

December 2007

Finishing

Trends & Technologies for Coatings Professionals **TODAY**

2007 Innovation Awards

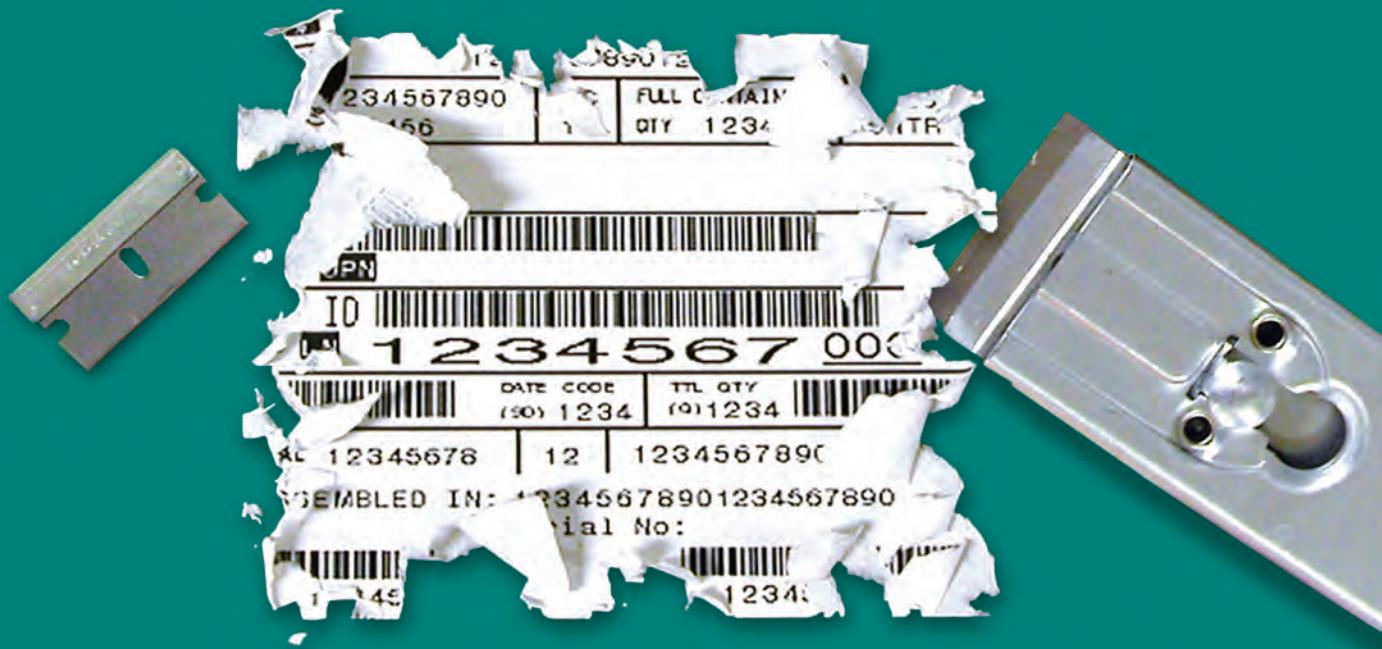


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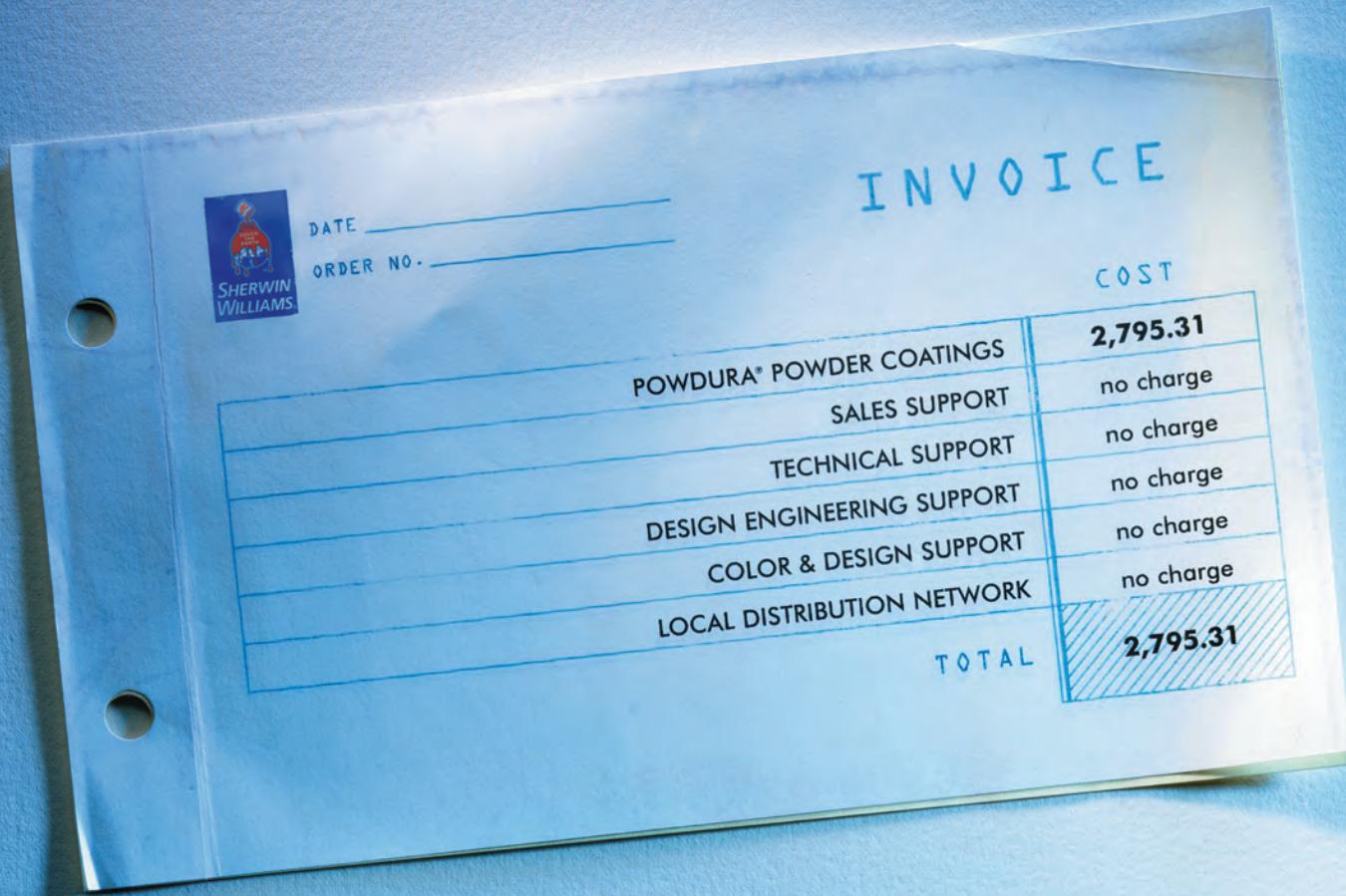
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ON THE COVER

Our 2007 Innovation Awards recognize and honor the cutting-edge innovators in the finishing industry. Story on p. 20. Cover design by Laura Carruthers.





'Tis the Season of Giving

Kevin Biller, Technical Editor

As the holiday season approaches, most of the western world celebrates some form of renewal and rebirth. With this celebration, many of us develop a sense of charity. The finishing industry has embraced a long tradition of giving back to the community. Many corporations formally extend their generosity by contributing to the less fortunate through organizations such as the United Way or Habitat for Humanity. A number of companies give back to the community as patrons to the visual and performing arts. Countless individuals band together to orchestrate food or clothing drives for local pantries or shelters. We also celebrate by giving gifts to each other.

Amid all this hustle and bustle, we need to pause and ask ourselves where our priorities truly lie. It can be easy to succumb to the commercialism of gift giving in a relentless quest to sate the materialistic yearnings of family and friends. It seems that some folks fear that if they don't deliver the latest fad, their relationship with the recipient will somehow fade. But the transcendence of time instructs us that the best gifts are often the simplest. Take the time to read a book to a young child. Visit someone in prison. Volunteer at a soup kitchen and bring your kids along. Instead of writing a check, donate your time to a local community center. Drop in at a nursing home and spend some time with the lonely souls who have dedicated their long lives to making the world a better place. Stop in at your neighborhood Red Cross and drop off a pint of life destined for an ailing stranger. Volunteer as a Big Sister or Big Brother. These are the kinds of gifts that can have a lasting impact.

Hats off to all of you who give.

Recognizing Innovation

December is also the time of year when *Finishing Today* recognizes key technology advances for the benefits they have brought to the finishing industry. This year's Innovation Awards (see p. 20) acknowledge the greatest technical strides made in the materials, equipment, process, instrumentation and plating fields.

The imagination and creativity behind these revolutionary advances is evident. One technology can accurately measure a huge range of film thicknesses on a variety of substrates without ever contacting the finish. Another significantly improves the efficiency of copper plating processes. An innovative system developed by a clever entrepreneur reduces wastewater from pretreatment and other processes. Still another offers a completely different approach to achieving a "stainless steel" look. And probably the most innovative technology uses plasma energy to clean aluminum prior to the coil application of a coating. Congratulations to this year's winners.

PUBLISHER

Donna M. Campbell

campbelld@bnpmedia.com • 610-650-4050 • Fax: 248-502-1091

SALES

Lisa Kinatader, Midwest/West Coast Sales Manager
kinataderl@bnpmedia.com • 630-882-8491 • Fax: 248-502-2097

Dawn LeRoux, East Coast Sales Manager
lerouxd@bnpmedia.com • 248-705-4039 • Fax: 248-283-6558

Andrea Kropp, Inside Sales

kroppa@bnpmedia.com • 810-688-4847 • Fax: 248-502-1048

Patrick Connolly, Europe/Far East Sales Manager, Patco Media London
patco44uk@aol.com • 44-1-702-477341 • Fax: 44-1-702-477559

EDITORIAL STAFF

Kevin Biller, Technical Editor
editor@finishingtodaymag.com
614-354-1198

Christine L. Grahl, Managing Editor
grahlc@sbcglobal.net
248-366-6981

Laura Carruthers, Art Director • carruthersl@bnpmedia.com

BUSINESS STAFF

Monica Hackney, Production Manager
hackneym@bnpmedia.com
248-244-6434

Jill L. DeVries, Reprint Manager
devriesj@bnpmedia.com
248-244-1726

Robert Liska,
Postal List Rental Manager
robert.liska@edithroman.com
800-223-2194

Shawn Kingston,
E-mail Account Rental Manager
shawn.kingston@epostdirect.com
800-409-4443

Ann Kalb, Single Copy Sales
kalba@bnpmedia.com
248-244-6499

Danielle Kimble, Marketing Coordinator
kimbled@bnpmedia.com
248-244-8257

CORPORATE OFFICE

BNP Media • 2401 W. Big Beaver Rd., Suite 700 • Troy, MI 48064-3333
248-362-3700 • Fax: 248-362-0317

CIRCULATION

Lisa DeWitt Audience Development Manager
Alison Illes Corporate Fulfillment Manager
Carrie Cypert Audience Audit Assistant
For subscription information or service, please contact Customer Service at:
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MEETINGS, SHOWS AND SEMINARS IN 2008

JANUARY 20-22

ASTM International Committee Meeting: D01 on Paint and Related Coatings, Materials, and Applications, Embassy Suites Hotel, Ft. Lauderdale, FL, 610.832.9738, jadkins@astm.org, www.astm.org/COMMIT/D01.htm

21-22

Surface Engineering for Aerospace and Defense, Coronado Springs Hotel, Walt Disney World, Orlando, FL, 202.580.6292, cclark@nasf.org, www.nasf.org

22-25

World of Concrete, Las Vegas Convention Center, Las Vegas, NV, www.worldofconcrete.com

27-30

PACE 2008, LA Convention Center, Los Angeles, CA, www.pace2008.com

FEBRUARY 7

SYMCO 2008, Drury Lane, Oakbrook, IL, 773.801.0758, GuyLopez@eastman.com, or 773.821.3089, Jncox@sherwin.com

12-15

Polyurea Development Association Annual Conference, Hyatt Regency Atlanta, Atlanta, GA, www.pda-online.org/program/annual.asp

27-29

Smart Coatings 2008, Grosvenor Resort, Disney World Resort, Lake Buena Vista, Orlando, FL, 734.487.2203, www.emich.edu/public/coatings_research/smartcoatings/index2.html

MARCH 2-6

NASF Management Conference, Sheraton Hacienda Del Mar Resort and Spa, Cabo del Sol, Los Cabos, Mexico, 202.457.8404, lweber@nasf.org, www.nasf.org

16-20

Corrosion 2008 Conference & Expo, Ernest N. Morial Convention Center New Orleans, LA, 800.797.NACE, cindy.euton@nace.org, www.nace.org

18-20

Spray Finishing Technology Workshop, Mount Wachusett Community College (MWCC), Robert D. Wetmore Technology Center, Gardner, MA, 978.630.9179, Khanson@mwcc.mass.edu, www.mwcc.mass.edu/programs/FWP/FINISHINGWORKSHOP.html

APRIL 8-10

ExpoCoating 2008 - The International Exhibition and Conference for Coatings and Surface Treatment, WTC Congress Center, Moscow, Russia, www.expocoating.ru/eng

20-23

Southern Society for Coatings Technology (SSCT) 2008 Annual Technical Conference, Sandestin Beach and Golf Resort, San Destin, FL, 800.969.1606, dr@mccanda.com

21-23

11th Annual Coatings for Plastics Symposium, Westin Yorktown Center, Lombard, IL, 888.530.6714, www.coatingsforplastics.com

MAY 4-7

RadTech UV & EB Technology Expo & Conference 2008, McCormick Place, Chicago, IL, 240.497.1242, uweb@radtech.org, www.uweb2008.com

14-16

Electrocoat 2008, Marriott of Indianapolis, Indianapolis, IN, 816.496.2308, kmcglathlin@electrocoat.org, www.electrocoat.org

JUNE 1-4

Powder Coating Institute's 27th Annual Meeting, Marco Island Marriott, Marco Island, FL, www.powdercoating.org

3-5

American Coatings Show (ACS) and Conference, Charlotte Convention Center, Charlotte, NC, 202.462.6272, www.american-coatings-show.com

JANUARY '08

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INDUSTRY & COMPANY NEWS

Enviro-Friendly Pretreatment Benefits Appliance Manufacturer

GE Water & Process Technologies, a unit of General Electric Co., recently presented Roper Corp., a wholly owned subsidiary of General Electric that manufactures cooking appliances, with a 2007 ecomagination leadership award for achieving substantial reductions in water and energy usage, greenhouse gas emissions, and nutrient levels in wastewater effluent. By switching to GE's ecomagination-certified Permatreat Enhanced Performance Pretreatment (EPP) Program to prepare metal parts for painting, Roper Corp. has reduced its annual water consumption by more than 360,000

gallons, lowered greenhouse gas emissions by 13.9 million ft³, and saved approximately \$100,000 in energy costs. Phosphate levels in plant wastewater have also declined by 45% as a result of the EPP Program.

Until recently, Roper used an iron phosphate conversion coating that required a bath of 125 to 140°F (52 to 60°C) and a post-treatment rinse stage. GE's EPP Program enabled Roper to perform pretreatment at ambient temperature, eliminate the need for a boiler to heat the bath, and also remove a post-treatment rinse. Roper was able to incorporate the EPP process in its existing tanks without major adjustments.

For more information about the EPP Program, visit www.gewater.com. More

information about Roper can be found at www.roperappliances.com.

PPG Paint Detackifier Named PACE Award Finalist

PPG Industries was named a finalist and received honorable mention in the 2008 Automotive News PACE Award program for its Green Logic paint detackifier. Used by domestic, European and Japanese automakers, the paint detackifier is added to the water wash system in automotive paint spray booths to denature and remove oversprayed paint. The patented formula, which incorporates chitosan derived from crab, lobster and shrimp shells, provides an environmentally responsible alternative to detackifiers derived from non-renewable, petroleum-based raw materials or based on chemistries containing residual-free formaldehyde.

Green Logic paint detackifier has been named "best in class" by OEM users and nominated for many environmental awards because it helps automakers realize performance gains in paint detackification and overall paint spray booth operations. It also offers greater ease of operation and savings from reduced spray booth maintenance, biocide use and wastewater treatment.

PPG also received honorable mention in the manufacturing process and capital equipment category for 100% Estabell waterborne basecoat — a European technology that uses a one-coat bell application. The environmentally responsible basecoat enables automotive manufacturers to reduce overall system costs and improve first-run capability without sacrificing performance by eliminating the need for a second pass of basecoat while still producing light metallic color matches that satisfy automakers' requirements.

Also receiving an honorable mention for coatings was BASF Coatings, Southfield, MI, for its Eco2 AdBloc product.

For more information about the 2008 PACE Awards, visit www.autonews.com/files/08_pace/finalists.html. PPG's website is at www.ppg.com, and BASF's website is at www.basf.com.

New Joint Venture Offers Marine Hull Bottom Protective Coating



Atlantic Powder Coating, Stevensville, MD, has formed a joint venture with Xiom Systems, West Babylon, NY, to provide mobile polymer powder coating services to the marine industry throughout the Chesapeake Bay watershed.

Atlantic Powder Coating established an architectural and decorative powder coating operation serving the Mid-Atlantic in 2006. The company says it is positioning itself to focus most of its offerings on the marine industry with its joint venture partnership with Xiom Systems. Xiom has developed both a mobile application system and special polymer formulations specific to recreational and commercial marine applications.

"What we are most excited about is the polymer formulation for protection of marine hulls," said Atlantic's Chuck Bell. "The coating formulation has tested to be incredibly effective at keeping growth off the bottom, while also being very sensitive to the environment."

Instead of a liquid paint, the polymer formulation is a powder that is applied "thermally" to the bottom of a vessel. The onsite-polymer powder spray system can be used to apply the coating to metal, fiberglass and wood hulls including metal and composite running gear such as props, rudders and other components.

The new division — Xiom-Atlantic Coatings — will offer the marine hull bottom protective coating service through mobile application units.

For more information, call Xiom at 866.688.9466 or 631.643.4400, or visit www.xiom-corp.com. Atlantic can be reached at 410.604.6081 or www.atlanticpowdercoating.com.

INDUSTRY & COMPANY NEWS

New Process Produces Cost-Effective Polyurethane "Skins"

Brightly colored, light-stable decorative skins made of polyurethane can now be produced directly in a reaction injection molding (RIM) process developed by Bayer MaterialScience AG and Faurecia. Working together, the two companies optimized the manufacturing process and an aliphatic polyurethane system to enable production of a high-quality decorative skin in a pre-production mold.

The aliphatic RIM skin is produced in a one-step process, which reportedly makes it a more cost-effective solution than the in-mold coating (IMC) RIM process. In the IMC RIM process, a decorative coating is first sprayed into the mold before an aromatic polyurethane system is injected in a second step using RIM technology. Although polyurethane skins produced in this way offer a high level of quality, the disadvantages of this two-stage process include longer cycle times and higher investments for molds and equipment. Polyurethane spray-on skin production in an open mold can also lead to unwanted material buildup, which causes irregular haptic features on the surface.

"By contrast, the advantage of the RIM process is that it enables wall thickness to be determined accurately, even at edges that are difficult to reach and in geometrically complex situations where a spray head cannot be positioned precisely. This prevents material buildup," explained Gregor Murlowski, an expert in polyurethane skins in the Polyurethanes Business Unit of Bayer MaterialScience. This high level of precision in determining the wall thickness offers the advantage that rip seams for concealed airbags can be created with absolute precision. A further benefit of this RIM process is its cost-effectiveness. "Depending on the component being manufactured, we anticipate that this process will be up to 50% faster than polyurethane spray-on skin technology," said Murlowski.

For more information, visit www.bayer-baysystems.com.

Coatings for Plastics Symposium to be Held in April

The 11th Annual Coatings for Plastics Symposium will be held April 21-23, 2008 at the Westin Yorktown Center in Lombard, IL.

The event will explore emerging trends in the coatings for plastics industry and will define the technologies that will have an impact on the industry's future. The two-day technical symposium will touch on topics such as coatings for plastics in appliances, electronics and construction. The event will feature 35-45 minute technical presentations, as well as a tabletop exhibition.

For more information or to register, call 888.530.6714 or visit www.coatingsforplastics.com.

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INDUSTRY & COMPANY NEWS

New Alliance Creates "Metal-over-Plastic" Technology

DuPont has formed an alliance with Canada-based Morph Technologies Inc., Integran Technologies Inc., and U.S.-based PowerMetal Technologies to develop and commercialize a nanocrystalline metal/polymer hybrid technology that will be used to manufacture extremely lightweight components with the strength and stiffness of metal and the design flexibility and lightweight benefits of high-performance thermoplastics.

The new technology — MetaFuse™ nanometal/polymer hybrids — uses a proprietary process that precisely applies ultra high-strength nanometal to components made of DuPont engineering polymers. This combination creates lightweight components in myriad, complex shapes with the stiffness of magnesium or aluminum and higher strength. The patented technology produces metals with a grain size 1,000 times smaller than that of conventional metals, according to Gino Palumbo, president and chief technology officer of Integran Technologies Inc.

"Nanocrystalline nickel or nickel-iron are high-performance metals that are two to three times stronger than normal steel and also are significantly harder, with better wear and friction performance," Palumbo said.

Initial developments will focus on selected applications in the automotive, consumer electronics and sporting goods markets. For more information, visit www2.dupont.com.

Horizon Establishes New Company to Market Metal Coatings

Horizon Business Group has established Sureshield Coatings Co., a spinoff that will market the Sureshield® brand of more than 150 antimicrobial, anti-fingerprint, and easy-to-clean coatings for metal. The company's products include powder, liquid and coil coating options that are designed to be easily integrated onto any consumer or commercial metal product.

For more information, call 866.573.4424 or visit www.sureshieldcoatings.com.

American Trim Debuts New Coating Line

The new Alodine®EC2™ high-performance coating line at American Trim in Cullman, AL, is operational and ready to support full production and prototyping. According to American Trim, the coating (developed by Henkel) virtually eliminates corrosion, improves wear resistance, enables the use of lower-cost materials (e.g., aluminum

instead of stainless steel) and offers excellent bonding capability when combined with Loctite®, Hysol® and Teroson® brand adhesives. The coating is based on Ti electrodeposited oxides and readily forms on aluminum and aluminum alloys, titanium and titanium alloys, and aluminized ferrous substrates.

The Cullman facility has a tank capacity size of 108 in. long, 30 in. wide and 40 in. deep — reportedly the largest of its kind in the world supporting the Alodine EC2 technology.

For more information, call Chris Highfield at 937.494.6024 or e-mail chighfield@amtrim.com.

Nukote Expands Coating Capabilities with New Pilot Coating Line

Nukote International has acquired a new state-of-the-art pilot coater that will enable the company to diversify its coating business. The new line provides a flexible, low-cost platform for coating development that will enable Nukote to pursue both custom coating solutions and the development of proprietary coating technologies. These developments will, in turn, feed Nukote's Custom Coating Technologies division, which now has six lines capable of precision coating on a wide range of substrates.

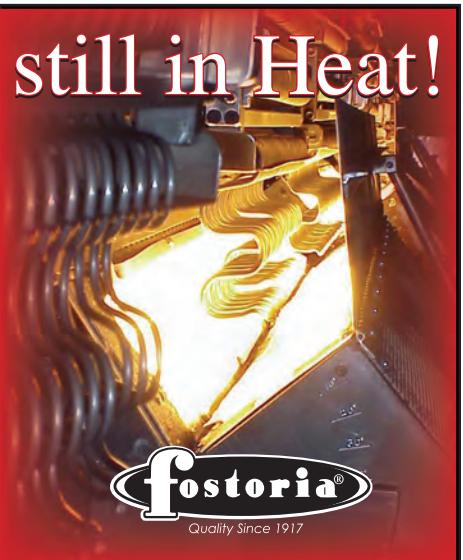
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The new pilot coating line can accommodate solvent, aqueous and hot melt coatings using slot die, wire rod, gravure or reverse roll coating methods. The coater has both oven drying and chill roll features with laminating capabilities.

For more information, call 800.345.5445 or visit www.nukote.com.

Silver Again Tops Automotive Color Charts

Silver has remained at the top of the charts as the most popular color for 2007 cars, but other colors are gaining on the perennial leader. According to the annual automotive color popularity data released by PPG Industries, silver is losing some steam as black closes in on the long-time favorite. In addition, brighter hues such as blue, red and niche market colors seem primed for resurgence.

Globally, silver held the top position as the most popular car color at 31.5% (down from 33% in 2006). Black jumped to 18% (from 15.4% in 2006) to take second place, followed by white (12.5%), blue (12.4%), red (8.8%), naturals (gold, orange and brown tones, 6.6%), other/niche market colors (5.9%) and green (3.8%).

In North America, silver also held the top spot over other vehicle colors with 22% (down 2% from last year). White, another automotive palette staple, was the second most popular North American color for 2007 with 16%. Black came in third at 15% – up two percentage points from last year – followed by red (13%), blue (12%), naturals (10%), other/niche market colors (6%) and green (5%).

“Silver is popular with consumers and automakers because it accentuates the styling of a vehicle and looks modern while also having a high resale value,” said Jane E. Harrington, PPG manager, color styling, automotive coatings. “We’re looking at new interpretations to emerge in tinted silvers and charcoal shades. In addition, hue-shifting pigments can really make silvers look unique.”

Looking beyond 2007, the colorists of the PPG Global Design and Color Marketing Team examined cultural and lifestyle trends

to create cutting-edge color palettes and special effects that meet automakers’ goals for brand identity, durability, workability and cost effectiveness. For the 2010-2011 model years, they have developed 105 exterior colors and more than 25 interior color concepts for automakers’ consideration. Some new colors in the collection are Cold Stare, a tinted silver with a steel blue highlight; Double Vision, a medium green with a red hue-shifting highlight; Out of Sight, a soft brown with a blue hue-shifting highlight; Quest, a citrus-inspired yellow metallic; and Gleam, an icy green with an intense gold flash.

For more information, visit www.ppg.com.

SYMCO Scheduled for February

SYMCO 2008 will be held February 7, 2008, at Drury Lane in Oakbrook, IL. The event

will feature tabletop exhibits and vendor talks on OEM metal, plastic and architectural coatings. For more information, contact Guy Lopez at GuyLopez@eastman.com or 773.801.0758, or John Cox at Jncox@sherwin.com or 773.821.3089.

Enthone Licenses Catalytic Inks from TECSEN SA

Enthone Inc., a business unit of Cookson Electronics, has signed a worldwide exclusive licensing agreement with TECSEN SA, Brussels, Belgium, for catalytic inks. Under the terms of the agreement, Enthone will gain exclusive worldwide rights to manufacture, market and sell catalytic ink technologies used in a range of applications, including phone cards, RFID, printed flexible circuits, plated shielding and decorative plating on plastics.

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Primarily marketed under the EnTRACE™ trade name, the line of inks is designed to offer superior yield performance for the metallization of a new range of plastic substrates.

According to the company, the inks offer a shorter, environmentally friendly metallization process while providing strong adhesion on a variety of engineering resins.

“Our intent is to expand the availability of the catalytic inks throughout Enthone’s global manufacturing reach, as well as to devote significant R&D resources to both enhance existing products and develop new products based on the EnTRACE technology,” said Stephen J. LaCroce, vice president of marketing.

For more information, visit www.enthone.com.

Titanium Coating Improves Biomedical Implants

icotec ag in Altstätten, Germany, has received the 2007 Materialica Design Award in the “surfaces” category in Munich, Germany, for the functional coating of composite implants made of carbon fiber-reinforced PEEK. This marks the third time in a row the Swiss company has received this international innovation and design award for one of its products.

Carbon fiber-reinforced PEEK is a composite material that is mainly used in aeronautical and aerospace applications, as well as in lifestyle applications such as golf clubs and motorcycles. icotec has been a pioneer in using this high-performance material for biomedical implants. The company recently extended the range of properties of its implants with a titanium coating on the composite biomaterial.

“The rough surface coating enables a strong bone attachment on the implant. This is a desirable effect if the implant remains in the body. Unlike the only slight bone attachment on uncoated composite implants: ideal for applications where the implant needs to be removed after healing. With partial coating, we are able to control the strength of the bone adhesion according to the application’s needs,” said Roger Stadler, managing director of icotec.

For more information, visit www.icotec.biz.

Akzo Nobel Shareholders Approve ICI Acquisition

Akzo Nobel N.V. shareholders have given strong support for the company’s proposed acquisition of Imperial Chemical Industries



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PLC (ICI). At an extraordinary general meeting (EGM) held in Amsterdam, shareholders voted 79% in favor of the transaction. The transaction is expected to close on January 2, 2008, subject to the outcome of ICI's court meeting and EGM in early November and certain other conditions.

For more information, visit www.akzonobel.com.

RadTech Opens Nominations for Technology Awards, Scholarship Program

RadTech, The Association for UV and EB Technology, has opened nominations for the biennial UV/EB End User Emerging Technology Awards, which will be presented at the RadTech UV/EB Technology Expo & Conference, May 4-7, 2008, at McCormick Place in Chicago, IL.

The organization also has developed a "RadTech Experience" Scholarship and cash award for a promising undergraduate and a graduate student studying UV/EB technology. The scholarship will sponsor participation at the conference.

For a copy of the award submission form or scholarship application materials, e-mail uveb@radtech.org or call 240.497.1242. For more information about the conference, visit www.radtech2008.com.

Conference Focuses on Automotive Materials Weatherability

Attendees at Q-Lab Corp.'s Oct. 30 Automotive Weathering Technology Symposium took away information about testing procedures, correlation, and materials science relevant to their industry. The event, sixth in Q-Lab's series of international automotive weathering

symposia, attracted 45 automotive OEMs and suppliers with positions in R&D, quality control and senior management to the Hyatt Regency Dearborn, MI.

Scientists Dr. Michael Diebold (DuPont), Ellen Phillips (Diamond Polymers) and Kurt Davidson (Ciba Specialty Chemicals) shared information about advanced materials with improved appearance properties and weatherability. Diebold illustrated photo-degradation and gloss retention variability in TiO₂ pigments. Phillips focused on the effect of color and UV stabilizers on ABS and ASA polymers. Davidson talked about new light stabilizers that can be used for low-volatile organic compound (VOC), high-performance coatings.

Several speakers presented different perspectives on how natural outdoor exposures in southern Florida and accelerated weathering can be used most effectively to improve product reliability and performance.

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Michael Crewdson (Q-Lab) cautioned the audience not to rely solely on accelerated testing. Warren Ketola (WK Weathering Consulting) reminded listeners that accelerated test duration is material-dependent — that there is not a universal equation for how many hours in a xenon tester equals Florida exposures. His presentation gave insights about acceleration factors, comparative testing and confidence plots.

John Boisseau (BASF) discussed new developments in acid etch testing for automotive clearcoats. Years of collaborative research have produced an accelerated Q-Sun acid etch test cycle with proven correlation to Jacksonville, FL, outdoor test results. Recently this method became ASTM D7356.

Presenter Jeffrey Quill (Q-Lab), co-author of a correlation study about SAE's xenon arc test methods, reminded the audi-

ence that SAE J1960 and J1885 will officially be obsolete in January 2008, and explained that there is good correlation between the new performance-based and the old hardware-based methods. He answered questions from those who would be affected by the test method update.

For more information, contact Q-Lab Corp. at info@q-lab.com.

PPG Acquires CRC, Enters Partnership with Agion

PPG Industries has acquired certain assets of Coatings Resource Corporation (CRC), Huntington Beach, CA. Terms were not disclosed. CRC operates one manufacturing facility in Huntington Beach and employs approximately 30 people. The acquired assets include inventory, accounts receivable,

key sales and technical personnel, selected equipment, formulations and customer lists. CRC's manufacturing plant in Huntington Beach will not be acquired by PPG but will toll manufacture products for PPG for the foreseeable future.

In a separate move, PPG has entered a worldwide, multi-year exclusive partnership agreement with Agion Technologies to develop, manufacture, and jointly market PPG's coatings for use on laptop computers. The coatings, which feature Agion's antimicrobial protection, have been developed to work continuously to inhibit the growth of microbes using "nature's antimicrobial" — naturally-safe silver ion technology.

For more information, visit www.ppg.com. CRC's website is at www.coatingsresource.com, and Agion Technologies' website is at www.agion-tech.com.



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Akzo Nobel Moves U.S. Headquarters to Hudson, OH

Akzo Nobel Coatings, Inc., has selected Hudson, OH, the previous site of The Flood Co., as headquarters for Decorative Coatings U.S.A. Nils van der Plas has been appointed as general manager and will be responsible for the management of Flood® Wood Care products, Sikkens Wood Finishes, and Synteko® Floor Finishes. He was most recently with Akzo Nobel Chemicals in the Netherlands and has relocated to Hudson, OH.

According to the company, this appointment is part of an overall process of consolidating and improving business processes for the U.S. Decorative Coatings business. In a related move, Gerald Koutavas has been named director of sales and marketing for the Flood, Sikkens and Synteko brands for North America. Under his direction, each brand will continue to have its own positioning, channels and strategy. Koutavas had been based in Troy, MI, but has also relocated to Hudson.

Other functions, such as operations management which includes logistics and manufacturing, management of R&D, and the financial functions for the three brands are

INDUSTRY & COMPANY NEWS

also being consolidated, but separate manufacturing sites for the brands will continue.

For more information, visit www.akzonobel.com.

Syrgis Performance Products Launches New Company

Following its recent purchase of a prominent producer of methyl ethyl ketone peroxides in North America, Syrgis Performance Products has renamed the Norac organic peroxides business units in the U.S. to Syrgis Performance Initiators Inc., and in Europe to Syrgis Performance Initiators AB.

The acquisition is expected to add more than \$50 million in annual revenue to the Syrgis group. In addition to manufacturing and distribution facilities in Sweden and Helena, AR, Syrgis acquires the considerable technical, sales, and manufacturing staff, support and services with the purchase. The acquisition of this organic peroxides line also brings an extensive distribution network in the U.S. with companies like Composites One, North American Composites and Ashland Distribution.

For more information, visit www.syrgis.com.

HERO Appoints Coast to Coast as Sales Representatives

HERO Products Group has appointed Coast to Coast – Sales and Marketing as representatives for Canada. Coast to Coast will represent HERO's complete line of point of sale paint equipment products, including automatic and manual colorant dispensers, as well as its line of paint mixers and shakers. The move is designed to improve HERO's overall customer communication through Coast to Coast's team of nine staff and sales representatives.

For more information, call Coast to Coast at 866.679.6879 or visit the HERO website at www.hero.ca.

CORRECTION: In "Modern CARCs for Military Protection" (October 2007), four of the MIL specs in "Table 1. The CARC System" were inadvertently listed in the wrong column. MIL-C-5541 (chromate conversion) and MIL-A-

8625 (anodize), both for pretreating, and MIL-PRF-23377 and MIL-PRF-85582 for priming, should have been listed under "Non-Ferrous Metal." A corrected copy of the table can be

found in the online version of the article, located in the editorial archives at www.finishingtodaymag.com. We apologize for any confusion this error might have caused. 



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Sean Tauffer *Sales Manager, Fristam Pumps*

Sean Tauffer has joined Fristam Pumps USA as the southwest regional sales manager. In his new position, Tauffer will be responsible for Fristam's distribution network in the southwestern U.S. Tauffer has nearly 20 years of pump and process industry experience.



Paul Skelton *Vice President, Sales and Operations, Carolina Process Control*

Paul Skelton has joined Carolina Process Control, LLC (CPC) as the new vice president of sales and operations. CPC, based in Forest City, NC, is a supplier of metal finishing supplies and equipment for the plating and powder coating industry. Skelton, who has relocated to North Carolina from Tulsa, OK, has 20 years of experience in the metal finishing industry. His fields of expertise include chemistry, waste treatment, technical support, production management, operations and sales. He will be responsible for

overseeing the daily operations for CPC, including the chemistry, commodity sales and turnkey equipment divisions.

Trevor Jones *Senior General Manager, Yaskawa Motoman Canada*

Motoman Inc. has hired Trevor Jones as senior general manager of Yaskawa Motoman Canada (Mississauga, Ontario). Jones brings more than 23 years of robotics industry experience to his new role. He was a founding member of CRS Robotics, which was later acquired by Thermo CRS Ltd., a Thermo Fisher Scientific subsidiary in the life science industry. He held key posts at CRS such as VP/manager of R&D, VP/manager of product development, chief technical officer, VP and business unit manager for OEM markets, director of North American sales, and director OEM sales and business development. Currently, Jones is also president of the Robotics Industries Association (RIA). Jones will report to Roger Christian, Motoman's vice president of marketing and international groups.



Karen Zaccaro *Region Manager, ALMCO, Inc.*

ALMCO, Inc., a manufacturer of automated deburring and finishing equipment and parts cleaning machines and systems, has appointed Karen Zaccaro the new region manager responsible for sales and management of distributor activities in all New England states. Zaccaro, based in Manchester, CT, formerly owned a distributorship of finishing equipment and supplies — Surface Finishing Solutions LLC — for five years. Most recently she was a technical sales representative for Bel Air Finishing Supply in Warwick, RI, since 2005. Her finishing industry experience also includes sales and quality assurance responsibilities with two Bloomfield, CT, firms — New England Metal Finishing and Precision Metal Finishing.

Ron Plooy *UV Chemist, Allied PhotoChemical*

Allied PhotoChemical has hired Ron Plooy as UV chemist as part of its internal expansion into the rapidly growing UV coating marketplace. Plooy has more than 30 years of experience in UV chemistry, ranging from baseline UV clear technology to advanced hybrid UV technology. He has initiated UV programs at several companies, owned his own company and expanded existing UV programs during his tenure in the UV marketplace.

Laurie Thomas *VP of Supply Chain, Michelman*

Michelman has appointed Laurie Thomas to the position of vice president of supply chain. Effective October 1, 2007, Thomas' responsibilities include sourcing and purchasing raw materials, managing inventory, manufacturing and operations, as well as overseeing global customer support functions. Thomas' past successes include a roll-out of the IAMS brand to over 25,000 new food, mass and club stores, resulting in a significant increase in brand awareness and revenue. She was also responsible for implementing the IAMS global ERP system.



BASF Hires Gantner, Hummel; Promotes Herion

Joseph M. Gantner has joined the BASF Functional Polymers business as a technical sales representative for the northeast region of the U.S. Gantner comes to BASF from Wolstenholme International Inc., where he was eastern regional sales manager responsible for sales of metallic pigments, metallic inks and carbon black dispersions to the ink, plastic paint markets in west Chicago, IL. Prior to that, he held various sales positions with Sigma Coatings USA of Harvey, LA, and Carboline Company of St. Louis, MO. Earlier in his career, he worked as a technical service manager for Con-Lux Coatings of Edison, NJ, and as a lab manager for International Paint Co.

Christopher J. Hummel has joined the BASF Functional Polymers Architectural Coatings business in Charlotte, NC, as product marketing manager. With 18 years of chemical industry experience, Hummel comes to BASF from the Huntsman Polyurethanes business (formerly ICI), where most recently he was sales and commercial manager in the Coatings, Adhesives and Elastomers group, located in Auburn Hills, MI. Prior to that, he held various positions in sales and marketing in several locations.

BASF also has appointed **Dr. Christof Herion** as the director of production for its Intermediates unit located in Geismar, LA, where diols and derivatives, and amines are produced. Since joining BASF in 1989, Dr. Herion has held various technical and commercial positions in process licensing, catalyst marketing, petrochemical operations and marketing of intermediate chemicals.

Doug LoFranco

VP of OEM Sales, Wheelabrator Group

The Wheelabrator Group has named Doug LoFranco vice president of original equipment manufacturer (OEM) sales in North and South America. LoFranco will play an integral role in the day-to-day decision making at the company.



He joined Wheelabrator two years ago from Rockwell International, where he was the Canadian Engineered Solutions Group - National Business Manager. Prior to his service at Rockwell, he held various business development roles of increasing responsibility for a number of well-respected technical companies. He is a registered professional engineer with a bachelor of science degree in engineering from the University of Guelph in Ontario, Canada.

Bjorn Tranebo

General Manager, Burlington Technology Center, Wheelabrator Group



Bjorn Tranebo was recently promoted to General Manager of the Wheelabrator Group Burlington Technology Center. Prior to this appointment, Tranebo was the Operations Manager at the Burlington facility. As the Burlington Technology Center general manager, Tranebo will be responsible for product innovation, application and project engineering and overall project management of the Wheelabrator Burlington facility. He will work closely with Technology Center general managers to ensure a consistent, standard and global approach to delivering what the company terms "the Wheelabrator value."

James R. Jaye

Director, Corporate Communications, Nordson Corp.

Nordson Corp. has appointed James R. Jaye as director, corporate communications. In his new role, Jaye will oversee Nordson's corporate communications function, including internal and external communications and media relations. Prior to joining Nordson, Jaye was corporate manager, business communications, for Parker Hannifin, where he held positions of increasing responsibility since 1995. 

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A “stainless steel” ceramic coating, an open-air plasma pretreatment technology, a non-contact film thickness instrument, a periodic pulse reverse plating system and a water recycling system are this year’s hottest innovations.

It’s time again to recognize and honor the cutting-edge innovators in our industry. Over the past few months, we received a number of nominations from across the globe for these awards. We’ve set aside this special issue to recognize the greatest achievements in new technology in materials, process, instrumentation and equipment. This year, with our expanded coverage of the plating industry, we also have added an award for the greatest advancement in this technology.

The awards this year go to enterprises ranging from global organizations to a small machine shop in Colorado. It is our distinct honor and pleasure to present the 2007 *Finishing Today* Innovation Awards.

INNOVATION AWARD FOR MATERIALS: Ferro Evolution™ Coatings

For years, the high-end major appliance industry designers have favored the look of stainless steel. Refrigerators, ranges, ovens, freezers and outdoor grills for the luxury market all sport this look. In spite of the rich aesthetics and perceived quality profile provided by stainless steel, the material itself is not without shortcomings. It discolors with heat, can stain when subjected to some cleaners and has a tendency to show fingerprints. Furthermore, the price of stainless steel has increased significantly over the last couple of years.

Ferro Corp., headquartered in Cleveland, OH, has developed a lower-cost alternative

BY KEVIN BILLER

that provides the look of stainless in a ceramic coating. Dubbed Evolution, this coating does not fingerprint and is resistant to common household cleaners. It gives the heat resistance typical of porcelain enamel while maintaining the look of stainless steel. The corrosion resistance and weathering durability of this product have been well documented in laboratory and life-cycle testing. Relatively low-cost steel can be used in conjunction with Evolution to produce an overall lower cost compared to stainless steel without compromising on aesthetics. In addition to a stainless steel-look coating, this product line also has coatings that simulate copper.

INNOVATION AWARD FOR PROCESSING TECHNOLOGY:

Plasmatreat Openair® Plasma Pretreatment Technology for Metal

The concept of using plasma energy to pretreat plastic substrates has been embraced by the finishing industry for years. Plasma energizes the surface that then provides an anchor for various finishes to adhere. Plasmatreat, based in Steinhagen, Germany, with North American offices in Mississauga, Ontario, Canada, has taken this innovation further to clean and energize metal surfaces. The impact this technology may have on the coatings industry is monumental.

Typically, metal cleaning/pretreatment processes involve the application of a series of heated aqueous solutions that alternately clean, then rinse, then convert, then rinse, then seal and dry the substrate. These process usually are accomplished in three to five steps but can exceed 15 stages in more compli-





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estimate that the conversion will eliminate 150 to 180 tons of sludge and wastewater produced at the plant per year.

INNOVATION AWARD FOR INSTRUMENTATION:

Sensory Analytics SpecMetrix™ Non-Contact Film Thickness Technology

Film thickness measurement is critical to every finishing operation. Performance, aesthetics and economics are all driven by how much coating has been applied to the substrate. Sensory Analytics, headquartered in Greensboro, NC, has pioneered and patented technology that provides real-time, nondestructive measurement of a vast array of inorganic and organic coatings on metallic or non-metallic surfaces. This non-radioactive technology based is capable of precisely measuring thicknesses ranging from 200 nanometers to 200 microns (0.01 to 8.00 mils).

The innovation that the SpecMetrix technology brings is the safety of avoiding radioactive methods and its versatile capability. No other technology can measure such a broad thickness range over so many different substrates. This technique has found use in the automotive, medical devices, building materials, electronics, aviation and packaging industries.

INNOVATION AWARD FOR PLATING TECHNOLOGY:

MacDermid Periodic Pulse Reverse Plating System

Direct current acid copper plating has long been used in decorative copper plating applications such as automotive wheels and plumbing fixtures because of its high leveling and bright covering power. However, as with most acidic-based electrolytes, acid copper carries the drawback of poor throwing power. As a result, excessive plating times are required to achieve minimal copper thicknesses in low-current-density areas, and too much copper metal is applied in the high-current areas, leading to wasted metal and added costs. Additionally, complex shapes can be difficult — and sometimes even impossible — to plate. Issues such as high metal prices, high charges to dispose of metal-containing waste, and the need to increase productivity on existing plating lines are forcing many decorative plating companies to look for an alternative.

One solution is the use of a periodic pulse reverse (PPR) system, also known as pulse plating, developed by MacDermid, Inc., based in Denver, CO. Pulse plating provides exceptional deposit distribution, which reduces metal usage, and it lowers the metal concentration in the electrolyte, which reduces the amount of drag-out losses and sludge produced in waste treatment. It also produces excellent low-current-density brightness, thereby making it easier to plate complex shapes. The brightness



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cated systems. The stages all require meticulous management of temperature, solids level, pH and other chemical analyses to ensure expected performance. Many stages also require heat to optimize the cleaning or chemical reactions. Furthermore, the processes generate sludge that may contain hazardous materials that require special handling and disposal.

The Plasmatreat technology eliminates all the stages prior to the application of the conversion coating. This process provides an energized hydrophilic surface possessing a contact angle of 15 to 28 degrees. Plasmatreat commercialized this technique at an aluminum coil coating line in Switzerland this past summer. Project engineers

and leveling are similar to traditional decorative acid coppers, which makes it an easy replacement for current acid copper systems.

This technology has been commercialized successfully on two continents. One of the largest automotive plating-on-plastics job shops in Europe has been using pulse reverse copper technology for more than a year on a full production line. The company has achieved a net savings of 20% in copper anode and salt materials while producing deposits comparable in leveling and bright throwing power to conventional systems.

The PPR system has also been used for more than a year in full production at a job shop in the Midwest U.S. A significant number of processed parts are for high-end applications and therefore require a very high-quality finish. The company has seen a savings of 20% in copper metal and a 30% reduction in plating time while achieving excellent deposit distribution. It has been able to plate complicated parts more reliably due to the superior bright throwing power at extreme low current densities. Additionally, the company has reaped the benefit of easier bath maintenance.

INNOVATION AWARD FOR EQUIPMENT: TASROP, Inc. STW Water Filtration System

Robert Miller runs TASROP, Inc., a powder coating job shop at the foothills of the Rocky Mountains in Florence, CO. It's part of a full service machine shop he started in 1998. His powder coating operation had always been environmentally friendly; however, the company still had to deal with the high costs and environmental impact associated with disposing of wastewater generated from his metal pretreatment system.

A local drought spurred Miller to seek a solution, but there didn't appear to be any technology available to accomplish the job. So he created his own system. The resulting equipment, which he calls the Save the Water (STW) recycling system, reduced his water usage from 16,000 gallons of water per month to 1200 gallons per month, and from three barrels of chemicals per month to one and a half barrels per year — a 90% savings on water and chemicals.

The system processes the contaminated water and chemical solutions through its proprietary filtration system, then refilters the solution continually and pumps it back into the power washer/cleaning system. Miller calculated that a company using 15,000 to 18,000 gallons of water and 165 to 185 gallons of chemical cleaning agent per month could decrease its usage to less than 1,200 gallons of water and 7 gallons of cleaning agent per month by using the new recycling system. Based on that model, a small business could potentially save \$17,000 per year — while also helping to protect valuable natural resources. **ft**



MacDermid Periodic Pulse Reverse Plating



TASROP STW System

Kevin Biller is technical editor of *Finishing Today*. He can be reached at editor@finishingtodaymag.com.

EDITOR'S NOTE: Feature articles on the *Plasmatreat*, *TASROP* and *MacDermid* technologies have appeared in past issues of *Finishing Today* magazine. For more information, visit www.finishingtodaymag.com, or visit:

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A New Hardcoat for Automotive Plastics



Thermally cured silicone hardcoats can achieve a durable, high-gloss finish, giving a longer lasting protective surface for automotive exterior plastic parts.

As the world focuses on fuel efficiency, alternative fuels and the environmental impact of CO₂ emissions, the automotive industry is looking for new solutions to reduce vehicle weight. The objective is to replace historically heavy parts with parts made from lighter materials that meet consumers' demands for aesthetics and satisfy applicable government regulations.

In light of these goals, plastic parts present an attractive alternative. Plastics are relatively light and can have

**BY ROB HAYES AND
ANA MARIA BONADIES**
Momentive Performance Materials

a potentially lower impact on the environment, since weight reduction typically leads to improved fuel efficiencies. Additionally, the versatility of plastic part processing

provides the industry with design choices that support product differentiation for consumers. Plastics such as polycarbonate (PC) and polyacrylate demonstrated these benefits when they were selected to replace glass in headlight (Figure 1) and rear lenses.

However, plastics also present a major challenge to the automotive industry and its suppliers. Despite its many desirable features (light weight, impact resistance, transparency, flame resistance and design flexibility), plastic is susceptible to three potential shortcomings: 1) degradation when exposed to weather conditions (UV, heat, water) for long periods of time, 2) scratching or marring with little force and 3) susceptibility to chemical and/or solvent attacks. Any of these potential deficiencies may



Figure 1. A headlight coated with UV curable hardcoat silicone.

ABOVE: The new hardcoat system is used on the Toyota® Tundra® garnish, among other applications. Photo courtesy of LexaMar Corp., Boyne City, MI. (Toyota and Tundra are registered trademarks of Toyota Jidosha Kabushiki Kaisha TA Toyota Motor Corp.)

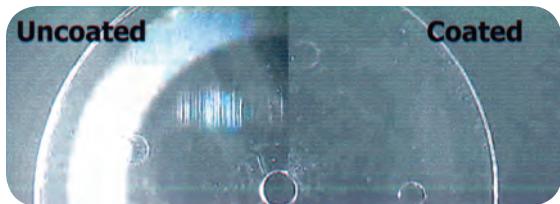


Figure 2. Comparison between a hardcoated and non-hardcoated part. Source: Momentive Performance Materials Research Laboratories, Waterford, NY.

lead to product failures and/or consumer complaints that the plastic part looks old too soon — consumers expect vehicles to maintain their gloss. As a result, while plastics offer many desirable features for the automotive industry and its suppliers as alternatives for heavier parts, there is no “perfect material” available yet to address the fact that the part needs to last in the car over a long period and still look like new.

As the automotive industry continues to improve plastics for new applications, silicone-based hardcoats have become an enabling technology. Silicone hardcoats

There is no “perfect material” available yet to address the fact that the part needs to last in the car over a long period and still look like new.

potentially provide automotive designers and customers with an added degree of protection for the appliques, mirror shells, sunroofs, vent grills and polycarbonate (PC) exterior trim sported by many of today’s cars and trucks. These plastic parts have traditionally been susceptible to fading and cracking after extended exposure to harsh in-use environments. Silicone-based hardcoats, particularly thermally cured hardcoats, have enabled many companies to achieve a durable, high-gloss finish, giving a longer lasting protective surface for automotive exterior plastic parts (see Figure 2). Hardcoats help enable the use of plastic without sacrificing durable aesthetics or performance.

Hardcoat Advances

Although thermally cured silicone hardcoats have long been available in the marketplace, more demanding performance requirements have led to the development of a two-component silicone hardcoat system consisting of a hardcoat topcoat and a basecoat.* This thermal-cure silicone coating system can provide exceptional protection from ultraviolet light exposure, excellent abrasion resis-

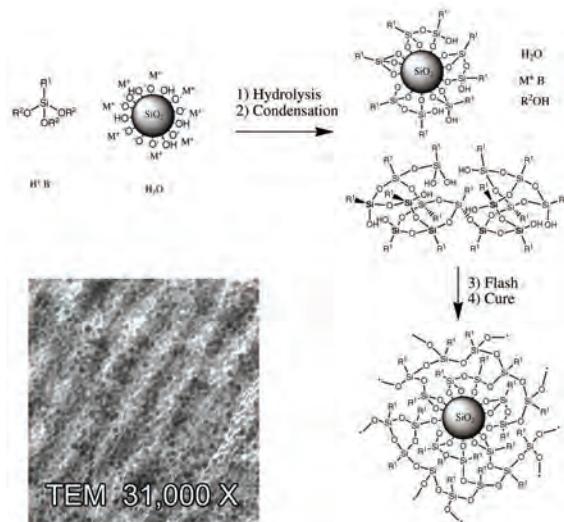


Figure 3. General scheme for the synthesis of a thermal-cure silicone hardcoat. The TEM image on the lower left is of a cured silicone hardcoat. The nanosilica in the cured coating is shown in the dark spheres in the image.

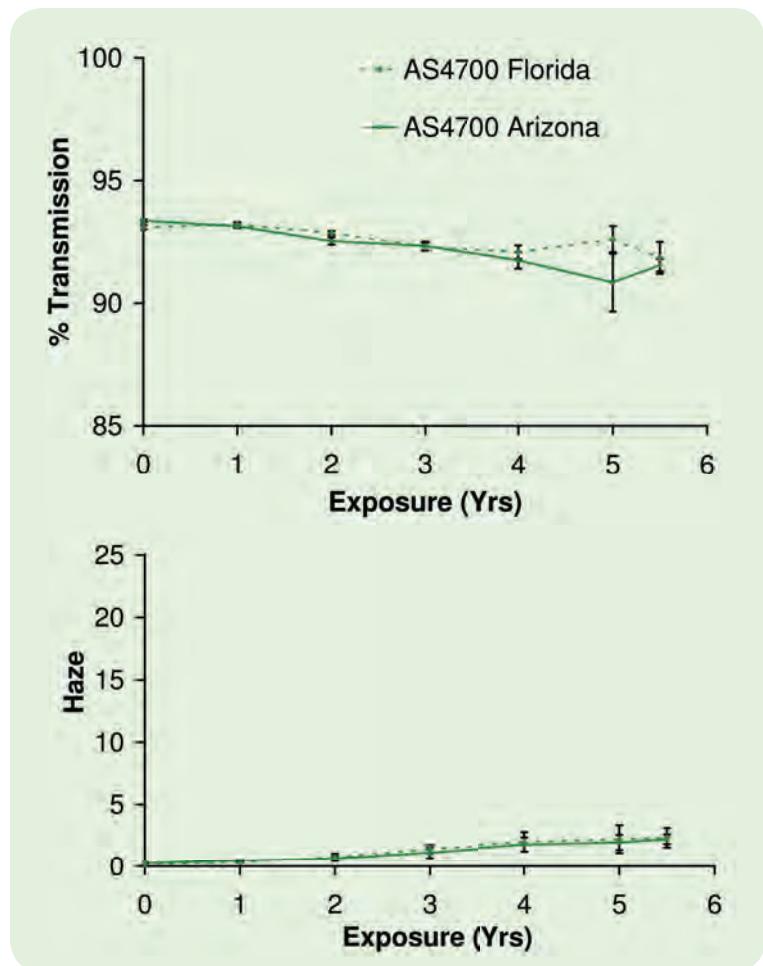


Figure 4. Outdoor exposure data for 5° (to horizon) south facing in Florida and Arizona. (Test data; actual results may vary.)

*The new hardcoat system is supplied as a topcoat (AS4700) and basecoat (SHP470) from Momentive Performance Materials, Wilton, CT.

PLASTIC FINISHING

SILICONE HARDCOATS



Figure 5. Photos of 5° weathering samples of polycarbonate coated with the new hardcoat system from Florida and Arizona testing. The top 20% of each panel was not coated and shows the effect of weathering exposure on uncoated PC. (Test results; actual results may vary.)

tance and chemical resistance. The system typically produces a high-performance protective hardcoat for polycarbonate that imparts excellent protection for parts, exceeding the protective value of other coating systems currently available on the market.

In general, the synthesis and thermal cure process of a silicone hardcoat can be summarized as shown in Figure 3. The final product of this reaction process is a highly cross-linked silicone resin/nanosilica composite that, when used in conjunction with the thermal cure silicone basecoat,

The high-gloss appearance of the advanced hardcoat system can be maintained long-term due to its excellent abrasion resistance and superior chemical resistance.

typically has excellent adhesion to plastic (such as polycarbonate) and high resistance to abrasion and scratching. Patented UV absorbers provide the UV screening properties of the coating system. These UV absorbers are among the most photo-stable UV absorbing molecules currently known, and their use in the advanced thermal cure silicone coating system provides the coating with its exceptional performance characteristics.

Weatherability studies are ongoing for the new hardcoat system. The graphs in Figure 4 show the light transmission and haze variation of samples of clear polycarbonate (Lexan[†] LS2-111) exposed in Florida and Arizona at 5 degrees, with application of the hardcoat topcoat varying from 4.5 to 8.5 microns and a primer coat thickness varying from 1.5 to 2.5 microns.

The data in Figure 4 and the analysis of samples such as those shown in Figure 5 demonstrate that the new hardcoat system retained excellent optical properties without cracking, delamination or adhesion loss after five years of “natural weather” exposure (Florida and Arizona).

The weathering performance has been further supported by accelerated weathering test results (Figure 6). These data show that the light transmission and haze of samples of clear polycarbonate (Lexan LS2-111) coated with the new hardcoat topcoat and basecoat system can perform in a fashion similar to that observed in the natural Florida and Arizona testing. As in the natural weathering testing, adhesion was maintained throughout the accelerated exposure testing period. The data in Figure 6 show that PC coated with the new hardcoat system can retain its optical properties up to ~15

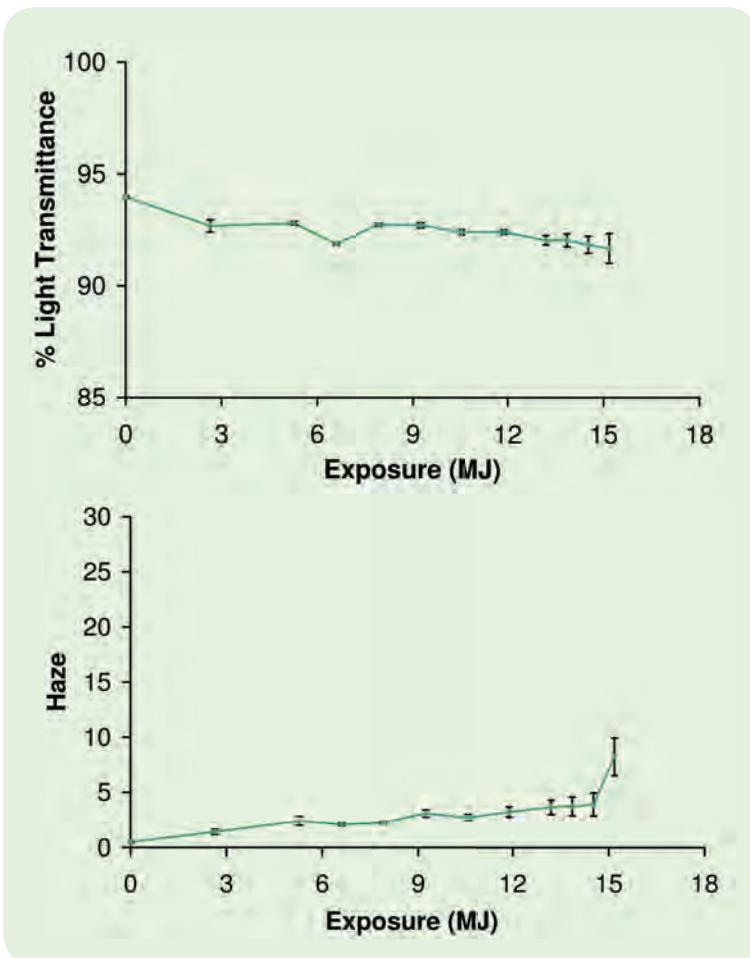


Figure 6. Accelerated weathering data. Samples were weathered according to the modified SAE J1960 protocol (Xenon light source with boro/boro filters). (Test data; actual results may vary.)

[†]Lexan is a trademark of SABIC Innovative Plastics IP.

TABLE 1. Performance of the New Hardcoat System

Feature	Potential Advantage	Typical Benefit
Taber delta haze of 5 to 7	Harder coating	Superior abrasion resistance
Extended weatherability from 3 to 5 years	Exceeds OEM UV protection requirements (pillar posts, grills)	Improved weathering performance Part design flexibility

MJ/m² of Xenon exposure, which is equivalent to five years of natural exposure in Florida (5 degrees south facing).

A Durable, High-Gloss Finish

The high-gloss appearance of the advanced hardcoat system can be maintained long-term due to its excellent abrasion resistance and superior chemical resistance. More importantly, this new hardcoat system appears to have the potential of lasting two to three times longer than other commercially available hardcoat systems. The performance characteristics of the new system are summarized in Table 1.

The new hardcoat system is already finding use in the automotive industry. Additional applications are likely as automakers seek new ways to reduce vehicle weight without compromising durability. **ft**

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Rob Hayes, Ph.D., is a product chemist for silicone hardcoat technology at Momentive Performance Materials, Wilton, CT, a provider of silicon-based material solutions. He can be reached at 518.233.3591 or Rob.Hayes@momentive.com. **Ana Maria Bonadies** is regional marketing manager – SRS – Americas, for Momentive Performance Materials. She can be reached at 011.55.11.3284.1638 or anamaria.bonadies@momentive.com. For more information, visit www.momentive.com.

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QUENCHING

Metal with Coatings

Water-based quench coatings offer an innovative way to improve heat treating and optimize the final finish.

In today's competitive marketplace, companies seek new, cost-effective methods to improve their manufacturing processes and, ultimately, their final product. Innovations in water-based coatings are providing low-cost and eco-friendly options that protect heat-treated metal products and result in an aesthetic finishing coat, increasing their product's appeal to end users.

One such innovation is water-based quench coatings, which can be used to replace traditional quench fluids.

BY HANK LIMPER
Houghton International Inc.

When positioned in-line with heat-treating operations, water-based quench coatings use the residual heat in the parts to dry efficiently. The parts are then ready for immediate shipment, bypassing the need for secondary finishing processes that are labor intensive and expensive, thus expediting the manufacturing process.

ABOVE: Water-based quench coatings are available in a range of colors and can be used on a variety of different parts.

Quenching in colored, water-based polymer coatings replaces processes such as oiling, painting and plating that use hazardous materials and require waste processing. Manufacturers can use water-based coatings in place of the oils and polymeric compositions that are traditionally part of the final step in heat treating.

Integrating water-based quench coatings can eliminate the need to pretreat parts before heat treating. Because the coatings can penetrate scale and rust, parts with water-based coatings usually do not need to be pretreated or cleaned unless they have an oil coating that isn't removed during heat treating. Additionally, because manufacturers do not need to paint, clean or handle the products, they enjoy reduced labor costs.

These coatings are effective for protecting castings, forgings and other heat-treated parts made of any metal substrate, including steel, iron, aluminum, brass and bronze. Manufacturers can also use water-based quench coatings as solid film lubrication for fasteners and bearings, a primer and undercoating for metal products, or coating on metal components for processing, drawing or stamping.

Coating Properties

Water-based quench coatings are well-suited for manufacturing a variety of heat-treated metal products. They provide uniform, low-gloss finishes that can resist runs, sags, blisters and other surface imperfections. While a low-gloss black finish is the most commonly used, the coatings are available in a palette of 15 colors, including silver, gold and clears. They also possess other beneficial properties.

Low VOCs. Most water-based quench coatings have low volatile organic compounds (VOCs) compared to other coating processes in manufacturing. The amount of VOCs in waterborne coatings is typically between 0.1 to 0.9 lb/gal minus water.

Unless specifically requested, the dried coatings contain no hazardous compounds — an extremely important feature, as they can displace oiling, painting and plating, which are not environmentally friendly. When used properly, water-based coating baths provide manufacturers with a safer working environment for employees.

Corrosion Resistance. Coated parts have demonstrated a high level of corrosion protection during real-world exposure. Agricultural tools quenched in a waterborne coating, for example, have shown minimal corrosion and remained well protected after being exposed to the elements for more than two years.

Humidity Resistance. Some water-based quench coatings have undergone repeated water resistance testing under ASTM D2247 (100% relative humidity, 100°F). The coatings provided 100 to 200 hours of protection at 1 mil

(25 microns) after seven days of drying time. Bolts dipped in waterborne quench coatings showed only minimal deterioration (3% rust) as per ASTM D610, the standard test method for evaluating the degree of rusting on painted steel surfaces.

Automatic Transmission Fluid Resistance. Some coatings conform to General Motors' (Allison Transmission) specification TMS 26915 for transmissions. Following 72-

Water-based quench coatings are well-suited for manufacturing a variety of heat-treated metal products.

hour immersion in various transmission fluids at 250°F, springs quenched in waterborne coatings showed no softening, loss of adhesion or discoloration.

Establishing Operating Parameters

Before diving into water-based coatings, manufacturers must evaluate their basic coating and finishing needs. They must choose the best set of operating parameters, whether they are proposing to quench parts in a conveyor-type system or in a batch process where up to several hundred parts are coated at once.

To establish the best operating parameters for water-based coatings in a production line, manufacturers should use the following steps as a guide:

1. Clean and degrease parts in lacquer thinner or other suitable solvents. Manufacturers often omit this step because conventional processing rarely includes cleaning.



Water-based quench-coated springs entering a dryer oven.

WATER-BASED COATINGS

QUENCH COATINGS

2. Hang cleaned parts on hooks, place in mesh baskets or on a conveyor.
3. Heat parts to the temperature that approximates the heat used in a regular heat treating process.
4. Prepare the quench bath by reducing the coating's concentrate with a sufficient amount of water. If the bath is used to coat small parts, two parts concentrate to one part water is a good starting point. If a

One of the most important considerations of operating a tank filled with water-based coatings is maintaining the quality of the quench bath.

large number of parts require coating, a weaker bath consisting of one part concentrate to two parts water may be a better option. Mix small portions of the bath with appropriate amounts of water to determine which mix yields the highest number of coated parts, achieving the ideal concentration. Once established, maintain the quench bath at this ratio.

5. After parts are heat treated, remove them from the oven quickly and immediately immerse them in the quench bath. Swirl the parts around to simulate fluid motion in the quench tank. They should remain in the tank long enough to drop their temperature to between 90 and 140°F. This is the most important step in the process. If too much time

elapses after removing the parts from the oven, the coating process will fail. Hotter parts will dry faster when they are removed from the bath, but if parts are removed too quickly, the coating may blister. Determine a balance by running a series of varying quench times.

6. Shake or spin the coated parts to remove excess coating.
7. Direct air from small fans over freshly coated parts to speed the drying process.

This protocol can help manufacturers determine the right balance of operating parameters for water-based coatings. The concentrations of the baths, immersion times, temperature and number of parts will have a varying effect on final quenching guidelines.

After the proper guidelines have been established, using waterborne coatings is a simple process. The operator submerges heated parts (300 to 1700°F) in a temperature-controlled, water-reducible polymer bath for five to 50 seconds. The exact timing depends on the part's size, its required removal temperature for proper drying and the desired coating thickness. After drying, parts are ready for additional processing, packaging or shipment.

Quality Quench Control

One of the most important considerations of operating a tank filled with water-based coatings is maintaining the quality of the quench bath. The quality of the process will be influenced by the physical condition of the various quench tanks, so consistency in the bath's composition is imperative. Daily operations should control measures of acidity-alkalinity (pH) and the solid materials that form the coatings (weight percent solids). Routine measurement and analysis will encourage good results.

pH Testing. A pH meter monitors the alkalinity of water-based quench baths. The pH range normally used in these quench baths is 8 to 9. Maintaining pH within this range promotes compatibility between water and the coating polymer used for quenching.

In normal day-to-day operations, the pH of the polymers tends to drop — they will be less alkaline. With routine analysis, manufacturers can discover these downward drifts in pH and correct them before the manufacturing process is interrupted. Small, frequent additions of fresh quench bath concentrate should keep the pH in check. If additional pH correction is necessary, operators can add small amounts of ammonia.

Monitoring Weight Percent Solids. Monitoring the weight percent solids enables manufacturers to determine the percentages of liquid and solid portions of the quench bath. The solid portion controls the thickness of the coating that deposits on the heated metal parts. With water-based coatings, as the concentration of the bath increases, so does the coating's thickness.



Water-based quench-coated springs exiting a dryer oven.

WATER-BASED COATINGS

QUENCH COATINGS

Upon startup, operators reduce the quench bath concentration using water. Depending on several factors — preheat temperature, desired thickness, and the number of parts to be quenched — the concentrate may be reduced to 3:1, 1:1 concentrate to water ratio or some other reduction ratio as a starting point. This will help set parameters for the reduction ratio that leads to the desired finished product.

At this point, a weight percent solids determination should be made to establish the weight percent solids concentration at which a finished product will be processed. Operators can maintain this level by adding water or quench bath concentrate. If solids exceed the desired range, excessive coating may occur, resulting in blisters, craters or a “festered” appearance. Conversely, if solids levels decrease below the desired range, the coating’s thickness will drop, resulting in less coverage and a washed-out appearance.

A Competitive Option

Manufacturers can implement water-based quench coatings in existing heat-treating operations at a low capital expense. These low-VOC coatings provide corrosion and

wear resistance, ductility and lubricity, and come in a variety of colors. Even more importantly, these coatings can increase profitability by eliminating the extra costs of separate painting operations, which can give companies a competitive edge. **ft**

Hank Limper is the product manager for cutting and grinding products at Houghton International Inc., Valley Forge, PA. Houghton International markets ThermadepSM water-based quench coatings to the metalworking industry through a partnership with Egyptian Coatings, Franklin, TN. For more information, e-mail hlimper@houghtonintl.com or visit www.houghtonintl.com.

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Modern

Powders for MDF

Ultra-low bake and ultraviolet powder coatings can expand the design capabilities of MDF while reducing environmental issues and processing costs.

Substrates such as wood, plastics and medium density fiberboard (MDF) are sensitive to heat (thermal expansion) and cannot be coated with conventional powder coatings. Consequently liquid coatings, foils and laminates have been used for their decoration and protection, especially in the furniture industry.

In recent years, the development of ultra-low bake (ULB) and ultraviolet (UV) powder coatings for these substrates has allowed a dramatic reduction or even elimination of these traditional systems, resulting in new benefits for manufacturers. The woodworking industry in particular has increasingly begun taking advantage of UV and ULB technology to switch to powder coatings. As a result, new powder formulations are being developed that fulfill the

needs of the growing MDF coating market (see Figure 1). The number of MDF powder coating lines has been increasing for several years, and this trend seems destined to continue in the future.

Generally speaking, powder coatings are “solventless” and do not contain or emit volatile organic compounds (VOCs). This characteristic makes them inherently user-friendly and easy to recycle (no waste treatment is required). UV and ULB powders place an extremely low thermal load on the substrate and can be handled immediately after curing. Unlike with liquid coatings, it is often possible to reduce or even eliminate intermediate sanding steps.

The use of ULB/UV powder coatings permits a greater freedom of board design (for example, allowing curvilinear

ear shapes and seamless edges), while offering the flexibility of colors and textures not available in foils or laminates. Furthermore, these coatings allow a reduction in costly processes such as edge banding.

However, achieving a high-quality finish with this new technology requires choosing the right MDF type and powder, as well as the correct technical support and curing line.

MDF Suitability

Medium density fiberboard is an engineered wood composite used widely in the woodworking industry. It is manufactured by a dry process and available in thicknesses from 1.8 to 60 mm. The typical density is between 650 to 800 kg/m³.

The choice of MDF type is as important as any other parameter because it can critically affect the coating performance. Characteristics such as “coatability,” deep routing, sanding, resistance to edge cracking, conductivity and degassing are all affected by the kind of wood, fiber, pretreatment, glue resin, additives and pressing process used to create the MDF substrate. There is no one “right quality” of MDF for powder application, but some types are more suitable than others. In general, the higher grades work best because they are more consistent than the lower grades. MDF suppliers usually can recommend a suitable choice.

ULB and UV Powder Coatings

ULB and UV powder coatings are specially formulated to allow a fast, low-temperature cure, which minimizes the thermal stress to the MDF. They are available in a range of finishes, including textured/smooth finishes (with a high or low gloss), clearcoats (smooth and textured) and pigmented or clear sandable primers.

ULB and UV fine-textured finishes can be obtained in a variety of colors and can be used in a one-layer application on even the most complex shapes to achieve the same look as multiple coats of a liquid finish. However, a two-layer solution is recommended to obtain smooth finishes (see Figure 2).



Two Layers (Primer + Topcoat)

vs Multiple Liquid Layers (Multilayers of Primer + Topcoat)

Figure 2. A two-layer ULB or UV solution is recommended to obtain smooth finishes.

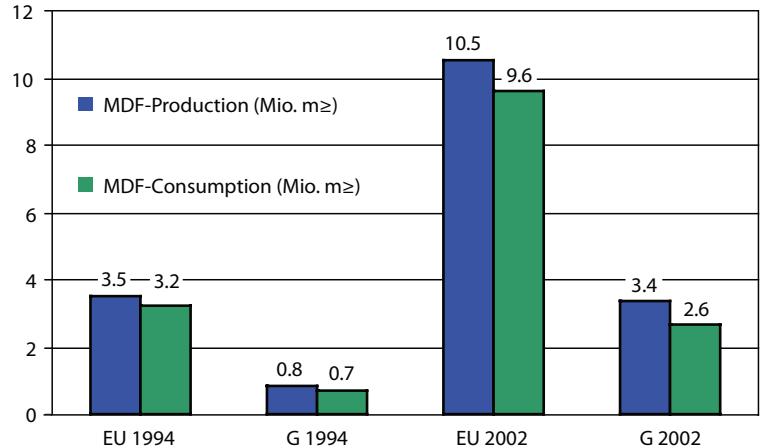


Figure 1. MDF production and consumption are growing, providing the potential for an increased use of powder coatings in this field. (EU: Europe; G: Germany. Source: EPF.)

Powder primers are available both in UV and ULB systems. They are easy to sand and offer excellent adhesion with the topcoat. Usually, a UV powder is recommended as a topcoat because of its smooth finish and high hardness, which makes it more scratch and chemical resistant than ULB powders. ULB powders also tend to exhibit more orange peel on the surface.

UV Powder Coating Process

The process of coating substrates with UV powder is divided into four different steps: preheat, powder application, melting and leveling, and curing (see Figure 3).

The preheating step can be skipped, depending on the conductivity and porosity of the substrate. Substrates with good conductivity will be inherently suitable for powder application, and there will be no need to apply a liquid primer or preheat the substrate. The temperature at the substrate’s surface should never exceed 130°C (266°F).

The powder is applied at room temperature with automatic spray equipment (corona and/or tribo guns) and is then passed through a convection or convection plus infrared (IR) oven for melting (generally two minutes at 120°C/248°F).

POWDER COATINGS

MEDIUM DENSITY FIBERBOARD

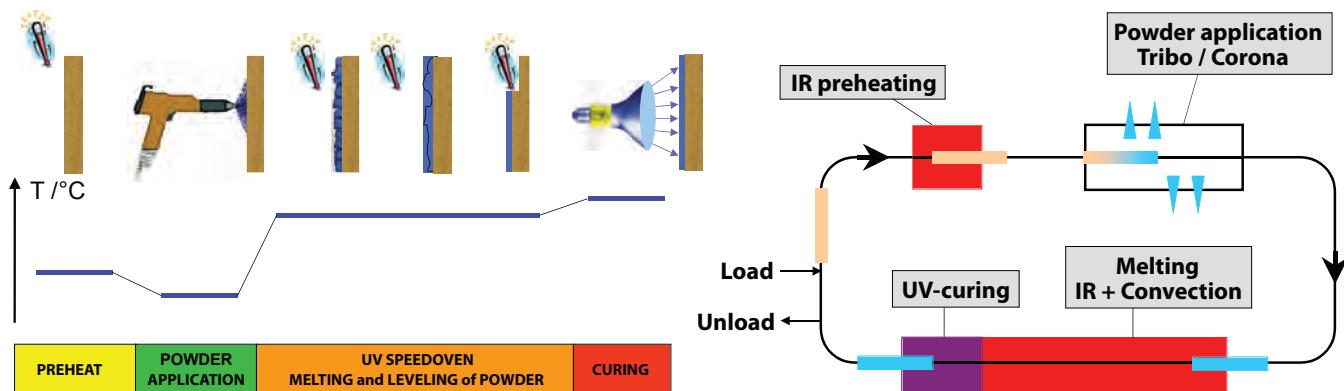


Figure 3. An overview of the UV powder coating process.

After the powder has been melted, it is exposed to UV lights with a suitable wavelength (between 100 and 450 nm) and intensity to initiate the polymerization.

When the photoinitiators in the coating are exposed to UV light, they cleave into free radicals that then initiate addition polymerization within the unsaturated groups of the binder system. The whole reaction is completed in a few seconds.

ULB Powder Coating Process

Generally, ULB powder coatings use a standard powder coating chemistry. Since they are primarily used for interior applications, they are commonly formulated in an epoxy polyester binder system. The choice of the catalyst in these formulations is critical for low bake applications, as the board temperature cannot exceed 140°C (284°F).

The primary advantage of the ULB powder process is that it doesn't differ from that of normal thermosetting powders. It consists of a preheating stage (or primer application if required) and powder application (at ambient temperature), followed by melting/curing in a convection and/or IR oven. The processing time takes between 10 and 15 minutes.

During the installation of a ULB line it is important to consider the configuration of the IR lamps used to melt and polymerize the powder. Heat must be applied homogeneously to the entire board to avoid degassing problems or undercuring.

Current research efforts are focused on achieving high-performance ULB products with superior mechanical and chemical properties, ever-shorter curing schedules and compliance with furniture standards even under severe conditions.

UV or ULB: Which is Better?

The choice of whether to use UV or ULB powders primarily depends on the requirements of the application. Generally, ULB powders are recommended for lower-perfor-

mance end uses (e.g., TV stands shelves, etc.) as they meet the furniture standards for "general use." Also, compared to UV powder coatings, ULB powders offer a broader color range and a lower cost per square foot coated. Some colors, such as deep yellows, are difficult to cure with UV light, and there are also difficulties in curing very thick coatings. Moreover, while ULB powders can be used successfully on complex 3D shapes, hidden areas will remain uncured when using UV powders.

UV powders are generally recommended where high performance is needed. In offices and kitchens, furniture generally must meet the standard for severe usage. The heating cycle used to melt a UV powder is milder and, unlike that of a ULB powder, separate from the curing process. This inherent latency means that smooth finishes are much easier to obtain. Consequently, the choice of the right MDF (in order to reduce deformation of the board and edge cracking) is less critical for UV powders, allowing the use of a lower-cost substrate. The next generation of UV powder offers superior mechanical and chemical properties. **ft**

This article was written by the following individuals: Ernesto Marelli (011.33.477.9670.00 or ernesto.marelli@fra.dupont.com), R&D project leader at DuPont Powder Coatings France S.A.S.; Paul Dinning (Paul.Dinning-1@gbr.dupont.com), R&D project leader, and Steven Hobbs (Steven.Hobbs@gbr.dupont.com), technology supervisor at DuPont Powder Coatings UK; Oriol Aixala, R&D project leader, and Helene Bolm (Helene.Bolm@swe.dupont.com), technology supervisor, at DuPont Powder Coatings Scandinavia; Dr. Carlos Rodriguez Santamarta (Carlos.Rodriguez-Santamarta@esp.dupont.com), technology manager for DuPont Powder Coatings Europe; and Dr. Volker Rekowski (Volker.Rekowski@deu.dupont.com), global quality manager for DuPont Powder Coatings.

For more information about powder coatings, visit www.alesta.dupont.com.



The Case for Capital Equipment

Whether you're evaluating a water recycling system or other capital equipment, a business case can help you determine whether the equipment makes good business sense as an investment.

Everyone likes to talk about reducing their impact on the environment. But when it comes to installing a water recycling system or any other capital equipment, that equipment has to do more than just benefit the environment and improve plant operations; it also has to make good business sense as an investment. Most decision makers use a tool called a "business case" to evaluate potential capital equipment investments. Building a business case for a capital equipment investment is not terribly difficult if you follow a good outline and do all the analysis.

Begin in the Middle

A business case typically opens with one or more cover pages, sponsor pages and other information, depending on the level of formality. These pages are followed

BY JEFF WATSON
R3 Water Technologies

by the executive summary, the problem definition, project description, project evaluation and project selection, which includes the methodology and anticipated results. (See the sidebar, "A Business Case Outline at a Glance.") The "meaty part" of a good business case starts with the executive summary — a concise description of the problem and how it can be solved. However, while the executive summary is placed at the beginning, it should always be the last detail that is finalized when building a business case, so that it accurately encompasses all of the definitions, project descriptions, analysis, and implementation information in the project. So where do you begin, if not at the beginning? To develop a solid business case, you essentially need to begin in the middle by establishing a detailed definition of the problem.

Define the Problem

There must be a need, or else you wouldn't be evaluating new equipment. The problem definition should encompass a problem statement, a description of the stakeholder environment, and a description of the current environment. Each of these areas might require two to three pages to address fully.

The problem statement should describe the problem the project will address, including any issues related to technology, processes and services.

The problem statement should describe the problem the project will address, including any issues related to technology, processes and services.

The section on the stakeholder environment should describe the departments that are affected by the project, both positively and negatively. For example, in a water recycling project, the production and quality departments would benefit from a consistent supply of clean water, while the maintenance and facilities departments would have some extra work to do. Be sure to explore these facets as much as you can.

The section on the current environment should describe the situation as it exists or, in the case of new installations, as it would exist without the equipment you're

hoping to install. For example, project managers building a new finishing plant in Reynosa, Mexico, knew that the facility would experience problems with water quality and availability. The current environment in the plant was summarized as follows:

"We know that the city of Reynosa is notorious for having bad water, and we know that water supplies in late summer go almost completely dry in the afternoons. Quality and quantity of water throughout the year are questionable, and it is known that at times there is zero pressure, and at other times the water is simply unusable. Under these current conditions, it will be impossible to maintain consistent finish quality, and at times it may be impossible to run the processes at all."

Evaluate the Project

The next piece of the business case is the project description, but this section doesn't get completed until all the other work is done. You'll first need to evaluate the various approaches that might solve the problem, including the possibility of maintaining the status quo, or "doing nothing." The project evaluation section should include a description of strategic alignment, an agency impact analysis, a financial analysis and an alternatives analysis. In the strategic alignment, describe how the project fits into the overall vision of both the company and the facility. For example, the importance of improving human productivity is not the same in China as it is in Ohio. Corporate priorities must be considered in scoping and selecting projects for approval.

In the agency impact analysis, summarize how the project would impact the use of resources at the corporate, plant, and operational levels. Include information such as who will champion the project once the implementation begins, who will be responsible at the plant level for making it work, and what resources will be needed to make this project successful.

The financial analysis should explore all of the financial aspects of the proposed project. The more fully you can expand the financial implications of your project, the more likely it will be approved. Managers and investors try to hire good people and trust them to do good things, but a large project carries a lot of risk. These "money people" will not approve any project until they see that the financial homework has been done. Include both quantitative and qualitative costs in your analysis. For example, quantitative costs might include the capital equipment itself; your time, staff time, compliance time, legal and engineering time; facility modifications that will allow the project to be successful; new operating costs expected from having done the project; and anticipated savings in material and operating costs, and labor, engineering and management time. Qualitative costs might include fewer issues with environmental compliance, more consistent quality and less process variation.



A water recycling system installed at a new finishing plant in Reynosa, Mexico, is minimizing water costs and providing a consistent source of high-quality water to the plant. Photo courtesy of R3 Water Technologies.

Finally, the alternatives analysis should describe the various options, including the option of not implementing any project at all and at least one non-selected project option.

In the Reynosa plant, the criteria for evaluation were as follows:

- How well does the process handle the issue of supply variation, in terms of both availability and quality?
- How well does the process handle the issue of making the water consistently high quality, available in plenty, and at the correct pressure and flow?
- How well does the process handle the treatment of wastewater to within compliance limits?
- What is the capital cost of the proposed equipment, plus the costs of facility modifications and other loads?
- What is the return on invested capital (ROIC) in percent per year?
- What is the expected life cycle of the equipment?
- What operational and maintenance costs are associated with this process?
- Are there any additional benefits or issues that should be considered?

In the alternatives analysis for the Reynosa project, the status quo (doing nothing) was evaluated and found to be highly risky based on the following points:

- Water supplies in Reynosa are highly variable during different parts of the year.
- The quality of water varies widely depending on rainfall, and can range from acceptable to unsafe and unusable within a few days.
- Guarantees from the local water utility have been aimed at supply, but not the quality or safety of the water. The water is not pure enough to be used in the plant's processes without treatment.
- The variation in quality of painted products and the risk of warranty claims far exceeds the cost of addressing the problem with equipment.

The non-selected project option — the traditional approach of purifying the process feed and “treat and dump” for the wastewater — was rejected based on the following analysis: “This is by far the most common method of dealing with water issues in Mexico and the U.S., but does not deal with the variation in supply, does not buffer against ‘zero-pressure’ days, and carries 80% of the cost of recycling without any of the benefits.”

Select the Solution

The project selection is a summary of the reasons the proposed solution was chosen over all other possibilities. The summary should focus on how this solution scored on the criteria listed in the evaluation, and should include the financial analysis and comparisons to be the best of the other options.

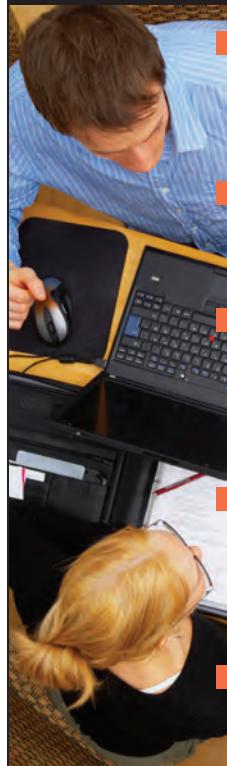
The two sections of the project selection are the methodology and the results. In the methodology section, describe how the comparisons were done, what metrics were measured and which areas were rated based on “knowledge and research.” Knowledge and research goes a lot further if it is called that, and if the decisions are backed up with facts and a certain amount of “real” comparative testing.

In the results section, describe in detail the ratings and measurements that were used to decide that the proposed equipment is better than any other course of action. These are the statements that highlight why the chosen equipment is best, and how it overcomes any shortcomings or any issues where another choice may be better in some way.

In the Reynosa project, a water recycling system installed by R3 Water Technologies, Claremont, NC, was chosen based on the following selection methodology:

- **Supply variation:** The status quo would leave the facility open to unacceptable variation in both supply and quality. The “treat and dump” option addresses quality variation on the incoming stream by purifying the incoming water and, if a large enough surge tank is purchased, could buffer the supply variations. However, the recycling option eliminates the problems of supply variation almost completely because all that is required is makeup water to replace losses. The recycling option includes a certain amount of

A BUSINESS CASE OUTLINE AT A GLANCE



1. Executive Summary*

- 1.1 Problem Statement
- 1.2 Project Description
- 1.3 Project Evaluation

**Should be readable and understandable in 90 seconds or less.*

2. Problem Definition

- 2.1 Problem Statement
- 2.2 Stakeholder Environment
- 2.3 Current Environment

3. Project Description

- 3.1 Goals and Objectives
- 3.2 Performance Measures
- 3.3 Assumptions
- 3.4 Proposed Environment
- 3.5 Major Project Milestones

4. Project Evaluation

- 4.1 Strategic Alignment
- 4.2 Agency Impact Analysis
- 4.3 Financial Analysis
(quantitative and qualitative)
- 4.4 Alternatives Analysis

5. Project Selection

- 5.1 Methodology
- 5.2 Results

process water in “inventory” by nature of the process. Properly sized surge tanks and supply pumps will completely buffer the facility from supply problems.

- **Compliance:** The status quo does not address compliance issues. The “treat and dump” option is designed to achieve environmental compliance but nothing further. The recycling option is designed to eliminate some of the compliance burden by dramatically lowering the amount of water that is released to the environment. The recycling system will produce wastewater at least as good as that produced by the treat and dump system, but it is designed almost never to release water to the sewer.
- **ROIC:** The status quo has zero capital cost but is disqualified for other reasons. The “treat and dump” option has capital equipment costs, operating costs and facility modifications that will never have a payback. The recycling option is expected to have a 185% payback in the first two years.

Summarize the Project

Once you have chosen the project solution, you’re ready to compile the project description. This section is a description of the actual equipment and process in general terms, how the project will solve the problems described in the problem definition, and how the organization will be affected by the project. Describe in detail the goals and objectives, performance measures, assumptions, proposed environment, and major project milestones that will indicate success.

In the goals and objective section, you’ll want to answer the question, “What do you hope/expect will happen once this project is implemented?” In the Reynosa plant, the goals and objectives were defined as follows:

- The extra 250,000 gallons of holding capacity in the fire tank will provide the needed surge capacity for raw water during supply shortages.
- The proposed potable water system will treat and condition the water so that it is usable even during times when the city supply is substandard.
- The potable water repressurization pumps will provide constant pressure and flow, so that consistent plant operations can be maintained.
- The wastewater treatment system will treat all expected waste streams effectively to allow disposal to the sewer whether the water is recovered or not.
- The recycling process will remove effectively all suspended and dissolved solids and provide pure water for rinsing, boiler feed and other applications.
- The water treatment processes will operate almost transparently to the rest of the facility. Operator involvement and the need for maintenance time will be minimized in the design.

The performance measures should define exactly how the project will be measured against the above goals and objectives once it is implemented. It is well known that written goals with written metrics are much easier to reach than unwritten goals — both because the former are well

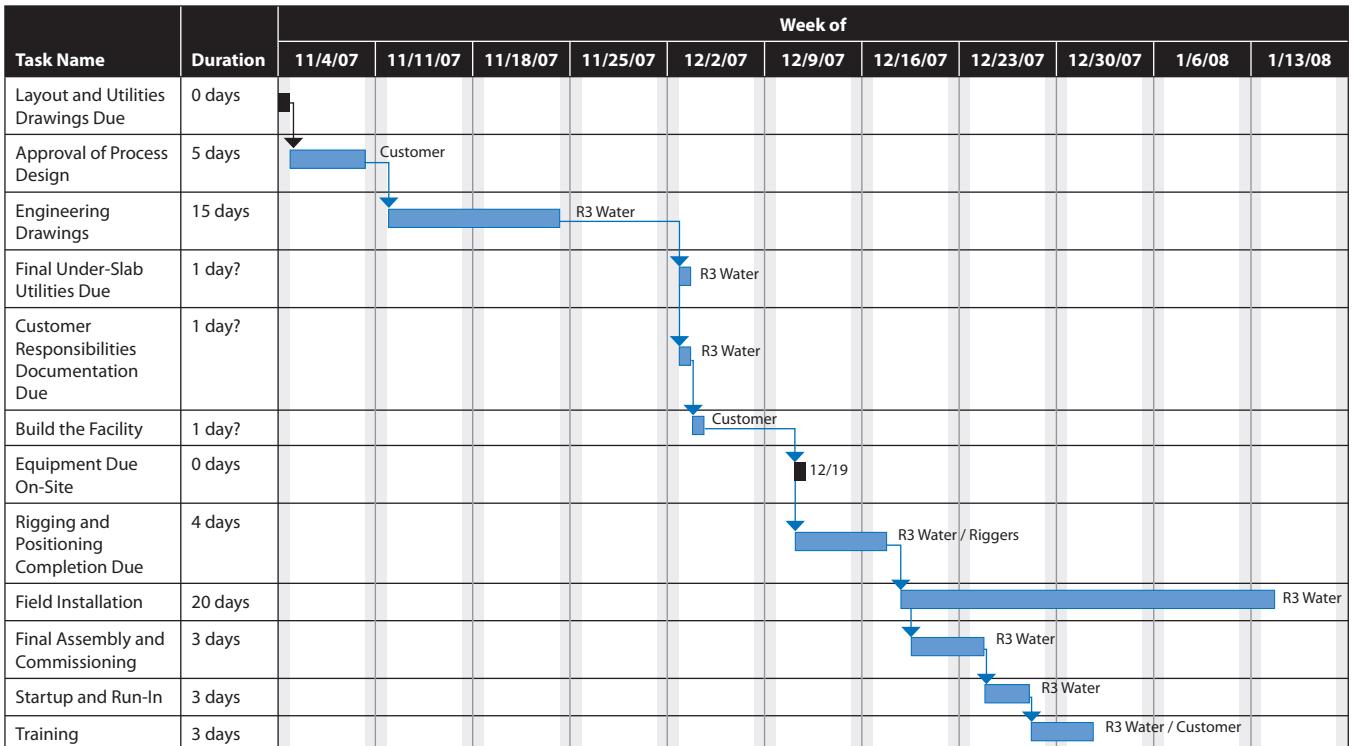


Figure 1. A Gantt chart, such as the simplified version shown here, lists all the various tasks and dependencies in a project and can help you identify major milestones.

documented and because everyone involved understands from the beginning what the targets actually are.

In the assumptions section, think about your assumptions and discuss them with other people to find out how accurate these assumptions might be. Identify assumptions that are germane to the project, and describe how these assumptions affect the decisions you're attempting to make.

For the proposed environment section, describe the situation you envision. In business terms, and without glowing promises, describe how the plant will operate when the project is complete and operational. This section is the "vision" of the business case. If the new environment is not going to be significantly better than the existing situation, you can expect to have a hard time selling your idea.

To identify the major milestones, use a Gantt chart (see Figure 1). A Gantt chart is simply a graphic representation of your project schedule, showing all the various tasks and the dependencies. By looking at the Gantt chart, you can quickly see which tasks must be delayed if any problems arise with certain aspects of the project. For example, if the rigging and positioning of the equipment is delayed, it is obvious that the utility connections, assembly, startup and training may all be delayed. Describe both implementation and financial milestones, including progress payments and the goals that must be achieved to trigger a payment. If the project will "ramp-up" slowly into full production, be sure to show the milestones for ramping up, and possibly a definition of metrics to define "completion."

Define the Project for the Decision-Makers

Finally, after the rest of the business case is complete, you should be ready to write the executive summary. This section comprises three parts: a problem statement, a project description and a project evaluation. It tells the executive decision makers what the problem is and promises to study it thoroughly in the remainder of the business case. The executive summary should make the case in business terms, and be readable and understandable in no more than 90 seconds. If your idea can't be reduced to that amount of information, it's not a summary yet.

For example, in the Reynosa plant, the problem was summarized as follows:

"Water in Mexico is known to be a problem. Incoming water quality and availability, and wastewater treatment and disposal are issues. This business case studies the need, benefits, costs, and implementation strategy for capital equipment to address water issues that will be present at the new facility."

The project description for the Reynosa project was summarized as follows:

"This proposal is for capital equipment and other improvements to build a 'closed-loop' water recycling system designed to capture and recover 90 to 100% of the process

water from the plant's three washer operations. Equipment included in the project is a combination of a potable water system to soften and filter all the incoming water, a reverse-osmosis system to remove effectively all dissolved solids from any water used for plant processes, a traditional hydroxide precipitation system to treat the returning process wastewater, and recycling equipment to prepare the water for processing by the reverse osmosis system and return to the plant. This equipment will reduce our dependence on the Reynosa city water supply by reducing our overall water need, and will improve our process water consistency by always treating the same process waste-stream, thereby eliminating most of the variation in the feed stream. The facility will benefit from improved potable water, excellent process water, and better consistency of both. Another benefit is the almost complete elimination of the process waste stream and the associated compliance issues."

Implement the Solution

Once you've studied, argued, researched, toured, justified and purchased capital equipment, it is time to move to the implementation phase. Get a good project manager and use a project plan with as much detail as you can. Typically the implementation team is not the same as the people who negotiated the deal, so the more detailed the contract, the shorter the discussions about who is supposed to do each item.

In the Reynosa project, the water recycling system was planned for its own building on a new construction site, so all of the equipment locations and utility connections were made on a "blank slate." This situation helped facilitate implementation.



Ultrafiltration is used in the Reynosa plant to remove all suspended solids and oils effectively and to render the wastewater ready to be further processed for use in the plant. Photo courtesy of R3 Water Technologies.

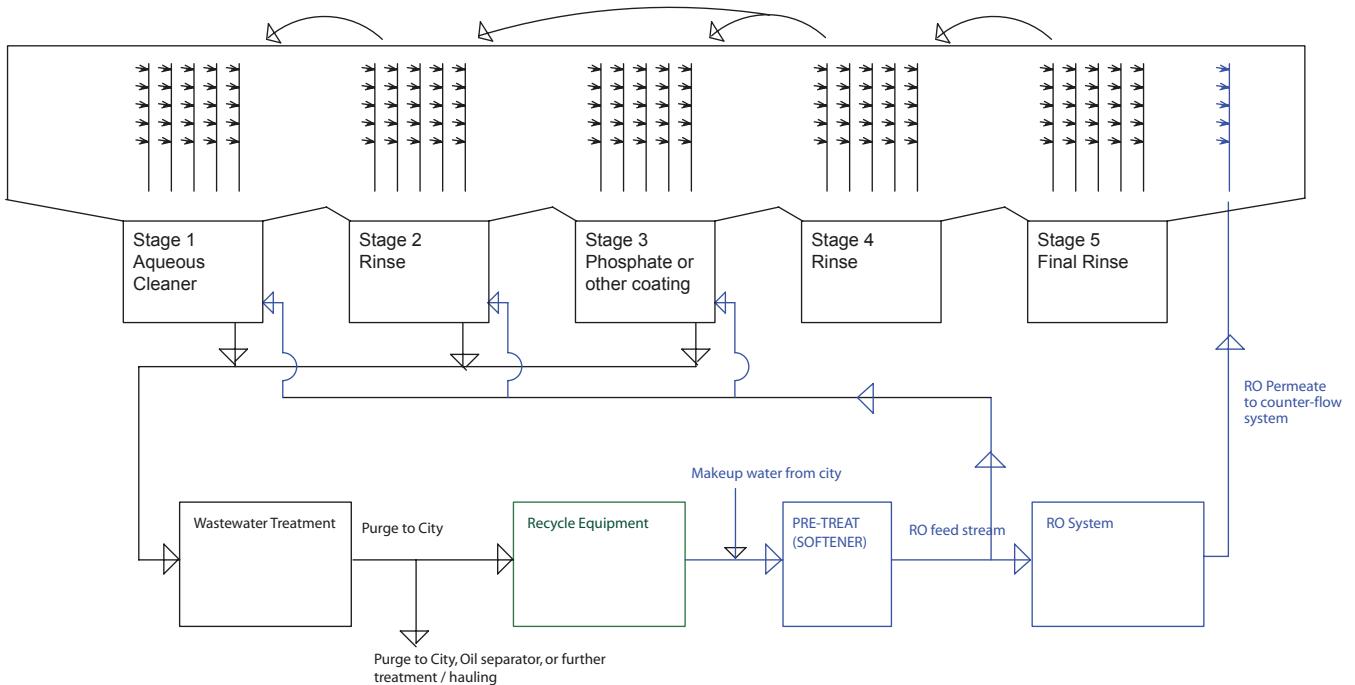


Figure 2. A layout for the water recycling system at the Reynosa finishing plant. Internal flow rates, interim filtration, and other equipment designed to service the main process are shown on the layout.

The basic building blocks of recycling for the industrial plant are the same as for the idea of dumping it down the sewer and pulling in new. The wastewater has to be treated, and the new water has to be at an acceptable level of quality. The project plan therefore began by “nailing down” the obvious details:

- Wastewater would be treated by hydroxide precipitation to allow removal of complex phosphates, heavy metals, suspended solids and final adjustment of pH to within an operator selected range.
- Process water for the plant would be treated to remove dissolved solids and would be delivered to the processes at a quality, flow and pressure that could be efficiently used in the processes.

To recycle water, you can’t just run a pipe from the wastewater system outlet to the inlet of the pure water system; the equipment would self-destruct. In selecting equipment, you have to consider what is to be removed, in what order, and what the process needs to look like. In the Reynosa project, these criteria were defined as follows:

- Product water from the hydroxide precipitation system would contain suspended solids, emulsified oils, which must be removed prior to any pure water system such as deionization or reverse osmosis.
- Ultrafiltration would be used to remove all suspended solids and oils effectively and to render the wastewater ready to be further processed for use in the plant.
- Due to the high level of dissolved solids that would be present, reverse osmosis was selected for pure water

production, and stainless steel repressurization pumps were selected for pushing the water back to the plant.

- Holding tanks were sized to prevent the processes from running out of water during maintenance operations. Pressure switches and bladder tanks would be used to maintain pressure on the supply lines without the pumps running all the time.

Once you have identified all of the criteria for the system, you can lay out the process. For water recycling equipment, a layout would include internal flow rates, interim filtration, and other equipment designed to service the main process (see Figure 2). Once the building layout, flow rates, dimensions of the equipment, and other details are all worked out, you can get to a much better idea of what the finished product will look like.

At this point in the project all the utility connections, sizes, locations, and all the footings, clear-heights, service access, and building code required spaces have been defined. This is this point at which the drawings need to be checked out in detail, with both experts and production and maintenance personnel getting their ideas in. Once the project moves “from paper to steel,” changes become not only very expensive but also hard to make, and they add time to the project timeline. Once the drawings exist, it is critical to get everyone involved to be sure the project being built is the project that is desired.

The recycling system installed at the Reynosa plant was selected because of its flexibility in handling a feed stream that could vary widely over the course of the day, both in

terms of contaminants and flow rate. The solution included the proper steps, in the correct order and at the correct internal flow rates, to allow the plant to recycle 100% of the process wastewater from the plant effectively and return it for reuse. All makeup water for the system first comes through a potable water system that was also installed as part of this project. The potable system consists of a multimedia filter and softener, mainly to ensure that the water is safe for the facilities, having low hardness and few abrasive solids to wear the equipment. Additional equipment could be installed to allow for chlorine or ozone feeds, or other treatments as required for human uses.

Analyze the Results

The most important part of any capital equipment project is the final result. Can the company use the equipment as planned, and are the promised results being realized? In the case of the recycling system installed at the Reynosa plant, the answer is "yes." After a learning curve and a few incidents of "playing with the controls," the system is operating in automatic mode, not only recycling 100% of the process water but also receiving and making use of the condensate from the air conditioning and air compressors as makeup water.

In short, this system is saving the plant about 80 to 90% of the cost of water in a city where the cost of water is very high. The plant is buffered from the effects of variation in supply, and the finishing processes have a consistent source of high-quality water to operate with.

In considering water recycling equipment or any other capital project, it is critical to involve experts early, and to frame the business case in business terms. If a project can withstand the critical examination of a well done business case, it is almost always a good idea. **ft**

Jeff Watson is director of water systems at R3 Water Technologies, Claremont, NC, a provider of zero-discharge recycling systems for the finishing industry and other industrial water users. Watson has been active in the finishing industry for more than 20 years, first at Custom Chemicals of Texas, then founding R3 Technologies. He is past-president of both the Texas chapter and the national board of Chemical Coater's Association International (CCAI), and has been active on that board for over 10 years. Watson is also active as an industry consultant, and is pursuing research into both regional and global water issues. He can be reached at jwatson@r3water.com. For more information, visit www.r3water.com.



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Surface Treatment Chemistries

CHEMETALL OAKITE: This company has introduced three new surface treatment chemistries for the finishing industry. OXSILAN[®] 9810, a non-hazardous prepaint treatment for all-ferrous and most multi-metal surfaces, is designed to provide a significant cost savings over zinc phosphates. It produces little or no sludge and performs optimally at ambient temperatures. Chem Cote 3010, a prepaint treatment for iron and steel, is designed to leave a superior iron phosphate coated surface to which paint adheres easily. The resulting surface is also highly resistant to corrosion, the company reports. Since the product works at lower spray temperatures, the use of a burner is reduced or even eliminated to provide energy savings. Pyrene US 1002 is an alkaline detergent that is specially formulated to remove metalworking fluids from ferrous substrates. The product is biodegradable, works at low temperatures for energy savings, and has a long solution life for material savings. Call 800.526.4473 or visit www.chemetalloakite.com.

Chlorine-Free Solvent Cleaner

PICO CHEMICAL CORP.: PICO SOLV NPB is a new chlorine-free solvent cleaner manufactured as a direct "green" replacement for tri-chlor (TCE), perchlor and other more hazardous cleaning solvents such as mineral spirits, xylene, MEK, toluene and alcohol. The clear-colored fluid was developed to meet industry's need for more environmentally responsible (non-ozone depleting) and non-hazardous solvents with better solvency performance in various cleaning applications to remove organic soils. The product efficiently removes cutting, machining, lubricating and stamping oils, as well as greases and protective waxes. It evaporates quickly, has no flash point, is chemically stable and leaves no films or residues. Call 708.757.4910 or visit www.picochemical.com.



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TECHNIC INC.: The Cy-less II-W cyanide-free silver-plating process chemistry, designed for general metal finishing, decorative and electronic component/connector applications, is an environmentally-safe, high-performance silver process. The process has a bright, non-yellow appearance and even distribution for applications with high quality demands. Visit www.technic.com.

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SEI CHEMICAL: This company has been appointed by Clariant Corp. as the first authorized agent worldwide for Clariant's polysilazane resins and products through its KION[®] division. The technology offers optically clear, anti-stick, heat-resistant and UV-stable properties in single-component formulas. The product line is reported to be especially effective on a variety of ferrous, non-ferrous and galvanized metals, painted and powder coated surfaces and synthetic materials. The coatings are highly resistant to acid and alkaline cleaning products. E-mail info@seichechemical.com or visit www.seichechemical.com.

Corrosion Protection Coating

GREENSTONE HOLDINGS, INC.: This company is the exclusive US agent for Permeate[™] HS-100, a corrosion protection sealer developed and manufactured by D&D Corporation in Japan. This product, an inorganic silicate sealer, is designed to enhance corrosion-resistant coatings on metal surfaces. With its high fluidity, the coating reportedly penetrates through micropores on a metal coating created during the coating process and protects the metal from exposure to water, acid, salt, and other harmful chemicals. The coating is designed to help protect infrastructure assets such as bridges, highway supports, large gas and fuel tanks, aircraft, and ships, where it is critical to preserve long-term structural integrity. Visit www.egreenstone.com.

Acrylic Binder for Waterborne Traffic Paint

ROHM AND HAAS PAINT AND COATINGS MATERIALS: The acrylic binder Fastrack[™] HD-21A meets new Federal Specification TT-P-1952E for waterborne traffic paint with increased durability. The new binder is a 100% crosslinking acrylic that is being used currently by traffic paint manufacturers to produce high-build, durable water-based markings. It reportedly has excellent glass bead retention, excellent adhesion to concrete and asphalt highways, and provides exceptional durability. Traffic paints based on Fastrack HD-21A binder are currently being used at Cape Canaveral on the landing site for the space shuttle, on high-speed racetracks, on airport runways, on federal and state highways, and on bridges and tunnels. Visit www.FastrackRoadMarkings.com or www.rohmhaas.com.

Waterborne Polymers

NUPLEX RESINS: This company is launching a new global brand of waterborne products, "Setaqua[™]," effective January 1, 2008. The new product line consists of specialty acrylic dispersions, emulsions and alkyd emulsions for the industrial, architectural, wood, automotive and plastics coatings markets, as well as a new line of cosolvent-free polyurethane dispersions. Call 800.873.5410 or visit www.nuplexresins.com.

MATERIALS & EQUIPMENT

Cladding Technology

CONFORMA CLAD: A new technology for coating components allows this company to use tungsten carbide cladding to coat less accessible areas of components and apply metallurgically bonded protection to any complex geometry. Previously, Conforma Clad® wear protection was only available to parts and components with easily accessible surfaces. With the new technology, those limitations no longer apply. For example, parts with an inner diameter (ID) less than one inch or blind holes can now be fully protected using the new cladding. Visit www.conformaclad.com.

EQUIPMENT

New UV Coating Method

KEMIRA COATINGS (TIKKURILA)/PHOSEON TECHNOLOGY: These companies have developed a new UV-curing coating method, called UVITEC® 2D, for parquet boards, doors and other furniture components made of wood or wood-based materials, as well as plastic materials such as PVC flooring and plastic panels. With the new method, it is possible to replace traditional UV-curing devices in UV painting/coating lines. The method includes UV-curing coatings LUMINOL and UVINOL, and a semiconductor light matrix (SLM) UV LED light source from Phoseon Technology. According to the company, the main benefits of the new method are the long lifetime of the UV LED light source and very low energy consumption. Visit www.tikkurila.com, www.kemira.com or www.phoseon.com.

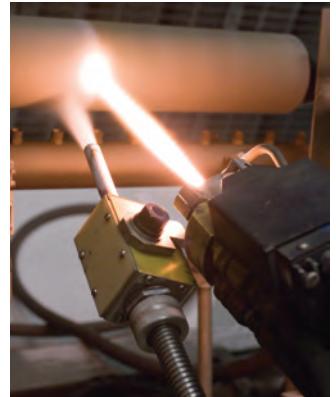
Atmospheric Plasma Surface Treatment System

ENERCON INDUSTRIES CORP.: The Plasma3™ atmospheric plasma surface treatment technology has the ability to modify surfaces unresponsive to traditional treatment methods while completely eliminating backside treatment. The system is designed to produce uniform plasma treatment that adds long-lasting and significantly enhanced wettability, printability, and adhesion properties to the surface. It can be used on most materials, including specialty films, polymers, foams, wovens, nonwovens, fibers, metals and powders requiring stringent surface specifications. Call 262.255.6070 or visit www.enerconind.com.



Thermal Spray Cooling Technology

AIR PRODUCTS: This company's new thermal spray cooling technology uses cryogenic nitrogen vapor (-320°F) to maintain part temperature during thermal spray coating applications. The technology makes high-quality thermal spray coatings possible by maintaining part temperature within a predefined narrow range, even for heat-intensive spraying processes. The technology can enable the user to apply coatings faster and at a lower cost than traditional cooling methods. Visit www.airproducts.com.



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BEX, INC.: A new air atomizing spray nozzle from this company has two gas ports — one for gas to atomize the sprayed liquid, and another for gas that drives the cylinder. This feature allows clean gas to be blended with liquid and prevents contamination from cylinder lubricants. Available with tips that provide a flat V, solid stream and full cone spray patterns, the new nozzle can spray between one-half gallon and 70 gallons of fluid per hour. It can spray atomized liquid or the liquid itself, either continuously or in pulses, and it is also capable of pulsing powder. The nozzle also features an individual replacement capability. Call 734.464.8282 or visit www.bex.com.



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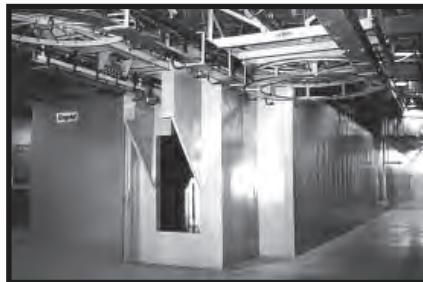
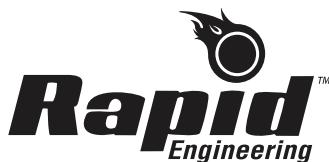
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in the initial prep work. The remaining eight grits are for polishing floors to a high gloss. The rings are changed by placing them onto the cup wheel outfitted with a high-strength Velcro pad. When used properly the rings can polish up to 9000 ft² of surface area, the company reports. Call 918.216.6100 or visit www.cdclarue.com.

LITERATURE Spindle-Finishing Brochure

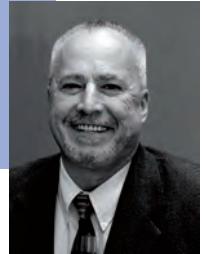
ALMCO, INC.: New literature from ALMCO, Inc. describes the Model S2-30, a new high-production spindle-finishing machine for deburring small gears and machined parts. The machine requires just 15 ft² of floor space, yet reportedly is capable of finishing up to 480 pieces per hour with extreme uniformity and consistency. Parts measuring up to 2½ x 3 in. are loaded on one or both of the machine's spindles, either manually or with robots if desired, and unloaded after a typical 15-second deburring cycle. The literature details how spindle finishing offers numerous benefits not possible with conventional finishing equipment. The highest precision of parts is attained, and many can be deburred in no other way because of requirements for extreme accuracy. Process repeatability is assured through elementary adjustments of the equipment and simple procedures performed without special operator skills. Call 800.521.2740 or visit www.almcoinc.com. 

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QC Solutions
for Coatings

From
Jim
Roberts

Technical
Manager



What is the difference
between Adhesion and
Flexibility?

Adhesion and Flexibility are two very different yet closely related paint / film properties. By that I mean that changing one of these two properties in a product can result in changes in the other, even though they are entirely different properties.

Adhesion can be thought of as the chemical or physical bond that the coating has to the substrate. It is measured by simple destructive tests such as a cross-hatch or scrape adhesion test, or with a more complicated pull-off test where the actual tensile stress necessary to pull the coating from the substrate is measured.

Flexibility can be thought of as an internal adhesion. Do the bonds within the paint allow it to move while in good contact with the substrate or does it break apart and crack. Tests for flexibility involve distortion of the substrate and examining the coating surface for cracking.

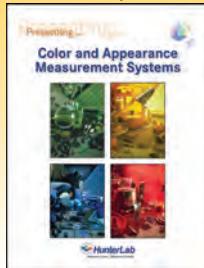
Often a coating that fails in flexibility will also break loose from the substrate, but not always. A balance is needed to prevent a too-flexible coating from popping loose of the substrate and causing a bubble.

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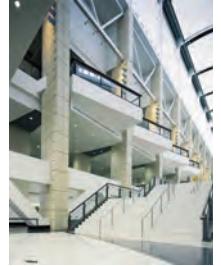
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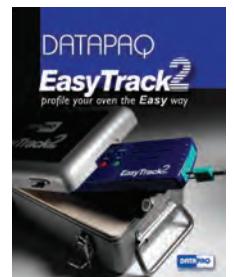


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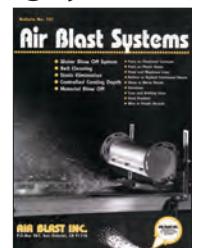
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Ask Joe Powder

Dear Joe,

I have developed crackle finishes with both solvent- and water-based liquid systems. Is it possible to develop a crackle finish with powder coatings?

Sanjay Kamble

Dear Sanjay,

I would recommend starting with an OH-polyester-TMMGU system and modifying it with various other resins to vary the degree of wrinkling that this system produces. TMMGU is tetra methoxy methyl glycoluril and is supplied by Cytec as Powderlink 1174. It requires an acidic catalyst that is usually buffered by a base. The main polyester suppliers (DSM, Cytec, Hexion and Sun Polymer) have recommendations for the most suitable OH-polyesters to use with TMMGU. You typically want a lower OH material (25 to 35 hydroxyl number) because TMMGU can seriously depress the Tg of your powder.

This system provides a fairly tight wrinkle. Dilution with other resins (acrylic, COOH-polyester, etc) opens up the wrinkle, producing more of a crackle finish.

Dear Joe,

As the originator of the Powder Coating Forum for *Finishing Today* when it was still *Industrial Paint & Powder* magazine, I really enjoy your column. A few years ago, I spent several days at a very large powder coating manufacturing facility. The plant was doing "in-mold coating," in which they took sheets of plastic, placed them in a mold, and closed the mold. After the part was formed, and while it was still hot, they opened the mold slightly and injected powder into the mold. They then closed the mold, and the powder coated the part and cured under the heat of the mold. When the mold was opened, they

had a part that was the color that they wanted. They were making bath fixtures (sinks), but the process would work on just about any product. I am curious to know if this process is being used elsewhere at this time.

Bob Collins, President, Metal Finishing Services, Inc., Gallatin, TN

Hi Bob,

I remember reading your columns over the years. I always enjoyed your helpful knowledge and wit. I am somewhat familiar with in-mold powder coating technology. Ferro also pursued this technology in the 80's and 90's. They had at least one commercial application — a fast-cure system that I believe was based on unsaturated polyester chemistry. The process was not quite quick enough for widespread commercialization. Perhaps it will someday be resurrected in another application.

Dear Joe,

I have a customer that wants me to powder coat a set of wheels for his truck. I have asked my suppliers if they could provide a chrome powder and was told they couldn't. Is it possible to achieve a chrome finish with powder?

Rick

Hey Rick,

Sounds like a neat project. You can't perfectly emulate a chrome finish with powder; however, you can approximate it with a cool metallic patina. Powder suppliers can formulate a product with a leafing aluminum pigment that provides a bright, continuous metallic sheen. You need to topcoat most of these with a durable clear to achieve resistance to the elements. The finish won't have the reflectivity and hardness of a chrome finish, but it still looks pretty cool. 

You can't perfectly emulate a chrome finish with powder; however, you can approximate it with a cool metallic patina.

"Ask Joe Powder" is a regular feature of Finishing Today magazine. Send your questions to askjoe powder@yahoo.com. Additional questions and answers can be found online at www.finishingtodaymag.com.

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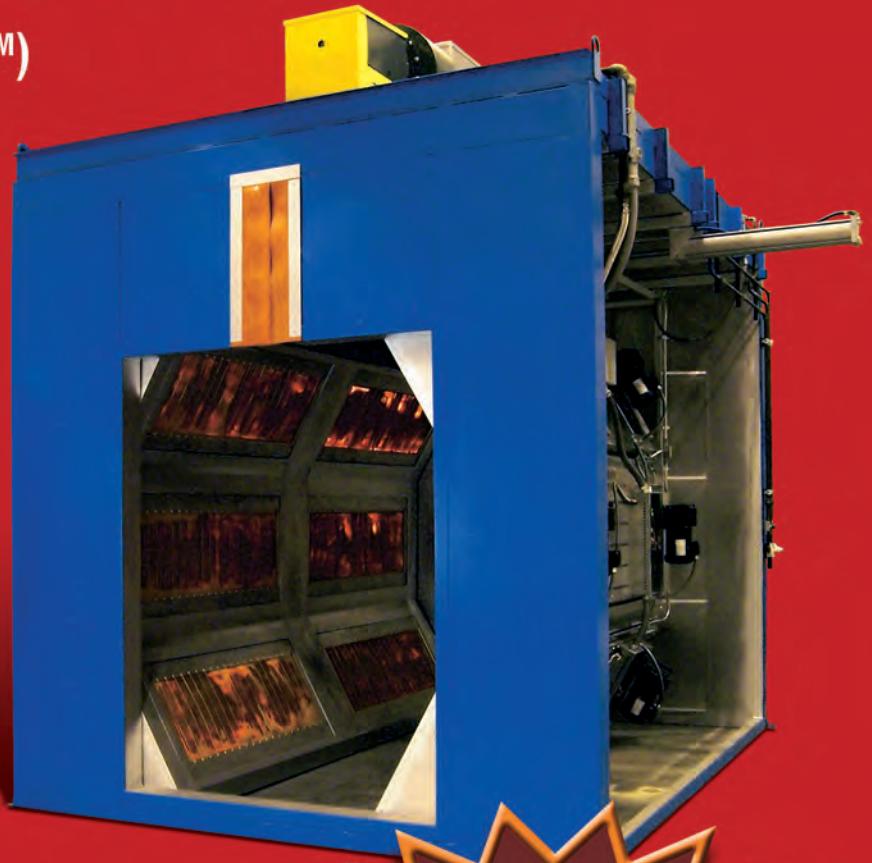
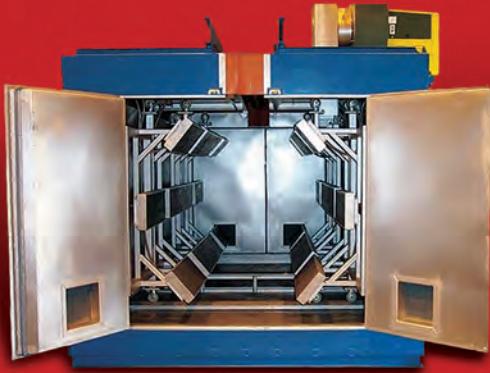
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