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**INDUSTRIAL FINISHING****20 Large Structures****23 Automatic Liquid Paint Spray Guns****25 UV-Cured Wood Finishes****PLATING AND ANODIZING****36 Water Bugs****38 NPRI****41 Barrel Plating****44 Plating Thickness Testing****PAINT AND COATINGS MANUFACTURING****28 Mixing and Dispersion****31 UV Photoinitiators****35 Legislation, by Gary LeRoux****DEPARTMENTS****4 From the Editor****5 In the News****11 Calendar of Industry Events****12 CPCA Corner****15 CASF News****26 "Remember When" Photo Essay****47 New Products and Technologies****50 Ad Index**

**On the Cover:**  
Protecting infrastructure.  
Image: Shutterstock

# Getting Creative



**THERESA ROGERS**  
theresa.rogers@cfcma.ca

It's been an unusual year. A year of lockdowns for most of us. This has meant entirely new ways of living, working and connecting. With the cancellation of traditional trade shows and meetings, we thought it would be fun to get creative and reminisce about shows of the past. Check out the photos on page 26. We also remember our beloved founder and publisher, Pete Wilkinson, whom we lost a year ago to cancer.

We've also got something else a little different this issue. As we've learned, in Alberta, when prosecutions for improper release of waste materials result in a finding of guilt, judges have "creative sentencing" options available to them over and above the imposition of fines.

Judges presiding over cases decide if they want a creative sentence and what sort of creative sentence would be appropriate. Any

sentence imposed by criminal court judges must reflect the circumstances of the offence and the offender.

In this case, as Canada's industry magazine for finishing and coatings manufacturing, *CFCM Magazine* was recently approached by Alberta Environment and Parks to publish an article written by an electroplating company, which cannot be named, that committed an *Environmental Protection and Enhancement Act* infraction.

This article, written by the offender, is part of a creative sentence that the Provincial Court of Alberta imposed.

It's a departure from our usual editorial, however, we support the principle of companies taking strong responsibility for their processes and actions. The article is informative and perhaps offers an alternative safety measure readers on the finishing side may want to explore.

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## Clariant Expands Pigments Laboratory for African Market

Clariant Pigments is expanding its pigments laboratory near Johannesburg, South Africa.

To be officially opened and inaugurated in early 2021, the new facility will service the emerging Middle East and Africa paints and coatings market, Clariant says.

The company says its investment in the laboratory, which has taken more than 12 months to complete, will increase local value-added color support services to the coatings industry across Africa, Turkey and the Middle East. The new facility also offers increased local employment opportunities and in-house skills development training in color technologies.

“Previously, we were only able to supply pigments as raw materials, but we are proud to now be offering a full spectrum of value-added services including customized color solutions, color matching services or the development of own color recipes to create an unlimited number of shades, for example tinting systems,” says Rossitza Dimitrova, Clariant Business Unit Pigments Head of Technical Marketing, Middle East and Africa. “To complete our services we also offer technical marketing and after sales support.”

The following ranges will be produced at the facility:

Hostatint 500 and Colanyl 500, binder-free pigment preparations for decorative coatings

Hostatint A 100, a range of solvent-based pigment preparations with high pigment loading and good rheological properties for industrial coatings

Hostafine, aqueous binder-free pigment preparation range for water-based wood coatings for wood stains and glazes

Hostatint A 100-ST, highly transparent pigment preparations for solvent-based paint systems for industrial coatings

“In South Africa there is a growing demand for both locally produced and sustainable colorants and at Clariant Pigments we can now better serve the local and regional coatings industry with innovative and sustainable ranges of colorant solutions,” says Piers Kure, Clariant Business Unit Pigments Head of Sales, Sub Sahara, Africa.


[www.clariant.com](http://www.clariant.com)



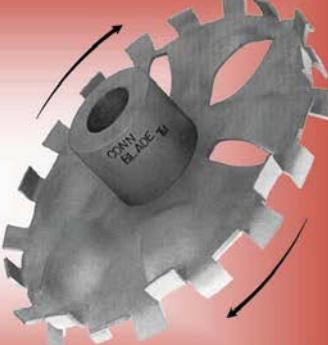
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## AkzoNobel Becomes Official Supplier to Tour de France

The strategic three-year partnership will see the company offer support through its portfolio of brands, as well as creating opportunities to engage in projects with local communities.

“AkzoNobel and the Tour de France is an irresistible combination,” says AkzoNobel CEO, Thierry Vanlancker. “Both organizations share an exciting and proud history, where passion and sustainable performance meets innovation and tradition.

“The race is all about teamwork, expertise and human endeavor; attributes that strongly resonate with AkzoNobel, our pioneering spirit and our commitment to being a frontrunner.”

He adds that as well as helping AkzoNobel to engage with both new and existing audiences and customers, the partnership will also offer opportunities to make a difference to communities across France.

“We’re always looking for ways to make a positive social impact through the transformative power of paint and this partnership will open up some wonderful opportunities,” continues



Photo Credit: Alex Broadway

Vanlancker. “We’re looking forward to getting started and are excited to be part of such a prestigious event which is so well loved around the world.”

[www.akzonobel.com](http://www.akzonobel.com)

## Hempel Announces New Head of Marine Coatings

Alexander Enström has been appointed to head up Hempel’s new global marine organization.

With a strategy to double revenue by 2025, Hempel hopes to build its marine segment. The company says it wants to better serve global marine customers with a full range of coatings and services.

“At Hempel, we want to create long-term partnerships with our customers in order to support their needs and sustainability journeys,” says Lars Petersson, CEO, Hempel. “Marine customers are becoming more global. Our new marine organization mirrors this, enabling us to better meet and respond to our customers’ global requirements.”

He adds, “I’m extremely pleased that we succeeded in attracting Alexander Enström to our team. He is a proven global leader with a deep understanding of marine customer needs. He will add leadership and experience to our marine team and will play an important part in helping us reach our target of becoming the leader in the marine segment.”

As Vice President and Head of Marine, Enström brings more than 14 years of experience in the coatings industry, and vast knowledge of marine coatings and the marine industry, specifically.

“The new marine structure enables us to increase the value we deliver to our customers around the world – in terms of both solutions and services,” Enström says. “Hempel already has a strong technology platform and set-up. We want to build on this, one step at a time, and become the trusted partner to our customers by helping them achieve efficiency and sustainability targets in their day-to-day operations. Hempel is a great company with a strong purpose and a unique culture.”

[www.hempel.com](http://www.hempel.com)



Alexander Enstrom

## Lorama Group and JF Shelton Announce Distribution Agreement with Hydrite

Lorama Group International and JF Shelton recently announced a distribution agreement with Hydrite Chemical Co.

As subsidiaries of Lorama Group Inc., both Lorama Group International and JF Shelton will leverage Lorama’s laboratory capacity of 40 lab technicians, U.S. and international sales teams, and international logistics office to assist customers with Hydrite’s portfolio of additive solutions, Lorama says.

“Lorama Group and Hydrite have been working together for many years through our ongoing business relationship with Lorama’s subsidiary distributor Specialty Chemical Sales,” says

Jake Jevric, Corporate Vice President at Lorama Group. “The new territory additions will further strengthen our technical and commercial position with Hydrite within North and Central America.”

“We are excited about the distribution agreement with Lorama Group International and JF Shelton,” says Jon Murnik, Vice President - Manufactured Products for Hydrite. “This agreement will allow our customers to benefit from expanded sales support throughout North America with additional technical resources, knowledge, and industry expertise. Through this agreement, we will leverage our integrated resources for nimble and flexible operations, diverse product offering, dedicated lab support, and expanded supply chain.”

[www.lorama.com](http://www.lorama.com)

# BEHR REVEALS ITS COLOR OF THE YEAR



Behr Paint Company has revealed its 2021 Color of the Year, Canyon Dusk S210-4, a terracotta shade.

The company says Canyon Dusk is a rich, neutral color that creates an atmosphere of warmth.

“There is something so reassuring about dusk, the moment just after sunset, which brings the promise of a new day,” says Erika Woelfel, Vice President of Color and Creative Services at Behr. “The illuminating, free-spirited Canyon Dusk is a color that can be found in a variety of places, from an awe-inspiring desert landscape to the color of sunbaked clay. Wherever it is found, we share a collective need for these moments of comfort and inspiration in the days ahead.”

Canyon Dusk’s neutrality serves as the foundation for an array of design styles, in both residential and commercial environments, Behr says. Designers and DIYers can pair the color with jewel tones or pastels, making it a fit for modern, casual and traditional styles.

“From seasoned DIYers to first time painters, it’s been inspiring to see people really embracing opportunities to enhance their spaces during this time when we are all in our homes more than ever before,” says Jodi Allen, Global Chief Marketing Officer for Behr. “Whether creating an unexpected accent wall or a simple color change, paint can make a huge visual impact, and it’s one of the most affordable and straightforward DIY projects to tackle.”

In conjunction with its Color of the Year announcement, Behr is asking consumers

to share where they find Canyon Dusk in their daily lives. The contest challenges aspiring artists and photographers, as well as DIYers and everyday enthusiasts, to share

inspiring imagery of where they find their Canyon Dusk on Instagram tagging @behr-paint using #2021CanyonDuskContest.

[www.2021canyondusk.com](http://www.2021canyondusk.com)

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## Using Antiviral Coatings to Reduce Spread of Covid-19

Researchers at Northumbria University in the UK have been tasked by the government's Defence and Security Accelerator (DASA) to develop an antiviral coating suitable for use on everyday surfaces.

DASA, part of the Ministry of Defence, has commissioned a research team from Northumbria to develop a new type of multi-functional antiviral coating to be used in public health crises such as the ongoing COVID-19 pandemic.

In partnership with Defence Science and Technology Laboratory (DSTL), academics from the University's Department of Applied Sciences are working to create a unique superhydrophobic, low-friction coating that destroys viruses while maintaining robust and easy-to-clean properties.

While antiviral coatings are not a new concept, existing approaches can release chemical compounds into the environment, are not long-lasting or are difficult to clean and maintain. This coating aims to provide a solution, researchers say.

Funding from DASA will enable the research team to explore wide-ranging applications, to understand whether the coating is universally robust on an array of surfaces and materials. It is hoped that in the future it could be used on high-contact surfaces such as handrails on public transport, hospital carts or retail cash registers, as well as in the home.

The team sees the coating as a tool that could help bring down the COVID-19 rate, while allowing more scope for "normal" life to continue.

"Having the ability and insight to design multifunctional coating systems that can create long-lasting defence against viruses, whilst also being compatible with everyday life, is challenging yet important," says Dr. Matt Unthank, Project Lead and Associate Professor in Polymer Chemistry.

"It's not just about destroying viruses in the laboratory. New coating systems and surface treatments need to be robust, easy to clean, universal in their application, safe and low-cost. Our research seeks to explore these interdependencies and to develop new antiviral coating systems for the current and future pandemics."

Disinfecting methods such as chemical, bleach or alcohol-based products actively destroy, or deactivate, microorganisms such as bacteria and viruses on contact. However, this approach requires constant retreatment of the surfaces with disinfecting agent which can be labor-intensive and impractical.

An alternative approach is to create a permanent or semi-permanent surface that destroys virus particles on contact, known as an antiviral surface. These fall into two major categories:

- 1) those that slowly leach virucidal chemicals from a coated surface into the environment resulting in an antiviral effect, known as "controlled release" biocidal or virucidal coatings.
- 2) those that have a surface that is permanently capable of destroying microorganisms, such as coronavirus and are known as "contact biocidal" or "contact virucidal" coating

Unthank and his team are focusing on developing new multi-functional contact biocidal and virucidal coatings, which are safe, do not release chemicals to the environment and are user-friendly and universal in their application.

[www.northumbria.ac.uk](http://www.northumbria.ac.uk)

## Dow Introduces New Water Repellent Finish for More Sustainable Textiles



Dow recently introduced DOWSIL IE-8749 Emulsion, what it calls a "new generation" of durable water repellent finishes for fabrics based on silicone chemistry.

"As the global textile industry quickly adopts new production practices and materials with reduced environmental impacts, it's important to examine the water repellent treatments being used as many conventional options come with a number of disadvantages," says Shawn Mealey, Technical Service and Development Scientist at Dow. "At the same time, fashion designers are being tasked with finding fabric solutions that meet consumer and societal expectations for style, ease of care and durability. With DOWSIL IE-8749 Emulsion, we can help meet those needs and provide designers with a water repellent treatment that aligns with the industry's overall push for greater sustainability."

Studies conducted on a variety of textiles with the new treatment demonstrate improved continued water repellency after multiple washes, compared to standard silicone finishes. Unlike many conventional finishes, Dow says, DOWSIL IE-8749 Emulsion does not need to be regularly heat-treated to restore the water repellency performance, a key advantage for the durability of the final product.

The company adds, "By incorporating a DOWSIL IE-8749 Emulsion treatment into their finishing processes, textile finishers receive greater control over the hand feel of the fabric – an important parameter driving consumer choices today. Depending on specific need, this can range from a very soft hand feel that is characteristic of silicone when used alone, to a firmer hand with the addition of cross linkers."

The technology behind the emulsion was developed through a collaboration between Dow and Nicca Chemical, and was recently recognized by a 2020 R&D 100 Award. It does not contain fluoroalkyl or fluorocarbon.

[www.dow.com/textiles](http://www.dow.com/textiles)



# ChemPoint and Henkel Reach Distribution Agreement for BONDERITE Products in Canada

ChemPoint.com Inc., a subsidiary of Univar Solutions Inc., has partnered with Henkel Corporation to further the sales, distribution, and marketing of Henkel's BONDERITE products in the U.S. and Canada. The products provide an array of application solutions such as metal pretreatment, removal, cleaning, specialty coating and more in the industrial manufacturing marketplace.

The partnership allows ChemPoint to offer a full line of forging, casting, machining, lubricating, cleaning, and protection products as well as coatings. This includes technical service and support around surface technology and process solutions to help customers overcome challenging processing conditions.

"The combination of Henkel's material expertise coupled with ChemPoint's technical proficiency, innovative digital approach and service-driven platforms will help enhance the experience of customers seeking a competitive advantage in the homecare and industrial cleaning and lubricants and metalworking markets," the companies say.

"Our relationship with Henkel is a testament to their trust in us and our expertise as a leader in online marketing, logistics, technical service, and sales," says Rick Hoener, Vice President of



ChemPoint. "We're committed to our goal of efficiently supporting customers, reaching new potential customers, and generating as well as capturing demand for Henkel's innovative metalworking and finished fluids solutions."

Dr. Stephan Winkels, Vice President, Surface Treatment, Cleaners and Lubricants, Automotive Components for Henkel, says, "Our products are known in the industry for their wide range of uses, reliability, and proven results. ChemPoint has a deep understanding of our business and we believe that our relationship will lead to greater access of our products across the United States and Canada along with support for those seeking next-generation functional coatings solutions."

[www.univarsolutions.com](http://www.univarsolutions.com)



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## IN THE NEWS

### Technic Appoints New Market Manager for Anodizing Processing Equipment

Technic recently announced the appointment of Christian Ebbrecht as its new Market Manager for Anodizing Equipment.

With more than three decades of process expertise and involvement in a variety of associations within the industry, it is expected he will bring significant new resources to Technic customers, the company says.

A graduate of Calvin College, Grand Rapids, MI, Ebbrecht earned his MBA from Nichols College, Dudley, MA. He has played an active role in the anodizing industry as a technical support consultant and instructor for both individual companies as well as organizations such as the National Association of Surface Finishers (NASF).

As one of the founding members of the Aluminum Anodizers Council (AAC), the international trade association for anodizing manufacturers, Ebbrecht remains an active member in its development, growth and influence.

Ebbrecht has served in technical service since 1990 for anodizing chemistry and colors for Reliant Aluminum Products and others.

"We are delighted to welcome Chris to Technic," says Jim Acquaviva, Director of Business Development, Technic Equipment. "His extensive background, expertise, and commitment to the anodizing industry will add significant value to individual customer projects and an enhancement of our product line."

[www.technic.com](http://www.technic.com)



**Christian Ebbrecht**

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# CALENDAR OF EVENTS

July 13-16, 2021

*Powder Coating Week*

**Orlando, FL.**

[www.conference.powdercoating.org](http://www.conference.powdercoating.org)

September 13-16, 2021

*Fabtech 2021*

**McCormick Place, Chicago, IL.**

[www.fabtech-chicago-exhibition.com](http://www.fabtech-chicago-exhibition.com)

September 21, 2021

*CASF Golf Tournament*

**Whistle Bear, Cambridge, ON.**

[www.casf.ca](http://www.casf.ca)

September 28-30, 2021

*ABRAFATI 2021*

**Sao Paulo, Brazil.**

[www.abrafatishow.com.br](http://www.abrafatishow.com.br)

October 4-6, 2021

*Women in Finishing Forum*

**Embassy Suites South Bend at Notre Dame, South Bend, IN.**

[www.ccaiweb.com/page/WiF](http://www.ccaiweb.com/page/WiF)

November 2-4, 2021

*SUR/FIN*

**Detroit, MI.**

[www.nasfsurfin.com](http://www.nasfsurfin.com)

November 4-6, 2021

*Woodworking Machinery Supply and Expo*

**Mississauga, ON.**

[www.woodworkingnetwork.com/events/woodworking-machinery-supply-conference-and-expo](http://www.woodworkingnetwork.com/events/woodworking-machinery-supply-conference-and-expo)

April 5-7, 2022

*American Coatings Show*

**Indianapolis, IN.**

[www.american-coatings-show.com](http://www.american-coatings-show.com)

April 26-29, 2022

*PaintExpo*

**Karlsruhe, Germany.**

[www.paintexpo.com](http://www.paintexpo.com)

May 25-26, 2022

*Canadian Paint and Coatings*

*Association Annual Conference*

**Quebec City, QC.**

[www.canpaint.com](http://www.canpaint.com)

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# CURRENT PAINT AND COATINGS ISSUES IN CANADA

By Gary Leroux



## New Paint Recycling Regulation Coming in Ontario

Since the windup of the Municipal Hazardous or Special Waste (MHSW) program in Ontario, the Ministry consulted with stakeholders on a new regulation for paint under the Resource Recovery and Circular Economy Act (RRCEA). The draft regulation is now available to stakeholders for a public consultation period until March 28, 2021. CPCA is working with the program operator, Product Care, on the analysis of these new regulations and making appropriate interventions where required to ensure a reasonable regulation for paint recovery and recycling in Ontario.

CPCA continues to work with other like-minded associations in Ontario in seeking enhanced transparency and more accountability for ongoing changes to increasing waste recovery costs for producers in Ontario. For this, there need to be substantive amendments to the current legislation ensuring greater accountability of the oversight agency, RPRA, as well as Ministry officials who are responsible for developing policy and regulations. The new paint recycling regulation is targeted to come into force at the end of June 2021.

## PMRA Confirms Aligning with the EU on Decision to Prohibit Specific Uses of Chlorothalonil

In a letter to registrants dated February 10, 2021, Canada's Pest Management Regulatory Agency (PMRA) confirmed it will not reopen its final decision on the special review of chlorothalonil published for agricultural and turf products in 2018. PMRA is alleged to have based its decision on an EU preliminary risk analysis which later led to a final decision in 2020 to eliminate the use of chlorothalonil in plant protection as well as in all uses based on human health and environmental concerns. Similarly, as with OIT, chlorothalonil may very well be another example of a continuing PMRA misalignment with the US EPA.

At an upcoming meeting with the PMRA, CPCA intends to inquire about PMRA's current position with respect to their proposed decision on six preservatives, including chlorothalonil. Selective alignment is not an option. Government cannot choose to ban a substance, as it did in the case of OIT (since reversed), that the US EPA had not banned, as this caused misalignment initially. The government cherry picked EU data banning the substance, but again, not in alignment with our closest trading partner, the United States.

Early in 2020, Environment and Climate Change Canada presented the results of a study that compared the actual VOC content in products sold in Canada to various models used in the United States including CARB 2019 and OTC Phase II. At the time, CPCA submitted comments recommending a phased-in adoption of OTC Phase II, stating that it took several years for all U.S. states to officially move from OTC I to OTC II and that not all U.S. states have yet done so. Additionally, we noted that most of the impact of adopting U.S. rules will be on specialty products such as maintenance enamels and specialty primers that serve specific needs and are difficult to reformulate.

## CPCA Members Provide Feedback on the Technical Challenges Associated with Adoption of California VOC Limits in Canada

In December 2020, government officials shared their intent to adopt CARB 2019 VOC limits, mainly because OTC indicated it

**Regulators specifically asked CPCA to provide more detailed information on all product categories, which would present problems for the paint industry under the proposed new limits and to further explain how formulators expect their conversion to lower VOC limits will be technically challenging for many.**



would be moving forward to adopt CARB-2019 limits in Phase 3 and the alignment with CARB 2019 would provide significant reductions of up to 7.7 Kt in Canada. A formal consultation of the proposed amendment to Canada's Architectural VOC Regulations is planned later in the Spring of 2021.

Regulators specifically asked CPCA to provide more detailed information on all product categories, which would present problems for the paint industry under the proposed new limits and to further explain how formulators expect their conversion to lower VOC limits will be technically challenging for many. CPCA subsequently distributed a survey to members and compiled the technical information obtained from several Architectural members

pointing to roughly 18 category limits deemed to be particularly problematic. This feedback was shared with regulators and CPCA will hold a meeting in March to discuss these issues with officials before the formal consultation takes place.

#### **Ongoing Chemicals Assessment Activities**

The ongoing risk assessment of chemicals in commerce continues under the Chemicals Management Plan (CMP). CPCA continues to monitor substances implicated in paint, coatings, sealants, and adhesives and update members on regulatory actions via our digital platform, the Canada Coatings HUB, and regular bulletins. In early February, the final screening assessment for benzophe-

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none was published and confirmed that the substance is toxic for human health when used in interior and exterior paint and coatings. Government proposed a Code of Practice as an instrument to limit its use in these products to a maximum concentration of 0.1 percent by weight.

CPCA is reviewing the current levels of benzophenone use and will prepare an official submission with member input in the coming weeks. The Phosphoric Acid Derivatives group was also evaluated; three substances in the group were found CEPA non-toxic, however the use of trixylyl phosphate in consumer products will be monitored via significant new activity provisions. Several other final assessment reports were published including those for Dinoseb, Dimethoxymethane, Acetic Acid, and the Alkylimidazoline and Used/Re-refined Oils groups which all concluded the substances implicated do not meet any toxicity criteria under CEPA.

Finally, Draft Screening Assessment reports were released for Na3NTA and the Decenes group. Na3NTA does not meet any of the toxicity criteria and no follow-up activities are planned at this time, however a specific risk assessment was made for wood furniture polishing and wood floor cleaning products as well as for spray boat cleaners. For the Decenes group, two of the substances are proposed toxic for human health: hydrogenated didecene and HTTD. These will be added to Schedule I but they do not

appear to be used in paint and coatings in Canada.

CPCA continues to update the CMP substances database as these publications are released, and members are encouraged to consult the up-to-date database on the Canada Coatings HUB to ensure full compliance and limit surprises that could mean unintended non-compliance for some.

**Health Canada Inspection Reports Reveal CPCA Members in Full Compliance with Several Regulations**

Health Canada recently published its cyclical enforcement reports for several Regulations under the Canada Consumer Product Safety Act, including the CCCR, 2001 and the Surface Coatings Materials Regulations (SCMR). For the latter regulation, in Fiscal Year 2019-2020, lead testing of 31 different products was carried out, resulting in only one recall. No CPCA manufacturer members appeared directly implicated in the corrective actions required and non-compliance issues during the two-year period. However, these publicly posted reports remind members that enforcement activities are constantly being carried out and to take all necessary measures to remain in full compliance. ■

*Gary LeRoux is President and CEO of the Canadian Paint and Coatings Association. [www.canpaint.com](http://www.canpaint.com)*

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# CARBON TAX DISADVANTAGE: SURFACE FINISHING INDUSTRY AT RISK

By Bob Smith

Are you the owner of a surface finishing manufacturing facility or establishment in Canada? Are you an employer or employee in the surface finishing industry? Then you need to be concerned and should pay attention to this column. Our industry is at risk and you can help.

The concern over climate change and rising carbon dioxide levels is real. Responsible companies and business owners across the country have been actively investing in green technologies for years and the surface finishing industry is a leader in the adoption of these new technologies.

Demand for action by environmentalists and their effect on some governments for climate action is intense. In Canada, in response to public pressure, the federal “Carbon Tax” was introduced and we are now seeing the effects of it on trade exposed manufacturing sectors such as ours – the surface finishing industry – and it’s not good news.

According to Alex Greco, Director-Manufacturing Policy, Canadian Manufacturers and Exporters (CME), the federal government has released its framework Net Zero strategy which provides a range of actions to be taken, most notably highlighted by a \$170 per tonne carbon tax by 2030 and a Clean Fuel Standard.

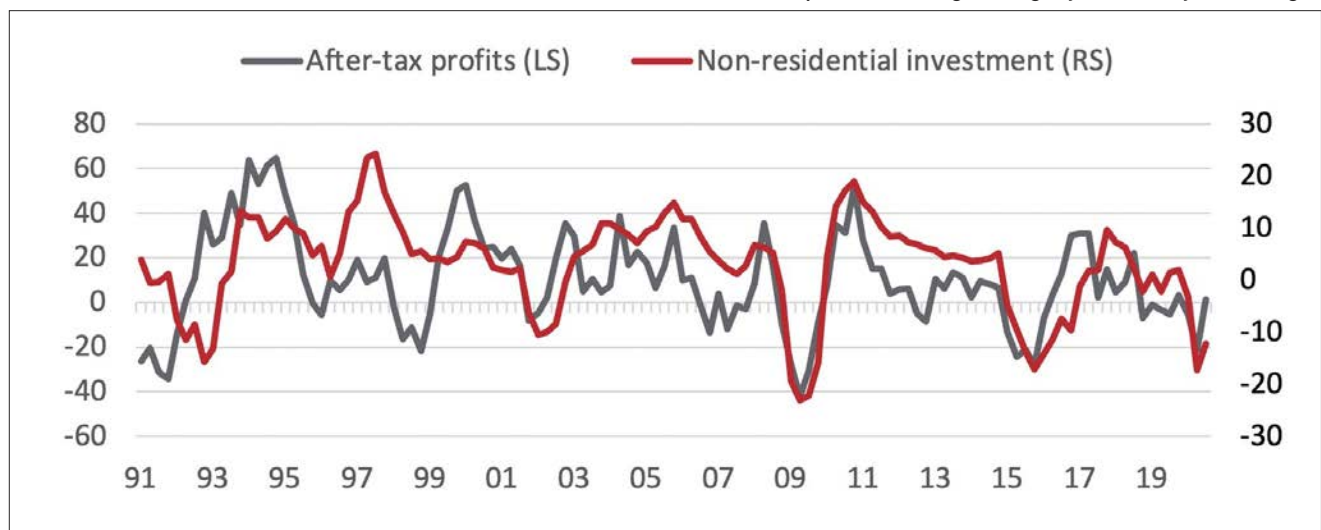
By CME’s estimates, the escalation of carbon taxes from \$50 per

tonne to \$170 over the next decade will have a cumulative cost for Canadian manufacturing ranging between \$65 billion and \$82 billion based on current levels of output and emissions. As the chart below shows, there is a direct link between technology investment and profitability. This means that every dollar removed from the sector is a dollar that cannot be invested in technological change and emissions reductions. This is why CME has long advocated on behalf of its members for full revenue recycling from carbon taxes back into industry – not taking this money and putting it into general revenue or to other sectors of the economy, including individuals and households. (See Chart Bottom of Page)

While there are support programs for Canada’s industrial sector, there is significant concern that these measures will fall short and will not leave Canadian manufacturing stronger, more resilient, or globally competitive and some sectors, including ours, have been left out of this program.

From a recent report from the Fraser Institute: “...many manufacturing sectors, including basic chemical manufacturing, primary metal manufacturing, cement and concrete product manufacturing, miscellaneous chemical product manufacturing, and non-metallic mineral product manufacturing, will be negatively affected.

**After-Tax Cash Flow Drives Business INVT**  
Canada (four-quarter moving average, year-over-year change)



Source: Canadian Manufacturers & Exporters (CME) and Statistics Canada

As a result of changes to our competitiveness in the global marketplace due to increases in carbon pricing mechanisms, we have lost business to competitors in the U.S., Mexico and China, which translates directly into lost jobs.

## DYNAMIX Blending Technology, Service and Value



Dynamix is one of North America's fastest growing manufacturer and supplier of metal finishing chemistry. "The philosophy at Dynamix is simple - enhance our customers' performance and profitability, while dealing with all of our partners in an open and honest forum."

The primary focus of Dynamix is the design and manufacture of specialty chemicals for the metal finishing industry, covering all aspects of metal finishing from anodizing to zinc plating. Toll blending, packaging and distribution of custom formulated products are also available.



We offer a service that encompasses all of our values with a highly skilled and motivated team. The laboratory at Dynamix is well equipped and able to provide analytical solutions specific to a particular sector of industry and/or customer. Products are designed at Dynamix to provide unsurpassed performance and solution economy. Superior chemistry is only the beginning, as the company realizes that technical and application knowledge are just as vital to the metal finishers' success.



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For instance, the tradable basic chemical manufacturing sector would see a production cost increase of 5.7 percent in the short term. Similarly, a highly tradable primary metal manufacturing operation would face a 3.6 percent increase in production cost. Competitiveness pressures will also be significant for oil and gas extraction and pulp, paper, and paperboard mills, among others."

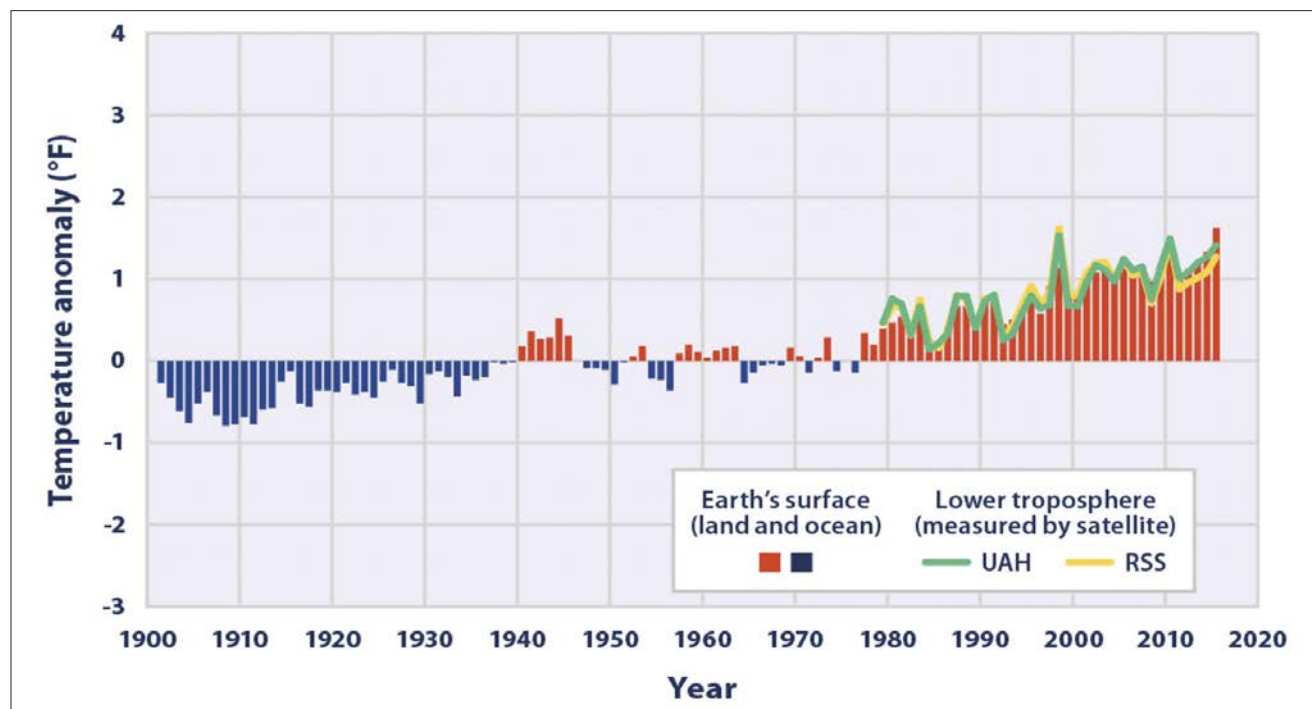
In response to these concerns, the federal government has designed an output-based pricing system (OBPS) with the intent of limiting the harm to sectors exposed to trade and competitiveness pressures. Thus far, the surface finishing industry has been excluded. Why is this? Our industry is heavily exposed to foreign competition in the U.S., Mexico and China, where such a tax does not exist. We are at risk.

As one large surface finishing shop in Ontario recently commented on the potential impact of the tax:

"As a result of changes to our competitiveness in the global marketplace due to increases in carbon pricing mechanisms, we have lost business to competitors in the U.S., Mexico and China, which translates directly into lost jobs. Quoting from the 2020 Orr and Boss Industrial Impact Study undertaken with sponsorship and funding from CASF, 57 percent of this industry sector is based in Ontario, which currently exposes them to the pricing increases currently in place under the federal Output Based Pricing System (OBPS) program. With the announcements from the federal government, under the new Climate Plan strategy, it is posited that CO2 emissions pricing between 2022 and 2030 will increase from \$50 per tonne CO2 emissions to \$170 per tonne of CO2 emissions – a 340 percent increase!" (As a side note, Quebec's cap-and-trade plan, where CO2 emitters must buy carbon credits, limits them to a carbon price of just \$17 per metric tonne, not the current \$50 for 2022 rising to \$170 per tonne in 2030 noted above in predominantly Ontario). This increase affects our sector's ability to be competitive internationally as many other jurisdictions, some elsewhere in Canada but many globally, do not have carbon emission reduction programs in place, or have programs that are very much less onerous financially. The Canadian Surface Finishing industry has been advocating for some time for our sector, (NAICS Code 3328 – North American Industry Classification System 2017 ver. 2.0 – "Coating, engraving, cold and heat treating & allied activities"), to be approved



## Climate Change Graphic Worldwide, 1901–2015



This graph shows how annual average temperatures worldwide have changed since 1901.

under the OBPS program referred to above, and for our members and sector to be approved and accepted as a participant in the EPS program, (Emissions Performance Standard ERO 019-2813)".

### The Carbon Tax: How Did We Get Here?

According to the Fraser Institute, Ontario released its Climate Change Discussion Paper on Feb. 12, 2015. The plan was essentially a laundry list of public policies that have been sought by environmentalists and allies for decades: smart growth, public transit, electric cars, biofuels, manual transportation (walking/biking), more recycling, replacing traditional manufacturing with green-tech manufacturing, and now, "putting a price on carbon." So, let's talk about carbon pricing, where governments charge those who emit CO<sub>2</sub>.

First, we must address the "economists all agree" theory. Carbon price advocates would have us believe that economists universally support the idea of pricing carbon because it's the "most efficient" policy. But they don't. The economic literature only suggests that a carbon tax would be an efficient policy for controlling emissions if used instead of, not on top of, command-and-control regulation. Simply throwing a carbon tax on top of the current pile of regulations does nothing to fix their inherent inefficiency.

Carbon price proponents also claim that if you start with a low, revenue-neutral tax, increase it slowly over time, and make it universal across your economy, you can mitigate the economic damage that accompanies carbon taxation. Not so much. As Fraser Institute senior fellow Robert P. Murphy points out, even a textbook perfect carbon tax would cause economic damage and reduced incomes.

Well, but what about the benefits? The government wants to dramatically reduce carbon emissions – 80 per cent by 2050, to be precise. As noted, because energy demand is relatively insensitive to prices, for carbon taxes to produce any significant reduction of

emissions, they would have to be set far beyond the level of harm they are intended to reduce. For example, getting even a 30 per cent reduction from Canada's motor vehicles would require a gasoline tax of about \$975/tonne of carbon dioxide, an order of magnitude beyond B.C.'s, as an example, current tax of \$30/tonne.

For Canada, meeting the 2030 Paris Agreement, while an honorable goal, will make almost zero global difference while irreversibly damaging our manufacturing base through losses in high paying manufacturing jobs to China, India and others. Bringing those manufacturing jobs back to Canada from China or India or even Mexico, as we have learned in the last 50 years to our chagrin, is almost impossible.

Canada's total annual GHG (greenhouse gas) emissions are roughly 730 megatonnes which equates to 1.58 per cent of total global emissions and ranks the country in 11th place. For perspective, the world's top emitters are China (first at 11.7 billion tonnes), the U.S. (second at 5.7 BT), and India (third at 3.4 BT), while the EU as a region is responsible for 3.2 BT. Canada is a small emitter of greenhouse gasses on the global scale.

### Where Do We Go From Here?

Regardless of whether you believe the Carbon Tax is right for Canada or not, under the current federal government regime, it is here to stay. The manufacturing sector will need to adapt.

CASF understands and supports the global move to greener technologies and carbon reduction. Our industry sector employs hundreds if not thousands of environmental experts working tirelessly toward that goal within our facilities and as consultants for our smaller members. We are one of the most heavily regulated Industries in Canada and our environmental track record is strong and enviable. We take this obligation to the environment seriously by

## CASF NEWS

As I write this, mid-February, we're off to a cracking start in 2021 at CASF with our brand new President, Graham Douglas of UBA/Kencro, who is full of energy and great new ideas. We've just had our AGM combined with our Q1 Board meeting at the end of January and have taken on a management group to help us run CASF. Graham will have put out his first President's Newsletter by the time you read this so you will now have seen most of the exciting news but something I'm particularly pleased about is Mike Kuntz and his Technology & Communications committee group's efforts toward a new CASF website and graphics package. I've seen the new logo and some of the website ideas and it's modern, colorful and says a lot about the energy level at CASF right now. Please stay safe and hopefully you'll each have been able to get your coronavirus vaccination before the next issue of the *CFCM Magazine* hits your desk.

investing in these new technologies as they become available and economically feasible.

Improvement in the manufacturing industry's emissions profile in Canada comes from a commitment to invest in pollution prevention and abatement measures, adds CME's Greco. In 2016, the latest year for which data are available, capital expenditures on pollution prevention and abatement totaled \$734.3 million in the Canadian manufacturing sector. These investments were heavily concentrated in the sector's largest GHG emitters: primary metal, chemical, petroleum and coal product, paper, and food.

While these technological investments by the sector, (and all sectors in Canada), are paying off in reduced emissions intensity, this is a small amount compared to what is likely to be needed to meet Canada's Paris Agreement and Net Zero targets. In fact, by CME estimates, Canada would need to triple its current rate of technological progress, with emissions intensity falling at a 4.9 percent average annual pace, just to meet its 2030 emissions reduction target. Yves Giroux of the Parliamentary Budget Office, (PBO), set our 2030 GHG emissions goal as 30 percent below 2005 levels and the current projection is a shortfall of 77 megatonnes in Canada. To meet our 2030 goal would entail an increase in the 2022 carbon pricing levy of \$50 per tonne, already a large increase from the



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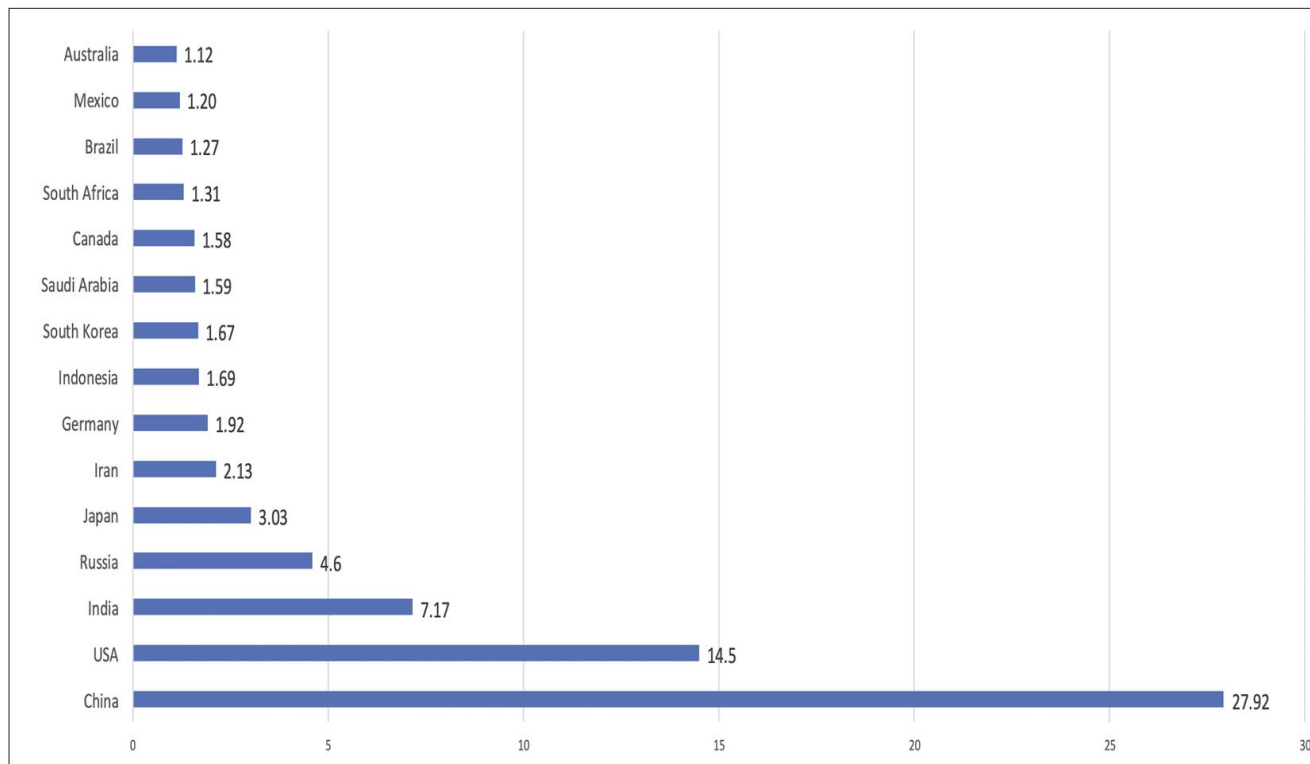
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## Largest Producers of Fossil Fuel Emissions by % – 2019



current rate, to between \$81 and \$239 per tonne and we should not expect the final number to be far from \$239. And remember, this number is split between households and industry and will be even higher for those not covered under the OBPS!

In 2020, CME conducted its bi-annual Management Issues Survey where the association posed a range of questions to Canadian companies about business conditions, strategies, and concerns, including on climate policies and actions. In short, the responses from Canadian industry tell us that larger companies are much more likely than smaller companies to have GHG emissions reductions strategies and smaller firms, not surprisingly, are significantly lagging.

At a more detailed level, only one in five Canadian manufacturers have established targets but, not surprisingly, responses varied widely depending on firm size: Half of large businesses have set targets; 30 per cent of medium-sized enterprises have done so; and less than 10 percent of small manufacturers have done the same.

### Here are our suggestions to pass along to our leaders for consideration:

**1.** Introduce a broad-based, direct, investment tax credit to encourage investment in new technologies. This should not be a program that companies have to apply for and qualify for. Rather, it should be a tax-based program that would apply pre-tax and available to all domestic manufacturers who meet a set measurable reduction in GHG emissions.

**2.** Introduce refundable tax credits aimed at commercializing green technologies. The government has signaled its intention to support green technologies through a reduction in corporate taxes paid on these goods. While an important signal, it does not go nearly far enough. First, most companies commercializing these products makes little to no profit in the early stages of production so the credit will not have a meaningful impact. Additional direct support should be considered. Second, the range of technologies being considered appears narrow to just final consumer products. This should be broadened to include emissions reducing technologies, such as manufacturing process technologies.

Finally, the OBPS system was designed to protect our sensitive trade-exposed sectors across the country. The surface finishing industry is one of them and we deserve the recognition and ability to opt into the OBPS program; we represent \$6.5 billion in annual output and thousands of jobs and are under more pressure than ever from the U.S., China and Mexico.

If you also believe Surface Finishing shops deserve to be included in the OBPS program, or support the two suggestions above, please consider this article and contact Ms. Katherine Teeple, Director, Industrial GHG Emissions Management – [Katherine.teeple@canada.ca](mailto:Katherine.teeple@canada.ca) and make your feelings known. ■

*Bob Smith is Past President and Membership Chair, Canadian Association for Surface Finishing (CASF), [www.casf.ca](http://www.casf.ca)*

# LARGE STRUCTURES

## Demand Specific Coating Solutions



The G20 group of nations predicts that at current rates, investment in new infrastructure will amount to \$78.8 trillion by 2040. This is according to Global Infrastructure Outlook (2019).

According to Infrastructure Canada in 2020, “more than \$180 billion is being delivered over 12 years to provide predictable and sustainable funding for projects that will build modern, resilient, and green communities for Canadians” through the Investing in Canada Plan.

With such massive investment at stake, the protection of large pieces of infrastructure such as bridges and transit facilities, recreation centers, sanitation, and more, becomes paramount.

Much of this large infrastructure is made of steel, and steel is prone to rust and wear. Surface preparation is key to success.

“To ensure good coating adhesion, it is essential that the surface to be coated is rendered free of dirt, dust and debris that might affect performance,” says Serco Group. “Water-soluble residues, if left on the surface, will cause rapid deterioration at the interface with paint when the coating is exposed to moisture.”

Paint is the most commonly used material to protect steel, says Serco, with the term covering a wide range of materials with different properties. Application is comparatively easy with no limitation on the size of steelwork that can be treated. Careful attention to important factors such as surface preparation, the selection of a suitable paint for the specific situation and correct application must be observed.



*The Gordie Howe Bridge will link Windsor and Detroit.*

Photo Credit: [www.gordiehoweinternationalbridge.com](http://www.gordiehoweinternationalbridge.com)

For structural steelwork, the paint film thickness is important for lasting protection.

“Best results are obtained when coatings are applied in heated, enclosed workshops; units for bridge structures and building framework can be coated in this manner before erection and additional coats may be applied on site, where required,” says Serco. “Modern coating facilities can automatically blast clean and prime steelwork before departure to site. Where improved resistance to mechanical damage or better durability in certain environments is required, coatings of non-ferrous metals such as zinc or aluminum can be used

instead of paint coatings, although this may incur increased cost. The combination of metallic and paint coatings can provide very long term durability in aggressive environments and an aesthetically pleasing appearance.”

A typical protective paint system involves a primer coat, sealer, undercoat, intermediate coat, and finish coat, the company says.

The Association for Materials Protection and Performance (AMPP), formerly the Society for Protective Coatings, represents the global community of corrosion and protective coatings professionals.

Members “are dedicated to advancing technical and practical expertise in corrosion prevention and control,” with AMPP helping to protect infrastructure and assets worldwide through member and workforce education and credentialing, company accreditation, technological innovation, and global standardization.

AMPP says the structural steel primer is the first consideration when approaching a large steel coating project. The primer will both protect against the effects of environmental exposure and provide a better surface to which a topcoat can cling.

Because steel is made mostly of iron, it corrodes in the presence of oxygen. Even the most benign, controlled interior service environments can be corrosive, says AMPP. To prevent that corrosion, owners have two choices: Apply protective coatings to structural steel or choose structural material made of rare and costly superalloys.

“While corrosion protection is the more important role structural steel primers play, they also provide a better surface for topcoat application,” AMPP says. “Reasons for choosing a topcoat can vary. It might be to add even more corrosion protection or it could be for aesthetics only. In any case, topcoats last much longer when applied over primers. That’s because primers fill in surface defects that might otherwise compromise topcoat adhesion.”

Tradeoffs confront asset owners at every turn. Generally, the choice depends on how long an owner intends a coating system to last and how much they’re willing to spend.

For instance, owners interested in long-term asset protection often choose intense surface preparations. A well-prepared surface reduces the risk of premature coating failure. And if an owner is willing to go to the expense of a more involved surface preparation, it’s worth a similar investment in a high-quality primer (and topcoat). It’s expensive up-front, but the benefit is a coating system that remains intact for decades.

On the opposite end of the spectrum, owners hoping to incur as little up-front cost as possible are likely to choose a less stringent surface preparation and a less costly primer, too. Less intense surface prep can increase the risk of premature failure, though, and since this route comes with a lower price tag, owners should expect to recoat the asset more frequently, warns AMPP.

Greenkote, which makes anticorrosion metal coatings, recently announced a major expansion at its headquarters facility in Brook Park, OH. The expansion comes in response to a surge in demand for corrosion protection on environmentally exposed metal fasteners and hardware in a number of different industries, the company says.

“I don’t know if climate change may be a part of it, but we’re seeing notable increases in anticorrosion coating orders for all kinds of different metal parts that are exposed to the elements,” says Mark Gore, CEO. “The orders are coming from a range of sectors, including

automotive, rail, electric power distribution, wind power generation, and others. These are all applications that have fasteners, fixtures and other metal hardware exposed to long-term outdoor atmospheric corrosion.

“It’s also possible that we’re getting more than our share of this business because of a couple other factors,” adds Gore. “Number one, Greenkote coatings are actually diffused into the metal surface, making them damage resistant, longer-lasting and better-performing than older treatments such as galvanizing and paints. Another factor is eco-friendliness.”

Greenkote can be applied to a broad range of metal parts, from threaded fasteners to stamped and cast pieces, in sizes from 0.2 to 78 inches. It is applied by a patented zinc-based dry thermal diffusion process that requires no hazardous chemicals and produces no toxic byproducts, the company says.

Major coatings suppliers such as PPG offer a wide range of options and expertise to guide asset owners in their selections for these large projects.

**With so many variables in industrial painting projects, understanding the industrial painting process thoroughly, or finding partners that do, can help complete a project properly, within budget and on time.**

“Our advanced coatings and systems for civil and commercial infrastructure deliver proven protection from corrosion, high-temperatures and fire to ensure durability and aesthetic performance that will protect your valuable assets,” PPG says.

PPG says it is a leader in the specification and supply of high-performance, environmentally preferred coating systems for bridges, with an expert technical support team available to provide professional advice.

The company’s Amercoat 235 is a two-component, multi-purpose phenalkamine epoxy that can be used as a primer or midcoat with “exceptional corrosion protection in salt and fresh water immersion and corrosive chemical environments, good adhesion to damp surfaces, and suited to heavy industry and structural steel projects such as bridges and stadiums.

PPG’s Sigmafast 278 is a two-component, high solids, zinc phosphate epoxy primer and buildcoat suited to commercial buildings and more. The company says it offers “excellent corrosion resistance in atmospheric exposure, cures at temperatures down to -5 deg. C, can be applied easily via airless spray, and has a wide application range.

Powder coating is also an option, Larson Electronics’ Andrew

Holland tells real estate management industry news source, Remi Network.

“There are copious benefits of this coating,” he says. For instance, it takes about 20 minutes to complete and layers don’t hinder the flexibility of the base item. This helps components endure vibration, chipping, fading, corrosion and rough weather.

“When exposed to outdoor or marine environments, powder coatings can resist corrosion, abrasion and chemicals – but only up to a certain threshold,” Holland says. “Compared to paint, this type of protection is exponentially more reliable. To ensure protection, powder coatings must be maintained properly by applying paint over the exposed or chipped surface.”

SunDial Powder can process large architectural components including beams, supports, enclosures, gates, fencing, and other ferrous and non-ferrous building elements.

“We offer OEMs a competitive edge when it comes to durable, protective finishes and commercial performance coatings for an unlimited array of industrial applications,” SunDial says, “plus



advantages like our seven-stage pre-treatment system and advanced coating technology for aluminum extrusion, die cast powder coatings, and precision sheet metal.”

SunDial also offers an environmentally friendly process and a team to test, calibrate and monitor process control procedures for customers.

Toronto-based InduSpray will prepare and paint large steel structures, structural steel parts, beams, cranes, and bridges.

InduSpray offers sandblasting, ultra-high-pressure water blasting, dry ice blasting (CO<sub>2</sub> blasting), and other preparation methods for steel/metal. The company will also analyze any steel painting project and provide options based on exposure, longevity and cost.

“We offer epoxy coatings, urethane coatings, plural component coatings, fire resistant coatings, and standard architectural coatings to protect and extend the life of your steel structures,” the company says. “We excel in complicated rigging access environments, blast media containment, and fast turnaround time projects.”

With so many variables in industrial painting projects, understanding the industrial painting process thoroughly, or finding partners that do, can help complete a project properly, within budget and on time. ■

# AUTOMATIC SPRAYING OFFERS MANY CHOICES

Despite the continuing growth in sprayed powder, three-quarters of the spray finishing market in North America is estimated to remain in the field of liquid paint. This includes, of course, both solvent-based and water-based paints.

The need to remain competitive against low-labor-cost countries has driven a heavy push by equipment suppliers into automated systems. If overspray can be minimized, and spray guns be shut off micro-seconds after a part is painted, the user can cumulatively shave valuable dollars of the cost of a finishing job.

Robot systems in particular are receiving constant attention, as suppliers work to meet the demands of precise, highly accurate production lines. But even for lower volumes, where full robotics might be prohibitively expensive, there are options available that can reduce the expense of spraying without breaking the bank.

Beyond automation technology, however, the guns themselves have received considerable attention in recent years, as designers look for ways to reduce clogging and improve the regularity of spray patterns. Without such improvements, any digital control system would have been limited in its capabilities.

Graco's AL series of automatic, airless spray guns is recommended, the company says, for metal finishing applications. The guns have a lightweight and compact rounded gun design that can handle high production speeds.

The durable, stainless steel construction can withstand the wear effects of tough materials, and a reduction in parts over previous designs lowers the cost of repairs. There is also a wide range of tips to cover a range of end-uses.

Graco's G40 automatic air-assisted spray gun is also lightweight and is stated to offer a superior finish quality with tighter patterns widths and high position accuracy. The indexing aircap provides fast and accurate positioning in either the vertical or horizontal position.

"The AAF tip line," Graco says, "is designed for soft spray and improved transfer efficiency. It is ideal for wood and general metal finishing applications."

The SATAjet 3000 A RP is, SATA asserts, an extra fast, material-fed automatic gun for paint spraying machines and robots. The optimized RP high-pressure technology ensures fast and precise results.

"The high application efficiency of well over 65 percent complies with the VOC directive [to cut emissions] and saves material," the company adds. "It offers a high material transfer rate, and is suitable for paint jobs where high application speed is required."

There is manual adjustment of the round and flat fan via an adjustment screw, and material flow rate can be adjusted with the help of a detent.

Various quick-change adapters are available for a smooth flow in production, for maintenance or for cleaning. Special test air nozzles are available to precisely reproduce the atomization parameters.

The company's PHASER paint spray gun was developed in con-

junction with the Porsche Design Studio. Technically, it is identical to the top model SATAjet X 5500, using the same nozzle concept and all the other features of that model.

It is, SATA says, economical, quiet in use and consistent. Specific applications for which it is recommended include car refinishing, painting building and yacht and boat decorating.

SAMES KREMLIN's Airmix line of automatic spray guns, the company says, "uses noble materials – stainless steel in particular – and produces the entire body and head or aircap in its own plant. We focused on the ergonomic design of our guns with a small footprint, in parallel with the reduction of weight by use of aluminum, important when they are mounted in series on automatic machines.

"Maintenance is also a key criterion taken into account to limit machine downtime. A flanged design, for example, with optimized product circuits, limits the consumption of solvent during color changes. Spray quality for a high finish and transfer efficiency are our standard."

The Airspray pneumatic range from SAMES KREMLIN features low pressure, HVLP guns, with a head pressure limited to 0.7 bar. This type of spray, the company explains, provides a high-end finish.

"We have been able to develop a complete range of aircaps and nozzles or needles of different sizes," the company says, "depending on the desired flow rate. The required fan shapes the product applied, including lacquers and varnishes, so any combination is possible."

Another system the company offers is the A25 F Flowmax automatic airspray gun. This benefits from the company's Flowmax technology, which is claimed to guarantee a very high reliability, and the possibility to spray critical products. It is recommended for spraying paints, glues, water-based materials and UV products.

"It features high transfer efficiency, outstanding finish quality, modular design and high reliability," SAMES KREMLIN states.

DeVilbiss has concentrated on a compact line of automatic spray guns. Its Automatic I guns feature a wide range of aircaps, and a removable stainless steel spray head for fast maintenance.

"Control of spray performance and fluid flow is unequalled with the fluid adjusting knob," the company states. "There is an independent fan for atomizing and triggering air, which is vital for robotic and automatic spray machine applications, and an indexing air cap for consistent reproduction of a spray pattern."

Another product in the range, the Compact Automatic X HVLP spray gun, detaches from its mounting block in a few seconds by use of an easy thumb release mechanism. This, the company claims, dramatically reduces production downtime.

There is a recirculating and non-recirculating gun head, in an all-in-one arrangement, fixed gun positioning, and a small footprint.

One of the company's most recent additions is the Compact I Trans-Tech Auto spray gun. This, DeVilbiss says, "utilizes the very

## INDUSTRIAL FINISHING: AUTOMATIC LIQUID SPRAY GUNS



A Graco AL automatic spray unit.



A SATA 5000 Phaser unit.



A SAMES KREMLIN A25 Flowmax unit.

latest advances in computational fluid dynamics. This results in superior atomization with the new DeVilbiss Transfer Technology.”

The company claims exceptionally efficient material transfer with this unit. Optimum coverage and paint usage is achieved with reduced air consumption, lowering electrical needs and energy costs.

“Users can exceed production requirements at an accelerated application rate of up to 600 cc per minute,” the company adds.

Nordson has several offerings in the field, including its Trilogy AAA automatic spray gun. This, the company says, is a compact, lightweight gun that it recommends for a variety of liquid spray applications.

“The gun incorporates a variety of performance features, including separate air regulators for round or flat jet spray patterns, offering more application versatility,” Nordson says. “Its modest size and weight make it ideal for fixed, robotic and reciprocating applications.”

Compact design aims to save valuable line space, and the company adds that the unit consumes less air than predecessor guns, providing more efficient operation. There is a stainless steel packing cartridge, and the needle seal is accessible from outside, easing maintenance issues.

The Trilogy AAA is offered with separate round and flat jet regulation, providing a superior level of adjustment versatility.

Among its other offerings, Nordson has a modular unit, the air-operated A7A Automatic Airless spray gun. This, the company says, produces fine atomization and a soft, controllable spray.

“With fast response times and high-speed cycling capability, it delivers excellent finish quality with minimal overspray in high-

production painting, sealant and adhesive applications,” Nordson states. “It has a fast response time, from 30 to 40 milliseconds, and high-speed cycling capability up to 2500 cycles per minute.”

Modular design permits fast cleaning and repair with minimal downtime. Durable stainless steel construction is optimal for waterbornes, UV curables and highly corrosive materials, and a PTFE-coated packing cartridge resists material buildup on the shaft and spring. The unit mounts to a half-inch round bar for fast, easy installation.

Lemmer is another supplier with HVLP spray guns. Its model A-928 HVLP is designed for low overspray and high production.

“Low overspray is achieved by converting compressor air to High Volume Low Pressure in the air cap,” the company says. “Applications for this spray gun include automotive finish coats, furniture fine finishing, metal fabrication and most other spray type jobs.”

Spray fan control is adjusted at the top back of gun, while the horizontal and vertical patterns are controlled at the air cap, with material flow controlled at the back of the gun.

The fluid needle and seat are made of stainless steel and the entire gun can be placed in a gun cleaning cabinet. This gun is supplied with a 1.4 mm general purpose nozzle for thin materials such as lacquer, stain and enamels.

Spray guns generally comprise one of the most diverse product areas in the coatings business, and any potential customer has a broad range of options from which to choose. Choosing the ideal gun for any plant might require some sifting of these options, but the selection is certainly there. ■

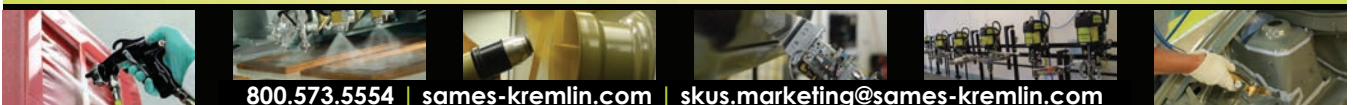
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# SOLVE AND EVOLVE

## A COLLABORATIVE APPROACH TO SOLVING CUSTOMER ISSUES EQUALS SUCCESS AS UV-CURED WOOD FINISHES EVOLVE

Proponents of UV-curable wood coatings note they offer advantages over conventional wood finishing systems and are increasingly being adopted for a wide range of applications.

This type of finishing system offers high curing speed and therefore increased production, lower energy costs, a smaller factory footprint, and greater ease of use (such as a consistent viscosity and no need to clean the application machinery after use).

But, as good as it already may sound, technologies continue to evolve.

Heraeus recently launched a testing center in South Boston, VA, called the ChemQuest Technology Institute (CQTI) which has a production-capable, flat line conveyor suitable for wood and specifically for testing UV-curable coatings for end users and coatings formulators.

The company says the CQTI is the only site in North America for conducting UV curing trials, or even production, on large components using Heraeus UV curing technology.

“Heraeus Noblelight America, LLC sought to partner with ChemQuest not only to advance UV coating processes but to make hard data collection easier for proving the performance/cost advantages of converting to UV curing,” says Bertram Raabe, Sales Manager, NA East, Heraeus Noblelight America.

No other facility offers such a wide array of state-of-the-art coatings application and curing capabilities on two production-ready coatings lines – one for flat parts and another for 3D parts, the company says.

Heraeus touts the expertise of experienced UV coatings formulators and applications engineers who help clients develop and optimize new UV curable formulations and manufacturing processes. End users of UV curing and UV raw material suppliers and formulators can reduce R&D development time and prove the feasibility of UV curing processes faster, Heraeus says.

“This testing facility is ideal for both testing of flat-line wood coating or three-dimensional hanging parts,” says Raabe. “The automated Superfici flat line was designed with wood products such as cabinetry, furniture and flooring in mind. No other independent facility provides microwave-powered and 30-inch wide UV LED flat-line curing systems. Comparing different UV curing methods – UV LED, microwave-powered, or arc lamps – is now easily achievable on one line.”

According to CQTI, coatings can be applied to any flat substrate (wood, glass, metal, composite, or plastic) measuring up to 50 inches wide, 12 feet long, and four inches thick. After an automated spray-application of a coating, the substrate can be exposed to several curing methods for R&D testing, including infrared curing (IR); convection curing; and three types of UV curing: traditional mercury arc UV, Heraeus Semray UV LED, and Heraeus Light Hammer 10 Mark II microwave-powered UV.

Comparing curing variations of different UV spectra can be done easily by switching out the bulb in Heraeus’ Light Hammer 10



*Flat line with 50-inch wide Heraeus microwave-powered UV curing system.*

system, for example, to determine which UV spectra works best with any of the wide array of photoinitiator chemistries. Adjustments to the UV wavelength emitted by the LED modules are also easily rendered in the Semray UV LED units.

Allied Photochemical also likes to engage key customers to solve a coating or process issue, says Joseph Grefke, Sales Operations Specialist.

UV-cured wood finishes are evolving, Grefke says, where formulators in Allied’s supplier community continue to innovate and deliver new raw materials.

“These new raw materials and technologies give Allied increased flexibility to formulate superior coatings for our customers that offer lower viscosity, increased hardness, nano properties, and are environmentally friendly,” says Grefke.

In turn, the UV process itself allows the customer to develop innovative manufacturing systems – with faster production speeds, smaller equipment footprints, and cleaner formulations with no VOCs or HAPs, he adds.

Grefke likes to remind customers that UV is a process, not just a coating. This lack of understanding is what often results in customers’ biggest headaches when dealing with UV-cured wood coatings, he says.

“It takes the customer’s knowledge, the UV equipment integrator and Allied to work together, to solve the customer’s problem,” he says. “We have perfected this approach.”

Allied understands this clearly, Grefke says adding, “We are 100 percent a UV coatings formulation and delivery company. We have no hidden agendas; just delivering a great UV coating solution to our customer.

“It is not always about the cost per gallon of the coating. While this is important, the coating must exceed the customer’s needs and expectations.” ■

# Remember When

- Remember when... we used to attend events?
- Remember when... we used to see each other in person, not on a Zoom call?
- Remember when... we used to shake hands, not elbow-bump?
- Remember when... we weren't grossed out at the thought of a buffet?
- Remember when... we used to eat and drink our way through tradeshow?
- Remember when... you wore the same pleated khakis and golf shirt as five other colleagues at your show booth?

Those were the days! They will return.  
In the meantime, enjoy this look back.





*Coatings West, Las Vegas, NV, 2009*



*FABTECH, Atlanta, GA, 2018*



*Powder Coating Show, Louisville KY, 2015*



*Ontario Painting Contractors Association golf tournament, The Country Club, 2015*



*SUR/FIN, Atlanta, GA, 2017*



*Inortech-Chimie Celebrates a quarter-century in 2015*



*Canadian Paint and Coatings Association Conference and AGM, Vancouver, BC, 2019*

# MIXING FOR A LOW VOC WORLD

## New Equipment Continues to Evolve

Understanding the science behind particle dispersion can be complicated and take many years to learn all there is to know about the equipment, technology and chemical formulations. Then, new advances change everything.

Fundamentally, dispersion is the distribution and concentration of particulates suspended in a liquid that remains homogeneous with progressively decreasing volumes insofar as the number of particles per unit liquid volume is statistically representative, says CMC, which supplies media mills, mixers and dispersion equipment.

In the past few decades, regulatory requirements have prompted the coatings industry to refine conventional low-solid, solvent-based formulations and develop more waterborne systems, high-solids coatings, energy-curable inks, and other low-VOC technologies. Along with this environmentally responsible shift, the changing needs of modern businesses and consumers ushered in developments in formulation and functionalities.

Now, says Charles Ross & Son Co. (Ross), which offers mixing, blending, drying and dispersion equipment, faced with a growing demand for specialty and high value-added coatings, manufacturers are taking a closer look at their processing methods, particularly the mixing and milling steps. Coatings producers are striving to improve performance and compliance while managing costs.

In a paper for UL, a global independent safety science company, Ross says infused with thermochromic, fluorescent, color-shifting, rust-inhibiting or other novel properties, many modern paints, inks and coatings contain unique combinations of innovative raw materials. But fundamentally, they remain formulations that rely on good mixing. The degree of mixing and dispersion affects a variety of characteristics, such as: color, gloss, conductivity, stability, adhesion properties, curing rate, and weatherability.



*ROSS-CDA-25 with High-Shear-Mixer.*

Manufacturers employ various dispersion tools in the production of paints, inks and coatings and some of these technologies are relatively new solutions to age-old processing issues. Mixer selection is based on a number of factors including viscosity profile, shear requirement, order of addition and throughput.

In February, BYK-Gardner released its new VMA-Getzmann TORUSMILL 2-in-1 production dispersion system for pre- and fine dispersion in one container.

It calls the technology "revolutionary" because the system uses a single, closed container for both pre-dispersion with an impeller disk, and subsequent milling with an integrated basket mill. The container has capacity of up to 2,000 liters.

"This is a major advancement in dispersion technology aimed to save time, space and manufacturing costs," says Andreas Stummer, BYK-Gardner Business Line Manager for Dispersion.

The system's predispersion is achieved in the traditional manner with a centrally mounted impeller disc. For fine dispersion, the centrally mounted basket mill is lowered into the millbase. With this system, very fine particle size, even nano, and narrow particle size distribution are achievable in a short time, the company says.

Stummer says saving time and money is still the most important thing to his customers.

"By designing modular equipment such as the 2 in 1 TORUSMILL we are able to offer quicker processing times, space savings and reduced maintenance costs. We are also offering vacuum milling capability for our lab and production equipment which allows for a more efficient grind and reduces additive costs in the process. By removing foam we are able to mill faster and also have a much higher container fill rate post processing."

BYK-Gardner is differentiated from its competitors because the product line is designed with three different safety devices including a container clamping system, container threshold zones, as well as redundant safety switches that exceed current safety standards for this type of equipment, says Stummer.

"Our modular design allows customers to integrate basket mills, bead mills, rotor stator, vacuum systems, or a wall scraper on

one machine making it the most flexible equipment on the market," he adds. "By using multiple baskets, a customer can make a color change in less than three minutes."

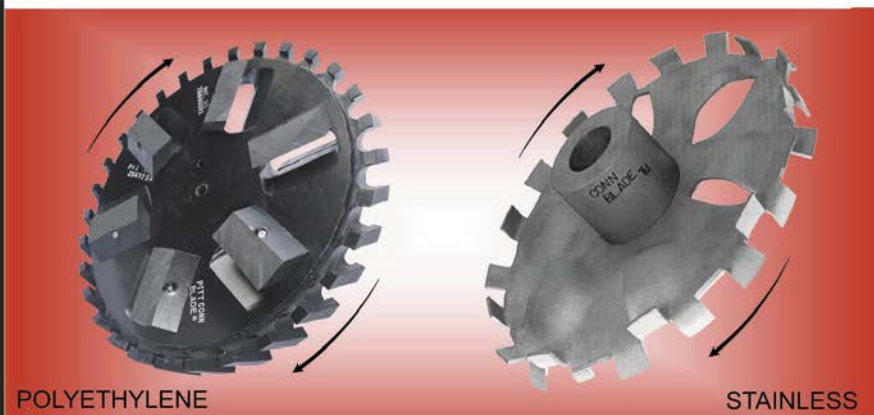
Conn and Company has been designing

and manufacturing industrial mixing equipment for more than 60 years.

"The company recognized the need for blending and dispersion blades that provided true pumping action instead of plowing

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6



action,” says President Richard Freeman.

Conn's patented Conn Blade has a combination of louvers and teeth.

“It is a high pumping high shear dispersion blade and is the most efficient and aggressive dispersion blade available,” says Freeman. “The low shear blade is excellent for mixing micro spheres or flakes or other fillers that need to be well mixed, but not destroyed.”

The blades are available from two to 48 inches in diameter with mounting holes or mounting hubs to retrofit and upgrade a customer's existing equipment. Split construction is available for entry through manways. Conn also manufactures complete units and drive assemblies to mount on tanks, air or electric utility/laboratory mixers, spool-type top entry for flange mounting to the customer's tank, and drive assemblies for mounting on bridge support for open top tanks.

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## Understanding the science behind particle dispersion can be complicated and take many years to learn all there is to know about the equipment, technology and chemical formulations.

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In December, Ross launched a new dual-shaft mixer that incorporates a high shear rotor/stator “for more intense shearing and homogenization requirements”. Instead of a conventional high speed disperser blade, the rotor and slotted stator mixing head, also often called a homogenizer, affords more advanced deagglomeration and emulsification capabilities, the company says. Complementing the high shear mixer, a two-wing anchor promotes bulk flow and uniform batch temperature.

The CDA-25 features dry-running Double FlexiLip seals on both agitator shafts suitable for vacuum operation up to 29.5 in. of mercury and includes a portable mixing vessel with heating/cooling jacket.

Everyone agrees, when it comes to paint and coatings, being able to provide custom-engineered solutions to solve specific client challenges go a long way in helping both customer and supplier succeed.

“Our equipment can be fully customized to meet the changing demands for producing high quality dispersions and coatings,” says Stummer. “Our state-of-the-art dispersion lab in Wallingford, CT, is available for trials and for proof of concept scenarios helping with



VMA-Getzmann TORUSMILL 2-in-1 production dispersion system.

finding the right equipment. With our BYK additives partnership we are also able to assist customers with formulation questions and help improve products and processes.”

Constant innovation is also a driver of success.

“We are constantly improving our product line from lab to pilot to production,” says Stummer. “This year we are introducing our new SL horizontal mill with an all-new technology package. The new control interface and software set the industry benchmark in up-scale and data tracking capability. We are also introducing the H4 vertical system for pilot and small scale production needs. This vertical dissolver and milling system can be customized to meet the most challenging process requirements. We are also improving our new VL line of vacuum dissolvers with a more ergonomic design and new motor capabilities to properly disperse even the most difficult products.”

Listening to customer needs means suppliers can be true partners in optimizing an operation's mixing procedures. ■

# THE USE OF ANTHRACENE DERIVATIVES IN UV-LED CURING

By Dr. Mike J. Idacavage



There is a strong interest in UV-LED curing of coatings, inks, adhesives, etc., due to the benefits of using UV-LED as the energy source. To meet the end user's needs, resin formulators need to draw on the list of available materials. While the range of monomers and oligomers that can be used is quite large, formulators are somewhat limited by the photoinitiators available. The UV-LED lamps that are most used today further limit the available useful photoinitiator options. Currently, TPO is one of the more popular photoinitiators. However, recent shortages in the availability and impending regulatory reclassification of TPO have focused attention on the limited options a formulator has when using a UV-LED lamp for curing.

One of the key conditions that formulators must consider is how well the photoinitiator absorption bands will overlap with the wavelengths emitted by the light source. For Arc and microwave lamps, this is easy as both types of lamps produce UV energy in a wide assortment of wavelengths resulting in a high probability that there will be overlap. Figure 1 shows a typical H Arc lamp emission with several common photoinitiator absorptions. Both CPK (Cyclohexyl-Phenyl Ketone) and TPO (Trimethylbenzoyl Phosphine Oxide) can be used with an Arc lamp and H bulb combination.

UV-LED lamps are not so forgiving. A characteristic of an UV-LED lamp is the production of very narrow UV wavelength emissions. This results in a high probability that the photoinitiator absorptions and the lamp emissions will not overlap as can be seen in Figure 2. While CPK is not sensitive to the UV-LED lamp in this case, there is enough absorption by TPO to allow it to react. This is a key reason why TPO is one of the preferred photoinitiators when using a UV-LED lamp. Another factor is the cost advantage that TPO has over other photoinitiators such as BAPO that are effective when using UV-LEDs as the light source.

Anthracene derivatives are a potential solution to broadening the range of photoinitiators that can be used with UV-LED lamps. Table 1 lists a few common anthracene derivatives that are commercially available (trade names are UVS-1101 and UVS-1331).

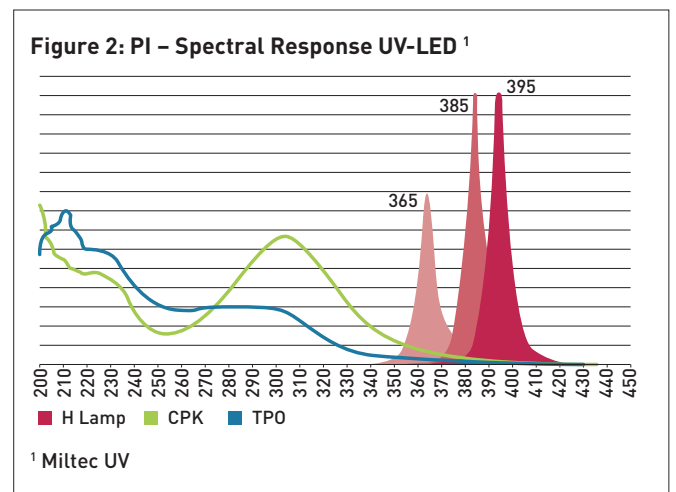
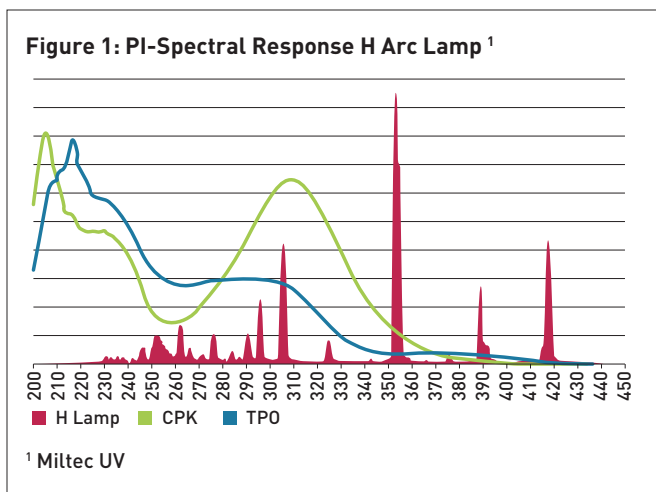
Table 1

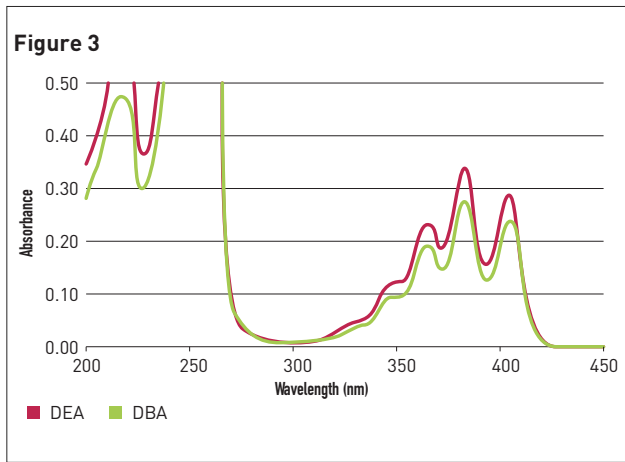
Chemical Name	9,10-DiButoxyAnthracene	9,10-DiEthoxyAnthracene
Abbreviation	DBA	DEA
Structure		
Typical Characteristics	Appearance: Yellow powder Purity: 98% or more	Appearance: Yellow powder Purity: 97% or more

9,10-DiButoxyAnthracene (DBA) and 9,10-DiEthoxyAnthracene (DEA) both absorb at wavelengths that overlap well with the currently available UV-LED lamps on the market. (Figure 3)

Although both DBA and DEA absorb energy at wavelengths such as 385 nm and 405 nm produced by commercially available UV-LED lamps, they cannot form free radical species by themselves. However, they can transfer energy to photoinitiators that absorb at lower wavelengths which can then produce free radical species. These free radical species are then able to initiate polymerization. The mechanism by which the anthracene derivatives transfer energy is not clear and is now under investigation in the lab. Based on data to date, the energy is transferred by either a Triplet Energy Transfer process or an Excited State Energy Transfer (Table 2).

TPO is an excellent photoinitiator due to its ability to absorb at wavelengths that are emitted by 385- and 405-nm UV-LED lamps.





However, both the cost and periodic supply issues result in the search for potential substitutes to TPO. We compared TPO with a range of commonly found free radical photoinitiators. The experiment was run using the photoinitiator alone and with 0.2 PHR of DEA. The reaction was monitored by observing the total exotherm by Photo-DSC (Figure 4).

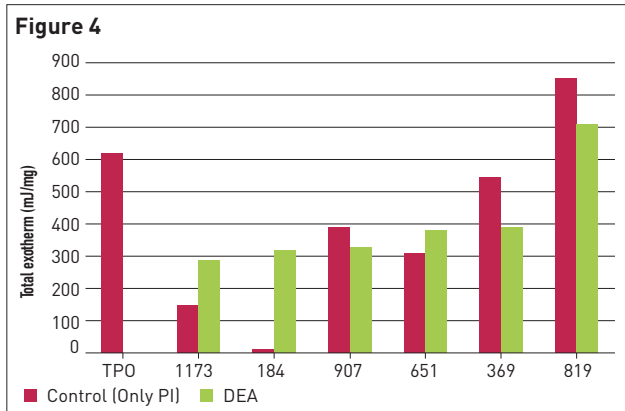
In this test, photoinitiators 1173, 184 and 651 showed an increase in the reaction when compared to the photoinitiators by themselves. However, in each case, the total reaction was less than that of TPO. Based on these initial promising results, it was believed that a modified anthracene derivative may increase the photopolymerization to meet or exceed that of TPO. A new anthracene derivative – designated ESA – was developed in the lab with the general structure shown in Figure 5.

A second series of experiments was run using the photoinitiator alone and with 0.2 PHR of ESA. The reaction was monitored by observing the total exotherm by Photo-DSC (Figure 6).

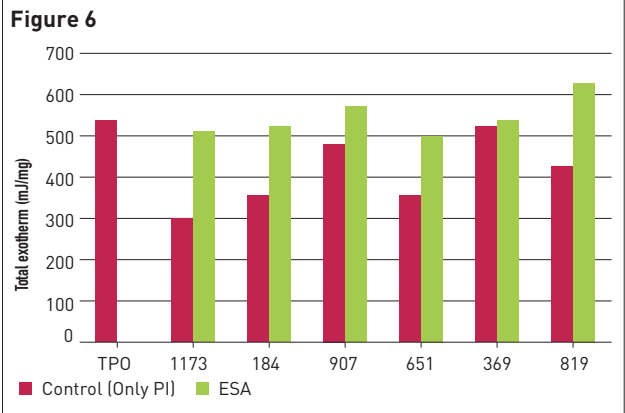
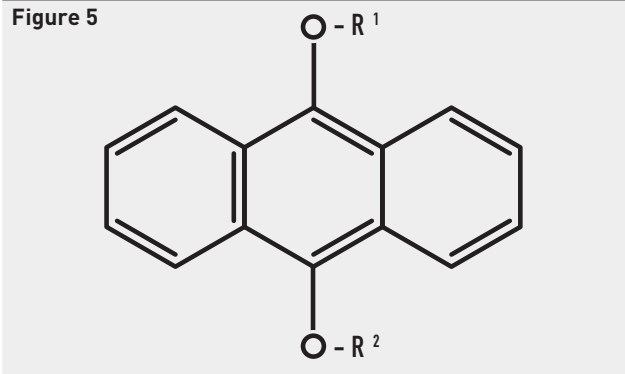
In this case, most combinations of photoinitiator and the anthracene derivative ESA demonstrated reactivity equal to or better than

Table 2

DBA+UV	→	DBA*	
DBA*+PI	→	DBA+PI*	Triplet Energy Transfer or Excited State Electron Transfer
PI*	→	PI•	Initiator Produces Radicals



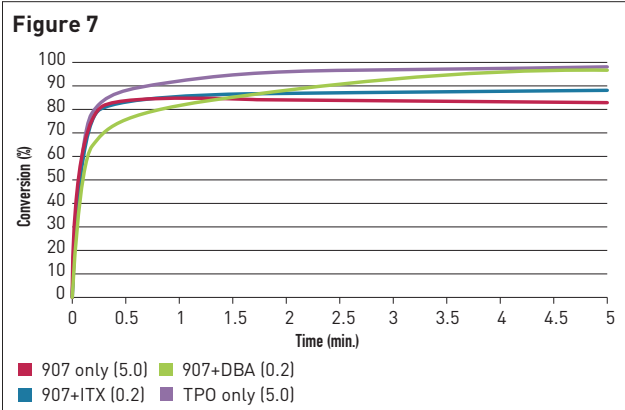
Formulation: Monomer: TMPTA, PI: 5.0 phr and TPO @ 3.0 phr, Sensitizer: DEA 0.2 phr, Light source: 405nm UV LED (100 mW/cm2)



Formulation: Monomer: TMPTA, PI: 5.0 phr and TPO @ 3.0 phr, Sensitizer: ESA 0.2 phr, Light source: 395nm UV LED (100 mW/cm2)

Table 3

Test Condition	TMPTA 100 part + 907 5 PHR+DBA 0.2 PHR
	TMPTA 100 part + 907 5 PHR+ITX 0.2 PHR
	TMPTA 100 part + TPO 5 PHR
Light Source	LED 365 + 405nm

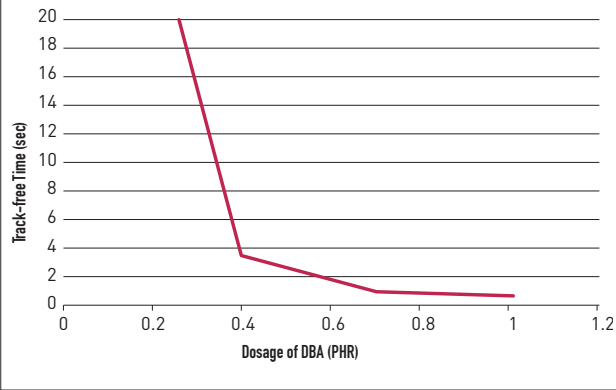


that of TPO. Thioxanthone type sensitizers such as ITX have traditionally been used as sensitizers for free radical photopolymerizations. To compare the effectiveness of anthracene derivatives to ITX when using UV-LED lamps for cure, the experiment shown in Table 3 was run and the results given in Figure 7. TPO was used as the control photoinitiator.



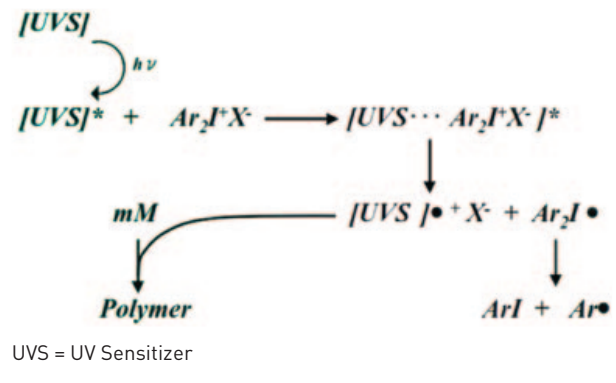


**Figure 8**

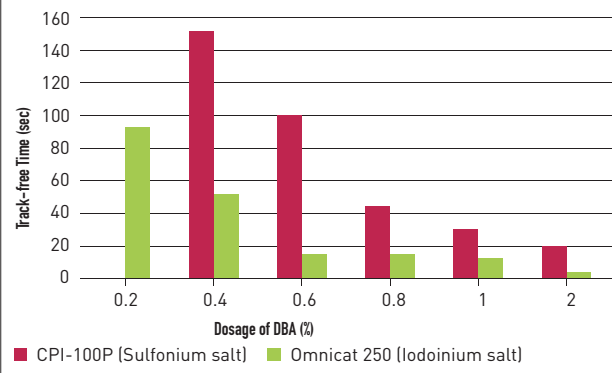


Formulation: Tetraacrylate monomer, PI: Iodonium Salt (4.1 phr, Film Thickness 18  $\mu\text{m}$ , OD value > 1.5, Light source: UV LED 365 nm (30mW/cm<sup>2</sup>) covered with PET

**Figure 9**



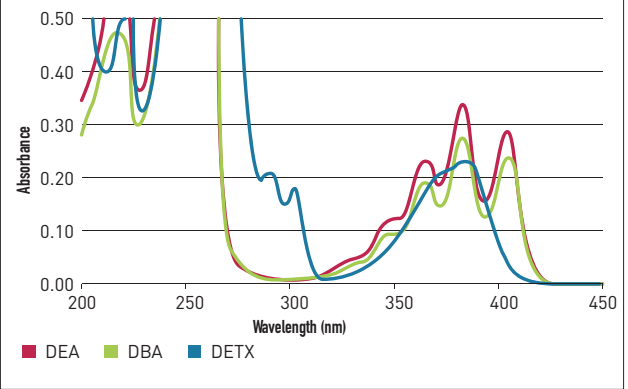
**Figure 10**



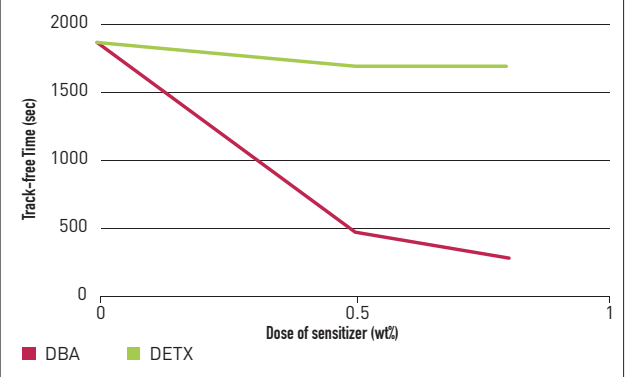
Formulation: Cycloaliphatic Epoxy, PI: Sulfonium or Iodonium, Anthracene: DBA, Thickness: 5 $\mu\text{m}$ , Light source: UV LED 405nm (50mW/cm<sup>2</sup>)

After five minutes of exposure, the combination of the photoinitiator 907 and DBA outperformed both the use of 907 by itself and the combination of 907 and ITX. In fact, the anthracene derivative DBA matched with the 907 photoinitiator gave essentially the same conversion as TPO. To complete the work on free radical curing, we examined the use of anthracene derivatives in pigmented coatings. In this case, a simple black pigmented coating was cured using an iodonium salt as the photoinitiator. The Optical Density of the cured coating was greater than 1.5 and a UV-LED lamp at 365 nm was used as the UV source (Figure 8).

**Figure 11: PI-Spectral Response H Arc Lamp**



**Figure 12**



Formulation: Cycloaliphatic Epoxy, PI: Sulfonium salts 5 wt%, Sensitizer: DBA or DETX diethyl thioxanthone, Blue pigments (P.B.15): 30 wt%, thickness: 30  $\mu\text{m}$ , Light source: 365nm UV LED (< 1 mW/cm<sup>2</sup>)

In this case, curing was negligible if the photoinitiator was used without any sensitizer present. As the anthracene derivative DBA is added at increasing levels, the amount of time needed to achieve surface cure drops dramatically.

Like the use of anthracene derivatives in free radical curing, these sensitizers can also play a role in UV-LED cationic cure. The overall mechanism is believed to be like the mechanism of anthracene derivative sensitization in free radical cure mentioned earlier in this paper. J. Myoung-Souk and J. Crivello have suggested the following process for the role of anthracene derivatives in cationic cure (Figure 9)

The performance of the anthracene derivatives varies with the type of photoinitiator used in cationic cure. Figure 10 illustrates the impact that the addition of DBA has on iodonium photoinitiators when compared to sulfonium initiators while cured using a 405 nm UV-LED lamp. DBA is particularly effective at a dose range of 0.4 – 0.6%.

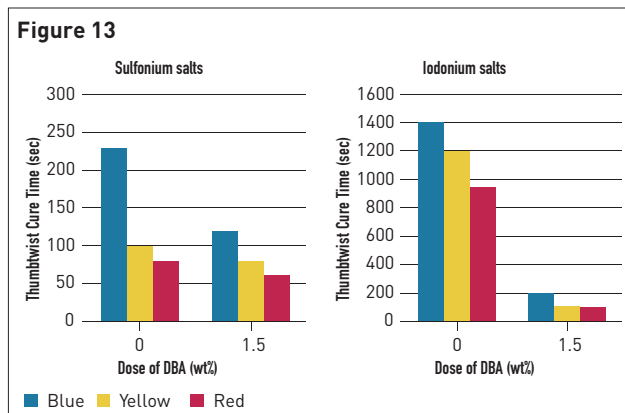
A traditional class of sensitizers used in cationic cure is thioxanthenes. When comparing the absorption spectra of DEA and DBA with a typical thioxanthone DETX, one would predict that DEA, DBA and DETX would be interchangeable when it comes to their use in UV-LED cationic cure applications (Figure 11).

In this case, the formulation tested contained 30 wt% blue pigment. The use of pigments in cationic cure coatings and inks is

Table 4

DBA (phr)	Tack-free time (sec)
0.0	NA
0.4	>600
0.7	>60
1.0	30

Formulation: Cycloaliphatic Epoxy, PI: Iodonium salt in propylene carbonate, Sensitizer: DBA, Black Paste – 7 phr (1.3 O.D.), thickness: 12 µm, Light source: 365nm UV LED (30 mW/cm<sup>2</sup>)

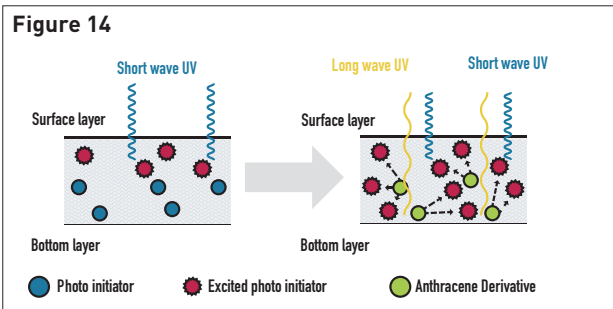


Formulation: Cycloaliphatic Epoxy, PI: Sulfonium or iodonium salts 10 wt%, Sensitizer: DBA or DETX diethyl thioxanthone, Pigments: 20 wt%, Light source: 365nm UV LED (< 1 mW/cm<sup>2</sup>)

common. The use of anthracene derivatives in pigmented coatings could allow the utilization of the higher wavelength absorption bands of the anthracene derivative followed by the transference of energy to a photoinitiator that may be blocked by the pigment. In this experiment, a black matrix coating used in LCD displays was cured using a 365 nm UV-LED lamp. The base formulation did not exhibit any cure. When DBA was added to the formulation, the time to cure was reduced in line with the amount of DBA used with a tack free state achieved using a 1.0 phr level of the anthracene derivative (Table 4).

The use of anthracene derivatives is applicable across a range of pigmented cationic-cured inks. Figure 13 illustrates the use of DBA in blue, yellow and red cationic cured inks. The lamp used in all cases was a 365 nm UV-LED. In all cases, a reduction in cure time was seen with the largest reduction obtained when iodonium salts were used as the photoinitiator. It should be noted that, using 1.5 wt% of DBA, the cure speed of the iodonium salt-initiated formulation approached that of the sulfonium salt-initiated formulation.

The ability an anthracene derivative molecule to transfer energy to a photoinitiator is not only useful in pigmented systems but can also be used to enhance cure in thick films. Anthracene derivatives are excited by long wavelength light which can reach the bottom of a thick layer. This leads to a more complete cure due to the transfer of energy to the photoinitiators in the bottom layer (Figure 14).



### Application Example

The information discussed in this paper so far is based on laboratory data. A recent example of a commercial use of anthracene derivatives to promote cure can be seen in the innovative work at Polymer Gvulot (Polymer-G for short), an Israeli company creating formulations for new 3D printing technology. Based on their development work, anthracene derivatives were selected for their hybrid formulations in order to facilitate cure when using 395-nm and other UV-LED light sources. This has allowed the rapid cure of very thick objects made by Gel Dispensing Technology (GDT)-type 3D printing.

### Summary

Anthracene derivatives are effective sensitizers for UV-LED cured systems. They can be used in both free radical and cationic cure reactions. By combining anthracene derivatives with a wide range of free radical photoinitiators, a large increase in reaction rate and/or conversion can be obtained. This now provides formulators with an increased number of photoinitiator options that can be used to replace more expensive or hard-to-obtain photoinitiators for UV-LED cured formulations. Depending on the requirements, anthracene derivatives are typically used at the 0.2 to 1.0 % level. ■

*Dr. Mike J. Idacavage is Advisor, Nagase America. This paper was presented at RadTech 2020 UV+EB Technology Conference. The author would like to acknowledge the significant contribution made by Mr. Naoki Yoshida of Kawasaki Kasei Chemicals Ltd.*

# LEGISLATIVE MODERNIZATION FOR CHEMICAL REGULATION

By Gary LeRoux

Once again the government in Ottawa is talking about legislative “modernization”, which usually means tightening the noose around efforts of the chemical sector to deliver highly performing products for customers.

Developments around the anticipated federal amendments to the Canadian Environmental Protection Act (CEPA) were discussed at a recent meeting of multiple chemical industry groups and the views varied, but all agreed that the federal government is signaling that amendments to CEPA are imminent. The specific timeline is unclear due to uncertainties around a likely federal election in the Spring, a federal budget in March and the ongoing economic challenges precipitated by the pandemic.

While it is unclear when action will be taken by this government, it is very clear the intent is to broaden the scope of chemical assessment and the related risk management measures such as regulations and other restrictions. Industry must continue to advocate for the long-standing risk-based approach for chemical assessment and not accept incessant and unsubstantiated calls for hazard-based approaches that have strangled the European Union under REACH for years.

There has not yet been final approval for extending the 15-year-old federal Chemicals Management Plan, assessing chemicals in commerce, and the related funding of approximately \$500 million necessary to run the post-2020 CMP program for another five years.

The federal Cabinet, under direction of the Environment Minister, has reviewed a draft approach on what CEPA “modernization” might look like. In that undertaking, certain points are likely to be considered in the eventual amendments tabled and the ones of greatest concern for chemical industries include the following:

- Data requirements for chemical assessment being widened in scope, entrenching concepts like alternative assessment, informed or problem substitution, vulnerable populations, etc.
- The requirement to subscribe to a new concept on what government is referring to as “the right to a healthy environment” is expected to be included in the preamble to the Act providing a very wide scope for assessment.
- Sections of the Act will be changed to allow more input from “civil society” in support of the existing environmental non-governmental organization (ENGO) efforts to tighten both chemical assessment and risk management in the name of environmental justice, which would irrevocably change the way CEPA is enforced in future.
- Much more focus on “vulnerable populations” related to the operating sections of the Act such as Section 64, which is focused on controlling toxic substances.
- Possible changes to the current nomenclature, particularly as it relates to substances being designated CEPA-Toxic and the “lowering” of the bar for such a designation.
- Possible changes to confidential business information (CBI), although commercially sensitive, are on the table for further consideration.

- There may also be amendments addressing chemicals of very high concern (CVHC) to align with actions being taken in Europe, which will alter the way forward on risk assessment and risk management of numerous chemicals.

There is no anticipated change to the risk-based approach by the current Environment Minister but continued pressures from the ENGO community could cause this to change.

Such “modernization” is of course, of grave concern for the coatings, adhesives, sealants and elastomer (CASE) industry, as one of the most implicated industries under CEPA with respect to chemical assessment. A broader scope for assessment will mean more bans and more use restrictions than in the past.

If this proceeds as expected, it will likely be problematic for product formulations writ large. CPCA, and other industry groups, must now focus on highlighting the benefits of current chemicals in commerce and how they are often misrepresented in the context of inherent toxicity and other challenges under the heading of “problem formulations”. Industry must be clear as to how these substances are actually used and why they are critical for product performance in multiple industry sectors. For example, many coatings products ultimately help extend the lifecycle of valuable private and public assets, while at the same time reducing the environmental footprint of the industries they serve. These industry sectors include construction, auto, marine, transportation, aerospace, etc.

The benefits of certain chemical inputs are often not well understood by those who seek to restrict certain chemical uses and secure more bans. Industry must be specific about the complexity of assessing such chemicals and their specific use profiles. In many cases they are not even suited for various risk-assessment and government decision-making frameworks. It’s the job of the paint and coatings sector to point out the enormity of such benefits to those conducting assessments, those amending legislation and those using the products. As such, industry must up its game on raising awareness as to why chemicals in their products are of critical importance across multiple value chains.

If work on the “modernization” of CEPA evolves as noted above, the final decision on CEPA amendments will be taken up by the current government this Fall or by a new government, if an election is called between now and September, which is highly likely. Given the above, it will be important for the entire chemical industry to promote and support the existing risk-based approach to chemicals management in Canada. CPCA will be doing what it can in the coming days and weeks with outreach to federal Ministers and senior officials on the benefits of coatings and how it helps the government get to net zero emissions by 2050.

The paint and coatings industry is part of the solution in getting to zero with many of its products reducing the environmental footprint of other industry sectors. ■

*Gary LeRoux is President and CEO of the Canadian Paint and Coatings Association. [www.canpaint.com](http://www.canpaint.com)*

# WATER BUG SURFACES AS POTENTIAL SPILL SOLUTION



Water bug installed in the pit to shut off water to the building if it gets wet.

## Note to readers:

In Alberta, when prosecutions for improper release of waste materials result in a finding of guilt, judges have sentencing options over and above the imposition of fines. “Creative sentencing” is a catch-all term used to describe the various options in a section of legislation that covers court orders relating to penalty. This section appears in various pieces of legislation and includes:

- Any other measures the court may see fit to secure the offender’s good conduct
- Bond or other monetary payment
- Community service orders
- Compensation orders
- Providing specified information
- Publication orders
- Remediation orders
- Stop orders

Judges presiding over cases decide if they want a creative sentence and what sort of creative sentence would be appropriate. Any sentence imposed by criminal court judges must reflect the circumstances of the offence and the offender.

This article, written by the offender, who can’t be named, is part of a creative sentence that the Provincial Court of Alberta imposed as a result of an Environmental Protection and Enhancement Act infraction.

Alberta Environment and Parks

Our company was penalized \$30,000 for improperly disposing of waste. The sentencing made the local news, projecting a very bad image of the company. As owners, we took it hard. This incident goes against our personal standards of integrity and environmental care.

We accept full responsibility for this incident. In fact, we were first to alert the authorities that a large amount of water had been released into our local municipality's storm water infrastructure. We admitted guilt after the subsequent investigation found that the water contained traces of toxic electroplating waste.

The waste escaped when a fitting broke on a water pipe. As a result, the waste tanks were flooded, and the combination of the water and waste overflowed.

We knew we needed to have secondary containment for our electroplating waste. We thought the system we designed had so much secondary containment that even if something happened, the worst result would be that our secondary containment would fill. The training we gave our people was based on that assumption.

But we were wrong. We did not account for the fact that an external source of liquid could combine with our waste and overwhelm our secondary containment.

We prided ourselves on trying to be an industry leader, and we have always tried to make better systems to avoid spills and releases. Following this incident, we developed a new technique to avoid spills.

Our technique is a fresh idea using old technology. Our company believes that protecting the environment is important. We want to try to help other companies avoid situations like ours.

We have now placed sensors, commonly called water bugs, in all critical locations of the building. The water bug sits within the secondary containment, below the top lip of that container.

The water bug is a 24-volt moisture sensor that, when dry, allows 24-volt power to pass through it via a solenoid to two Belimo stainless steel ball valves. The default state of the ball valves is to be closed, preventing water flow. A constant application of power is required to keep them open. If the power is taken off, the valves spring closed and shut all the water to the building off. The second valve is installed as a redundant safety valve if the first one fails.

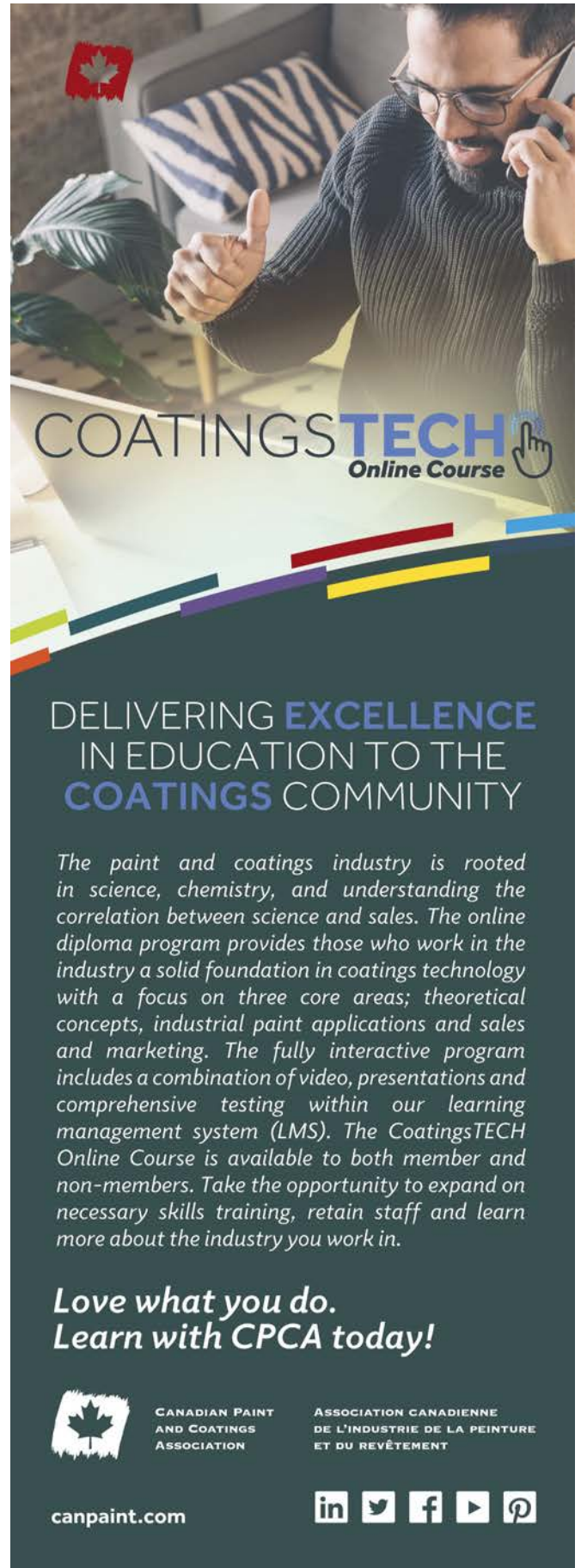
"Solenoid" is the generic term for a coil of wire used as an electromagnet. In this application, the device creates a magnetic field from electric current and uses the magnetic field to create linear motion, i.e., it acts as a switch.

If there is no water on the sensors, the power passes through the sensors and keep the solenoids open. If any of the sensors detect water on the floor, the power to the solenoids is interrupted and the valves shut off the water supply to the building. This prevents any drainage water on the floor from entering the storm or sanitary drains. The water will not come back on until the water bug sensor is dry, which means the danger has been rectified.

Ideally, the sensor would be located near the bottom of the secondary containment to reduce the likelihood of over-topping. This is especially important if there is a lag time between the moment when the water supply is switched off and the time when the water stops flowing into the secondary containment.

The water bug will also activate a siren, drawing attention to the situation. The siren should notify both those within the building and, in case the building is unoccupied, someone on-call off the premises.

Water bugs and solenoids are not new technology. However, using them together to protect the environment is an idea that our company believes is worth sharing with other companies in the surface finishing industry. Their use may help other companies avoid some of the heartache that our company had to endure. ■




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# THE NATIONAL POLLUTANT RELEASE INVENTORY

## Mandatory Reporting for Platers and Anodizers



By Peter J. Paine

The National Pollutant Release Inventory (NPRI), which was established in 1992 by Environment Canada and launched in 1993, is the national pollutant release and transfer register of Canada. This list of pollutants contains releases from a “facility” to the air, water, and land together with disposals at, or from, a facility.

Reported information is used in the creation of environmental management plans and to inform Canadians about their environment.

Facilities which meet the reporting requirements are required to report to the NPRI under the Canadian Environmental Protection Act, 1999 (CEPA 1999). More than 300 substances are listed on the NPRI and more than 8,000 facilities annually report information on their pollutant releases and transfers to Environment Canada.

The NPRI records information about:

- Releases from facilities to air, water and land
- Disposals at facilities and transfers to other locations for disposal
- Transfers to other locations for treatment or disposal and
- Facilities’ activities, location and contacts

All levels of government in Canada, companies and associations use NPRI data to track national environmental performance. The NPRI is also used to inform Canadians of the pollutants in their communities, identify environmental priorities and track progress in pollution prevention. Other uses include evaluating releases and transfers of any substances of concern, model air quality and implement policy initiatives. An overview of the NPRI is released annually.

A Pollutant Release and Transfer Register (PRTR) is a system for

collecting and disseminating information about environmental releases and transfers of hazardous substances from industrial and other operations.

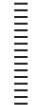
PRTRs were established in several countries after the 1984 Bhopal Disaster in India where a release of MDI killed and maimed many people who lived adjacent to the plant. In 1992, the United Nations Conference on Environment and Development in Rio de Janeiro (i.e. the Sustainable Development Conference which gave rise to the idea of “sustainable development”) affirmed the community and the workers’ right to know about toxic chemicals and other substances of concern.

Other countries with PRTRs are the U.S. (Toxics Release Inventory), Australia (National Pollutant Inventory), Mexico (Registro de Emisiones y Transferencia de Contaminantes) and the EU (European Pollutant Release and Transfer Registry).

A consequence of the 1984 Bhopal disaster and the 1992 UN conference was the development in Canada of the Environmental Emergency Regulations. These regulations require companies to prepare (and be prepared to implement) detailed plans on how to deal with an on-site “emergency” if they store and handle certain substances/chemicals which are specified in the Regulations.

### NPRI Reporting Requirements Under Canadian Law

Reporting to the NPRI is mandatory under the Canadian Environmental Protection Act, 1999. Reports are due every year by June 1. Owners and operators of facilities that meet the NPRI reporting requirements published in the Canada Gazette have to report to the



NPRI. The NPRI reporting requirements can be complex and using the federal government's Single Window Information Manager (SWIM) can be a bit tricky.

### Determining if Your Facility Meets the Requirements

There are three main factors that determine if your facility has to submit an NPRI report:

1. The activities that take place at your facility
2. The total number of hours worked at your facility
3. The substances manufactured, processed, otherwise used, or released to the environment at your facility

To determine if the NPRI requirements apply to your facility the following is required:

1. Do any of the following activities take place at my facility?
  - waste or sewage sludge incineration
  - wood preservation
  - fuel terminal operations
  - municipal wastewater collection and/or treatment
  - pit or quarry operations
  - operation of stationary combustion equipment
2. Do employees and contractors work more than 20,000 hours during a year (about 10 full-time workers/employees)?

If you answer yes to either or both of the above questions, then you have to submit an NPRI report if you can also answer yes to the following question:

- Does my facility manufacture, process, otherwise use, or release, one or more of the NPRI substances and is the quantity above the threshold for that substance?

If you answer no to all of these questions, you may not have to submit an NPRI report.

### Exceptions

Facilities operating stationary combustion equipment have to report on criteria air contaminants (CACs) if the release thresholds are met (regardless of employee hours).

If your facility is subject to the chromium electroplating, chromium anodizing and reverse etching regulations you must report for hexavalent chromium (and its compounds) regardless of the number of employees and regardless of other reporting thresholds. This requirement was mandated in 2018.

You do not need to report releases, disposals or transfers of NPRI substances that came from the following activities:

- Education or training of students
- Research or testing
- Maintenance and repair of vehicles
- Distribution, storage or retail sale of fuels, except as part of terminal operations
- Wholesale or retail sale of the substance itself or products that contain the substance
- The growing, harvesting or management of renewable natural resources
- Dentistry

You also do not need to report to the NPRI if the only activities that take place at your facility are any of the following:

- Exploration for oil or gas, or the drilling of oil or gas wells
- Discharge of wastewater from a wastewater collection system with an average discharge of less than 10,000 m<sup>3</sup> per day
- Production of less than 500,000 tonnes at pits or quarries, excluding open-pit mines

### NPRI Substances

The NPRI substances are divided into five parts based on their reporting criteria.



### Part 1A - Core substances

You may need to report Part 1A substances if they were manufactured, processed or otherwise used at a concentration equal to or greater than one percent by weight and in a quantity of 10 tonnes or more. (The exception is for byproducts and mine tailings; there is no concentration threshold for Part 1A substances in those cases.)

Examples of substances: Ammonia, zinc, methanol, toluene, phosphorus

Examples of facility types: sewage treatment; oil and gas; manufacturers of chemicals, plastics, paint and wood products; metal fabricators

### Part 1B - Alternate threshold substances

You may need to report 1B substances if they were manufactured, processed or otherwise used in quantities equal to or more than specific mass thresholds.

Examples of substances: lead, cadmium, arsenic, cobalt, selenium, mercury

Examples of facility types: sewage treatment; wood preservation; metal plating; military bases; pulp and paper mills; power stations; cement and lime manufacturers; hospitals; mining and metal production

### Part 2 - Polycyclic aromatic hydrocarbons (PAHs)

You may need to report if PAHs were incidentally manufactured or present in mine tailings, and they were released, disposed of or trans-

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ferred for recycling in a combined quantity of greater than or equal to 50 kilograms. The exception is for wood preservation facilities that use creosote; they have to report whether or not they reached the 50 kg reporting threshold.

Examples of substances: phenanthrene, pyrene, chrysene, anthracene, quinoline

Examples of facility types: aluminum production; steel manufacturers; pulp and paper mills; oil and gas extraction and refining; cement manufacturers; power stations; wood preservation

**Part 3 - Dioxins, Furans and Hexachlorobenzene**

You need to report for Part 3 substances if any of the following activities took place at your facility:

- incineration of hazardous or non-hazardous waste, biomedical or hospital waste, or sewage sludge
- chlorinated solvent production
- metal smelting
- power generation using fossil fuels in a boiler unit
- iron and steel manufacturing
- pulp and paper manufacturing
- titanium dioxide pigment production
- cement manufacturing
- magnesium production
- wood preservation using pentachlorophenol

**Part 4 - Criteria Air Contaminants (CACs)**

All facilities must consider CACs released from stationary combustion equipment regardless of the number of employees at the facility. As well, facilities with equal to or greater than 20,000 employee hours (including contractors), or where an activity to which the employee threshold does not apply took place, must consider all other sources of CACs at the facility. You may need to report for CACs if they were released to the air from your facility in quantities equal to or greater than their release thresholds.

Examples of substances: Nitrogen oxides, particulate matter, sulphur dioxide, volatile organic compounds

Examples of facility types: facilities with boilers burning fuels or waste; electricity generating stations; oil and gas extraction

and refining; aluminum production and processing; pulp and paper mills; bakeries; painting operations; printers; waste treatment; mines; pits and quarries; sawmills and wood products operations

**Part 5 - Speciated Volatile Organic Compounds (VOCs) - Additional reporting requirements**

You may need to report for Part 5 substances if they were released to the air in a quantity equal to or greater than 1 tonne and the 10 tonne air release threshold for VOCs (under Part 4) was met.

**Conclusions**

Canada is one of many countries with a PRTR. In Canada this is called the NPRI which is administered by Environment Canada.

The NPRI has been in existence for nearly 20 years and has expanded to include additional substances in specific categories.

PRTR data from Environment Canada's NPRI is used for many purposes, not only by the federal government but also by several other industrial sectors, other government (federal, provincial and municipal) departments, universities, and more, and is made available through the NPRI website.

For the chromium plating/anodizing sector in Canada, reporting to the NPRI is now mandatory for all platers/anodizers complying with the Environment Canada "Chromium" regulations regardless of the number of employees.

Companies are required to report their "release data" to NPRI for a given year by June 1 of the following year. The reporting is done through the SWIM on the NPRI website.

For the 2019 NPRI reporting year, the reporting deadline was delayed to July 31, 2020 due to the COVID-19 pandemic. This was the first time a reporting date was delayed. At the time of CFCM Magazine publication, NPRI had not announced whether the 2021 reporting date would also be delayed due to the ongoing pandemic. ■

*Peter J. Paine is CEO/Owner of P. J. Paine & Associates. For more information on the NPRI or for assistance completing your NPRI submission, he can be reached at [pjpinc@rogers.com](mailto:pjpinc@rogers.com) or (613) 884 - 9029.*



# BARREL PLATING

# ESSENTIALS



*Barrel-plated parts with zinc coating.*

**B**arrel plating is not one of the processes that results in high-precision finishes. It is the form of electroplating that produces large volumes, usually of smaller parts, turning them out fast and economically.

A trick in the procedure lies in the bipolar contact between individual pieces in the barrel, which is usually a rotating cage in which the first step in treatment happens, prior to the barrel's immersion in a trough-like plating bath. This high contact level improves plating efficiency, although the extensive contact between the pieces also makes the finish less regular than happens with more demanding plating methods.

Danglers or center bars inside the barrel maintain electrical contact throughout the process. It is excellent for many applications, but not appropriate for when finished part specifications are demanding precise.

The basic technology goes back as far as the late 1800s, so there is nothing new about the concept. However, its ease of use in the majority of plating applications means it is probably the most widely used electroplating method around the world today.

A key factor to avoid is product entrapment, which can lead to

scrapping of multiple components in higher volume applications.

Palm Technology takes a modular approach to its barrel plating lines. This, the company says, minimizes installation time, provides the customer with process flexibility and allows for the line to be easily expanded.

"We use corrosion-resistant materials to fabricate tanks for applications as diverse as laboratory etch lines up to large tanks for aerospace anodizing lines," Palm states. "We have the capability to build a single tank or an entire process line."

The company fabricates its Simona-brand tanks from polypropylene, PVC, CPVC, PVDF, Kynar, carbon, and stainless steel. It can roll polypropylene 1/8-in. thick at 16-in. diameter, up to 1-1/4 in. thick at 13-ft diameter.

"Our tanks have customized guarding to prevent damage to sensors, heaters and heat exchangers," the company says. "Our tanks are spark tested at 20,000 volts and water tested to ensure even expansion and that they are defect-free before they leave our facility."

Progalvano offers an extensive range of barrels and tanks. Its ROTOR standard series has been continuously developed over nearly 50 years.

## PLATING AND ANODIZING: BARREL PLATING

"This range consists of over 150 models, configurable in either single or twin barrel versions," the company explains, "with on-board motors or external drive transmission, and a load capacity of up to 500 kg."

An example is the Rotor 2000 which is designed to be versatile enough for use in both automatic and semi-automatic plants. This type of rotating barrel, Progalvano says, delivers advanced performance for nickel plating and zinc plating. Its main difference from the similar Export model is the cathodic contact on top of the tank, which uses traditional cylindrical copper contact pins rather than the company's standard 'bell' contacts.

The non-dipped portion of the frame is of stainless steel AISI 304, coated with hepoxidic paint.

The dipped portion of the frame is stainless steel AISI 316 and polypropylene. More than 30 different versions of the design are offered.

There is a modular structure, and tank to barrel cathodic contact (using a V block of the pin type). The design is fully customizable, and is available with an automatically opening door.

The company's Rotor Export 2000 M barrel range is designed for use with heavy loads. These barrels are normally combined with large-capacity cylinders, and are specific for phosphating processes, electroless nickel plating, degreasing, and other applications where their greater carrying capacity increases productivity.

They can take loads of up to 500 kg, for peak temperatures up to 100 deg. C, and the modular structure is reinforced with welded ribbing on a stainless steel frame. The tank to barrel cathodic contact is of the wedge-bell type.

In addition to its standard range of barrels having on-board motors, Progalvano has developed the same series with an external drive transmission as a rotating system. This line is mainly intended for markets such as North America, where the external drive transmission is a standard barrel configuration.

JBC Surface Finishing Systems also offers a range of tanks for this area. Depending on user needs, it can produce tanks from polypropylene, stainless steel, mild steel (lined or unlined), fiberglass or titanium. It also produces drop-in flexible liners when applications call for them.

The company also specializes in pumps and filtration systems for maintaining the system.

Eagle Engineering has designed its electroplating barrels to avoid plating errors due to product entrapment.

"Our unique self-aligning system has bottom beams at a 30-deg. incline for exact positioning," the company says. "This ensures good contacts for the main power supply and motor which are self-cleaning. It also minimizes any rocking of the unit whilst in use."

The barrels are designed so that the whole system, barrels and

blocks, can be supplied for easy on-site installation, Eagle adds. It also guarantees precise clearances to ensure smooth barrel rotation and plating quality.

To ensure efficient performance and longer operational life, the barrels employ a premium grade PE 1000 polyethylene, which allows for the maximum perforated open area. This, the company explains, offers more efficient solution and electrolytic transfer, which means faster processing time and power cost savings.

There is a one-piece wrap-around cylinder skin, avoiding joints and potential chemical traps. Paneled construction is available where required for specific product types, and perforation chamfers and corrugation patterns help eliminate surface tension and adhesion.

There are fully sealed high tensile 18.5 mm diameter steel rod reinforcement supports, with 25 mm available for heavy duty barrels. The heavy duty lid frame is reinforced with high tensile steel bars.

Danglers, of course, are also a key component of a barrel plating line. Correctly defining the size and specifications of danglers is critical in maintaining consistent finishes.

The Dangler Guys specializes in vulcanized danglers. Its Ultimate Dangler offers one-inch OD insulation, and 1.125-in. OD inside the barrel of the component. These, the company says, remain always flexible.

Rubber-coated danglers feature a 0.88-in. OD EPDM jacket, the same 1.125 OD inside the barrel, and are, the company says, extremely durable. The covering in this case is PVC.

Newact Inc. has a fully vulcanized sleeve on its danglers, which is molded directly to the cable. This reinforces the cable jacket to resist cuts and bends.

"This superior design substantially extends the life of the dangler," Newact says, "reducing maintenance, virtually eliminating drag-out all of which lowers operating costs. The sleeve reduces the carry-over of chemicals from tank to tank often found in plastic sleeves."

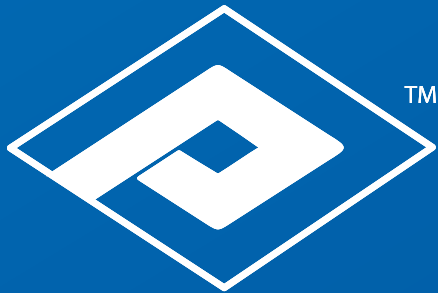
Most cable sizes from 4/0 to #8 are standard in the company's product range, and large gauges are available. Cables in Kevlar-reinforced rubber are also offered.

Double crimped knobs give a positive electrical connection and added strength not found in soldered knobs. Two types of knobs are available, standard and crimped-over.

As with so many finishing processes, the basic technology of barrel plating is simple, the devil being in the details. Carefully selecting components for the type of products being plated, using the full range of supplier options, is the best way to ensure finish quality, and a satisfied customer. ■



**As with so many finishing processes, the basic technology of barrel plating is simple, the devil being in the details.**



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# THROUGH THICK AND THIN

## Thickness Testing Methods for Plating Technologies



*XRF with Operator.*

**By Connor Stewart**

Achieving the correct coating thickness is imperative in the surface finishing industry. Manufacturers often require coatings to meet thickness requirements to ensure the product's functionality and appearance. Highly regulated industries, such as the aerospace and automotive industries, have strict specifications on functional coating thicknesses and a thousandth of an inch can be the difference between sellable product and scrap.

Even when parts have wide ranges for coating thicknesses like in some powder coating and zinc plating operations, ensuring that the finished good falls within that range will help shops avoid costly mistakes. While it's important to achieve the correct coating thickness, monitoring the coating thickness is equally important. Factors such as how a coating is applied, the geometry of a part and the concentration of product used will all influence coating thickness.

Because of the importance and variability of coating thicknesses, consistently and accurately measuring a coating is an integral part of any surface finishing application. The type of instrument employed to do so depends on the finish and the coating's application. This article explores the principles of how these instruments work and when each instrument should be used.

### X-ray Fluorescence

Perhaps the most powerful and robust instrument used for coating thickness testing is the X-ray Fluorescence Spectrometer (XRF). This non-destructive and non-contact technique uses X-rays to probe the thickness of both conductive and nonconductive coatings.

An XRF functions by producing and emitting X-rays which are

aimed at a sample. The incoming X-rays, or primary X-rays, strike the coating surface and excite the elements within the coating. This causes the excited elements to emit a unique, secondary X-ray which is detected by the XRF. Depending on the intensity and energy of the secondary X-rays, the XRF can determine both the composition and thickness of the coating with impeccable accuracy. Since each element will produce a unique secondary X-ray, an XRF can measure the thickness of multiple layers and alloyed layers simultaneously.

For example, coatings like electroless nickel, which have specific sulphur and nickel compositions, can be determined via XRF. While these laboratory-grade instruments can give invaluable information about coating thicknesses, it still has its limitations. XRFs require that the coating and base substrate be discrete, distinguishable layers.

For example, an XRF cannot determine the thickness of brass over copper since both layers contain copper and will produce indistinguishable secondary X-rays. Additionally, coatings containing lighter elements such as silicon or sulphur are difficult to measure. These elements are easily excitable by the primary X-rays and produce an excess of secondary X-rays which are difficult to differentiate between. A very powerful, and consequently very expensive detector is required for those applications.

While XRFs are expensive and require training and regular maintenance, handheld XRFs (HXRF) are becoming more available. HXRFs operate under the same principle as laboratory XRFs and while being more affordable and easier-to-use, these instruments often operate with a large margin of error and should not be used for thin layer applications.

### Simultaneous Thickness and Electrochemical Potential (STEP) Test

This is a destructive technique designed to measure both the thickness and electrochemical potential of multiplex nickel products. This test is exceptionally important for nickel-chromium coatings which are typically subjected to harsh outdoor conditions.

A standard duplex nickel system includes a bright (non-sulphur baring) and semi-bright (sulphur baring) nickel layer. An adequate thickness and electrochemical potential between the layers causes the bright nickel layer to corrode preferentially compared to the semi-bright layer, improving the corrosion resistance of the coating. This is why numerous automotive and aerospace specifications have strict STEP test requirements for duplex nickel. The STEP test is an electrochemical stripping test, meaning the test measures the anodic dissolution of the nickel under a constant current. Based on the varying amount of sulphur content in the different nickel layers (i.e. semi-bright vs. bright), the time and respective voltage required to dissolve each layer is unique and can be translated into thickness measurements.

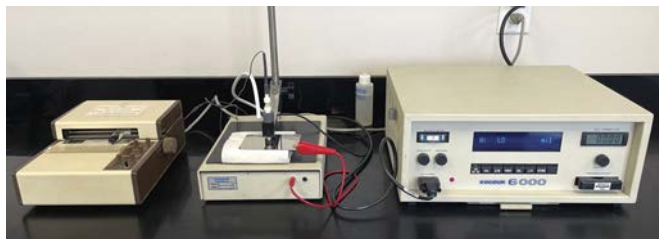
While this test is effective, especially for nickel applications, it is a destructive test so samples used for this test are scrapped after testing. This measurement method is restricted to duplex coatings so the STEP test lacks wide applicability.

### Eddy Current

Eddy current is a quick and reliable technique used to measure non-conductive coatings such as aluminum oxides produced in anodizing applications and paint layers applied in powder coating shops. An eddy current thickness gauge is a non-destructive instrument that measures non-conductive surfaces over non-ferrous substrates like aluminum or copper. An eddy current probe runs alternating current through a metallic coil which creates a magnetic field around the probe. As the probe comes into contact with a nonferrous substrate, the magnetic field induces a weak electrical current on the surface of the substrate called an eddy current.

The resulting eddy currents produce their own magnetic fields, which are detected by the probe. The eddy current gauge correlates the intensity of the detected eddy currents to the thickness of the nonconductive coating; the thicker the coating, the weaker the intensity. Eddy current thickness gauges are reliable instruments in addition to being inexpensive and simple to use.

However, eddy current gauges struggle to report precise measurements when the base substrate is rough. The eddy current induced on rough surfaces produces varying signals which consequently limits the ability of the gauge to accurately report thicknesses. Substrates such as zinc die castings or sandblasted materials



STEP test.



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## PLATING AND ANODIZING: THICKNESS TESTING



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are examples of where eddy current gauges are limited. Additionally, these instruments cannot be used on steel substrates which limits its applications in the surface finishing industry.

### Magnetic Thickness Gauge

A magnetic thickness gauge is a non-destructive technique that can be used on

steel substrates. It measures non-conductive coatings over ferrous substrates. These gauges are the go-to measuring apparatuses in the e-coat and powder coating industries but can also be used to measure nonmagnetic metals such as chrome or zinc plated on steel.

The most basic magnetic thickness gauge is composed of a permanent magnetic and a spring. The magnet is attracted to the ferrous substrate and the force required for the user to pull the magnet off the substrate is correlated to the thickness of the coating; the less force required to pull the magnet off the substrate, the thicker the coating. While a coating thickness test cannot get any simpler than this analog method, it is very sensitive to surface roughness, substrate thickness and the type of steel alloy used, therefore its accuracy is limited.

A more robust magnetic method is a magnetic induction thickness gauge. These gauges use two coils inside its probe: a magnetic coil and a detector coil. It operates by adhering to the Hall Effect, which states that a voltage is produced when a magnetic field is applied perpendicular to the flow of cur-

rent. As the probe approaches a magnetizable substrate, a magnetic field is induced in the substrate perpendicular to the current in the detector coil. The strength of the voltage produced is proportional to the distance from the probe to the ferrous substrate, which in turn calculates coating thickness.

Magnetic thickness gauges are often paired with eddy current gauges to allow the instrument to measure non-conductive coatings over both ferrous and non-ferrous substrates. These gauges are easy to use and have come down in price over the past few years as the technology has improved.

Each of the instruments discussed in this article are popular throughout the surface finishing industry. By knowing the appropriate application of each instrument and its limitations, operators can obtain accurate and precise data about coating thicknesses. By controlling, maintaining and achieving the correct coating thickness, surface finishing shops can control their costs, maintain their quality and achieve the best possible finish. ■

*Connor Stewart, B.Sc., is Technical Sales and Service Representative, Dynamix.*

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## NIX SENSOR TO LAUNCH PORTABLE 31-CHANNEL SPECTROPHOTOMETER

Nix Sensor Ltd. is launching the Nix Spectro 2, a professional-grade, accessible, and cost-effective spectrophotometer it says offers a new way for industry professionals to capture and communicate spectral data.

“The product development and engineering teams at Nix have been listening closely to the needs of our customers around the world and the message is clear; paint matching and custom formulation must be brought to the masses, especially in the COVID-19 era,” says Matthew Sheridan, CEO and Founder, Nix Sensor Ltd. “Brands must also extend outside of their traditional retail settings if they want to stay competitive. To accomplish this, we needed to build a device that is not only portable, durable, and accurate, but most importantly, easy to use. I am proud to say that we have achieved all of these goals and more with the Spectro 2. I’m excited to see how this technology will once again revolutionize the retail/online paint experience.”

Nix says the Spectro 2 is the only portable spectrophotometer of its kind to capture spectral data across 31 channels (10nm bins over 400-700nm) while being durable enough to be used on a job site and easy enough to be used by a homeowner.

Smaller than a tennis ball and made from solid aluminum, the device’s portability will usher in a new era of “on-site” color matches, formulation and color communication, Nix says. “Accelerated by the COVID-19 pandemic and by software tools like Nix Sensor Ltd.’s Paint With CHIP app ([paintwithchip.com](http://paintwithchip.com)), we expect the disruption of the traditional retail paint model to continue to accelerate throughout 2021 and beyond,” the company says.

[www.nixsensor.com/nix-spectro-2](http://www.nixsensor.com/nix-spectro-2)



## PPG DEBUTS COATING FOR CORROSION-UNDER-INSULATION APPLICATIONS IN NA

PPG recently announced the North American introduction of its HI-TEMP 1027HD coating, a next-generation, ambient-cure coating engineered for challenging corrosion-under-insulation (CUI) conditions.

A high-build product that offers dry film thickness of 10 to 12 mils in a one-coat application, PPG HI-TEMP 1027HD provides protection against corrosion on pipes, vessels and construction parts when plants are in operation. It is formulated to withstand severe temperature cycles ranging from -320 deg. F to 1,000 deg. F and resists dry exposure with intermittent temperature peaks of up to 1,200 deg. F.

PPG HI-TEMP 1027HD also protects coated pipes, parts and assemblies in changing ambient temperature conditions. This is critical during shipping, as these materials are commonly transported between continents and exposed to months of rain, snow, ultraviolet (UV) light and other environmental hazards, PPG says. The coating protects those same components from damage and wear before and during new construction, when they are stored, handled and erected on the building site.

“Oil and gas, chemical processing, power generation and industries such as paper mills and steel mills rely on insulated pipelines, which are always vulnerable to corrosion-related leaks and pipe failure,” says Bart Martens, PPG Global Product Manager, Protective and Marine Coatings. “Because of its hardness and resistance to thermal shock and cycling, PPG HI-TEMP 1027HD coating more effectively protects these critical assets against corrosion. This can extend maintenance intervals and minimize the risk of unexpected shutdowns.”

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## NEW DEFOAMER FOR WOOD COATINGS COMPLIANT WITH ECOLABELS

Increasing regulatory requirements mean that proven wood coatings must be reformulated. And, of course, the new formulations must perform just as well as the established ones. To this end, Evonik is introducing TEGO Foamex 812, a new defoamer developed for this purpose.

The new defoamer has an ideal balance of effectiveness and compatibility while meeting stringent regulatory requirements, Evonik says. It meets the requirements of the current labels for low-pollutant paints and coatings including the European EcoLabels and the relevant IKEA standards. TEGO Foamex 812 does not contain any biocides or reportable SVHC substances.

In addition, it offers strong defoaming power combined with high compatibility, Evonik says. TEGO Foamex 812 is available worldwide.

Although the new defoamer was developed specifically for wood coatings, it is also suitable for other applications. In addition to pigment concentrates, possible applications include printing inks with food contact, automotive coatings, and can coatings. [www.coatino.com](http://www.coatino.com)





## WAGNER EXPANDS RANGE OF HIGH-SPEED ROTATION ATOMIZERS



WAGNER is extending its range of high-speed rotation atomizers to serve the growing demand for automated liquid paint applications in the various motion technologies available today.

The TOPFINISH RobotBell 1 ECH is mounted on a robot arm, while the TOPFINISH Bell 1S ECH is specially designed for use with reciprocators and linear axes systems. The RBC 1E control system is available for both versions.

From metal workpieces to automotive components and wood, WAGNER's high-speed rotary atomizers can be used in numerous industrial sectors to achieve efficient coating results on both small and large workpieces, the company says.

Just like the existing versions with internal charging, the new versions also enable large spray pattern variations (70 - 800 mm). Alternative disk sizes and adjustable steering airs are available, which can be adapted to suit the respective workpiece geometry and also the material used.

An internal and external flushing device on the bell disk, as well as the direct disposal of excess material via a drain valve, ensure short color change times for fast cycles in highly automated coating.

Depending on the material, flow rate and workpiece, an application efficiency of more than 80 percent can be achieved with the very fine atomization, WAGNER says. Compressed air consumption is approximately 20 percent lower with WAGNER high-speed rotary atomizers than with comparable products, it adds. An exhaust air concept, which discharges the exhaust air to the rear, also optimizes the coating result.

WAGNER uses the same basic components – such as the turbine, bell disks and valve blocks – for all high-speed rotary atomizers. The spare and wear parts are also identical.

“The simple operation, robust technology and durable components made of stainless steel reduce the effort required for assembly and maintenance and therefore also the operating costs,” the company says.

[www.wagner-group.com](http://www.wagner-group.com)

## CAST ALUMINUM SOLUTIONS LAUNCHES INDUSTRIAL HEATERS WITH TEMPS TO 1110 F

Cast Aluminum Solutions (CAS) – a supplier of industrial heating devices for specialized chemical and water processing applications including paint ingredients, solvents, and other key chemicals, recently launched its new CAST-X High Temperature Heater line.

CAST-X High Temp Heaters feature operating temperatures to 1110 deg. F (600 deg. C). Very few industrial heaters feature operating temperatures in this range, CAS says, adding the line can heat flammable liquids and gases, another rare feature.

CAST-X High Temp can safely heat solvents, IPA (isopropyl alcohol), disinfecting agents, acetone, pentane, ammonia, and other low-flashpoint liquids. Process gases such as nitrogen, argon, CO and CO2 are also well-suited for these heaters, even if they are under high-pressure or in a cryogenic state. DI Water is also commonly heated using CAST-X Heaters, and if needed, steam can be generated.

CAST-X High Temp Heaters are an easily-integrated inline heater with common flow-tube sizes, and compatibility with most worldwide voltages. They are available in two sizes.

A no contact design means the heated media never contacts the heating elements. Heated media (liquid or gas) flows through a stainless steel or Inconel flow-tube, cast in the heater body, into which high-performance heat elements are also integrated.

Many of today's advanced chemical reactions and catalytic transformation processes require higher than normal temperatures, and the new line is designed to fit those thermal requirements, CAS says.

“The CAST-X Heater has always been favored by chemists requiring high-purity heating, or heating of flammable media,” says Jeffrey Awe, Global Marketing Director at CAS. “With CAST-X HT offering temperatures to 600 deg. C, the potential market for this heater family is expanded significantly.”

Jerry Carlson, Divisional Vice President adds, “The CAST-X High Temp line occupies a unique position in the chemical heating marketplace. It combines the safety and purity of an isolated fluid path, with the high operating temps demanded by today's advanced applications.”  
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## THRIVING AVIATION INDUSTRY EVOKES DEMAND FOR AEROSPACE COATINGS

By Global Market Insights

A global behemoth, the aerospace industry has come out strong as a profitable business sphere over the past few years, both in terms of revenue share and developments. The Canadian aerospace industry contributes about \$26 billion in GDP and hundreds of thousands of jobs to the economy.

By the end of 2018, the U.S. aerospace industry boasted of foreign direct investments (FDIs) of almost US \$22 billion. The sector as a whole has been proliferating at a steady pace over the last decade or so. Obviously, this will provide a major boost to the demand for aerospace coatings.

It is no secret that aerospace sector is one of the demanding industries for coatings and materials. Aerospace Coatings – as well as paint technology – offer high-end protection from corrosion, UV radiation, erosion, abrasion, and more in the most extreme conditions. The aerospace coating market is set to record phenomenal gains in the years ahead because of its strong role in the overall aerospace and defense industry, and for its winning business strategies including mergers and acquisitions, product diversification, partnerships, and others.

Powerful industry players like BASF, Akzo Nobel NV, Henkel, PPG Industries, and The Sherwin Williams Co., are leaving almost no stone unturned to leverage the opportunities coming their way, making the global market a lucrative business hub.

**Billion-dollar Aerospace Industry to Form a Pivotal Growth Ground for Canada Aerospace Coatings Market**  
Speaking of the significance of aerospace coatings across Canada, it is pivotal to understand how crucial the aerospace industry is for the country. According to the Aerospace Industries Association of Canada and Innovation, Science and Economic Development Canada, the aerospace industry valuation in the region, in 2018, stood at an impressive US \$31 billion, and contributed over US \$25 billion to the national GDP and more than 215,000 jobs in the Canadian economy. Around 70 percent of the industry's activity is dedicated toward manufacturing while the remaining concentrates on MRO (maintenance, repair and overhaul).

Expanding aircraft production and rising passenger traffic are likely to offer a significant boost to the overall industry share over the coming years. In turn, this will boost the aerospace coatings industry in Canada.

The Canadian government has been bringing about various reforms as well as novel strategies to enhance the development of aerospace coating facilities across the country.

In 2018, the federal government and the Atlantic Canada Opportunities Agency (ACOA) announced a whopping US \$12 billion investment in leading aerospace company MDC Coating Technologies. As per news reports, the funds have been utilized to

pave way for new manufacturing operations and technology for the firm's specialized coatings and polishing for aerospace engines. In addition to the power pact investment, ACOA's business development program was also reported to offer US \$200,000 to bolster MDC Coating's purchase of a 3D metal printer to support novel manufacturing techniques. As per credible sources, the company's coating technology has drastically reduced engine maintenance costs, greenhouse emissions, and fuel consumption, acting as a perfect solution for all coating needs across the aerospace industry.

### Numerous Developments in Aerospace Coatings to Revolutionize the Business Space

Lately, the aerospace coatings market has been highly characterized by a host of modern innovations, mainly influenced by the global sustainability trend. This has been particularly observed across North America, which hosts a number of aerospace manufacturers. Industry leader PPG International's recent development of TPO AERCON aerospace electrocoat primer for the U.S. Air Force is one example. With highly anticipated testing being conducted at the Air Force's Advanced Technology and Training Center in middle Georgia, PPG primer is said to offer superior corrosion resistance and enhanced topcoat adhesion for aircraft parts.

Reports suggest that the U.S. Air Force issued a bulletin last October to declare the primer's validity and significance for coating parts used on the outer surface of aircraft. Once thoroughly tested for use, the coating is expected to become a subject of pursuit amongst investors which would bring a dynamic disruption in the overall aerospace coatings industry to watch out for.



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