

CONCRETE CONSTRUCTION

An Official Magazine of
World of Concrete



**60 Reasons
to Celebrate
Concrete**

**Reason #31:
Like the Pantheon,
Concrete Endures**

Also in this issue:
Record-tall tilt-up panels, pg 45

THE INDUSTRY'S FIRST AC BRUSHLESS ROTARY HAMMERS

HITACHI
Inspire the Next



COME FIND ME AT YOUR LOCAL HITACHI DEALER AND SEE FOR YOURSELF.



DH40MEY

1-9/16" SDS Max
Brushless Low Vibration
Rotary Hammer

DH45ME

1-3/4" SDS Max
Brushless Rotary Hammer

DH45MEY

1-3/4" SDS Max
Brushless Low Vibration
Rotary Hammer

DH52ME

2-1/16" SDS Max
Brushless Rotary Hammer

DH52MEY

2-1/16" SDS Max
Brushless Low Vibration
Rotary Hammer

FIND OUT WHAT MAKES US SO GREAT.

www.hitachipowertools.com





Consolidation Perfection ...Begins Here!

***OZTEC's job-proven concrete vibrating and ceiling grinding equipment
...Designed to meet the extreme demands of the concrete industry!***

***See Oztec's full line of
concrete vibrating equipment
and concrete grinders on our
web site: www.oztec.com***



Oztec Industries, Inc. Tel: 1.800.533.9055 . 1.516.883.8857





★

DESIGNED FOR AN
**AMERICAN
WORKHORSE.**

© 2016 International, Inc. All rights reserved.
All marks are trademarks of their respective owners.



**INTRODUCING THE NEW INTERNATIONAL® HX™ SERIES.
FINALLY A TRUCK THAT WORKS AS HARD AS YOU.**

Worksites are tough. They're dirty, gritty, and hard on trucks. The comfort, functionality and style of the HX Series keeps you working harder, longer and more efficiently thanks to a completely redesigned interior that's ergonomically advanced with high quality appointments, best-in-class visibility and a new hydraulic assist clutch. Wrap it up in an all-new design, and you've got the total package to keep you moving.

International



IT'S UPTIME™

The Worldwide Leader in Concrete Paving Technology



info@gomaco.com | www.gomaco.com

The Profit on Your Projects These Days is Dependent on Your Technology

G+[®] machine control has a fast processing speed and features two-way communications with paver accessories. Its instant digital feedback combined with the tight closed-loop electronic and hydraulic control creates a G+ paving experience that is smooth, efficient and accurate. G+ Connect[™] allows a simple connection to 3D or choices from our complete sensor library. We understand how important it is for you to make the right purchasing choice in a concrete paver. There is nothing on the market that can compare to our G+ control system, versatile product line and industry leading sales and service support. Our worldwide distributor network and our corporate team always stand ready to serve and assist you. Give us a call for the latest in concrete paving technology.



CONCRETE STREETS AND HIGHWAYS | AIRPORT RUNWAYS | CURB AND GUTTER | SIDEWALKS
RECREATIONAL TRAILS | SAFETY BARRIER | BRIDGE PARAPET | BRIDGE DECKS | IRRIGATION CANALS
GOMACO CORPORATION IN IDA GROVE, IOWA, USA | 712-364-3347



45

26



FEATURES

- 26 Concrete Construction's 60th Anniversary**
Here's what our readers told us were 60 reasons to celebrate the concrete industry today and look forward to a strong future.
- 45 Walking Tall**
Tilt-up concrete reaches new heights, as panels almost 112 feet high are erected for a college dorm in Florida.
- 55 Changing the Game with Concrete Maturity**
Can maturity replace concrete cylinders for long-term strength testing?

DEPARTMENTS

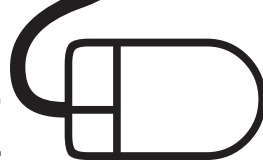
- 9 Insider Information**
Sixty years of CC, jobsite diversity, and Building Business
 - 14 Your Business**
Contractor to Watch; a Timeline of our 60 Years in Business
 - 18 Projects that Rock**
Three infrastructure projects: State Route 520 Bridge, Second Avenue Subway, and Southeast Collector Trunk Sewer
 - 22 Building Business NEW!**
Serve your best customers first
 - 24 Uncommon Sense**
The calling of concrete
 - 64 Problem Clinic**
How to make concrete form panels last.
- Concrete Construction Products**
Visit our website to see the latest formwork products.

IN THE NEXT ISSUE OF

CONCRETE CONSTRUCTION

- Placing High-Performance Floors
- Table Forms for Top-Down Construction
- CONCRETE SURFACES: Floors

COVER: Photo by Ismail Çiydem



A new concreteconstruction.net

With more than 1 million visitors each year, we already were the industry's number one source of information for concrete contractors. Now with a new, more agile website, you can find all of the information you seek even faster with our new user-friendly format and design.

In the News

Read the following news stories and more at our website, which we update several times a day:

- Why do so many Construction Workers Commit Suicide?
go.hw.net/suicide
- Trump's Great Wall's Biggest Winner
go.hw.net/TrumpWall
- Kodasema Creates Movable Concrete Micro-home
go.hw.net/MicroHome

CONCRETE CONSTRUCTION PRODUCTS

CONCRETE CONSTRUCTION Products

Visit our website for the latest and greatest products that will make your life easier. We post new products daily, so visit our website and click on the Products tab to see what's new.

Quick Poll

Do you rely primarily on a single ready-mix concrete producer/supplier or multiple companies?



2017 World of Concrete

Registration is open for World of Concrete, which takes place Jan.16-20 in Las Vegas. Visit our website for more information as the event nears. CONCRETE CONSTRUCTION is an official publication of World of Concrete.



Sign up for our Newsletter

What's a Monday without the CONCRETE CONSTRUCTION Industry Update newsletter in your inbox? Visit our website and click on the Newsletter tab to sign up.



UPDATED FREE WEBINAR

MOISTURE TESTING

OF CONCRETE FLOOR SLABS



Wagner Meters is proud to offer the updated webinar, "Moisture Testing of Concrete Floor Slabs." presented by Howard Kanare, a leading expert in concrete moisture issues. Kanare provides breakthrough scientific information that seriously challenges what we have believed regarding traditional methods for measuring moisture in concrete slabs.

Register for the Webinar Today!



ON-SITE, OFF-SITE, AND EVERYWHERE IN-BETWEEN.

We see service differently. Keeping your tires rolling in top condition is the best way to keep your production efficiency up and cost per hour down. We have over 200 locations and 1,500 service trucks in the U.S. and Canada to give you the peace of mind that you're rolling on expertly serviced tires. In our shop or on the road, we're bringing something new to tire service: SERVICE.

GENUINE • COMPLETE • RELIABLE

1-844-68-TIRES • gcartires.com/service

GCR
TIRES & SERVICE



THE WORLD'S #1 SUPPLIER OF
BOOM EXTENSION CONCRETE SCREEDS



BOSS
240



THERE'S A NEW **BOSS** IN TOWN & YOU DON'T WANT TO MISS IT!

Ligchine International is pleased to introduce the most innovative, power house, laser guided screed ever offered in the industry. Like every ScreedSaver model, the **BOSS 240** includes our standard features of Wireless remote control; Fully automatic operation; 2D laser control; 3D satellite control (optional); haul it with a pickup truck/trailer combination; FL numbers that can only be achieved by a boom operated screed, etc.

WHAT'S NEW:

- **MEGA SCREED COVERAGE** – The BOSS offers a massive 240 square feet of coverage per pass with an 18' boom combined with a 13.5' Superflat screed head.
- **ENGINE** – Kubota WG1605 (57hp) gas engine (or optional Kubota LP Gas engine).
- **ZERO TURN DRIVE SYSTEM** – Independently turn the upper boom frame OR lower drive frame 360° via hydraulic remote control.
- **STICKUP AVOIDANCE** – Instead of rotating the head in a wide circle, BOSS is equipped with lateral boom/screed head side shift to avoid the obstacle.
- **CONCRETE ADDITIVE SPRAYER** – Standard on the BOSS is a liquid additive spray bar on the screed head with an on-board tank and automatic ON/OFF activation.
- **PRESSURE WASHER** – Standard on the BOSS is a 2,000 psi pressure washer, water holding tank, & detachable 50' braided hose.
- **LIGHTING SYSTEM** – Bright LED lighting system provides high intensity front and rear lighting.
- **DIAGNOSTICS** – BOSS includes a Parker 7" Color (touch screen) display with continuous hydraulic, electronic, power, and system status.

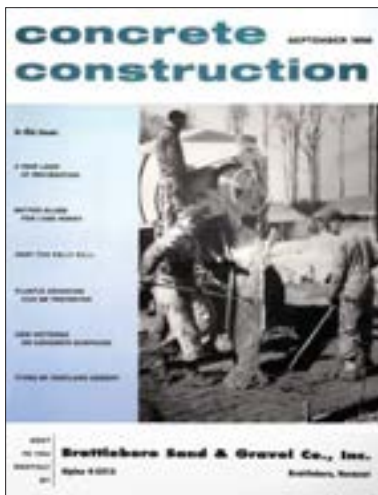


CALL: 812-903-4500
WEB: www.ligchine.com

or EMAIL: sales@ligchine.com



60 Years of CONCRETE CONSTRUCTION



The first cover of CONCRETE CONSTRUCTION.

Ten years ago we published our 50th anniversary edition of CONCRETE CONSTRUCTION. Now we are celebrating the 60th just because everyone likes a party and it's a great excuse to look at where our industry has come from, where it is today, and what to look forward to. There's a timeline of the magazine's history on page 16 and our list of 60 Reasons to Celebrate Concrete starts on page 26. Sixty years is a long time in a person's life—I was only 3 years old when Bill Avery rolled out his first issue of CC, so this magazine's life has roughly aligned with my own and somehow it became my life's work. As editor, walking in the footsteps of people like Avery, Mary Hurd, and Ward Malisch is a great honor and I feel the responsibility to maintain the standards they set and to provide you, our

readers, with the information you need to do your job better. In the first issue, Bill Avery established the goal of CC which remains true today: to make the magazine an industry journal for the "free exchange of ideas, opinions, and experiences" related to concrete. Here's to another 60 years!

To Go Far, Go Together

A recent news item noted that "Construction, by far the most gender-imbalanced field, is also the only industry with a share of women below 10%." That got me thinking about tolerance and diversity on construction jobsites and about how many gay concrete workers there are and how they are treated. Do you have LGBT workers on your jobs? You may say that you don't know or care, but if you do have gay workers I bet there are very few who are "out." Being tolerant and even welcoming to people of all kinds seems to me to be both good sense and good business and a part of the change that is taking place across the construction industry. The old wild-west feeling of a jobsite where we had little regard for the emotional or physical well-being of workers is thankfully becoming a thing of the past. New Jersey Sen. Cory Booker quotes an old African saying that if you want to go fast, go alone; if you want to go far, go together. We should actively encourage diversity and inclusion in our workplaces and view all of our coworkers as important parts of a team that can only go far together.



William D. Palmer Jr.
Editor in Chief
wpalmer@hanleywood.com
Twitter: @wmpalmer



Building Business

Kimberly Kayler starts a new column for CC this month called "Building Business" on page 22. Topics will include marketing, business communication, and planning. Kimberly's company, Constructive Communication Inc., has been providing great content for CC and other industry publications for many years. She has even hired some of our former employees! She and her stable of writers understand how to promote their clients (companies like Doka, the Tilt-Up Concrete Association, and Madison Concrete Construction) while still producing articles that provide our readers with solid, useful information. Kimberly is currently the chair of ACI's marketing committee where she has helped develop an ambitious international marketing plan. Please welcome her to CC.

FORMWORK EXCHANGE LTD.

"Congratulations to Concrete Construction on their 60th Anniversary".

Our company has enjoyed collaborating with Concrete Construction and World of Concrete for over 34 years.

Formwork Exchange LTD.

Operating since 1981 and is still "customer centric".

Rent • Sell • Buy

Handset & Flying Shoring - Handset & Euro Clamp Forming

Complete Engineering



Since 1981

New & Used
All Systems
U Name It



www.formwork-shoreall.com

Very Competitive
Try Us

Formwork Exchange Ltd.

Email: sales@formwork-shoreall.com

Phone: 770-562-2609

Brooks, Bonnie, Maria or Nelson



DELIVERING SUSTAINABLE SOLUTIONS

After water, concrete is one of the most sustainable and widely used materials in the world.

Fly ash plays an important role in increasing the sustainability of concrete. Headwaters Resources is the nation's leader in supplying quality fly ash. We can help you discover how to improve the performance of your concrete while simultaneously improving its environmental profile.

Visit www.flyash.com for answers to the most common questions about fly ash. You can also contact your expert Headwaters Resources technical support representative for advice on your specific sustainability opportunities.

www.flyash.com

CONCRETE CONSTRUCTION®

Group Editorial Director, Design and Commercial Construction | Ned Cramer • ncramer@hanleywood.com

Editor in Chief, Commercial Construction | William D. Palmer Jr. • wpalmer@hanleywood.com

Group Managing Editor | Tom Bagsarian • tbagsarian@hanleywood.com
Community Manager | Sharon J. Rehana • srehana@hanleywood.com

Assistant Managing Editor | Colette Martino Palait • cpalait@hanleywood.com
Digital Projects Producer | Zack Zerndt • zzerndt@hanleywood.com

Art Director | Robb Ogle • rogle@hanleywood.com

Graphic Designer | Lita Ledesma • lledesma@hanleywood.com

Production Manager | Stephanie E. Fischer • sfischer@hanleywood.com

Ad Production Coordinator | Terry Rinella • trinella@hanleywood.com

Group Director, Marketing & Circulation |

Christina Lustan • clustan@hanleywood.com

Audience Marketing Manager |

Chari O'Rourke-Berzanskis • corourke@hanleywood.com

Marketing Director |

Matthew Carollo • mcarollo@hanleywood.com

President, Hanley Wood Contractor Group |

Rick Strachan • rstrachan@hanleywood.com

Editorial Director, Commercial Construction |

William D. Palmer Jr. • bpalmer@hanleywood.com

Chief Design Director

Aubrey Altmann • aaltmann@hanleywood.com

HANLEY WOOD MEDIA

President | Dave Colford

Executive Vice President/Strategic Marketing Services | Tom Rousseau

Senior Vice President/Strategic Marketing Services &

Consumer Media | Jennifer Pearce

Senior Vice President/Audience Operations | Sarah Welcome

Vice President/Product Development | Rizwan Ali

Vice President/Client Operations | Mari Skelnik

Senior Director/Print Production | Cathy Underwood

PUBLISHED BY hanley wood

HANLEY WOOD CORPORATE

Chief Executive Officer | Peter Goldstone

Vice Chairman | Frank Anton

Chief Financial Officer | Matthew Flynn

President/Media | Dave Colford

President/Digital | Andrew Reid

President/Marketing | Jeanne Milbrath

President/Metrostudy | Christopher Veator

Senior Vice President/Marketing | Sheila Harris

Vice President/Corporate Accounts | Ryan Flom

Vice President/General Counsel | Michael Bender

Vice President/Business Planning & Analysis | Ron Kraft

Vice President/Corporate Controller | Kelth Rosenbloom

EDITORIAL AND ADVERTISING OFFICES

5600 N. River Road, Suite 250, Rosemont, IL 60018

773-824-2400; Fax 773-824-2401

cceditor@hanleywood.com • www.concreteconstruction.net

www.worldofconcrete.com

SUBSCRIPTIONS & ADDRESS CHANGES

Phone: 888-269-8410; 847-291-5229 (outside U.S.) | Fax: 847-291-4816

Mail: CONCRETE CONSTRUCTION, PO Box 3494, Northbrook, IL 60065

cc@omeda.com | www.omeda.com/cc

Privacy of mailing list: Sometimes we share our subscriber mailing list with reputable companies we think you'll find interesting. However, if you do not wish to be included, please call 888-721-2402.

CONCRETE CONSTRUCTION will occasionally write about companies in which its parent organization, Hanley Wood, has an investment interest. When it does, the magazine will fully disclose that relationship.

Opinions expressed are those of the authors or persons quoted and not necessarily those of CONCRETE CONSTRUCTION.

Reprinting of articles is prohibited without permission of Hanley Wood. Write the Editor in Chief to request permission. Individual subscriptions: \$30 per year, \$46 for 2 years. Canada and Mexico: \$39 per year, \$64 for 2 years. Foreign (includes airmail delivery): \$93 per year, \$162 for 2 years. CONCRETE CONSTRUCTION is indexed in Construction Index. Back issues of CONCRETE CONSTRUCTION are generally available from Hanley Wood for \$10. Out-of-print issues in microfilm form may be ordered from ProQuest Information and Learning, Attn: Reprint Department, 300 N Zeeb Road, Ann Arbor, MI 48106, phone: 734-761-4700.



Stop water dead in its tracks.



Introducing RPSInject™ from Simpson Strong-Tie.

Stop water leaks without costly excavations. RPSInject™ polyurethane injection resins give you a safe, versatile and easy-to-use solution for repairing cracks to prevent water infiltration. These non-toxic, non-flammable expanding resins are available in four formulations and adjustable cure times to help you solve your next concrete repair challenge.

With RPSInject resins, you can repair in place. Call us about your project at (800) 999-5099 or visit strongtie.com/rpsinject.

SIMPSON
Strong-Tie

BACK-SET

MOLECULAR CEMENT DISSOLVER™



- Biodegradable
- Acid Alternative
- Cost Effective
- Non-hazardous
- Non-corrosive
- Non-dot Regulated

Back-Set™ is an acid alternative with no fumes or odors. This is a newly developed concept in chemistry, completely safe. Back-Set molecularly attacks the portland cement, completely dissolving the hardened molecular structure.

URNS HARD SET UP CEMENT BACK INTO RINSABLE MUD!

BACK-SET DOES NOT CONTAIN MURIATIC, HYDROCHLORIC, HYDROFLUORIC, SULFURIC OR PHOSPHORIC ACIDS. THE ACTIVE INGREDIENT OCCURS NATURALLY IN SUGAR CANE SYRUP.

RoMix Manufactures **BACK-SET™** utilizing applied science by DuPont™



**TECHNOLOGY FOR A
GREEN ENVIRONMENT!**

Toll Free: 800-331-2243
Fax: 817-685-0877
romixchem.com



CONCRETE CONSTRUCTION

5600 N. River Road, Suite 250, Rosemont, IL 60018
Phone: 773-824-2400 • Fax: 773-824-2401

cceditor@hanleywood.com
www.concreteconstruction.net
www.worldofconcrete.com

President

Hanley Wood Contractor Group | Rick Strachan
Phone: 202-736-3332 / Fax: 202.785.1974
rstrachan@hanleywood.com

Vice President, Sales-Commercial Construction

Greg Cooke
Phone: 773-824-2403 / Fax: 773.824.2401
gcooke@hanleywood.com

STRATEGIC ACCOUNT MANAGERS

West/Central

Greg Cooke
Phone: 773-824-2403 / Fax: 773.824.2401
gcooke@hanleywood.com

East/Southwest

Ed Kraft, National Sales Director, Commercial Construction
Phone, Fax: 443-445-3488
ekraft@hanleywood.com

East/West

Mike Worley
Phone: 773-824-2416 / Fax: 773-824-2401
mworley@hanleywood.com

Canada

D. John Magner • jmagner@yorkmedia.net
Colleen T. Curran • ctcurran@yorkmedia.net
Phone: 416-598-0101 ext 230 / Fax: 416.598.9191

e-Media Sales

Greg Cooke
Phone: 773-824-2403 / Fax: 773.824.2401
gcooke@hanleywood.com

Inside/Classified Sales Business Development Manager

Bob Marinez
Phone: 440-686-1228 / Fax: 440.686.1230
rmarinez@hanleywood.com

Inside/Classified Sales Business Development Manager

Caroline Orr
Phone: 202-729-3566 / Fax: 202.785.1974
corr@hanleywood.com

Inside/Classified Sales Business Development Manager

Debora Reda
Phone: 773-824-2413 / Fax: 773.824.2401
dreda@hanleywood.com

Sponsor Sales/Service

Chari O'Rourke-Berzanskis
Phone: 773-824-2525 / Fax: 773.824.2401
corourke@hanleywood.com

MEDIA KITS

Greg Cooke
gcooke@hanleywood.com

REPRINTS AND LICENSING

Wright's Media
Phone: 877-652-5295
hanleywood@wrightsmedia.com

LIST RENTALS

Contact: Brian Clotworthy
Phone: 800-529-9020
brian@inforefinery.com



*Keep it SIMPLE &
Leave it DURABLE*



We have ALL
you need to
**GRIND
& SEAL**
under ONE roof

Exclusive Distributor of densifiers and sealers by



Quest
building products™

888.457.3887 WWW.QUESTBUILDING.COM



FUNDING

BUILT FOR THE CONSTRUCTION INDUSTRY

- Revolving lines of trade credit (up to \$5,000,000)
- Online platform to track purchases, make payments, and more
- Fast and easy application process, no FICO needed

With CreditSuppliers' unique trade credit system, construction professionals are positioned to manage their cash flow efficiently, create new opportunities, and grow their businesses.



Discover our revolutionary system by visiting:
www.creditsuppliers.com/ccmag

YOUR BUSINESS



This \$77 million school in Olathe, Kan., includes 227 tilt-up panels.

LITHKO

CONTRACTOR TO WATCH

Lithko Contracting, Liberty Twp., Ohio

BY ZACK ZERNDT

WHEN LITHKO WAS FOUNDED IN 1992, co-workers were traveling long distances for projects, keeping them on the road and away from their families. Since then, Lithko has stressed a healthy work-life balance. This marked the beginning of Lithko's BURGs, or Business Units Running Great. The contractor operates more than 14 BURGs in 35 states. Each is a full-service concrete contractor that uses Lithko processes to deliver exceptional results.

Lithko is a middle-market "total package" concrete contractor and a member of the Tilt-Up Concrete Association. The contractor handles all portions of the project that involve concrete: walls, slabs, decks, columns, tilt-up, high-tolerance floors, and sitework.

While many tilt-up contractors are more specialized, Lithko truly does it all. The contractor does architectural tilt-up with brick inlay, warehouse tilt-up, exterior finish, interior components of a building, monuments, multistory office buildings, elevator shafts, and more.

The contractor goes beyond the jobsite to help communities in need. Lithko recently donated their services to Hope

House, a provider for domestic violence survivors. The 2016 Lithko Intern class, business unit leaders, and the CEO spent the day placing a new patio, fixed four sidewalks, and put in two new ramps to help with their deliveries.

Lithko's expected growth and ability to consistently complete quality projects on time gives them a competitive edge. "As far as number of locations and mobility, there's really nobody that compares to our scope and scale from a tilt-up perspective," says Lithko CEO Rob Strobel.

Investing in talent is top priority. The goal is to hire more than 100 interns and full-time project engineers. The contractor likes to groom its own workers and set them up for success. Interns have gone on to fulfill many leadership roles within the company.

"If we can empower our people with information, then they're going to personally strive to meet or exceed their goals," says Strobel.

By almost doubling its locations in the past five years, the sky is the limit. "Our goal is to have locations in 50 cities across the U.S.," says Strobel. **CC**

TOW LIKE A PRO.

Precision. It's what makes us Professional Grade. Precision you'll find in our belief that good is a world away from great. And precision you'll find in the 2016 GMC Sierra 3500HD Crew Cab, which offers a maximum fifth-wheel or gooseneck trailer weight rating of up to 22,900 lbs.* A meticulously engineered available Duramax 6.6L V-8 Turbo Diesel gets Sierra HD up to speed with 765 lb-ft of torque. And an integrated trailer brake controller works seamlessly with ABS to ensure that stopping is just as precise. When it comes to towing the big loads, the pros know: precision matters.

THE NEW GMC SIERRA DENALI HD. THAT'S PROFESSIONAL GRADE.



GMC

WE ARE PROFESSIONAL GRADE

*Requires 3500HD Crew Cab Dual Rear Wheel 2WD with available Duramax 6.6L V-8 Turbo Diesel engine. Before you buy a vehicle or use it for trailering, carefully review the trailering section of the Owner's Manual. The weight of passengers, cargo and options or accessories may reduce the amount you can tow. ©2016 General Motors. All rights reserved. The marks appearing in this ad are the trademarks or service marks of GM, its subsidiaries, affiliates or licensors.

PRECISION

60 Years and Counting

A lot of people have come and gone in the CONCRETE CONSTRUCTION offices since our first issue was published in 1956. The timeline at the bottom looks at the people and the products that have been an integral part of CONCRETE CONSTRUCTION. Also below are quotations from some of the industry professionals you can find in our special 60th anniversary coverage starting on page 26.



I'm proud of all the concrete-related associations that make our industry stronger, safer, and more professional.
 —Christy Collins, Executive Director, American Concrete Pumping Association



We're the toughest of all the trades—I will put a concrete guy against any other tradesmen! That message needs to be promoted more. Check out the video Tough as Concrete at bit.do/Tough.
 —Jereme Montgomery, Executive Director, Nebraska Concrete and Aggregates Association



The concrete industry is willing to help and bring along the smallest contractor; size doesn't matter; we help each other!
 —Rocky Geans, President, L.L. Geans Construction



The speed of time sometimes seems to slow invention and progress, but doesn't stop it. We are proud of the past 60 years of progress and optimistic about the wonders it will bring.
 —Bernie Erlin, The Erlin Co.

In March Bill Avery publishes pilot issue of CONCRETE CONSTRUCTION; first official issue published in September.

Dan Anderson begins as director of sponsorship

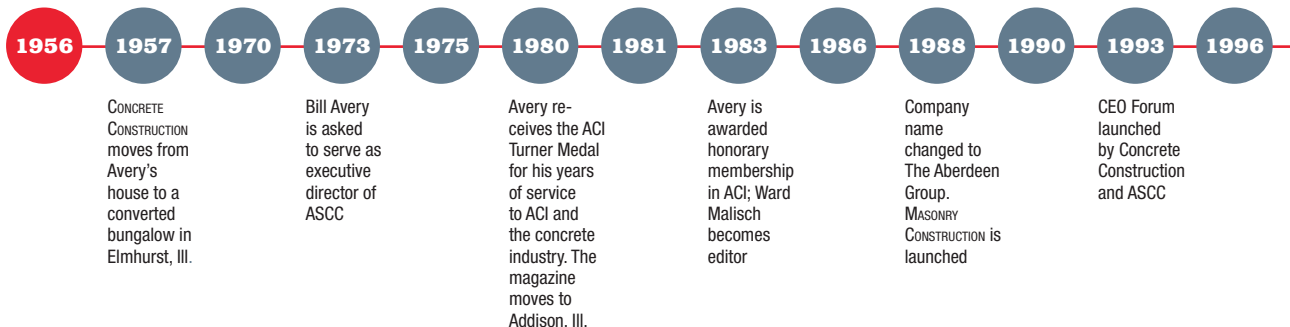
World of Concrete debuts in Houston

Mary Hurd replaces Avery as editor

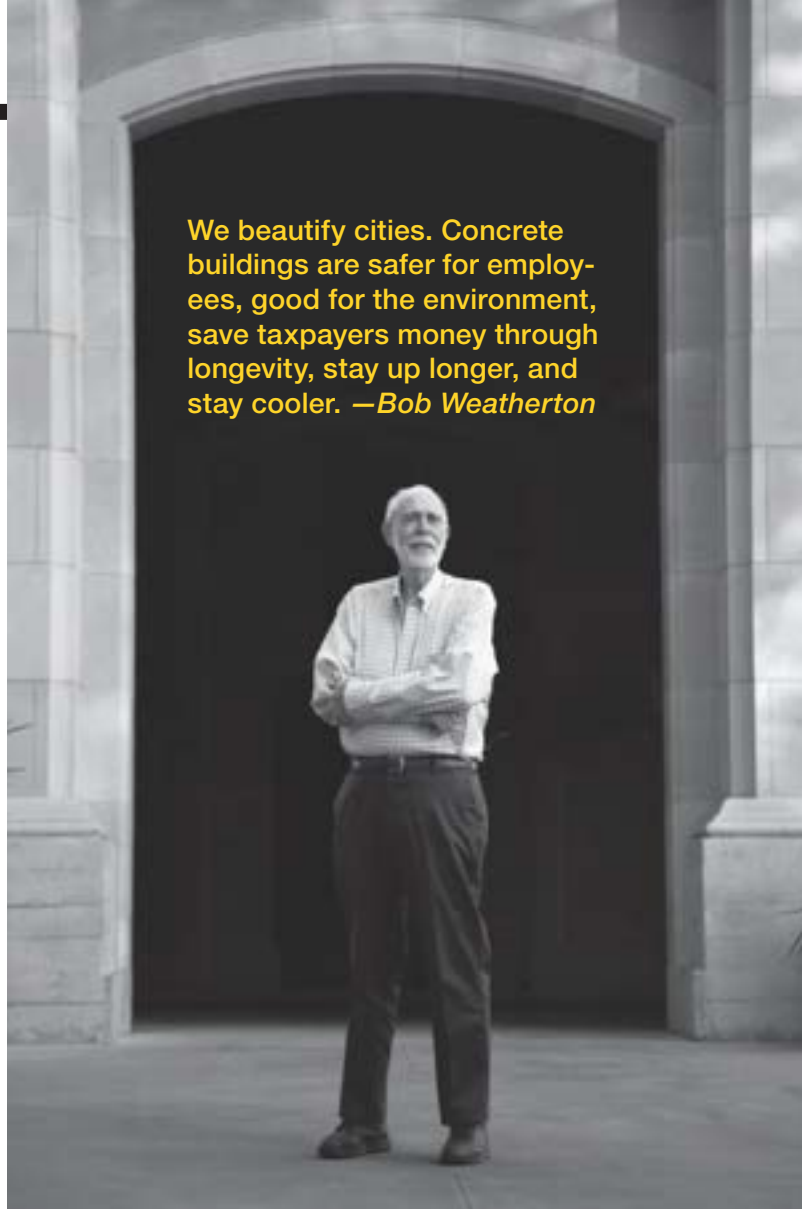
Avery retires and Anderson becomes president of CONCRETE CONSTRUCTION Publication Inc.

The Aberdeen Group buys THE CONCRETE TRADER (NOW THE CONCRETE PRODUCER)

The Construction Super-network website is launched



We beautify cities. Concrete buildings are safer for employees, good for the environment, save taxpayers money through longevity, stay up longer, and stay cooler. —Bob Weatherton



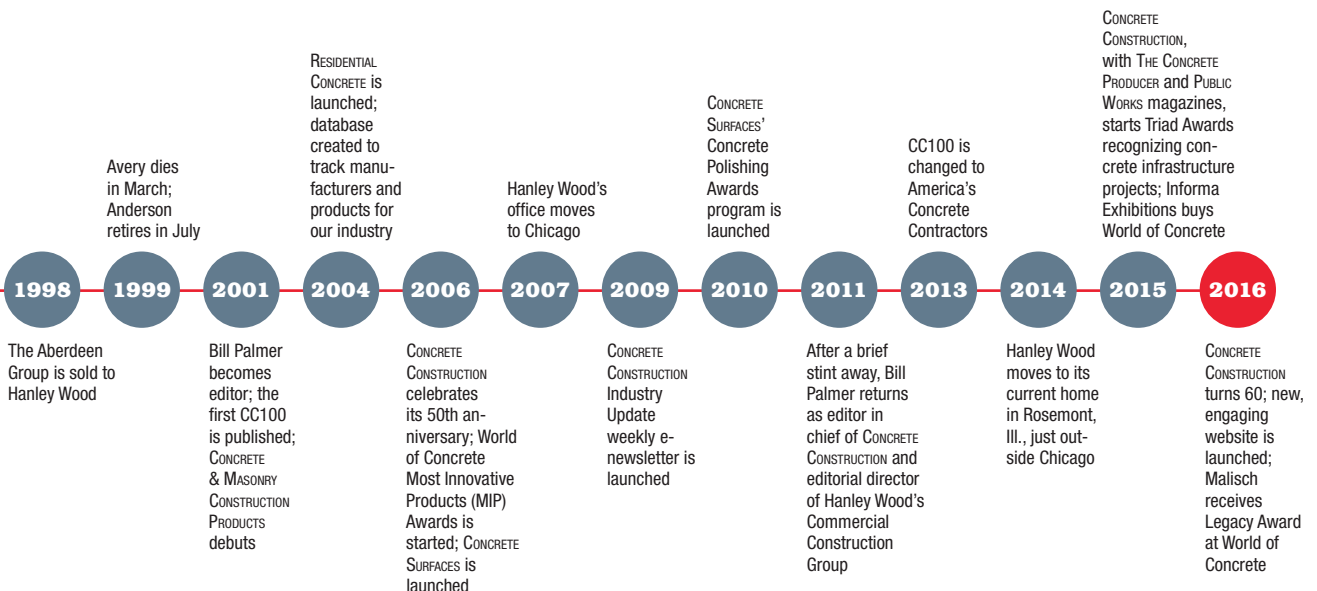
Concrete's gotten smarter. The skill and knowledge of today's concrete producers and contractors has taken quantum leaps in the past 60 years. They've become educated and trained specialists, courtesy of ACI, ASCC, NRMCA, and others.

—Dan Biddle, VP of Sales, Forta Corp.



Lots of different things have been done with concrete, but there are still untapped ways of utilizing it that we haven't even thought of.

—James (Jay) Shilstone, Command Alkon and The Shilstone Companies



Impressive Infrastructure

This month we feature three important infrastructure projects. The Second Avenue Subway tunnel is New York's first subway line to be built in more than 70 years. The trunk sewer project in Canada was built 131 feet below the ground surface. Both were runners-up in our 2016 Triad Awards. Visit concreteconstruction.net/triad-awards for more in this annual program. Finally, the state Route 520 bridge in Seattle is the world's longest floating bridge. Improving our infrastructure improves our daily lives, and concrete construction makes these projects possible. For more information and photos of these and other projects, visit go.hw.net/projects.

As the bridge continues to take shape, crews work to build 772 columns and install 331 girders to form the superstructure of the new bridge. Once complete, the superstructure will support the new roadway. WSDOT



State Route 520 Bridge, Seattle

Stretching almost 1.5 miles, the state Route 520 Bridge is the longest floating bridge in the world. The Washington State Department of Transportation (WSDOT) developed a plan to build 77 new pontoons for the bridge. Pontoon construction began in 2011 in a new casting basin where 33 of them were built. Twenty-one of these were longitudinal pontoons, making up the spine and primary support. They are each 360 feet long

and weigh about 11,000 tons. In 2012, construction of 44 of the smaller, supplemental pontoons began. Engineers used a fly ash and microsilica mix to reduce microcracking. They also added a new layer to the design, elevating the 10.5-inch-thick road deck 10 feet above the pontoons using concrete columns. The construction of support and box columns on Pontoon W continues.

Our biggest **innovation**
ever is coming

09.07.16

www.htc-floorsystems.com

HTC, Inc.
1-877-482-8700
info@htc-america.com
www.htc-floorsystems.com





MTA Capital Construction President Dr. Michael Horodniceanu led a tour of the Second Avenue Subway Phase I project when it was 82% complete in May 2015. MARC A. HERMANN / MTA NEW YORK CITY TRANSIT

Second Avenue Subway TBM Tunnels, New York

The Second Avenue Subway project is the first new subway line in New York City in more than 70 years. Project manager Metropolitan Transit Authority Capital Construction (MTACC) needed an innovative solution: a dust-dry tunnel built on a tight schedule. Cast-in-place concrete provided the answer. The 19-foot, 9-inch interior diameter running tunnels were first proposed to be lined with precast concrete segments, but during the bidding phase the option of using a cast-in-place tunnel liner was selected. The final version included a 12-inch-thick concrete liner reinforced with both steel and polypropylene fibers. The high-strength, low-permeability concrete mix included 650 pounds of cement per cubic yard, 150 pounds of fly ash, 3/4-inch aggregate, a high-range water reducer, 30 pounds of steel fiber, and 1.75 pounds of polypropylene fiber. The contractor placed more than 18,000 cubic yards of concrete to form the tunnel liners.



Doka's custom formwork solutions and the good teamwork between Doka and Strabag made this project a success. DOKA

Southeast Collector Trunk Sewer Project, Ontario, Canada

To handle the growth of Markham and Pickering in Southern Ontario, a trunk sewer was contracted to accommodate the additional future sanitary sewer flows. The trunk sewer is 8.7 miles long and is to be built at depths of 16 feet to more than 131 feet. Doka supplied the custom benching formwork for 13 ventilation shafts, ranging between 32- and 197-foot depths. The custom formwork panels allowed Strabag, the contractor,

to pour the U-shaped benching at the bottom of each ventilation shaft connecting the newly drilled tunnel openings with each other. One challenge was ensuring that the pipeline stayed within the Newmarket Till soil stratum, which is more conducive material for tunnel construction. To do so, a substantial drop in elevation of the pipeline over its length was needed.



SKULLERZ
EYE • PROTECTION

MODEL: BALDR
BLACK FRAME // SMOKE LENS

THINK BIG

We think big. We just can't help it. Our latest Skullerz® model was dreamt up, detailed, and designed BIG. Think full ANSI, CSA, and MIL-PRF Ballistic Impact requirements, UV protection, scratch resistance, and our largest frame design for max coverage, plus available Fog-Off™ anti-fog technology, and polarized lenses. We call it Baldr, son of Odin. A name fit for a future king.

©2016 ERGODYNE

// PROTECT YOUR EYES //

JOIN THE TENACIOUS NATION
WWW.ERGODYNE.COM // 800 225-8238





Kimberly Kayler
kkayler@constructivecommunication.com

Serve Your Best Customers First

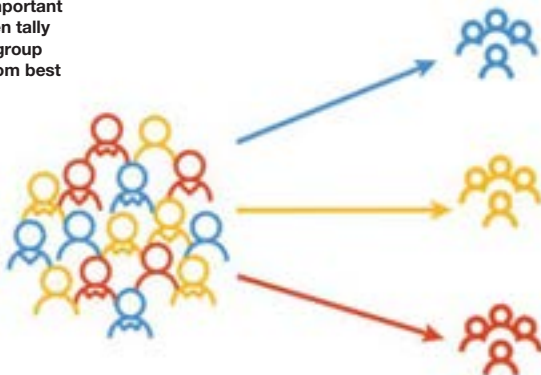
CUSTOMER SEGMENTATION HAS long been a standard in other industries. For example, there are countless examples of manufacturers slapping a different label on an automobile and marketing it to a dissimilar demographic either based on a difference in price, image, or even branding. Applying this same philosophy to the concrete contractor can benefit customer retention and profitability.

Customer segmentation is simply a process by which you organize your customers regarding their needs and your services. The process allows a company to select, prioritize, define, and deliver tailored value propositions for customer segments, and develop and manage effective channels for serving these customers.

While we know that all clients are not created equal, we often provide the same level of service to our top clients that we provide to our least desirable ones.

For example, while it is appropriate to work overtime and move other deadlines around to meet the needs of an A client — one that refers other profitable work to you, understands your value, pays your invoices on time — it's not smart to take that same approach for a one-time client that will never refer you to others and is slow to pay.

Segment your customer base to identify what you view as important in a client. Then tally the scores to group your clients from best to worst.



Make a list

The first step in segmenting your customer base is to identify what you view as important in a client. Make a list of the things you deem important. With this list of desirable attributes complete, go through and weigh your clients on a scale of one to 10 in how they perform. Many find it simple to group the tallied numbers at the end in three categories — A, B, and C clients. You'll be surprised when you realize that you cater to many of the less desirable.

Now, with the criteria established and a basis for where each client falls, determine what level of service is a fit for each category. For example, today many retailers move C customers to web and phone orders only, ensuring that expensive time with a salesperson falls in the A or B range. Companies will also break down ongoing service into customer segments.

Using these scenarios as an example, discern different offering levels for the products and services you provide. For example, an A client may garner same-day service, while a C client should be handled within 48 hours. Be sure that the definition of service offerings goes beyond actual tangible deliverables but also includes things such as communication. The key is to be fair, not equal.

This process should result in standard operating procedures for all clients. While such tactics may seem out of the norm, most firms report that customer segmentation improves customer service, since you are focusing energy on tasks, and communication through more effective allocation and utilization of resources. Profitability also increases since you are getting paid for value delivered. **CC**

Kimberly Kayler, CPSM, is the founder and president of Constructive Communication, Inc. She is a member of the ACI Board of Directors and chair of the ACI Marketing Committee. You can reach her by e-mailing kkayler@constructivecommunication.com.

doka

The Formwork Experts.

It's not just
Formwork.
It's Doka.

#MoreThanFormwork

Doka Product Expertise

Wall Systems

Slab Systems

Climbing Systems

Frame Shoring and
Structural Support Systems

Safety Systems

System Components

Doka Services

Engineering Service

On-site Field Service

Pre-assembly Service

Reconditioning Service



facebook.com/DokaNorthAmerica



linkedin.com/company/doka-com



twitter.com/doka_com



youtube.com/DokaNorthAmerica

USA | 877-365-2872 | usa@doka.com

Canada | 866-923-6629 | canada@doka.com

www.doka.com



See us at
Conexpo Booth
#G1622





Craig Cottongim
craigcottongim@gmail.com

The Calling of Concrete

I'M ALMOST 50 years old, but even after a lifetime in concrete, I still feel like a 15-year-old right before a big pour. I get excited about concrete. Concrete is the center of most all of my conversations. So, what's so special about working in concrete anyway?

Those of us working in concrete form a unique bond that's stronger than any band of brothers. We experience challenges which the typical person couldn't comprehend, and through sharing our particular hardships and victories, we develop authentic lifelong friendships.

The greatest gratification in life comes from somewhere in between the joy of learning, mentoring, and of knowing what it means to depend on others, while striving to be dependable for a team of dedicated professionals. But make no mistake, our work is demanding; we achieve stamina that athletes competing in a triathlon would envy.

Fresh blood

But I'm also worried about our future when I survey my gray-haired cohorts. So I want to spotlight two efforts aimed at helping our industry recruit some much-needed fresh blood.

I recently spoke to Concrete Industry Management students at Middle Tennessee State University, where Heather Brown and her colleagues are shaping the hearts and minds of dozens of students. It was my privilege to share with their group some of the "real life" aspects of working in concrete. The most rewarding part of the experience came when one student shyly approached and said, "I was thinking about changing my major, but after today I'm really inspired to be in concrete. Thank you!"

Secondly, Jereme Montgomery, the executive director of the Nebraska Concrete and Aggregates Association, recently started a workforce development program to help recruit young adults into the trades. He's in discussions with the U.S. Department of Labor about creating apprenticeship programs for ready-mix drivers and for finishers.

He's also urging the U.S. Department of Education to bring back coop programs to our schools.

Thanks to his efforts, eight different trades started the Build Our Nebraska program. It is an exciting attempt to expose high schoolers and college students to the wonderful opportunities in construction through job fairs and campus visits.

"All of the people with a passion for concrete that I know started young," Montgomery told me. "We have to get them in when they are young!" Part of what he is doing is changing the image of our industry by showing young adults that they can be successful without a four-year degree. Keep an eye out on social media for the #concretetough hashtag he started.

Also, Montgomery will present a seminar at World of Concrete in January titled, "Increase attraction of concrete careers and resolve workforce issues." I can't wait to attend his session!

Thanks to concrete we have a sense of pride, knowing few people can do our job and we have a work ethic others only dream of. May this special 60th anniversary edition of CONCRETE CONSTRUCTION inspire you to persuade others to pursue a similar career. We've heard the call of concrete, and we've responded with blood, sweat, and tears. Now it's time to help the next generation hear the call loud and clear. So speak up, because people can't respond to an invitation they haven't received.

Author's note

This month's column is dedicated to the memory of Don Deetjen. He owned Deetch Industrial Concrete in the Chicago area from the 1970s to the 1990s. I worked for him for about 10 years and learned more from him than I did from anyone else. He retired in 1996 and died on July 2. **CC**

Craig Cottongim is a long-time concrete finisher who also is a writer and communicator. You can find all of his columns at go.hw.net/cottongim. E-mail craigcottongim@gmail.com.



Think Forward. **Tilt-Up!**

Visit us at the TCA Convention in Denver from October 10th to the 12th.

For more than 80 years Meadow Burke has been Lifting America Strong through concrete accessories – developing, distributing and supporting products throughout North America. What differentiates us from the field?

We Think Forward. Tilt-up!

We've led with bold ideas, first class engineering and forward thinking design. We develop and test the products that advance design capabilities in tilt-up construction which enable taller, wider and more complex projects. From product development to engineering support, Meadow Burke is unmatched in tilt-up lifting analysis, training and professional support.

By thinking forward, we enable you to tilt-up!

Call toll free at 877.518.7665 or visit MeadowBurke.com

MB MeadowBurke®



Reasons to Celebrate Concrete

« BY BILL PALMER »

In the 60 years since CONCRETE CONSTRUCTION was first published, the concrete industry has made great strides in materials, equipment, construction techniques, and applications. And I would wager that the best is yet to come. For many applications, there is really no substitute for concrete.

To celebrate CC's 60th anniversary, we asked prominent industry members to tell us why they are proud to be a part of this dynamic industry and what we have accomplished and why they are optimistic about the future of concrete (you can see a complete list of those people on CC's website). Some of the responses were obvious; others will surprise you. We couldn't fit them all in the magazine but you can find all of the responses at go.hw.net/cc60. Feel free to add your own reasons to be proud!

1

Sustainability: “Our industry has recognized that cement production significantly contributes to ozone depletion and CO₂ generation. Many facets of our business have made ‘impossible’ commitments in the area of sustainability, then gone on to achieve those commitments,” says Jay Shilstone, Command Alkon. BASF’s Jennifer Hamilton agrees, “We should be proud of environmental product declarations (EPD), eco-efficiency analysis (EEA), and environmentally-preferable concrete mixtures (Green Sense) that can be quantified.”

2

Advancements in fiber reinforcement: “Ancient fibers of straw and animal hair have come a long way over the past 60 years. New high-strength fibers of steel and synthetics have taken reinforcement options to new, creative, and cost-effective levels.”— *Dan Biddle, Forta Corp.*

3

Excitement. “You interact with different people every day and concrete being environmentally sensitive just adds to the excitement! And working with cool tools and equipment. Who wouldn’t want to use power tools, set-up lasers, and GPS, and run a laser screed, drive a skid loader, operate finishing equipment...the list goes on.” — *Jereme Montgomery, Nebraska C&AA.*

4

Fly ash, slag cement, and silica fume are all industrial byproducts that are being incorporated to improve concrete performance and eliminate the need for disposal. Despite recent regional fly ash shortages, the American Coal Ash Association insists that it “will continue to be produced and continue to be available for beneficial uses” well into the future. Today, ash is being removed from landfills and reconditioned for beneficial uses (like concrete).

6

Specialty Admixtures: Shrinkage-reducing, hydration-stabilizing, slump retention, corrosion-reducing, anti-washout, viscosity-modifying—the innovation continues!

7

Certification: From testing technicians to precast plants to flatwork finishers, industry members are obtaining credentials certifying their knowledge.

8

Seismic concrete design: Despite what you see in the news from places like Haiti, modern concrete structures have easily withstood major earthquakes.

9

Lightweight concrete: Not only is it lighter and more fire-resistant, lightweight can provide internal curing water and actually dries nearly as fast as normal-weight concrete.

10

Locally produced: Concrete is the only construction material that is always locally produced, primarily with local materials by professional producers.

11

Photocatalytic concrete: Italcementi’s TX Active cement reacts with air pollutants and also keeps white cement structures their whitest.

12

Essential: “There is no suitable or viable replacement for concrete,” says Rich Szecsy, TACA. “In other words, what would our life be like without concrete?”

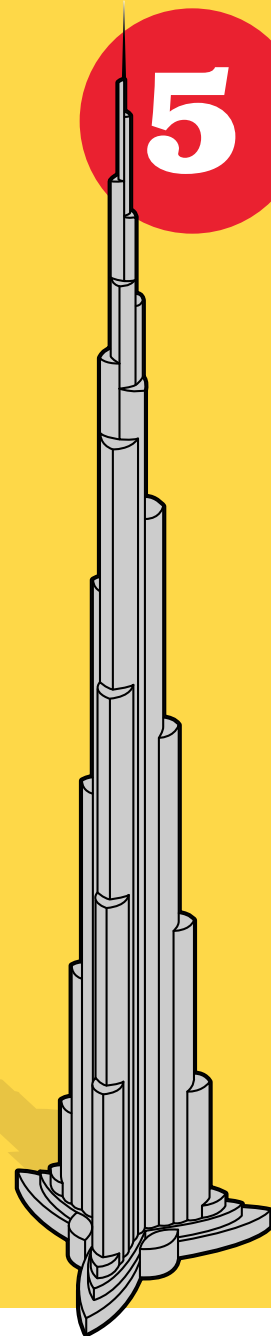
13

Concrete Cares: Mike Murray’s pink concrete campaign is only one of the many community-building efforts made by companies in the concrete industry in their local communities.

World’s tallest buildings

The tallest buildings could not be built without the strength and stiffness of high-performance concrete. The Burj Khalifa, the world’s tallest, used nearly 60,000 cubic yards of concrete just in the foundation and a total of more than 250,000 cubic yards.

5



Self-Consolidating Concrete

Contractors find placing concrete in heavily reinforced columns and beams, especially for high-rise construction or in high-seismic zones, to be ever more difficult. Factor in the labor costs for two or more workers to operate a vibrator and wrangle its hoses on the jobsite. Then consider the risks of “white finger” injuries that vibrator operators face, and the liability those risks impose on contractors. Self-consolidating concrete (SCC) is a product that addresses all these concerns. By eliminating the need to vibrate concrete placed in crowded forms, SCC saves time, reduces labor costs, and helps preserve worker health and safety. No wonder Bill Phelan of Euclid Chemical compares it to an automatic transmission, and notes how few people use a stick shift these days.

14

15

“We should be proud of the MIT Concrete Sustainability Hub’s focus on a life-cycle approach with research and tools to support competition and longer term decisionmaking, which is changing the rules of the game.” — *Julie Garbini, RMC Foundation.*

16

Codes and standards: “Sure we complain about them—how they are hide-bound and slow to change. But people who participate in the process are steadfast in their dedication to ensuring life-safety while still accommodating innovation.” — *Jay Shilstone.*

17

Robotic stations and laser scanners for site layout: Site layout used to be done with optical transits, levels, and 100-foot tapes. Today’s total stations have the entire layout entered as a CAD file and use laser point clouds to verify as-built conditions.

18

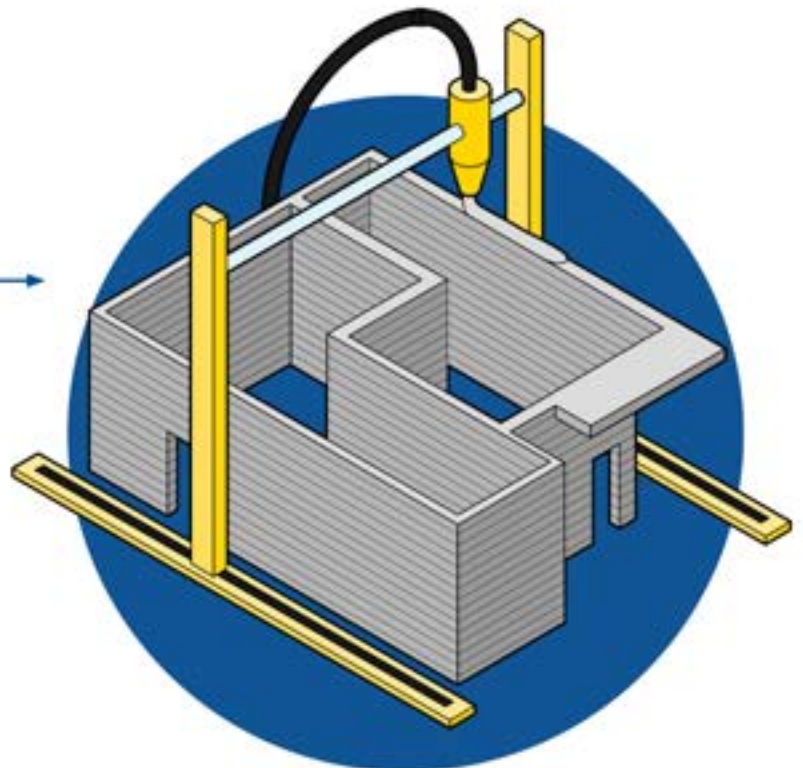
Lean construction management techniques and integrated project delivery (IPD): It’s really just a matter of working together and constant improvement.

19

Concrete 2029: Most organizations and companies within the concrete industry have some sort of strategic plan but never before has the entire community come together to create a plan to improve the industry, said Peter Emmons to open the initial Concrete 2029 planning session in May. The objective is no less than to save the concrete industry for future generations.

20

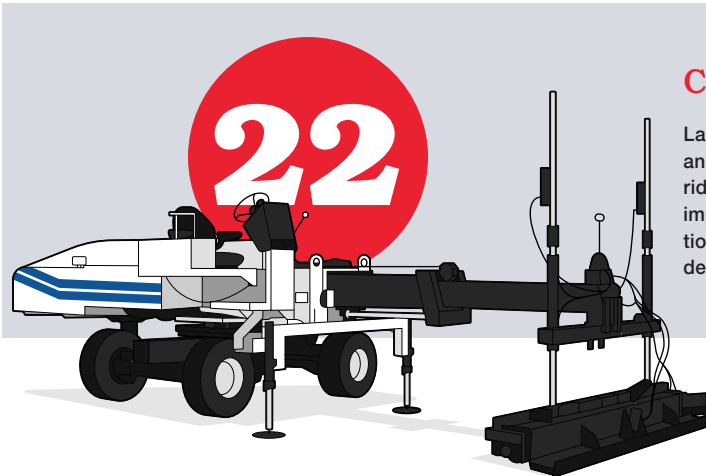
Onboard measurement of slump, water-cement ratio, and air content: New technology allows concrete workability and air to be tested during transit and to have continuous water additions.



21

3D Printing of Concrete:

An interesting worldwide trend worth keeping an eye on. “3D concrete printing, when combined with a type of mobile prefabrication center, has the potential to reduce the time needed to create complex elements of buildings from weeks to hours. We expect to achieve a level of quality and efficiency which has never been seen before in construction,” says Skanska’s director of innovation Rob Francis.



Concrete Equipment

Laser screeds, early-entry saws, concrete boom pumps and placing booms, robotic demolition equipment, and riding trowels have eased the pain of concrete work and improved the quality. To learn what a concrete construction jobsite looked like in 1956, you can read Gene Boeke's description at go.hw.net/1956jobsite.

23 World of Concrete: WOC is now more than 50 years old and drew more than 60,000 visitors and 1500 exhibitors in February 2016. WOC remains the essential show for concrete construction, although CONEXPO-CON/AGG (coming in March 2017) is bigger every three years.

24 Flat floors and extended joint spacing: The greatest problem in heavy warehouse floors is joint deterioration—get rid of the joints and that problem goes away. Extended joint spacing is being achieved with fiber reinforcement (steel and macrosynthetics), post-tensioning, and shrinkage-compensating concrete.

25 Skilled labor: The industry has a huge group of skilled craftsmen. There are thousands of ACI-certified concrete flatwork finishers in the U.S. and many more skilled craftsmen across the industry.

26 Polished concrete: The nearly maintenance-free polished concrete floor is replacing vinyl, wood, and tile in many applications. It's a great way to revive and old floor.

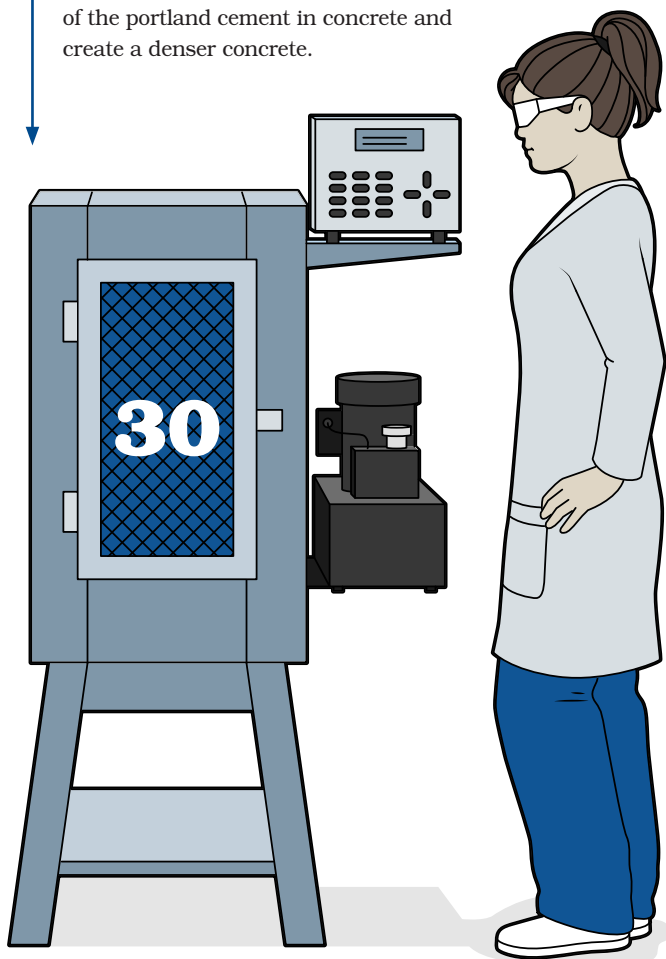
27 Insulating concrete forms: ICFs are a simple way to build an energy-efficient concrete building.

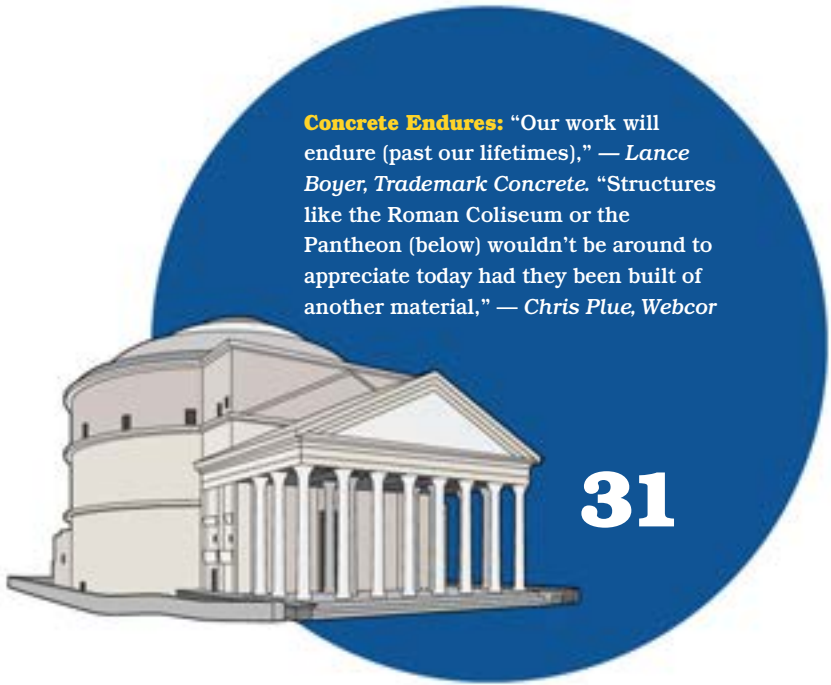
28 Concrete is evolving, versatile, challenging, exceeding expectations, character-building, inspirational, strong, trend-setting, overcoming obstacles, meeting demand, gratifying, limitless, bountiful, beautiful, and sustainable. —*Scott Tarr*

29 American Society of Concrete Contractors: In 1994, ASCC had a staff of one and the World of Concrete opening party drew about 25 people. Today, ASCC's staff includes the executive director (Bev Garnant), a membership director (Todd Scharich), a technical director (Bruce Suprenant), and one full-time and five part-time staff members. The WOC Kick-Off Bash drew almost 500 people this year and more than 250 will attend September's Annual Conference. ASCC has become the nation's leading advocate for concrete contractors.

Alternative cementitious materials:

New binders such as geopolymers, activated slags, metakaolin, activated glass, magnesium silicates, and CO₂-cured concrete can replace some or all of the portland cement in concrete and create a denser concrete.





Concrete Endures: “Our work will endure (past our lifetimes),” — *Lance Boyer, Trademark Concrete*. “Structures like the Roman Coliseum or the Pantheon (below) wouldn’t be around to appreciate today had they been built of another material,” — *Chris Plue, Webcor*

31

32

Concrete toppings: Overlays have improved dramatically. Unbonded concrete over asphalt for pavements and parking lots is showing great success. ASCC is about to publish a new guide for design and construction of overlays. “Polymer-modified toppings continue to evolve, allowing for less removal and replacement of concrete,” — *Byron Klemaske, T.B. Penick*

33

Portland limestone cement: Adding this basically inert material reduces cement consumption while having little effect on strength or workability.

34

Maturity methods: Despite some reservations (see article on page 55), maturity methods increase safety by allowing accurate knowledge of in-place strength for earlier post-tensioning, formwork/shoring removal, and return to service.

35

Concrete countertops and furniture: Lots of creative uses for concrete, even concrete jewelry, a concrete watch, and, of course, concrete canoes.

36

“Concrete is tried and true but there is still much room for innovation (self-healing concrete, pollution-resistant concrete, ‘smart’ concrete, lightweight concrete, etc.),” — *Shelby Mitchell*

37

Concrete people: “Not only do people in our industry care about concrete, many of them are passionate about it,” says Jay Shilstone. “Concrete people are willing to help and bring along even the smallest contractor,” says Rocky Geans. “Size doesn’t matter, we help each other!”

Concrete Industry Management Program

In the 20 years since the first two students were enrolled, the CIM Program has grown into a vital source of well-trained, highly motivated graduates ready to take on leadership roles in the concrete industry. More than 1000 students have completed the four-year B.S. program, which combines technical courses with business management. The program has expanded from Middle Tennessee State University to California State-Chico, Texas State University, and the New Jersey Institute of Technology. In 2013, an MBA in the CIM program was added at MTSU. What makes the CIM program unique is the strong support of the concrete industry, from industry associations and corporations to the World of Concrete auction which has generated \$4 million for the program over the last 10 years.

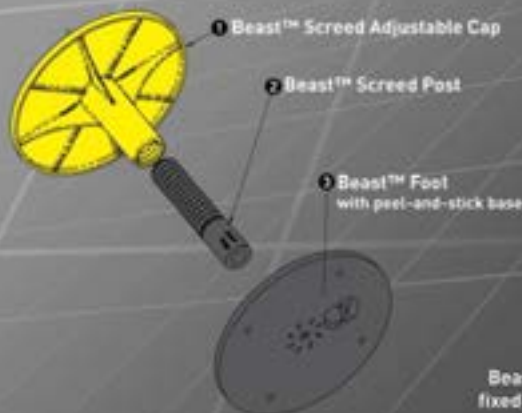




BEAST SCREED

"ANOTHER STEGO INDUSTRIES INNOVATION"

Keep an EYE on EFFICIENCY!



Beast™ Screed will easily adjust to ensure a fixed elevation and more accurate F_L numbers than traditional wet-screeding.



Beast™ Screed System

Is your screed process efficient and VAPOR BARRIER-SAFE?

Beast™ Screed is a fixed-elevation, point-to-point guide screed system that allows you to maintain levelness during the screeding operation. Set it and forget it. No more shrinking cow patties!

Beast Screed eliminates the need to frequently re-establish grade to ensure floor elevation has not changed during the screeding operation as is typical with common wet-screed methods.

SIMPLE.
ACCURATE.
REVOLUTIONARY.



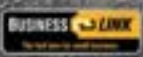
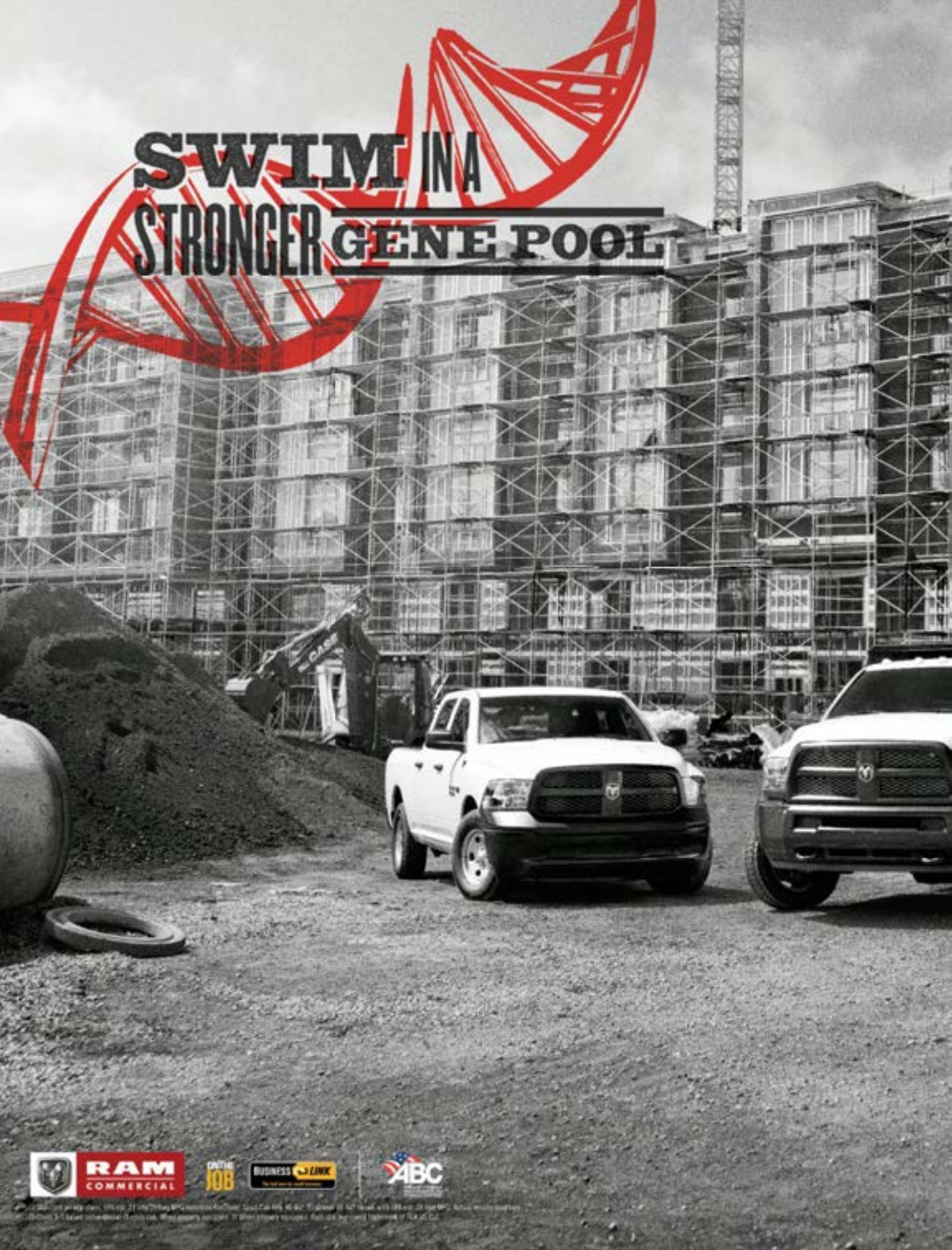
www.stegoindustries.com

Check out our
Beast Screed Video on our
website!



©2016 Stego Industries, LLC

SWIM IN A STRONGER GENE POOL



© 2014 Ram Commercial. All rights reserved. Ram Commercial is a registered trademark of Ram Commercial. All other trademarks are the property of their respective owners. Ram Commercial is not affiliated with ABC. All other trademarks are the property of their respective owners.



RAM
COMMERCIAL
VEHICLES

1500 TRADESMAN **BEST-IN-CLASS** **29 HWY MPG ECODIESEL**
CHASSIS CAB **BEST-IN-CLASS** **37,500 LBS GCWR**
HEAVY DUTY **BEST-IN-CLASS** **31,210 LBS TOWING**



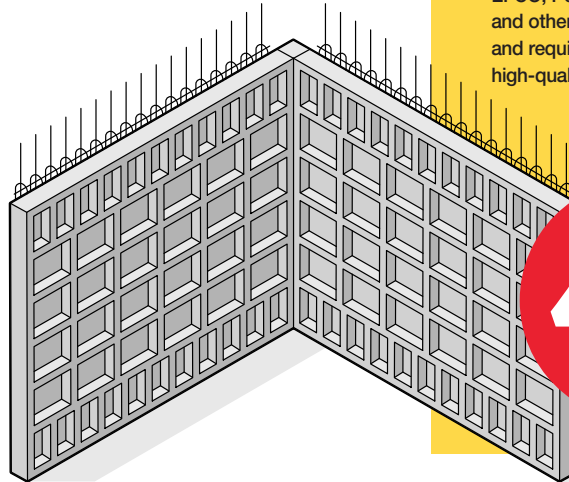
60 Reasons to Celebrate Concrete

39

ASTM C94, Specification for Ready-Mixed Concrete: The standard specification that governs the production and delivery of concrete has recently dropped the maximum of 300 truck drum revolutions requirement that got many loads rejected. The committee also suggests that producers and contractors confer when compressive strength results don't meet the spec and has allowed water addition in transit for trucks equipped with automated systems like Verifi.

40

ACI 562 Repair Code: The new repair code is performance-based, and with release of the "Guide to the Code Requirements," repair contractors know exactly who's responsible for what. Very soon, the International Concrete Repair Institute will release a structural concrete repair technician certification that will be referenced in ACI 562—a surface repair technician certification is available now.



Modular Formwork

Building formwork used to require skilled carpenters, but today's easy-to-assemble forms from EFCO, Peri, Doka, Ulma, Atlas, and others speed construction and require less skill to achieve high-quality finishes.

41



Scan for more information.

DRYTEK® Self-leveling Underlayment

- Pourable and pumpable
- Topically stained or integrally colored
- Fast cure and quick drying
- Polishable wear surface topping

www.drytek.com | 1.800.243.4788

8401190816 © 2014 LATICRETE International, Inc. All trademarks shown are the intellectual property of their respective owners.



60 years of building chemistry
Products & Relationships

Trimble
DIMENSIONS 2016

TRANSFORM THE WAY THE WORLD WORKS

LEARN – EXPLORE – COLLABORATE

Exciting things are planned for Trimble Dimensions User Conference 2016! Join thousands of your peers for three days of education and inspiration. Explore the new conference venue and visit the expanded Expo showcasing the latest technologies. Learn by attending any of the information-packed breakout sessions. Collaborate with peers from around the world.

Dimensions 2016 delivers a wide range of informative and networking opportunities. Plus over 450 sessions with many qualifying for Professional Development Hours (PDH), insightful keynotes, hands-on training led by industry experts and special events.

Dimensions is the not to be missed conference of the year. Why wait?

REGISTER TODAY! ≡

NOVEMBER 7–9
THE VENETIAN, LAS VEGAS

www.trimbledimensions.com | trimble_dimensions@trimble.com

60 Reasons to Celebrate Concrete

42 **Ultra-High Performance Concrete** (UHPC, like Lafarge's Ductal) was developed in Europe in the 1980s and has found some applications in structures like bridges that can take advantage of its very high tensile strength and impermeability.

43 **Industry associations:** There are a lot of associations in the concrete business, starting with the American Concrete Institute and the American Society of Concrete Contractors. Then there is NRMCA (see Reasons #47, 54, and 57) plus smaller groups like the American Concrete Pumping Association, the Tilt-Up Concrete Association, and the Concrete Sawing & Drilling Association. These groups advocate for their members, provide education and certification, and disseminate knowledge. A promising recent development is funding the development of information (rather than relying on volunteers), which allows documents to go public much more quickly than in the past. "I'm proud of ALL the concrete-related associations that make our industry stronger/safer/more professional," says ACPA's Christy Collins.

44 **"We beautify cities.** Concrete buildings are safer for employees, good for the environment, save taxpayers money through longevity, stay up longer, and stay cooler. And concrete always uses local materials." —*Big Bob Weatherton*

Cordless tools make jobsites safer and work simpler. Batteries have improved and even better batteries are on the horizon, including those with inductive charging.

45



TOUGH FLOORS COME IN BLUE DRUMS

**ASHFORD
FORMULA**

THE INDUSTRY'S FIRST & FINEST
CONCRETE DENSIFIER.

ASHFORDFORMULA.COM



Mention this ad and receive a trucker hat when you place your next order. Limit 5 hats per order. Offer expires October 15, 2016.

CLOSE TO OUR CUSTOMERS

 **WIRTGEN GROUP**

**CLOSE
TO
OUR
CUSTOMERS**



➤ Find out more: www.wirtgen-group.com/america

WIRTGEN

/

VÖGELE

/

HAMM

/

KLEEMANN

60 Reasons to Celebrate Concrete



46

Extreme Tilt-Up: Tilt-up has gone through an innovative period when it is being used almost exclusively in some markets for mid-rise office buildings. Records for heaviest panel and tallest panel are broken regularly. See page 45 for the new tallest panel at 111 feet, 9 inches tall, breaking the previous record by 15 feet.

NRMCA Parking Lot Design Assistant Program

NRMCA's Design Assistant Program (DAP) was rolled out in 2012 to help everyone in the industry get the correct concrete design for a specific parking lot application. By accessing this free service, designers and contractors can get recommendations for concrete thickness and compressive strength, cross section details showing base support information, joint spacing, and other typical details. The DAP has proved effective in promoting the use of concrete in parking lots. NRMCA reports that more than 60% of all parking lot DAP projects went concrete. The DAP is on target to do 220 parking lot projects in 2016, with a goal of doing 1000 projects annually by 2020. And now, NRMCA has rolled out a DAP for concrete buildings to convert them from wood frame or steel to concrete. The results so far have been extremely positive, with four DAPs completed and many more getting under way, reports NRMCA Senior Director, Building Innovations, Gregg Lewis.

47

That Feeling...

...when you've under-ordered concrete for the next pour. Now you're behind schedule and paying people to wait around....

NEXT TIME USE TEKLA SOFTWARE



VISIT US AT THE
2016 ASCC ANNUAL CONFERENCE
September 15-18, 2016
Minneapolis, MN

Watch our webinar:

Ensure Better Pour Planning
with Tekla Software
www.tekla.com/pourconcrete

Easily create accurate, constructable, concrete models with Tekla software. The as-built 3D model creates automated pour drawings so you can manage and optimize your concrete pours.



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



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

miracote.com

48

Reorganized ACI 318 Building Code Requirements:

Substantial changes in the document's organization included the new Chapter 26, Construction Documents and Inspection, which contains all the details that the designer must communicate to the contractor in the project specifications. This change helps reduce confusion and potential oversights.

49

Moisture in concrete slabs: Moisture coming from concrete has destroyed flooring all over the world. Now we better understand the problem, know how to measure the moisture more accurately (with ICRI-certified technicians), and have excellent under-slab vapor retarders and mitigation materials.

50

Economic Impact: BASF scientist Fred Goodwin says, "Concrete is an important worldwide economic factor, yet low-cost when compared to other materials, which explains its popularity." He points to a study by the European Cement Association focused on the multiplier effect of the cement and concrete industry that concluded "for every euro generated in this sector, €2.8 are generated elsewhere in the economy."

51

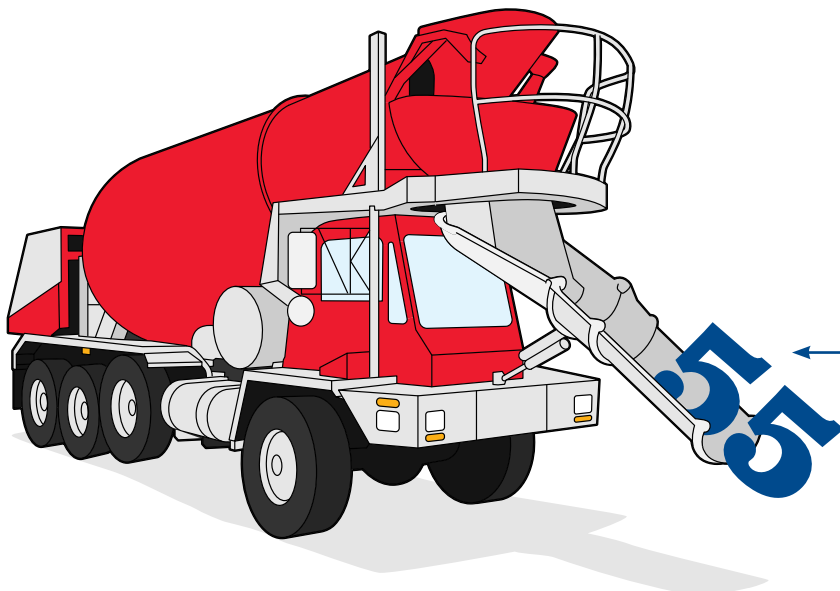
Concrete paving: Improved initial construction methods (such as stringless paving) and repair methods (like dowel-bar retrofit and diamond grinding) are making concrete pavements very competitive, especially on a life-cycle cost basis.

52

Pervious Concrete: Pervious has helped concrete capture a larger share of the parking lot market through its ability to reduce stormwater runoff. It can also result in snow- and ice-free surfaces. NRMCA's marketing and installer certification programs and ACI's 522 Specification have moved this material forward.

53

Technology Tools, including Building Information Modeling (BIM), virtual reality, and 3D laser scans of buildings and floors. "4D and 5D modeling link BIM to schedule and costs." — *Mike Hernandez, Baker Concrete.*



Performance-Based Concrete Specifications

Recognizing that prescriptive specifications tend to constrain innovation in concrete design and production, NRMCA established its P2P (Prescription-to-Performance) Initiative in 2002. The goal has been to promote performance-based specifications as a superior alternative to prescriptive mix design specs, and thus benefit the industry in several ways. Performance-based specifications allow ready-mix producers and contractors to develop and place economical, workable concrete mixes, while assuring designers that critical performance requirements are being met. Though it will still take time before performance specs become the general rule, the P2P Initiative has raised industry awareness and prompted many steps in the right direction. New simple and quick test methods for placeability, finishability, and durability have eliminated some contractor objections to P2P. "We're moving closer to performance-based specifications which will help drive increased sustainability and innovation, as well as cost-effectiveness," says Julie Garbini, RMC Foundation.

54

Front discharge mixers: Although more expensive, these mixers allow the driver to avoid backing onto muddy, uneven jobsites where they must depend on direction from an unknown spotter.

WORK TRUCK
MEDIUM
DUTY
FLEET TRUCK OF THE YEAR

#1: UPFITTING IS
NOW UPLIFTING.

A BUSINESS CASE FOR A MEDIUM DUTY TRUCK.



The Ford F-650/F-750 present upfitters with a clean cab-to-axle design. There are no components to move, no rivets or bolts along the top of the frame rails to get in the way, helping to make upfitting easy and fast. It's more proof that Ford means business.

DID YOU KNOW? You can order the F-650/F-750 with available integrated Ford Telematics™ powered by Telogis®* to get historical and real-time status of vehicle health, location, driver activity and more. Experience how Ford Telematics can help you save time and money for fleets of all sizes.

THE F-650/F-750



Vehicle shown with optional features and aftermarket equipment. *Ford Licensed Accessory.

/// FORD.COM

60 Reasons to Celebrate Concrete

56 Challenging: “Concrete is the only construction material that arrives onsite perishable,” says Chris Plue, Webcor. “Unlike pipe, lumber, or wiring, those that work with concrete have a limited amount of time to deal with the material. Every workday is like gameday.”

57 Build with Strength: Faced with mid-rise buildings being converted to wood-frame structures, NRMCA has launched the Build with Strength program to show owners and designers why concrete should be the preferred alternative. And PCA is developing an industrywide marketing plan for concrete.

58 Worker shortage: There are some in the industry who are working to attract new workers. Chicago’s Ozinga Brothers put out the Born to Build campaign and Jereme Montgomery produced a video called Tough as Concrete. Meanwhile Tanya Komar’s Concrete Preservation Institute is attracting new military veterans.

59 Decorative concrete: The decorative industry has matured with some of the original players disappearing or being bought by larger companies (think Scofield, Increte, Bomanite). “I am enthused by the growth in communications among decorative concrete professionals,” says ASCC’s Todd Scharich.

Safety

ASCC’s newest strategic plan includes a goal to feature safety at every meeting—and most ASCC meetings these days start with a “safety moment.” Contractors are getting much more serious about safety at the very highest level. During this summer’s Concrete Executive Leadership Forum, Bill Gilbane, president of the Gilbane Companies, one of the nation’s largest construction companies, said, “Safety is everyone’s responsibility. Safety and productivity are one and the same. We just completed a 17 million man-hour job without a single lost-time accident—that’s what we were most proud of on that project.” **CC**



Why do people choose the L&M™ FGS PERMASHINE® polished concrete system?

Scan the QR code to download the Polished Concrete and LEED v 4.0 Certification whitepaper.

Installers and owners choose L&M™ FGS PERMASHINE® because the system offers them:

- Credibility and trust built over a decade
- Exceptional product performance and national spec listings
- “High traction” certification by the National Floor Safety Institute
- Dedicated, long-term support of the polished concrete industry
- LEED™ Green points
- Architectural customization and colors

L&M
Construction Chemicals

A product brand of LATICRETE International, Inc.



www.lmcc.com

Talk with a LATICRETE technical service rep about your next polished concrete project. Visit www.lmcc.com or call 1.203.393.0010 today.

48023-0714 ©2014 LATICRETE International, Inc. All trademarks shown are the intellectual properties of their respective owners.

NEW!

ULMA



FORMADECK

Drop Head Shoring System

A post, joist and drop-head handset shoring system designed to maximize labor productivity and reduce formwork cycle time



- High level of productivity through the use of 8' x 8' and 8' x 6' grid patterns - fewer components required
- Ability to install the system from the ground with simple light-weight components results in added safety and overall ease of use

- Drop heads for early retrieval of deck components which can be moved to the next shoring location for faster cycle times while the posts remain for reshoring. Only one solid hammer blow on the loaded wedge is required to drop the shoring deck 4 inches

ULMA FORM WORKS, INC.

Northeast (973) 636-2040
Mid Atlantic (443) 296-9852

•• www.ulmaconstruction.us



From the beginning of your projects

BECAUSE PORTABILITY MATTERS.



This construction engineer is fully equipped for on-site 3D laser scanning

The FARO Focus3D X 330 Laser Scanner combines portability and simplicity into the smallest and lightest laser scanner ever built.

- Climbing up ladders and scaffolding?
Transporting is made easy with any backpack.
- Air travel to job site and worried about lost/damaged equipment?
The Focus3D fits in overhead compartments.
- Transport targets?
Not needed. SCENE Software offers targetless registration.

To see a LIVE demonstration visit, www.faro.com/focus

World's Tallest Tilt-up Panel

Florida contractor lifts a narrow nine-story panel, *very carefully.*



Lifting these very tall panels was a challenge due to the height more than the weight.
PAUL CARECCIA PHOTOGRAPHY

TILT-UP

TILT-UP HAS REACHED new heights! The world's tallest tilt-up panels were erected this past winter at the Florida International University Biscayne Bay Campus near Miami. The panels stood 111 feet, 9 inches tall and were constructed as part of a nine-story, 600-bed dormitory. The construction required a total of 16 extremely tall panels to form the living rooms within the dormitory, with each panel measuring 13 feet, 2 inches wide, 16 inches thick, and weighing 134,000 to 146,000 pounds.

The project came to Meadow Burke about two years ago when Woodland Construction Co. of Jupiter, Fla., approached the tilt-up engineering team with a nine-story concept panel. At first glance, it seemed that this was pushing the limitations of what was achievable in tilt-up. But an increase in the thickness of the panel to 16 inches made it possible to come up with a preliminary detail using



With most of the shorter, wider panels already placed, the building awaits erection of the nine-story panels. MEADOW BURKE

RE·BAR·TIER™

In 1993 MAX developed the World's First Battery Operated Rebar Tying Tool. Since then MAX Rebar Tying Tools have been revolutionizing rebar tying all around the world. With just one pull of the trigger you can tie rebar in less than a second. MAX Rebar Tying Tools save time and money and increase job productivity.

RB398
Ties Up to
#5 x #6

RB518
Ties up to
#7 x #8



FREE BATTERY WITH PURCHASE OF RB398 OR RB518 AND 5 BOXES OF WIRE. OFFER VALID SEPTEMBER 2016.

MAX BUILDING OUR WORLD

Watch The
Tool in Action



www.maxusacorp.com
800-223-4293





EPOXY • METALLICS • NATURAL STONE • OVERLAY
POLYASPARTICS • URETHANE • SEALERS

www.mckinnonmaterials.com
TOLL FREE 1-866-622-7031

Visit us on Facebook

Optimize Your Purchasing Power

It just makes sense:
Same quality products direct from the manufacturer saves money.

LARGEST IN-STOCK SELECTION OF EPOXY STONE

UV Epoxy



Aurora Epoxy Dust

Aurora Epoxy Dust (over 40 color choices) A reflective metallic pigment that creates a unique 3-D visual effect. Mix two colors for even more inspiring color results.



Crystal Coat

The choice is crystal clear for pavers: **Crystal Coat** substantially decreases cleaning and maintenance costs.



Tinted Industrial Epoxy

Winning Results
This "checkered flag illusion" was created using Black & White Industrial Epoxy, protected with our High Performance Urethane.



McKrete™

McKrete™ Dry Mix & Additive
Indoor or outdoor, this user-friendly acrylic material can be stenciled, taped or textured.



Aurora Epoxy Dust

Chromastain
Eco-friendly water-based, self-sealing stain penetrates and adheres to porous surfaces for custom blending and shades.



Chromastain



Miracle Glaze H20

Miracle Glaze H20
Low VOC, water-based urethane. Odor-free, high gloss, chemical and abrasion resistant.

With a total of 16 pick points, these panels required a lot of rigging. MEADOW BURKE



Lifting Very Tall Panels

Gary Fischer, president of Woodland Construction, says the panel weights were not the main factor during the lifting. “The main challenge is that when reaching these heights and adding the adequate boom length required for the vertical load, it drastically reduces the crane’s capacity due to boom length and angle. For example, the 146-kip panel with 30 kips of rigging put us at the limit with the minimum boom requirement of 230 feet. The crane’s capacity with 230 feet of boom is 187-kips at a 40-foot radius, where a typical boom length of 160 feet gives us a capacity of 234 kips. Detailed lift analysis and ‘Critical Lift Plans’ needed to be completed prior to erecting to be sure everything was perfect and accurately figured, since we typically like to stay within 75% of the crane’s capacity with any lift.” When asked why they went with such tall panels, Fischer admits that “we wanted to try to do a nine-story panel! It was a challenge and we were successful.”

Fast, Accurate
Moisture Test
for Concrete Floors

RAPID RH

Smart Sensors, Smart Choices!

4.0 EX SINGLE USE
#1 selling RH test on the market for over 10 years

5.0 REUSABLE
So advanced, it's almost automatic

- Easiest to Comply with ASTM F2170
- 10 Times FASTER
- Lowest Cost/Test
- Simplest to Use

WAGNER METERS
Unleash Your Expertise

MAKE YOUR **SMART CHOICE** TODAY - CALL NOW - 1.800.207.2104 - WWW.RAPIDRH.COM




BUILDING **BETTER** BUSINESSES, COMMUNITIES, AND LIVES

"With the help of CreditSuppliers, we were able to compete, and ultimately win our bid. With such limited funding options out there for us construction guys, it was a breath of fresh air when we discovered what they're doing at CreditSuppliers."

- Amedeo Piccinini, Owner and President, M.E.G.A. Precast



**LEARN MORE ABOUT WHAT WE'RE
DOING AT CREDITSUPPLIERS**

 (866) 922-8322

 WWW.CREDITSUPPLIERS.COM/CCMAG

a conventional four-high rigging pattern and requiring reinforcing using #9 rebar.

Meanwhile, designers worked on an efficient plan for an eight-high lift. The lift included using 16 inserts which were cast into the face of the panel and anchored with Meadow Burke's Super-Lift III Face

and Edge Lift Anchors and Clutch System. The inserts were placed in a combination of eight rows and two columns to be able to lift and rotate the panel.

Super-Lift III face lift inserts were used to provide a safe and secure panel lift while the Super-Lift III Edge lift

inserts were used for final setting with the panels in a plumb position. Other lifting products supplied for the job included 8-inch steel strongbacks, which were used for the tall panels in order to resist bending moments, as well as B-75 bracing inserts.

RIGGING WAS CRITICAL IN SOLVING THE CHALLENGE SO THE CRANE COULD WORK WITH THE MAXIMUM REACH OF THE BOOM. LAST MINUTE ADJUSTMENTS TO SLING LENGTHS WERE REQUIRED WITH THE FIRST PANEL.

Extreme height

By late summer of 2015, the project was a go and engineering began to further tackle the lifting design. While the weight of each 9-story panel was not uncommon compared to the typical tilt-up panel, the extreme height of the panel presented several lifting challenges including potentially exceeding the crane's lifting capacity. Rigging was critical in solving that challenge so that the crane worked with the maximum reach of the boom. Last minute adjustments to sling lengths were required when lifting the first panel.

Besides the nine-story-tall panels, three other types of panels were used on this project. These additional panels were divided into four, three, and two stories attached to the structural steel building in a stacked arrangement on top of each other, with the four-story panels at the bottom, the three-story panels in the middle, and the two-story panels at the top. In all, there were 106 additional panels, besides the 16 nine-story tall



THE BEST MIXER MADE FOR YOU.

You can't top the original Zim Mixer®... the Industry-Leading Volumetric Concrete Mixer.



TECHNOLOGY

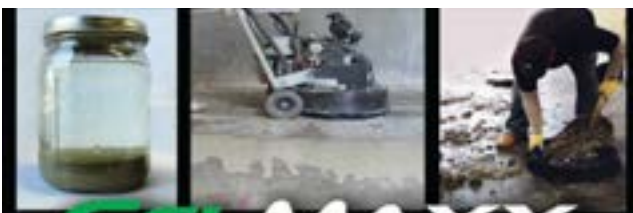
Patented, self-cleaning dual chain-feed system assures low-maintenance, dependability, long-lasting service. Accurately mix a better, custom, fresh pour on-site...with no waste.

Call Toll Free: 888-576-6499

View our video online or call for your own DVD.



Zimmerman Industries, Inc.
Ephrata, PA USA | Phone: 717-733-6166
www.zimmermanindustries.com



GELMAXX
Slurry Solutions of Excess Water Management

RECLAIM
≈ WATER ≈
FOR REUSE
AND
SOLIDIFY
SLURRY
FOR **DISPOSAL**

GELMAXXUSA.COM | 855.322.3335



ClearSpan fabric structures
1.866.643.1010 ClearSpan.com/ADCC

WE MANUFACTURE • WE INSTALL
WE SAVE YOU MONEY

BUILDINGS OF 1,000 USES

Fabric Structures Hybrid Buildings Foundation Solutions

ZERO PERCENT FINANCING AVAILABLE 

Moisture Testing
Concrete Floors



in-situ RH BluePeg


Lignomat offers:

- ✓ re-usable RH Probes
- ✓ fail-proof connections
- ✓ accurate, easy-to-read
- ✓ complies to ASTM F2170


Choose Lignomat for easier and more profitable concrete testing.

For more info
800-227-2105
www.lignomat.com

Sylvan's Chamfers, Reveals, Drip Strips, Half-Rounds & Custom Form Shapes give you...



...lasting impressions in Tilt-Up and Pre-Cast concrete.



SYLVAN
PRODUCTS, LLC

Call (800) 842-1990
Bryan, Bailey or Scott
sylvan-products.com/concrete
Prompt Nationwide Service

panels, for a total of 122 panels for the entire project.

With the concept of the shorter panels resolved, tilt-up engineer Elizabeth St. John took on the engineering for the standard panels while Meadow Burke's Engineering Manager, Scott

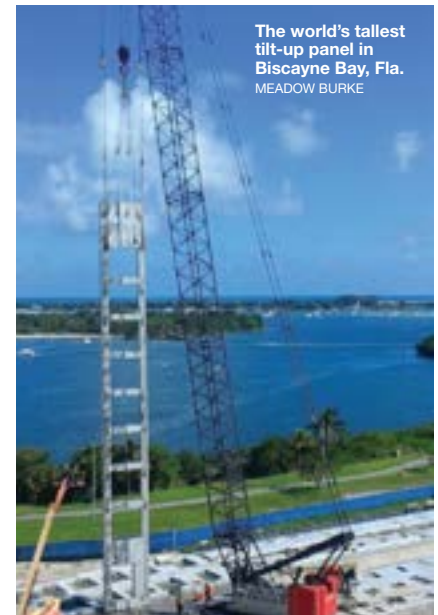
Collins, took on the design work for the unstacked tall panels.

As the panel design was being worked on, the eight-high lifting analysis was also ready for beta testing. After several updates from the programmers, Collins was confident that it was suitable for the

panels and that it would reduce some of the risk that would have been taken with a four-high lift.

Setting the panels

The final lifting design used an eight-high by two-wide rigging pattern. During the lifting the contractor had to transfer the load to additional plumb-setting lift inserts near the top of the panel. Bracing the panels after lifting was not required since setting of the panels was completed after all the floors had been placed. Despite being designed for 185 mph wind loads, since the panels were attached to the steel building frame at each floor, minimal steel reinforcement was needed for the final in-place loads.



The Meadow Burke tilt-up inserts for the project were supplied by leading distributor HD Supply White Cap of Pompano, Fla.

Amidst the complexities and challenges that came with the design, the results proved to be a worthy concept. The project now holds the record for the world's tallest tilt-up panel as recorded by the Tilt-Up Concrete Association. With the ingenuity of the teams involved, this was another successful tilt-up project to add to the books for Meadow Burke and Woodland Construction. **CC**



Save Time & Labor Costs

with Rapid Set® Cement Products

Building Restoration Structural Repair Bridge Repair



Apply non-permeable coatings in 12-24 hours

- One hour structural strength lets you complete repair and restoration projects faster
- Durable, long lasting, high-quality results
- Maximum protection provides complete sulfate resistance, protects against concrete carbonation and water penetration, and is non-corrosive to steel and iron

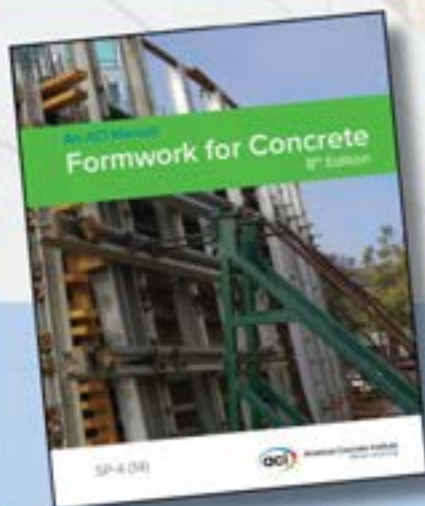


Rapid Set CTCEMENT.COM • 800.929.3030

Order at www.concrete.org or call us at +1.248.848.3800

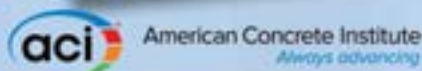
Formwork for Concrete

Completely revised and updated; still the formwork reference of choice



The 8th Edition, authored by David W. Johnston, North Carolina State University, is a major revision of the document to bring it up-to-date with "Guide to Formwork for Concrete (ACI 347R-14)". Revisions include referencing current standards and practices, removing outdated or irrelevant material, adding content on new developments in formwork technology and practice, and updating the look and layout of the document.

- An ACI best-selling document
- Allowable strength design and load and resistance factor design examples
- Updated to current standards
- Chapter problems for classroom study
- 500 modern color photographs
- 150 color illustrations
- Includes ACI 347R-14



Formwork for Concrete, 8th Edition, 2014, 512 pp. Order Code: SP48TH, \$249.50 (ACI members \$149.00)

RESOURCES FOR SUCCESS FROM ACI!



+1.248.848.3800 ■ www.concrete.org

Drill, Clean, Inject, Install...

Simple Enough?

Don't bet on it.

ACI-CRSI's Adhesive Anchor Installer Certification program is designed to credential installers that have demonstrated specific knowledge and are capable of effective installation of adhesive anchors in concrete.

ACI-CRSI Adhesive Anchor Installer Certification...Now Available!

www.ACICertification.org



INSPECTOR PROGRAM LAUNCHING IN 2016!



SETTING THE BAR A MILE HIGH

The 2015 Tilt-Up Convention & Expo features three days of education, tours, certification, awards, exhibits, demonstrations and networking geared at today's tilt-up professionals.



Inova Dry Creek Phase 1 - Centennial, Colorado
All-Phase Concrete Construction, Inc.
Powers Brown Architecture
LJB Inc.



Education

While the tilt-up industry is perfectly positioned to respond to the needs of today's owners with a product that is well known for speed and economy, there is room to improve and expand the appeal of your offering. This year's education program will focus on increasing market intelligence, implementing solutions to the labor shortage, cultivating safety leadership, developing an expert voice and setting yourself apart from the rest of the pack. "Setting the Bar a Mile High" implies we are all holding each other accountable for success, challenging each other to do better, and announcing to the world that our product is the most advanced and best suited system to meet the needs of today's market with speed, economy, versatility, intelligence and quality.

Registration

Find event details including a full schedule of events, seminar descriptions, speaker bios, registration details and more on the TCA's website or give us a call at (319) 895-6911.

www.tilt-up.org/convention

DENVER, COLORADO
OCTOBER 10 - 12

HDSUPPLY
CONSTRUCTION & INDUSTRIAL
WHITE CAP

TILB
MeadowBurke®

**CONCRETE
CONSTRUCTION**

presenting sponsors

official media partner

Changing the Game with Concrete Maturity

Can maturity replace concrete cylinders for long-term strength testing?



Concrete maturity was used in critical sections of a high-rise structure to monitor strengths for expedited stripping of the forms. PHOTOS: INTELLIGENT CONCRETE LLC

BY J. BELKOWITZ, W. BELKOWITZ, AND D.W. HARRIS » **IN THE MID-1970S** more than 65 people died in two tragic construction accidents. In both cases, cold weather had delayed the hardening of concrete elements and early stripping of formwork resulted in failure of the concrete and reinforcing steel. These tragedies led to the recognition that concrete maturity, originally developed in the 1940s, could be used to evaluate the hardening process in concrete elements in cold weather.

The American Concrete Institute (ACI) and ASTM define concrete maturity as a method to estimate strength development in construction based on the assumption that samples of a given concrete mixture

attain equal strengths if they attain equal values of the maturity index regardless of temperature changes. Today, concrete maturity provides real-time data that enables the end-user to make better-informed and instantaneous decisions.

Within the last three decades, through the efforts of concrete contractors, the Federal Highway Administration, and state DOTs, concrete maturity has resurfaced as a quality assurance method for fast-track pavement construction, specifically in determining when the pavement can be opened to traffic. Concrete maturity found a foothold where a concrete manufacturer and contractor could use maturity to

assure the purchasing agency that the concrete mix would attain the traffic-opening strength at the specified time. This concept has been repeated for years with few failures.

That brings us to today; the objective of this article is to determine if the same concrete maturity used for short-term strength development, cold weather precautions, and fast-track construction can be extended to long-term strength estimation and as a supplement to concrete cylinders.

Maturity curves

The maturity method establishes a relationship between strength,

MATURITY METHODS

temperature, and time that can be used to estimate strength development (ASTM C 1074-11). That relationship builds on the idea that the maturity, or strength development, of a given concrete mixture will be equal no matter the ambient temperature during the time

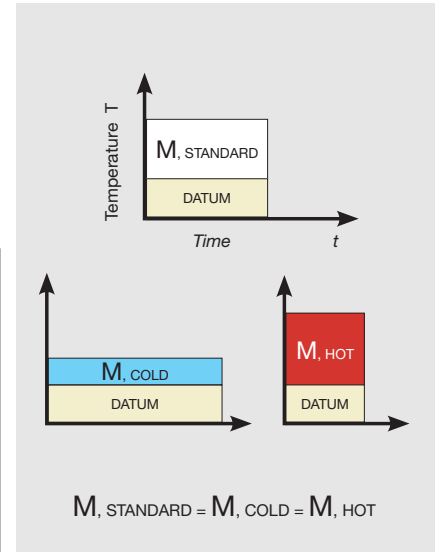
over which it gains strength. Assuming these temperatures are not so extreme as to be detrimental to the hydration process of cement, the mix cured in a hotter environment will more quickly reach the same maturity (and therefore, theoretically, the same strength) as that



Your Trusted Partner

800-850-2044 | Lackmond.com

LACKMOND
PROFESSIONAL DIAMOND TOOLS & EQUIPMENT



achieved by samples cured in a standard cure environment and much more quickly than samples cured in a colder environment, as illustrated above.

The basis of concrete maturity is an empirical relationship between the compressive strength of the concrete and the maturity index. These relationships are obtained by testing for compressive strength on laboratory specimens whose temperature history has been measured, recorded up to the time of testing, and can be compared at a later point to the concrete maturity on the jobsite.

Implementing concrete maturity

Concrete maturity implementation can be cumbersome and costly, but despite the needed initial investment of time and resources, concrete maturity is an invaluable method for strength estimation on a jobsite. While concrete maturity has the potential of giving the end-user immediate real-time data of a particular concrete mix's strength development, the process to get to the prediction takes some legwork. The user must conduct the following three steps for each concrete mix design:

1. Develop the strength-maturity relationship for the mix
2. Place maturity loggers into the forms prior to concrete placement
3. Use the appropriate model to determine the maturity index

Let's look at each of these in detail.



A concrete testing firm validates concrete maturity data between two different maturity systems.



WARRANTY REDEFINED.



Materials and workmanship warranty

Hilti will repair or replace parts that break as a result of defects in materials or workmanship for 20 years.



Some limitations apply. Contact Hilti for details.

www.us.hilti.com 1-800-879-8000 (U.S.)
www.hilti.ca 1-800-363-4458 (Canada)

Developing maturity curves

A strength-maturity relationship is developed with laboratory compressive strength tests on the concrete mixture to be used. A maturity curve is specific to a single concrete mix design. When a concrete producer has a change in a material's source or concrete mix design, a new maturity curve must be developed.

Part of the laboratory work for the concrete maturity curve is to determine the datum temperature or equivalent energy of the concrete. This includes casting, curing, and breaking grout samples that represent the concrete mixture to be used. The grout samples are cured at three different temperatures and broken intermittently over 32 days. This practice allows us to determine the minimum temperature or energy needed for cement hydration.

In most cases, though, the datum temperature and equivalent energy are assumed by the end-user. While this practice is usually considered a conservative approach to maturity, it can result in wasting time and money on the jobsite. And, in some instances, especially in long-term applications of maturity, assuming the wrong maturity data can risk the safety of workers.

As an example, consider two concrete mixes. One, a classic curb and gutter concrete mix with a low total cementitious materials content and the other a fast-track pavement mix with a

much higher total cementitious content and high admixture content for rapid strength gain. The fast-track concrete with higher cementitious content would be more likely to continue hydrating at lower temperatures and thus the datum temperature and activation energy will be lower for the fast-track mix than for the curb and gutter concrete.

But if instead of determining the datum temperature and activation energy, we assume a value it could be too low or too high. If too low, the result will be a set of calculated concrete maturity values that are higher than the actual value which could lead us to pull our forms too early. If a higher value is assumed, it would take a longer time to reach the target maturity, which is conservative, but also wastes time and money waiting for the strength gain that has actually already been achieved. Since the objective of concrete maturity is to expedite construction safely, assuming datum temperatures and activation energies results in reduced reliability for both short- and long-term strength prediction.

Installing maturity meters

The second step in implementing a maturity program is to attach a concrete maturity logger or meter in the formwork where the concrete in question is to be placed. The temperature history of the in-situ concrete, for which strength is to be estimated, is recorded from the time

MATURITY METHODS

of concrete placement to the time when we want to estimate the strength. The recorded temperature history is used to calculate the maturity index of the field concrete. There are several different types of maturity loggers and meters that will be covered in a follow-up article.

Maturity models

The final step in estimating the strength of the field concrete is to use the appropriate model to calculate the maturity index and the strength-maturity relationship. This step can be another source of error when using

Concrete Temperature and Strength

BY KENNETH C. HOVER, CORNELL UNIVERSITY

Concrete hardens and gains strength not because it “dries,” but because the cement “hydrates,” forming microscopic bonds that hold the cement grains and aggregates together in a manner similar to the bond between two strips of Velcro.

Like most chemical reactions, the rate of hydration increases with temperature, approximately doubling with each 20°F increase in concrete temperature. Compared with concrete at the standard laboratory temperature of 73° F, concrete in the field at a temperature in the mid-90s is hydrating twice as fast and concrete at a comfortable temperature in the mid-50s is hydrating half as fast. This effect is readily seen in the lower curve in Fig. 1 for compressive strength at an age of one day. But an aggravating fact is that speeding up the hydration usually lowers the quality of the Velcro-like bonds, lowering later-age strength as shown in the upper curve (28-day strength) in Fig. 1.

The result is that increasing concrete temperature accelerates early-age strength, usually at the expense of reduced later-age strength (Fig.2). Around 73° F and higher, warmer concrete results in higher strength up to about three days, at which age concrete that had been kept cooler begins to show higher strength (Fig. 2).

As seen in Fig. 3, temperatures cooler than about 73° F result in lower strength up to about 28 days, after which “cooler is better.” Ages at which the effect of temperature switches from beneficial to detrimental, or vice versa, are known as the “crossover points.”

One of the challenges in classical maturity applications is compensating for the crossover effect, given that maturity will always give more credit toward strength-gain for warmer concrete. This is why maturity predictions are usually more accurate in cold weather, or for early-age in hot weather or intentional high-temperature curing.

All charts from Design and Control of Concrete Mixtures, 15th Edition, Portland Cement Association, with permission.



PROFESSIONAL SAWING SOLUTIONS

If you have new or old concrete to cut, we have a solution for you.

Husqvarna is a world leader in walk-behind sawing solutions. When new concrete is placed, Husqvarna's Soff-Cut® saws and method minimizes the risk of random cracking in concrete by cutting control joints when concrete is still hydrating - before it has a chance to create a random crack. Alternately, when you need to cut cured concrete or asphalt, our flat saws have the power, ergonomics, torque, maneuverability and reliability to achieve maximum productivity.

We also manufacture a wide variety of diamond blades, perfectly matched for aggregates throughout the country.

[f facebook.com/husqvarnaconstruction](https://www.facebook.com/husqvarnaconstruction) [y youtube.com/husqvarnaCP](https://www.youtube.com/husqvarnaCP) [i HusqvarnaCP_Americas](https://www.instagram.com/HusqvarnaCP_Americas)

Copyright © 2016 Husqvarna AB (publ). All rights reserved. Husqvarna is a registered trademark of Husqvarna AB (publ).



WARRANTY REDEFINED.



Wear and tear coverage

Hilti will repair tools at no cost for 2 years from date of purchase. Damage due to wear and tear is covered. No charges for parts, labor, or even shipping.

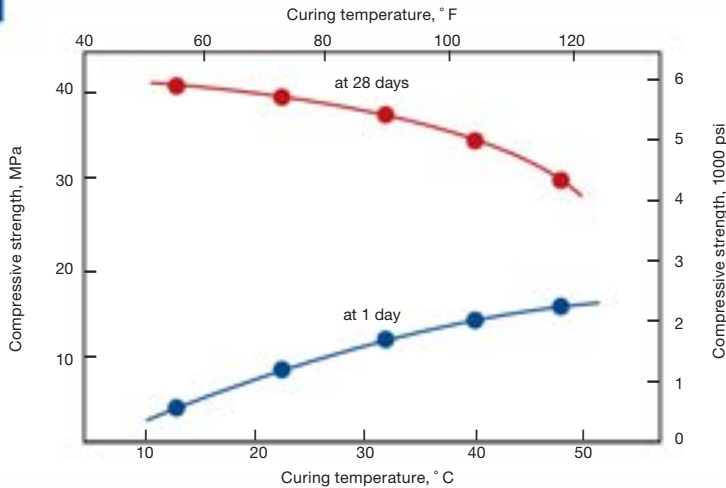


Some limitations apply.
Contact Hilti for details.

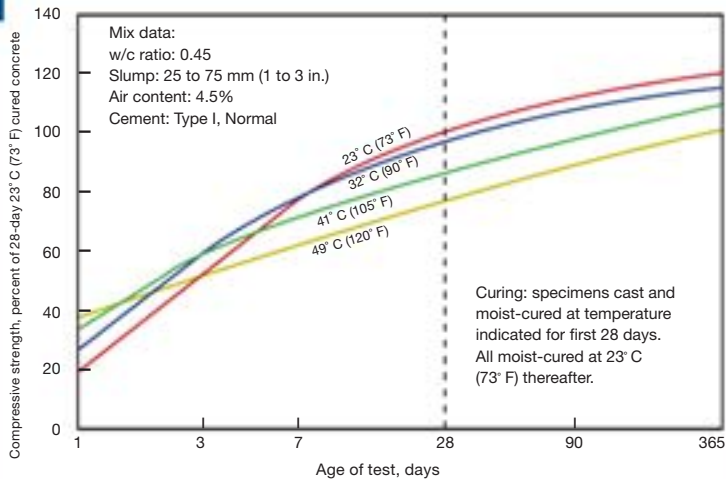
www.us.hilti.com 1-800-879-8000 (U.S.)
www.hilti.ca 1-800-363-4458 (Canada)



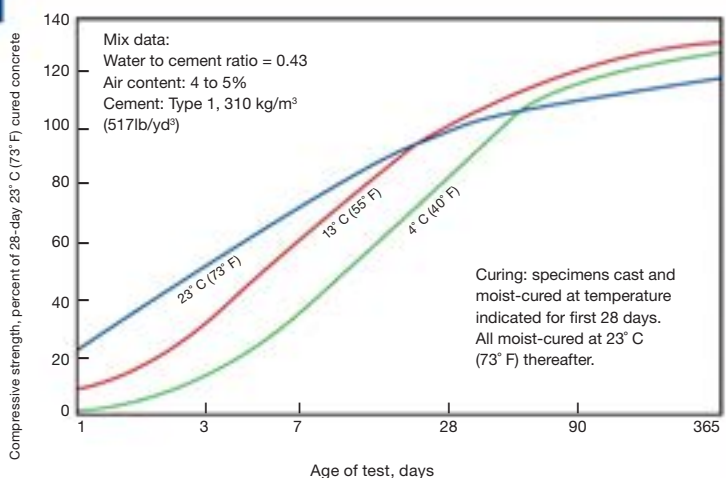
1



2



3



MATURITY METHODS

concrete maturity to predict long-term strength. There are two models used: the temperature-time factor and the equivalent-age. While changing from one model to the other can be as simple as changing the selection in a drop-down menu, most maturity loggers default to the temperature-time factor. But for long-term strength prediction the maturity curves should be based on the equivalent-age method, which is better suited to predicting strength development of concrete after 14 days. For strength development within 14 days, the temperature-time method (most widely used method) is recommended.

Advantages and limitations

Concrete maturity is often used in critical construction activities such as removing formwork and reshoring; post-tensioning of tendons;

termination of cold-weather protection; and opening roads to traffic. We have identified the advantages of using concrete maturity for short-term and long-term concrete strength prediction by conducting a survey with concrete and construction entities that have used maturity methods.

From the survey, we found that end-users prefer concrete maturity as an estimation technique because it is an inexpensive, repeatable, and easy-to-implement process. And while the traditional method of casting cylinders creates a snapshot of the concrete strength in given sections of the concrete, cylinders provide only limited information from a larger concrete pour. Maturity loggers and meters are relatively easy to use and maintain, and downloading the data takes no more than five minutes in the most extreme cases. End-users can include maturity



Seal. Strengthen. Safeguard.

Floors treated with Duro-Nox look better, last longer and cost less to maintain.

ASK ABOUT THE DURO-NOX 20-YEAR WARRANTY



chemical solutions to concrete problems

customerservice@nox-crete.com
402-341-2080 | www.nox-crete.com

CONCRETE CONSTRUCTION TARGET YOUR MARKET



Reach Prospects

Educate Customers

Reward Buyers

Build Customer Loyalty

- ① Your company's logo and message on each cover generates good will. Your company can grow your business by reaching new customers.
- ② Boost recognition locally by linking with a National Brand! (CONCRETE CONSTRUCTION is the official publication of the annual World of Concrete trade show)
- ③ Provide customers with the solutions and technical information they need to get the job done right the first time!
- ④ Co-op Sponsorship — This partnership option links Manufacturers and Producers/Distributors to continually expand their share of the contractor market.

For information on how your company can participate, please contact Chari Berzanskis at (773) 824-2525 or cberzanskis@hanleywood.com.

hanleywood



WARRANTY REDEFINED.



In and out of the repair center in one day or the repair is free

If Hilti does not repair a tool the same day it is received in a Tool Service Center then the repair is free – including parts, labor and shipping.



Some limitations apply. Contact Hilti for details.

www.us.hilti.com 1-800-879-8000 (U.S.)
www.hilti.ca 1-800-363-4458 (Canada)



Concrete cylinders are cured in a concrete maturity box to simulate the temperature gain that is experienced in the concrete structure.

loggers in multiple locations to create a more detailed account of in-situ concrete strength development, monitor critical areas of construction, and take advantage of early strength gains to move the project schedule forward.

Despite the potential of concrete maturity as a nondestructive prediction method, there are limitations that must be recognized. As listed in ASTM C 1074-11, here are the top three limitations to implementing and employing concrete maturity:

1. Concrete must be maintained in a condition that permits cement hydration.
2. Concrete maturity does not take into account the effects of early-age temperature on long-term strength (see sidebar by Ken Hover).
3. Concrete maturity is recommended by ASTM, ACI, and others as an estimation method only. Concrete maturity must be supplemented by other indications of the potential strength of the concrete mixture. This practice is often dismissed when it comes to long-term strength determination. But concrete maturity was never intended to be a stand-alone prediction method for the

entirety of the concrete elements in question on a jobsite.

Roadblocks

One of the toughest roadblocks to overcome in implementing a maturity program is the cost of developing the concrete maturity curves. The maturity loggers are inexpensive; but developing the maturity curves is a costly and involved process that must be done months before starting the project. Ultimately, the cost of developing the concrete maturity curves is a burden that hangs between the concrete manufacturer and the general contractor.

Another roadblock with concrete maturity is that it is not concrete strength. And while there are plenty of case studies to prove the effectiveness of concrete maturity over the short term, it's less common to estimate long-term concrete strength with maturity. Whether you believe that concrete cylinders are accurate representations or not, as an industry there is more confidence in concrete cylinders and beams than in concrete maturity when evaluating long-term strength.



A concrete field technician activates a bluetooth concrete maturity meter.

The next step

The road the industry must go down to adopt concrete maturity as a long-term strength prediction method includes several questions and activities.

- Are we using the right prediction method for long-term qualification of strength?
- Should we use concrete curing boxes?
- How many data loggers are needed per volume of concrete?
- Can we assume a single datum temperature or activation energy for all concrete mixes?
- Do the swings in concrete constituents allowed by ASTM C 94 invalidate the established maturity curves?

Currently, the authors, working with concrete manufacturers, universities, and contractors in Colorado have started

a pilot program on active jobsites that includes concrete maturity methods and devices. These results will be compared to the theories at the foundation of this strength prediction method. Ultimately, the hope is that the pilot programs will validate the established practices and suggest revisions to some of those practices if they are not feasible in the field. Details of this work will be published in a follow-up article where we will attempt to show whether concrete maturity is an effective and realistic means to supplement concrete cylinders on a jobsite. **CC**

Jon Belkowitz is director of research and development, Whitney Belkowitz is CEO and president, and David Harris, P.E., is principal engineer all with Intelligent Concrete in Elbert, Colo. For more information visit intelligent-concrete.com.

BackSaver Patented Hammer Drill Attachment
 Revolutionize the way you work!
SAVE YOUR BACK and Get the Job Done!
 version 1.5
\$449 EACH
NEW and IMPROVED Design
There isn't another tool like this available!
 Our revolutionary and patented hammer drill attachment may change the way you use your hammer drill forever. With the durable BackSaver you will be able to:
 • Stand and work to help prevent back injury
 • Drill dowel bars more easily
 • Apply more pressure and use less energy
 • Increase productivity
 • Distances user from harmful silica dust
BackSaver attaches to the following drills:
SDS Max Rotary Hammers:
 Dewalt Hammer D92 - 3"
 Dewalt Hammer D91 - 1-3/8"
 Dewalt Hammer D90 - 1-3/4"
 Dewalt Hammer D89 - 1-5/16"
Spline Rotary Hammers:
 Dewalt Hammer D88 - 1-3/4"
 Dewalt Hammer D87 - 1-5/16"
Currently Adding Dealers
 Ask your local dealer about BackSaver! www.hammerdrillattachment.com
 PRODUCT DEMONSTRATION CALL 816-767-8878

SureBuilt Concrete Forms & Accessories
MADE IN USA
Sure-Ply Handset System
Sure-Ply Handset Forms
Shoring & Post Shores
Formliners
Wall & Form Braces (UP1-14)
 ✓ Birch Plywood 9-Ply, 220/220 Overlay
 ✓ Less Deflection, Full 2" Crossmembers
 ✓ 20% More Weld on Cross Member
 ✓ 8 Additional Dado Slots
 ✓ Baked-On Powder Paint, 12 Colors
 ✓ Reversible Plywood
 ✓ High Carbon Structural Steel
 ✓ All Full Moment Welds
www.surebuilt-usa.com • (708) 493-9569 • info@surebuilt-usa.com

Company	Page Number	Toll-Free Number	Website
American Concrete Institute	53		www.concrete.org
BackSaver	62		www.hammerdrillattachment.com
Chrysler Group LLC	32-33		
ClearSpan Fabric Structures	51	866-643-1010	www.ClearSpan.com/ADCC
CreditSuppliers	13, 49	866-922-8322	www.creditsuppliers.com/cmag
CTS Cement Manufacturing Corp.	52	800-929-3030	www.ctscement.com
Curecrete	36		www.ashfordformula.com
Doka USA	23	877-365-2872	www.doka.com
Ergodyne	21	800-225-8238	www.ergodyne.com
FARO USA	44		www.faro.com/focus
Ford Motor Company	41		www.ford.com
Formwork-Shoreall	10		www.formwork-shoreall.com
GCR Tires and Service	7	844-68-TIRES	www.gcrtires.com
GelMaxx Slurry Solutions	51	855-322-3335	www.gelmaxxusa.com
General Motors	15		
GOMACO	4		www.gomaco.com
Headwaters Resources	10		www.flyash.com
Hilti	57, 59, 61	800-879-8000	www.us.hilti.com
Hitachi Power Tools USA	Cover 2		www.hitachipowertools.com
HTC Professional Floor Systems	19	877-482-8700	www.htc-floorsystems.com
Husqvarna Construction Products	58		
Lackmond Products Inc.	56	800-850-2044	www.Lackmond.com
Laticrete International Inc.	34	800-243-4788	www.drytek.com
Laticrete International Inc.	42		www.lmcc.com
Ligchine International	8		www.ligchine.com
Lignomat USA Ltd.	51	800-227-2105	www.lignomat.com
MAX USA Corp.	46	800-223-4293	www.maxusacorp.com
McKinnon Materials Inc.	47	866-622-7031	www.mckinnonmaterials.com
Meadow Burke	25	877-518-7665	www.MeadowBurke.com
Miracote Products	39	800-692-3502	www.miracote.com
Navistar	2-3		www.InternationalTrucks.com/HXSeries
Nox-Crete Products Group	60		www.nox-crete.com
Oztec Industries, Inc.	1	800-533-9055	www.oztec.com
Putzmeister America Inc.	Cover 4	800-884-7210	www.PutzmeisterAmerica.com
Quest Building Products	12	888-457-3887	www.questbuilding.com
RoMix Chemical & Brush, Inc.	12	800-331-2243	www.romixchem.com
Simpson Strong-tie	11	800-999-5099	www.strongtie.com/rpsinject
Stego Industries LLC	31		www.stegoindustries.com
SureBuilt Manufacturing	62		www.surebuilt-usa.com
Sylvan Products LLC	51	800-842-1990	www.sylvan-products.com/concrete
Tekla, Inc.	38		www.tekla.com/pourconcrete
The American Institute of Architects	Cover 3		www.aia.org/concreteconstruction
Tilt-Up Concrete Association	54		www.tilt-up.org/convention
Trimble	35		www.trimbledimensions.com
Ulma Form Works	43		www.ulmaconstruction.us
Wagner Meters	48	800-207-2104	www.rapidrh.com
Wagner Meters	6	800-207-2104	www.wagnermeters.com/webinar
Wirtgen America Inc.	37		www.wirtgen-group.com/america
Zimmerman Industries Inc.	50	888-576-6499	www.zimmermanindustries.com

Advertisers: To update your listing, contact Stephanie Fischer at 773-824-2422 or send an email to sfischer@hanleywood.com

Good Form Leads to More Pours per Panel

Properly maintaining your forms will make them last.

QUESTION: HOW CAN I MAKE SURE I'M GETTING THE MOST LONGEVITY AND USE FROM MY CONCRETE FORMS?

ANSWER: WE ASKED ROGER ROATCH WITH APA - THE ENGINEERED WOOD ASSOCIATION, TO RESPOND:

When it comes to concrete structures, formwork may represent close to half the cost. Fortunately, concrete forms are durable workhorses that can be used over and over with proper maintenance and upkeep. Here are seven



A chemically reactive release agent will give overlaid panels the longest life and should be applied before the first pour. Check with the manufacturer of the forming plywood for more details. PHOTO: NOX-CRETE PRODUCTS GROUP

ways to extend the life and usefulness of your plywood concrete forms:

1. Strip forms carefully. Metal bars or pry bars should not be used on plywood because they will damage the panel surface and edge. Instead, use wood wedges, tapping gradually when necessary.

2. Clean and apply release agents. Soon after removal, plywood forms should be inspected for wear, cleaned, and repaired, spot-primed, refinished, and lightly treated with a form-release agent before reusing. Use a hardwood wedge and a stiff fiber brush for cleaning. Avoid using a metal brush because it may cause wood fibers to “wool.”

3. Apply sealants and release agents as directed. Protective sealant coatings and release agents for plywood increase form life and aid in stripping. Some panels may require only a light coating between uses. Applying a form release agent a few days before the plywood is used, then wiped so a thin film remains, will prolong the plywood's life, increase release characteristics, and minimize staining.

4. Know the difference between release agents and coatings. Release agents and coatings can affect forms and concrete differently, so select a release agent keeping mind its influence on the finished concrete surface. For example, some release agents including waxes or silicones should not be used where the concrete is to be painted.

Plywood form coatings, such as lacquers, resin, or plastic base compounds sometimes are used to form a hard, dry, water-resistant film on plywood forms.

Usually, the field-applied coatings reduce the need for application of release agents between pours and result in greater reuse.

5. Patch and repair forms. On prefabricated forms, plywood panel faces (when the grade is suitable) may be reversed if damaged. Tie holes may be patched with metal plates, plugs, or plastic materials. Nails should be removed and holes filled with patching plaster, plastic wood, or other materials.

6. Handle and store forms properly. Be careful to prevent panel chipping, denting, and corner damage during handling. Panels should never be dropped. Forms should be carefully piled flat, face to face and back to back. Forms should be cleaned immediately after stripping and can be solid-stacked or stacked in small packages with faces together.

Hairline cracks or splits may occur in the face ply. These “checks” may be more pronounced after repeated use of the form. Checks do not mean the plywood is delaminating. Form maintenance, including careful storage to assure slow drying, will minimize face checking.

7. Consider the effects of admixtures and chemicals. Many admixtures and pozzolans increase the abrasiveness or alkalinity of the concrete. While wood and phenolic overlays resist alkaline solutions and abrasion, some admixtures may significantly decrease the lifespan of a concrete-forming panel.

There's much to consider when it comes to proper upkeep and maintenance of concrete forms. But following these tips will ensure the best life and use of forms project after project. **CC**

Roger Roatch is an Engineered Wood Specialist for APA. For more on concrete form maintenance and selecting the best form panel for the project, download the APA Concrete Forming Design/Construction Guide at www.performancepanels.com/concrete-form-panels.



AIA Master Agreements Are The Cure

Renegotiating contracts for each scope of service is time-consuming and results in project delays (and headaches!). AIA Master Agreements allow parties to agree on a predefined set of terms and conditions that will apply to multiple scopes of services, removing any renegotiation. Protect your project with AIA Contract Documents.

Get free samples of AIA Master Agreements at www.aia.org/concreteconstruction

 **AIA** Document A121™ – 2014
Standard Form of Master Agreement Between Owner and Contractor where
Work is provided under multiple Work Orders

AGREEMENT made as of the _____ day of _____
in the year _____
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

and the Contractor:
(Name, legal status, address, and other information)

AIA Contract Documents®
THE INDUSTRY STANDARD.

Learn more at www.aia.org/concreteconstruction



PERFORM AT A HIGHER LEVEL

38Z-5

Putzmeister

Meter Truck-Mounted Concrete Boom Pump

Redefine your job site performance with the Putzmeister 38Z-5-Meter truck-mounted concrete boom pump, featuring a new five-section design. Engineered for maximum maneuverability and flexibility, this sleek unit is refined with a reduced boom unfolding height and equipped with our exclusive Ergonic® Pump Control System. The culmination of superior craftsmanship and an unmatched commitment to quality, the 38Z-5 is the industry's premier solution to help you perform at a higher level.

At Putzmeister, exceeding your expectations isn't a goal – it's mandatory.



800.884.7210 | PutzmeisterAmerica.com

