

Funding revolutionary ideas in transportation

Change can come in small increments or quantum leaps. TRB's IDEA programs—Innovations Deserving Exploratory Analysis—supported a major leap toward a new kind of bridge beam.

The IDEA programs fund research into promising but unproven innovations in transportation. To complement more traditional incremental research efforts, the IDEA programs help jumpstart high risk but potentially game-changing concepts in transportation. The programs have a standing invitation to inventors, entrepreneurs, and visionaries: Show us the next big thing.

A bold new idea in bridge design

The NCHRP IDEA and High-Speed Rail IDEA programs recognized the possibilities in a revolutionary bridge beam design. The concept was unique: Start with a fiber-reinforced plastic shell. Inside, marry a concrete arch for compressive strength with steel fibers for tensile strength.

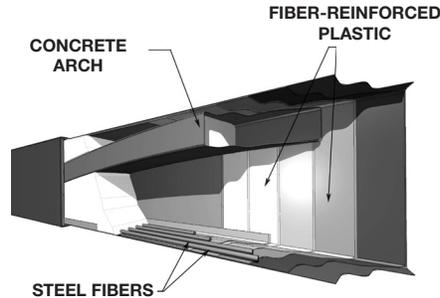
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“The only problem is that bridge innovation involves such high risk,” says the beam’s inventor and 2010 *Engineering News-Record* Award of Excellence winner, John Hillman. “You’re not allowed a single failure once structures go up. So the barriers to developing and implementing new bridge technologies are formidable.”

The IDEA programs understood the importance of taking a chance on true innovation. “This beam would never have made it off the drawing board without the IDEA programs’ support,” Hillman says. “I strongly encourage the engineering profession to support the model of the IDEA programs.”

From concept to practice

Riding on momentum provided by IDEA-funded research, the life of the hybrid-composite bridge beam continued with further



The key components of the hybrid-composite beam

development and commercialization beyond the IDEA programs. Today it’s off the ground and integrated into structures across North America. One is a 32-foot bridge that opened in Cedar Grove, N.J., in 2009. Says Richard Dunne, executive manager of structural engineering at New Jersey DOT, “We’re always looking to find new and innovative ways of doing things. Using this new hybrid-composite beam aligns with our agency’s philosophy of innovation.”

Another recent implementation is a 57-foot bridge in Lockport Township, Ill. “We completely replaced the existing bridge, finishing three months early by using the hybrid-composite beam,” says Jack Waxweiler, the township’s highway commissioner. “The beams all arrived on one truck and were set in a single day.” The impossible was turned into practice thanks to the IDEA programs.

A ripple effect

The impact of the IDEA programs’ investment grows with every new project, and the next one is a big one. The hybrid-composite beam is being used

in a 540-foot eight-span bridge in Boothbay, Maine. Maine DOT project manager Nate Benoit says, “We did a great deal of testing at the University of Maine and validated the performance of this technology.”

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The hybrid-composite beam is also finding applications beyond highways. It has been successfully tested in a 30-foot railway bridge in Colorado. And a new shipping berth at a Canadian port will be incorporating the beam as well. Like so many other seeds of innovation that the IDEA programs helped turn into real improvements in transportation (see pages 13-15 of www.transportation.org/sites/scoh/docs/BD-08-31_Report_to_AASHTO_BOD.pdf), the hybrid-composite beam is proving to be another winning idea courtesy of the IDEA programs.

Research results are detailed in the report *Product Application of a Hybrid-Composite Beam System* (onlinepubs.trb.org/onlinepubs/archive/studies/idea/finalreports/highspeedrail/hsr-43final_report.pdf).



A New Jersey bridge takes shape with the hybrid-composite beam

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