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March/April 2019

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The Official Publication of the Powder Coating Institute®
Volume 13 • Number 2 **March-April 2019**

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John Sudges

Just Scratching the Surface

As I begin my role as president of the Powder Coating Institute, I sit here and think of all the others that I follow and the impact of the past boards of directors. Their passion for and involvement in this association have brought us to where we are today. Since becoming involved with PCI, I have met some incredible individuals who have truly enriched my knowledge and had an impact on me professionally and in lasting friendships. As we start 2019, I would like to look back and reflect on our progress and share what has been evolving within the Powder Coating Institute.

The heart and soul of our association is our member companies and the individuals who represent those companies. It is those representatives who make up the committees that direct the association's path (or vision) and mission to promote powder coating. Our Education Committee continues to evolve in its efforts to educate the industry by holding hands-on training and hosting the annual Technical Conference. Our Promotions Committee strives to produce new and exciting materials to teach users and consumers about the advantages of powder coating such as our new videos. They are also involved with our publication, *Powder Coated Tough*. Our new Technical Committee is tasked with keeping our technical publications up to date and is committed to new developments in non-conductive and low temperature substrates, while the Membership Committee works to grow the association and has plans in place to increase retention rates by ensuring members understand the value of their involvement. The revitalized Certification Committee is gaining momentum and is working hard to grow the number of certified companies within our custom coater and OEM membership.

> ***...why wouldn't you want to participate and help shape and grow the industry in which we work?***

If you believe that the powder coating market has made major strides up to this point, the reality is we are just scratching the surface. There are so many areas and opportunities for growth. This is where we need your assistance and participation if we as an association want to continue to grow. Now is the perfect time to join and become active in our association. Looking back at the progress PCI has made, why wouldn't you want to participate and help shape and grow the industry in which we work?

As we begin 2019, the board of directors, executive director, and PCI staff look forward to continuing the push for growth and look forward to seeing you this April in Orlando, FL, at the Powder Coating 2019 Technical Conference and/or in June at the PCI/CCAI 2019 Joint Annual Meeting in Hilton Head, SC. In the meantime, if you have suggestions or questions please feel free to contact me.

John Sudges
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IFS Coatings Launches Architectural Powder E-Book >>

IFS Coatings recently announced the launch of an exciting e-book on high performance powder coatings for architectural applications. "The Architect's Guide to Powder Coating" is now downloadable here: https://ifscoatings.com/content/assets/Uploads/PDF/Architects-guide-powder-coatings.pdf.

The e-book, created by the IFS architectural team, covers a wide range of topics pertinent to high performance powder for architectural applications. These include the different types of powder coating, the environmental advantages of powder and achieving LEED points, powder for steel, liquid fluoropolymers vs. powder fluoropolymers, powder for interiors, what to watch out for when writing a powder spec, and much more.

Glynn Mason, IFS president, explains, "The IFS Architectural team works closely with architects, designers, and specifiers on a daily basis. The e-book covers some of the most common questions asked and information desired by design professionals, and utilizes the extensive experience of our architectural experts."

The e-book covers everything from choosing the right type of powder for the end use, to the incredible performance capability of high-performance powders and how powder will meet and exceed the performance requirements of the coating specs through to specification and application.

TTX Mexico Officially Opens in Monterrey, Mexico >>

Therma-Tron-X, Inc. (TTX) has chosen Mexico as the home for its first international subsidiary, TTX Mexico. TTX is a North American industry leader in the design and manufacture of industrial finishing systems and industrial water treatment equipment. The importance of the Mexican market and a commitment to TTX's existing Mexican customers drove the decision to invest in a permanent operation within Mexico. Mexico's forward-looking stance also provides strong internal growth potential as well as a launching point from which to support and grow business throughout Latin America.

"As TTX enters its 50th year of business, we also celebrate over 25 years of successful relationships in Mexico. TTX is proud to expand our support capabilities into a permanent presence in Mexico where we see a robust business and cultural environment. Local team members, with the full support of TTX headquarters, will bring a new commitment to our customers in Mexico," said Robert Rock, vice president of strategic development at TTX.

TTX has selected the municipality of San Pedro Garza García, Nuevo Leon, for the TTX Mexico headquarters. Remote office locations for the convenience of customers are available now in Mexico City, Queretaro, Guadalajara, Puebla, Tampico, Ciudad Juarez, Tijuana, and Cancun. Additional locations will be opened throughout 2019.

PLACES TO BE

APRIL

1-2
Custom Coater Forum
Orlando, FL

1-2
Powder Coating 101: Basic Essentials
Orlando, FL

3-4
PCI'S Powder Coating 2019 Technical Conference
Orlando, FL

MAY

7-8
Powder Coating 202:
Optimizing Your Powder Coating Operation
Amherst, OH

JUNE

4-5
Powder Coating 101: Basic Essentials with Lab
Minneapolis, MN

17-20
PCI/CCAI Joint Annual Meeting
Hilton Head Island, SC

AUGUST

6-7
Powder Coating 101: Basic Essentials with Lab
St. Charles, IL

SEPTEMBER

17-18
Powder Coating 202:
Optimizing Your Powder Coating Operation
Westland, MI

OCTOBER

8-9
Powder Coating 101: Basic Essentials with Lab
Orange City, IA

DECEMBER

3-4
Powder Coating 202:
Optimizing Your Powder Coating Operation
Indianapolis, IN

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

Inaugural Women in Finishing FORUM to be Held at the University of Notre Dame >>

Women in Finishing 2019 FORUM

The first annual Women in Finishing FORUM will be held May 9-11 at the Embassy Suites South Bend Notre Dame and the University of Notre Dame campus.

Powered by the Chemical Coaters Association International, the Women in Finishing FORUM will feature a variety of professional and personal development sessions and workshops, as well as networking and team building activities. Through unique programming, participants will learn new ways to deal with issues that impact effectiveness, maximize professional impact, build strategies for success, and much more.

All women who have chosen or are pursuing a career in industrial finishing, from the finishing line to executive management, are invited and encouraged to attend the WiF FORUM.

Topics to be covered include: Effectively Navigating Conflict, Building a Championship Mindset, the Impact Wellness has on Success, Successful Finishing Career Journeys from women in the finishing industry, and more. Networking activities such as a welcome reception, dinner and brunch will be held throughout the event.

Holding the event at the University of Notre Dame provides access to unique speakers who will complement industry experts resulting in an outstanding, well-rounded program.

For more information and to register, visit www.ccaiweb.com/event/wifforum19.

Elcometer Expands into a New North American Headquarters and Training Center >>

Elcometer, one of the world leaders in the design, manufacture, and supply of inspection equipment for the coatings, concrete, and Ultrasonic NDT sectors and manufacturer and supplier of a full range of abrasive blasting and ancillary equipment, has moved into their new North American headquarters, allowing them to achieve their growth strategy.

Based in Warren, MI, Elcometer's modern 22,000 square foot (2,050 square meter) North American headquarters provides state of the art office space for sales and technical support teams, and also accommodates their ISO 17025 Test Laboratory, providing fully accredited servicing and training support to their customers.

"North America is a very important market for Elcometer and the move to larger premises means we can accommodate demand for our U.S. and Canadian customers well into the future," Michael Sellars, managing director at Elcometer, stated. "Our new North American headquarters allows our dedicated team of in-house sales and service engineers, technical support, and training personnel to provide our customers with the highest levels of customer support that they have come to expect from Elcometer."

"Our new facility also allows us to expand into new product ranges, including our new range of dry abrasive blast machines, precision media valves, blast hoses, blast nozzles, and personal protection equipment, which, following the introduction in Europe and the Middle East in November, will be launched in North America in the spring," said Joe Walker, vice president, Elcometer, Inc.

The Elcometer North American headquarters is located at 6900 Miller Drive, Warren, Michigan 48092 USA. All other contact details remain the same.

Troy Corporation Announces Acquisition of DBM Blending >>

TROY
The Gold Standard for Performance

Troy Corporation announced that it has completed the acquisition of DBM Blending B.V. of Moerdijk, The Netherlands. Financial terms were not disclosed.

Included in the acquisition is a state-of-the-art manufacturing facility near Rotterdam, The Netherlands. "Troy is experiencing unprecedented growth," says W. Brian Smith, executive vice president and chief operating officer of Troy Corporation. "This acquisition enhances Troy's manufacturing capabilities," continues Smith, "which further extends the company's ability to meet the needs of customers in Europe and worldwide, as well as provide them with more of the advanced technologies they have come to expect from Troy."

"DBM has a proven record of excellence in manufacturing," continues Smith, "which complements Troy's long history of delivering outstanding performance, quality, and value to the marketplaces we serve." For more information about the acquisition, as well as Troy's full line of advanced preservatives and performance additives, visit www.troycorp.com.

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Evonik Expands Industrial 3D Printing Portfolio, Acquires Structured Polymers >>

German industrial chemical corporation Evonik has acquired Austin-based 3D printing materials start-up Structured Polymers, Inc. Deemed "the future of SLS powder," Structured Polymers' specialism is color, with their TrueBlack powder described as "the world's first SLS ink with inherent color." As such, these powders do not require any recoloring, i.e., painting or dyeing after 3D printing.

By adding Structured Polymers to its material portfolio, Evonik continues to grow its presence in the additive manufacturing sector. Dr. Ralph Marquardt, head of strategy and growth businesses for Evonik Resource Efficiency GmbH, comments, "The acquisition of Structured Polymers' technology excellently complements our existing activities with high-performance polymers for additive manufacturing."

It's Not Too Late to Register for PCI's Powder Coating 2019 >>

PCI's Powder Coating 2019 is right around the corner, but it's not too late to register! Held at the Renaissance Orlando at SeaWorld®, this four-day event starts off with PCI's Powder Coating 101 Workshop and Custom Coater Forum on April 1-2 and wraps up with Technical Conference and Tabletop Exhibition on April 3-4. With general sessions of interest to all powder coaters, 27 breakout sessions covering all aspects of powder coating, and a Tabletop Exhibition displaying the latest innovations in the industry, PCI's Technical Conference continues to be the industry's leading educational event. Combination discounts are available for those who register for both the two-day Technical Conference and either the Powder Coating 101 Workshop or the Custom Coater Forum.

Don't miss out! Visit conference.powdercoating.org and REGISTER today!

Throughput | Bluestreak™ Introduces Bright AM™ >>

THROUGHPUT | Bluestreak™, a Manufacturing Execution System (MES) and Quality Management System (QMS), has launched **Bright AM™**, a production platform to track, manage, and support additive manufacturing's unique requirements – tracking the process of disparate parts 3D printed together on a single build plate as well as everything from incoming orders to work-in-progress to delivery confirmation.

Bright AM™ also supports unique serial numbers for each part being printed and tracks each serial number through the process, including any nonconformances, a critical requirement for such industries as aerospace, aviation, and medical.

"Although the additive manufacturing industry has been rapidly evolving into a viable production technology, what individual companies are working out for themselves is quality processes with repeatability. With so many parameters, how do you track, validate processes, and ultimately pass certification, which is necessary to compete in the bevy of industries of which AM benefits? That's where Bright AM™ excels," states Todd Wenzel, president/CTO.

Bright AM™ enables businesses to conform to individual part specification requirements every time while automatically creating and maintaining a fully documented audit trail, containing specification documents, operating requirements, and media attachments as well as automatically cross-reference specifications to everything it impacts within the system.

PEOPLE IN POWDER

Gerardo Perez Carpy Joins Col-Met EFS

Perez Carpy

Gerardo Perez Carpy has joined Col-Met as a business development manager for Mexico. Gerardo, with the support of the entire Col-Met team, will work to develop distribution partners in Mexico to promote the sales of Col-Met standard and RP Filtration products throughout Mexico.

Gerardo joins Col-Met with 25+ years of experience in the finishing industry. Most recently he worked for Carlisle Fluid Technologies as general manager for their division located in Mexico City where he oversaw all manufacturing and sales activity, also supporting the Central American and Caribbean markets. As his career developed within the Carlisle / ITW organizations he worked in the capacity of business unit manager, operations manager and sales manager. Throughout his career he has gained extensive knowledge of the finishing industry and fostered strong relationships with the distribution networks throughout Mexico.

Pneu-Mech Systems Mfg. Announces Jason Gatton as Director of Sales and Crystal Branem Joins as Regional Sales Manager

Gatton

Jason Gatton joined Pneu-Mech in June of 1996 working in the fabrication and installation departments. In February of 2002 he transferred to estimating, where he was responsible for supporting the sales team by designing and quoting projects.

In 2005 Jason transitioned to system sales, where he became their top producer. In 2015 he took on the role of special project manager, where he continued to excel in being a valuable producer. As Director of Sales, Jason will be responsible for estimating, sales, and marketing. Jason will work out of the Pneu-Mech corporate office in Statesville, NC.

Pneu-Mech Systems Mfg. also announces the addition of Crystal Branem as Regional Sales Manager. Crystal comes to Pneu-Mech Systems Mfg. with 11 years of account management experience. Crystal will work from their sales office in Charlotte, North Carolina.

SUCCESS STORIES

Metamorphosis

Finishers often take measures to extend the life of their equipment in an attempt to delay capital expenditures. Inevitably this can cause production and energy inefficiencies in a finishing operation. Jesse Stricker of INTEK Corporation says he sees a lot of outdated gas-fired convection ovens limping along trying to keep up with production demands. Several years ago, a large metal fabricator approached INTEK and reported having problems with their aged gas-fired conveyor oven keeping up with production demands, worried they would have to prepare for the expense and disruption associated with replacing the entire oven.

After a visit to the plant, INTEK proposed the idea of inserting modular electric IR units to the front end of the old oven. The approach consisted of 32 modular heaters and a separate control panel to work independently from their gas-fired system. The customer did the installation themselves without any downtime in their oven's production schedule, saving thousands of dollars.

After this life-extending approach, the oven ran for another 4 years until the gas-fired portion of the oven was finally at the end of its life. This time around the customer opted to completely convert the existing oven to electric IR. The fabricator was provided with additional modular heaters and controls and a dedicated control package along with the instructions, schematics, conduit, high temperature wire and junction boxes which allowed them to complete the upgrade themselves and achieve a strategically zoned, balanced operation.

For more information:
www.intekcorp.com

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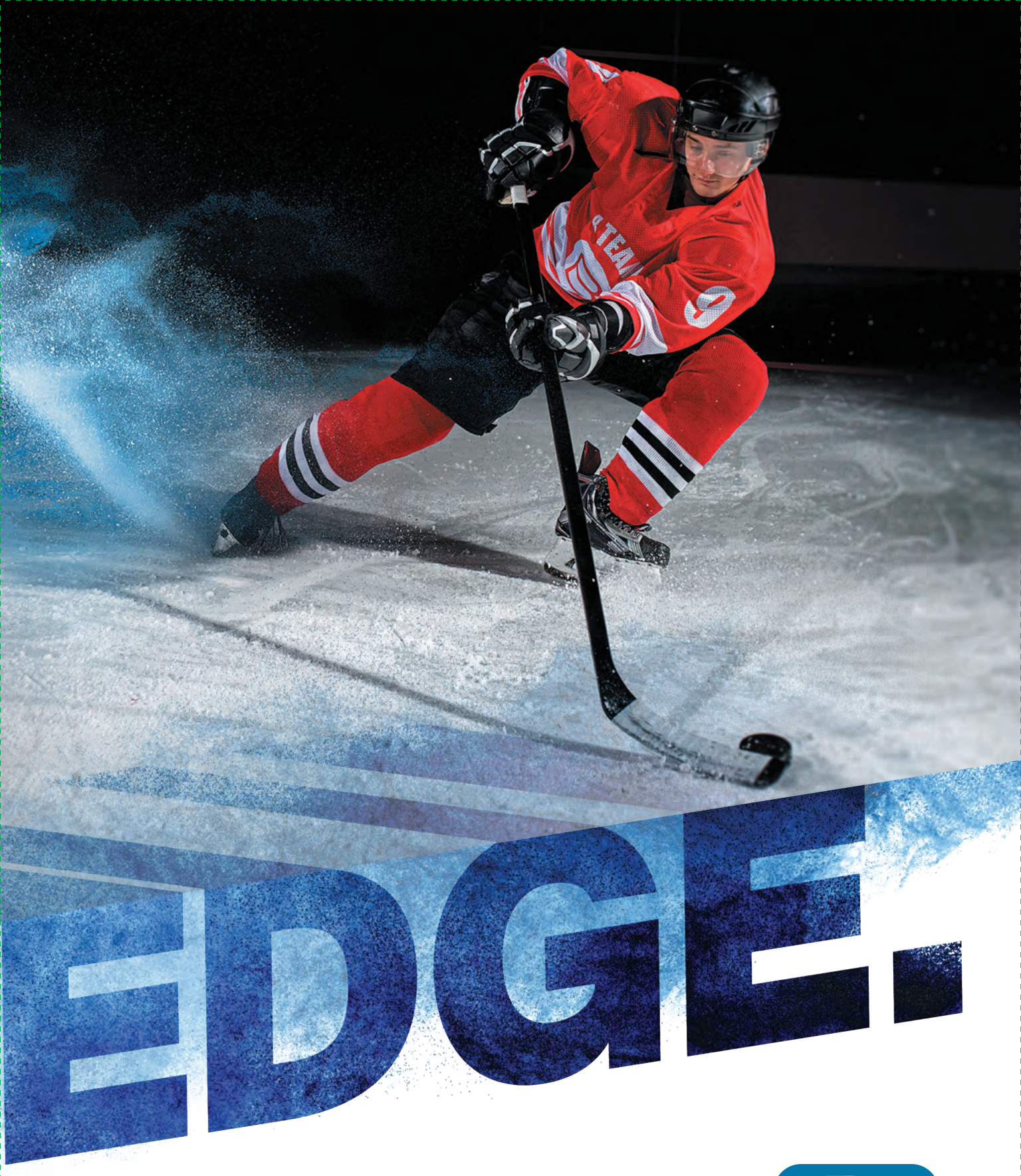

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Powder Coating Energy Efficiency: Ten Steps for Process Energy Analysis

by Michael L. Stowe

The industrial sector accounts for about 34 percent of total U.S. energy consumption [(1)]. This energy is consumed as electricity that is purchased or self-generated, and as fossil fuels such as natural gas, propane, fuel oils and coal. Understanding these energy sources and their associated uses, equipment, efficiencies, costs, availabilities and waste streams is critical to developing a sustainable energy efficiency program.

Every manufacturing plant has raw materials that come into the receiving dock and finished products that are sent out from the shipping dock. Between the receiving and shipping docks, transformation occurs. Transformation adds value to the materials in a step-by-step process, and energy is required. Evaluating the process transformation steps and energy inputs provides clues about where to look for energy savings.

This article focuses particularly on the transformation process of powder coating. We will look at a ten-step method for performing process energy analysis for four steps in the powder coating line (Figure 1):

1) Pretreatment.
2) Drying.
3) Powder application.
4) Curing.

Understanding these processes and their associated equipment, technologies and support systems is key to finding energy efficient solutions. This article briefly discusses energy efficiency, energy intensity and transformation, and then presents a ten-step method for conducting a powder coating line process energy analysis. This technique focuses on a process block diagram that shows energy inputs, energy wastes, energy recovery and possible energy improvements.

Figure 1. Powder coating line processes.

Energy efficiency and intensity

The total energy into a system is E_{in}, which is the amount that appears on your utility bill. The total energy out of the system is E_{out}, which represents the useful energy that adds value to the product during the process. The difference between E_{in} and E_{out} is the loss. Loss is wasted energy that is not useful to the process and degrades efficiency (Figure 2). For sustainable energy efficiency, energy losses must be identified, documented, tracked, corrected and prevented from recurring. If the loss were zero, the system would be 100 percent efficient; however, this does not occur in the real world.

The energy intensity of a manufacturing process is the amount of energy that is required to produce one logical unit of product (e.g., kWh/ton of metal melted at a foundry, MMBtu/bbl of oil refined at a refinery, MMBtu/lb of polymer produced at a chemical plant). Energy intensity

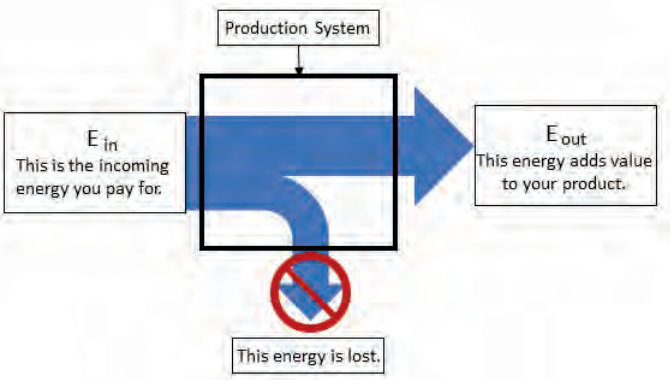

Figure 2. Energy efficiency is improved by eliminating losses and getting more energy to add value.

provides an order-of-magnitude estimate of the significance of energy in the production process, and it varies widely from industry to industry.

For the powder coating process, energy intensity could be defined in several ways, including:

1) kWh per part.
2) kWh per pound of powder applied.
3) MMBtu per square foot of product coated.

Transformation

Transformation in manufacturing is the conversion of a raw material state of a product into a finished state. For the powder coating line, transformation processes include:

1) Dirty part → Clean part.
2) Clean wet part → Clean dry part.
3) Part with no powder paint applied → Part with powder paint applied.
4) Part with uncured powder → Part with cured powder.

Each step of the transformation process should add value with minimal waste. Every step requires some type and amount of energy to carry out the transformation. Certain steps require a large amount of energy, while others require very little. Outlining each step and the required energy inputs is useful for planning and prioritizing energy improvement projects.

The Ten Steps

Step 1. Identify the Raw Materials

Some industrial processes have one main raw material, while others have dozens or even hundreds. Raw materials can come into the process at many places along the transformation journey. To determine the type and amount of energy required in the system, first consider these aspects of the raw materials:

1) Type of material, e.g., metal, chemical, mineral, textile, vegetable, finished goods.
2) Physical state, e.g., solid, liquid, gas, subassembly.
3) Delivery method, e.g., tanker ship, tanker truck, common carrier, railcar.
4) Delivery storage, e.g., dry bulk, tank farm, warehouse, sacks, pallets, cardboard boxes.

Defining the raw materials and their details is an initial step in creating a process block diagram. We will follow these materials on their journey to their final destination, while evaluating the energy use at each point along the way.

For the powder coating process, the raw materials are unpainted parts. These parts come in all shapes and sizes, but at the end of the process, we want to have a properly powder coated part.

Step 2. Identify the Final Products

The final product is the destination of the transformation journey. Manufacturing plants are in the business of making money, so raw materials are brought in, transformed into something useful and then sold for a profit. The manufacturing plant adds value, hopefully very efficiently, to the raw materials and produces a final product of a designated design and quality. Answer these questions to identify the final products:

1) Is the final product a completed consumer good that is ready for sale?
2) Is the final product an intermediate finished item that will become the raw material at another manufacturing site?
3) How is the final product packaged?
4) How is the final product shipped?

For the powder coating process, the final product is a properly powder coated part. Typically, the powder coating line is just one step in a larger manufacturing plant. The powder coating can be an intermediate step or a final step in the overall process.

Step 3. Tour the Plant

There are many possible ways to get from Point A — the raw materials — to Point B — the final product. Touring the manufacturing site with process operators and maintenance personnel as guides is essential to defining the transformation steps and developing the process block diagram. The walk-through should ideally be conducted chronologically, from raw materials to finished products. During the plant tour, take good notes and include:

1) Major transformation steps.
2) Specific process parameters for each step (e.g., temperature, flowrate, pressure, material characteristic).
3) Energy inputs into each step (e.g., electricity, natural gas, steam, chilled water, compressed air).
4) Equipment used to complete the steps.
5) Facility equipment used to support the steps (e.g., air compressors, boilers, chillers, cooling towers).
6) Waste streams (e.g., combustion stack gases, wastewater, metal shavings, sawdust).

For the powder coating process, your tour will be focused on the powder coating line. During your tour of the line, record process parameters such as

wash tank temperatures, drying oven temperatures, curing oven temperatures, etc. Also, note the product flow through the process and record line speed of the powder coating material transport trolley.

Step 4. Develop the Process Block Diagram

You have done your homework and completed a detailed tour of the manufacturing site. Now, you are ready to flesh out the process block diagram. Use your notes, conversations, utility data and possibly some online research to document the transformation steps in the process. The product of your work should look something like Figure 3, which shows the basic process steps for a powder coating line. Figure 3 is just an example and other powder coating lines may have different equipment configurations with different energy sources.

Once the process block diagram is developed, the next steps are to evaluate each process step block to identify the energy inputs, energy wastes, energy recovery possibilities, energy efficiency opportunities and new technology opportunities (Steps 5–9).

Step 5. Identify Energy Inputs

Each step of the process block diagram must be reviewed to identify the primary energy inputs required to perform the transformation. Energy inputs may be direct energy, such as electricity, natural gas, propane and fuel oil, or derived energy, such as compressed air, steam or chilled water. Repeating this analysis for every step helps to produce an overall qualitative energy usage model. From Figure 3, we can observe that for our example powder coating line:

1) There are a lot of electric motors consuming electricity for conveyors, fans and pumps.
2) There is a significant amount of electricity consumed for the infrared heating in the booster curing oven.
3) Natural gas is consumed for heating sources in the boiler, the drying oven and the final curing oven.
4) Steam from the natural gas fired boiler is used to make hot water for heating the pretreatment line tanks.
5) There is some energy input for area support systems such as lighting, HVAC or other items.

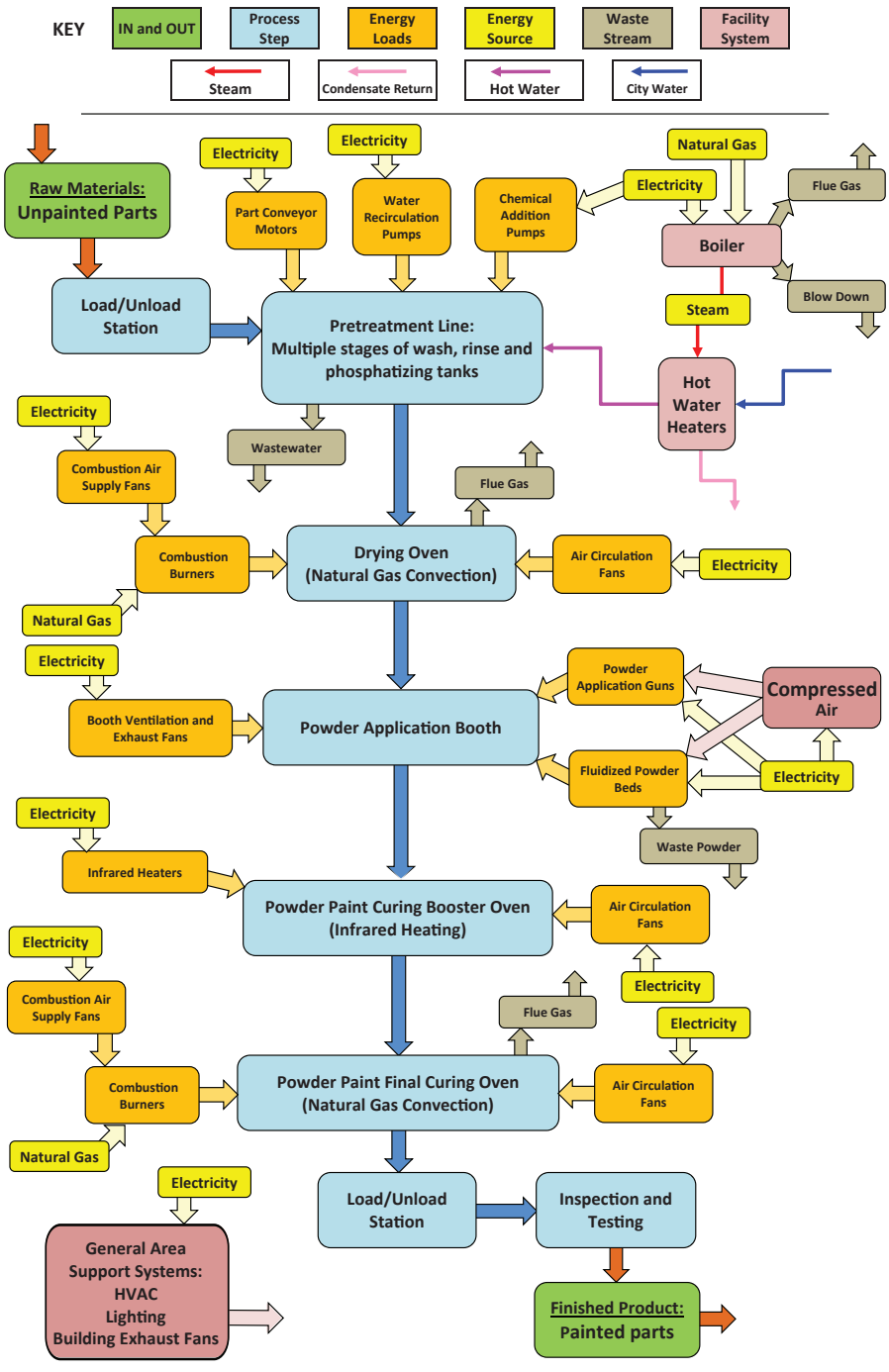

Figure 3. An example process block diagram for a powder coating line.

Completing an energy input analysis for each block in the diagram creates an overall picture of the process energy consumption. If available, information to help quantify the energy input is valuable, including motor horsepower, actual metered cubic feet of natural gas, electric process sub-metering, etc.

Step 6. Identify Energy Wastes

Energy is wasted to some degree in every step of the manufacturing process. Major wastes should be identified when you are analyzing the process block diagram. Identifying process waste streams is the first step to minimizing them, recovering valuable energy from them and reducing their environmental impact. Figure 3 includes several waste streams for the example powder coating line, including:

1) Flue gas from the boiler combustion.
2) Blow down from the boiler.
3) Wastewater from the pretreatment line tanks.
4) Flue gas from the drying oven combustion.
5) Waste powder from the powder application booth.
6) Flue gas from the final curing natural gas convection oven combustion.

Step 7. Identify Energy Recovery Possibilities

The energy waste streams should be examined for their potential for energy recovery. Observations of the waste streams in Figure 3 include:

1) Using the hot boiler flue gas to preheat the boiler combustion air.
2) Using the hot boiler blowdown to preheat the incoming boiler make-up water.
3) Using the hot pretreatment tank wastewater to preheat the incoming city water to the hot water heaters.
4) Using the hot drying oven flue gas to preheat the drying oven combustion air.
5) Recovering and recycling waste powder from the powder application booth.
6) Using the hot final curing oven flue gas to preheat the final curing oven combustion air.

These potential energy recovery options should be evaluated for economic feasibility and implementation. Recovering wasted energy can help offset the need for using primary energy and result in good energy cost savings.

Step 8. Identify Energy Efficiency Opportunities

Each block in the process block diagram should be evaluated for energy efficiency opportunities. Depending on the energy input for the process operation, a variety of options may be available to reduce energy consumption. The motors, compressed air and boiler/steam supply in Figure 3 have the potential for energy efficiency improvements.

Take a Look at Lighting

While not process related, the lighting of manufacturing spaces is frequently an opportunity for energy improvement. Typical older lighting technology uses metal halide high intensity discharge (HID) lamps and fixtures. Today's newer and more efficient light emitting diode (LED) lamps and fixtures are a good energy saving alternative. Let's take a look at an example.

Current situation:

1) 100 metal halide HID lighting fixtures.
2) 400 watts nominal power for each fixture.
3) These lights are on 8,000 hours per year.
4) Local electrical utility cost is $0.075 per kWh.
5) Annual energy consumption = 320,000 kWh.
6) Annual lighting energy costs = $24,000.

New situation:

1) 100 new LED replacement lighting fixtures.
2) 213 watts nominal power for each fixture.
3) These lights are on 8,000 hours per year.
4) Local electrical utility cost is $0.075 per kWh.
5) Annual energy consumption = 170,400 kWh.
6) Annual lighting energy costs = $12,780.

Savings:

1) Annual kWh savings = 149,600.
2) Annual lighting cost savings = $11,220.
3) Estimated installation costs = $37,500.
4) Possible electrical utility incentives = $16,500.
5) Net installation costs = $21,000.
6) Simple payback (with incentive) = 1.87 years.

In addition to the energy savings potential from an LED relighting project, LEDs provide very high quality lighting and can improve the operator's working environment as well as the ability to properly inspect parts.

Evaluation of lighting should be a part of any powder coating line energy optimization project.

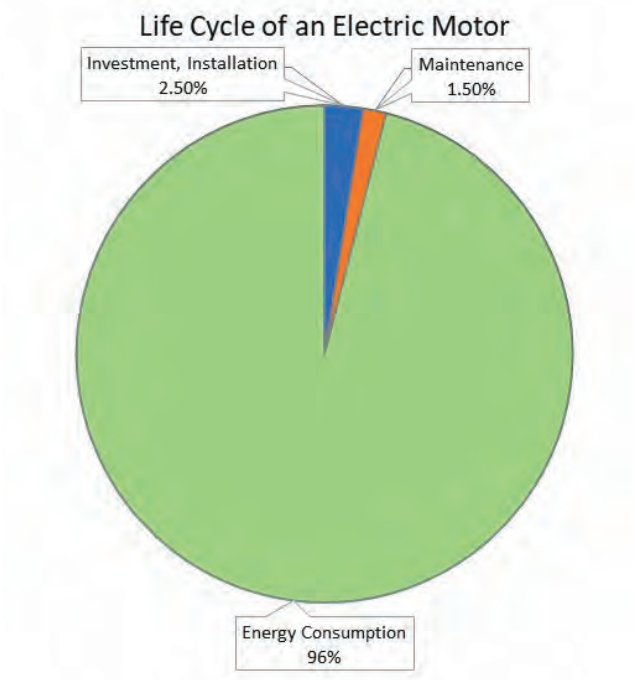

Figure 4. Electric motor lifecycle cost pie chart.

Motors. Motors consume a significant amount of process energy. The biggest cost over the life of a motor, by far, is the electricity to turn it — typically accounting for 96 percent of a motor's total lifecycle costs (Figure 4). Maximizing the overall efficiency of the plant's motor population has energy-saving benefits [2, 3]. NEMA Premium® [4] efficient motors should be used for all new motors.

Variable frequency drives (VFDs). Where variable loads and good feedback parameters exist, VFDs help save energy. Conduct a detailed analysis of VFD/motor combinations and implement where operationally and economically feasible. Possible areas to consider VFDs on the powder coating line include ventilation and exhaust fans, pretreatment line pumps and drying and curing oven air circulation fans.

Compressed air. Compressed air is a very expensive and inefficient energy source. A 1/8-in. diameter leak on a 100-psig compressed air system costs approximately $1,000 per year for the electricity to compress the air for just that leak. Multiply this by 100 leaks across a large process system, and a plant can spend up to $100,000 per year on wasted electricity for compressed air alone. Compressed air energy efficiency recommendations could include:

1) Establish and maintain a compressed air leak survey and repair program, which is inexpensive and has immediate payback.
2) Where feasible, replace air-driven mixers and diaphragm pumps with electric-driven mixers and pumps.
3) Use zero-loss condensate drains on the compressed air system throughout the plant.

Boilers, steam and combustion. The process steps in Figure 3 use a boiler to make steam that is used for process heating. Assuming a delivered cost for natural gas of $6 per dekatherm

(1 dth = 1 million Btu), exposed uninsulated steam piping can cost $200 per foot per year in lost heat. Extrapolating this over a large processing plant, 100 equivalent linear feet of uninsulated steam piping would cost $20,000 per year in lost heat (5). There are also opportunities for energy efficiency improvements on these systems, including:

1) Ensure combustion equipment and steam piping are properly insulated.
2) Monitor the oxygen content of the flue gas to ensure the most efficient combustion and reduce nitrogen oxide and sulfur oxide releases (6), which will also reduce the amount of natural gas consumed, thereby lowering the amount of carbon released.
3) Conduct a proper steam trap survey using a thermographic camera or ultrasonic leak detector and perform maintenance to save energy on steam systems.

Step 9. Identify New Technology Opportunities

Implementing new or existing process technologies can provide energy savings in addition to those identified in Step 8. A goal is to reduce energy intensity, and a different technology may lower the energy required to transform one logical unit of product. Look for opportunities to improve process equipment with new technology.

Possible energy saving technology improvements from Figure 3 could include:

1) Updating spray nozzles in the pretreatment line wash and rinse tanks to optimize spray patterns which could result in pump motor energy savings.
2) Upgrade pretreatment chemicals to low temperature chemicals that do not require tank heating and gain the savings of heating the tanks.
3) Convert the natural gas convection drying oven to infrared drying.
4) Upgrade the hybrid infrared/natural gas convection curing system to a full infrared curing system.

Process quality and part specifications must always be considered when upgrading to a new technology. Process parameters must still be met. In addition, the energy and financials would need to be evaluated to see if the idea is feasible. Once a careful analysis is completed, this type of new technology investigation can frequently provide energy efficiency and energy intensity savings without sacrificing any required process parameters.

Step 10. Implement Solutions

After you develop the process block diagram and perform the process energy analysis, the next and most important step is to implement some of the energy-saving solutions you have identified. Savings will not be realized until the results are actually applied.

Your analysis will produce a detailed set of opportunities for energy improvements. Compile the results in a table or spreadsheet so they can be evaluated, prioritized, budgeted and tracked for implementation. Then, repeat the approach periodically for continual improvement.

> Taking a practical, process oriented approach to your powder coating line can result in the discovery of many potential energy saving ideas.

Closing Thoughts

Pursuing energy improvements often produces benefits in other areas as well. These non-energy benefits may include greater plant productivity, higher product quality, fewer process bottlenecks, better worker safety, more available floor space, lower emissions and lower waste stream volumes.

Taking a practical, process oriented approach to your powder coating line can result in the discovery of many potential energy saving ideas. The process block diagram with energy inputs is key in this analysis process. Once you understand how the energy is consumed, it is much easier to find ways to conserve it.

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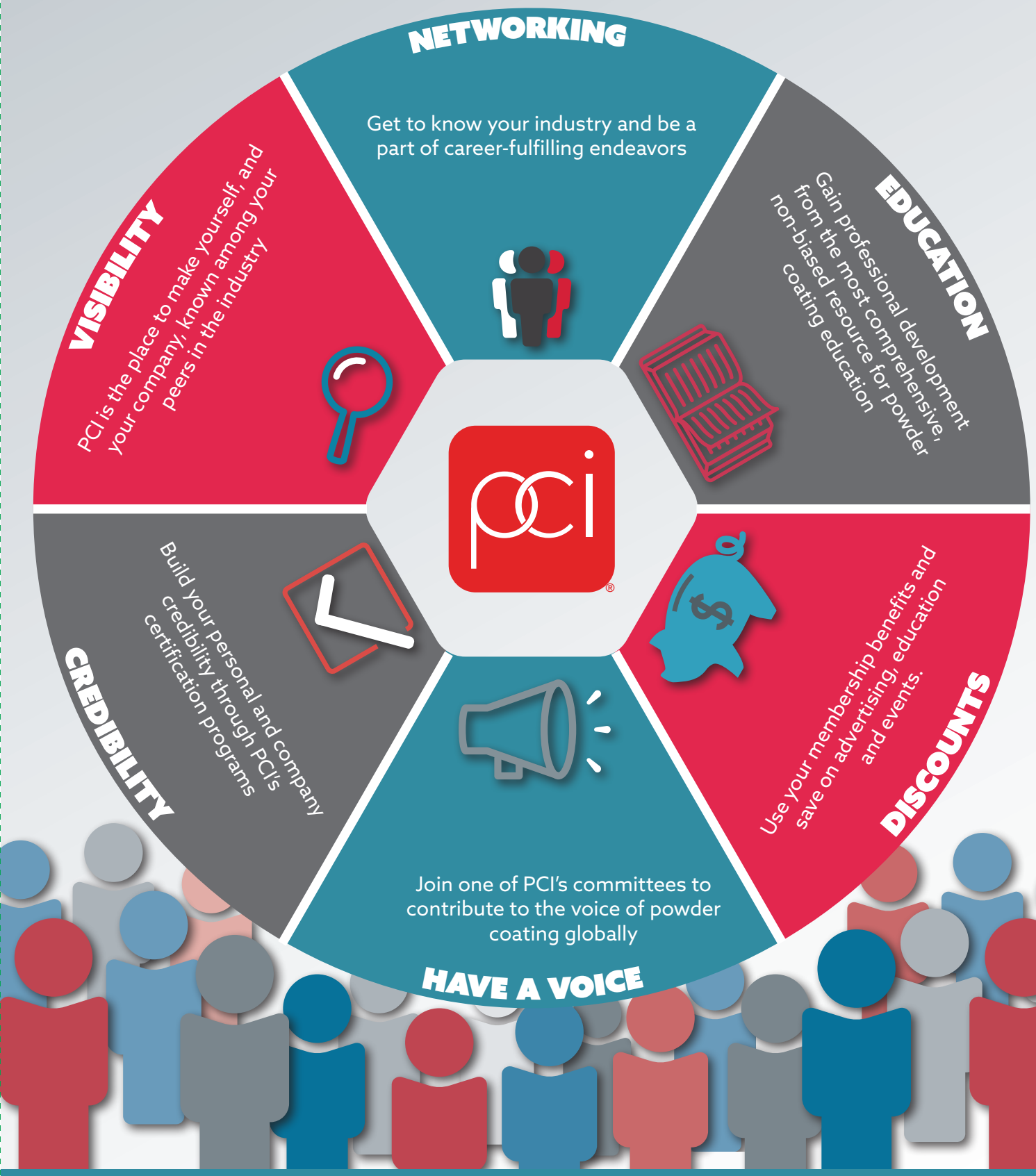

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Powder Coatings LEED the Way

by Fiona Levin-Smith

Green design. Eco design. Environmental design. There are many different terms for it, but the idea of sustainable design is all around us in a wide range of products we use every day.

From the symbols on food and drink packaging that show the containers are made of recycled or recyclable materials, to the move towards solar power in buildings and cars, companies in every industry around the world are working to make their products, and their companies, more sustainable. It's so common, it's now expected.

The concept of sustainable design is not a new phenomenon; it is something that has been around since probably the mid to late eighties, but it has developed. Over time, as this concept has been widely embraced, ways of incorporating sustainable design into as many aspects of a product as possible have increased. We've moved from awareness, through recycling, to renewable resources and onwards.

More and more, we as consumers expect this from our products and from the corporations (big and small) that produce them. That goes for buildings, too. Anyone with an interest in architecture and design, anyone working in the architectural coatings industry, anyone who's walked into a building and saw the "green building" logo on a wall as they enter, will know about sustainable design in architecture. For a long time, architects and designers have aimed to create buildings that are better for us and our planet. The general feeling is that it's about building the future, not just building.

Sustainability Initiatives

There are literally thousands of things that can be considered when making a building more sustainable to the community and the planet; for example, location, proximity to public transport or cycle paths, directionality of the location to take advantage of natural heating/cooling, community areas, recycled and renewable materials, solar, wastewater, energy used in construction, longevity of product…the list goes on. And on.

With the focus on sustainable design in architecture entrenched in the industry for so long, it is only natural that ways to formalize, recognize and improve the design approach and thought process didn't take long to come about. These days there are several organizations, some global, some more U.S. focused, that attempt to guide design professionals through the myriad of ways that a building can be made more sustainable.

The International Living Future Institute introduced the Living Building Challenge, Zero Energy and Declare. The International WELL Building Institute developed WELL, a standard for buildings, interior spaces and communities seeking to implement, validate and measure features that support and advance human health and wellness. On a smaller scale, Google introduced their own "Red List" of banned substances, and a group of leading U.S. architectural firms got together to create *mindful MATERIALS,* a free platform with aggregated information on human health and environmental impacts of products from leading manufacturers, vetted by experts passionate about making it easier to make informed product choices.

Perhaps I should have prefaced this article with "Welcome to the world of acronyms," as it seems there are a large number of them used constantly when covering this topic. VOCs, LEED, EPDs – it's acronym city here, but don't worry, keep going and we will explain them all as we get to them!

The United States Green Building Council (USGBC) has really taken the lead with LEED. Leadership in Energy and Environmental Design, better known as LEED, has been at the forefront of sustainability in architecture

on a global scale. It's the most widely used green building rating system in the world and is available for virtually all building, community and home project types. The USGBC states that LEED provides a framework to create healthy, highly efficient and cost-saving green buildings, and LEED certification is a globally recognized symbol of sustainability achievement.

Where Do Powder Coatings Come In?

"Human beings don't have a pollution problem; they have a design problem. If humans were to devise products, tools, furniture, homes, factories, and cities more intelligently from the start, they wouldn't even need to think in terms of waste, or contamination, or scarcity. Good design would allow for abundance, endless reuse, and pleasure," states an excerpt from *The Upcycle* by authors Michael Braungart and William McDonough, 2013, this is the issue that design professionals wishing to practice sustainable design run into every day. So, what if there were coatings that were a more sustainable option compared to some of the traditionally used options out there?

It will come as no surprise to those in the powder coatings industry that powder coating, including high performance powders for architectural applications, are a more environmentally responsible coating choice. But why so?

There are no solvents and therefore no, or extremely low, Volatile Organic Coatings (VOCs) in powder coatings. As solvents and VOCs are classified as bad for the environment, the fact that powders are virtually VOC-free is a huge advantage for any design professional wishing to practice sustainable design, especially when they use powders over large areas such as building envelopes.

In many cases, high performance powders are a single coat application that achieve the same chemical, mechanical and weathering performance as competing coatings. Not only does this mean less product is used, but also less energy in both application and curing.

From an application perspective, powder overspray can be reclaimed and reused or recycled. This one speaks for itself.

The pretreatment options for high performance powders are more varied. Both chrome and non-chrome pretreatments can be utilized, while still giving AAMA 2605 levels of performance. (AAMA 2605 is the highest North American standard available for coated architectural aluminum extrusions). This means the ability to remove chrome from the environment and around people is an option. Chrome-based pretreatment does not have to be used, nor does a chrome-based primer.

As well as reducing solvents and VOCs, we can also reduce the amount of hazardous waste.

Toxic hazardous waste is much reduced in both the manufacture and application of powder coatings when compared with competing coatings. That has to be a good thing!

For these reasons, and more, the Environmental Protection Agency (EPA) recognizes and recommends powder coatings as a sustainable coating option.

So, it makes sense that high performance powder coatings for architectural applications should be able to contribute to sustainably designed buildings, right? Absolutely.

Just how does this work? Well let's take LEED projects as an example. A product does not get LEED certified, the project or building does. When plans for the building commence, a decision is made as to whether or not to pursue LEED accreditation. It's not a decision that's taken lightly, as it takes a lot of hard work and resources to make it happen. However, once that decision has been made then the architectural team builds sustainable design into every possible facet of the building, and essentially tracks what they do. Incorporating various environmentally responsible aspects into the building earns the project LEED points. The

building has to earn a certain number of points to be LEED certified, and then there are three additional levels of LEED certification: LEED Silver, LEED Gold and LEED Platinum. The higher you go, the more points it takes to earn that level.

Earning a LEED point is not easy. There are many different categories that must be accounted for – and how do you know whether a product will count towards a LEED point? This is one area that LEED v4, the current version of LEED, is trying to make easier. (It should be noted that at the time of this writing, LEED v4.1 is in draft form only.) LEED v4 requires that all vendors to a LEED project must have an Environmental Product Declaration, or EPD.

What is an EPD?

An EPD provides a third party-verified, transparent look at a product, its ingredients and its impact across the entire life cycle, from raw material extraction to disposal. Similar to a nutritional label, an EPD is used to communicate information about the potential environmental and human health impacts of a product.

The good news is powder coatings can achieve EPDs. To get an EPD, architectural grade powder products go through a full life cycle analysis that examines ingredients, production, energy usage, packaging, application requirements, and more. The products are then tested in all of the LEED EPD categories, which include acidification potential (when acids are emitted into the atmosphere and subsequently deposited in surface soils and waters) and eutrophication potential (yep, I had to look that one up too!). Eutrophication or hypertrophication, is when a body of water becomes overly enriched with minerals and nutrients that induce excessive growth of plants and algae. This process may result in oxygen depletion of the water body. Additional categories are global warming potential, smog potential and primary energy demand.

The Perot Museum in Dallas achieved three environmental certifications – Green Globes® highest possible ranking for sustainable building design, a LEED Gold rating from the U.S. Green Building Council, and certification from the Sustainable Sites Initiative.

This means that using powder coatings that have been independently verified and have an EPD contributes towards LEED points, specifically a Materials Resources Credit.

So, Who Benefits With EPDs?

Clearly design professionals can quickly find products that will meet the LEED criteria, assess how sustainable they are, and make a more educated decision as to which products to incorporate into the building design.

Coaters who are using powders from companies with EPDs and are producing coated pieces for architectural projects can (and should) advertise that fact! Knowing that the powder coated objects come with an EPD can influence who gets the coating work. There have been cases where simply having the ability to offer coatings with an EPD have not only won the coaters work but made a loyal customer of both the contractor and architect. So keep this in mind: If you're going to work in the architectural space, specifying an EPD is helpful for the environment and for your bottom line.

Fiona Levin-Smith is vice president marketing & specification at IFS Coatings.

PCT

Waste in Wastewater:
Looking for the Green

by Mark Fretz

As my grandfather would tell you, "There's nothing wrong with skim milk that a little half and half won't fix." A point made in a joke, that a little of the right chemistry can go a long way.

In the manufacturing world the focus is constantly on production and the speed with which parts are processed and sold. The primary goal, to get parts out the door efficiently while reducing both the time to market and the cost of manufacturing, rarely considers the waste treatment process. This makes waste treatment a fertile source of improvements in efficiencies that can simultaneously increase both the bottom line and environmental impact. This article will touch on several ways that your waste treatment process can benefit from a review and update in technology to first, reduce the process inputs, including time commitment, chemical consumption, monetary spend and oversight. And second, provide the added benefit of reducing the amount of sludge and regulated effluents on the output side.

Minimizing the Impact

Waste streams are often complicated mixtures from multiple sources. Coming from the desire to get a better powder coating through phosphating and cleaning, as well as associated processes like stamping and metal removal, the waste stream has a high degree of variability that requires a capable and robust system to address the inputs from manufacturing and meet the outputs required by municipalities.

When it comes to the treated waste, there is both a liquid and a solid portion that can be optimized.

For solids - By reviewing the waste treatment process and updating technologies, savings in terms of the amount of sludge the process creates are possible. While this may seem like a minor impact in the overall scheme of manufacturing,

the maintenance of press filters and the transport of sludge to dumpsters take man hours that can be better applied to getting parts through the production line and maintenance of manufacturing equipment.

For liquids – The primary driver is meeting the levels prescribed by the regulating authority. While this defines the end, the means to that end is quite variable. Newer polymer technologies introduced in coagulation have been demonstrated to reduce the overall chemical usage and therefore, expense. Equipment designed for processing and delivering treatments can improve process efficiencies and reduce chemical consumption.

The waste treatment process is governed by risk and a desire to keep the company protected from bad PR as well as non-compliance fines.

Sludge Reduction

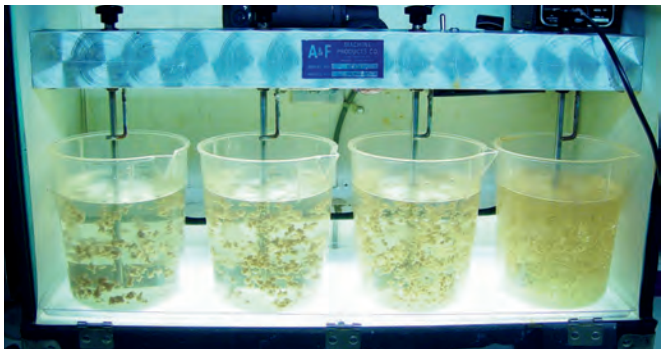
Often sludge in waste treatment is considered a good thing. You do, of course, want to remove the contaminants. The production of sludge demonstrates that something is happening, and that waste is being removed from the solution. This view takes away from the end goal of removing contaminants from the water to meet the requirements as efficiently as possible.

For example, one manufacturer of cabs for agriculture equipment had a long-standing process of treating their waste water with calcium chloride and an anionic polymer to treat the waste from their pretreatment and e-coat process. The discharge met the city's requirements for water pollutants. It also was quite turbid and produced a large amount of sludge that plugged up the filter press quite regularly. As is common in manufacturing, the situation was endured for years in order to produce parts. In fact, the situation went on so long that the routine of monitoring and cleaning the filter press became part of standard operations.

Updating technology can not only lead to cost savings, it can result in process improvements and more time for productive activities like making parts. In this case a review of the process and effluent indicated that by upgrading the technology from the classic calcium chloride and anionic chemistries to the newer polyelectrolyte-flocculant and a high performing polymerized coagulant, the process could deliver three advantages. One benefit was environmental, an increase in clarity. The second benefit was a 35 percent reduction in sludge created at the filter press. The third benefit was achieved by introducing a polymer blending system reducing the amount of chemicals needed for the process.

Gaining Compliance: The Value of Process Review

Perhaps you have not been paying much attention to your waste treatment process and are unaware of the state in which it is currently operating. Such was the case for an agricultural equipment supplier. It was observed that waste was lacking

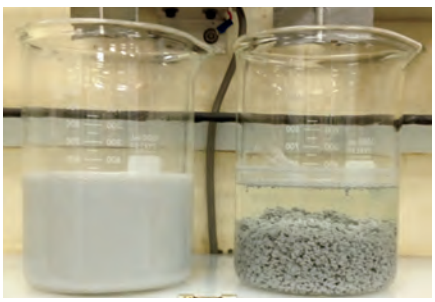


Testing for flocculation, the process by which fine particulates are caused to clump together.

clarity and the optimal pH for neutralization was not being maintained. The process implemented traditional calcium chloride technology and was being dosed excessively to meet effluent requirements.

After a process review and testing was complete, the company converted to a new polyelectrolyte and liquid alum-polymer technology, which enabled them to achieve the required clarity. In addition, the excessive use of calcium chloride was eliminated, reducing sludge by 50 percent.

This case study clearly illustrates the value of process review and its potential results in terms of reduced man-hours invested in treating the waste as well as the amount of waste going to the landfill. It is important to keep in mind that if you look solely at the numbers related to chemical costs, you may be overlooking potential savings in time, waste disposal costs and avoiding fines by complying with regulations.



By reviewing the waste treatment process and updating technologies, savings in terms of the amount of sludge the process creates are possible.

Lowering your Costs

Sustainability has become quite a buzzword and as such, the costs of sustainability are often overlooked or muted. In manufacturing, sustainability must also be consistent with your business model. If it isn't, you run the risk of having a very sustainable operation from an environmental perspective, but not a business perspective because it fails to provide the required cash flow. Such was the case for a manufacturer of net to near-net shaped formed and extruded components, which drove them to entertain the thought of improving their waste treatment process.

The process had already advanced from the classic calcium chloride and anionic coagulant to a more sophisticated polymer coagulation-neutralize-clarification process with a modest chemical spend of $300,000 annually.

The primary sources of waste fluid are a phosphate line and some process cleaning baths. A review of the sources revealed that there was potential to introduce an additional polymer in the coagulation process. At what cost, you might ask, and for what purpose? The cost of the polymer was estimated at $5,000 annually. However, this additional cost would reduce the coagulant usage by over $100,000!

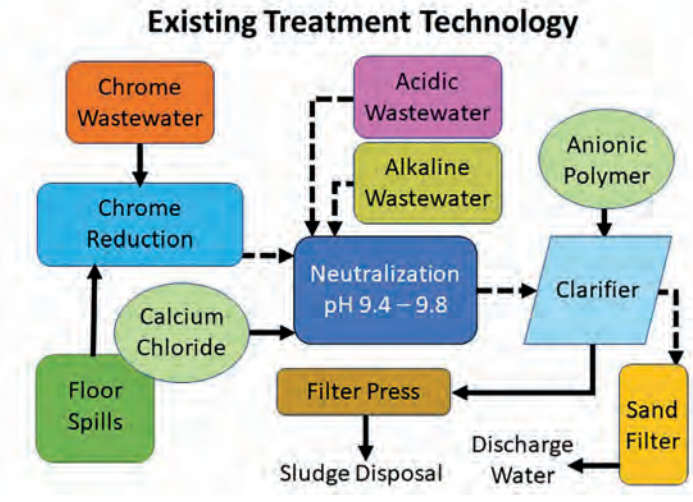
As technology continues to advance, so do opportunities for improvement. The "we have always done it this way" mentality certainly has great ability to sustain a business, and the tendency to not fix something that is not broken can carry a lot of weight. Still, as opportunities for improvement present themselves, revisiting an old process can lead to significant improvements.

A typical waste reduction system setup.

Adding Manufacturing Capabilities

It is obvious that a change to your manufacturing process will change your waste stream and waste treatment. Perhaps you are considering upgrading your capabilities to include e-coat and powder coating applications. Let's take a look at a retail equipment manufacturer who upgraded their capabilities from electroplating only, adding e-coat and powder coating.

Making this upgrade results in a situation where acidic and anionic wastewater comingle with the chrome wastewater, interfering with the reduction of chrome and the precipitation of the chrome, nickel and zinc. When the waste stream changes from electroplating to powder and e-coat, the increased anionic waste requires slug dosing of calcium chloride. While the waste is still predominantly the result of electroplating, the variability can go from one extreme to another depending on manufacturing needs.



Normal flow ratio [of total]:
Electroplating wastewater 70%
Powder/E-Coat wastewater 30%

Variance in flow:
Electroplating wastewater 60-80% peak- 100%
Powder/E-Coat wastewater 20-40% peak- 100%

Supplemental calcium chloride dosing provided some assistance; however, the periodic waste source changes made the calcium demand erratic and essentially impossible to control on a consistent basis. The soluble and suspended solids excursion events caused the sand filter to plug routinely with zinc, nickel, and chrome hydroxide-based suspended solids.

It is clear to see that the new variability of the waste needed a more tailored and robust solution. Testing revealed that the surfactants in the powder/e-coat were the primary cause of the suspension. By designing the waste treatment chemistry to address the swings to 100 percent of either the electroplating waste or the powder/e-coat waste, at a modest treatment rate of 200 ppm the metal hydroxides were adequately formed and coagulated. After pH adjustment, a dose of 2.5 ppm polymer was successful at flocculating the waste.

A consistent solids conditioning and neutralization of all wastewater sources, in both net anionic and cationic charge differentials, was obtained. A sludge reduction of approximately 15 percent was achieved by the application of the mixed chloride coagulant at a dosage of 200 ppm versus the previous periodic slug dosing of calcium chloride. The sand filter continuous backwash procedure maintained a clean media surface and the sand filter media did not foul with carbonate salts. Ongoing regulatory compliance for zinc, nickel, and chrome was realized with no reported excursions.

The Upgrades You Need

The waste stream is often overlooked in the effort to quickly produce parts. We all need a strong focus on delivering what the customer wants in order to stay relevant and marketable. From proper equipment utilization to updated chemistries, partnering with a knowledgeable and reputable supplier for an evaluation of waste treatment processes can put your mind at ease about reducing waste, leaving you free to focus on the manufacturing process.

Mark Fretz is product manager – metalworking and water treatment at Chemetall, a BASF company.

PCT

Powder vs. Waterborne Coatings:

A Comparison from an Environmental Perspective

by Rich Saddler

At first glance, comparing powder coatings to waterborne coatings is like comparing an apple to an orange. They are both round and grow on a tree, but is there more to it than that?

Waterborne coatings, along with powder coatings, were developed years ago to compete with traditional solvent-based coatings. The goal was to reduce the amount of volatile organic compounds (VOCs) from the solvents in the paint, while increasing the percentage of resin.

Waterborne coatings are a product family which accomplish much of the first goal while still providing the benefits of liquid paint. Liquid paint represents the highest volume of industrial coatings applied with approximately 85 percent of the market share. Liquid paint is versatile, can be applied in a wide variety of environments, and across a wide range of substrates. However, liquid paint still is typically between 45 and 75 percent resin (depending on the specific product). Several other components in the formulation are necessary for keeping the product fresh for a reasonable amount of time to account for transport and storage stability.

When the percentage of solids and transfer efficiency during application are factored in, the actual film-forming content of a gallon of liquid paint is reduced to less than 60 percent. The rest of the components in that gallon end up in the filters or are exhausted into the atmosphere.

On the other hand, powder coatings are, for all practical purposes, 100 percent solids. As much as 96 percent of one pound of powder coat paint purchased from your paint supplier can be applied to the final part that the customer is purchasing. This percentage is based on the efficiency of the paint system and the reclaim capabilities of that system. However, this improvement in utilization percentage can come with some constraints as compared to liquid coating. For example, the temperatures required to cure and crosslink powder coat paint can be elevated to a level that some substrates cannot withstand. Color matching or adjusting the paint at the point of application is also an advantage of liquid.

Which coating fits?

So how does a manufacturer decide which type of coating is best for their product and operation? One of the first questions one should ask: Is it capable of being powder coated? Years ago, when powder technology was in its infancy, that was an easy question to answer. If the substrate you were coating was not metal, then powder coating was not a viable option and liquid coating was the answer. However, with the developments in lower curing and ultraviolet curing resins, the answer to this question is not so simple and should be investigated thoroughly. Products that were not powder coating candidates before, in many cases are now being powder coated successfully across the country and the world.

Calculate Total Cost

If your product is a candidate for powder coating, how do you determine whether or not it is an economical choice in terms of dollars and cents? Comparing the cost of a gallon of paint to a pound of powder is not the final answer. The true applied cost of a coating incorporates a wide range of variables which should be included in your evaluation to get the total picture. Variables such as environmental rules and regulations, coating application efficiency, coating reclaim, disposal of waste from the entire coating operation, energy requirements, employee health and safety, and equipment costs all need to be taken into consideration.

Energy Requirements

Energy required to cure the two different coatings is a factor to evaluate from an environmental as well as financial perspective. Typical cure curves for thermoset powder coatings are in the range of 350 degrees Fahrenheit for 20 minutes. Depending on the size and quantity of your product, which determines the size of your cure oven, the energy required to heat up this space and maintain it at temperature can be expensive. Energy sources available to heat this space

should also be considered. Natural gas, steam, liquid propane, and electricity are some of the typical energy sources used in industrial ovens. Each has a different cost per thermal energy that should be calculated to determine costs for your particular application.

Waterborne liquid paint can be cured at ambient temperatures or elevated temperatures depending on the desired appearance, formulation and application. The more important factor is to monitor the relative humidity of the curing space to allow for the water to evaporate out of the coating before the resins harden. If the surface of the film hardens before all of the water is evaporated underneath, sagging, popping, or a milky discoloration of the film can occur. Reducing the relative humidity in the curing process is achieved with dehumidification systems or increased temperature which reduces the relative humidity. Your paint supplier will recommend the process best suited for the paint applied.

Although the percentage of flammable components in waterborne paints is small, National Fire Protection Association (NFPA) standards for safety require the exhaust rate of liquid ovens be higher than powder ovens. The warm contaminated air that is exhausted must be replaced with fresh air that needs to be heated to operating temperatures, increasing energy costs. These additional energy costs can be significant, especially in cold climates. In addition, the spray booth for a liquid coating must be exhausted to the atmosphere and the volume of air exhausted needs to be made up with fresh, outside air to ensure proper ventilation. The air replenishment adds to the cost of energy.

With waterborne paint, it is critical to monitor the relative humidity of the curing space to allow for the water to evaporate out of the coating before the resins harden.

Color Changes

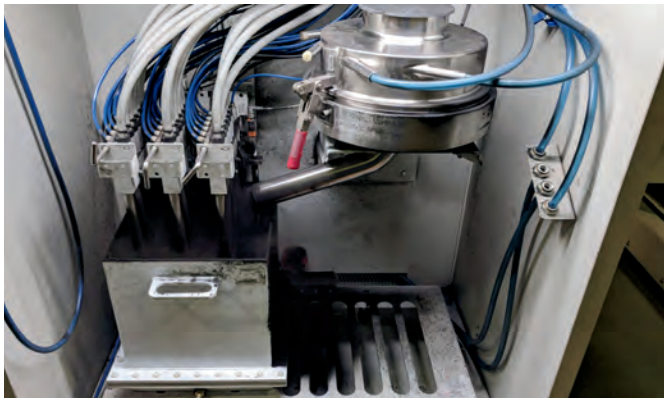
Application equipment has experienced continuous updates and improvements. Historically, liquid coating technology has been capable of changing colors in seconds, while powder coating color change times were evaluated in minutes. With new technology developed by powder coating equipment manufacturers, powder color changes can now be performed in seconds with multiple colors available to the painter with the push of a button.

Reclaim

Powder coatings have two basic methods of paint reclamation. A collector module dedicated to the reclaim color enables all of the overspray paint to be collected, processed through a sieve to remove any contaminates and then placed back into the feed hopper for a very high rate of reclaim capability. The drawback to this method is a separate collector module, and the associated equipment, is required for each reclaim color. As the number of colors increase, the payback of the required equipment for each color decreases for the lower volume colors.

The other option for reclaiming powder is cyclone-based technology. Powder-contaminated air from the booth is drawn through a cyclone system where the powder particles are separated from the air flow, and the reclaimed powder is returned to the feed hopper. This technology allows for an unlimited number of colors to be reclaimed but the efficiency of the system ranges from approximately 80-95 percent of the oversprayed powder.

The overspray of waterborne coatings can also be collected and resprayed. Overspray paint is collected utilizing different types of baffle systems. Although cleaning the baffles when required is a rather messy process, reclaim of liquid coatings is a proven technology. The collected paint is typically filtered to remove any solids which would cause plugging of the gun tip. It is then sprayed out as a primer coat on other parts. Depending on the product, system, and customer requirements, recovering waterborne paint



A system can reclaim an unlimited number of colors and the efficiency of the system range from approximately 80-95 percent of the oversprayed powder.

overspray could result in 50 percent of the oversprayed paint being reused.

Solvent

In waterborne coatings, most of the solvents are replaced with water. There can also be other minor components of alcohols and other solvents which are required for successful application and meeting customer coating requirements.

One of these commonly used components of waterborne coatings is glycol ether. EPA Title V Permit has identified certain glycol ethers as being a Hazardous Air Pollutant (HAP). Title V also states that if the plant/factory/facility meets certain threshold limits, these HAPs must be reported to the proper agencies. The local, state, and federal rules of HAPs is a long and complicated document. Further complicating the issue, the HAPs requirements for a waterborne system in one municipality can be completely different than a system located in another location. It is highly recommended that you contact your Local Authority Having Jurisdiction (LAHJ) to review your individual system. Regardless of your system size and complexity, consulting with an environmental engineering firm specializing in the rules and regulations in your location is suggested.

With the near 100 percent solids nature of powder coatings, most powder coating systems can be installed with little to no permit requirements from the local air emissions regulatory agency. Again, regardless of your system size and complexity, an environmental engineering firm should be consulted to determine what, if any, work needs to be completed with the LAHJ.

Waste Paint

Even with technology capable of reclaiming both waterborne liquid and powder paint, there are still situations where the excess paint cannot or is not recovered for reuse. The disposal of this excess waste paint is another variable that needs to be included in your comparison of coating options.

Excess powder coat paint has options for a second life. For non-visible surfaces, the surplus paint can be used as a coating to protect the surfaces from the elements. Excess powder material can also be reworked and re-tinted to be sprayed on other components. And, using leftover powders as an inert filler to other products has also been developed in certain applications.

However, should these types of reuse for waste paint not be available to a powder coater, most landfill operations will accept waste powder paint. Once again, it is advised that you work with your LAHJ and landfill companies to verify local rules and regulations related to your powder coat waste.

Waste waterborne liquid paints can be processed through a waste treatment system. The solids are settled out and disposed of in an approved manner, typically a landfill, while the liquid portion is separated into non-hazardous and hazardous waste and processed in facilities dedicated to processing of these waste streams.

Conclusion

Although there are applications where waterborne liquid paint is the best solution for painting of a product due to substrate material, existing equipment, or piece price costs, powder coating, with its clear environmental advantages, is often a preferred option and should be considered when evaluating a finishing operation. The benefits of higher paint utilization through reclaim, reduced waste disposal costs, and being a user-friendly material are all important factors that point to powder paint as a more environmentally friendly finishing process.

Rich Saddler is principal finishing consultant with Industrial Finishing Solutions LLC.

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Ask Joe Powder™

Blasted Cast Iron

Q **Joe,**

I've contacted you before so maybe you can help me again.

I run a small to medium sized powder coating line at a metal fabrication facility in southern New Mexico. We have a five stage washer that utilizes an alkaline first stage and a zirconium-based 4th stage. All stages use RO (reverse osmosis) water. Stages 2, 3 and 5 are RO rinses. We have a partitioned drying/curing oven, so adjusting one without impacting the other isn't possible.

I'm told we are going to be painting lots of "ductile cast iron" parts in the near future. What do I need to know about painting these types of parts? I've read they can have outgassing and adhesion issues. If true, how do I avoid such issues?

Management wants us to coat them with "something" that will (I assume) fill in some of the casting imperfections giving the final product a more finished appearance. I've been told to find out about some kind of thick primer? I'm told we'd want a powder coating product that matches one of the colors we currently use, but in a rough texture that could "fill in" or hide the roughness of the casting surface.

What do I need to do or apply to obtain the desired outcome?

Alan R.
Santa Teresa, NM

A Hi Alan,

Here's where to start - blast the cast iron with a decent media; I recommend medium grit aluminum oxide. Then run the part through your pretreatment system, including dry off. Next, I would preheat the part to about 350 degrees Fahrenheit, allow it to cool to about 225-250 degrees Fahrenheit, then apply a reasonably thick coat (5 to 6 mils) of a good edge coverage (higher viscosity) powder coating.

Your choice of chemistry will depend on the service environment the part will experience and the expected durability. If a single coat doesn't work, then lightly abrade the first coat and apply a second coat of powder. You should undercure the first coat if you need to use two coats. This will ensure excellent intercoat adhesion.

Please let me know how things work out.

Best regards,

– Joe Powder

DIY Repair

Q **Hi Joe,**

How can I repair a new bike rack that has a black powder coating? It has a damaged area about the size of a dime and is already bolted to a large concrete base. We would like to make the area rust proof. Is a patch the best bet or should a paint be applied to protect it from the elements?

Thanks for your advice.

Norm M.
Toledo, OH

A Hi Norm,

Here is what I would suggest: Abrade and clean the bare area, making sure that you remove all oxidation, rust, oil, and dirt. I would abrade the adjoining powder coated area as well. Next, apply a phosphoric acid metal pretreatment per the instructions provided by the supplier. You can find these on Amazon and possibly at your local DIY or auto parts store. This type of metal pretreatment will retard corrosion and provide a bit of a chemical anchor for your primer.

After the pretreatment dries sufficiently, mask off the area to be coated and apply a good aerosol epoxy primer. I would shy away from zinc-rich types because they are difficult to apply. After the primer dries, lightly abrade the primer with 400 grit automotive grade sandpaper and tack off the sanding dust. Next, apply a suitable aerosol topcoat. You can find these at a DIY or hardware store (if there are any left in this world).

This coating system will not be as durable as the original powder coating; however, if done carefully per the supplier instructions, it should last a couple years in a moderate climate.

Good luck,

– Joe Powder

The Answer is Yes, But…

Q **Is there a way to powder coat fiberglass?**

Nathan
Luna, NM

A Hello Nathan,

I think you are inquiring about the possibility of applying and curing powder coating over glass filled composite, a.k.a. fiberglass reinforced plastic (FRP). If this is the case, the answer is yes, but with a rather specific process and materials.

You'll first want to clean and lightly abrade the surface to ensure good adhesion of the powder coating. Most FRP harbors residual styrene which will bleed out during the powder bake so it is wise to prebake the substrate before applying the powder. I would bake it to about 340 degrees Farenheit.

The next step involves applying the powder. You may get lucky and be able to hit the hot substrate with powder and get adequate film build. This is a big maybe and requires timing and finesse. If that doesn't work you can apply a conductive solution (I recommend checking with Chemical Technology, Warren, MI), letting it flash and dry, then applying the powder electrostatically as you normally would do.

That sounds pretty easy so far, but we're not done yet. You absolutely must use a very low temperature cure powder and bake it no higher than about 300 degrees Farenheit for the recommended time. Not all powder manufacturers carry these products, so you'll have to look around. You can use powdercoating.org to search for powder manufacturers if you need a resource.

I hope this helps and please let me know if you have any further questions/ideas.

Warm regards,

– Joe Powder

Take a Bow

Q **Hey Joe,**

Are there established design guidelines for through holes and threaded holes on powder coated parts where plugging is not practical, and tap/ream after powder would rather be avoided? We manufacture Elite compound bows, etc. and have in-house powder coating processes. Thank you!

Mike L.
Rochester, NY

A Hey Mike,

You guys make some awesome bows. I took a look at your website - wow, very impressive. I think with such a high end product you undoubtedly take great care and time to make them perfect. I suggest that you bite the bullet (or maybe the arrowhead?) and consult with one of the high end masking/plug suppliers on the Powder Coating Institute website (www.powdercoating.org). These guys create amazing products custom designed for your exact application. I don't think you'll be sorry that you did.

If any of our erudite readers have another idea, please let us know.

Best regards,

– Joe Powder

Joe Powder™ *is trademarked and owned by Kevin Biller, technical editor for* Powder Coated Tough. *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!

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Some items are available for free download.

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Powder® Coating Institute

PCI Custom Coater members specialize in powder coating a wide variety of products to manufacturer specifications. In each issue of *PCT*, we highlight two of our Custom Coater members and the powder coating services they provide.

Maui Powder Works

Maui, HI
www.mauipowderworks.com
808-283-9664

Type of coatings applied:
Polyesters, TGIC, epoxy, and hybrids

Substrates powder coated:
Primarily aluminum and steel, but other alloys as well

Processes utilized:
Batch powder system that can accommodate parts up to 20 feet

Pretreatment:
Chemical

Curing:
Electric ovens

End-users/industries served:
Automotive, architectural and aerospace

Additional capabilities:
Specialty powder effect applications like patina powder coat, brush bronze effect, woodgrains, and marbling on large scale projects

Micron Metal Finishing

Bridgeview, IL
www.micronmetalfinishing.com
708-599-0055

Type of coatings applied:
Powder coating, plastisol, fluidized bed dip coating

Substrates powder coated:
Mostly steel and aluminum

Processes utilized:
Three conveyorized electrostatic powder lines; two lines have automatic guns and reclaim booths; one has manual sprayers and a spray-to-waste booth; the plastisol line and fluid bed dip line are conveyorized with hydraulic dip-to-line capability

Pretreatment:
Chemical, iron phosphate, and shot blasting

Curing:
Gas fired ovens

End-users/industries served:
Services many industries from lawn & garden to automotive; there is a high concentration of metal fabricators in the area resulting in both decorative and functional projects; customer base encompasses job shops and OEMs

Additional capabilities:
Pick-up and delivery service as well as light assembly and packaging

Listed alphabetically by state, the following companies are PCI® Custom Coater members as of February 8, 2019.

Alabama

Arlon Mechanical Service Co., Inc. ..... www.arlonmechanical.com
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
Nautilus Powder Coating ..... www.nautiluspowdercoating.com
Pacific Powder Coating, Inc. ..... www.pacpowder.com
Performance Powder, Inc. ..... www.performancepowder.net
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

CYA Powder Coating, LLC ..... www.cyapowder.com
Excell Coatings, Inc. ..... www.excellcoatings.com
Matrix Coatings Corp. ..... www.matrixcoat.com
Pro Powder Coating, Inc. ..... www.propowdercoat.com

Georgia

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

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

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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

Louisiana

Martin Specialty Coatings, LLC ..... www.martinsc.com
Niko Industries ..... www.nikoindustries.com
Quality Works of Southwest Louisiana, LLC ..... 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
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

North Carolina

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

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
PPG Coatings Services ..... www.ppgcoatingsservices.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
Applied Powder & Coatings, Inc. ..... www.appliedpowdercoatings.com
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Texas

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Washington

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

Wisconsin

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Recent Advancements in Bio-based Powder Coating Technology

by Kevin Biller

In the spring of 2014, I reported on the current state of bio-based powder coating technology with an article aptly named It's Not Easy Being Green. At that juncture, there had been no commercial success with introducing bio-based technology into powder coatings, although a number of attempts had been made.

Here is how I characterized the state-of-art of bio-based powders back then:

"Regardless of where the monomers come from and how the resins are produced, the ultimate product has to perform to become a commercial reality. Nearly all bio-based products synthesized to date for powder coatings have underperformed the state-of-the-art technology. In most cases the bio-renewal product has been inferior in color stability and UV durability. These shortcomings truly are show-stoppers for the powder coating formulator and her customers. The rubric 'half the performance at twice the price' comes to mind."

The good news is that significant effort has been made since then and results are promising enough to warrant an update.

Bio-Based Powder Technology

Approaches to powder coatings based on renewable resources typically involve reengineering the components of a thermosetting binder system. Scientists isolate monomers from plant-based materials and use them as building blocks for powder coating resins or crosslinkers. Monomers can be derived from sources such as soybeans, corn, pine trees (rosin), cellulose (e.g., cotton, wood and hemp), sugar cane, palm trees and linseed oil (flax). These monomers are then used to design resins or crosslinkers that have chemically reactive functional groups such as carboxyl, hydroxyl or glycidyl moieties. Two or more reactive sites are requisite to function in a thermoset binder system.

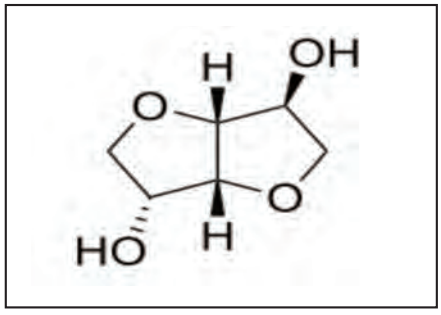
Below are some of the monomers that have been derived from plant materials and used to synthesize powder resins and crosslinkers.

Why Bio-Based?

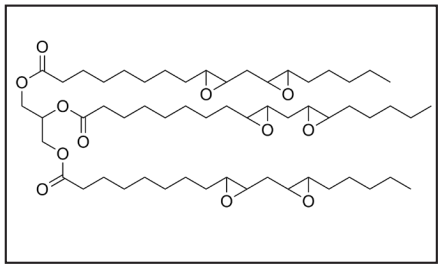
The main driver for bio-based powder coatings is to reduce reliance on fossil-based feedstocks, namely petroleum. The reasons for this are two-fold: 1. Fossil based feedstocks are limited in supply and will eventually be depleted, and 2. Many sources of petroleum involve unstable nations such as Saudi Arabia, Iran, Iraq, Venezuela, Nigeria and Russia. While these two points are debatable, it is nevertheless wise to explore alternatives to petroleum-based sources for powder coating binder components. Although the price of a barrel of oil is currently at a relatively low price, relying on unstable governments and fluid world political events can affect raw material price stability and continuity of supply.

Previous Attempts

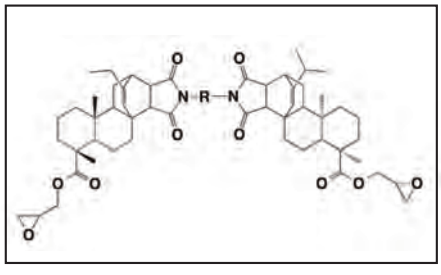
Not long ago, a major resin supplier developed carboxyl polyester resins on a monomer derived from soybean oil. Isosorbide was the monomer selected and the United Soybean Board funded the initial work. Two polyesters were developed, one for general industrial use and the other an



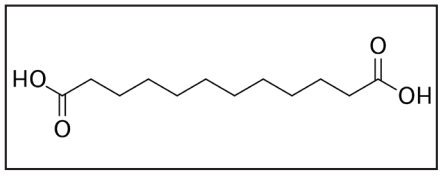
Isosorbide (from soybean oil).



Epoxidized soybean oil (from vegetable oil).



Rosin based glycidyl crosslinker (from pine trees).



C18 Diacid (from palm or soybean oil).

outdoor durable type. In 2009, the resins were introduced to the European powder coating industry with the less-than-ideal timing just after the Great Recession. This marketing strategy relied on Europe's penchant for green technology and the presence of the headquarters of a number of global powder coating suppliers.

Major powder producers evaluated these resins and concluded that the resultant coating performance was not impressive enough to encourage any of them to introduce them to their product lines. My lab performed a thorough evaluation and observed the same results. Another drawback was that these resins carried a cost premium because of higher feedstock prices.

In 2014, Washington State University developed a glycidyl functional curing agent designed for powders with a grant provided by the Center for Biopolymers and Biocomposites (CB^2). This oligomer possessed two functional groups and was evaluated with various carboxyl functional polyester resins. Poor cure and inadequate film properties were observed, undoubtedly due to low crosslink density from the only two chemically reactive groups.

Promising Recent Work

Over the last 15 years, resin producers have investigated a number of schemes to develop bio-based powder coating resins. A prevailing approach is based on using recycled PET (polyethylene terephthalate) as a building block for powder polyester resins. Recently, Allnex developed a line of bio-based resins based on recycled PET and renewable monomers derived from C5 and C6 sugars. The details are proprietary; however, these carboxyl-based polyesters can be used in a variety of powder coating systems, including epoxy-polyester hybrids, polyester-HAA (hydroxyl-alkyl amide) and TGIC cured formulas.

Resin E-04342 has a 30 acid number and can be cured with a 70/30 ratio of polyester to epoxy resin. Powder coatings based on this resin exhibit good impact and solvent resistance. In addition, this system provides an improvement in blooming resistance observed versus conventional hybrid polyesters.

Resin E-04367 is designed to cure with HAA at a 95/5 ratio of polyester to crosslinker. This approach exhibits mechanical film performance similar to conventional polyester/HAA powder coatings. However, a reduction in outdoor durability is observed in accelerated and natural sunlight testing. Pilot size samples of these resins are available for testing.

Another promising development has been achieved by a Battelle Memorial Institute project funded by the United Soybean Board. The project's scope of work was similar to previous ones – isolate a monomer from soybean oil and use it to synthesize a solid thermosetting powder coating resin. Jeffrey Cafmeyer, the project's principal investigator at Battelle, used high oleic soybean oil to synthesize long

chain aliphatic diacids. These diacids were then reacted with di-ethanol amine to create highly aliphatic polyester amide resins possessing carboxyl functionality.

Resins based on this synthetic approach were evaluated in powder coating formulations using various glycidyl functional and hydroxyl-alkyl amide curing agents. Excellent film performance was attained, especially with TGIC cured formulations.

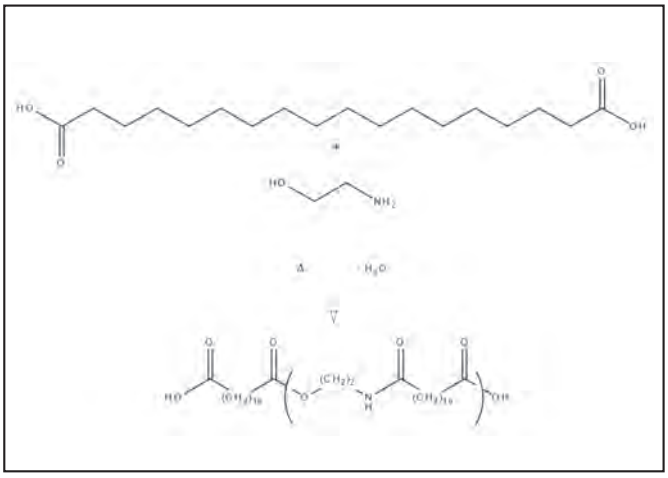


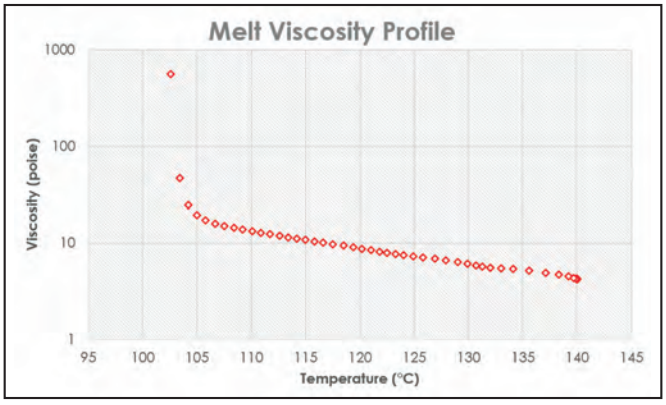
Figure 1. Generalized resin synthesis scheme of C18 carboxyl functional diacid polyester-amide resin. (Branched functionality due to diethanolamine omitted for clarity.) *Courtesy of Battelle Memorial Institute.*

Battelle Bio-based Resin Characteristics:

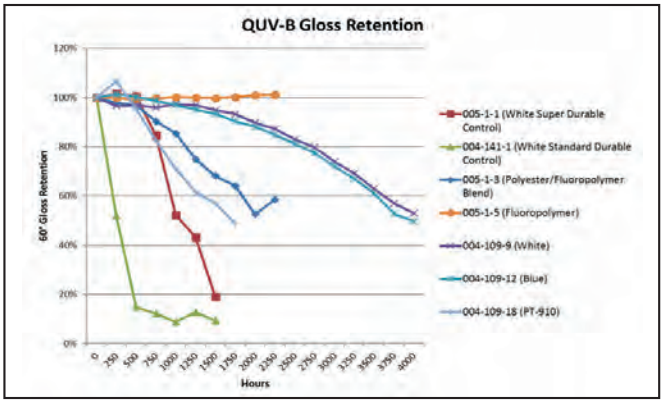
- 85% Bio-based.
- 2.1 Functionality.
- Low color.
- Sharp melting point - 105°C.
- Semi-crystalline.
- Acid Value 44-49.

Figure 2. a) C18 polyester-amide resin from the bulk condensation reaction, and **b)** Mechanically powdered resin. *Courtesy of Battelle Memorial Institute.*

Most remarkable about this polyester-amide resin is its excellent film performance when formulated in a powder coating. When cured with TGIC, this polymer produces very smooth films with 160 inch pounds impact resistance and excellent solvent resistance. Because of its relatively low melt point temperature this chemistry can be formulated to cure



Dynamic melt viscosity (poise) of bio-based powder coating resin.



ASTM D-4587 accelerated UV durability testing of bio-based powder coating vs. industry standard products.

at temperatures as low as 135 degrees Celsius. This makes it a candidate for temperature sensitive substrates such as MDF (medium density fiberboard), glass filled composites, pultrusions and many plastics. In addition, the UV durability is exceptional, eclipsing 4000 hours QUV-B exposure with less than 50 percent gloss loss. Equally important is that this resin possesses a uniquely stable melt viscosity profile. It is solid until about 105-110 degrees Celsius then exhibits a fairly low melt viscosity at about 125 degrees Celsius, enabling it to form a smooth, continuous film.

Powder coatings based on the Battelle resin technology have been scaled up to pilot size. Application trials have been conducted at infrared curing test facilities and MDF powder coating operations with good results. Plans for 2019 include further resin and powder coating scale-up and efforts to explore commercialization of this interesting technology.

Kevin Biller is technical editor of Powder Coated Tough and president of The Powder Coating Research Group.

New PCI Video Series Promotes #abetterkindofpaint

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.

Visit **www.powdercoating.org/promotepowder** to learn how you can share these videos and help promote **#abetterkindofpaint.**

Brought to you by Nordson

This Edition's Deadline:
April 4
Good Luck!

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*. Pop Quiz questions can be found in each issue of PCT.

Put on your thinking cap and then email your answer to popquiz@powdercoatedtough.com using the subject line "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.

This Issue's Question:

Q ***The EPA provides guidelines on the amount of pollutants a finishing operation can discharge into the sewer system. According to the EPA (thresholds may be different for Local Authorities Having Jurisdiction), which of the following pollutants can you indirectly discharge the LEAST amount each month?***

Choose the correct answer:

A. Copper
B. Lead
C. Nickel
D. Silver
E. Zinc

Send your answer for your chance to win!
popquiz@powdercoatedtough.com

Last Issue's Question:

The question for the January/February edition of Pop Quiz, along with the answer is:

Q: ***When performing film thickness testing, which of the following methods or references do you NOT use:***

A. ASTM D1186
B. ASTM D1400
C. ASTM D2794
D. ASTM D7378

A: The answer is C. ASTM D2794.
If you look at Table 18-3 on page 255 of the Handbook you will see that ASTM 2794 is used for impact testing, not film thickness.

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

Last issue's winner is:
Jason Cook, Digger Specialties, Powder Coating Operations Manager.

The t-shirt you selected is on its way.
Congratulations!

Part Preparation

Preparing a part properly is an essential first step for a durable powder coat. Depending on the substrate, you may require chemicals that etch the surface for proper powder adhesion, or it may require phosphating to improve corrosion resistance. Once the part is cleaned, proper masking materials are needed to protect some areas from being powder coated. The suppliers listed here can help guide you through this process. Don't forget to tell them you found them in *Powder Coated Tough*!

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By committing to regular meetings (two or three per year), Peer Group members share best practices and experiences that help custom coater members elevate their business to the next level. All CCAI & PCI Custom Coater members are invited to join this exciting program!

Here's what a few Peer Group members have to say:

The benefit of collaboration with others in my industry that are not competitors is priceless. This is a valuable program and one that I would recommend very highly to anyone in this industry.

It was nice to be exposed to coaters that did things different than me. It gave me the opportunity to open my eyes into creating more effective production.

FOR MORE INFORMATION, CONTACT TRENA BENSON AT TRENA@POWDERCOATING.ORG OR 859-525-9988

Kevin Biller

Proposition 65 Ramifications for the Powder Coating Industry

Many in the industrial coatings industry, and indeed the overall chemicals industry, have heard about California's Proposition 65. But how many of us really know what it is? Let's delve into how it was created, its mission, how it operates and the current status of compounds affecting you and the powder coating industry.

The Safe Drinking Water and Toxic Enforcement Act of 1986 is an initiative created by California voters to assuage their growing concerns regarding exposure to toxic chemicals. Dubbed "Proposition 65" as it was identified on the ballots, this act requires the state to publish a list of hazardous chemicals known to cause cancer, birth defects, or other reproductive harm.

The Office of Environmental Health Hazard Assessment (OEHHA) was formed as a division of California's Environmental Protection Agency and administers the Prop 65 directives. The bill that was passed requires businesses to notify consumers of significant quantities of listed chemicals in products they sell. Moreover, California businesses are prohibited from knowingly introducing any of these chemicals into sources for drinking water.

The list of hazardous chemicals, which now stands at over 800 entries, is compiled and updated at least annually by OEHHA. This list contains a variety of compounds from a myriad of sources, including additives or ingredients in common household products, food, drugs, dyes, pesticides, and solvents. The chemicals can also be encountered in construction, manufacturing, or chemical processes such as the combustion of fuels, including automotive transportation.

OEHHA employs two independent committees comprised of scientists and health professionals that are appointed by the Governor and are considered the "State's Qualified Experts." These two committees - the Carcinogen Identification Committee (CIC) and the Developmental and Reproductive Toxicant (DART) Identification Committee - are part of OEHHA's Science Advisory Board. Either of these committees can submit a compound for inclusion on the Prop 65 list. Committees compile recent relevant scientific data on the chemical and then open their selections for comments by the public before adding them to the list.

OEHHA also employs the expertise and recommendations of relevant federal agencies for the Prop 65 listings. The following organizations have been designated as authoritative bodies: the U.S. Environmental Protection Agency, U.S. Food and Drug Administration, National Institute for Occupational Safety and Health, National Toxicology Program, and International Agency for Research on Cancer.

Another means to add a compound to the Prop 65 list is through the California Labor Code, which requires the listing of compounds meeting certain scientific criteria established at the onset of Prop 65 in 1986. These metrics involve determining if the chemical in question causes cancer, birth defects, or other reproductive harm.

According to OEHHA, "Businesses are required to provide a 'clear and reasonable' warning before knowingly and intentionally exposing anyone to a listed chemical. This warning can be given by a variety of means, such as by labeling a consumer product, posting signs at the workplace, distributing notices at a rental housing complex, or publishing notices in a newspaper. Once a chemical is listed, businesses have 12 months to comply with warning requirements." Businesses with less than 10 employees and government agencies are exempt from these warning requirements.

So how does this impact our fair industry? Historically, not much. Back in 2009, TGIC was being investigated for toxicity and was on the launch pad to be listed; however, OEHHA delisted it on December 13, 2013, citing, "Because of recent changes in federal regulations, the chemicals identified…no longer meet the criteria for inclusion on the list on the basis of the Labor Code mechanism." A bunch of bureaucratic gobbledy gook, but California businesses no longer have to worry about listing it on their products.

Three other raw materials commonly used in powder coating formulas require warnings:

- Titanium dioxide (airborne, unbound particles of respirable size).
- Carbon black (airborne, unbound particles of respirable size).
- Silica, crystalline (airborne particles of respirable size).

These materials are ingredients commonly used to produce powder coatings and are handled by highly trained operators at powder manufacturing facilities. It is important to note that airborne exposure of all of these only occurs in the powder manufacturing process and not during the handling, transport, or application of powder coatings.

On a more amusing note, the following materials are deemed hazardous per California law and reside on Prop 65's listing: alcoholic beverages, oral contraceptives, unleaded gasoline (wholly vaporized), tobacco (and tobacco smoke), wood dust, leather dust, marijuana smoke, and last, but not least, salted fish – Chinese style.

I'm so glad that I work in the powder coating industry.

Kevin Biller is technical editor of Powder Coated Tough *and the president of The Powder Coating Research Group.*

Paul West

Connections Lead to Friendships

I have participated as a PCI member for 20 of my 35 years in the coatings industry. My involvement has encompassed serving on several committees, as both a participant and chairperson, and serving as a PCI board member for the last five years. The experience has been both fun and beneficial in enhancing my job as a polymer supplier in this industry.

The greatest benefits I have gained from my PCI involvement have come from the networking opportunities that enable me to meet other professionals in the powder coating industry, from raw material suppliers to powder coating manufacturers and applicators. Over the years, there have been several occasions where I was able to quickly reach out to fellow members I'd met along the way to obtain an answer to a technical question or gain insight on new trends or practices in the industry. Without my PCI connections, this useful information might otherwise have been missed.

PCI produces a variety of educational offerings and resources. While of value to all PCI members, I especially encourage those new to the industry to take advantage of the association's offerings. Without a doubt, they will accelerate your overall knowledge of the powder coatings market.

Of course, I have experienced many professional benefits as a result of my PCI membership and involvement. However, the many great friendships that I can attribute to my involvement in the PCI organization are just as valuable. It has made doing my job both more enjoyable and efficient.

Paul West, director of marketing, Sun Polymers International Inc.

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- Powder Coating Consultants, Division of Ninan, Inc. ..... www.powdercc.com
- Throughput / Bluestreak ..... www.go-bluestreak.com/PCI

Distributors

- Air Power, Inc. ..... www.airpower-usa.com
- D & S Color Supply, Inc. ..... www.dscolorsupply.com
- Intech Services, Inc. ..... www.intechservices.com
- Link Color NA, Inc. ..... www.linkcolorna.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
- PPG Industries ..... www.ppgindustrialcoatings.com
- TCI Powder Coatings ..... www.tcipowder.com
- Pt IGP North America ..... www.igp-powder.com/en
- Pt Menphis s.p.a. ..... www.menphis.eu
- Pt Sherwin-Williams Company ..... www.sherwin-williams.com
- Cardinal Paint and Powder ..... www.cardinalpaint.com
- Diamond Vogel ..... www.peridiumpowder.com
- Erie Powder Coatings, Inc. ..... www.eriepowder.com
- Keyland Polymer UV Powder, LLC ..... www.kpuvpowder.com
- Patriot Powder Coatings ..... www.patriotpowder.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 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
- Coral Chemical ..... www.coral.com
- DuBois Chemicals ..... www.duboischemicals.com
- EnviroServe Chemicals, Inc. ..... www.enivroservechemicals.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
- Stepan Company ..... www.stepan.com
- Pt AGC Chemicals Americas ..... www.lumiflonusa.com
- Pt Evonik Corporation ..... www.evonik.com
- Estron Chemical, Inc. ..... www.estron.com
- Indorama Ventures Xylenes & PTA, LLC ..... www.indoramaventures.com/en
- Sumitomo Corporation of Americas ..... www.sumitomocorp.com
- Sun Polymers International, Inc. ..... www.sunpolymers.com
- Teknor Apex ..... www.teknorapex.com
- Troy Corporation ..... www.troycorp.com

Systems House & Curing

- Col-Met Engineered Finishing Solutions ..... www.colmetsb.com
- George Koch Sons, LLC ..... www.kochllc.com
- IntelliFinishing ..... www.intellifinishing.com
- Midwest Finishing Systems, Inc. ..... www.midwestfinishing.com
- Therma-Tron-X, Inc. ..... www.ttxinc.com
- Pt Global Finishing Solutions ..... www.globalfinishing.com
- Pt Intek Corporation ..... www.intekcorp.com
- Pt Trimac Industrial Systems, LLC ..... www.trimacsystems.com
- Eaton Fabricating Co., Inc. ..... www.eatonfabricating.com
- Fostoria Process Equipment, Div. of TPI Corp. ..... www.fostoria-tpi.com
- Hedson Technologies North America ..... www.hedsonna.com
- Pneu-Mech Systems Mfg., Inc. ..... www.pneu-mech.com
- Rohner ..... www.rohner-usa.com

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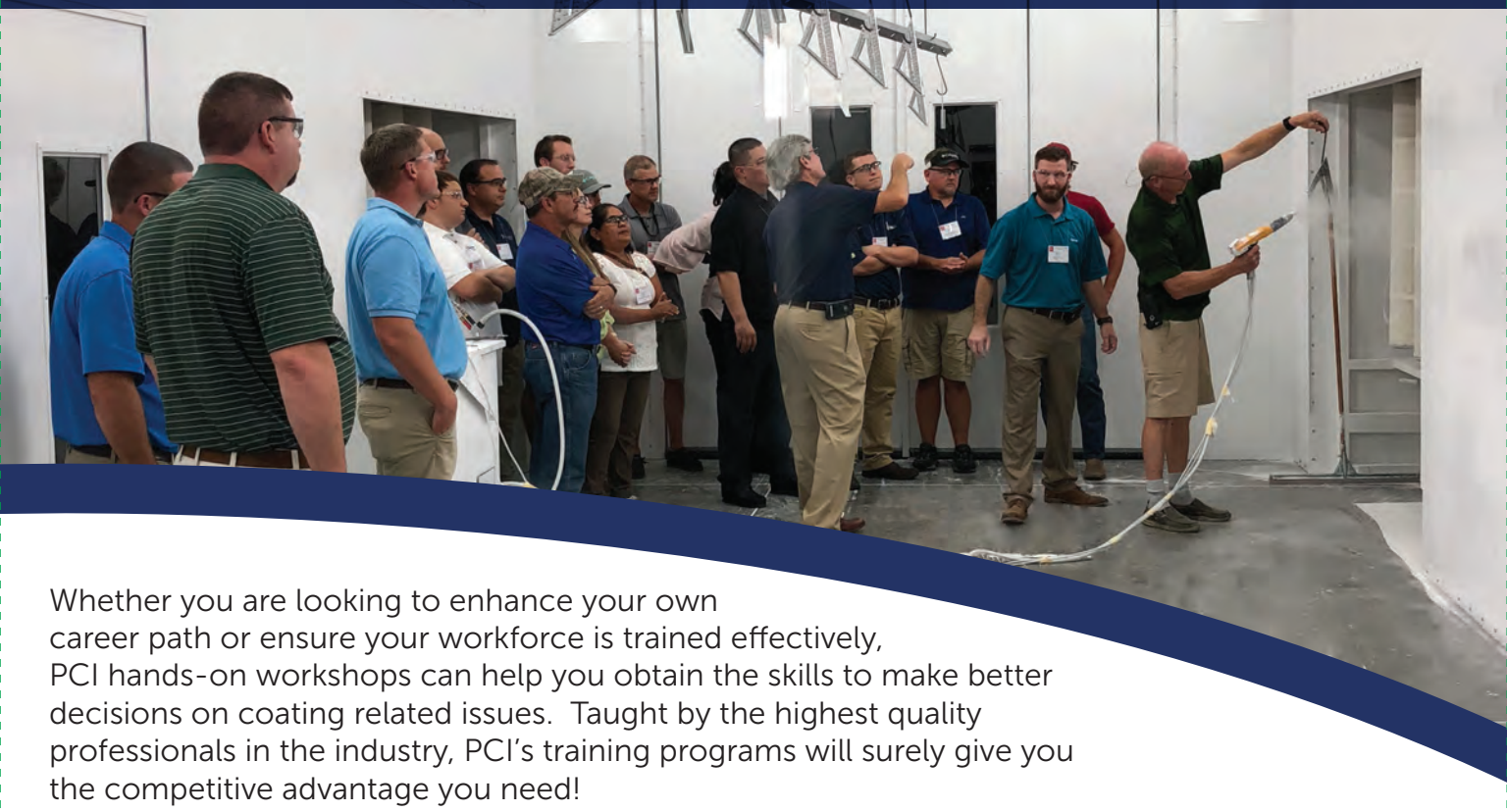

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UPCOMING WORKSHOPS

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Indianapolis, IN - December 3-4

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