

Next-Gen Steel Bridge Design Approaches

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An overview of resources for specifying and designing hot-dip galvanized steel bridges.

Jeff Cunningham, Marketing Communications Manager

American Galvanizers Association

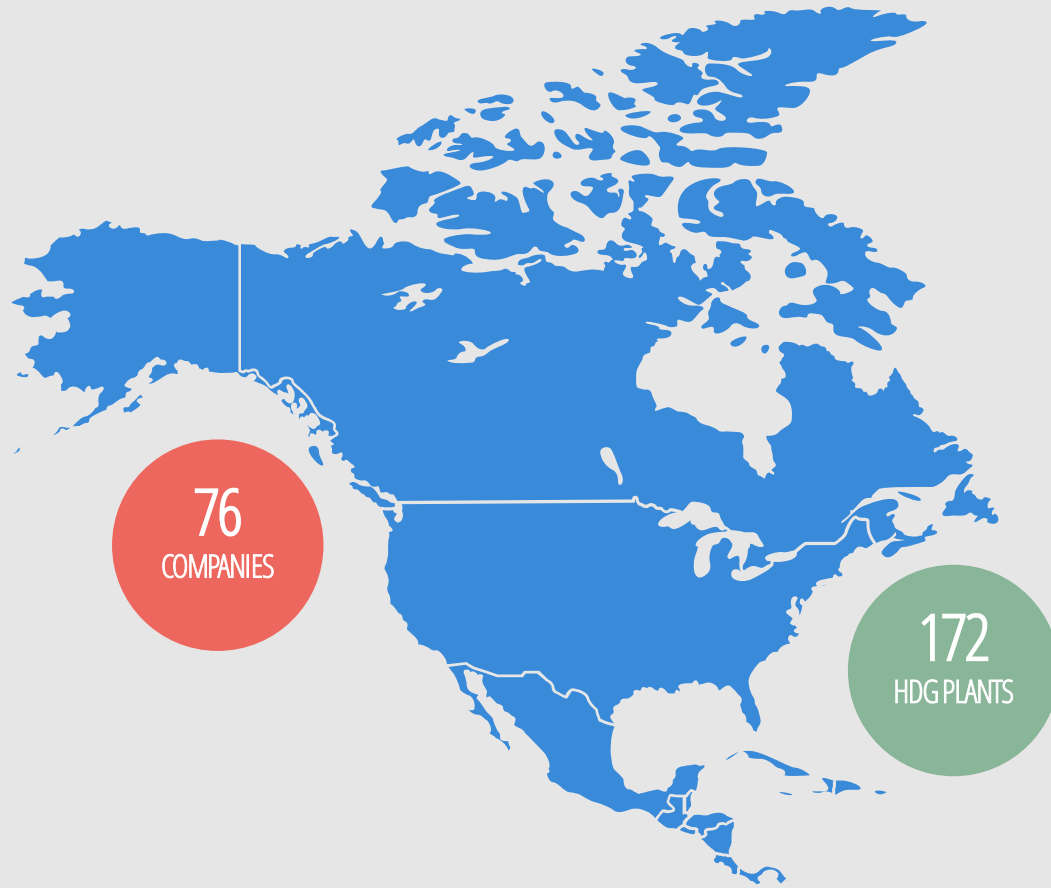
galvanizeit.org

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About the American Galvanizers Association (AGA)

Non-profit trade organization established in 1933



Technical

The AGA provides technical support on the performance, design, inspection and specification of HDG steel

Marketing

The AGA provides its members with sales & marketing support and serves as the unified voice of the industry

Specifiers

The AGA is a free resource to North American specifiers and provides guidance on specifying HDG steel

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AGA TOOLS & RESOURCES

ESSENTIAL RESOURCES FOR SPECIFYING HOT-DIP GALVANIZED STEEL

OGDENSBURG-PRESCOTT BRIDGE REHAB

Ogdensburg, NY | 2021

442 tons – Main span bridge
decking, structural steel floor
beams and stingers



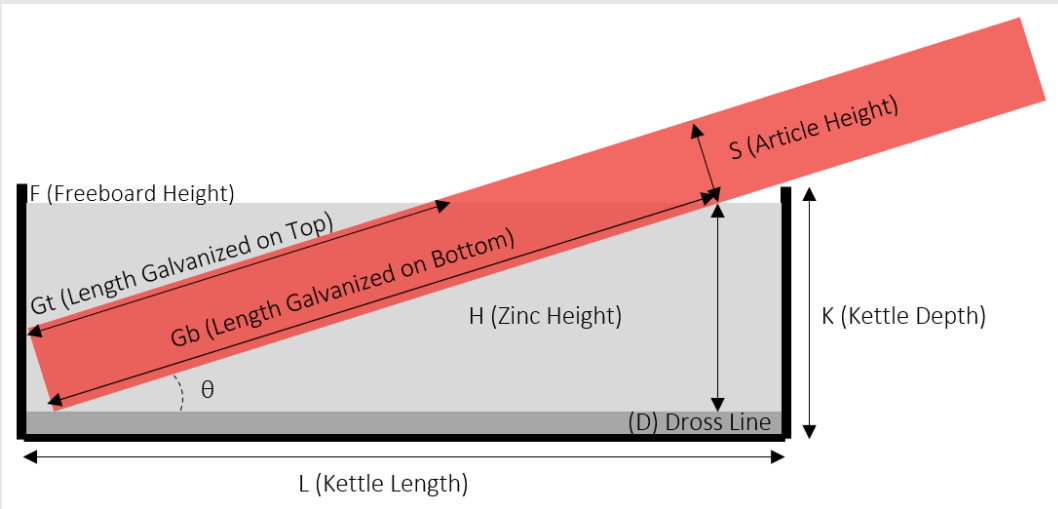
Progressive Dipping

→ Depends on:

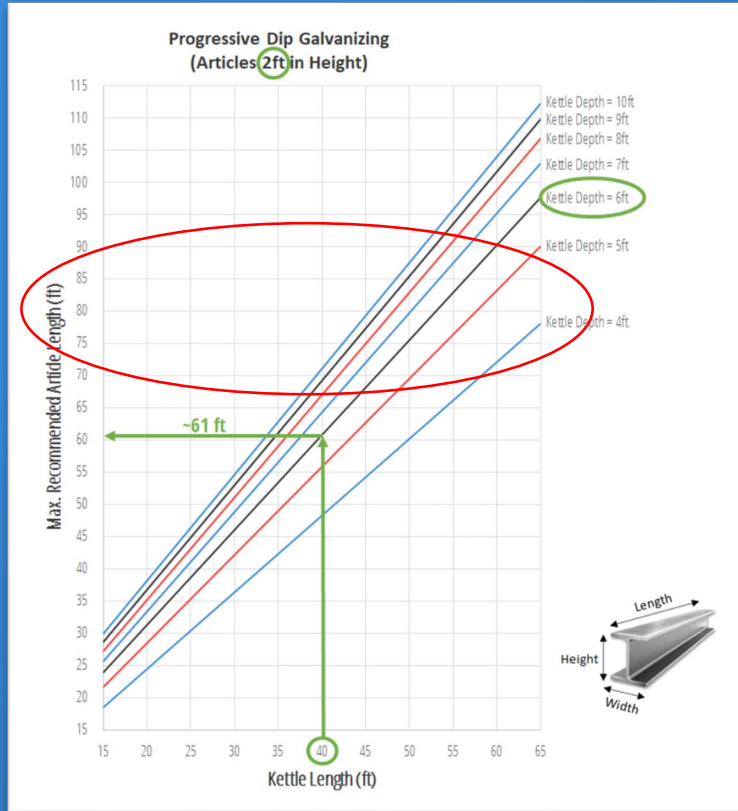
- Kettle dimensions
- Part dimensions
- Material handling capabilities (layout, cranes)

→ Managing Expectations:

- Overlap line appearance and roughness
- Uneven heating
- Increased susceptibility to warpage



AGA Resources for Progressive Dipping



Progressive Dip Charts

Search Results:

Address/Zip State/Province Company Name

Search Locations by Address/Zip

77584 100 miles SEARCH

This listing only shows the dimensions of the galvanizer's kettle (bath), and does not indicate the maximum material size that can be galvanized. Please contact the galvanizer for more information on capacity limits.

Galvanizers:

Filter by: Length ☐ 0-24 ☐ 25-34 ☐ 35-44 ☐ 45-54 ☒ 55+
Width ☐ 0-4 ☐ 5-7 ☐ 8+
Depth ☐ 0-5 ☐ 6-7 ☐ 8-9 ☐ 10+

Valmont Coatings - United Galvanizing
6123 Cunningham Rd Phone: (713) 466-4161 Kettle(s) (L x W x D):
Houston, TX 77041 Website 61' x 7'3" x 7'3"
United States 42' x 5' x 6'
View Portfolio

AZZ Galvanizing - Houston West
9103 fairbanks, N. Houston Phone: (832) 467-3772 Kettle(s) (L x W x D):
Houston, TX 77064 Website 62' x 8' x 10'

Galvanizer Locator
(sort by Kettle Size)
galvanizeit.org

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AGA American Galvanizers Association
Protecting Steel for a Sustainable Future

Progressive Dip Calculator

USER INPUTS

Enter Kettle Dimensions:

K (Kettle Depth)	72 inches
L (Kettle Length)	600 inches
W (Kettle Width)	60 inches

Enter Article Dimensions:

(S) Height	34 inches
Length	780 inches
Width	16 inches

Enter Properties of Zinc Height:

Dross Line Height	8 inches
Freeboard Height	4 inches

If unknown: use dross height = 8 in. and freeboard = 4 in.

Allowable Angles in the Bath:

θ minimum	6.1 °
θ maximum	6.3 °

Can This Article be Fully Galvanized? YES ✓

Article Orientation: I

Dip Method: Progressive Dip

F (Freeboard Height)
Gt (Length Galvanized on Top) = 245in
Gb (Length Galvanized on Bottom) = 562in
H (Zinc Height) = 60in
K (Kettle Depth) = 72in
D (Dross Line)
L (Kettle Length) = 600in
S (Article Height) = 34in
θ = 6.1°
Gt + Gb (Max. Progressive Dip Length) = 807.1in

Progressive Dip Calculator

Jesup Bridge

Jesup, IA | Installed in 2013 – Galvanized beams, diaphragms, W-beam rail, bolts and rebar.



Winter 2013

→ Initially, the progressive dip lines had a dark appearance and rough texture compared to the surrounding coating appearance, but after 10 years of weathering, the progressive dip line softened greatly as the zinc patina developed and provided a matte-gray color.



Spring 2024

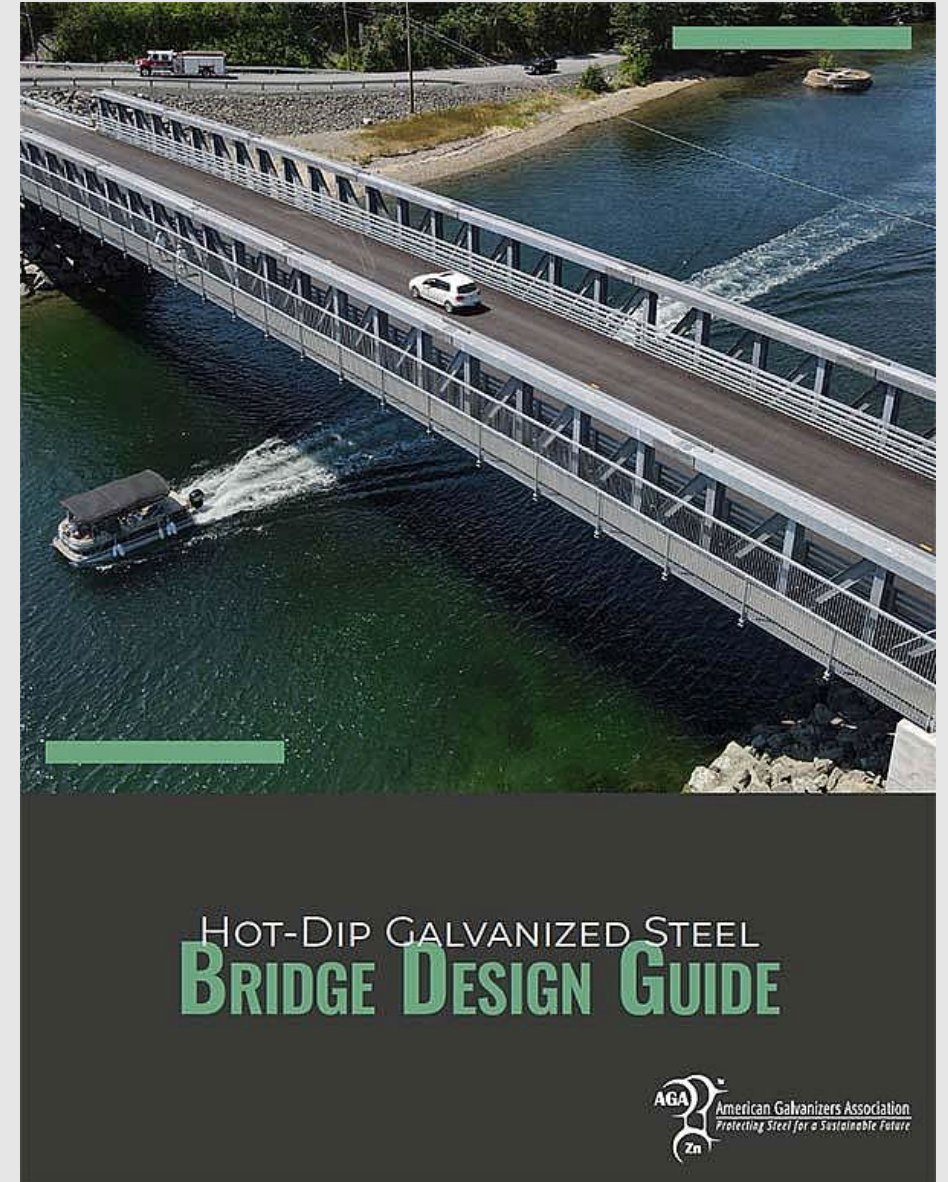
Options for Long Spans

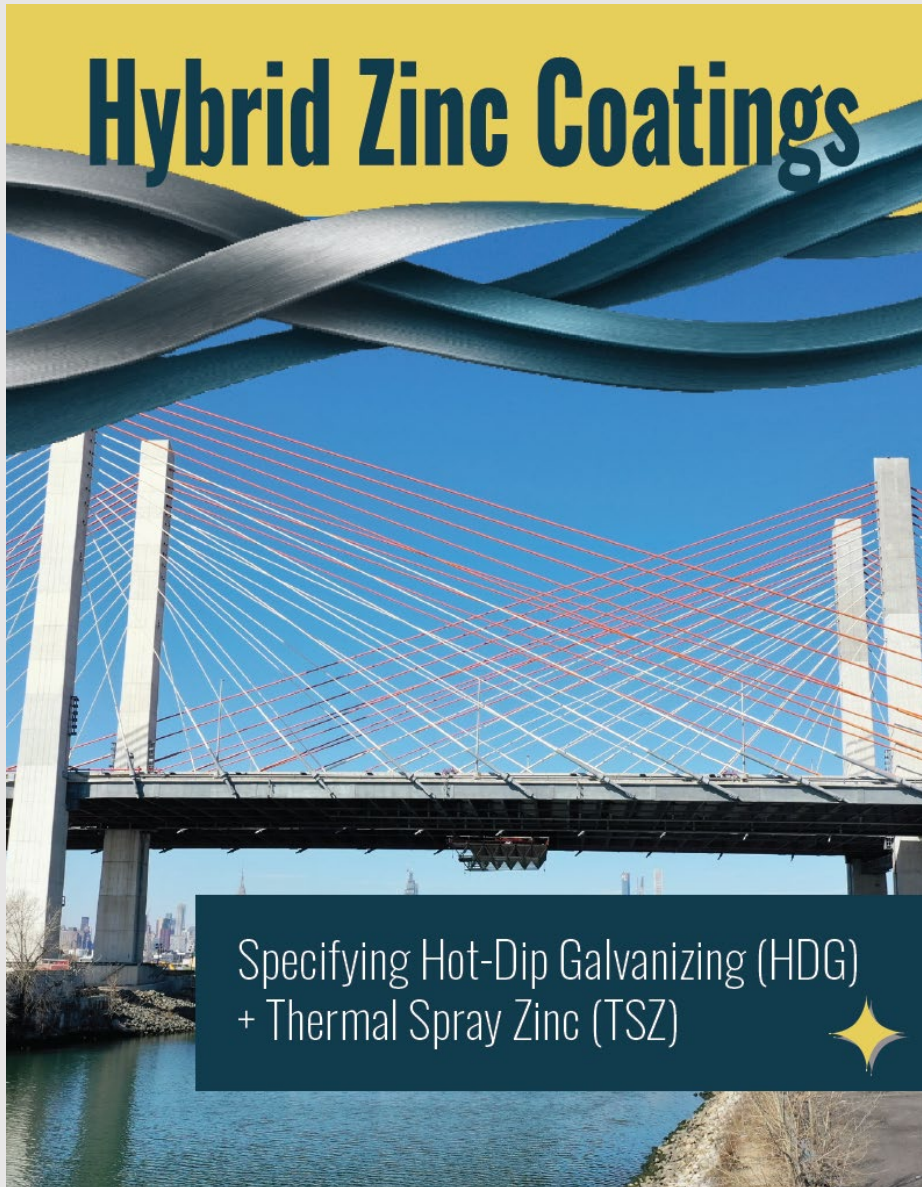
- Hybrid zinc coating systems (HDG + TSZ metallizing) for mixed-size projects
 - TSZ for large, accessible steel articles / HDG for steel articles that fit in kettle
 - Maximize cost efficiency
 - Leverage superior protection of zinc coatings
- Galvanize smaller components (cross frames, splice plates, etc.)



Hot-Dip Galvanized Steel Bridge Design Guide

- A comprehensive guide covering best practices, design considerations, performance expectations, and maintenance strategies for galvanized steel bridges.
- Intended for engineers, owners, fabricators, and detailers, it serves as a trusted, go-to resource for hot-dip galvanized (HDG) bridge applications.





Hybrid Zinc Coatings Guide

- Introduces the Hybrid Zinc Coatings guide, helping specifiers effectively combine HDG and thermal-spray zinc (TSZ) on bridge projects.
- Establishes the first formal framework for using HDG and TSZ together, outlining key benefits and best practices.
- Includes real-world case studies demonstrating successful hybrid coating applications.





FIXING ACCESS TO RURAL MISSOURI (FARM) BRIDGE PROGRAM

Missouri | 2023





USACE FORT WINGATE BRIDGE REPLACEMENT

Gallup, NM | 2022

52 tons – Press-brake-formed steel
tub girder: 8 beams weighing
12,600 lbs. each





STEARNS BAYOU BRIDGE

Ottawa County, MI | 1966

250 tons – Rail panels, and tube rail





QUESTIONS?

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