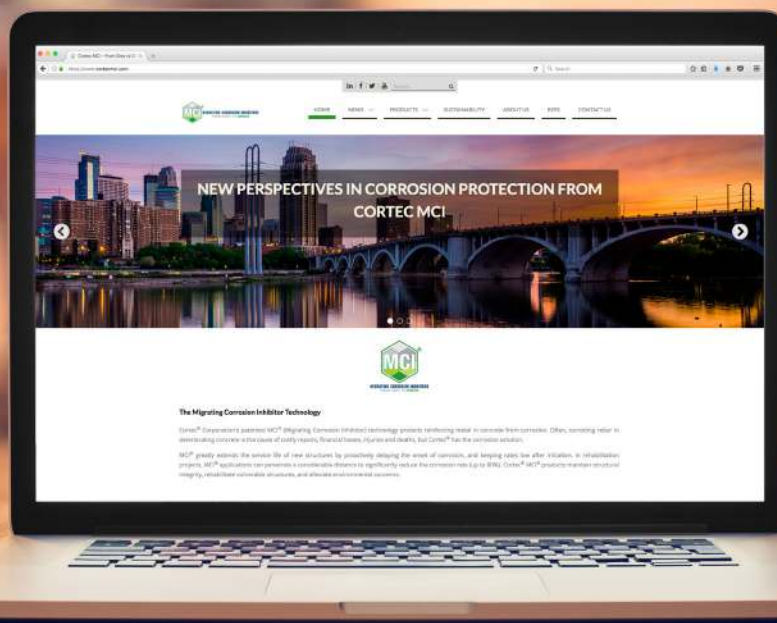




MIGRATING CORROSION INHIBITORS
FROM GREY TO GREEN

June 2017

New MCI® Resources Give Fresh Look at Tackling Infrastructure Deterioration



In the last six months, Cortec® has released two excellent updated MCI® Technology resources for the construction industry and has begun working on a more user friendly data sheet.

Updated MCI® Technology Brochure

A freshly updated brochure published in January provides an excellent overview on the possibilities and versatility of using MCI® Technology to extend the service life of concrete structures. Topics include:

- Durability and Sustainable Construction
- Cost Effective Service Life Extension
- Admixtures
- Independent Testing Results
- Admixture Comparison
- Repair
- Surface Treatment
- Post-Tensioning

A product application guide highlights the three levels of MCI® application: new concrete, existing structures with no visible corrosion damage, and existing structures with visible corrosion damage. The lists of relevant case histories show the variety of structures that have been treated with MCI®, from drinking water reservoirs to parking facilities, bridges, a children's hospital, and even historical Alcatraz!

The brochure concludes with a product selection guide that presents products by treatment category. To view the full brochure,

please visit: <https://www.cortecvci.com/Publications/Brochures/MCIBrochure/MCI.pdf>

New Cortec® MCI® Website

"New Perspectives in Corrosion Protection from Cortec® MCI®," can be found on the updated Cortec® MCI® website. The redesign includes major improvements to design and user experience that make it easier to browse MCI® products by type. MCI® news, sustainability info, a technology overview, videos, and contact information are some of the other resources available on the website.

The site offers special access for signed MCI® distributors and representatives, who can register and log in to view helpful documents and presentations or join in a private discussion forum with their MCI® comments, questions, and experiences. To see the fresh look of the new MCI® website for yourself, please visit the following link: <https://www.cortecmci.com/>

New PDS Format Coming!

Cortec® MCI® is excited about the upcoming launch of a freshly redesigned product data sheet format for MCI® products! The new data sheet will have a cleaner look and be more user friendly to engineers consulting the data sheets. Relevant construction spec numbers will be listed at the top for easy identification of product type. A variety of performance data will also be included on the sheet for better understanding of product capabilities.

Vukovar Water Tower Preserving a Symbol of Croatian Independence

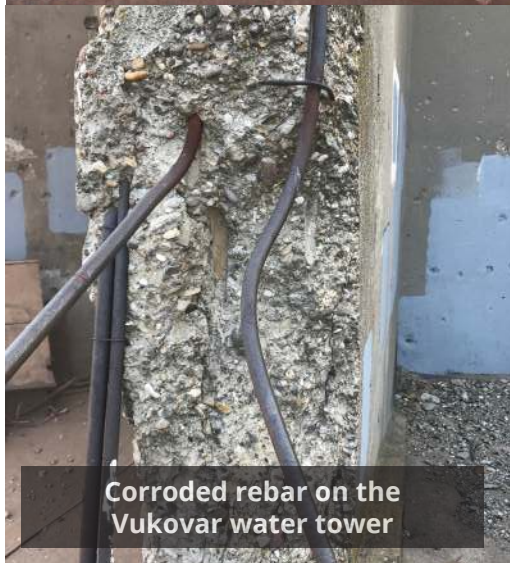
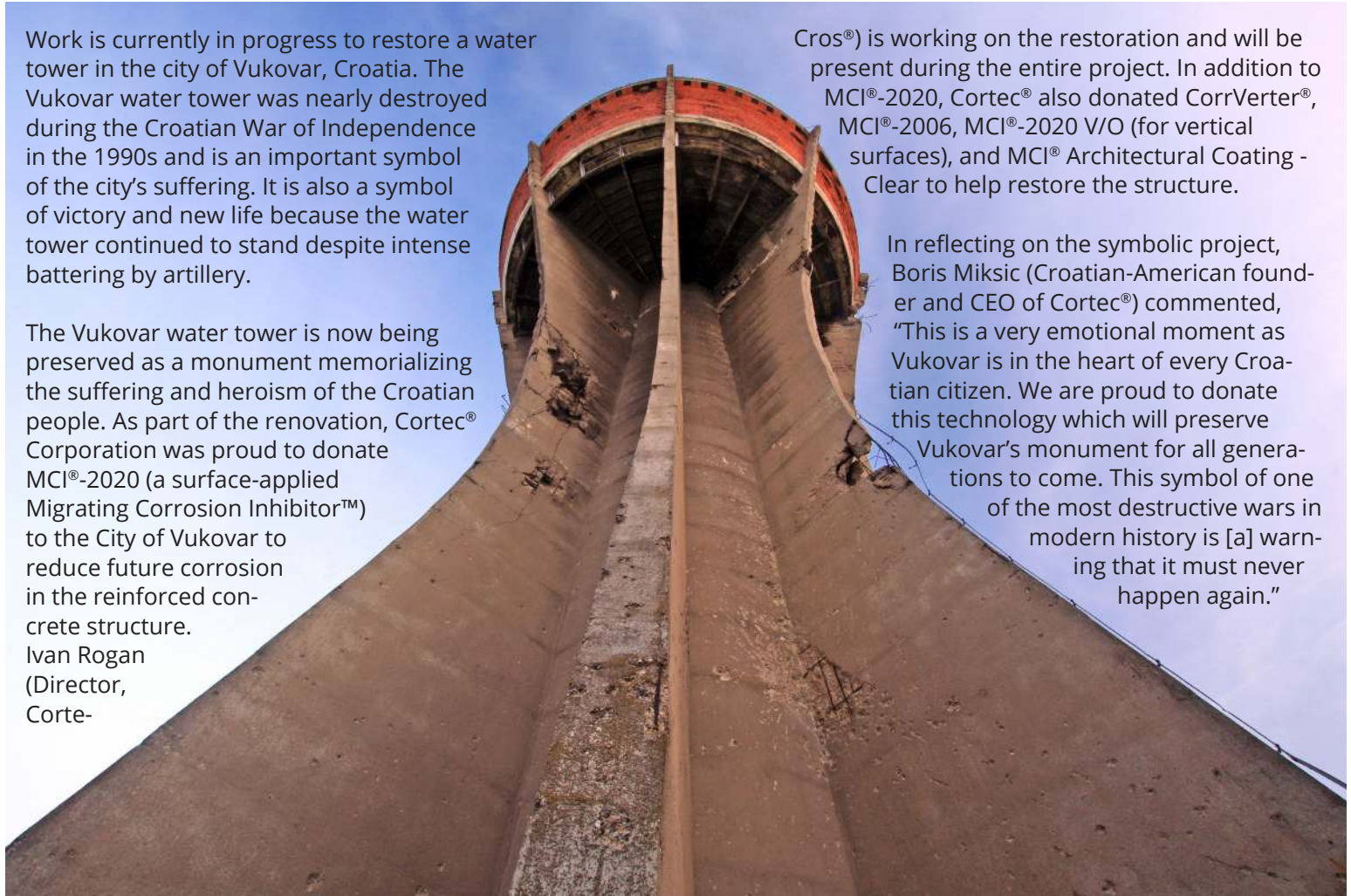
Work is currently in progress to restore a water tower in the city of Vukovar, Croatia. The Vukovar water tower was nearly destroyed during the Croatian War of Independence in the 1990s and is an important symbol of the city's suffering. It is also a symbol of victory and new life because the water tower continued to stand despite intense battering by artillery.

The Vukovar water tower is now being preserved as a monument memorializing the suffering and heroism of the Croatian people. As part of the renovation, Cortec® Corporation was proud to donate MCI®-2020 (a surface-applied Migrating Corrosion Inhibitor™) to the City of Vukovar to reduce future corrosion in the reinforced concrete structure.

Ivan Rogan
(Director,
Corte-

Cros®) is working on the restoration and will be present during the entire project. In addition to MCI®-2020, Cortec® also donated CorrVerter®, MCI®-2006, MCI®-2020 V/O (for vertical surfaces), and MCI® Architectural Coating - Clear to help restore the structure.

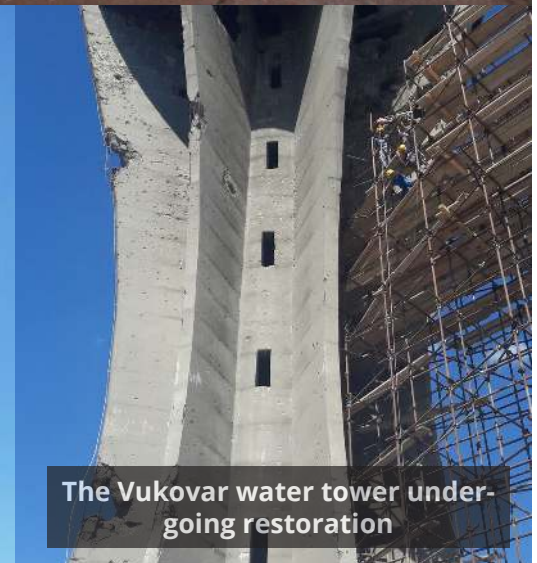
In reflecting on the symbolic project, Boris Miksic (Croatian-American founder and CEO of Cortec®) commented, "This is a very emotional moment as Vukovar is in the heart of every Croatian citizen. We are proud to donate this technology which will preserve Vukovar's monument for all generations to come. This symbol of one of the most destructive wars in modern history is [a] warning that it must never happen again."



Corroded rebar on the
Vukovar water tower



The Vukovar water tower



The Vukovar water tower under-
going restoration



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Case Histories

Canal de Alicante – Protecting a Desalination Plant Water Discharge System

Two MCI® products were used in the discharge water system of a Spanish desalination plant. The reverse osmosis process used at the desalination plant produces rejection water, or “brine,” that has practically twice the salinity of the original seawater being treated. In order to protect against corrosion in the reinforced concrete structures of the discharge system, MCI®-2020 was used in two layers of the dumping chest at approximately 0.48 pints per square yard (0.27 L/m²).

MCI®-2005 was used throughout the pouring box of the discharge system in the internal landfill, foundation slab and walls, beams, and upper slab. The addition of MCI® to various portions of the brine discharge structure left it fortified with a quality corrosion inhibiting system to help extend the service life of an important public resource.



Courtesy image from MCI International

Harvard Law Parking Garage – Finding the Right Corrosion Inhibitor

When Harvard University was researching corrosion inhibitor options for their upcoming parking structure projects, their goal was to find a proven inhibitor that would fit their budget and be well received by the ready-mix supplier supplying the concrete for the project. They also wanted a reference from a previous engineer who had specified MCI®. This was given to them by their consulting engineer, who had already used MCI® successfully in several projects.

The product chosen was Cortec® MCI®-2005 AL, a Migrating Corrosion Inhibiting admixture that met their requirements at a cost-effective price. An added benefit was that the dosage rate required less inventory space than other corrosion inhibitors. MCI®-2005 AL did not affect any of the concrete properties and was very easy to finish.

At the end of the October 2008 – October 2010 project, Joe Staples of ready-mix supplier Boston Sand & Gravel had this to say: “We delivered 11,500 cubic yards [8792.38 m³] of 5000 psi [34,473.79 kPa] concrete with MCI® 2005 AL and it was easy to dispense, had little effect on air entrainment or workability, and strengths were good. There were no issues.”



Out and About

Connecting at World of Concrete 2017

Cortec® followed an almost 20 year tradition by attending the huge World of Concrete (WOC) event in Las Vegas, Nevada, January 16th-20th. The international concrete and masonry event provided time to network with engineers and contractors and have good conversations with many representatives and distributors who turned out for the annual MCI® rep/distributor meeting held during WOC.

Highlights at the Cortec® booth included:

- MCI® admixtures and steel wool animations
- New MCI® brochure
- New MCI® rebar USB drives

Cortec® MCI® came away from the event with new ideas, new contacts, and greater camaraderie with associates in the concrete industry.

ICRI Spring Convention 2017

Cortec® also had the opportunity to build rapport with engineers and market players at the 2017 ICRI (International Concrete Repair Institute) Spring Convention, March 15th-17th in Montreal, Canada. Ashraf Hasania represented Cortec® MCI® at the event and shared more about MCI® Technology with engineers and those particularly interested in the use of MCI® to extend parking garage service life. He also attended some of the committee meetings and observed technical presentations on repair technologies to further his involvement and education in the industry.



Recent Publications

Two informative pieces published in the last half year detail the use/benefit of MCI® admixtures.

["A Safe Corrosion Solution for Potable Water Reservoirs"](#)

This article was published in the February 2017 edition of *Concrete International*, a monthly magazine published by the American Concrete Institute for the concrete community. It is an excellent example of using MCI® in a real-life construction project.

The article describes the use of MCI® in a drinking water reservoir in Spain. Due to past success using Cortec® MCI® in rehabilitation of a reinforced concrete pipeline, the Spanish nonprofit water consortium, CAT, chose an MCI® admixture for use in the 5000 m³ (1.32 million gallon) water buffer tank they were building. Cortec's Spanish distributor, Quimilock S.A., supplied the Cortec® MCI® for the project.

Because the buffer tank would contain drinking water for human consumption, CAT needed a very special product that would both

protect against corrosion and be safe to use in a structure containing potable water. This excluded nitrite admixtures that are highly water-soluble and dangerous for humans to consume.

An MCI® admixture was an excellent solution because it was certified to meet ANSI/NSF Standard 61 in addition to being less likely to leach out and dissolve in the water. It also qualified as a USDA Certified Biobased Product, making it more environmentally friendly.

The article provides a good summary of how MCI® works and how it can be used for protection in special structures.

["Prolong Reinforced Concrete Service Life with MCI® Admixtures"](#)

In May, Cortec® published a white paper written by Cortec® MCI® experts on the topic of extending concrete service life with MCI® admixtures. The paper describes the basic problem of corrosion in reinforced concrete and describes how Cortec® MCI® admixtures work to protect embedded steel reinforcement and reduce corrosion rates.

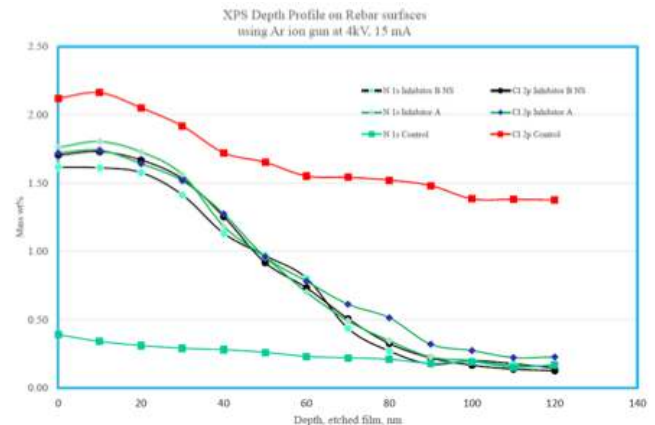
Drawing on test results from Dr. Behzad Bavarian, Akinbosedo Oluwaseye, and Lisa Reiner (presented at the NACE Corrosion 2017 Conference and Expo), the white paper shows how an MCI® admixture increased corrosion resistance of a rebar immersed in a concrete slurry by ten times. The ability of MCI® to migrate through concrete was also indicated by the presence of MCI® on embedded steel rebar surfaces according to XPS analysis.

Results from cracked beam testing performed by American Engineering Testing are also referenced, in which MCI® showed more significant reduction of rebar corrosion in the presence of hairline cracks than other common inhibiting admixtures.

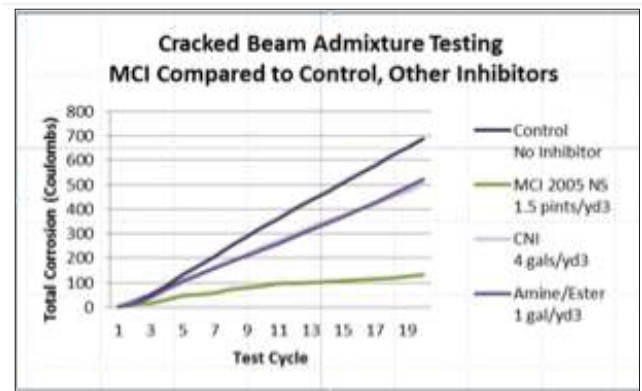
The white paper also addresses MCI® admixture conformance to construction industry standards and says that MCI® can extend concrete service life by as much as 50 years more than a comparable control mix.

In its final summary, the paper states, "MCI® admixtures provide a safe, environmentally friendly, and economical tool to fight corrosion and extend durability and service lives of your reinforced concrete structures."

To learn more about how MCI® admixtures can extend the service life of reinforced concrete structures, please visit the following link: <https://www.cortecmci.com/wp-content/uploads/2017/05/Mings-White-Paper.pdf>



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Image Sources:

(1) Behzad Bavarian, Akinbosedo Oluwaseye, and Lisa Reiner. "Improving Durability of Reinforced Concrete Structures using Migrating Corrosion Inhibitors as Admixtures." California State University, Northridge. Presented at NACE Corrosion 2017 Conference and Expo. (2) Jessi Meyer, Cortec® Corporation. Data taken from "Report of Concrete Corrosion Inhibitor Testing" American Engineering Testing, Inc., August 13, 2003.

Distributors News

Distributors play a key role in bringing MCI® solutions to end users around the globe. Cortec® is grateful for these important relationships and often works closely with partners in different countries. Here's a look at what Cortec's reps have been up to lately in conjunction with some of those local distributors.

Jessi Jackson Meyer (VP Sales, MCI®) recently spent three days at Manufacturers Packaging (ManPac) doing a series of "Lunch & Learns" and "Breakfast & Learns" with various engineering and contractor groups in Alabama (USA). One of these was the Structural Engineer Association of Alabama. Meyer and ManPac also met with the State Port Authority during her visit.

Heading over to the San Francisco Bay Area, Meyer collaborated with Rae Jean Nicholl of S.M.A.R.T. Distribution, to spend a day making presentations on Cortec® MCI® materials. They finished with an evening presentation for Westcon (Western Construction Consultants Association) on Organic Corrosion Inhibitors.

Jessi Meyer gave a "Lunch & Learn" to the Engineers Association of Alabama.



(Left to right) Andrea Moore (ManPac), Jessi Meyer, and Beth Morrisette (ManPac).





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MCI® News



Ivana Liposcak and Jessi Meyer spent time in the UK with David Kitchin of Lake Chemicals, focusing on MCI® repair product presentations.

Traveling to the UK, Meyer joined Ivana Liposcak (MCI® Technical Sales Manager, Europe) in late April for a week of work with David Kitchin of Lake Chemicals. Together, they focused on giving MCI® repair product presentations to contractors and consultants in the region. They also attended the UK Chemical Association Luncheon (of which Lake Chemical's Steven Cartlidge is President).

On the European continent, Liposcak has also been doing some work in Spain with Jesús

Orte Crespo of Quimilock. The two visited the construction site of Factory Mayoral in Málaga, where repairs have begun on the deteriorating structure. The factory is under severe attack by carbonation and is experiencing corrosion that could cause structural instability. To protect the building from further corrosion, MCI®-2021 UV (a concrete sealer containing Migrating Corrosion



Ivana Liposcak examines rebar attacked by carbonation and corrosion at a factory in Spain.

Inhibitors and a UV tracer) will be used in the restoration.

Contributing to the technical world, Cortec® Middle East (CME) teamed up with Cortec® Europe to present a paper at CoMS-2017. This was the First International Conference on Construction Materials for Sustainable Future and took place April 19th-21st in Zadar, Croatia. Liposcak represented Cortec® in conjunction with Nizar Marjaba from CME. During the event, Marjaba presented a paper on "Biobased and Sustainable Multifunctional Corrosion Inhibiting Admixture Used in the World's Tallest Building: Burj Khalifa," authored by himself, Usama Jacir (CME), and Dr. Mohamad Nagi (American University in Dubai).



Nizar Marjaba (CME) and Ivana Liposcak represented Cortec® at the first ever CoMS-2017 event in Croatia.

In Canada, Ashraf Hasania (MCI® Technical Sales & Market Manager) provided technical training to two distributors in Saskatchewan and Manitoba, highlighting the advantages of Cortec® MCI® versus competitors' products. He was later joined by Joe Solomon from Specialty Construction Products to give "Lunch & Learn" seminars at two engineering firms in the Winnipeg area. The two were able to meet with representatives of a local ready mix concrete supplier and a building services firm, as well.

Late May brought Meyer to the Middle East to join our Cortec® office in Dubai on several engineer and contractor visits and a visit to distributor Texel in Oman. Cortec® Middle East has also been doing research on the use of CP and MCI® together and will be presenting on this topic at the NACE Concrete Service Life Extension conference in New York City the last week of June.



CME visit to Oman: (left to right) Shabin, Binu, Nizar, Jessi, and Shahin.

Back in the USA, Cortec® MCI® is excited about new wireless iCorr equipment that has come out for measuring corrosion current of embedded concrete reinforcement. Cortec's distributor Corrosion Control Resources has already purchased one of these cutting edge pieces of equipment for use in their MCI® projects, and Meyer had the opportunity to see a demonstration of the equipment on her visit to their offices. She is excited about how the new equipment will allow for faster and easier corrosion evaluations on MCI® projects.



Corrosion Damage

Drew JOHNSON taking iCorr measurements

Cortec® is thankful for the hard work and collaboration of these and many other partners, who help bring MCI® solutions for extending concrete service life to end users around the globe.



MIGRATING CORROSION INHIBITORS
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MCI® News

Upcoming Events

Members of the Cortec® MCI® team will be attending numerous events in the next six months and encourage distributors and reps to also consider attending some of these meetings.

Particularly exciting events on the calendar are the July ACA International Concrete Symposium, which has invited Jessi Jackson Meyer to present an in-depth paper on 'Organic Corrosion Inhibitors – New Build & Existing Structures Performance,' and the Cortec® World Sales Meeting in September, when Cortec® friends and family will gather from around the world for their biannual reunion. Follow the links to learn more about these upcoming events!

NACE International Concrete Service Life Extension Conference

June 27th-29th, 2017

Columbia University

New York City, New York, USA

<http://concrete.nace.org/>

(Cortec® Middle East will be presenting research on using CP and MCI® together.)

ACA (Australian Corrosion Association) International Concrete Symposium

July 26th-27th, 2017

Melbourne Marriot Hotel

Melbourne, Australia

<https://events.corrosion.com.au/brian-cherry-international-symposium/>

(Jessi Jackson Meyer will present her paper on 'Organic Corrosion Inhibitors – New Build & Existing Structures Performance,' on July 27th.)

2017 Cortec® World Sales Meeting

September 13th-16th, 2017

Saint Paul, Minnesota

<http://www.cortecwsm.com/>

ACI Fall 2017: "Making Connections"

October 15th-19th, 2017

Disneyland® Hotel

Anaheim, California (USA)

<https://www.concrete.org/events/conventions.aspx>

2017 ICRI Fall Convention: "Docks, Locks, and Canals"

November 15th-17th, 2017

Hyatt Regency New Orleans

New Orleans, Louisiana USA

<http://www.icri.org/event/2017FallConv>

