CONCRETE REPAIR
BULLETIN
A Bimonthly Publication of the International Concrete Repair Institute

September/October 2018
Vol. 31, No. 5

SEISMIC SOLUTIONS

INTERNATIONAL
CONCRETE REPAIR
INSTITUTE

Compensation and Benefits for the Concrete Repair Industry Explored for the First Time

300+ firms throughout the United States surveyed.

"Stay competitive in this tough labor market with knowledge of compensation changes and trends!"

On Sale Now

Visit www.icri.org

Concrete Repair Bulletin
is published bimonthly by:
International Concrete Repair Institute, Inc.
1000 Westgate Drive, Suite 252
St. Paul, MN 55114
www.icri.org

For information about this publication or about membership in ICRI, write to the above address, phone (651) 366-6095, fax (651) 290-2266, or email info@icri.org. The opinions expressed in *Concrete Repair Bulletin* articles are those of the authors and do not necessarily represent the position of the editors or of the International Concrete Repair Institute, Inc.

ISSN: 1055-2936

INTERNATIONAL CONCRETE REPAIR INSTITUTE

ON THE COVER: Seismic Retrofitting of a 28-Story Hotel, and the CFRP confinement of lobby column. See page 16 for the full story.

CONCRETE REPAIR BULLETIN

September/October 2018
Vol. 31, No. 5

FEATURES

DEPARTMENTS

NOTE FROM THE EDITOR

Fall is now here and a busy ICRI year is starting to wrap up. This year has been a productive one for ICRI. Several Concrete Slab Moisture Testing Certification and Concrete Surface Repair Technician Certification classes have been held around the country. With the participation of over 300 companies, ICRI has released the first-ever Compensation and Benefits Survey for the concrete repair industry. ICRI and its members have also been actively lobbying for the adoption of ACI 562, the *Concrete Repair Code,* in several states, and was part of the successful campaign to have ACI 562 adopted by Ohio in August.

The 2018 ICRI Fall Convention, November 7-9, 2108, will be held at the Omaha Marriott Downtown at the Capitol District in Omaha, Nebraska. This year's theme is *Resiliency: Above and Beyond Concrete Restoration* and will provide a wealth of technical information and a great networking opportunity for all members.

This issue of the *Concrete Repair Bulletin* contains articles about strengthening concrete bridges, Fabric-Reinforced Cementitious Matrix (FRCM) for strengthening and retrofitting of existing structures, and a case study of a seismic retrofit of a 28-story hotel. This issue also includes an article that details the ICRI State of the Institute.

I hope you all have a good fall and successfully wrap up this construction season. I look forward to seeing you in Omaha in November!

Jerry Phenney, Editor, CRB
MAPEI Corporation

UPCOMING DATES & INFORMATION

CERTIFICATION CLASSES

Concrete Slab Moisture Testing Certification Program
- September 19-20, 2018—Baltimore, Maryland Area
- November 5-6, 2018—Omaha, Nebraska

Concrete Surface Repair Technician Certification Program
- November 6, 2018—Omaha, Nebraska (Live Performance Exam)

2018 ICRI FALL CONVENTION

Theme: *Resiliency—Above and Beyond Concrete Restoration*
November 7-9, 2018—Omaha Marriott Downtown at the Capitol District, Omaha, Nebraska

PRESIDENT'S MESSAGE

Where in the World is Cagayan de Oro?

RALPH C. JONES

For a President's message this may seem like a ridiculous question, but it really isn't. While Cagayan de Oro, Philippines, is over 8,000 miles from St. Paul Minnesota there is a direct link between the two cities. The headquarters for the International Concrete Repair Institute (ICRI) is located in St. Paul Minnesota, and ICRI has five company members and one individual member located in Cagayan de Oro. In fact, ICRI has members on every continent in the world except Antarctica. (Apparently Antarctica is a tough market to crack for concrete repair.)

What does this mean? It means that ICRI has a lot to offer concrete repair design professionals, contractors, manufacturers, educators and administrators around the world. While our membership is predominantly from the United States and Canada in North America, our influence reaches regions far beyond what most of us really understand. When our members are working on guidelines, education programs and certification programs they are quite literally making an impact on concrete repair around the world.

For our membership it means potential new business, contacts and networking opportunities. It also means members can now interface with like-minded colleagues around the world, and gain a better understanding of concrete repair procedures that may be the same, or may differ depending on region. These are colleagues that members may not have any other way of meeting.

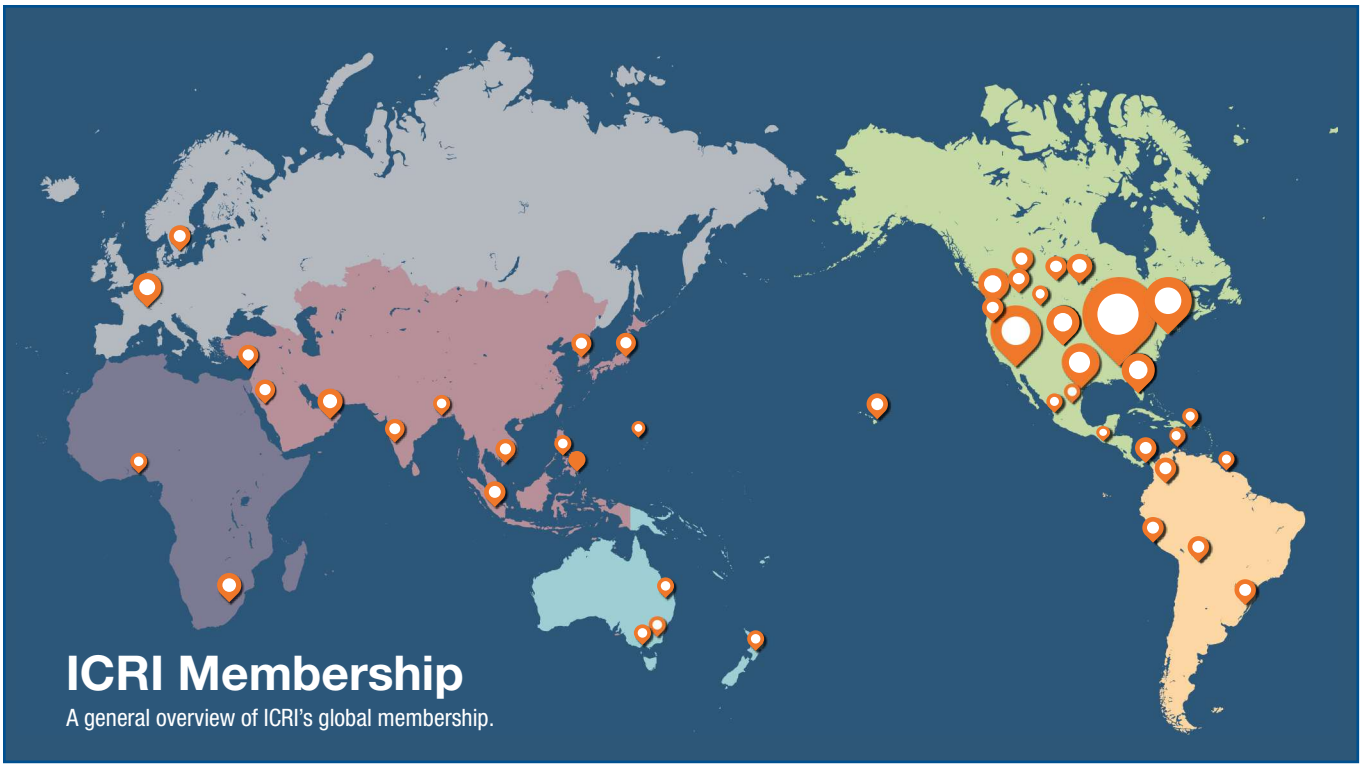
In addition to having membership from around the world, there has been interest recently in forming chapters in Dubai, Mexico and Central America.

At the Spring Convention in San Francisco, I was able to speak to a couple from Panama. We had a fascinating conversation and they informed me that ICRI guidelines and documents were used in their coursework in Spain for their Master's program in concrete repair.

ICRI Treasurer John McDougall recently made a trip to meet with the Concrete Repair Association (CRA) in the United Kingdom to make a presentation about ICRI. He discussed our guidelines, our certification programs and our concrete surface profile chips. John also met with leaders of the CRA and other organizations and investigated ways the two organizations could collaborate to advance concrete repair through both organizations.

ICRI currently has a memorandum of understanding with the Australasian Corrosion Association, Inc., in Australia and a memorandum of understanding with the British Columbia Floor

Continued on page 6



ICRI Membership

A general overview of ICRI's global membership.

Protectosil®

Water Repellents, Corrosion Inhibitors, Graffiti Control & Crack Sealers

Protectosil®

Protectosil® CHEM-TRETE
Protectosil® AQUA-TRETE®



Protectosil® Corrosion Protection



Protectosil® ANTIGRAFFITI



Protectosil® MMA Crack Sealer HE



Protectosil® Water Repellents

- Penetration deep into the substrate
- Treated structure remains breathable
- UV resistant

Protectosil® CIT
Protectosil® 300C

- Extends the service life of the structure
- Easy and low-cost spray-on application
- Anti-spall or corrosion monitoring warranties available

Protectosil® ANTIGRAFFITI

- Repels graffiti and aids in removal
- Withstands repeated cleaning cycles
- Lower maintenance cost

Protectosil®
MMA Crack Sealer HE

- Excellent crack penetration
- Cures within two hours
- Extends service life of concrete structures

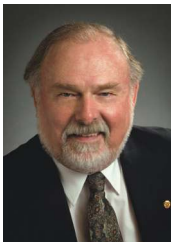
Learn more about our comprehensive line of Protectosil® products including water repellents and anti-graffiti treatments.

Evonik Corporation
Building Protection
299 Jefferson Road
Parsippany, NJ 07054-0677
PHONE +1 800 828-0919
info.protectosil@evonik.com
www.evonik.com/protectosil

EVONIK
POWER TO CREATE

TACTALK

A Look Back



JIM MCDONALD

Since 2018 is the 30th Anniversary of ICRI, I have been asked to briefly summarize Technical Activities Committee (TAC) activities to date. Kevin Michols, TAC Chair (2008-2013), did an excellent job of summarizing the organization of ICRI since its formation in 1988 and technical activities in the earlier years during the 25th Anniversary celebration (*Concrete Repair Bulletin [CRB]* Jan/Feb 2014). Therefore, I will concentrate on recent and current activities in this look back.

TAC members—particularly Fred Goodwin (Chair), Rick Edelson, and Mark Nelson—were instrumental in implementation of the ICRI Strategic Plan adopted following the 25th Anniversary. See Fred's explanation of the roles and interaction between the Technical Activities Committee (TAC), Strategic Implementation Committee (SIC), Coordination Committee, and the Secretariat in "TAC Talk" (*CRB* Sep/Oct 2017). Rick Edelson and Mark Nelson are current members of the Secretariat, a major component of the ICRI organization's structured growth. TAC and individual technical committees continue as major parts of the overall ICRI organization.

TAC has continued to collaborate with other organizations in developing documents pertinent to the concrete repair industry. For example, a number of TAC and ICRI technical committee members made significant contributions to ACI 562-13, *Code Requirements for Evaluation, Repair, and Rehabilitation of Concrete Buildings* and the updated ACI 562-16, *Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary*. Also, Fred Goodwin and ICRI Committee 150, Rick Edelson, Chair, contributed to development of a *Guide to the Code* on how to interpret, properly use, and implement the ACI 562 Repair Code requirements. The original joint ICRI/NACE/SSPC document, *Guide for Design, Installation, and Maintenance of Protective Polymer Flooring Systems for Concrete*, has been updated and the revision is currently being balloted by ICRI Committee 710. Plans for revision of the joint ICRI/PTI document, *Guide for Evaluation and Repair of Unbonded Post-Tensioned Concrete Structures*, have been approved.

A revised Committee 310 document, *Guide for the Preparation of Concrete Surfaces for Repair Using Hydrodemolition Methods*, was published in June 2014. Committee 710 document, *Guide for Horizontal Waterproofing of Traffic Surfaces*, was published in October 2014. A Committee 410 request to develop a *Practice Guide: In-Place Stabilization of Terra Cotta*, was approved with comment by TAC in November 2014. The Committee plans to complete the draft and ballot before the Fall 2018 convention. A Committee 130 document, *Guideline for Procurement of Concrete Repair Services*, was approved by TAC in May 2018 pending compliance with TAC review comments. A Committee 320 document, *Guideline for Structural Grout Materials Data Sheet Protocol*, was approved by TAC in April 2018 pending compliance with TAC review comments. The Committee 320 document, *Pictorial Atlas of Concrete Repair Equipment*, was revised to include two new chapters on hand tools and power trowels and was published in May 2014. A revised Committee 210 document, *Guide for Verifying Field Performance of Epoxy Injection of Concrete Cracks*, was approved by TAC and published in January 2016. A revised Committee 210 document, *NDE Methods for Condition Assessment, Repair and Performance Monitoring of Structures*, was approved by TAC in April 2018 pending compliance with TAC review comments. A revised Committee 320 document, *Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces*, has been approved by TAC and is scheduled for publication in September 2018.

In addition to traditional guidelines, TAC is currently using other forms of technology transfer including specifications, PowerPoint presentations, and other online tools. Committee 110 produced the first guide specification, *Structural Concrete Repairs*, that was published in January 2016. The committee also drafted a PowerPoint presentation to introduce the specification. Committee 110 recently balloted a draft specification, *Epoxy Injection of Concrete Cracks*, that is now being prepared for TAC review. A Committee 330 guide specification, *Externally Bonded FRP Fabric Systems for Strengthening Concrete Structures*, was published in October 2016.

TAC approved a Committee 320 request to develop a web-based educational tool, *Concrete Cracks – Identification, Causes, and Prevention*, in November 2014. TAC conducted a preliminary review of one module in November 2015. This module has been formatted by staff and and was scheduled to be reballoted within committee in Summer 2018. Committee 320 is working on the next five modules. A revised Committee 210 document, *Guide for Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials*, was published in December 2013. The committee request to develop a webinar, *Applications, Testing, and Interpretation of In-Situ Pull-Off Tests*, was approved by TAC in April 2016. The draft webinar was successfully balloted by Committee 210 and has been forwarded for TAC review.

The Concrete Surface Repair Technician (CSRT) Certification Program was introduced in June 2016. The program includes five online training modules, an online knowledge examination, and a performance examination on four ASTM standard test methods. TAC reviewed the technical content of the program. Committee 330 submitted a training plan and certification outline, *FRP Inspector Certification Program*, for TAC review prior

Continued on page 6

PRESIDENT'SMESSAGE

Continued from page 2

Covering Association in Vancouver, British Columbia, Canada, and many of our member companies have operations covering the globe.

While ICRI has made contributions to concrete repair well beyond North America, it has never had a formal outreach program to other countries. That is changing. Understanding the need for continued education in concrete repair around the world, and realizing that we have members from around the world, ICRI has created the ICRI Global Task Force; it is headed up by ICRI Past President Garth Fallis and is supported by ICRI Executive Director Mike Levin. It is made up of 11 ICRI members who either have direct international experience or represent companies that do. These 11 members have been asked to collaborate together to research and identify other parts of the world where ICRI can provide a meaningful contribution to concrete repair. This is a bold challenge but one I am confident we can meet with the support of our members. The task force's first goal will be to research and identify countries or regions where ICRI services are needed and how best to meet those needs.

To accomplish such a task, ICRI needs input from its members. If you or your company have operations outside of North America, or you are outside of North America, we would be interested in your thoughts and suggestions on where and how to expand ICRI into other countries. Please contact ICRI Executive Director Mike Levin at mikel@icri.org and share your thoughts, or provide the names of others we could contact to get a more in-depth understanding of the needs for concrete repair around the world. Your thoughts and opinions are important to ICRI.

This is just one of dozens of initiatives being developed by ICRI each day. We welcome you to become a part of advancing best practice methods for the global concrete repair industry.

What an exciting time it is to be a member of ICRI!

Ralph C. Jones, PE
2018 ICRI President ■

TACTALK

Continued from page 4

to forwarding to the Certification Committee in April 2017. TAC will continue to review technical content as appropriate.

The current TAC *Concrete Repair Terminology* document was published in June 2015. It includes definitions for more than 2,000 terms related to concrete deterioration, evaluation, repair, maintenance, etc. Anyone can search this resource on the ICRI website or it can be downloaded as a PDF file. TAC is currently reviewing all of the terminology from existing ICRI documents to verify that definitions are consistent within ICRI.

The companion TAC documents *Technical Committee Manual* and *Style Manual* were combined and published in 2015. This provided a single source for detailed guidance in organization and operation of technical committees to produce concise, well-written ICRI technical documents. This *Technical Committee Manual* was revised in 2018. Primary changes included adding a format section for specifications, and encouraging development of PowerPoint presentations concurrent with traditional documents as alternatives. Also, TAC's responsibility for review of the technical content in certification programs was defined. The TCM is available on the ICRI Technical Committee website page.

TAC continues to be responsible for technical sessions at ICRI conventions. The TAC Technical Session Subcommittee, Peter Golter, Chair, has done an outstanding job in soliciting abstracts for presentations, reviewing and ranking submittals, and making final selections for presentation. This subcommittee also assists in providing moderators for each technical session and assesses presentations as potential webinars.

TAC continues to encourage technical committees to provide material for publication in the *Concrete Repair Bulletin* (*CRB*). Committees often prepare articles for the *CRB* when new and revised committee documents are published. Examples include the Committee 160 introduction to the White Paper, *Sustainability for Repairing and Maintaining Concrete and Masonry Buildings*, *CRB* (Sep/Oct 2014) and the *Introduction to ICRI Technical Guideline No. 210.1R-2106, Guide for Verifying Field Performance of Epoxy Injection of Concrete Cracks*, *CRB* (Mar/Apr 2016). Committee 120 has contributed content for the "Safety Solutions" feature in several issues of *CRB*. Technical committees also prepare articles on a rotating schedule for *CRB*.

As confidently predicted by Kevin Michols during the 25th Anniversary celebration, ICRI technical activities have flourished under the leadership of Fred Goodwin. Also, I am convinced that Kevin's closure remains true. If you are not already, please consider sharing your expertise and experience with other ICRI members by joining a technical committee, giving a presentation, or submitting a project for award consideration. I am confident that the effort will be personally rewarding with great satisfaction.

Your participation will allow ICRI to continue to grow and evolve as the only organization that specifically addresses the needs of the concrete repair industry. ■

***Jim McDonald** is TAC secretary, an ICRI Honorary member and Fellow, and received the ICRI Distinguished Service Award.*

New **Q-Max Pro Concrete Mix** is the first and only concrete mix to deliver one-hour working time, three-hour walk-on time, and 6500 PSI compressive strength. With superior workability plus crack resistance, freeze-thaw durability, and corrosion resistance. **Quikrete.com.**

QUIKRETE®

WHAT AMERICA'S MADE OF.®

CEMENT & CONCRETE PRODUCTS™

SECRETARIATUPDATE

MARK NELSON

Open, accessible and efficient—these are words that often arise during our monthly Secretariat meetings. As a reminder, the Secretariat was formed to uncover, document and facilitate ideas through the network of ICRI committees. We constantly strive to ensure that all ICRI member voices are heard and all ICRI initiatives are moved through the relevant ICRI committees.

One facet of this program we would like to focus on this month is the submittal of ideas from local ICRI chapter members. ICRI's strength is our openness to all members. At our national conventions, any ICRI member can attend, and participate in, almost all of our technical and administrative committee meetings and discussions. We believe this accessibility provides a vibrancy of ideas that is unique in large trade organizations.

The ***idea*** platform, through the Secretariat, creates a simple and viable option for any ICRI member to get involved in the national ICRI organization. Even if you cannot attend national ICRI conventions, you can still get involved by submitting an ***idea*** to the Secretariat. Once you submit, we will review your ***idea*** to determine if it will be taken up as an ICRI initiative at this time. Once that initiative is created, the Secretariat follows it through to completion. As the ***idea*** submitter, you will receive a return email confirming the status of your ***idea***.

In addition, you will have the option to get involved with the progress of the Initiative if you so desire.

If you are a local ICRI chapter member reading this article, we ask that you think about how ICRI could be improved on a national level. If you come up with an ***idea***, please take 5 minutes to go to the ICRI website and submit that ***idea*** to the Secretariat. To submit your ***idea***, just find the icon directly under the Quick Links listing on the home page. The title is listed as "Idea Submission to the ICRI Secretariat."

We look forward to receiving your new ***idea***. ■

Mark Nelson *is an ICRI Secretariat and serves on the ICRI Technical Activities Committee and several administrative/technical committees.*

Stainless-steel anchorage for any application.

Cracked Concrete CODE LISTED

Our code-listed Titen HD® heavy-duty screw anchor is now available in Types 316 and 304 stainless steel to resist corrosion and maintain the structural integrity of concrete. Type 316 is the optimal choice for applications in corrosive or severe environments such as near chemicals or salt water. Type 304 is a cost-effective solution for less extreme applications, including in wet, moist or damp environments.

To learn more about the Titen HD (available in ⅜", ½", ⅝" and ¾" diameters) visit **go.strongtie.com/titenhdss** and **download our guide** or call (800) 999-5099.

SIMPSON Strong-Tie®

SUPPORTING MEMBERS

3M
Saint Paul, Minnesota
www.3m.com

CPR saving the life of concrete®
Baltimore, Maryland
www.concretecpr.com

HD SUPPLY CONSTRUCTION & INDUSTRIAL
AH HARRIS WHITE CAP
West Hartford, Connecticut
www.ahharris.com

APT
Harmony, Pennsylvania
www.advpolytech.com

CSI CONTRACTING SPECIALISTS INCORPORATED
Attleboro, Massachusetts
www.contractingspecialists.com

KEMPER SYSTEM
West Seneca, New York
www.kempersystem.com

AQUAFIN
Elkton, Maryland
www.aquafin.net

CORTEC CORPORATION
Environmentally Safe VpCI™/MCI® Technologies
Saint Paul, Minnesota
www.cortecvci.com

KRYTON SMART CONCRETE®
Vancouver, BC, Canada
www.kryton.com

BASF We create chemistry
Shakopee, Minnesota
www.buildingsystems.basf.com

EUCLID CHEMICAL
Cleveland, Ohio
www.euclidchemical.com

LymTal International, Inc.
Iso-Flex® brand of products
Atlantic Beach, Florida
www.lymtal.com

BENGOA CONSTRUCTION
Hollywood, Florida
www.bengoaconstruction.com

EVONIK POWER TO CREATE
Parsippany, New Jersey
www.protectosil.com

MAPEI®
Deerfield Beach, Florida
www.mapei.com

BONDED®
Kapolei, Hawaii
www.bondedmaterials.net

GRACO
Minneapolis, Minnesota
www.graco.com

MINOVA
Georgetown, Kentucky
www.minovaglobal.com

C.A. LINDMAN INCORPORATED
Jessup, Maryland
www.calindman.com

HD SUPPLY CONSTRUCTION & INDUSTRIAL WHITE CAP
Norcross, Georgia
www.whitecap.com

MIRACOTE
A Division of Crossfield Products Corporation
Rancho Dominguez, California
www.miracote.com

SUPPORTING MEMBERS

INTERNATIONAL CONCRETE REPAIR INSTITUTE

NEOGARD CONSTRUCTION COATINGS
Dallas, Texas
www.neogard.com

Saveto / vetonit
Riyadh, Saudi Arabia
www.saveto.com

structural
Columbia, Maryland
www.structural.net

NCFI POLYURETHANES
Mount Airy, North Carolina
www.ncfi.com

SCHÖNOX HPS NORTH AMERICA
Florence, Alabama
www.hpsubfloors.com

TEC Services
Testing • Engineering • Consulting
Lawrenceville, Georgia
www.tecservices.com

PPG PAINTS
Clearwater, Florida
www.ppg.com

SHERWIN-WILLIAMS
Cleveland, Ohio
www.swconcretecoatings.com

TEKNA CHEM
Renate, Italy
www.teknachem.it

PROSPEC
Aurora, Illinois
www.prospec.com

BUILDING TRUST Sika
Lyndhurst, New Jersey
www.sikausa.com

UFLOOR INC. SYSTEMS
Aurora, Colorado
www.ufloorsystems.com

PULLMAN
A Structural Group Company
Columbia, Maryland
www.pullman-services.com

SIMPSON Strong-Tie
Pleasanton, California
www.strongtie.com

VECTOR®
Winnipeg, Manitoba, Canada
www.vector-corrosion.com

COMMERCIAL GRADE QUIKRETE
Atlanta, Georgia
www.quikrete.com

SSI
Silicone Specialties Inc.
Houston, Texas
www.ssicm.com

W. R. MEADOWS SEALTIGHT
Hampshire, Illinois
www.wrmeadows.com

RESTORATION EAST LLC.
Baltimore, Maryland
www.restorationeast.com

SSRG Structural Systems Repair Group
Cincinnati, Ohio
www.ssrg.com

ICRI would like to thank its Supporting Members, whose dedication to ICRI is greatly appreciated. Your continued support greatly enhances programs both within ICRI and the concrete repair industry as a whole.

30 STATE OF THE INSTITUTE

BY MIKE LEVIN, CAE, ICRI EXECUTIVE DIRECTOR

ICRI had its origins at a World of Concrete seminar held in February 1988, during which attendees voiced their frustration about the lack of standards and guidelines for concrete repair. They also expressed their concern over the proliferation of unqualified contractors entering the industry. These inexperienced contractors were not properly trained in concrete repair and were underbidding them without proper knowledge of surface preparation, equipment, materials, techniques, etc.

In response to these concerns, the International Association of Concrete Repair Specialists was formed with a formal organizational meeting in Naperville, Illinois, on May 21, 1988, that was attended by 66 repair specialists. In 1993, the association's name was changed to the International Concrete Repair Institute.

Thirty years later the organization that founding members created is better than ever and continues as the only organization solely dedicated to the concrete repair and restoration industry. True to its origins, the Institute exists for one reason—to serve its members and the industry.

Who Are We 30 Years Later (Fig. 1)

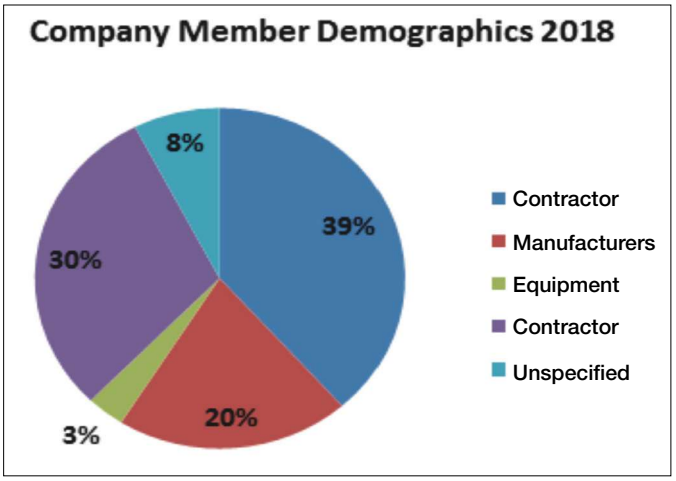


Fig. 1: 2018 Company Member Demographics

> *"I have never seen so much energy in this organization. What is equally as impressive is how this new energy is being harnessed into new ideas and programs."*
>
> ICRI President Ralph C. Jones, PE, ICRI member 15+ years

> *"ICRI and the Carolinas Chapter were instrumental in shaping my career. It's where I was welcomed as an equal and a peer amongst the industry's who's who—all seeking to gain more and new knowledge in our industry. Equally important are the professional development opportunities I was afforded—working on committees, working in a team. The Carolinas Chapter is where I learned how to be a professional. The leadership and their mentorship were very welcoming as I grew through my mid-twenties. The chapter leaders who welcomed me into the Carolinas and ultimately supported me to engage at a national level are still folks I revere."*
>
> John McDougall, ICRI Treasurer

Fig. 2: Testimonials

Members Say It Best

The best way to evaluate if the organization is serving its members is to ask them. Two testimonials that reflect how the association is meeting member needs are featured in Figure 2.

Recognition!

Being named an ICRI Fellow is recognition of someone who has made many noteworthy contributions to ICRI and the concrete repair industry in general. Mark DeStefano and Ashok Kakade were elevated to Fellows of the Institute at the 2018 Spring Convention.

Also at the Spring Convention, 22 ICRI chapters were recognized as Outstanding Chapters and two more were cited as Excellent Chapters. The Chapter of the Year was awarded to the Great Plains Chapter, and the Gulf South Chapter took home the award for the Most Improved Chapter.

At the 2017 Fall Convention in New Orleans, nine repair projects were recognized with Awards of Excellence, and an additional ten

projects took home Awards of Merit. The Project of the Year Award was presented to the Alcatraz Quartermaster Building Restoration Project submitted by Sika Corporation. Attendees of the 2018 Spring Convention were provided an opportunity to tour the facilities, led by members of the Concrete Preservation Institute (CPI).

NOTE: In conjunction with the celebration of ICRI's 30 years, the remaining portions of this year's State of the Institute Report will be different from previous years as the content will focus on "ICRI by the numbers."

Finances Continue to Be Sound (Fig. 3-5)

- $2,225,162 total revenue.
- $831,029 total membership dues revenue which resulted in a $49,788 net surplus over budget.
- $167,469 net income gain over budgeted loss of -$154,325.
- $92,487 net surplus over budgeted advertising revenue.

Technical Programs and Committees Continue to Drive ICRI

- 35 technical presentations at ICRI conventions now archived on the ICRI website.
- 2 Vision 2020 sessions at ICRI Fall Convention.
- 1 new software implementation linked to website (Causeway) for committee organization, document storage, and balloting.
- 1 updated Technical Committee Manual (TCM) published on Causeway.

Certification Programs Continue to Benefit Members and the Industry

- 1 new full-time ICRI Certification Manager started in May to promote and maintain existing/future certification programs.
- $148,983 net income profit—or double the budget of $74,750.

Concrete Slab Moisture Testing Technician (CSMTT) Certification Program

- 163 total certified/recertified vs. 90 last year.
- 194 participants vs. 118 in FY16-17 and average class size of 22 vs 15 in FY 16-17.
- 8 classes conducted including: Baltimore; Denver (during local chapter symposium); Chicago; Pompano Beach PCU; Dallas/Ft. Worth area (company in-house); World of Concrete; The International Surface Event (TISE); and partnered with the Flooring Contractors Association (FCICA) in Biloxi during their convention/trade show.
- 1 - First class in Canada held in conjunction with the British Columbia Floor Covering Association (BCFCA) in Vancouver.
- 1 new chapter/partner rebate program established and implemented at 3 CSMTT classes.

Concrete Surface Repair Technician (CSRT) Program

- 29 total certified technicians since launch in June 2016 (26 in FY 17-18).
- 6 of 6 participants passed the live performance exam class conducted in North Texas in February 2018 and became certified.

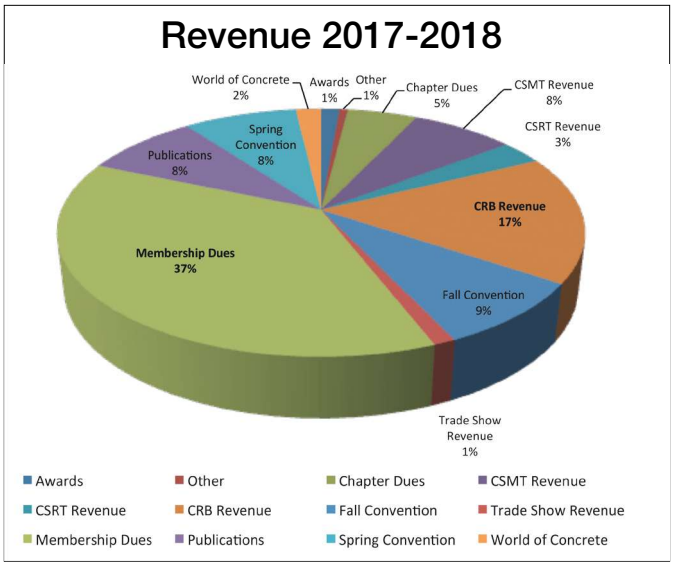


Fig. 3: 2017-2018 Revenue, Non-dues revenue=63%

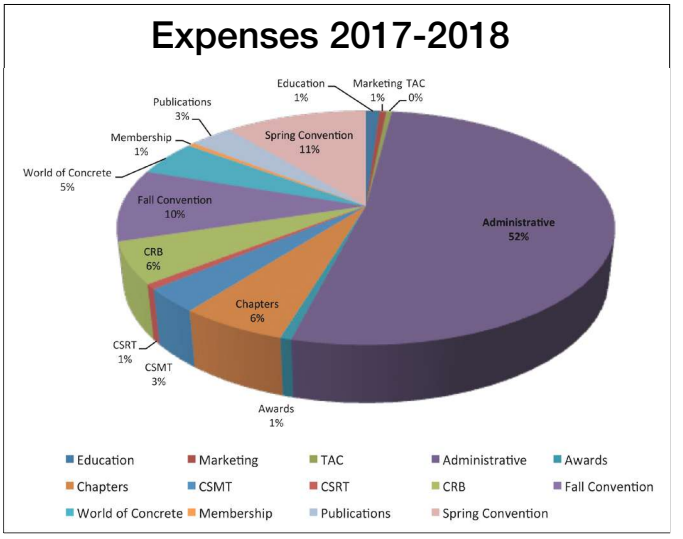


Fig. 4: 2017-2018 Expenses

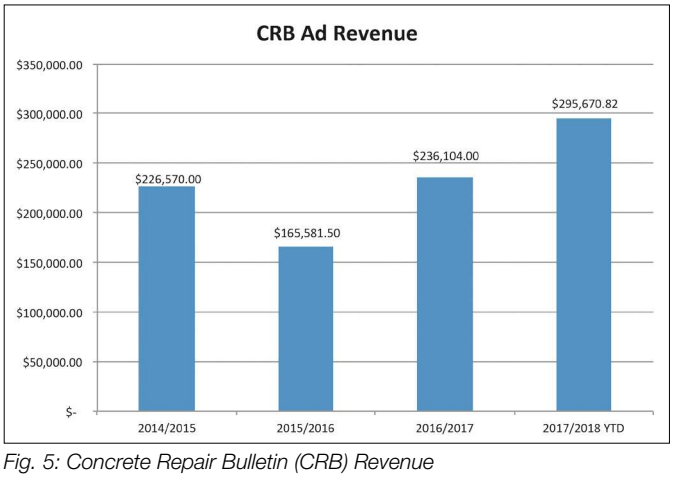


Fig. 5: Concrete Repair Bulletin (CRB) Revenue

Educational Products

- 5 ACI 562 videos launched on the ICRI website – free to ICRI members.
- 1 huge step forward with the adoption of ACI 562 Repair Code in Ohio, assisted by ICRI endorsement letter campaign. The CSRT certification program is included in ACI 562.
- 1 new certification program under development (FRP Technician Program).
- 2 new products under development (Pull-off Testing Webinar and Crack Identification Training Modules).

2017-2018 Conventions

- 607 total attendees networked, attended educational sessions and committee meetings, learned about best practices, made new acquaintances and had fun at the 2017 Fall (342 in New Orleans) and 2018 Spring (265 in San Francisco) Conventions.

Secretariats

- 27 new ideas were submitted to the Secretariats last year; most became initiatives to be developed by committees and staff.

Since last year's report, ICRI continued to implement new programs and changes that will carry over into future years and provide new member benefits for many years to come. New programs and projects are only approved if they fit into the ICRI mission and strategic plan (Fig. 6).

Chapters

- 39 Chapters.
- 2 new chapters approved at 2018 Spring Convention: Central Ohio Chapter and the Mid-South Chapter.
- 2,363 total chapter members.
- 62.8 average members per chapter.

Membership Hits Another Record

- 2,615 total ICRI members, exceeding the record set last year.
- 92% member retention rate—higher than association industry standards.

Fig. 6: Strategic Plan

Industry Partnerships

- 13 formal partnerships with industry related organizations that provide additional resources for ICRI members. The list can be found on the website.
- 1 new international partnership in Australia—the Australasian Corrosion Association (ACA).

Publications and Products

- $124,542 in revenue generated from sale of ICRI publications, including Concrete Surface Profile Chips (CSP).
- $104,408 of those sales were from the CSPs.
- 1,367 individual units sold.
- 423 guideline PDF downloads—free to members.
- 22,639 total digital versions of the *Concrete Repair Bulletin* (*CRB*) were distributed; the digital version was introduced toward the end of the fiscal year. The introduction of the digital version reduced the number of print copies distributed from 15,276 to 3,582 per issue.
- 90,843 total copies of the *CRB*, including print versions, were distributed during the year.

Social Media (Fig. 7 & 8)

- 10,556 ICRI followers on Facebook, which is largely comprised of males ages 18-34 as seen below. Facebook continues to be ICRI's most valuable social media tool, drawing the largest audience and engagement.
- 76.54% of all social media referrals are from Facebook.

Who Are Your Fans?

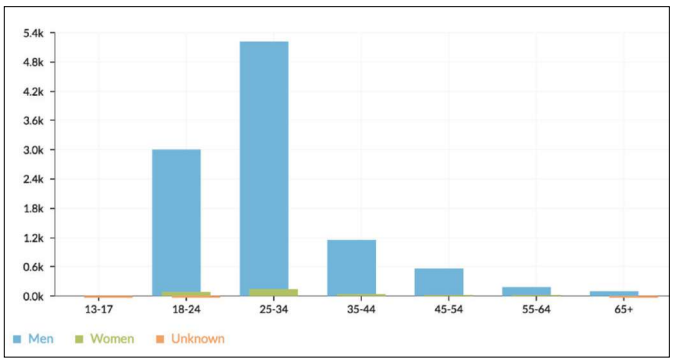


Fig. 7: The age group and gender of your fans.

1.	Facebook	793
2.	Twitter	98
3.	LinkedIn	82
4.	Weebly	39
5.	Blogger	22
6.	Naver	1
7.	YouTube	1

Fig. 8: Facebook comprises the majority of social media referral traffic, which is consistent with past figures.

World of Concrete

- 270 attendees at the 2018 ICRI Kickoff Party at World of Concrete (WoC).
- 12: number of years Kick-off Party has been held.
- $25,446 revenue received from WoC for ICRI's co-sponsorship which includes attendees who registered through ICRI and who receive the ICRI discount.

ICRI World Expansion

- 9 ICRI members volunteered to serve on the new Global Expansion Task Force to explore whether and how to expand ICRI's presence around the world.

None of these successes would have been possible without the leadership of those dedicated individuals who have served over the years as Board and committee members. ICRI remains grateful to the many talented individuals who created ICRI, and to those who have served throughout the past 30 years making the Institute what it is today and planting the seeds for future growth.

I welcome and encourage you to let me know how you think ICRI can continue to serve its members and the concrete repair industry. Please reach out to me at mikel@icri.org.

Respectfully submitted,

Mike Levin, CAE
ICRI Executive Director

ICRI publishes highlights of the annual State of the Institute Report to provide members with information on the Institute, its finances and programs. A detailed report is provided to the Board to review the condition of the Institute and for strategic planning.

Seismic Retrofitting of a 28-Story Hotel

BY KEVIN GOUDARZI

Fig. 1: 28-story hotel after seismic retrofitting

This article highlights the seismic solution for the retrofitting of a 28-story hotel located in Tehran, Iran, in 2006 (Fig. 1 and 2). The hotel was built during the 1970s by a German engineering company from Stuttgart. The building is constructed of concrete and has continuous walls from the 2nd to the 28th floors. These walls partition the rooms and are made of reinforced concrete. They function as the preliminary resisting elements for seismic activity, such as during an earthquake.

A major deficiency in the building construction was the existence of a soft story in the lobby created by poor quality concrete columns up to 36 ft (11 m) high (Fig. 3). The columns were introduced to create a commercial space on the first story and are highly critical. These columns had very little stirrups and consisted of poor quality concrete with an average concrete compressive strength of 2900 psi (20 MPa). In buildings built in the 1970s, columns usually only have standard vertical and transverse reinforcement. In order for these columns to survive severe earthquake loading, they must have tightly spaced closed ties that are adequately anchored.

The shear walls at upper stories are discontinuous at the first floor. Since the walls stop at ground level, they introduce a discontinuity to the lateral load resisting system. This results in a structure with a soft story floor (the story in which lateral stiffness is less than 70 percent of that of the story above, or less than 80 percent of the average stiffness of the three stories above). Such designs are not allowed in seismic zones because a high demand is placed on the columns during earthquake loading.

Seismic Loading and Base Shear

Seismic loading is one of the basic concepts of earthquake engineering and means the application of an earthquake-generated agitation to a structure. It happens at contact surfaces of a structure either with the ground, or with adjacent structures. Base shear is an estimate of the maximum expected lateral force that will occur due to seismic ground motion at the base of a structure. Calculations of base shear (V) depend on:

- soil conditions at the site;
- proximity to potential sources of seismic activity (such as geological faults);
- probability of significant seismic ground motion;
- the level of ductility and over strength associated with various structural configurations and the total weight of the structure; and
- the fundamental (natural) period of vibration of the structure when subjected to dynamic loading.

Preliminary Design

In this project, modern methods were introduced for the seismic retrofitting of the hotel building. The preliminary design

was to apply fiber-reinforced polymer (FRP) to the columns and shear walls at the lobby level and the basement. However, it was demonstrated that applying FRP alone would not be satisfactory. The FRP would solve the shear problem of the columns; however, the column bending problems could not be satisfactorily solved. The columns would drift too much, resulting in high bending moments. As such, additional bracing with hydraulic dampers was determined for implementation on the lobby level and the first floor. [1]

CFRP and Epoxy Materials Testing and Assessment

Samples of carbon fiber reinforced polymer (CFRP) wraps and epoxies for the project were tested at the Swiss Federal Laboratories for Materials Science and Technology (EMPA) in Switzerland. The material test results were as follows:

- **Epoxy Test Result in Laboratory:**
  1. tensile strength: 6100 psi (42 MPa) ± 7.4%
  2. tensile elastic modulus: 650 ksi (4485 MPa) ± 1.5%

- **Epoxy Specified Values on Manufacturer's Data Sheet:**
  1. Tensile strength: 4350 psi (30 MPa) - (7 days at 73.4 F [23°C])
  2. Tensile elastic modulus: 652 ksi (4500 MPa) - (7 days at 73.4 F [23°C])

- **CFRP Composite Test Result in Laboratory** (Fig 4)**:**
  1. Ultimate load: 87 Kips (87,000 lbs) ± 7.6% per specific width and thickness
  2. Tensile elastic modulus 4400 ksi (30,360 MPa) ± 2.8%

- **CFRP Specified Values on Manufacturer's Data Sheet:**
  1. Ultimate load: 80 Kips (80,000 lbs) per specific width and thickness
  2. Tensile elastic modulus 3600 ksi (24,840 MPa)

An assessment of the material testing results concluded that the measured tensile strength exceeded and the elastic modulus was comparable to the manufacturer's data sheet specifications for the epoxy used; and the measured strength and elastic modulus of the CFRP composite impregnated with epoxy exceeded the manufacturer's data sheet specifications.

Fig. 2: Close-up of hotel before seismic retrofitting

Column and Shear Wall Confinement Design

The owner set the seismic performance level of the building to immediate occupancy for earthquakes with a 475-year return period. This means that the post-earthquake damage state should include very little structural damage. Accordingly, the


Fig. 3: Poor condition of concrete column

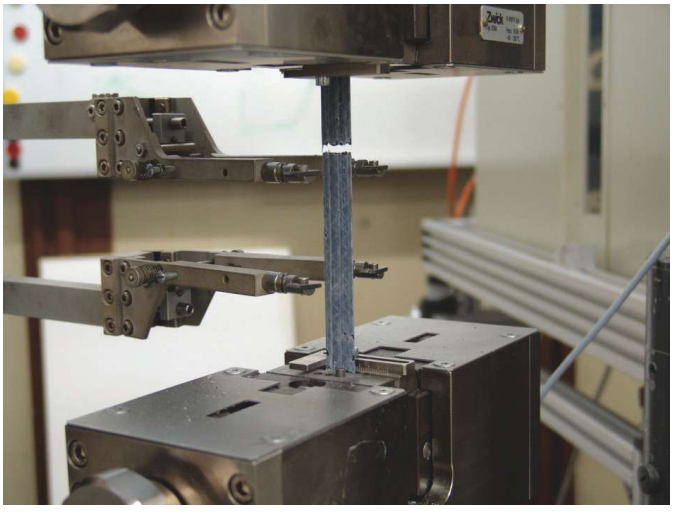


Fig. 4: CFRP sample after failure during tensile stress test

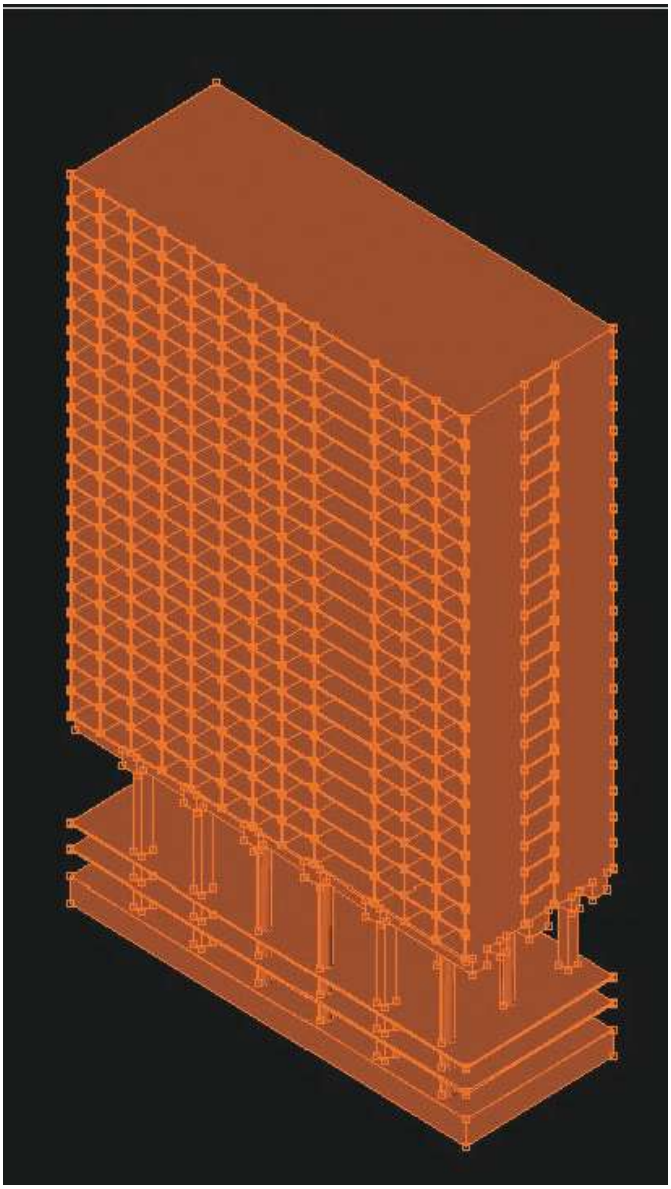


Fig. 5: Structural model of the building

basic vertical and lateral-load-resisting systems of the building should retain nearly all of the pre-earthquake strength and stiffness.

The seismic hazard due to the ground shaking is defined by the acceleration time history and response spectra. The local code of practice for seismic resistance design of buildings prescribes a response spectrum. The building is considered to be in a very high seismic zone. A site investigation was performed by the local Institute of Earthquake Engineering and Seismology in Tehran and a site-specific spectrum was determined for the building.

For the final design, non-linear analyses with acceleration time history were performed. An extensive finite element model was prepared (Fig. 5). The stiffness is frequency dependent and inputted to the structural software as springs and dampers to model the damping effect of the soil and the flexibility of the underlying soil. Including the soil effects reduced the loads by 17%.[2]

The dampers satisfy the following:

- Damper force from structural analysis;
- Damper stroke for the mitigation of earthquake vibrations;
- Thermal expansion/contraction; and
- Installation tolerances.

Retrofit Repair

To prevent overturning of the structure and reduce moment and shear at the base, 16 hydraulic dampers were utilized at the lobby and first floor. More than 215,000 sf (19,975 sm) of carbon fiber reinforced polymer (CFRP) was used to reinforce the columns and shear walls in the lobby and the two basement floors. Dampers were also installed with inverted V-bracings (Fig. 6).

All 36 ft (11 m) high circular columns in the lobby were confined with 3 layers of CFRP (Fig. 7 and 8). Additionally, they were confined 8 ft (2.4 m) from the top end and 8 ft (2.4 m) from the bottom end with 2 more layers. All 36 ft (11 m) high

Fig. 6: Inverted V-bracing with viscous dampers

Fig. 7: Columns at lobby wrapped by CFRP

Fig. 8: CFRP confinement of column

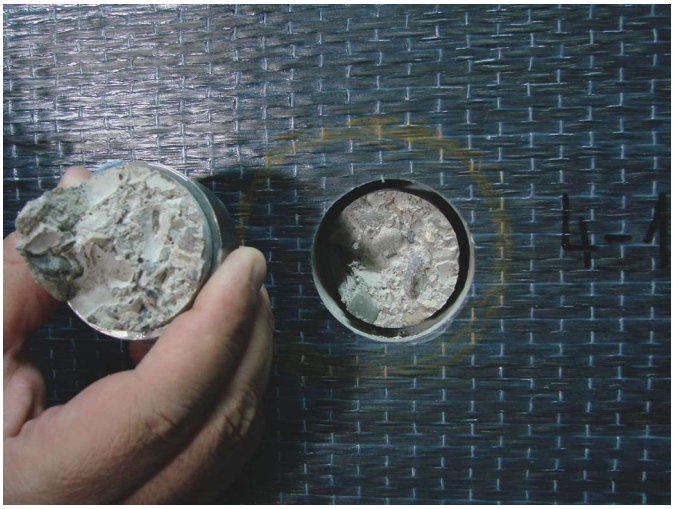


Fig. 9: A successful pull-off test resulted in a concrete failure

rectangular and square columns in the lobby were also confined with 5 layers of CFRP. Additionally, they were confined 8 ft (2.4 m) from the top end and 8 ft (2.4 m) from the bottom end with 5 more layers. All columns at the first basement level were confined with 5 layers of CFRP. All shear walls at the lobby level and the first basement level were strengthened with 3 layers of CFRP along their entire length.

The benefits of column confinement with CFRP include enhancing load carrying capacity, increasing deformation capacity in the case of seismic upgrading; and increasing shear capacity.

The retrofitted solution has the following advantages:

- Limiting the drift of the lobby that resolved the soft story issue;
- Reduction of shear and bending stresses;
- Limiting the loads in the bracing to acceptable levels; and
- Dampers allow a seismic health monitoring of the hotel in the future.

Pull-off Tests

The contractor performed pull-off tests on the CFRP at confined columns at minimum 8 days after wrapping (Fig. 9). Pull-off tests were performed at an average drilling depth of 0.40 in (10 mm). All tests resulted in concrete substrate failure (Fig. 9). The concrete failure stress varied between 130 and 260 psi (0.9 to 1.8 MPa).

Seismic Retrofitting of a 28-Story Hotel
Azadi Grand Hotel
Tehran, Iran

OWNER
Parsian International Hotels Co.
Tehran, Iran

ENGINEERS
SMTeam GmbH Company
Zurich, Switzerland

QUALITY CONTROL
EMPA Institute
Dübendorf, Switzerland

Radyab Engineered Solution Co.
Tehran, Iran

CONTRACTOR
Catic
Shanghai, China

Summary

Modern methods were introduced for the seismic retrofitting of a 28-story hotel. Extensive calculations were performed based on the local seismic code and the local site spectrum. The preliminary design of applying FRP to the columns and shear walls at the lobby level and the basement was not satisfactory. As a result, additional bracing with hydraulic dampers were installed, with the help of inverted V-bracings on the lobby level and the first floor. Carbon fiber reinforced polymer (CFRP) was used to reinforce the columns and shear walls in the lobby and two basement floors.

Running the 475-year earthquake analysis for the retrofitted building shows that the drift at the lobby level was reduced by 50%. Consequently, the stresses at the columns and walls were drastically reduced. Checking the shear forces, moments and axial loads with the allowable shear forces and moment-axial load capacity diagrams shows that the building can undergo the 475-year earthquake without major damage. ■

References

1. Mohasseb, Sassan and Abdollahi, Bahareh. *Soil-Structure Interaction Analyses Using Cone Models*, ResearchGate and Iran Geotechnics, 2009.

2. Mohasseb, Sassan and Daviran, Samaneh. *Seismic Retrofitting of a 28 Story Building Including Soil-Structure Interaction Effects*, ResearchGate, 2014.

Kevin Goudarzi, PE *is a project manager at KGS Construction and has a Master's degree in civil engineering. He has more than 20 years of experience in structural strengthening, historic preservation, and seismic retrofitting of various structures such as buildings, bridges, metro stations and industrial buildings, etc. He is a licensed professional engineer in Maryland and a member of ICRI and ASCE.*

Using Fabric-Reinforced Cementitious Matrix (FRCM) for Strengthening and Retrofit of Existing Structures

BY ANIKET BORWANKAR

Traditional Concrete Repair Methods

Using shotcrete has been a traditional method for repairing and strengthening concrete, masonry and brick structures. However, this method can present significant challenges with respect to time, labor, trade coordination and, of course, cost. Often, shotcrete repairs require two separate contractors — both a rebar contractor and a shotcrete application contractor. Rebar also takes several hours, if not days, to install, resulting in increased labor costs. Because rebar is susceptible to corrosion, it also needs 1.5 to 3 in (38 to 76 mm) of concrete cover to protect it from exposure to the elements. As a result, engineers need to factor the weight of the extra concrete into the building's total dead load.

Another familiar method for strengthening or repairing concrete and masonry structures uses a fiber-reinforced polymer (FRP) system, which can come with application challenges of its own. To install FRP systems, it is necessary to resurface any unevenness in the underlying substrate using a system-approved mortar or FRP paste before the FRP composite is applied. Afterwards, a finish coating is usually desirable to conceal the FRP. In addition, FRP systems can be challenging to install in damp areas or in areas exposed to higher temperatures.

What Is FRCM and What Is it for?

Used in Europe for the past decade and just now emerging in the United States, fabric-reinforced cementitious matrix (FRCM) systems combine high-performance sprayable mortar with a carbon-fiber grid to create thin-walled, reinforced concrete layers over existing masonry or concrete substrates. This system is similar to an FRP system, with the primary difference lying in the application methods. Instead of a carbon or glass fabric saturated with an epoxy, FRCM consists of a carbon-fiber grid embedded in a cementitious matrix. The function of the carbon grid is to carry tensile stresses.

Fig. 1: Cementitious matrix

So what is FRCM? In FRCM composite systems, the fabrics that are typically used in FRP are replaced with open carbon fabric grids in which the carbon fibers are oriented in two directions. The function of the cementitious matrix is to encapsulate and protect the fibers, and to transfer stresses from the concrete or masonry substrate to the fibers. Instead of relying on complicated rebar doweling, FRCM transfers stress through the bond between the substrate and the matrix, and through the mechanical interlock between the fabric and the matrix.

The cementitious matrix is typically a one-component, shrinkage-compensated, polypropylene-fiber-reinforced cementitious matrix (Fig. 1) designed to be field-installed with unidirectional (Fig. 2) and bidirectional carbon grids (Fig. 3). Benefits of the matrix include a 28-day compressive strength of 7,500 psi (52 MPa) and the ability to apply the matrix using a shotcrete pump on uneven surfaces. Typical mechanical properties of the cured FRCM composite are listed in Figure 4.

FRCM Installation Tips

Because FRCM accomplishes stress transfer through bonding between the substrate and the matrix, surface preparation of the substrate is crucial. First, prepare the surface and exposed reinforcement per ICRI Guideline No. 310.1R.[1] Prepare concrete surface to achieve a Concrete Surface Profile (CSP) 6-9 in accordance with ICRI Guideline No. 310.2R[2] by means of sandblasting, shotblasting or waterblasting. Substrate surfaces need to be clean, sound and free of standing water at time of application. All dust, laitance, grease, curing compounds and other foreign materials that might hinder the bond must be removed before installation. All corners to be covered with grid and matrix need to be rounded to a ¾ in (19 mm) minimum radius using a grinder. Finally, wet the substrate for at least 24 hours to a saturated surface-dry condition prior to FRCM application.

Once the surface is prepared as described above, layers of the carbon grid from a roll are pre-cut to the required dimensions of the area to be reinforced. Next, a shotcrete pump is used to spray the first layer of the matrix. The first layer should be minimum ½ in (13 mm) thick. The pre-cut carbon fiber grid is then wet-set in the first layer of the matrix, and a second layer of matrix sprayed at minimum ¼ in (6.4 mm) thick over it. Repeat this process for multiple grid applications, and finish the final layer to the desired smoothness. Overall, the minimum thickness of the system should be ¾ in (19 mm).

FRCM systems have certain advantages over typical shotcrete or FRP systems. Since this system does not have any steel rebar, only minimal concrete cover is needed. This reduces the overall thickness and weight, a crucial consideration in retrofit applications. Also, because no steel rebar dowels are needed to connect the system to the substrate, this system can be installed much faster than a conventional shotcrete method. An FRCM system also has a four-hour UL fire rating for its ability to withstand high temperatures.

Fig. 2: Unidirectional carbon grid

Fig. 3: Bidirectional carbon grid

Cured Composite Properties[1]

Property	Design Value[2]
Cracked Tensile Modulus	7.0×10^6 psi (48,300 MPa)
Ultimate Tensile Strain	1.1%
Ultimate Tensile Strength	143,000 psi (986 MPa)
Lap Tensile Strength	114,000 psi, 12" lap (786 MPa, 30 cm)
Thickness per Layer	0.5 in. (13 mm)

1. When installed with cementitious matrix and 2 layers of bidirectional carbon grid.
2. Average tensile strength and strain minus one standard deviation per ACI 549. Modulus values are average.

Fig. 4: Cured composite FRCM properties from a manufacturer technical datasheet

The design approach for flexure and shear strengthening considers an effective usable strain of FRCM, which represents a strain limit that globally accounts for the loss of bond. ACI 549.4R[3] identifies three different types of bond failures: cohesive failure in the substrate material; adhesive failure at the interface between the FRCM and the substrate material; and adhesive failure at the FRCM interface between the reinforcing fabric and the matrix.

FRCM Applications

Given its reduced preparation and installation time, FRCM is in many cases the most economical solution available for adding flexural, axial or shear strength to a range of structures. The lightweight, sprayable matrix is ideal for application on overhead or vertical surfaces in structures such as tunnels, mines, parking garages, silos, bridges, buildings and other structures with large surface areas. A single ¾ in (19 mm) layer provides sufficient structural strengthening without substantially constricting tight spaces or adversely affecting facility operations. Further strengthening can be obtained as necessary through the application of up to four additional ¼ in (6.4 mm) layers. Since FRCM systems can be successfully used to enhance the shear strength and ductility of structural members, they are a viable option for seismic retrofit of masonry and concrete structures. FRCM systems are also ideal for repairing existing concrete members without altering the existing substrate.

FRCM systems can be used to do the following:

- strengthen aging, damaged or overloaded structures;
- repair and strengthen surfaces in a single application;
- upgrade live-load ratings to accommodate changes of use;
- assist in seismic retrofits by adding shear strength and mitigating displacement and ductility;
- correct size and layout errors;
- match the finish of the existing substrate; and
- strengthen or repair damp substrates, or substrates in harsh environments that may expose the system to high temperatures, humidity, abrasion or ultraviolet (UV) radiation.

Case Study: Historic Napa Courthouse

FRCM is currently being utilized to strengthen and repair unreinforced masonry walls (Fig. 5, 6, and 7) on the historic Napa Courthouse building in Northern California, which was damaged in the 2014 Napa earthquake. The courthouse suffered structural damage to existing unreinforced masonry walls, plaster finishes, finish carpentry, HVAC, fire sprinklers and electrical systems.

Fig. 5: FRCM application over the prepared surface

Fig. 6: Laying out and wet-set of unidirectional carbon grid

Fig. 7: Wall before (a) and after (b) installation of FRCM final finished layer

Construction methods considered for repair of the courthouse structure included shotcrete walls, fiber-reinforced polymer (FRP), FRCM, mortar repointing, grout injection, and replacement with concrete masonry unit (CMU) walls. The most heavily damaged masonry walls, those no longer in stable form, were removed and rebuilt implementing ductile reinforced CMU construction. Special detailing considerations were designed to achieve strength and flexibility compatible with the remaining historic brick construction.

FRCM was selected instead of the more traditional repointing or grout injection as the preferred repair solution for the less damaged walls with their countless small cracks. FRCM provided a homogenous interaction with the existing masonry and corresponding performance and stiffness. Furthermore, the matrix provided greater strengthening with a smaller investment of labor than crack injection. The structure was composed of walls with elevation differences of up to 1 in (25 mm), which allowed FRCM to be sprayed at different thicknesses as required to create an even surface without building out the original substrate.

FRCM provided in-plane and out-of-plane strengthening with minimum surface preparation beyond the removal of existing finishes. The FRCM was also detailed to engage and tie the historic masonry to the new CMU walls. Additionally, the cement based FRCM did not seal the historic walls and allowed the walls to breathe as they had for 150 years and provided a favorable surface for installation of plaster finishes.

To generate minimum required strengthening values for the design/build manufacturer's calculations, a structural analysis was performed to determine the original capacities of the walls as well as the required strength and estimated loss of capacity due to earthquake damage. The manufacturer then submitted calculations, and an FRCM layout for each wall was submitted for structural review during construction by the manufacturer. Since this was one of the first applications of FRCM in California, a mockup was constructed to test installation procedures and identify any potential issues that could affect installation in the historic building. Key elements for successful installation were proper saturation of the walls to reach the surface saturated-dry (SSD) condition, which took significant quantities of water because the walls were 150 years old, plus proper installation sequencing of the fiber grid due to the shallow lift thickness of the FRCM matrix.

Conclusion

FRCM systems are currently being introduced in the structural repair and rehabilitation industry as a new and effective strengthening technology. Due to their reduced thickness, excellent durability, superior performance in high temperatures, and ease of installation, FRCM systems are a good alternative to traditional strengthening and repair methods. Compared to shotcrete, they add little weight to the structure and can provide an excellent solution for strengthening on concrete and masonry substrates, particularly in seismic retrofit applications. ■

References

1. ICRI Committee 310, *Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion* (ICRI 310.1R-2008), International Concrete Repair Institute, St. Paul, MN, 8 pp.

2. ICRI Committee 310, *Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair* (310.2R-2013), International Concrete Repair Institute, St. Paul, MN, 48 pp.

3. ACI Committee 549, *Guide to Design and Construction of Externally Bonded FRCM Systems for Repair and Strengthening Concrete and Masonry Structures* (ACI 549.4R-13), American Concrete Institute, Farmington Hills, MI, 2013.

Acknowledgement

Information for the historic Napa Courthouse case study was provided by ZFA Structural Engineers, Santa Rosa, CA, Structural Engineer of Record for the project.

Aniket Borwankar *is a Composite Strengthening Systems (CSS) Field Engineer with Simpson Strong-Tie. CSS includes Fabric Reinforced Cementitious Matrix (FRCM) and FRP systems. Borwankar received a Master's degree in Civil Engineering at University of Missouri, with focus on FRP reinforced concrete. After that, he pursued another Master's in Civil Engineering at Vanderbilt University focusing on carbon fiber reinforced cement. His research work deepened his understanding of these materials and resulted in journal and conference publications. After working in consulting engineering firms in Tennessee and California, Aniket joined Simpson Strong-Tie in March 2017. Since then, he has been involved in designing FRCM/FRP projects and educating engineering firms on the basics and design principles of FRCM/FRP.*

Designing with Titanium for Strengthening Concrete Bridges

BY JILL ADKINS

Aging Concrete Bridges

Many older concrete bridges were not built for today's standards. The bridges have inadequate steel reinforcement and were not designed for the current higher legal truck load demands. Therefore, many bridges throughout the country are facing potential replacement, imposition of restrictive load limits, or rehabilitation. Many of the older concrete bridges are also now considered historic landmarks due to the unique designs so there is a greater need for rehabilitation versus replacement.

Strengthening with Titanium

The use of near-surface mounted (NSM) technology is an attractive method for increasing the flexural and shear strength of reinforced concrete.[1] In NSM strengthening applications, grooves are cut into the outer surface of the concrete at a shallow depth to avoid cutting the original steel reinforcing bars. A bar or strip is placed in the grooves and is held in place along the length with epoxy. The common practice has been to use fiber reinforced polymer (FRP) bars or strips in NSM applications. An alternative choice is to use a titanium alloy bar (TiAB) that is high strength, ductile, and corrosion resistant. The titanium alloy bar NSM technique is unique because 90-degree anchorage hooks are bent on both ends of the bars, resembling a staple (Fig. 1). These anchorage hooks provide additional strength without complete dependency upon the epoxy bond with the concrete.

Titanium exhibits elasto-plastic properties, which allows the product to yield without sudden failure (Fig. 2). Because titanium is ductile and not subject to brittle fracture, the bars can be bent to form the anchorage hooks. The hooks can be bent in the field to accommodate custom designs and last-minute adjustments.

Titanium bars are corrosion resistant and can be installed with little or no concrete cover. Titanium is environmentally durable and will not be affected by harsh environments that some bridges are subjected to such as road salt and seawater.

When comparing to other corrosion-resistant metals, such as stainless steel, titanium requires fewer bars due to its higher strength. Fewer bars require less labor and less epoxy resulting in lower overall cost as compared to competing materials.

Fig. 1: Titanium staple

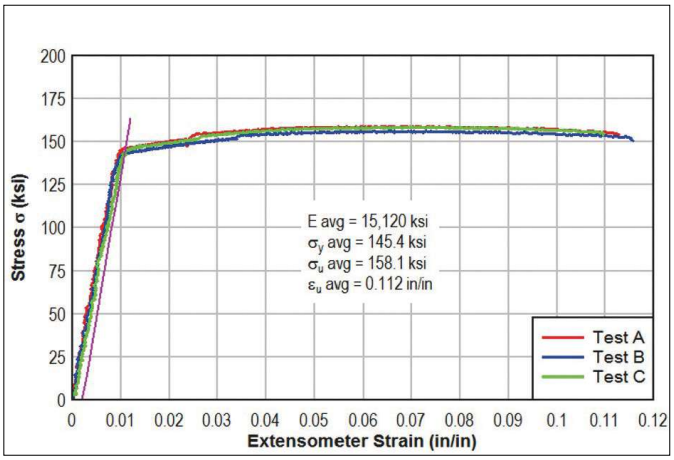


Fig. 2: Titanium exhibits elasto-plastic behavior (graph courtesy of Christopher Higgins, OSU)[2]

Designing with Titanium

An available design guide was developed to assist design engineers on how to utilize the titanium NSM technique. The *Guide for Design and Construction of Near-Surface Mounted Titanium Alloy Bars for Strengthening Concrete Structures* was prepared by Christopher Higgins, Oregon State University (OSU) Professor of Structural Engineering. The organization of the guide is similar to ACI 440.2R-17.[3] The design approach is based on AASHTO-LRFD (Bridge Design Specifications).

The guide provides design and construction recommendations for strengthening existing reinforced concrete (RC) structures with titanium alloy bars using the NSM construction method. The recommendations are supported by experimental and analytical research as well as field experiences that have demonstrated the application of titanium bars for strengthening full-scale specimens of typical bridge girders.[4]

The guide is only specific to titanium alloy bars for strengthening existing reinforced concrete structures for shear and flexure. The method requires the use of 90-degree anchorage hooks on the terminations of both ends of the bar. The design guide contains topics such as materials and properties, construction recommendations, design recommendations, and design examples.

Case Studies

Two case studies demonstrating field experiences with titanium near-surface mounted bars follow:

Mosier Bridge

In 2013, a bridge in Mosier, Oregon (Fig. 3) crossing Route I-84 was deemed critically deficient when inspectors found significant cracks, some with vertical displacement (Fig. 4), originating at the cutoff points for flexural reinforcing steel in the bridge girders. It was estimated that replacing the structure would cost US $4.6 million and would take over a year to restore regular traffic.

With direction from Oregon Department of Transportation (ODOT), Oregon State University (OSU) constructed and tested three full-size beams that replicated the Mosier Bridge girders.[4] One specimen represented the as-built condition without strengthening; a second specimen applied the titanium alloy bar NSM after first failing the specimen; and a third specimen applied the titanium alloy bar NSM with the specimen in an undamaged state. The results showed that four No. 5 hooked titanium bars could double the flexural strength of the test beam. The results also showed that even after fully failing the bond along the length of the NSM titanium alloy bars, there was reserve capacity (Fig. 5). The reserve capacity indicates that the mechanical anchorages on the titanium alloy bars could sustain loads above the factored demands even after bond rupture along the length that occurred at peak load.

Based on the test results, ODOT proceeded with strengthening on the Mosier Bridge using the titanium NSM technique. The bridge rehabilitation project was completed with a total of 70 titanium NSM bars. The steps included cutting shallow grooves and drilling holes in the ends to accommodate the anchorage hooks (Fig. 6a). A layer of epoxy was added after the grooves were thoroughly cleaned (Fig. 6b). The titanium hooked bar was inserted into the groove (Fig. 6c) and covered with another layer of epoxy and finished with a concrete layer so the bars would no longer be visible (Fig. 6d).

The rehabilitation project was completed in a matter of weeks and was estimated to cost less than 3% of the estimated cost for bridge

Fig. 3: The Mosier Bridge (photo courtesy of ODOT)

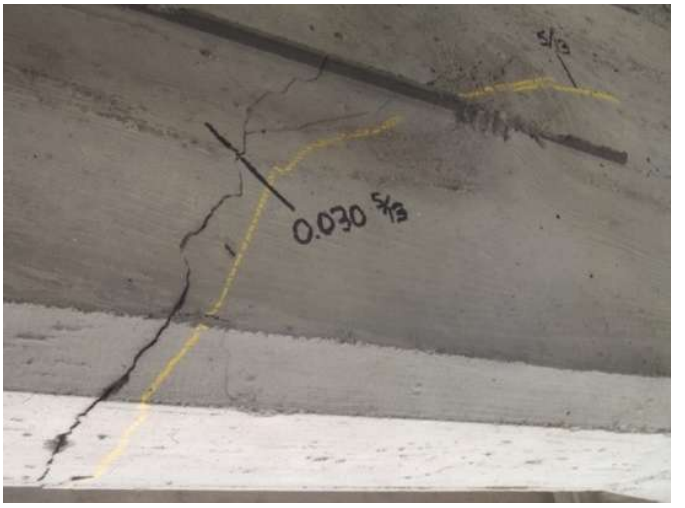


Fig. 4: Crack with vertical offset (photo courtesy of ODOT)

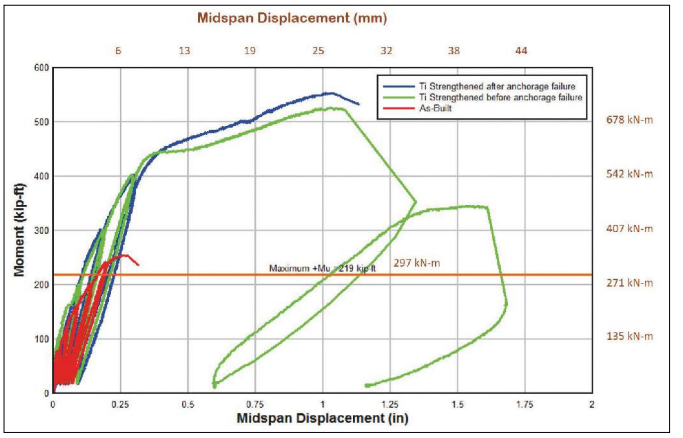


Fig. 5: Experimental flexural specimen responses with and without titanium strengthening along with design demands[4]

Fig. 6: Installation of titanium bars on Mosier Bridge: (a) Cutting of groove; (b) Inserting epoxy in the groove; (c) Inserted titanium bar in the prepared groove; (d) Completed install (photos courtesy of ODOT)

replacement and 30% lower than rehabilitation using alternative materials, such as stainless steel or FRP. The Mosier Bridge was the first reinforced concrete bridge in the world with titanium strengthening.

Rogue River Bridge

A more recent rehabilitation project in 2018 was the Isaac Lee Patterson Memorial Bridge, also known as the Rogue River Bridge (Fig. 7). The Rogue River Bridge is a concrete arch bridge that spans the Rogue River in Grants Pass, Oregon. It was constructed in the early 1930s and was designed by the well-known Oregon bridge designer and highway engineer Conde McCullough, who was the engineer responsible for many of Oregon's beautiful bridges. The iconic bridge was designated a National Historic Civil Engineering Landmark by the American Society of Civil Engineers in 1982 because of its significant contribution to the development of the civil engineering profession in the United States. It is unusual in its "through-arch" design, which means the road runs in the middle of the arches, as opposed to on the top or on the bottom of the arches.


Fig. 7: Rogue River Bridge

The bridge is one of more than 400 bridges in Oregon rated as structurally deficient. It is receiving a US $5.3 million renovation, which is the first major upgrade to the bridge since it opened in 1931. Because the Rogue River Bridge is considered a historic landmark, the only option was rehabilitation. Bridge strengthening was a part of the rehabilitation project, and ODOT opted to strengthen the girders with titanium bars. Due to the congestion of the internal steel bars, a method that required minimum grooves and minimum near-surface mounted bars was necessary. Therefore, titanium was selected because of the minimal bars necessary due to the high-strength material. The other major benefit of using titanium bars on this project was the mechanical anchorages with end hooks that allowed epoxying the bars into place during traffic loading.

The design chosen included No. 5 and No. 6 bars on the underside of the girders. The first step included cutting the grooves and drilling the holes for the placement of the hooked bars. The bars were cut and bent onsite, which allowed for last minute adjustments and

Fig. 8: Titanium bar bending onsite: (a) Cutting bar to length with abrasive saw; (b) Heating bar with a torch; (c) Bending bar with hydraulic rebar bender

dry fitting prior to final placement. An abrasive saw was used to cut the bars (Fig. 8a). The bars were then heated with a torch (Fig. 8b) and immediately inserted into a hydraulic rebar bender and bent around the specified mandrel diameter to achieve the hook on the end of the bar (Fig. 8c).

The bridge strengthening using titanium alloy bars on the Rogue River Bridge has been completed while the remainder of the renovation is still underway to restore the bridge to the original condition.

Summary

Titanium near-surface mounted bars have had success for flexural and shear strengthening in older concrete bridges as supported by years of research and testing along with actual case studies in field applications. A design guide for NSM titanium bars is available to assist engineers with the use of the technique. Additional information on strengthening reinforced concrete specimens with titanium alloy bars can be found in published literature.[5,6] ■

References

1. Adkins, G. *Titanium Finds a Home in Civil Engineering*, Concrete International, V. 39, No. 12, American Concrete Institute, Farmington Hills, MI, December 2017.

2. Higgins, C. *Renewal of Aging and Deteriorated Reinforced Concrete Bridges with Titanium Alloy Bars* (TiABs), Western Engineers' Bridge Seminar, Portland, OR, September 2017.

3. ACI Committee 440, *Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures* (ACI 440.2R-17), American Concrete Institute, Farmington Hills, MI, 2017.

4. Higgins, C.; Knudtsen, J.; Amneus, D.; and Barker, L. *Shear and Flexural Strengthening of Reinforced Concrete Beams with Titanium Alloy Bar*, Proceedings of the 2nd World Congress on Civil, Structural, and Environmental Engineering, Barcelona, Spain, April 2017.

5. Amneus, D.; Barker, L.; and Higgins, C. *Methods for Strengthening Reinforced Concrete Bridge Girders Containing Poorly Detailed Flexural Steel using Near-Surface Mounted Metallics*, ODOT Research Final Report No. FHWA-OR-RD-16-02, August 2015.

6. Strauser, P. *Good Bridges, Bad Details, and Ugly Cracks: A Study in Titanium Alternative to Fiber Reinforced Polymers*, Western Bridge Engineers Seminar, Reno, NV, September 2015.

Jill Adkins *is the Infrastructure Development Manager at Perryman Company—a fully integrated titanium mill located in Houston, Pennsylvania. She is a metallurgist with 20 years of experience in the titanium industry. Jill graduated from the University of Pittsburgh in 1998 with a degree in Materials Science and Engineering. She is a member of the International Titanium Association (ITA) and is an ASTM International Member participating on technical committees F04 on Medical and Surgical Materials and Devices and B10 on Reactive and Refractory Metals and Alloys. She is also a member of the American Concrete Institute (ACI) and the International Concrete Repair Institute (ICRI).*

Sponsor and Exhibit Opportunities Still Available!

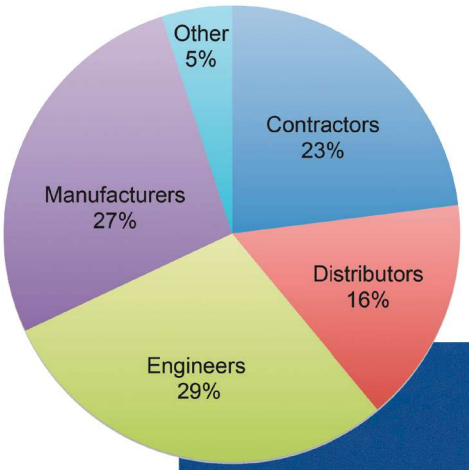
Enhance Your Knowledge. Build Your Career. Grow Your Network.

earn up to 12 PDHs AT THE TECHNICAL SESSIONS

Technical Presentations

- Are We the Blockbuster in the Netflix Era?
- Repair of Concrete Utility Poles with the Use of Migrating Corrosion Inhibitors
- Concrete Rehabilitation to Salt Processing Dome
- Why Does Rebar Corrode in Concrete? (in plain language)
- Resiliency of Existing Concrete Structures and Communities: How Can We Improve Long-Term Performance and Resiliency?
- Electrochemical Treatments to Significantly Extend the Service Life of Reinforced Concrete Structures
- Design Considerations to Improve Parking Garage Resiliency
- Restorative Waterproofing for Below Grade Parking Structures
- Why are Limestone-Containing Materials Turning Black—How Do We Stop and Prevent it?
- Architectural Concrete, an Innovative Approach to Concrete Restoration
- Historic Building Cast Stone and Masonry Façade Restoration Using UAVs and Photogrammetry
- Kansas City's Resilient Spiral Ramp
- Waterproofing Concrete Structures – A Dynamic System Approach (AIA CRP-02)
- Polishable Concrete Overlays
- Strengthening of Concrete Members Using Fabric Reinforced Cementitious Matrix
- Investigation and Repair of Above-Ground Swimming Pools and Supported Decks
- Self-Consolidating Concrete for Concrete Repair
- Port Improvement Via Exigent Repair (PIER): An Overview of Military Engineers Port Repair Technologies
- Shear Transfer at Repair Concrete
- Improvement in Anchorage Capacity of CFRP for Structural Strengthening

Who attends ICRI Conventions?



RESILIENCY

Above and Beyond Concrete Restoration

REGISTER @ WWW.ICRI.ORG

Schedule-at-a-Glance

WEDNESDAY, NOVEMBER 7

7:30 am – 12:00 pm	Tabletop Exhibits
8:30 am – 12:00 pm	Technical Session
12:00 pm – 4:45 pm	Chapter Sponsored Outings
6:00 pm – 6:30 pm	First-Time Attendee Reception
6:30 pm – 8:30 pm	Welcome Reception

THURSDAY, NOVEMBER 8

8:00 am – 12:00 pm	Committee Meetings
7:30 am – 5:30 pm	Tabletop Exhibits
8:30 am – 12:00 pm	Technical Session
12:00 pm – 2:00 pm	Luncheon
2:00 pm – 5:00 pm	Committee Meetings
2:00 pm – 5:30 pm	Technical Session
6:00 pm – 10:00 pm	26th Annual ICRI Project Awards

FRIDAY, NOVEMBER 9

7:30 am – 10:30 am	Tabletop Exhibits
8:00 am – 12:00 pm	Committee Meetings
8:30 am – 12:00 pm	Technical Session
12:00 pm – 1:30 pm	Networking and Chapter Luncheons
1:30 pm – 5:30 pm	Committee Meetings
6:30 pm – 9:30 pm	30th Anniversay Celebration!

26th Annual ICRI Project Awards
Red Carpet/Ceremony/Reception
Thursday, November 8, 2018

"Contacts, education, knowledge and experience… all found in one place."

ICRI is celebrating 30 years!

EXHIBIT / SPONSOR
OPPORTUNITIES STILL AVAILABLE

COMMITTEE MEETINGS
WHERE ICRI WORK GETS DONE—ALL ARE WELCOME TO ATTEND

CHAPTER SPONSORED SOCIAL EVENTS
THE GREAT PLAINS CHAPTER OF ICRI HAS PLANNED SOCIAL EVENTS FOR ALL TO ENJOY

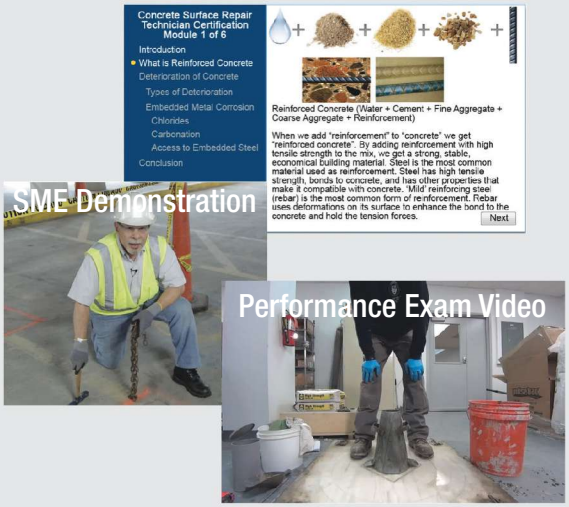
EARLY REGISTRATION DISCOUNTS!
REGISTER BY SEPTEMBER 18 FOR THE BEST DISCOUNTS!

SPECIAL HOTEL RATE!
STAY AT THE OMAHA MARRIOTT DOWNTOWN AND SUPPORT ICRI—BOOK BY OCTOBER 14 FOR ICRI RATES

The International Concrete Repair Institute offers certification as a…

Concrete Surface Repair Technician

Your qualification in concrete surface repair!



- Competency-based program using current best practices for training and evaluation
- Includes five online training modules, an online knowledge exam, and performance exam (video recorded or live at an on-site location)
- Qualifies individual to perform pre- and post-placement inspections and testing

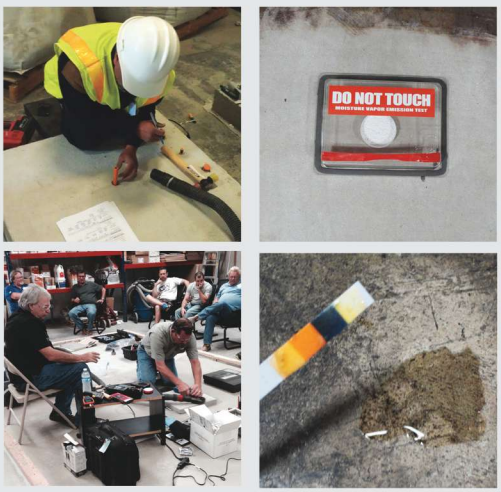
Certification Program Development Resulting from Industry Demand and Code Language

Visit www.icri.org for more information on these certification programs.

INTERNATIONAL CONCRETE REPAIR INSTITUTE

Find the Best! Be the Best!

- Improve the performance of concrete slab moisture testing
- Report more consistent, accurate, and reliable test results
- Make better decisions on when a concrete slab is ready for a floor covering installation



The International Concrete Repair Institute offers certification as a…

Concrete Slab Moisture Testing Technician

Your solution to floor moisture issues!

Waterproofing & Protection with MPC Park Deck

Two-component, polymer-modified, cementitious traffic-deck waterproof coating

- Concrete slabs on-grade
- Concrete decks over metal pan
- Concrete topping slabs over sandwich membranes
- Precast concrete parking structures
- Ramps and helixes
- Excellent for use on parapets, columns and vertical surfaces
- Concrete toll booth lanes
- Truck loadings docks and aprons

MIRACOTE

Please visit our website for more information on MPC Park Deck.

miracote.com

Crossfield Products Corp. | miracote.com | 800.692.3502 | miracote@cpcmail.net

CONCRETE REPAIRCALENDAR

SEPTEMBER 19-20, 2018
ICRI Concrete Slab Moisture Testing Certification
Baltimore, MD Area
Website: **www.icri.org**

NOVEMBER 5-6, 2018
ICRI Concrete Slab Moisture Testing Certification
Omaha, Nebraska
Website: **www.icri.org**

NOVEMBER 6, 2018
ICRI Concrete Surface Repair Technician Live Performance Exam
Omaha, Nebraska
Website: **www.icri.org**

NOVEMBER 7-9, 2018
2018 ICRI Fall Convention
Omaha Marriott Downtown at the Capitol District
Omaha, Nebraska
Theme: *Resiliency—Above and Beyond Concrete Restoration*
Website: **www.icri.org**

JANUARY 21, 2019
ICRI Kick-Off Party
In conjunction with World of Concrete
Las Vegas, Nevada
Website: **www.icri.org**

JANUARY 21-25, 2019
World of Concrete
Las Vegas Convention Center
Las Vegas, Nevada
Website: **www.worldofconcrete.com**

JANUARY 22-25, 2019
The International Surface Event (TISE)
Mandalay Bay Convention Center
Las Vegas, Nevada
Website: **www.intlsurfaceevent.com**

JANUARY 23-24, 2019
ICRI Concrete Slab Moisture Testing Certification
World of Concrete
Las Vegas Convention Center
Las Vegas, Nevada
Website: **www.worldofconcrete.com**

JANUARY 23-24, 2019
ICRI Concrete Slab Moisture Testing Certification
The International Surface Event (TISE)
Mandalay Bay Convention Center
Las Vegas, Nevada
Website: **www.intlsurfaceevent.com**

INTERESTED IN SEEING YOUR EVENT LISTED IN THIS CALENDAR?

Events can be emailed to editor@icri.org. Content for the November/December 2018 issue is due by October 1, 2018 and content for the January/February 2018 issue is due by December 1, 2018.

TERRATHANE™

BLUE COLLAR GOLD STANDARD

TerraThane™ is the hardest working, highest quality **Geotechnical Polyurethane Foam (GPF)** in the world.

Lighter, more rugged and durable, less costly GPF for residential, commercial, infrastructure repair, and pipeline solutions.

Backed by NCFI's more than 50 years of industry-leading science and innovation, and legendary technical support.

BLUE COLLAR
GOLD STANDARD

Team TerraThane™

TerraThane.com

NCFI POLYURETHANES

INDUSTRYNEWS

CIM PROGRAM AT MTSU ANNOUNCES LARGE COMPANY DONATION TO BUILDING CAMPAIGN

The Concrete Industry Management (CIM) program—a business intensive program that awards students with a four-year Bachelor of Science degree in Concrete Industry Management—is pleased to announce that the School of Concrete and Construction Management at Middle Tennessee State University (MTSU) has recently received the largest company donation to their Building Campaign from Irving Materials, Inc. With the help of this contribution, the school has reached 50 percent of its $5 million goal.

"As an employer of 14 CIM graduates between Tennessee, Kentucky and Indiana and nearly 50 summer interns, Irving Materials has always been a major supporter of our program," said Dr. Heather Brown, Chair and Professor, MTSU School of Concrete and Construction Management. "This generous gift will allow us to achieve 25 percent of the "brick and mortar" funding we need —positioning our building as a leader in the state for industry-matched infrastructure."

A joint initiative between MTSU and leaders from the concrete industry, the CIM program provides students opportunities to enter a broad field that has an urgent need for skilled professionals. MTSU is the first university to integrate a technical education in concrete with business and communication skills needed to advance in the industry.

"Irving Materials greatly benefits from the efforts of CIM by employing graduates whose pride in their work make our company better every day," said Irving Materials South President Kevin Swaidner. "This is in no small part due to the foundation they received at MTSU."

For more information on CIM and the CIM program, visit www.concretedegree.com.

SIMPSON STRONG-TIE RECEIVES 14TH CONSECUTIVE DISTINGUISHED "PARTNERS OF CHOICE" AWARD FROM DAVID WEEKLEY HOMES

Simpson Strong-Tie, the leader in engineered structural connectors and building solutions, has earned the homebuilding industry's most coveted award—the "A,A Partners of Choice" award, conferring highest honors for both quality and service—for the eighth consecutive year from David Weekley Homes, the nation's largest privately held homebuilder. Simpson Strong-Tie is one of only two companies to receive the prestigious Partners of Choice award—that denotes an "A" ranking in either quality or service, or both—for all 14 years since the program began.

The Partners of Choice award is part of the David Weekley Homes Supplier Evaluation Platform, a rigorous quarterly review of more than 200 national trading partners. Approximately 1,000 team members participate in the review. Their feedback provides partners an opportunity to evaluate and improve their channel alignment and performance. Survey feedback is offered to suppliers and conducted through a series of individual and group discussions, mentoring calls and strategy sessions to ensure ongoing improvement. The award program celebrates the suppliers who earn an "A" in quality, service or both within a 12-month period.

Every supply chain partner is evaluated and measured by the same standards, regardless of their industry or product. "Because of our unique grading system, suppliers across business segments are evaluated equally on their ability and agility to handle challenges throughout the supply chain," said Bill Justus, Vice President of Supply Chain Services for David Weekley Homes. "This process enables us to look deeply at the skillfulness of their cost-effective, timely and consistent product delivery and customer service. We aren't just buying a supplier's product, we're buying their expertise, and the companies we recognize with this award are the very best-in-class."

Simpson Strong-Tie is one of only eight companies to receive the 2018 "A,A" ranking for the award. "Receiving the 'Partners of Choice' award for 14 years in a row demonstrates not only how Simpson Strong-Tie products stand the test of time through continuing economic challenges, but how our customer service does as well," says Nate Johnston, Vice President of Builder Sales for Simpson Strong-Tie. "We strive every day to provide consistent, reliable customer service and value to our partners — it is our number one mission."

BUILD CHANGE AND SIMPSON STRONG-TIE RENEW FELLOWSHIP FOR ENGINEERING EXCELLENCE

Build Change and Simpson Strong-Tie announced the renewal of the Simpson Strong-Tie® Fellowship for Engineering Excellence program and call for applicants.

This is the second year of the Fellowship, resulting from the continuation of a successful partnership between international nonprofit social enterprise Build Change and global structural solutions leader Simpson Strong-Tie. Complementing the Simpson Strong-Tie goal to find solutions for making structures safer and stronger, the fellowship allows innovative engineers the opportunity to provide impactful contributions to Build Change programs as well as support other engineers' professional development in developing nations around the world.

"We are very pleased to renew the Fellowship for Engineering Excellence with Build Change. With the positive impact to developing areas in Indonesia, Colombia and the Philippines where our first fellow worked, we're looking forward to the Fellowship contributing even more to safer and stronger design and construction methods," said Simpson Strong-Tie Vice President of Engineering Jeremy Gilstrap.

The Fellowship is open to licensed civil and structural engineers with a minimum of eight years of professional experience in structural engineering. Applicants

should have experience working on earthquake- and wind-resistant design and construction of buildings, and on existing building seismic and structural evaluation and retrofit according to recognized standards, such as the IBC, ASCE 7, ASCE 41, and others. Candidates should be willing to travel to, live, and work in emerging countries in Latin America and the Caribbean, and South and Southeast Asia for a period of one year beginning September 1, 2018 and concluding August 31, 2019.

James Mwangi, the 2017-2018 Fellow, noted, "The Fellowship offered me the opportunity to share my previous experience by working face to face with not only the Build Change technical teams, but also with local engineers in each country, to promote capacity building."

For more information about the Fellowship and application instructions, visit buildchange.org/about/careers.

SIMPSON STRONG-TIE IS FOUNDING SPONSOR OF DR. LUCY JONES CENTER FOR SCIENCE AND SOCIETY

Simpson Strong-Tie, the leader in engineered structural connectors and building solutions, has announced it is the Founding Gold Sponsor of the Dr. Lucy Jones Center for Science and Society. The Center works to increase the resilience of communities faced with natural disasters and other global changes by using science to make better-informed decisions about how to mitigate risk.

"I created the Dr. Lucy Jones Center for Science and Society to get the best science used to create safer communities. This endeavor is only successful due to the support of partners who understand the value of science, like Simpson Strong-Tie," said Dr. Lucy Jones.

"We're very excited about supporting and partnering with the Center. Dr. Jones is renowned for her work in groundbreaking scientific research and for her ability to effectively communicate the findings to aid in disaster resilience," said Jeremy Gilstrap, vice president of Engineering with Simpson Strong-Tie. "We're committed to providing solutions and supporting efforts that help communities build better to improve safety and to recover faster after a natural disaster strikes."

The Center is currently developing resilience programs for communities, educational materials for individuals, and tools for local governments to assess their vulnerability to earthquakes.

SIMPSON STRONG-TIE RENEWS LEAD SPONSORSHIP FOR HABITAT STRONG

Simpson Strong-Tie, the leader in engineered structural connectors and building solutions, announced it has renewed its support of Habitat for Humanity's Habitat Strong program. Simpson Strong-Tie remains the major sponsor of the program.

Habitat for Humanity homes in areas susceptible to flooding, earthquakes, hurricanes, winds and wildfires can benefit from Habitat Strong building standards, which include a suite of fortified codes and best practices for building more resilient homes. Available to all Habitat for Humanity organizations across the country, the Habitat Strong program was created to offer Habitat for Humanity homeowners long-lasting safety benefits at affordable costs. Simpson Strong-Tie increased its monetary contribution to the program from $85,000 in 2015 to $150,000 in 2017.

"Our longstanding partnership with Habitat for Humanity just continues to grow stronger as we support their work in giving families and individuals access to safe, affordable and stable homes," said Karen Colonias, president and CEO of Simpson Strong-Tie. "Habitat Strong provides a great model for other builders to follow when thinking about building strong, resilient housing in natural disaster-prone areas."

Simpson Strong-Tie has partnered with Habitat for Humanity for more than two

decades and has been a national sponsor since 2007, donating more than $5 million in cash and products, including the structural connectors, anchors, fasteners and reinforced shear walls used in new home construction. The company also supports Habitat for Humanity's annual Jimmy and Rosalynn Carter Work Project.

NEWTECNIC AND CAMBRIDGE UNIVERSITY CONSTRUCTION RESEARCH PARTNERSHIP DELIVERS CONCRETE FACADE INNOVATION

Three-year Academic Project Advances and Accelerates More Appropriate Building Methods

International building design engineering firm Newtecnic and the Engineering Department at the University of Cambridge (UK), have completed a 3-year knowledge transfer partnership (KTP) to develop a new generation of components, load bearing connections and associated design methods for composite concrete building facades.

Following this initial project, Newtecnic is continuing and expanding the work in its recently formed Cambridge R&D office and in the US through partnerships with the University of Texas at Austin, and UCLA.

The partnership addressed the need for new building products and manufacturing and installation methods for complex building envelopes. It has enabled invention and innovation in design and testing of components and connections for fibre-reinforced and ultra-high-performance concrete facades on real-world building projects. These include the Zaha Hadid designed Central Bank of Iraq and Grand Theatre de Rabat, Istanbul's City Museum designed by Salon Architects, as well as other projects in Turkey, Algeria, and Saudi Arabia.

The research covered: fast nonlinear analysis (FNA), finite element analysis, design assisted by testing, bonding of structural elements, wind tunnel procedures, glass structural design, fatigue due to wind action, localised stress concentration, concrete static fatigue and testing of connections. Workflows and methods for testing have now been developed for these factors.

Newtecnic CEO Andrew Watts said, "By applying peer reviewed academic rigour to the development of new methods for testing concrete facade components, assemblies and connections, our objectives have been fully met. Investing in 3 years of intensive research means we can now very quickly apply standard tests to understand and verify components for fatigue and wind load over time on any project. This will save time on all existing and future projects. With this new system of advanced processes, we can efficiently accelerate the productivity of better solutions for advanced, exciting but affordable projects around the world."

Because the knowledge gained through this partnership allows projects to be developed based on the real physical behaviour of components, Newtecnic can design engineer more ambitious and complex building enclosures that are lighter, stronger and precisely quality assured.

Dr. Mauro Overend, director of the Glass & Facade Technology Research Group at the University of Cambridge, and the KTP Principal Investigator, said, "Conducting this work almost exclusively from first principles means that the construction industry now has access to newly discovered knowledge and know-how. This provides opportunities for companies to overcome the limitations of existing standards and to engineer complex free-form building envelopes in a safe and resource efficient manner."

WJE OPENS NEW JANNEY TECHNICAL CENTER

Wiss, Janney, Elstner Associates (WJE) announces the opening of its new Janney Technical Center (JTC) at the company's Northbrook, Illinois, headquarters. The JTC's 70,000-square-foot state-of-the-art testing and applied research facility includes a full array of chemistry, petrography, metallurgy, concrete and mortar, corrosion, and structural testing laboratories as well as environmental exposure chambers.

JTC staff include engineers and materials scientists who provide advanced testing and forensic capabilities to solve the most technically challenging problems in connection with structures, construction materials, process industries, and manufactured components. In addition, the JTC conducts applied research to advance knowledge and spark innovation.

The JTC provides consulting and testing to determine root causes of problems, understand failure mechanisms, evaluate performance, characterize materials, generate engineering properties, assess service life, and determine specification compliance to meet the needs of various types of clients.

The new facility replaces WJE's original JTC laboratory space, which was constructed in 1962 and was one-fourth the size.

WJE also has laboratory facilities in Austin, Texas, and Cleveland, Ohio.

The Janney Technical Center is named after WJE's late founder Jack Janney, who always stressed the value of testing to solve problems.

For more inforamtion visit https://www.wje.com/about/janney-technical-center.

NAI RESPONDS TO CHINA TARIFF ISSUES

NAI, a leading manufacturer of global connectivity solutions for high performance systems used in the industrial technology, telecom, data and medical industries, has formulated a response strategy to the immediate sourcing issues associated with the China Tariff disputes.

NAI is experiencing a very recent trend with companies shifting the sourcing of their procurements to North American production facilities as a hedge, until the longer-term tariff disputes come to some conclusion.

As a company with global manufacturing facilities, NAI has the ability to accommodate this recent trend with their half million square feet of production capacity in North America, which specializes in connectorized solutions for copper and fiber. NAI most recently began production in its Gaylord, MI, facility.

"We are helping customers deal with their tariff concerns by transferring their production, currently purchased from Asian sources, to North America. This allows them to maintain their production flow and income streams without interruption. Many connectivity suppliers do not have the North American production options that NAI has, so we have become a significant resource for customers," stated Bill Miller, Vice President Sales & Marketing at NAI. Mr. Miller further explained: "In exchange, some customers are offering NAI growth opportunities in our Asian facilities for consumption in the local markets there."

NAI designs and manufactures connectivity solutions that include cable assemblies, cable harnesses, pre-terminated assemblies and hybrid assemblies. In addition, NAI designs and produces electro-mechanical assemblies, such as box build, panel build and terminal block assemblies.

For more information about NAI and its production capabilities, please visit: www.nai-group.com.

SIMPSON STRONG-TIE HOSTS ARCHITECTURE, ENGINEERING AND CONSTRUCTION MANAGEMENT SCHOLARSHIP RECIPIENTS

Simpson Strong-Tie, the leader in engineered structural connectors and building solutions, hosted more than 30 college students awarded with a Simpson Strong-Tie® Student Scholarship for the 2018–2019 academic year.

Scholarship recipients from throughout the country toured the company's manufacturing facility and training center in Stockton, California, on Thursday, July 19. They also observed product testing at the Tyrell Gilb Research Laboratory, one of the largest private labs of its kind in the US. Product demos of the company's concrete and fastener divisions, along with a visit to an active jobsite using Simpson Strong-Tie products, were also part of the group's first day.

The students traveled to the Simpson Strong-Tie home office in Pleasanton, California, for their second day, where they heard from a local architect and a structural engineer about the importance of building professional relationships in the industry. They then got their hands dirty with a mini-house build, a project calling on them to follow plans closely and collaborate with one another to complete the build. Closing out the day, the students met with several of the company's senior leaders, including CEO Karen Colonias and CFO Brian Magstadt.

Civil engineering major Evan Batton of the University of Texas commented, "The panel discussion was very enjoyable, it gave insight that the average student does not get to hear. Hearing the stories of the leaders of the company was invaluable in helping us on our path."

The Simpson Strong-Tie Student Scholarship Program supports education and encourages the design and building of safer structures in our communities by assisting architecture, structural engineering and construction management students in meeting their education costs. Up to 68 scholarships of $2,000 per recipient are awarded every academic year to students at 76 participating schools.

For more information, visit strongtie.com.

CONCRETE INDUSTRY MANAGEMENT PROGRAM'S NATIONAL STEERING COMMITTEE ANNOUNCES NEW BOARD

The National Steering Committee (NSC) for the Concrete Industry Management (CIM) program—a business intensive program that awards students with a four-year Bachelor of Science degree in Concrete Industry Management—recently announced its new board members beginning July 1.

The slate of new NSC officers includes:

- Executive Director – Eugene Martineau, CIM National Steering Committee
- Chairman – Mike Schneider, Vice President, Chief People Officer (CPO), Baker Concrete Construction, Inc.
- Vice Chairman – Michael Philipps, Vice President, Business Development, Construction Materials, Sandler Training
- Secretary/Treasurer – Nicole R. Maher, Chief Operating Officer, National Ready Mixed Concrete Association (NRMCA)
- Immediate Past Chairman – Wallace Johnson, U.S. Concrete, Inc.

The NSC board of directors includes:

- Randal M. Beard, Principal and Managing Director, Walter P. Moore
- Dr. Rex Cottle, Trinity Industries, Inc. (retired)
- Steve Cox, Vice President - Customer Success, Command Alkon
- Brian Gallagher, Vice President, Marketing, O'Neal, Inc.
- Julie Garbini, Executive Director, RMC Research & Education Foundation
- Beverly Garnant, Executive Director, American Society of Concrete Contractors
- Douglas Guerrero, Chairman, CIM Patrons, California State University, Chico
- Marti Harrell, NPCA Vice President of Education and Training and NPCA Foundation Executive Director, National Precast Concrete Association (NPCA) Foundation
- Scott Harrison, Senior Associate, Construction Insight, Inc.
- Kyle Loyd, Executive Vice President, Concrete & Waterproofing, Sika Corporation
- Paul Ozinga, Executive Vice President, Ozinga RMC, Inc.
- Aaron Snowdon, Director RMC Performance, Summit Materials, LLC

- Russell Tripp, President, American Concrete Pipe Association
- Rick Yelton, Editor at Large, Informa Exhibitions U.S.

"We continue the great fortune of having a board of directors comprised of industry leaders that bring vast amounts of experience, capability and commitment to the National Steering Committee," said CIM NSC Executive Director Eugene Martineau. "Their leadership is essential as the NSC continues to provide oversight and direction while advancing the CIM program and preparing the next generation of leaders for the concrete industry."

To learn more about the program, visit www.concretedegree.com.

CHANEY CELEBRATES DECADE OF RECOGNITION FOR WORKPLACE QUALITY AND SUCCESS

Maryland company wins tenth consecutive AWE Seal of Approval award

Chaney Enterprises, a ready-mix concrete, aggregates, custom blends, and related construction supplies provider, announced it has won its tenth consecutive Alliance for Workplace Excellence (AWE) Seal of Approval award for its commitment to supporting employees and their communities.

The AWE Seal of Approval is awarded to companies on the criteria of balanced leadership and overall workforce success. Chaney's selection for this award recognizes superiority in corporate culture practices, employee opportunity and family friendly policies; commitment to corporate, social, and civic responsibility; and diversity and inclusion practices, among other attributes. Chaney was also awarded the AWE Health & Wellness Seal of Approval and the AWE EcoLeadership Award, applauding employee health and wellness initiatives and commitment to environmental sustainability and effective use of resources, respectively.

As one of 41 employers of all sizes and industry types from across the country being recognized, Chaney is the only concrete and aggregate supplier in the region to receive the awards this year.

"We pride ourselves on providing an excellent experience for our employees which, in turn, helps them to deliver excellent service to our customers," said Francis "Hall" Chaney, III, president of Chaney Enterprises. "To be recognized as a leader in workplace excellence for the past decade is reassuring for our employees and shows our team's commitment to our mission of taking pride in delivering exceptional products and services, while demonstrating commitment to our people, our communities, and our environment."

All nominees for AWE awards undergo a comprehensive assessment process led by an independent review panel of business professional and Master's and Ph.D. level students in various fields including business, industrial and organizational psychology, human resources, environmental science, public health, and diversity and inclusion.

Chaney employees were present to receive the awards during a gala celebration and recognition ceremony held in Gaithersburg, MD. For more information visit www.chaneyenterprises.com.

ENGINEERED RESTORATIONS, INC. SUPPORTS TRANSITIONING MILITARY SERVICE MEMBERS

Lawrenceville, GA, Alcatraz Island, CA, and Pearl Harbor, HI, August 22, 2018

Engineered Restorations, Inc. and the non-profit CPI Foundation (the Concrete Preservation Institute) announce they will join forces to prepare active duty service members for civilian careers in the concrete infrastructure industry.

Participating in 12-week Field Schools, soon-to-be veterans are trained in classroom curriculum and hands-on projects repairing concrete landmark structures at Alcatraz Island, CA, and Pearl Harbor, HI. The program helps active duty participants get ahead of the veteran-to-civilian transition curve and avoid unemployment and underemployment.

"We provide valuable career development opportunities for our deserving service members and train the critically-needed workforce for the concrete industry facing a shortage of skilled tradespeople and managers required to build and fix our country's infrastructure," said CPI President and CEO Tanya Komas. "Engineered Restorations' support of CPI is a win-win-win public-private partnership: preparing transitioning service members for rewarding civilian careers; providing workforce for industry; and completing deferred maintenance projects that may not otherwise be completed on National Park Service sites with irreplaceable cultural heritage."

CPI holds three 12-week, full time sessions per year at both Pearl Harbor and Alcatraz Island. Service members remain on active duty while training, receive hands-on technical and management skills, and can earn professional certifications upon passing examinations. CPI then connects candidates with industry employers, who actively seek to hire qualified individuals in concrete repair, new construction, material production, transportation, business, sales, operations, safety, and other construction-related areas. Find out more about CPI at www.cpi-foundation.org.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your 200-300 word industry news to editor@icri.org. Content for the November/December 2018 issue is due by October 1, 2018 and content for the January/February 2019 issue is due by December 1, 2018. ICRI reserves the right to edit all submissions.

In Need of Repair

ICRI Fills the Need for Training in the Concrete Repair Industry

The single largest opportunity for people entering the construction trade is in concrete repair, rehabilitation, and restoration.

More concrete is used than all other construction materials combined—12 billion tons placed annually. It is the second most common man-made material in the world, second only to potable water. However, the volume of *existing* concrete is at least 30 times the volume of new concrete—at least 360 billion tons of existing concrete worldwide.

Despite its durability, concrete structures require maintenance and repair.

The ASCE Report Card estimates $4.6 trillion needs to be spent over the next 10 years to return our infrastructure to a "C" rating—$14,241 per American citizen.

Concrete repairs are not performing satisfactorily.

The US Corps of Engineers Study REMR CS2 states, "A little more than 50% of the repairs performed on Corps structures are performing satisfactorily, which is an unacceptable rate. Failures are attributable to design or evaluation errors, material performance, and installation or construction errors. The Corps' experience is not unusual."

The Corps' findings were confirmed by CONREPNET—an examination of 215 case histories where about 50% of repairs were deemed successful. Of those repairs it was found that 20% deteriorated within 5 years, 70% within 10 years, and 90% deteriorated in 25 years.

We NEED trained concrete repair professionals.

An informal poll conducted at the 2017 International Concrete Repair Institute Fall Convention reported over 95% of contractor members polled indicated a need for new workers to go immediately to work in the concrete repair and restoration field.

Due to the number of concrete structures that are in need of repair, restoration, and maintenance—*and* the lack of satisfactory performance of repairs previously performed—the need for field workers who are trained in concrete repair methods and standards has never been greater.

Educational content exists.

ICRI had its origins at a World of Concrete seminar in February 1988, during which attendees voiced their frustration about the lack of standards and guidelines for concrete repair. They also expressed their concern over the proliferation of unqualified contractors entering the industry. These contractors were not properly trained in concrete repair and were underbidding without proper knowledge of surface preparation, equipment, materials, techniques, etc.

Since then, ICRI has created and updated technical guidelines, publications, and certification programs to educate concrete repair professionals on all aspects of concrete repair.

INTERNATIONAL CONCRETE REPAIR INSTITUTE

ASSOCIATIONNEWS

AMERICAN CONCRETE INSTITUTE LAUNCHES NEW DECORATIVE CONCRETE FLATWORK CERTIFICATION PROGRAM

The American Concrete Institute has introduced a new decorative concrete flatwork certification to its programs. The program allows individuals to earn two designations: Decorative Concrete Flatwork Finisher and Decorative Concrete Flatwork Associate.

The Decorative Concrete Flatwork Finisher and Associate certifications require individuals to complete a written exam, and maintain current certifications as an appropriate ACI-Certified Concrete Flatwork Finisher or Technician. The Decorative Concrete Flatwork Finisher certification requires 1,500 hours of work experience.

The decorative exam covers basic knowledge of proper installation and finishing procedures for decorative concrete flatwork. Topics include:

- Coloring: applying and finishing dry-shake hardeners, finishing integral color
- Stamping: form layout, squaring formwork, pattern layout, release agents, texturing tool, finishing for texture application
- Exposed Finishes: seeding aggregate, finishing for top surface retarder application, applying top surface retarders, washing the surface.
- Stairs: forming, stamped finish, exposed finish, colored finish
- Cleaning/Sealing: applying curing compounds and sealers, surface preparation for sealers

An ACI-Certified Decorative Concrete Flatwork Associate may upgrade to ACI-Certified Decorative Concrete Flatwork Finisher at any time during the five-year certification period by fulfilling the work experience requirements.

The certification is offered through ACI's global network of more than 120 sponsoring groups in local concrete communities. Additionally, the certification will be offered at the American Society of Concrete Contractors annual conference on September 20-23, 2018, in Charlotte, NC.

Learn more about ACI certification programs at why-ACIcertification.org.

OHIO BUILDING CODE NOW REFERENCES ACI 562 REPAIR CODE

The American Concrete Institute announces that the Ohio Building Code now references ACI 562 Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures.

For commercial buildings, the Ohio Building Code is based on the 2015 edition of the International Code Council's International Building Code. The new changes add requirements for ACI 562-16 as follows: evaluation and design of structural concrete repairs and rehabilitation shall be in compliance with Chapter 34 of the International Building Code and ACI 562. Requiring the ACI 562 means that minimum requirements for public safety related to structural concrete are now being applied to existing buildings as well as new buildings.

Based on nearly one century of content, the ACI 562 code requirements combine the Institute's historical knowledge with state-of-the-art resources on the evaluation, repair, and rehabilitation of concrete buildings. ACI 562-16 provides minimum performance requirements that address the unique nature of existing building construction.

A leading authority and resource worldwide for individuals and organizations involved in concrete design, construction, and materials, ACI has long focused its efforts on knowledge development and dissemination. Through its mission, the Institute dedicates resources and effort to advance the adoption of its consensus-based knowledge.

ACI supports efforts to engage in state code development, helping ACI achieve its mission of developing, disseminating, and advancing the adoption of consensus-based knowledge on concrete and its uses.

Additional information can be found at the ACI 562 Repair Code Portal, concrete.org/ACI562.

INTERESTED IN SEEING YOUR NEWS IN THIS COLUMN?

Email your 200-300 word association news to editor@icri.org. Content for the November/December 2018 issue is due by October 1, 2018, and content for the January/February 2019 issue is due by December 1, 2018.

PEOPLE ON THE MOVE

JQ HIRES STRUCTURAL PROJECT MANAGER IN AUSTIN, TEXAS


BRYANT DE LA CRUZ

JQ announced that it has hired **Bryant De La Cruz, PE,** as a Structural Project Manager in the firm's Austin office.

Bryant has more than 14 years of experience in the A/E/C industry and has managed all phases of project development from schematic design through construction completion. His structural design experience includes work on commercial, corporate, medical, multifamily, education and hospitality structures in multiple regional markets and utilizing multiple structural systems.

A licensed engineer in Texas, Bryant earned both a Bachelor of Science in Manufacturing Engineering degree and a Master of Science in Mechanical Engineering degree from The University of Texas-Pan American in Edinburg, Texas. He also holds his Master of Science degree in Civil Engineering from Texas A&M University-Kingsville.

Among De La Cruz's current projects:

- Prairie View A&M University Observatory Expansion and SEED Lab, Prairie View, Texas
- Green Pastures Hotel, Austin, Texas
- Kickapoo Traditional Tribe School and Administration Buildings, Eagle Pass, Texas

INTERESTED IN SEEING YOUR PEOPLE IN THIS COLUMN?

Email your People on the Move announcements to editor@icri.org. Content for the November/December 2018 issue is due by October 1, 2018 and content for the January/February 2019 issue is due by December 1, 2018.

NACE CIP LEVEL 3 CERTIFIED SENIOR SCIENTIST AND PRODUCT MANAGER JOINS CQTI


CHARLES KIMBLER

ChemQuest Technology Institute (CQTI) is pleased to announce that **Charles Kimbler** has joined as a director, effective immediately. For over 20 years, Charles Kimbler has driven innovation and technological advances in formulated coatings, developing and delivering customer-centric solutions, across diverse end markets and global geographies.

In 1993, Charles earned his Bachelor of Science in chemistry from Eastern Kentucky University, followed by an MBA degree in International Management from Baldwin-Wallace University. He is also NACE (National Association of Corrosion Engineers) CIP Level 3 certified.

In his 22-year tenure with The Sherwin-Williams Company, Kimbler rose from his initial position as a coatings chemist in the North American Automotive Division to a Global Product Manager, expanding beyond a scientific role into global marketing and business development, product management, product development, technical service, and the manufacturing of coatings.

Most recently, Kimbler's key responsibilities as the Global Technical Service & Development Manager for the Coatings Group at Michelman, Inc., included optimizing customers' starting formulations with newly developed binders. On the R&D side of the business, he managed the accelerated performance testing of binders and surface modifiers through outdoor weathering studies. Kimbler also mentored (and recommended products and solutions) to its sales organization and conducted joint technical visits with them.

GSSI ANNOUNCES NEW TECHNICAL APPLICATIONS SPECIALIST

GSSI, the world's leading manufacturer of ground penetrating radar (GPR) equipment, is pleased to announce the hire of **Brett Caldwell** to the position of Technical Applications Specialist supporting the geophysical, geotechnical, environmental, and academic markets. Brett is a GPR Technician with a diverse background in geosciences and construction.

After serving in the US Army's 10th Mountain Division Core Air Defense Element as an Assistant Operations Sergeant, Brett worked in a variety of customer facing positions, including sales, coaching, and management positions in the automotive and athletic apparel industries. Brett then studied Geology at Towson University before beginning his work for Penhall Technologies, first as a GPR analyst, and then as a field supervisor, in which he managed all aspects of GPR activities for Penhall in the Central United States Region.

In a Facebook post announcing his hire by GSSI, Brett explained his longtime desire to join the GSSI team, writing, "Every experience I have had as a consumer of their [GSSI's] GPR products has been nothing short of positive. Sales, marketing, training, support, engineering – they're all top notch." Brett went on further to express his excitement over joining GSSI: "I'm very excited to say that I'll be joining GSSI as a Technical Applications Specialist…While I've enjoyed my time in Construction, I couldn't be happier to get back to my roots."

GSSI is confident that Brett's wealth of experience in a variety of industries, as well as his natural competitive spirit (he is an Ironman finisher), will help GSSI continue to lead the GPR industry.

PEOPLE ON THE MOVE

KARINS ENGINEERING GROUP, INC ANNOUNCES CHANGES AND ADDITIONS IN SARASOTA OFFICE

John F. Bonacci, PhD, PE, LEED AP
Vice President of Engineering

A Director at KEG since 2004, John is excited about his new role as KEG's technical leader while representing KEG through high level participation on industry organization boards and committees. John will expand his long-standing involvement in industry organizations to help maintain KEG's commitment to incorporating the "State-of-the-Art" in engineering service to clients. He will educate staff company-wide on the most current thinking, as well as help influence laws, standards and codes in Florida.

Thomas A. Hagood, Jr., PE, SI
Vice President of Design—Business Development

Tommy holds a Bachelor's degree in civil engineering from The University of Alabama and a Master's degree in structural engineering from Vanderbilt University. He has more than 45 years of experience in structural engineering design, management and business development. Tommy is licensed in Florida, Tennessee, Georgia, Alabama, Louisiana, North Carolina, and Ohio. Tommy will be working on the Executive Committee on continued firm-wide growth of the structural engineering design business, including strengthening KEG's existing relationships, mentoring branch managers in KEG's six locations, and developing new relationships throughout our service area.

Jerome J. DiMercurio, PE, SI
Engineering Manager—Sarasota

Jay holds a Bachelor's degree in civil engineering from Tufts University College of Engineering. He has 35 years of experience in building design, project management and design office management. Jay is licensed in Florida, Georgia, Iowa, Maine, New Hampshire, Pennsylvania, Rhode Island, South Carolina and North Carolina.

This team brings to KEG a wealth of experience and expertise in the design of varied and complex building types that have been constructed throughout the US and abroad. They have designed virtually every building type, but specialize in the design of complex, complicated building structures, including multistory buildings (mid-rise and high-rise).

CHAPTER MEETINGS & EVENTS

BALTIMORE-WASHINGTON
September 13, 2018
3rd QUARTER DINNER MEETING
Topic: Seismic Retrofitting of a 28-Story Hotel
Presenter: Kevin Goudarzi, PE
Maggiano's Little Italy
Washington, DC

October 4, 2018
ANNUAL GOLF TOURNAMENT
The Timbers at Troy
Elkridge, MD

CAROLINAS
October 11 & 12, 2018
CHAPTER FALL CONFERENCE
Golf, Banquet, and Conference
Hotel Ballast
Wilmington, NC

CHICAGO
September 18, 2018
CHAPTER DINNER MEETING
Topic: ICRI Certification Programs
Erie Café
Chicago, IL

October 25, 2018
CHAPTER SEMINAR
Topic: Post-Installed Anchors in Concrete
Wiss, Janney, Elstner Offices
Northbrook, IL

DELAWARE VALLEY
September 28, 2018
CHAPTER GOLF OUTING
Rock Manor Golf Club
Wilmington, DE

October 17, 2018
FALL SYMPOSIUM
Topic: Stone Repair, Installation and Cleaning
Bricklayers Local 1 Union Hall
Philadelphia, PA

FLORIDA FIRST COAST
September 20, 2018
CHAPTER TECHNICAL MEETING
Topic: Construction Site Repair
Location: TBD

October 1, 2018
CHAPTER GOLF TOURNAMENT
Queens Harbor Golf Club
Jacksonville, FL

FLORIDA WEST COAST
October 5, 2018
DEMO DAY PRESENTATION
University of South Florida
School of Engineering
Tampa, FL

November 2, 2018
SPORTING CLAYS TOURNAMENT
Tampa Bay Sporting Clays
Land O' Lakes, FL

GEORGIA
September 27, 2018
CHAPTER LUNCHEON
Maggiano's Perimeter
Atlanta, GA

October 25, 2018
CHAPTER LUNCHEON
Maggiano's Perimeter
Atlanta, GA

GREAT PLAINS
September 27, 2018
13th ANNUAL GOLF TOURNAMENT
Schoal Creek Golf Course
Kansas City, MO

GREATER CINCINNATI
September 13, 2018
20th ANNUAL CHAPTER GOLF CLASSIC
Mill Creek Course at Winton Woods
Cincinnati, OH

HOUSTON
September 20, 2018
TECHNICAL MEETING
Joint meeting with ICRI and ACI
Saint Arnold Brewery
Houston, TX

METRO NEW YORK
September 6, 2018
CHAPTER BREAKFAST PRESENTATION
Topic: Ethics
Club 101 Manhattan
New York, NY

September 20, 2018
CHAPTER GOLF EVENT
Cedar Hill Golf and Country Club
Livingston, NJ

October 25, 2018
CHAPTER TECHNICAL MEETING
Club 101 Manhattan
New York, NY

MINNESOTA
October 2, 2018
FALL TECHNICAL SESSION
Topic: OSHA Safety and Fall Protection
AET Offices
Saint Paul, MN

NEW ENGLAND
September 11, 2018
CHAPTER ROUNDTABLE DISCUSSION
Stockyard Restaurant
Brighton, MA

October 9, 2018
CHAPTER TECHNICAL SEMINAR
Topic: Carbon Fiber Reinforcement
Granite Links
Quincy, MA

NORTH TEXAS
September 13, 2018
MEMBERSHIP MEETING
Presenter: Jason Chodacheck, Vector Corrosion Technologies
Pappasito's Cantina
Dallas, TX

October 5, 2018
JESSE POINTS MEMORIAL GOLF CLASSIC
Waterchase Golf Club
Fort Worth, TX

NORTHERN CALIFORNIA
September 28, 2018
CHAPTER ONE-DAY SYMPOSIUM
Repairs after Earthquakes and Fires
California Cement Masons
Pleasanton, CA

ROCKY MOUNTAIN
September 27, 2018
CHAPTER SPORTING CLAYS
Kiowa Creek Sporting Club
Arapahoe County, CO

October 18, 2018
CHAPTER PROGRAM MEETING
Location: TBD

SOUTH CENTRAL TEXAS
September 20, 2018
CHAPTER MEMBERSHIP LUNCHEON
NXNW Restaurant & Brewery
Austin, TX

SOUTHEAST FLORIDA
October 26, 2018
21st ANNUAL GOLF TOURNAMENT
Jacaranda Golf Club
Plantation, FL

SOUTHERN CALIFORNIA
September 27, 2018
CHAPTER DINNER MEETING
Topic: Chemical Grouts; Urethane versus Epoxy
Stevens Steakhouse
Commerce, CA

TORONTO
October 9, 2018
CHAPTER TECHNICAL MEETING
Location: TBD

VIRGINIA
September 20, 2018
CHAPTER FALL SYMPOSIUM
Topic: ACI 562 Repair Code
Colonial Heritage Golf Club
Williamsburg, VA

FOR UP-TO-DATE CHAPTER ACTIVITIES AND FULL DETAILS ON THOSE LISTED HERE, VISIT WWW.ICRI.ORG.

INTERNATIONAL CONCRETE REPAIR INSTITUTE

WOMEN in ICRI

ICRI is pleased to offer a dynamic forum for its female constituents and members to:

- network;
- advance knowledge;
- address barriers that may be controversial regarding growth and participation in policy making and industrial leadership; and most important,
- recognize the challenges and successes of women who share a place within the concrete repair industry.

"We empower one another by supporting and helping one another."

If you are interested in participating in this group, contact:
Katherine Blatz, Katherine.blatz@basf.com | Monica Rourke, Mrourke@mapei.com
Gigi Jaber-Sutton, gigij@icri.org

ICRI Committees

Taking part in ICRI committees gives you the opportunity to play a vital role in the direction of the repair and restoration industry, and ICRI as an organization. Whether your interests are in organizational marketing or technical aspects of the industry, ICRI has a committee to fit your talents.

- **Administrative committees** report directly to the ICRI Board of Directors. These committees lay the groundwork for the organization and work to ensure its continued growth and success
- Participation on **Technical Committees** and subcommittees increases your knowledge in almost every area of concrete repair and restoration, and enables you to stay on the leading edge of best industry practices.

All Committees meet in person twice a year at the ICRI Spring and Fall Conventions and all (with the exception of Fellows and Nominating) are open to anyone to attend. Visit www.icri.org for more Information on ICRI committees.

INTERNATIONAL CONCRETE REPAIR INSTITUTE

Are you a potential mentor?
Share your ideas on how your experience can benefit young professionals

Are you a potential mentee?
Share what you would like to learn from a mentor and where you feel you could benefit

ICRI is developing a Mentorship Program geared toward young professionals within ICRI to help build leadership skills and guide career growth. The program will involve activities and interactions at the National and Local Chapter level.

Get involved and help drive it forward.

Contact Elena Kessi, elena@aquafin.net, to get involved.

CHAPTER NEWS

FLORIDA WEST COAST SEMINAR ON FALL PROTECTION

The Florida West Coast Chapter had a great dinner meeting on Thursday, August 2, 2018. The topic was Safety and Fall Protection and the presenters were from 3M. The meeting was held outside at 3 Daughters Brewery in St. Petersburg, FL, with approximately 35 in attendance. The program was well received and having a fall protection presentation at a brewery garnered the chapter quite a few compliments.

Florida West Coast members gather for a fall protection seminar

Several demonstrations were given during the fall protection program

2018/2019 CHAPTER NEWS DEADLINES

NOVEMBER/DECEMBER 2018
September 10, 2018

JANUARY/FEBRUARY 2019
November 10, 2018

MARCH/APRIL 2019
January 10, 2019

Send your Chapter News by the deadlines to Dale Regnier, Chapter Relations Director, at daler@icri.org

MINNESOTA SPRING TECHNICAL SESSION

The Minnesota Chapter hosted a Spring Technical Session on May 22, 2018. The topic of the session was Electrochemical Treatments to Historical Structures, presented by Brian Pailes, PhD, PE, NACE, CP-3 of Vector Corrosion Services. Brian discussed the unique challenges historic structures present related to restoration in order to preserve the integrity of the structure without affecting the architecture and aesthetics. Brian focused on two types of corrosion mitigation that are available, electrochemical chloride extraction and realkalization. Brian's presentation included a detailed description of each of the processes as well as case studies of projects using each of the processes. The session was well attended and very informative. A special thanks to Brian.

GEORGIA HOSTS ANNUAL GOLF OUTING

The ICRI Georgia chapter has been enjoying a rainy and hot summer since that weather pattern began in early April! However, that did not stop them from launching their Annual Scholarship Golf Tournament on May 7, 2018. This year, the tournament occurred at Lake Lanier Islands Legacy Golf Course in beautiful Buford, Georgia. They welcomed 80 golfers, and approximately 12 additional volunteers. The chapter brought in 20 event sponsorships, ranging from event sponsor, to gold, silver, hole-in-one, cigar, drink, and driving range sponsors. There were also a number of typical hole sponsorships and they brought with them several volunteers to greet golfers prior to teeing off. Big thanks go out to event sponsor Coastal Construction Products, which has a large presence in the Georgia chapter. The gold sponsors were Simpson Strong-Tie and TEC Services, Inc., and the Silver Sponsor was Everclear Enterprises, Inc.

Results came in as follows: 1st place went to Supplies Unlimited, 2nd Place to Engineered Restorations, Inc., and 3rd Place was awarded to Supplies Unlimited. The Georgia Chapter greatly appreciates all the generous sponsors and they look forward to another successful event next year! Please visit the chapter website to view additional photographs and event information.

The welcome table and registration area is ready for the Georgia golfers

The golf team representing Everclear Enterprises and Penta included (left to right) Bryan Heery, Will Pelton, Mark Lester, and Greg Hays

The team from TEC Services included (left to right) Joshua Lloyd, Steven Maloof, Brian Wolfe, and George Harrison

The 1st place team, representing Supplies Unlimited, included (left to right) Mickey Aycox, Justin Horton, Brad Ramey, and Kyle Flanagan

CHAPTER NEWS

ROCKY MOUNTAIN HOSTS ANNUAL GOLF OUTING

The Rocky Mountain Chapter hosts its 18th Annual Golf Tournament at the Hiwan Golf Club in Evergreen, Colorado on Monday, August 13, 2018 with 117 members and guests participating in the 4-person scramble. The beautiful day in the mountains began with registration and breakfast burritos and wrapped up with a lunch banquet and a raffle. The annual golf outing is traditionally the major source of funding for the Chapter and the Rocky Mountain Chapter would like to thank all of the attendees and sponsors.

One fantastic foursome (left to right): David Booth with East/West Urban Management, Kim West from ASR Companies (Golf Committee Chairperson), Conor Bancroft with Wember, and Chris Boortz with ASR Companies

The presidential foursome (left to right): Marcy Forbes with Mapei, Lindy Dahlman from RSI, Brittany Barnett with RSI, and Angela Echols with RSI and Current Chapter President

ICRI CHAPTER ROUND TABLE

The next ICRI Regional Chapter Round Table will be in Philadelphia, September 17-18. The Baltimore-Washington, Delaware Valley, Metro New York, Connecticut, Pittsburgh, New England, Quebec and Toronto chapters will all be invited to attend. Each chapter may send two delegates to the Round Table events.

For the latest ICRI Chapter information visit www.icri.org

CHAPTER NEWS

CHAPTERS COMMITTEE CHAIR'S LETTER

MICHELLE NOBEL
Chapters Chair

I can't believe it's already time for the kids to go back to school! Where does the time go? I hope most of you had a chance to try out some new meeting ideas for your chapters over the summer months. With people traveling more than usual during these months, it's a great time to mix it up a bit and think outside the box to entice new members, plus it breaks up the monotony for the existing members. Doing fun events, like a baseball game, a meeting at a local brewery or a whiskey tasting and cigar social on the river brings members together for a good time in a relaxed and different atmosphere. Hopefully, all of you have had some relaxing time off with your families and friends so you can get ready for fall and the end-of-year push!

Speaking of plans for the fall, I hope everyone plans to attend the ICRI Round Table in Philadelphia, September 17-18. The Baltimore-Washington, Delaware Valley, Metro New York, Connecticut, Pittsburgh, New England, Quebec and Toronto chapters will all be invited to attend. Please make sure you send two delegates to the Round Table events in your area, so your chapter can benefit from these meetings. I'm looking forward to finding some new ideas that I'll bring back to share with everyone! When you're traveling, remember to reach out to the local chapter to see if they're having an event while you're in town. It's always great to see how other chapters run their meetings. It's like global networking, which takes networking to a whole new level!

The ICRI Fall Convention is right around the corner!! It's being held in Omaha, Nebraska, November 7-9. The theme of the convention is *Resiliency, Above and Beyond Concrete Repair*. These are some of the events that are planned:

- European Hunt @ Pheasant Bonanza Hunt Club (Wednesday afternoon)
- Learn to Shoot/Trap @ Pheasant Bonanza Hunt Club (Wednesday afternoon)
- Omaha Zoo Tour (Wednesday afternoon)
- The 26th Annual ICRI Project Awards Ceremony and Reception (Thursday evening)
- 30th Anniversary Celebration at SLOWDOWN (Friday evening)

The ICRI Spring Convention recognizes the Fellows of ICRI, people who have given their expertise and time to this great organization, and the local ICRI chapters, for all their accomplishments throughout the year. The ICRI Fall Convention recognizes the projects that we all work on together. In this united front, we hope to have a project that excels above all others, to be the ***ICRI Project of the Year!*** It's like winning the Oscar for Best Picture, and you have bragging rights for the next year!

All chapters should be sending a delegate to the convention. This is an opportunity for newer members or even members that haven't been to a convention for a few years, to take advantage of this program. To find out more information on being a delegate, please talk to the current chapter president or visit www.icri.org.

The next Concrete Slab Moisture Testing cetification program is being held in Baltimore, MD from September 19 to 20. If you're looking to become a qualified concrete slab moisture testing technician, now's your chance. You could leave the ICRI Round Table and go straight to the next testing! The Concrete Surface Repair Technician (CSRT) certification program, the Concrete Slab Moisture Testing Technician (CSMTT) certification program and ACI 562-16 Repair Code and Guide Videos are training programs offered by ICRI. To find out more information on these programs please visit www.icri.org and go to the Education tab at the top of the page or contact the ICRI Office at (651) 366-6095.

Please remember to always be careful and travel safe, and I'll see everyone in cool Philly for the next ICRI Chapter Round Table!

Sincerely,
Michelle Nobel
2018 Chapters Committee Chair

ICRI has 39 chapters, including 2 student chapters, in metropolitan areas around the world. Chapters hold technical presentations, educational meetings, symposiums, and local conventions on repair-related topics.

Chapters also provide an outstanding opportunity to meet and build relationships with repair specialists in your area. In addition to the technical meetings, chapters also host golf outings, social evenings, dinner cruises, and other networking events.

NEW 38 SPECIAL CONCRETE GROUT PUMP BY VENTURES EQUIPMENT

Ventures Equipment is proud to announce the 38 Special Concrete Grout Pump which is built to be rugged, robust and reliable. It works great with Ready Mix Concrete, Extended Pour and Form Repair Materials, Shotcrete, High Volume Slurry and Masonry Block Fill. The unit can be charged with Ready Mix Trucks or Batch/Continuous Mixers. It has been designed for safe and simple operation with very limited maintenance required. Operating on a gas over hydraulic variable speed drive system, the unit can achieve discharge outputs more than 12 Yards an Hour with Ready Mix and 25 Yards an Hours with Slurry and Screeds.

The 38 Special Concrete Grout Pump is available in a small trailer mounted unit which can easily be towed by a ½ ton truck as well as a skid mounted version. It has an 8 Cubic Foot Hopper with a 4-inch Heavy Duty Clamp Discharge to easily handle 3/8" aggregate pumpable mix designs. With pumping distances in excess of 200 Feet Horizontal and 80 Feet Vertical, the 38 Special can make impossible projects possible.

For additional information on Ventures Equipment, please contact us at www.ventureseq.com or 817-636-5642

NEW FROM W. R. MEADOWS – DECRA-SEAL NATURAL

New from W. R. MEADOWS comes DECRA-SEAL NATURAL, water-based sealer that enhances the natural appearance of a variety of decorative hardscapes. DECRA-SEAL NATURAL can effectively be used on interior, exterior, horizontal and vertical decorative concrete, pavers, unglazed tiles, and a variety of porous natural and artificial stones. DECRA-SEAL NATURAL is a non film forming, penetrating water repellent that chemically bonds to the substrate to help increase the service life. DECRA-SEAL NATURAL offers a long-lasting, non-yellowing matte finish while also offering excellent sealing benefits.

DECRA-SEAL NATURAL is low VOC and is safe and easy to use. It can be applied by an industrial sprayer, lint-free roller, or lambs wool applicator. Simply clean equipment with soap and water after use. Reduce water and salt penetration, enhance and enrich surface appearance, and preserve the natural look of the substrate with non-gloss DECRA-SEAL NATURAL.

Further information about DECRA-SEAL NATURAL can be found at https://www.wrmeadows.com/decra-seal-natural-water-repellent-sealer-enhancer.

STRUCTURAL REPAIR MORTARS NOW INCLUDE MIGRATING CORROSION INHIBITOR

ChemMasters, Inc. has announced the addition of migrating corrosion inhibitor to their popular "ChemSpeed 75" and "ChemSpeed 75 ES" (Extended Set) repair mortars. Both are versatile single component cementitious mortars suitable for 0.50 inch to full depth structural and traffic bearing repairs to slabs, bridge and parking decks, columns, beams and roadways. ChemSpeed 75 and ChemSpeed 75 ES are high early strength mortars that offer versatile placement options including horizontal trowel, vertical and overhead form and pump applications, and may be extended up to 60% for deep repairs.

ChemSpeed 75 reaches initial set in 13 to 19 minutes, while ChemSpeed 75 ES has an extended initial set of 40 to 50 minutes for increased flow and easier use in hot weather. The addition of migrating corrosion inhibitor ensures superior protection for structural steel and rebar, for maximum repair durability. They are freeze/thaw resistant, high early strength mortars reaching 2,000 psi compressive strength within one hour, may be placed at temperatures down to 20° F (-6.7° C) and may be primed or coated with as little as 4 hours cure.

ChemMasters, Inc. is a 60 year-old manufacturer of specialty concrete chemicals used to improve, repair and protect concrete and masonry. The company is the acknowledged leader in the formulation and manufacturing of low-VOC solvent-based products for use in the states that require them. A state-of-the-art research and development facility is operated by ChemMasters to advance the science of concrete improvement. For more information visit www.chemmasters.net.

BOSCH GAS18V-3N 18V CORDLESS WET/DRY VACUUM FEATURES POWER AND CONVENIENCE FOR THOROUGH JOBSITE CLEANUP

Vacuum offers combination of great power and added protection of HEPA filter

A professional vacuum cleaner is as important to the jobsite as a power tool or building materials. The Bosch GAS18V-3N 18V Cordless Wet/Dry

Vacuum Cleaner offers pro performance for cleanup just about anywhere, including the shop, jobsite and truck. And all without the need to plug in.

The 2.6-gallon vacuum offers sustained suction for up to 24 minutes of high-power vacuuming when using a Bosch 18V 6.0 Ah battery. The proprietary canister design features Bosch-exclusive rotational airflow technology, which helps ensure consistent vacuum performance. Portable, handy and powerful, the Bosch GAS18V-3N vacuum weighs only 10.2 Lbs. (tool with attachments only, not including battery).

The vacuum features a washable HEPA filter, which captures 99.97% of particles at 0.3 microns and larger. In addition, it delivers up to 51 CFM (cubic feet per minute) airflow for convenient cleanup and provides wet suction of up to a gallon and a half of water for disposal.

The vacuum also features a complete set of attachments, including three extension tubes, a crevice nozzle and a floor nozzle. Adapters for connecting the vacuum cleaner to various Bosch power tools and their dust hoods are available separately.

The Bosch GAS18V-3N Cordless Wet/Dry Vacuum works with the Bosch 18V battery system, so it can clean up where there's no outlet by delivering up to four minutes of runtime per battery amp hour (Ah).

The cordless wet/dry vacuum weighs only 10.2 Lbs. (tool with attachments only, not including battery). It's compact and provides an integrated hose and on-board nozzle storage. This wet/dry vac is easy to transport and use anywhere on the jobsite.

The Bosch GAS18V-3N Vacuum Cleaner comes with a washable HEPA filter, a 5.25 Ft. hose, three extension tubes, a crevice nozzle and a floor nozzle. This is a bare-tool kit; the battery and charger are sold separately. Additional information is available online at www.bosch.com.

NEW PARTNERSHIP PROVIDES MAXIMUM VALUE AND PERFORMANCE FOR CONCRETE FLOOR SLAB DESIGNS

CTS Cement Manufacturing Corp. – manufacturer of Rapid Set® professional-grade cement products and Komponent® shrinkage-compensating cement for concrete repairs and new construction projects – announces a partnership with Concure Systems to provide the ultimate performance in moisture protection and Komponent® shrinkage-compensating jointless floor slabs.

Facilities specifying moisture sensitive floor coverings or seamless flooring systems can now benefit from the best of both worlds – combining integral moisture mitigation, 90-95% fewer joints, and dimensional stability that prevents shrinkage-cracking, spalling and edge curling.

Integrating these two innovative technologies allows you to minimize or eliminate control joints and saw cutting, prevent joint related flooring failures, and eliminate topical moisture remediation systems. This solution can eliminate delamination concerns for moisture sensitive floor coverings or resinous floor systems and prevent reflective cracking and costly joint failures – all while improving operational efficiencies and overall aesthetics.

Specifying an integral concrete slab solution using Komponent and Concure means construction costs can be reduced, project timelines accelerated, and long-term maintenance costs minimized. These innovative, proven technologies offer complementary benefits and ensure maximum performance in industrial, commercial, and institutional facility designs.

Concure's Lifetime Warranty for preventing moisture vapor emissions (MVE) challenges helps protect the owner's capital investment and provides peace of mind for long-term performance. For more information visit www.CTScement.com.

AVOIDING THE LEGAL, FINANCIAL AND ENVIRONMENTAL CONSEQUENCES OF CONCRETE WASHOUT

Technology that can help concrete plants and construction firms meet growing demand, without suffering legal, financial or environmental consequences associated with waste disposal. Among such technologies are the latest Qdos chemical metering pumps and Bredel hose pumps from Watson-Marlow Fluid Technology Group (WMFTG), which are highly proven in tough applications such as construction sites, aggregate and concrete production plants.

In a typical treatment system, initial pH adjustment is performed to maximise the precipitation of solids and the treated water passes through a lamella clarifier. This process is followed by the recovery of suspended cementitious solids using flocculants dosed by WMFTG's high accuracy Qdos chemical metering pumps, to aggregate the fine particulates into rapidly settling clumps.

Following treatment, settled solids from the water collect in a hopper where the resulting sludge can then be pumped by Bredel hose pumps into a skip or sludge storage tank, or for off-site disposal.

The level and type of solids in the sludge various greatly but does not impact the capacity of the hose pumps, which can transfer up to 80% solids in suspension. Furthermore, flow is entirely independent of suction and discharge conditions.

Peristaltic pumps from WMFTG are increasingly favoured for concrete washout applications, due to their extremely low maintenance requirements, and safe, non-contacting pumping method. Without mechanical seals or valves to leak or corrode, Qdos and Bredel pumps completely contain the pumped fluid, preventing operator contact with chemicals, or spillage of untreated sludge.

Importantly, peristaltic pumps do not require skilled personnel for maintenance. A simple Qdos ReNu pumphead or Bredel hose change, takes only minutes and can be performed on site. Their low cost maintenance adds to the list of reasons that growing numbers of plant contractors are turning to WMFTG pumps for chemical dosing and sludge transfer duties in the final stages of pH adjustment and treatment of concrete wash water.

Clean, pH-adjusted and sediment-free water can then be re-used on site, for tanker and conveyor washout, providing further cost savings.

For more informtion and to read the case study regarding construction waste such as concrete washout visit http://www.watson-marlow.com/gb-en/

TUCKERBILT CONCRETE TRANSPORTER RUNS WITH JCB FROM MASTRY

Tucker's Machine & Steel Service's new Tuckerbilt® T-644 is the most thoroughly innovative Concrete Transport Vehicle available. Harnessing its JCB EcoMax 320/50704 Stage IV/Tier 4 engine supplied by Mastry Engine Center, it moves its six-yard payload 50% faster and 2' higher than previous models.

Tucker's chose the JCB engine because of its impressive torque and it was offered without a diesel particulate filter. With fewer parts, there's less to fail—an important consideration when operating on a dirty construction site. Additionally, everything needed is on one side of the engine for easy maintenance. Located on the rear of the T-644, it eliminates the need for a counterbalancing weight.

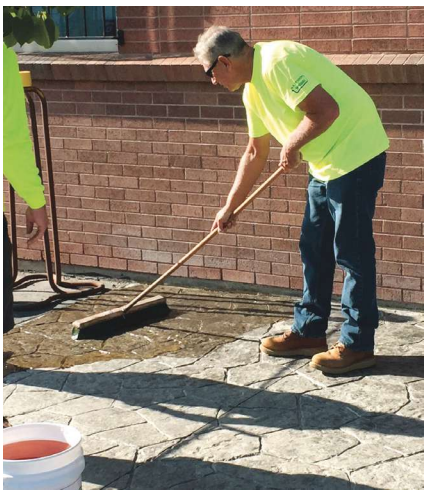
The 108 kW JCB EcoMax engine has a formidable reputation for performance and reliability. The four-cylinder diesel provides an impressive 145 continuous bhp @ 2200 rpm. Twin auxiliary PTOs deliver massive high torque to power the hydraulic pumps, even at lower rpms.

The 14" covered auger trough of the Tuckerbilt T-644 Concrete Transport Vehicle boasts infinitely adjustable speed for precise pouring. It handles low-slump, standard mix and SCC. The hopper has an integrated splash deflector and swings 90° left and right on its centerless turntable for incredible reaching capabilities. A smart vehicle, it has CAN-based machine control technology with on board diagnostics. The enclosed climate-controlled cab is ergonomic for long days on the job. Cameras and radar ensure exceptional ground crew safety. A video is at bit.ly/2L2pxYY.

Since 1953, Tucker's Machine & Steel Service, Inc., has dominated the pre-press concrete pouring market. Continually introducing market-changing technologies, it has never strayed from its commitment to manufacture dependable products and deliver the finest customer service. Its website is www.tuckerbilt.com.

NEW FROM W. R. MEADOWS – ULTRITE COATING REMOVER

New from W. R. Meadows comes Ultrite Coating Remover, a soy gel that effectively lifts a wide range of one-part topical coatings, such as sealers, acrylics, urethanes, latexes, lacquers, etc. from a variety of surfaces including concrete, masonry, wood, and metal. Ultrite Coating Remover can remove multiple layers in one application without vigorous scrubbing.



Ultrite Coating Remover does not contain methylene chloride, is low odor, and is safe for interior use. It is ideal for use in warehouses, industrial plants, schools, automotive plants, parking garages, plazas, and service stations. Use Ultrite Cleaner to remove the residues left from Ultrite Coating Remover.

Ultrite Coating Remover is an exciting option to remove warn out coatings," says Jim Becker, Product Group Manager, Construction Liquids, W. R. Meadows. "Ultrite Coating Remover is the easiest product I've ever used to strip acrylic sealers."

Further information about Ultrite Coating Remover can be found at https://www.wrmeadows.com/ultrite-coating-remover.

GOING FROM STRENGTH TO STRENGTH IN RAIL

Cintec has an unparalleled international reputation for designing and manufacturing reinforcement and anchoring solutions for masonry and concrete structures.

For over a quarter of a century, Cintec has secured and reinforced historic and historical buildings, masonry bridges, monuments, railway structures, retaining walls and harbour walls throughout the world.

The patented Cintec reinforcement and anchoring system is straightforward: injecting a proprietary cementitious fluid grout into an anchor surrounded by a fabric sock, which has already been placed in an oversized drilled hole. The reinforcement system's ingenuity lies in its versatility. Drawing on decades of experience and testing, Cintec's designers can customize it to any specification.

Cintec International has supplied Network Rail and formerly British Rail and many County Councils and Local Authorities with anchors and reinforcements for over 25 years either directly or through Cintec's approved contractor network.

Cintec and its partner companies offer a complete diagnostic service on all masonry and stone bridges and structures, from initial assessment and a finite element design process through to anchor installation and completion.

Electrification projects

The work involves utilising Cintec's patented anchoring system to support the weight of the gantries which will hold the cables needed to electrify the lines, and in some cases to strengthen railway bridges and viaducts to which the gantries are attached.

Maidenhead Viaduct

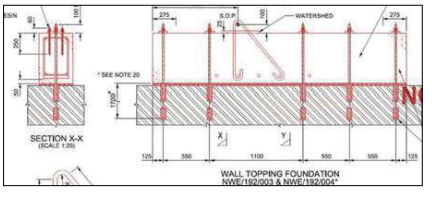
One of the latest uses for Cintec anchors has been at Maidenhead viaduct. The engineers Balfour Beatty Rail needed to connect a series of concrete slabs for overhead gantries to the existing stone viaduct without any possibility of subsequent movement.

The Chorley Line

Cintec anchors are being used to connect the new concrete foundation to an existing masonry wall. Vertical Cintec M24 anchors 2,325mm long are installed into the masonry and the new concrete foundation subsequently cast around the exposed ends of the anchors. After casting the concrete 200x100x20mm washer plates are used to secure the concrete to the masonry wall. Holes or voids were filled using Cintec Presstec grout.

GWEP Cutting Bracket Fixings

The London to Cardiff line exits the long tunnel and continues through a deep cutting with sides at angles between 65 and 75 degrees. The diagram below illustrates the problem as the line had little clearance between track and cutting face.



The inclined face of the cutting consisted of a masonry facing in front of a rockface of variable consistency and internal voids and fractures. Also, as there is insufficient room to accommodate traditional concrete pad foundations to plant electrification gantries upon the obvious and only answer was to use the Cintec anchor system.

The 96 No Grade 316 SS 45mm diameter Cintec anchors in 100mm diameter hole up to 3,300mm long were installed to secure the gantries along a substantial length of cutting.

Mainline station works

The Cintec anchor system was used as high load holding down anchors for the new canopy link between the new and old stations.

In this case, it is Cintec's ability to provide a bespoke system for the problem that has enabled these projects to be so successful. The great flexibility of designs available to the engineers has enabled a large variety of structural challenges to be met utilising Cintec's anchors.

The future

Cintec is proud to have been involved in the work that has already taken place improving the UK's rail system and plans to continue to expand into the rail upgrading programme with partnering arrangements with prime suppliers to Network Rail in addition to advising professional design practices on practical and cost effective structural solutions.

For more information visit www.cintec.com.

INTERESTED IN SEEING YOUR PRODUCTS IN THIS COLUMN?

Email your 200-300 word product information to editor@icri.org. Content for the November/December 2018 issue is due by October 1, 2018 and content for the January/February 2019 issue is due by December 1, 2018. One (1) high resoution product photo may be included. ICRI reserves the right to edit all submissions.

NEW MEMBERS

COMPANY MEMBERS

Geotec Development / Industrial Coatings
#8 Cay Bay Rd
Cole Bay, Caribbean 123
Sint Maarten
Andy Carchidi
Email: andy@geotecdevelopment.com

Little Feet Concrete, Inc.
340 United Court Suite #4
Lexington, Kentucky 40509
United States
Andrew Whalen
Email: andrew@littlefeetconcrete.com

Maschmeyer Concrete
1142 Watertower Rd
Lake Park, Florida 33403
United States
Bryan Fulcher
Email: bfulcher@maschmeyer.com

Matcon Construction Services, Inc.
1717 East Busch Blvd, Ste 601
Tampa, Florida 33612
United States
Les Mouzon
Email: les@matconconstruction.com

MCQ Sales LLC/Kingspan Insulation
106 Cray Terrace
Fanwood, New Jersey 07023
United States
Peter Mcquaid
Email: pete@mcqsales.com

Team Cam LLC
701 Evelyn Avenue
Linthicum Heights, Maryland 21090
United States
Ryan Blades
Email: lritz@teamcamservices.com

ADDITIONAL INDIVIDUALS FROM MEMBER COMPANIES

Andy Bell
Pecora Corporation
1081 Woodshire Ct
Rock Hill, South Carolina 29730
United States
Email: bella@pecora.com

Stephen Bouwer
Structural Preservation Systems, LLC
9735 International Court N
St. Petersburg, Florida 33716
United States
Email: sbouwer@structural.net

Louann Burdell
JJ Morley
1325 3rd Avenue South
Birmingham, Alabama 35233
United States
Email: louannburdell@morleycompany.com

Steve Butler
National Waterproofing Supply
4914 Distribution Drive
Tampa, Florida 33605
United States
Email: steve@nationalwaterproofingsupply.com

Joseph Contreras
Sullivan Engineering, LLC
409 Minnisink Road, Suite 103
Totowa, New Jersey 07512
United States
Email: Jcontreras@sullivanengineeringllc.com

Charles Davis
John Rohrer Contracting Co., Inc.
United States
Email: charles@johnrohrercontracting.com

Clint Etzel
Walter P Moore & Associates, Inc
1301 McKinney St Suite 1100
Houston, Texas 77010
United States
Email: cetzel@walterpmoore.com

Blake Lemcke
American Engineering Testing
550 Cleveland Ave North
St. Paul, Minnesota 55114
United States
Email: blemcke@amengtest.com

Charlie Lerman
Alchemy-Spetec
13025 91st Avenue Ct NW
Gig Harbor, Washington 98329
United States
Email: avpuli@gmail.com

Tyler Logar
Joseph B. Callaghan, Inc.
1617 JFK Blvd.
Philadelphia, Pennsylvania 19103
United States
Email: tlogar@jbciengineers.com

Justin Mayo
Maschmeyer Concrete
1142 Watertower Rd
Lake Park, Florida 33403
United States
Email: jmayo@maschmeyer.com

Mike McCarter
John Rohrer Contracting Co., Inc.
United States
Email: mike@johnrohrercontracting.com

Kirby McCleary
Walker Consultants
199 E. Montgomery Avenue, Suite 100
Rockville, Maryland 20850
United States
Email: kmccleary@walkerconsultants.com

Rey Ortiz
Fyfe Company, LLC
4995 Murphy Canyon Road, Suite 110
San Diego, California 92123
United States
Email: reyortiz@aegion.com

Benjamin Pisello
Coastal Construction Products, Inc.
1314 Atando Avenue
Charlotte, North Carolina 28206
United States
Email: bpisello@coastalone.com

Tony Provenson
Engineered Restorations, Inc.
1151 Eddystone Lane
Ponte Vedra, Florida 32081
United States
Email: tprovenson@er-inc.net

Zac Rogers
John Rohrer Contracting Co., Inc.
United States
Email: zac@johnrohrercontracting.com

Charles Williams
Structural Preservation Systems, LLC
9735 International Court N
St. Petersburg, Florida 33716
United States
Email: charles.h.williams.jr@gmail.com

ADDITIONAL INDIVIDUALS FROM SUPPORTING MEMBER COMPANIES

Kevin Irving
Phoscrete Corporation
13167 Stone Creek Ct
Huntley, Illinois 60142
United States
Email: jkevinirving@gmail.com

Kevin Moore
Walker Consultants
2101 Fourth Avenue, Suite 1210
Seattle, Washington 98121
United States
Email: kmoore@walkerconsultants.com

INDIVIDUAL MEMBERS

Fari Barzegar
446 - 17th Street, Suite 300
Oakland, California 94612
United States
Email: Fari@HabitatEngineering.com

Ryan Browne
600 Treat Ave.
San Francisco, California 94110
United States
Email: ryanbrowne@rainbow415.com

Continued on page 56

NEW MEMBERS

Continued from page 54

Christy Delaney
885 Dunsmuir St Suite 520
Vancouver, British Columbia V6C1N5
Canada
Email: christy.delaney@octaform.com

James Garland
18430 33rd Ave N
Plymouth, Minnesota 55447
United States
Email: jgarland@jondon.com

Ryan Jarret
314 Edison Furlong Road
Doylestown, Pennsylvania 18901
United States
Email: rjarret16@gmail.com

Kevin Keaton
106 Cedar Crest Road
Aylett, Virginia 23009
United States
Email: kevin.keaton@neenahenterprises.com

Kyle Kiifner
3936 Newland Drive
Round Rock, Texas 78681
United States
Email: kyle.kiifner@jedunn.com

Jared Klime
880 Montclair Rd, Ste 600
Birmingham, Alabama 35213
United States
Email: jkime@lbyd.com

Dennis Krieger
831 Harmon Ave
Columbus, Ohio 43223
United States
Email: Dennis.krieger@janell.com

Jim Mays
PO Box 1020
Delaware, Ohio 43015
United States
Email: jmays@mces.com

Sheri Porter-Nelson
3900 Briars Road
Olney, Maryland 20832
United States
Email: estimating@trcfloors.com

Jay Poston
1341 Nazareth Church Road
Spartanburg, South Carolina 29301
United States
Email: jposton@lesco.net

Sebastien Roberge
17, rue de l'Industrie
Saint-Remi, Quebec J0L 2L0
Canada
Email: sebastien.roberge@sair.ca

Grant Russell
311 E. 11th Ave
Kansas City, Missouri 64116
United States
Email: grant.russell@nortonschmidt.com

James Scheld
266 Merrick Rd Suite 300
Lynbrook, New York 11563
United States
Email: JScheld@hisassoc.com

Jeff Schmucker
1002 Linda Ct.
Newport, North Carolina 28570
United States
Email: jschmucker@carboline.com

Dylan Seitz
7051 East Parkview Drive
Parma, Ohio 44134
United States
Email: dseitz@chasephipps.com

Joshua Weiss
444 Santa Fe Drive
Denver, Colorado 80204
United States
Email: joshua@npwcontracting.com

STUDENTS/APPRENTICES

Justin Barden
Wiss, Janney, Elstner Associates, Inc.
30700 Telegraph Rd, Ste 3580
Bigham Farms, Michigan 48025
United States
Email: jubarden@umich.edu

Bobby Jacobs
Purdue University
101 Andrew Pl, Apt 205
West Lafayette, Indiana 47906
United States
Email: jacobs43@purdue.edu

Boyu Wang
University of Victoria
3800 Finnerty Rd
Victoria, British Columbia V8P 5C2
Canada
Email: boyuwang@uvic.ca

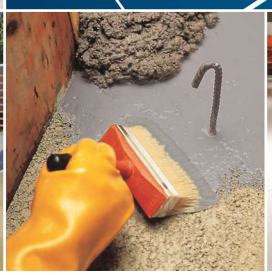
INDEX OF ADVERTISERS

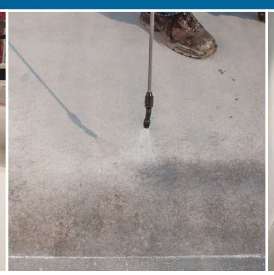
INTERNATIONAL CONCRETE REPAIR INSTITUTE

1000 Westgate Drive, Suite 252 | St. Paul, Minnesota 55114 USA
Phone: +1 651-366-6095 | Fax: +1 651-290-2266
Web: www.icri.org | Email: info@icri.org

MAPEI provides a **world** of **Concrete Restoration Systems**

- Concrete Repair Mortars
- Corrosion Protection
- Construction Grouts
- Waterproofing
- Sealants and Joint Fillers
- Coatings and Sealers
- Epoxy Adhesives
- Decorative Toppings
- Cure and Seals
- Densifiers
- Structural Strengthening Products





MAPEI offers a full spectrum of products for concrete restoration, waterproofing and structural strengthening. Globally, MAPEI's system solutions have been utilized for bridges, highways, parking garages, stadiums, building and other structures.

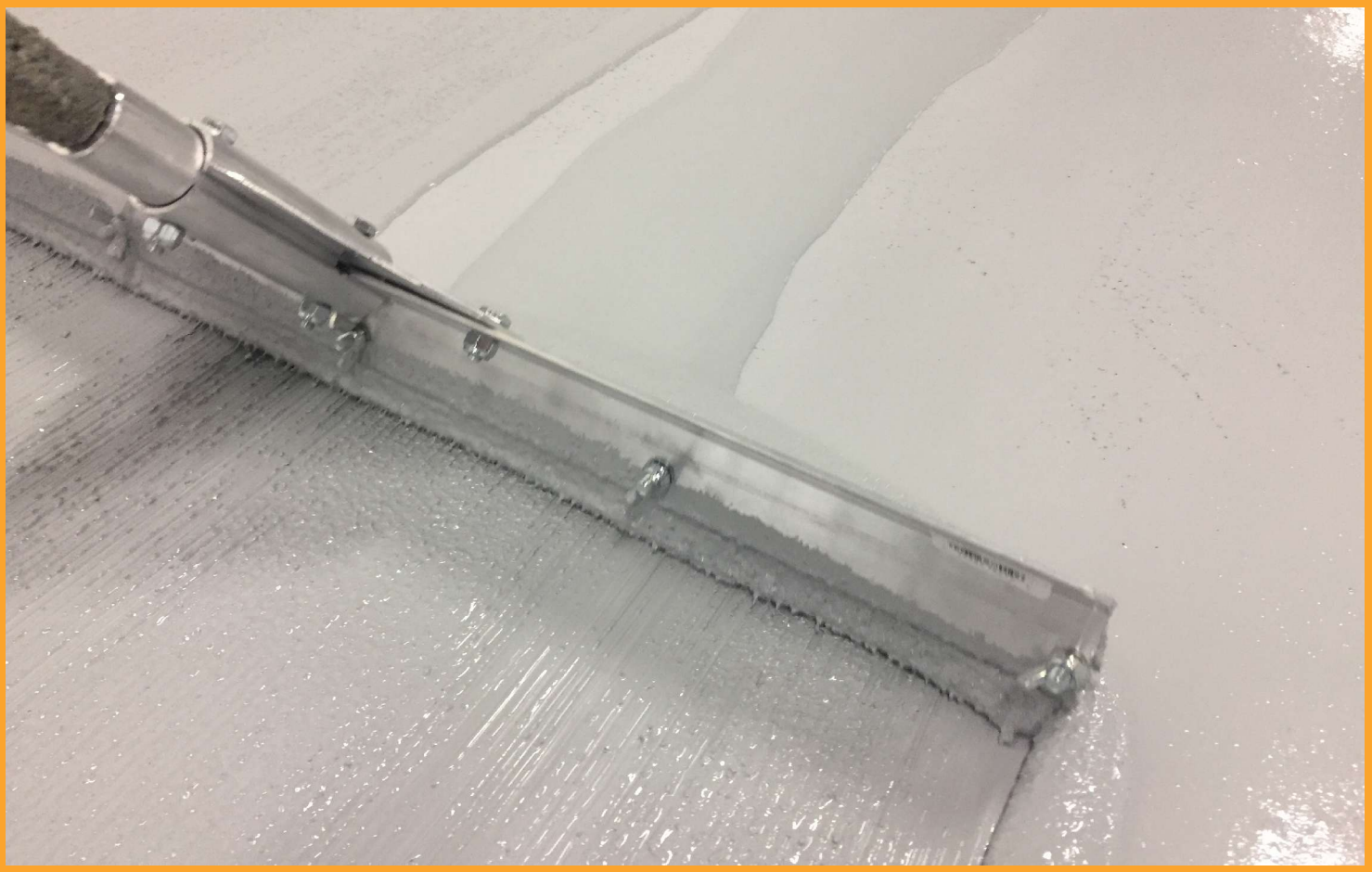
Visit www.mapei.com for details on all MAPEI products.

MAPEI USA

www.mapei.com

MAPEI®

ADHESIVES · SEALANTS · CHEMICAL PRODUCTS FOR BUILDING



Sikalastic® Textured Top Coats

SILICA DUST FREE TRAFFIC COATINGS

- Pre-mixed aggregate TopCoat
- Excellent encapsulation of the aggregate
- No silica sand used
- Consistent texture
- Outstanding wear resistance
- Standard and custom colors available

learn more at

USA.SIKA.COM

Sika Corporation
201 Polito Avenue, Lyndhurst, NJ 07071 Phone: 201-933-8800

BUILDING TRUST