

New Design Approach Saves Time, Money for Short-Span Steel Bridges

Shallow steel press-brake tub girder is about a third the cost of concrete

By Mike Engestrom, Chairman of the Short Span Steel Bridge Alliance, Technical Marketing Director for Nucor-Yamato Steel

More than half of America's bridges are classified as city/county/township bridges—typically short spans. Of those, one-fourth are deemed structurally deficient or functionally obsolete. (www.infrastructurereportcard.org/a/#p/bridges/overview)

A team of researchers is testing a steel option for new and replacement bridges that could be constructed faster than concrete options. Judging from one trial in Iowa, the work could also cut about one-third of the cost in comparison to concrete.

The effort stems from a challenge to the Short Span Steel Bridge Alliance (SSSBA) from the Federal Highway Administration, which hoped for an innovative approach to building bridges that are 140 ft or less in length. The goal is to develop steel-bridge concepts with modular/pre-fabricated components that are economical and that help accelerate construction.

For several years, a team of industry leaders has been studying the issue. The researchers consist of members of the SSSBA, including West Virginia University's Dr. Karl Barth, the school's Jack H. Samples Distinguished Professor and a nationally recognized expert in the field of steel-bridge analysis, design and rating. Also involved is Dr. Michael Barker of the University of Wyoming, who specializes in steel bridges and bridge engineering.

Last year, the research team launched a unique web-based design tool called eSPAN140, which houses standard designs and details for short-span steel bridges and buried soil structures. As a result, steel producers, fabricators, engineers, designers and owners can quickly find information to design a bridge with rolled beam, plate girders, corrugated steel pipe or structural-plate options.

Their latest effort involves accelerated bridge construction (ABC). This involves a shallow steel press-brake tub girder technology, which can consist of modular shallow trapezoidal boxes—either galvanized or weathering steel—and fabricated from cold-bent structural steel plate. The deck is precast on the girder and trucks haul the modular units to the bridge site.

Potential benefits include reducing fabricated costs and avoiding additional details, such as stiffeners and cost frames. It can be used for both tangent and skewed configurations on simple or continuous spans.

Testing is funded by the Steel Market Development Institute (SMDI) and steel has been donated by several companies, including Nucor Steel, EVRAZ North America and SSAB Americas. While testing continues, fabricators are already developing plans within the SSSBA to fabricate and market the bridge system on a national scale. The Amish Sawmill Bridge in Buchanan County, Iowa, has been awarded a grant from the federal Innovative Bridge Research

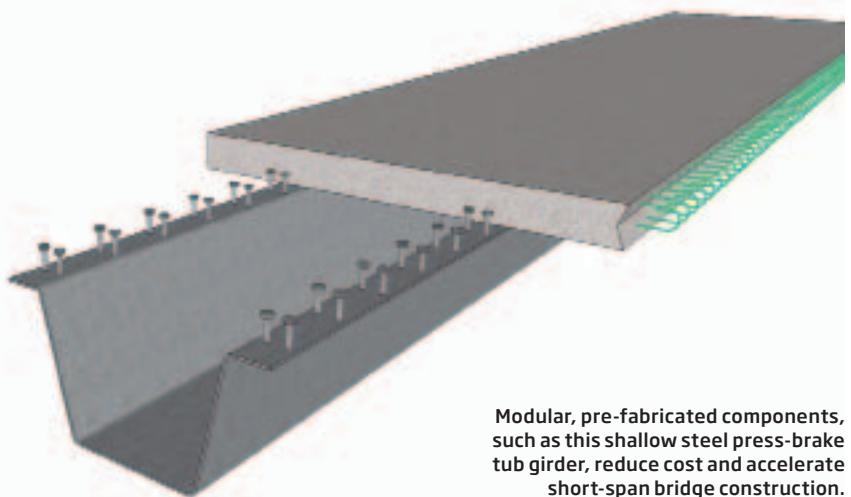
and Deployment Program to install this bridge system.

The work calls for four 52-ft-long press-brake tub girders, plus delivery and galvanizing, according to county engineer Brian Keierleber. The total estimated cost of the materials is less than \$47,000. Add labor, equipment and construction of the deck and the total cost should be about \$107,000. Keierleber said a standard cast-in-place system would cost about \$156,000.

"I am always looking for a more economical way to build a bridge," Keierleber says. "Necessity is the mother of invention."

Keierleber cites necessity because Buchanan County has a total of 257 bridges, some of which were built before General Custer fought in the Battle of the Little Bighorn. The first cars over the bridges were Ford Model Ts. Now they're used by grain carts with 2,000 bushels.

With about 70 bridge upgrades needed, Keierleber is already doing the math to determine how much time and money he can save by using steel solutions. ■



Modular, pre-fabricated components, such as this shallow steel press-brake tub girder, reduce cost and accelerate short-span bridge construction.

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