionics ..... www.parkerionics.com
- Pt Wagner Industrial Solutions ..... www.wagnersystemsinc.com
- Carlisle Fluid Technologies ..... www.carlisleft.com
- SAMES KREMLIN ..... www.sames-kremlin.com

Powder Producers

- AkzoNobel Powder Coatings ..... www.interpon.com
- American Powder Coatings, Inc. ..... www.americanpowder.com
- Axalta Coating Systems ..... www.axaltacoatingsystems.com
- IFS Coatings ..... www.ifscoatings.com
- TCI Powder Coatings ..... www.tcipowder.com
- Pt IGP North America ..... www.igp-powder.com/en
- Pt Sherwin-Williams Company ..... www.sherwin-williams.com
- Cardinal Paint and Powder ..... www.cardinalpaint.com
- Erie Powder Coatings Inc. ..... www.eriepowder.com
- Keyland Polymer UV Powder, LLC ..... www.kpuvpowder.com
- Patriot Powder Coatings ..... www.patriotpowder.com
- PPG Industries ..... www.ppgindustrialcoatings.com
- Vogel Industrial Coatings ..... www.peridiumpowder.com
- Williams-Hayward Protective Coatings, Inc. ..... www.williams-hayward.com

Pretreatment Companies

- Chemetall US, Inc. ..... www.ChemetallNA.com
- Pt Atotech ..... www.atotech.com
- Pt BCI Surface Technologies ..... www.bulkchemicals.us
- Pt Coral Chemical ..... www.coral.com
- Pt Henkel Corporation ..... www.functional-coatings-henkel.com
- Pt Hubbard-Hall Inc. ..... www.hubbardhall.com
- Pt Torch Surface Technologies ..... www.torchsurfacetech.com
- Calvary Industries, Inc. ..... www.calvaryindustries.com
- DuBois Chemicals ..... www.duboischemicals.com
- Maxon Technologies ..... www.maxontechnologies.com
- Troy Chemical Industries, Inc. ..... www.troychemical.com

Raw Material Suppliers

- Allnex ..... www.allnex.com
- Arkema Coating Resins ..... www.arkemacoatingresins.com
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- Pt AGC Chemicals Americas ..... www.lumiflonusa.com
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- Troy Corporation ..... www.troycorp.com

Systems House & Curing

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- IntelliFinishing ..... www.intellifinishing.com
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- Therma-Tron-X, Inc. ..... www.ttxinc.com
- Pt Intek Corporation ..... www.intekcorp.com
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- Eaton Fabricating Co., Inc. ..... www.eatonfabricating.com
- Fostoria Process Equipment, Div. of TPI Corp. ..... www.fostoria-tpi.com
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The Powder Coating Institute has made an investment in the promotion of powder coating technologies with our new series of videos. With videos planned to target both consumers and manufacturers, these videos encourage the production and purchase of powder coated products.

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