NEx insights

User Experience and Success Stories with FRP-Reinforced Concrete

Highlights from the NEx workshop at the ACI Concrete Convention – Spring 2023

Sales of fiber-reinforced polymer (FRP) reinforcement and its use in concrete construction applications have been steadily increasing worldwide in recent years. To shed light on this growing trend, the second NEx workshop at the ACI Concrete Convention in San Francisco, CA, USA, was organized to build on the success of the first workshop that focused on designing with glass fiber-reinforced polymer (GFRP) reinforced concrete using ACI CODE-440.11-22, "Building Code Requirements for Structural Concrete Reinforced with Glass Fiber-Reinforced Polymer (GFRP) Bars—Code and Commentary." Held on April 5, 2023, the workshop brought together engineers, owners, contractors, design consultants, and building officials to share their experiences in design and construction with FRP-reinforced concrete.

The workshop featured two sessions (morning and afternoon), with three presentations from industry experts per session. Cary Kopczynski, ACI Past President and Senior Principal and CEO of CKC Structural Engineers, Bellevue, WA, USA, delivered the first presentation, "Durable and Constructable: Achieving Both Objectives with FRP Reinforcing." He highlighted the engineer's perspective on designing with FRP reinforcement and showcased successful case studies of construction projects in the United States. The second presentation, by Matthew Chynoweth, National Complex Bridge Director for WSP USA, focused on "FRP Materials and Specifications for Transportation Infrastructure." As a former Chief Bridge Engineer at the Michigan Department of Transportation (MDOT) and a past Chair of American Association of State Highway and Transportation Officials (AASHTO) Committee T-6, Fiber Reinforced Polymer Composites, Chynoweth provided updates on AASHTO specifications and discussed MDOT deployments of FRP materials. He highlighted the use of carbon fiber-reinforced polymer (CFRP) for pretensioning and post-tensioning of concrete bridge elements, FRP mild reinforcement, and the use of FRP for strengthening and sustainability purposes in transportation infrastructure. The third presentation, by Josh Beech, Owner of Beech Contractors LLC, provided insights from a contractor's perspective on "Lessons Learned Using FRP Reinforcement."


Kopczynski


Chynoweth


Beech


Seracino


Senecal


McMahon

Beech shared challenges faced during installation, including technical, manufacturing, and fabrication issues, as well as the learning curve and resistance to implementing this new technology. Despite these challenges, he highlighted the potential of FRP reinforcement in various applications and expressed optimism about its future in concrete building and infrastructure projects.

The second session featured presentations on the applications of FRP reinforcement. First, Rudolf Seracino, a Professor at North Carolina State University, Raleigh, NC, USA, discussed "Harkers Island Bridge Replacement: Design and Construction of North Carolina's First All-FRP Reinforced/Prestressed Concrete Bridge." He focused on the ongoing construction of the replacement bridge entirely reinforced with FRP reinforcement and shared details of the design and construction processes. Next, in the penultimate presentation, Matthew Senecal, ACI Director of Engineering, Farmington Hills, MI, USA, shared his experiences as an engineer learning to design with GFRP. He discussed the challenges and lessons learned in transitioning from designing with conventional steel reinforcement to FRP reinforcement and highlighted the importance of technical knowledge and expertise in designing with FRP reinforcement. The final presentation of the workshop by Brett McMahon, Chairman and CEO of Miller & Long Co., Inc., Bethesda, MD, USA, provided a builder's perspective on the "Cost-Saving Features of FRP Products." McMahon shared insights on how FRP reinforcement can be cost- and time-effective in construction projects and elaborated on its advantages in terms of ease of placement, lighter weight, and noncorrosive nature.

Overall, the speakers emphasized the many advantages of FRP reinforcement in construction applications, including its durability, lighter weight, noncorrosive properties, and ease of placement, even in extreme weather conditions. Several presenters highlighted the capital cost savings as a result of using the FRP materials with more savings anticipated when considering the life-cycle approach.

Based on the presented information, FRP reinforcement is being successfully used in transportation infrastructure, commercial buildings, residential construction, and marine applications; and the workshop provided real-life examples and case studies of its diverse applications. However, the workshop also acknowledged that there are challenges in transitioning from conventional steel reinforcement to FRP reinforcement, including technical, manufacturing, and fabrication challenges, as well as a learning curve and resistance to the adoption of new materials and technology. All these presentations will soon be available on the NEx YouTube channel (@nex6561).

For more information on NEx, visit **www.nonmetallic.org**.

Different FRP reinforcement samples were circulated during one of the presentations with reference to their use

The workshop attracted a large number of attendees interested in learning about FRP reinforcement and provided a great opportunity for interactions and discussions