

High-performance steel used in new bridge

The Illinois Department of Transportation (IDOT) today announced the completion of a new bridge in Lake Villa, Lake County, Ill., constructed with a groundbreaking type of high-performance steel developed by engineering researchers at Northwestern University.

About 500 tons of the copper alloy steel, known as ASTM A710 Grade B high-performance structural steel, was used in constructing the 430-foot span that carries IL Rt. 83 over the Canadian National Railroad tracks. While some landscaping work remains, the bridge opened in its normal traffic pattern today.

"IDOT is excited about the possibilities presented by this new type of cost-efficient, high-performance steel developed right here in Illinois," said IDOT Secretary Timothy W. Martin. "Not only is this steel strong, tough and easy to fabricate, but it withstands the elements better than typical steel, meaning it doesn't have to be painted. This makes construction easier and will significantly reduce long-term maintenance costs."

IDOT is in the process of applying to the American Society for Testing and Materials (ASTM) and the American Association of State Highway and Transportation Officials (AASHTO) to have this steel designated as standard for bridge construction.

The only previous use was in the rehabilitation of the Poplar St. Bridge over the Mississippi River in the Metro East area.

The steel has a strength of 70,000 pounds per square inch (psi) compared with 50,000 psi in commonly used structural steel. It is also easy to weld, and tests have shown it has high-impact toughness at low temperatures. In addition, the high copper content gives the alloy much better resistance to atmospheric corrosion than other high-performance steels.

"We developed this steel nine years ago and application has been a long time in coming," said Morris E. Fine, professor emeritus of materials science and engineering at Northwestern University, who developed the new alloy with his colleague Research Professor Semyon Vaynman and with key support from Northwestern's Infrastructure Technology Institute. "This steel is cost-effective because its processing is cheaper than competing structural steels of the same strength, its weathering resistance is best, and it's easier to weld."

"We are delighted to see our steel used in this new bridge and hope that the steel will be used in other bridges in Illinois as well as in other states," said Vaynman, research professor of materials science and engineering at Northwestern.

"For more than a half-century, Professor Fine has been one of the seminal leaders in materials science engineering worldwide," said David Schulz, director of the Infrastructure Technology Institute at Northwestern. "The Infrastructure Technology Institute is pleased and proud to have supported his team's development of the high-strength steel employed in the Route 83 bridge. We look forward to continuing to help him 'push the envelope' of ever-stronger and more economical steels."

Source: Northwestern University

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