Repair of Buildings & Bridges with Composites (RB2C)

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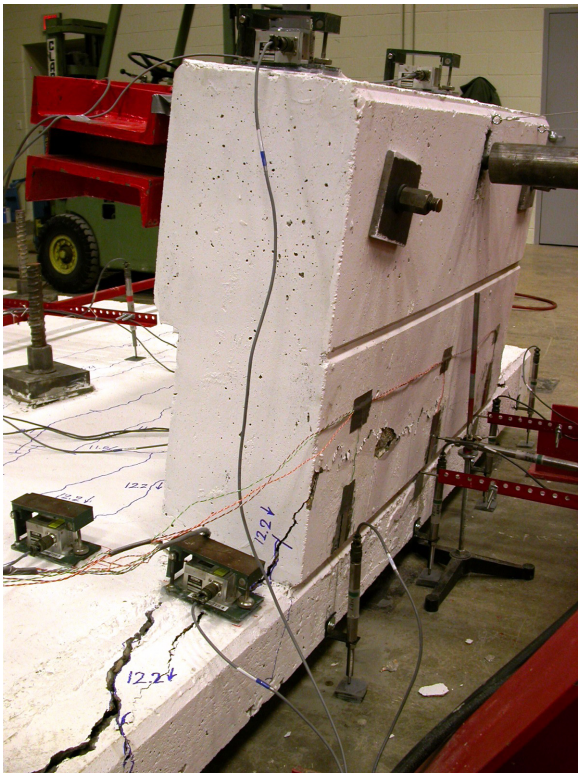
Design Guide for Reinforcing Bridge Decks and Railings with Longer Service Capability

Corrosion is one of the main causes of infrastructure decay. Billions of taxpayer dollars have been and will be invested to minimally maintain crumbling infrastructure. Imagine, bridge decks could last 75 to 100 years in service rather than the current 25 to 40 years. Researchers at the Center for Repair of Buildings & Bridges with Composites are enabling a whole new industry to fill the need for potentially high volumes of fiber-reinforced polymer (FRP) rebar.

Drafting and successful interface with American Association of State Highway and Transportation Officials committee, T-6 will ENABLE the use of FRP reinforcing bars in bridge decks in the USA. This recently adopted design guide is the culmination of many years of research. This work means that previously funded NSF research in the field of fiber-reinforced polymers can now be used to make the Nation's infrastructure more durable and longer lasting.

The document will allow fiber-reinforced polymer producers, as well as state and federal departments of transportation to safely incorporate well researched design, testing and implementation criteria to new materials for new construction and renovations. Before these guidelines had been published and adopted, there was little or no incentive for state Department of Transportation (DOT) engineers to consider as fiber-reinforced polymers. For more information, contact Fabio Mattaat the University of Miami, 305.284.5429, fmatta@miami.edu.

Bridge Rehabilitation



Synergism through the RB^{2}C center has resulted in the adoption of fiber-reinforced polymer (FRP) internal reinforcing for concrete structures. Much existing infrastructure is falling to disrepair due to simple corrosion of the reinforcing steel embedded in concrete. Each year the effects of corrosion on essential infrastructure divert billions of dollars of public funds to renewal of bridges and other structures. A number of efforts are being taken to mitigate this problem but most are superficial compared to getting at the root of the problem and utilizing a non-metallic reinforcing material that will not corrode. Lightweight, high strength materials have been demonstrated to be useful in restoring structural capacities to existing buildings and bridges extending their useful life. The adoption of FRP materials for the repair and new construction will benefit everyone by making our infrastructure last significantly longer freeing public resources for other pursuits. NSF funding has facilitated basic research in the area of FRP reinforcement and repair and has resulted in codification for use in the civil infrastructure and demonstration projects that can be leveraged for broader use enabling participating industry partners to be involved in the early stage development of a growing industry aimed at producing FRP rebar and repair materials. It should be noted that the civil engineering community is becoming more aware of the existence of such materials and that building design and construction codes are now being updated to facilitate their use. Documentation is being developed on how bridges should be selected for various FRP-strengthening procedures along with associated cost estimates of competing scheme, and predicted life expectancies of strengthened bridges. For more information, contact Dr. Antonio Nanni at the University of Miami-Florida, 305.248.3461, nanni@miami.edu.

Preformed Fiberglass Grating Panel Systems (GRIDFORM)

GRIDFORM consists of fiberglass grating panel systems with fiber-reinforced polymer (FRP) plate for stay in place use. These FRP grating panels replace steel rebar in reinforced concrete bridge decks on vehicular bridges. The grating panels are shop fabricated and shipped to the job site ready for installation on the steel bridge girders and the concrete pour. Field installation time for the GRIDFORM panels including the concrete pouring is approximately 25% of normal steel rebar installation and concrete pour. This reduced installation time results in lower field installation costs and less disruption of service for people needing access to the bridge for travel. Additionally, reduced field installation time translates into a lower rate of construction workplace injuries. GRIDFORM grating panels have become recognized as a viable alternative to traditional steel reinforced concrete bridge decks. The use of GRIDFORM panels meets the Federal Highway Administration's initiative of "Get In and Get Out." The emphasis by FHWA is to reduce the amount of construction time and the concurrent disruption to the traveling public by utilizing new technologies and methods for rapid construction of bridges and roads. The new technology will result in producing the FRP grating panels at the manufacturing site of the FRP grating. This new breakthrough technology has resulted in a new product line for the Strongwell plant located in Chatfield, Minnesota. Strongwell is promoting this new product line to county and state transportation officials as a time saving alternative to traditional construction materials. For more information, contact Dr. Antonio Nanni at the University of Miami-Florida, 305.248.3461, nanni@miami.edu.