

The Concrete Research Network

An industry collaboration powered by the ACI Foundation's Concrete Research Council

In its quest to align donors, researchers, and funders with concrete research projects, the ACI Foundation has recently united with several industry partners by formal Memorandums of Agreement to form the Concrete Research Network (CRN).

The CRN is a forum for the concrete industry to engage and connect researchers, funding organizations affiliated with the concrete industry, and industry users with technical research needs, with the end goal of promoting research needs and projects that offer broad implementation across the concrete industry. The CRN currently consists of the:

- ACI Foundation;
- American Society of Concrete Contractors (ASCC) Education, Research & Development Foundation;
- Charles Pankow Foundation (CPF);
- Concrete Reinforcing Steel Institute (CRSI) Education & Research Foundation;
- Portland Cement Association (PCA) Education Foundation;
- Precast/Prestressed Concrete Institute (PCI); and
- Ready Mixed Concrete (RMC) Research & Education Foundation.

The Concrete Research Council (CRC), a long-standing council of the ACI Foundation, actively participates in the CRN as the manager of its activities and website. Each of the participating foundations and associations of the CRN has a representative on the Council. Other concrete industry foundations and associations are being solicited for membership in the CRN.

Why the Need for the Concrete Research Network?

The origin of the CRN was one of the outcomes of an industry-wide meeting of representatives of the concrete industry, including researchers, designers, contractors, and philanthropic foundations (funders). These interested parties gathered to discuss processes for identifying and setting research goals, soliciting funding, distributing funding, and managing research projects and the dissemination of their results.

As a result, the CRN was developed in recognition of the concrete industry's need to engage and connect researchers, funding organizations and industry users to



Partners of the Concrete Research Network

promote research needs and projects and expand dissemination of results within the concrete industry. The CRN's Mission Statement is as follows: "Provide a forum for collaboration among funders, researchers, and users that will generate research proposals in response to industry needs and disseminate research findings and champion the process for adoption of new or improved methods of concrete design and construction." The CRN member organizations have and will continue to award research grants to qualified entities. All results of research must be made available in the public domain without restriction.

Research in Action

Recently, the collaborative efforts of CRN members led to the completion of timely research that will have an almost immediate impact on the concrete industry. According to Mark Perniconi, Executive Director of the Charles Pankow Foundation: "All major updates or changes to the ACI 318 code require either an engineering study or lab testing that all fall under the definition of research. CRN has definitely proved to be a responsive and useful tool to assist in providing funding support for this type of research."

One of the most fundamental assumptions in reinforced concrete design is that reinforcing bars exhibit elastic-perfectly plastic behavior. However, many modern reinforcing bar products, including coiled steel bar stock, stainless steel bars, and high-strength bars, have no well-defined yield point. For these products, the yield strength is delineated as the stress measured at a specified strain. "Building Code Requirements for Structural Concrete (ACI 318-11)" defines this strain using the extension under load method at a strain of 0.35%—a method that was first required in "Building Code Requirements for Reinforced Concrete (ACI 318-71)." Currently, however, almost all other standards define the yield strength as the stress based on the offset method at an offset strain of 0.2%.

In July 2013, the Concrete Reinforcing Steel Institute (CRSI) contacted ACI with a resolution from its Board, requesting that ACI Committee 318 use the 0.2% offset method in the 2014 edition of the Code. A proposal was

submitted to the Charles Pankow Foundation to fund a study of the effects of the change on reinforced concrete design. In August, the CPF signed a research contract with Wiss, Janney, Elstner Associates, Inc. (WJE). Through the CRN, collaborative funding was provided by CRC and CRSI.

Under the direction of principal investigator Conrad Paulson, WJE evaluated several different yield measurement methods to determine their influence on member strength calculations. Using data that included stress-strain curves from bars as manufactured in 2011 and 2012, the research team determined that using the 0.2% offset method provides for adequate strength and safety in reinforced concrete members. In September 2013, the research results were used to support a proposal submitted to ACI Committee 318. The proposal was approved with amendments on October 23, 2013, so the 2014 edition of the Code will include a definition of yield strength of nonprestressed bars and wires that will be consistent with the definitions in other standards using the 0.2% offset method.

Launch of the CRN Website

CRN embodies a collaborative network that is meant to leverage funding, create greater awareness of ongoing and new research efforts throughout the concrete industry, and involve the industry at different levels in adopting promising new technologies. At the core of this network is a website that will serve to organize information for partners, funders, researchers, and users. Built in partnership with several industry foundations, the site will assist in efforts to coordinate funding for comprehensive, larger-scale research projects and disseminate the results of all research to a wider audience.

"As a forum, the CRN and its website affords the entire concrete and construction community greater opportunities for collaboration, through both funding and strategic initiatives, and to tackle our chief challenges of dissemination and implementation of results," said Joseph Sanders, past and long-time CRC Chair, Strategic Development Council Chair, and a Consultant with Pankow Builders. "Information only has value when it is available in the right format, to the right people, in the right place, at the right time and our hope is that the CRN website can facilitate this type of communication."

CRN will benefit all members of the concrete community—technical committees, designers, contractors, trade associations, owners (government agencies and private owners), engineers, and manufacturers/producers—by focusing on:

- Application-oriented projects that create new knowledge about the industry, advance the state of the science of the concrete industry, or provide tools and resources that can be replicated or adapted by the concrete industry;
- Research that will advance an innovative product, component, or building system;

About the ACI Foundation

The American Concrete Institute (ACI) formed the ACI Foundation (at that time called ConREF) in 1989. A nonprofit educational and research foundation to receive, administer, and expend funds for educational and research purposes, the ACI Foundation consists of the Concrete Research Council, the Strategic Development Council and the Scholarship Council.

For more information, visit www.acifoundation.org.

- Practical research that benefits reinforced concrete design, ready mixed concrete, or precast/prestressed concrete applications;
- Research that improves the quality, efficiency, and value of large buildings by advancing innovations in concrete materials, construction, and structural components and systems which can be adopted into code requirements; and
- Research that improves the performance of building design and construction teams by advancing integration, collaboration, communication, and efficiency through innovative new tools and technologies, and by advancing new means and methods for project team practices.

And the CRN website will be a critical tool for maintaining focus on those issues. Some key attributes of the CRN website include:

- Publicly accessible compilations of information and opportunities about research needs, ongoing projects, and research products available from each partner;
- Links to research products so that the positive effects of successful research can be applied; and
- Forms for interested parties to suggest industry research needs.

The Concrete Research Council as a CRN partner

Since its formation, the CRC has provided hundreds of thousands of dollars in funding to worthy research projects designed to advance the technologies and practices within the concrete industry. As the manager of the CRN, the CRC will continue to contribute grants to concrete research projects.

About 30 individual members currently comprise the CRC, representing industry and research entities. The CRC collects information on research needs, reviews submitted research proposals, approves worthy proposals, and provides seed money to fund a portion of the research.

CRC provides seed funding, currently \$10,000, that is intended to complement and encourage additional funding from agencies or organizations. Acceptance of the research proposal by CRC, even with limited funding, serves as a “highly regarded” endorsement by CRC that carries considerable weight with funding agencies. CRC will usually make the commitment of funding contingent on funding of the larger proposal. In some cases, such as proposals from ACI committees for resolving technical issues, the seed funding from the CRC may be all that is required to perform the research.

Currently, within the CRC framework, 15 research projects are in progress. In 2013, the CRC funded

Networking

Anyone can submit a research need at any time. The most effective research needs are those where the problem statement is clearly stated. Clarity in a problem statement will allow a potential researcher to create a viable research program. It’s also important that the research has industry backing. For example, an ACI technical committee and/or industry entity endorsement can create more opportunities for collaborative funding.

Researchers are continually challenged to find research projects that are relevant to the concrete and construction industry. ACI technical committees are charged with identifying research needs to solve technical issues within the concrete industry. The online form on the CRN website for research need suggestions is a tool that can be used by ACI technical committees and others to communicate their research needs to a wider audience. Once a form is completed and has been vetted by the site administrator, the research need will be posted on the CRN website for exposure to researchers, and potential funders, users, or other interested parties.

Please visit www.concreteresearchnetwork.org to see how you can participate.

seven projects—the \$70,000 in CRC seed funding was leveraged into \$506,513 worth of research through collaborative funding with other industry supporters and CRN partners.

Seven research projects have been completed in the last year. Links to the completed research reports are on the CRC website, www.concreteresearchcouncil.org.

Researchers can find the grant proposal guidelines on the CRC website. CRC’s link to the CRN assures that the CRN partners will see the research proposal. The main evaluation criteria for a proposal include:

- Impact of the research to ACI and the concrete industry;
- Whether the research is required for a need of an ACI technical committee—for example, a change in the building code—or for a publication update; and
- Support from the relevant ACI technical committee Chair indicating the importance/impact of the research to the committee, ACI, and the concrete industry.

Proposals can be submitted throughout the year to Ann Daugherty, Director—ACI Foundation, at ann.daugherty@acifoundation.org.

Once a research proposal is submitted, it is evaluated by a task review group of technically qualified ACI members. If the task group recommends funding, then the proposal is balloted to the entire CRC membership for final funding approval.