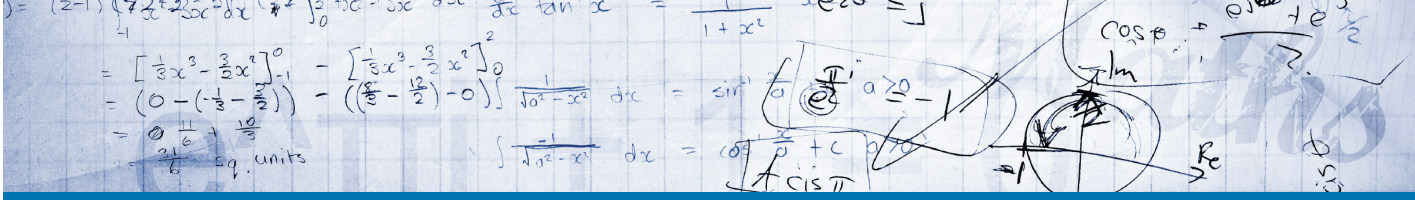

Discussion

Flexural Behavior of Full-Scale, Carbon-Fiber-Reinforced Polymer Prestressed Concrete Beams

The following comments relate to "Flexural Behavior of Full-Scale, Carbon-Fiber-Reinforced Polymer Prestressed Concrete Beams," by Prakash Poudel, Abdeldjelil Belarbi, Bora Gencturk, and Mina Dawood, which appeared in the September–October 2022 issue of *PCI Journal*.[1]

Today's highway bridge construction almost exclusively uses steel prestressing strands for prestressed concrete beams. Prestressing steel is susceptible to corrosion-induced degradation when exposed to aggressive environments. Corrosion can result in the deterioration of the serviceability and strength of highway bridge beams. These concerns have led to the use of nonmetallic pre-stressing elements made of glass-fiber-reinforced polymer (GFRP), aramid-fiber-reinforced polymer (AFRP), and carbon-fiber-reinforced polymer (CFRP) materials, which are collectively referred to as fiber-reinforced polymers (FRPs). Among FRPs, CFRP has the greatest potential to replace steel strands and provide corrosion-free prestressed concrete bridge girders when combined with corrosion-resistant transverse reinforcement. Completed examples of CFRP prestressed concrete beam implementations in the United States include the Pembroke Avenue Bridge and Plum Creek Bridge in Michigan. Examples in progress include the Interstate 64 South Side High Rise Bridge and Laskin Road Bridge in Virginia.

The statement about the Interstate 64 South Side High Rise Bridge and Laskin Road Bridge being examples of prestressed concrete beam implementations is either incorrect or misleading. Myers et al.[2] clearly indicates that the piles being used in Laskin Road Bridge include carbon-fiber-reinforced polymer (CFRP). That paper is silent on beam applications, and to be clear, there are no prestressed beams with CFRP in the Laskin Road Bridge. Myers et al. indicates that the piles used in the Interstate 64 South Side High Rise Bridge include CFRP. It is also silent on beam applications, and there are also no prestressed beams with CFRP in the Interstate 64 South Side High Rise Bridge.

The Virginia Department of Transportation (VDOT) has completed CFRP prestressed beams for a bridge over Aaron's Creek, and VDOT has ongoing CFRP prestressing for the Hampton Roads Bridge Tunnel Expansion project, but not at the projects cited.

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References

1. Poudel, Prakash, Abdeldjelil Belarbi, Bora Gencturk, and Mina Dawood. 2022. "Flexural Behavior of Full-Scale, Carbon-Fiber-Reinforced Polymer Prestressed Concrete Beams." *PCI Journal* 67 (5): 22–38.
2. Myers, J. J., and T. Viswanath. 2006. "A Worldwide Survey of Environmental Reduction Factors for Fiber Reinforced Polymers (FRP)." In *Structures Congress 2006: Structural Engineering and Public Safety Proceedings, May 18–21, 2006, St. Louis, MO*. Reston, VA: American Society of Civil Engineers.

Authors' response

The authors would like to thank Andrew M. Zickler for taking the time to read the paper[1] and point out the discrepancy. The authors agree with the comment that when read with the first sentence it implies that the Interstate 64 South Side High Rise Bridge and the Laskin Road Bridge are examples of the progress of carbon-fiber-reinforced polymer (CFRP) prestressed beam implementations. The authors should have written, "Examples of CFRP prestressing implementations include ...".

The authors would also like to thank Zickler for pointing out that there is already a completed bridge with CFRP prestressed beams—the Aaron's Creek Bridge—and there is an ongoing bridge tunnel expansion project. The authors would like to express their gratitude to Zickler and the entire Virginia Department of Transportation Structure and Bridge Division for their efforts in advancing this novel material in various bridge components.

With regards to the paper, the authors make the following clarification: "Completed examples of CFRP prestressed concrete beam implementations in the United States include the Pembroke Avenue Bridge and Plum Creek Bridge in Michigan as well as the Aaron's Creek Bridge (completed) and the Hampton Roads Bridge Tunnel Expansion (ongoing) in Virginia. Examples of CFRP prestressed pile implementations include the Interstate 64 South Side High Rise and the Laskin Road Bridges in Virginia."

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References

1. Poudel, Prakash, Abdeldjelil Belarbi, Bora Gencturk, and Mina Dawood. 2022. "Flexural Behavior of Full-Scale, Carbon-Fiber-Reinforced Polymer Prestressed Concrete Beams." *PCI Journal* 67 (5): 22–38.

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