



# GALVANIZING ELIMINATES REPAINTING ON BRIDGES

A turn-key operation specializes in designing, fabricating and erecting galvanized truss bridges

By Michael E. Trunko

**W**HEN U.S. BRIDGE, A DIVISION OF AISC-MEMBER OHIO BRIDGE CORPORATION, began fabricating steel truss bridges in 1949, they relied primarily on lead-based paint for corrosion protection. Today, however, more than 60% of their projects are protected through galvanizing the steel members.

The company, which has fabricated more than 1,000 bridges, offers a complete turn-key package, including design, fabrication and erection. U.S. Bridge has been galvanizing bridge beams for a number of years, but only began offering fully galvanized truss bridges in 1993.

The reason for the company's move to galvanizing is simple: EPA requirements make it very difficult, and often expensive, to repaint truss bridges. In addition, money for maintenance has been declining. As a result, concrete was gaining market share as a seemingly low-maintenance alternative.

Prior to turning to galvanizing, U.S. Bridge considered a variety of improved paint systems. However, while paint systems have improved substantial-

ly in the recent past, none can yet match the 35-year warranty that the company can offer with a galvanized system.

The company uses hot dip galvanizing, where a zinc coating is applied by immersing the fabricated steel in a bath consisting primarily of molten zinc. Fabricated items are immersed in the bath long enough to reach the required temperature and then are slowly withdrawn. Excess zinc is removed by draining, vibrating and/or centrifuging.

Until recently, trusses could not be galvanized because the kettles were too short and shallow. Columbus Galvanizing, a division of Voight & Schweitzer, Inc., a Columbus, OH, based galvanizer, solved this problem recently by investing in longer and deeper kettles to accommodate larger steel members. And if a piece is still too tall for the kettle, it can be double-dipped. The maximum truss span that can be accommodated is 150'.

However, before the bridge structures could be galvanized, U.S. Bridge had to do some redesigning of their trusses. Cold steel dipped into an 850 degree F thermal molten steel bath creates stress that must be accommodated in the design process. For example, the fabricator changed the design of their bridges' gusset plates to eliminate pockets. Typically, there is a pocket behind each gusset plate. But if the pocket contains any kind of moisture, it will generate highly pressurized steam and blow the joint apart.

### **GALVANIZING**

Galvanizing provides thorough coverage throughout the entire truss. Each section of the bridge is completely fabricated before galvanizing to ensure that all surfaces, including welds, are covered by a zinc coating that averages at least 5 to 7 mils—a level of protection that exceeds the minimum ASTM specification of 3.9 mils.

Unlike other surface coatings,



such as paint, during galvanizing the protective zinc actually bonds to the surface of the steel to form a hard barrier. This ensures a long-lasting, maintenance-free surface because the corrosion of galvanized material is an electrolytic process in which the zinc corrodes sacrificially to protect the steel.

Everything is galvanized on the bridge. When assembling sections in the field, galvanized bolts are used to join the trusses together. When welding is necessary, special welding techniques for galvanized material are used so that a minimal amount of zinc is burned away. And any that is burned away is touched-up with zinc paint.

*The galvanizing process ensures an attractive, long-lasting, maintenance-free surface. Shown on the opposite page is a bridge in Jackson County, OH. Pictured at top is a bridge in Median County, OH and pictured above is a bridge being erected in Ohio.*





*Pictured is a truss member as it is dipped in a galvanizing bath.*



*Pictured is a bridge in Ross County, OH.*

In a rural atmosphere away from the sulfuric and the other corrosive fumes more common in urban or industrial areas, the expected service life exceeds 80 years (the expected service life is defined as the life until 5% of the surface is showing red iron rust). Due to this exceptionally high level of protection, U.S. Bridge has worked out with Columbus Galvanizing a 35-year rust-free warranty—an industry first.

#### **PERMANENT VALUE**

The U.S. Bridge truss design is based on the popular Warren truss patented by James Warren in 1948. U.S. Bridge modified the original design by adding vertical members for extra rigidity, especially during erection. And to improve aesthetics, the company made the top cord polygonal rather than the horizontal topcord on a standard Warren truss. Finally, the company welds all the gusset plates that connect the truss members.

The galvanized bridges cost about 10% more than weathering steel bridges, which are similarly maintenance-free. However, some owners object to the appearance of weathering steel and prefer the appearance of a galvanized structure.

*Michael E. Trunko is a full-time, freelance journalist specializing in business profiles and case studies. Since 1983, he has written more than 450 such features. He can be reached at 330/865-0088.*