

# AGA TOOLS & RESOURCES

ESSENTIAL RESOURCES FOR SPECIFYING HOT-DIP GALVANIZED STEEL

## OGDENSBURG-PRESCOTT BRIDGE REHAB

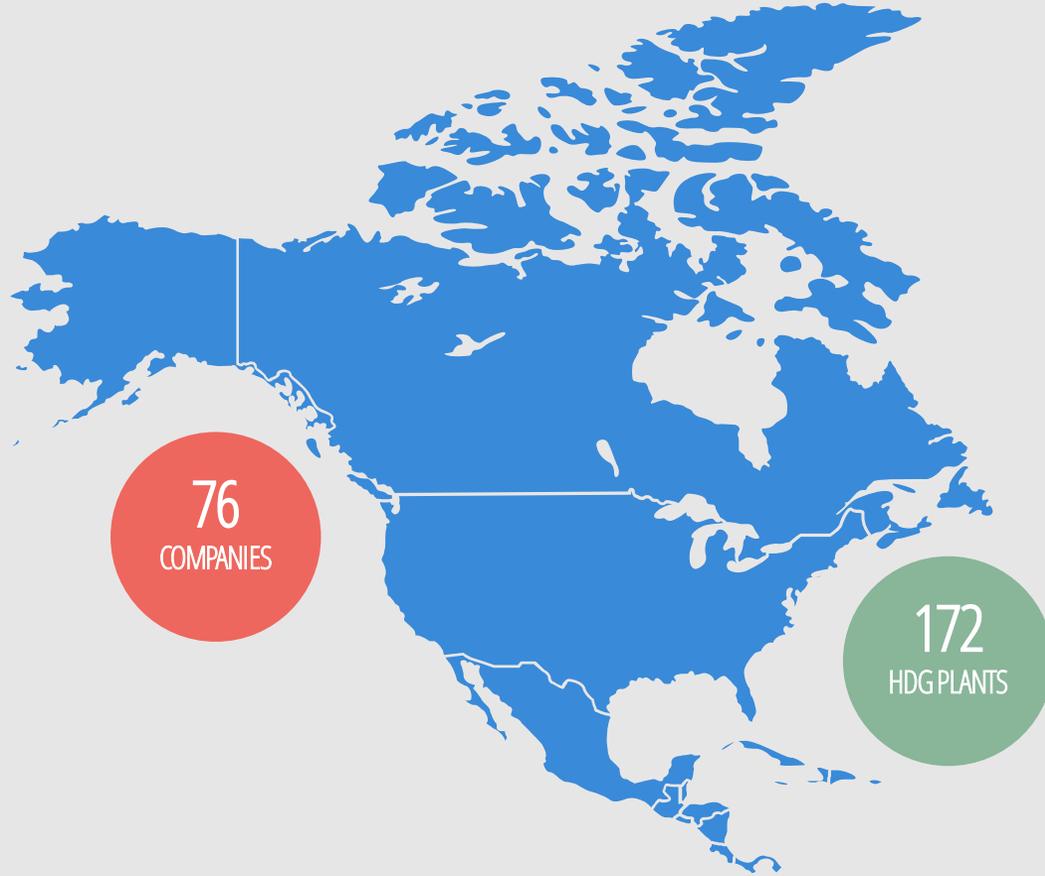
Ogdensburg, NY | 2021

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



# 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

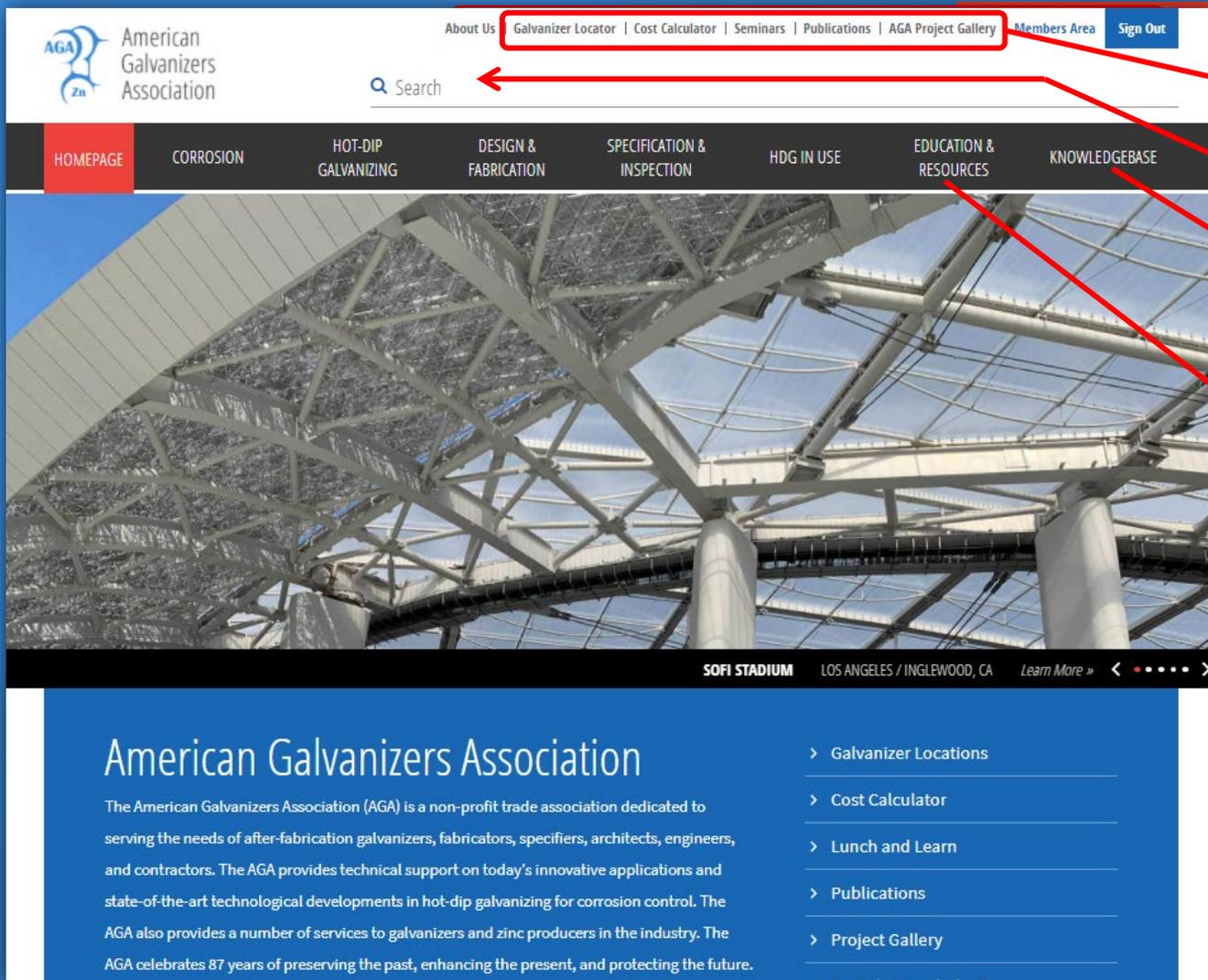
## Specifiers

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

[galvanizeit.org](http://galvanizeit.org)

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# Website - Galvanizeit.org



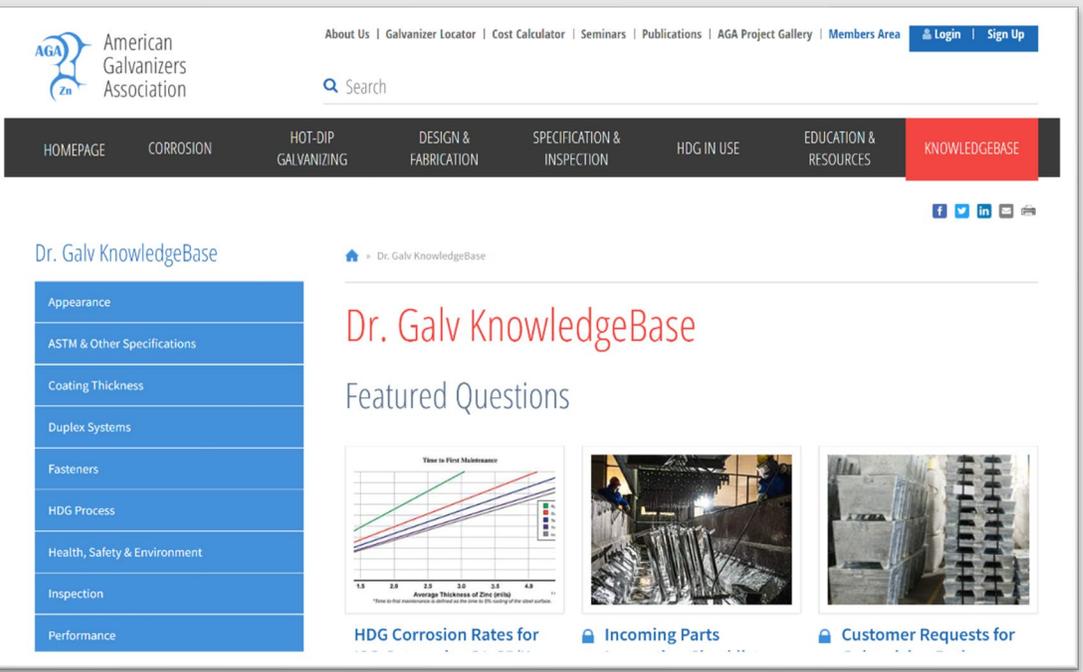
Tools & AGA Resources

Robust Search Function

Knowledgebase

Education & Resources

# Dr. Galv™ Knowledgebase



- More than 400 short form Q&A articles
  - Organized by category
  - Visible using search function
  - Some are member protected
    - HDG Process
    - Environmental Health & Safety
- Designed to answer specific FAQs about anything galvanizing
- Technical expertise tailored to galvanizers





# Knowledgebase Design & Fabrication



**Design & Fabrication**

- Design Considerations
- Architecturally Exposed Structural Steel (AESS)
- Bend Diameters
- Cold Worked Steels
- Dissimilar Steel Chemistries
- Dissimilar Metal Corrosion with Zinc
- Distortion & Warping
- Bolts, Nails & Fasteners
- Part Identification
- Masking
- Material Handling
- Moving Parts
- Overlapped Surfaces
- Steel Residues
- Steel Selection
- Steel Size Limits
- Steel Surfaces

## Design Considerations

Corrosion protection begins at the drawing board, and regardless of what protection system is specified, it must be factored into the products design. Similarly, all [corrosion protection systems](#) require certain design details and proper planning to ensure the highest quality coating. For hot-dip galvanizing, a total immersion process in molten zinc, the design engineer will want to ensure all pieces are fabricated suitably for the process. Most design principles necessary for success throughout the galvanizing process are easily and readily followed, and in most cases, ensure maximum corrosion protection. Incorporating these design practices along with those listed in [ASTM A308 Practice for Providing High Quality Zinc Coatings \(Hot-Dip\)](#), will not only produce optimum quality galvanized coatings, but also help reduce costs, improve turnaround times, and ensure the safety of galvanizing personnel.

Select a topic from the alphabetical list below to view detailed information on each subject:

- Architecturally Exposed Structural Steel (AESS)
- Bend Diameters
- Cold Worked Steels
- Dissimilar Steel Chemistries
- Dissimilar Metals in Contact
- Distortion & Warping
- Fasteners, Bolts, & Nails
- Hole Sizes

# Design Considerations



**Design Guide**

The Design of Products to be Hot-Dip Galvanized After Fabrication

# Design Guide



## FABRICATION & DESIGN DETAILS FOR GALVANIZING

American Galvanizers Association • galvanizeit.org • 720.554.0900

The poster contains numerous technical diagrams and text boxes detailing fabrication and design requirements for galvanizing, including sections on 'CONNECTIONS TO STEEL', 'TEMPERATURE', 'LIMIT PROTECTION METHODS', 'FASTENERS', 'WELDING', 'HOLE SIZES', and 'CORROSION'. It also includes a 'CONCLUSION' section.

# Design Poster

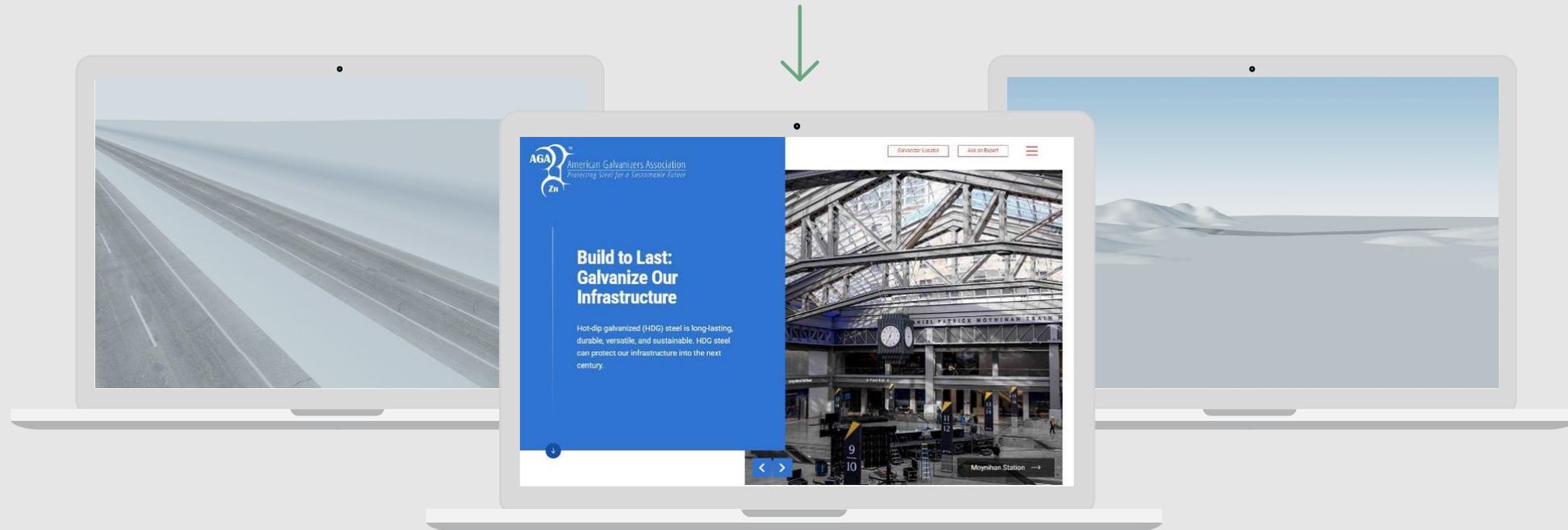


# HDG Markets & Products Website

<https://markets.galvanizeit.org>

- Website Highlighting HDG Projects & Technical Info
- Organized by Market/Product Type & State/Provinces
- Animations Highlight the Various Uses of HDG Steel

 Visit Website

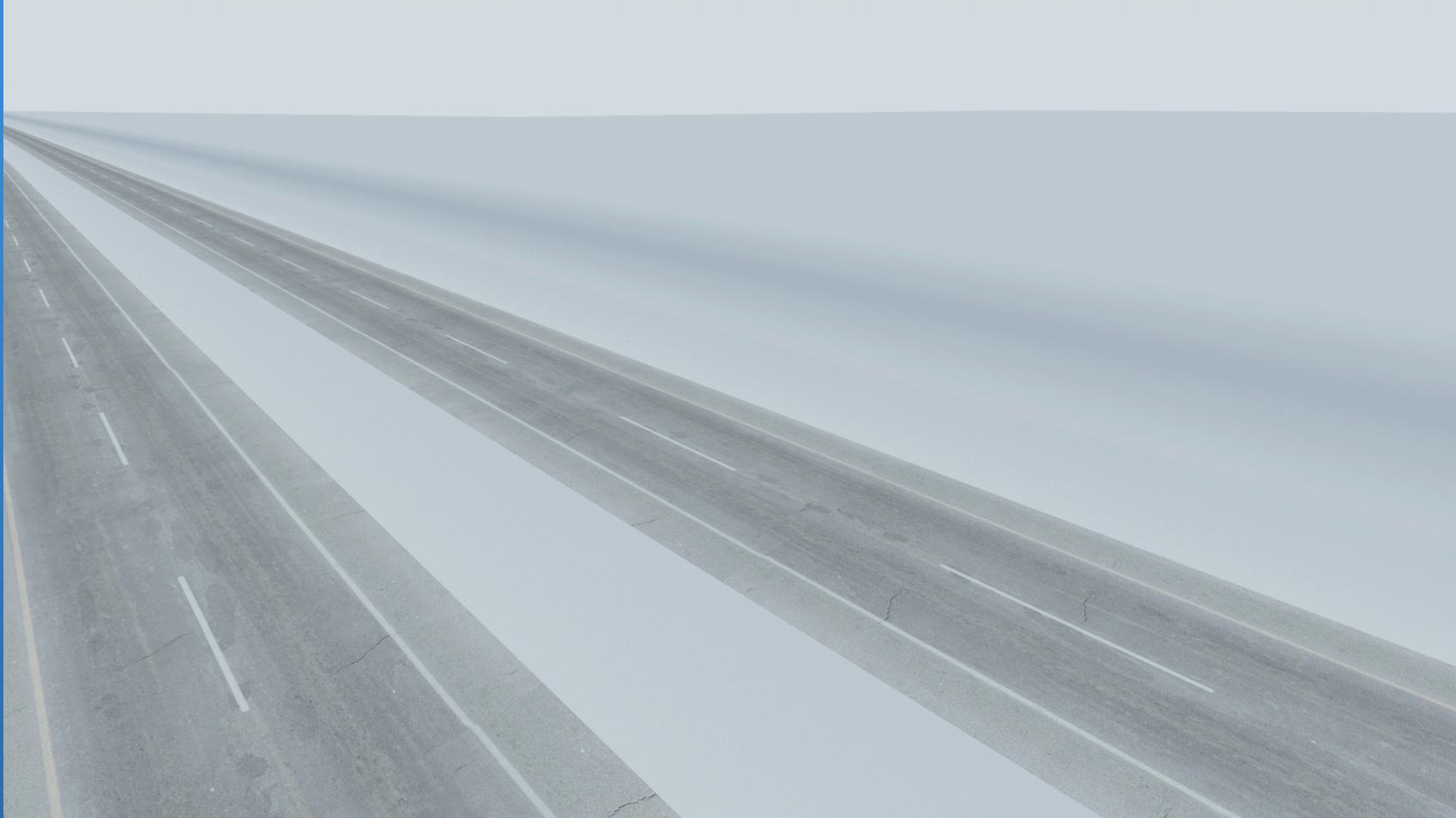


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# HDG Components in Bridges & Highways

[markets.galvanizeit.org](https://markets.galvanizeit.org)

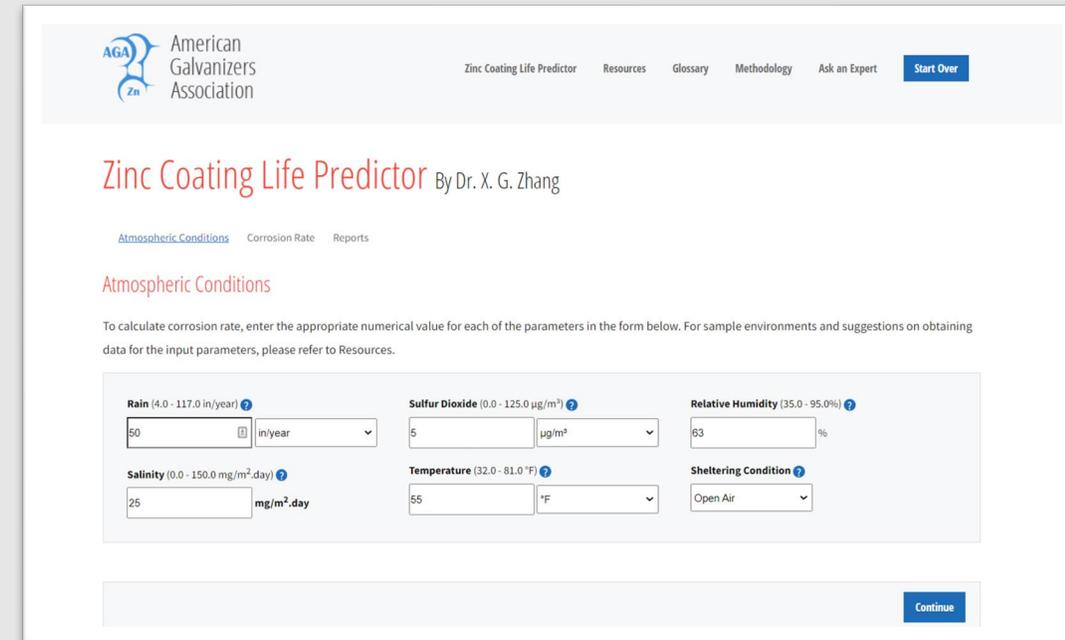


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# Zinc Coating Life Predictor

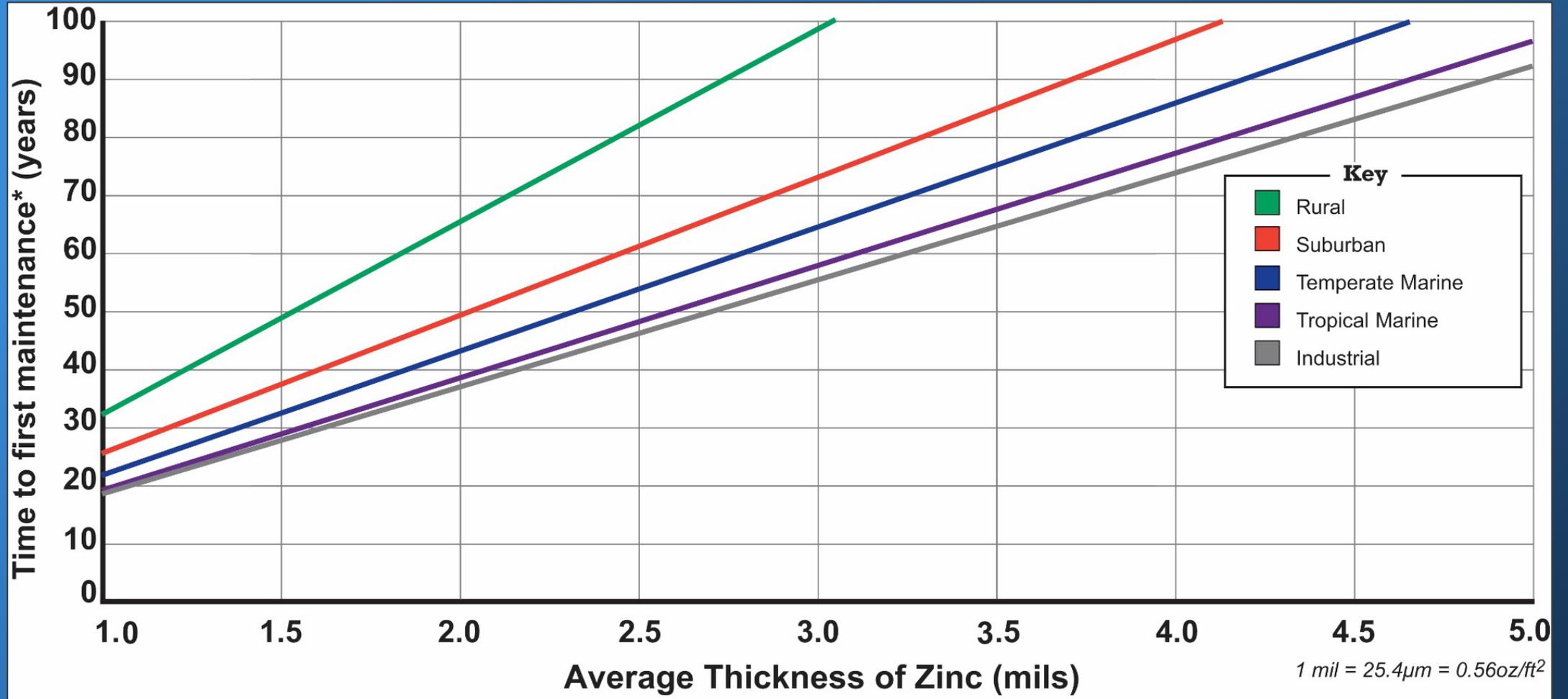
- Estimate the corrosion rate of zinc (galvanized) in various environments
  - Statistical Methods
  - Neural Network Technology
  - Extensive Worldwide Corrosion Database
- Users Guide w/ Links to Collect Local Data
  - <https://galvanizeit.org/knowledgebase/article/the-zinc-coating-life-predictor>
- Used to develop our Time-to-First Maintenance Chart
- **ZCLP.galvanizeit.org**



The screenshot shows the web application interface for the Zinc Coating Life Predictor. At the top, there is a navigation bar with the American Galvanizers Association logo and links for 'Zinc Coating Life Predictor', 'Resources', 'Glossary', 'Methodology', 'Ask an Expert', and a 'Start Over' button. The main heading is 'Zinc Coating Life Predictor' by Dr. X. G. Zhang. Below this, there are links for 'Atmospheric Conditions', 'Corrosion Rate', and 'Reports'. The 'Atmospheric Conditions' section contains a form with the following fields: Rain (4.0 - 117.0 in/year) with a value of 50 and unit 'in/year'; Sulfur Dioxide (0.0 - 125.0 µg/m³) with a value of 5 and unit 'µg/m³'; Relative Humidity (35.0 - 95.0%) with a value of 83 and unit '%'; Salinity (0.0 - 150.0 mg/m³.day) with a value of 25 and unit 'mg/m³.day'; Temperature (32.0 - 81.0 °F) with a value of 55 and unit '°F'; and Sheltering Condition with a value of 'Open Air'. A 'Continue' button is located at the bottom right of the form.



# Time to First Maintenance Chart



\*Time to first maintenance is defined as the time to 5% rusting of the steel surface.

1 mil = 25.4µm = 0.56oz/ft<sup>2</sup>

# Soil Charts

## Evaluate Chloride Concentration

> 20 PPM use Charts 1 & 2

- Evaluate Moisture Content
- Evaluate pH

< 20 PPM use charts 3 & 4

- Evaluate pH
- Evaluate Moisture Content

\*NOTE: Service life is defined as the time to necessary part replacement (total zinc consumption + 25%)



Soil Chart  
(PDF)

### High Chlorides >20 PPM

CHART 1

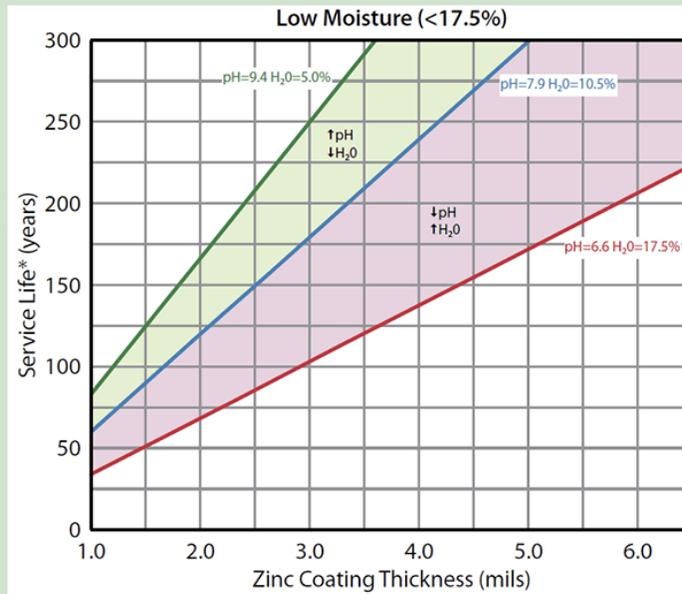
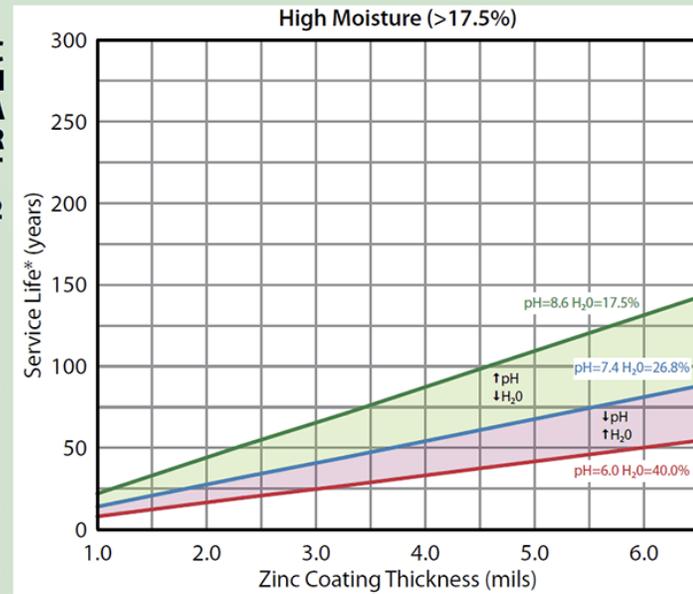


CHART 2



### Low Chlorides <20 PPM

CHART 3

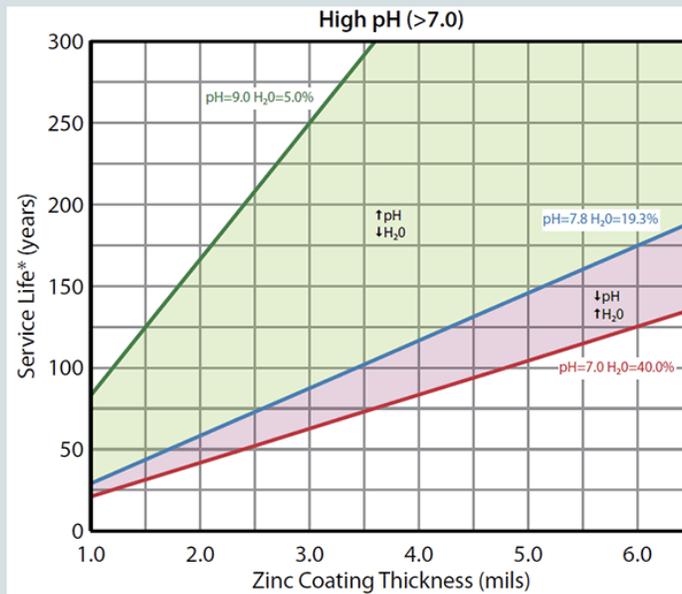
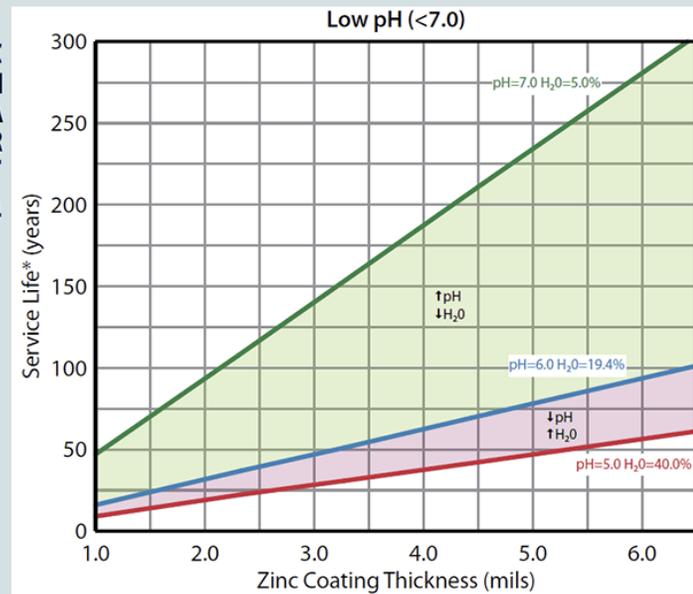


CHART 4



\* Service life is defined as the time to necessary part replacement or underground maintenance.

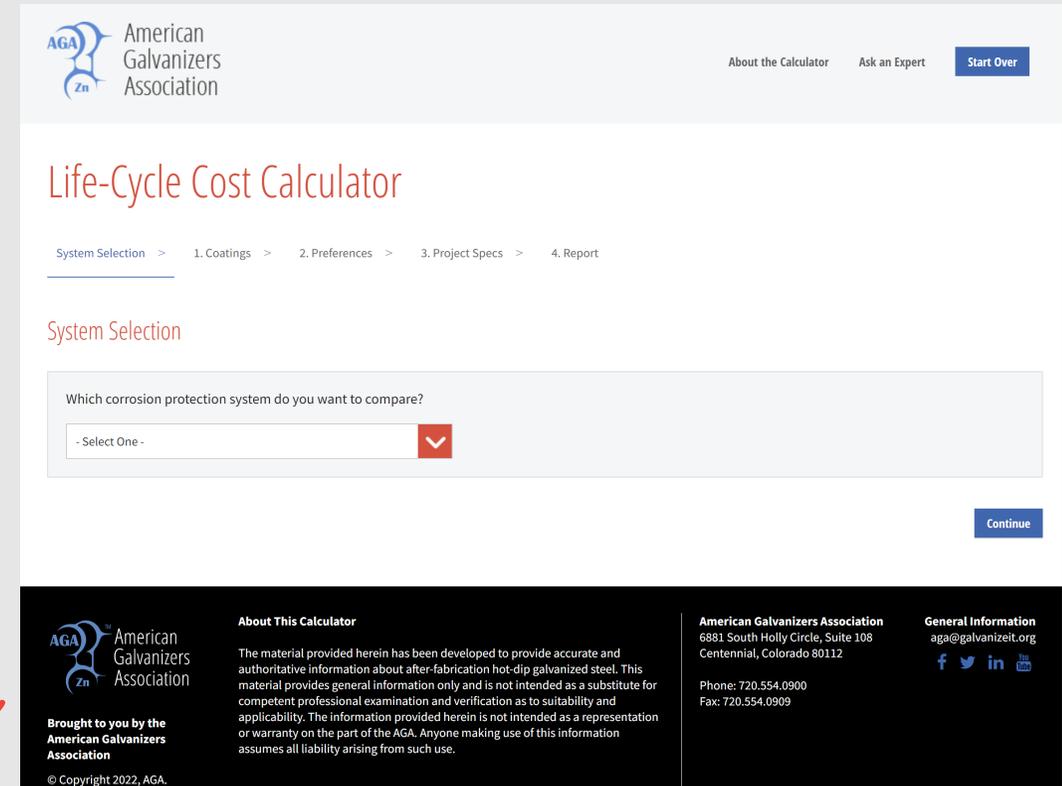
1 mil = 25.4 μm = 0.56 oz/ft<sup>2</sup>

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# Life-Cycle Cost Calculator

- Life-Cycle Cost Savings
  - Total cost throughout project life
  - Includes maintenance costs and time value of money (interest/inflation)
  - Often HDG initial cost IS life-cycle cost
- Life-Cycle Cost Calculator to ASTM A1068



The screenshot shows the web interface for the Life-Cycle Cost Calculator. At the top left is the American Galvanizers Association logo. To the right are links for 'About the Calculator', 'Ask an Expert', and a 'Start Over' button. The main heading is 'Life-Cycle Cost Calculator'. Below it is a breadcrumb trail: 'System Selection > 1. Coatings > 2. Preferences > 3. Project Specs > 4. Report'. The current page is 'System Selection', which contains a dropdown menu with the text 'Which corrosion protection system do you want to compare?' and '- Select One -'. A 'Continue' button is located at the bottom right of the form area. The footer contains the AGA logo, a disclaimer under 'About This Calculator', contact information for the American Galvanizers Association, and social media icons under 'General Information'. A red mouse cursor icon is positioned at the bottom center of the page, pointing towards the calculator interface.

# LCCC: Inputs

**PROJECT SIZE**  
Enter amount of steel to be coated.

ft<sup>2</sup>  tons

**EXPECTED LIFE-SPAN**  
Amount of time before this structure is no longer maintained or in use.

Years

**STRUCTURE TYPE**  
Specify the size and/or complexity of the structure.

- Select One - ▼

---

**MEMBER TYPE**  
Select the project's structural makeup.

Typical mix size/shapes  
250 ft<sup>2</sup> / ton

Large Structural  
100 ft<sup>2</sup> / ton

Medium Structural  
200 ft<sup>2</sup> / ton

Light Structural  
400 ft<sup>2</sup> / ton

Light Trusses  
500 ft<sup>2</sup> / ton

---

**SERVICE LIFE ENVIRONMENT**  
Select the environment that represents your project's location.

Rural  
Mild/Low Corrosion (C2)

Industrial  
Moderate/Medium Corrosion (C3)

Heavy Industrial  
Severe/Very High Atmospheric Corrosion (C5-I)

Seacoast  
Very high Atmospheric Corrosion (C5-M)

# LCCC: Reports

## Life-Cycle Cost Calculator

System Selection > 1. Coatings > 2. Preferences > 3. Project Specs > 4. Report

### Cost-Comparison Report ?

Review and customize before printing

### Cost-Comparison Report

The cost of galvanizing vs. a paint system

**Cost Comparison**  
HDG vs. IOZ/Epoxy/Polyurethane

	HDG	Paint System
<b>Initial Cost</b>		
Per ft <sup>2</sup>	\$2.16	\$4.98
Total	\$108,000.00	\$249,050.00
<b>Life-Cycle Cost</b>		
Per ft <sup>2</sup>	\$2.16	\$31.39
Total	\$108,000.00	\$1,569,500.00
<b>AEAC</b>		
Per ft <sup>2</sup>	\$0.07	\$1.08

For this project...  
**HDG Life-Cycle Cost Savings: 93%**

DETAILED COST COMPARISON  
HDG vs. IOZ/Epoxy/Polyurethane

Cost Of Galvanizing	Today's Cost	Net Future Value	Net Present Value
Original Galvanizing	\$2.16	\$2.16	\$2.16
<b>Total Price / ft<sup>2</sup></b>	<b>\$2.16</b>	<b>\$2.16</b>	<b>\$2.16</b>

Cost Of Paint System	Today's Cost	Net Future Value	Net Present Value
Original Painting	\$4.98	\$4.98	\$4.98
Touch-Up - Year 21	\$2.49	\$5.68	\$3.05
Maint. Repaint - Year 31	\$4.48	\$15.42	\$6.08
Full Repaint - Year 42	\$8.47	\$43.97	\$12.71
Touch-Up - Year 63	\$2.49	\$29.47	\$4.58
<b>Total Price / ft<sup>2</sup></b>	<b>\$22.91</b>	<b>\$99.52</b>	<b>\$31.39</b>

PRINT PREVIEW

CUSTOMIZE REPORT

Project Name

Subtitle

Your Company's Name

Address

City, State & Zip

Your Name

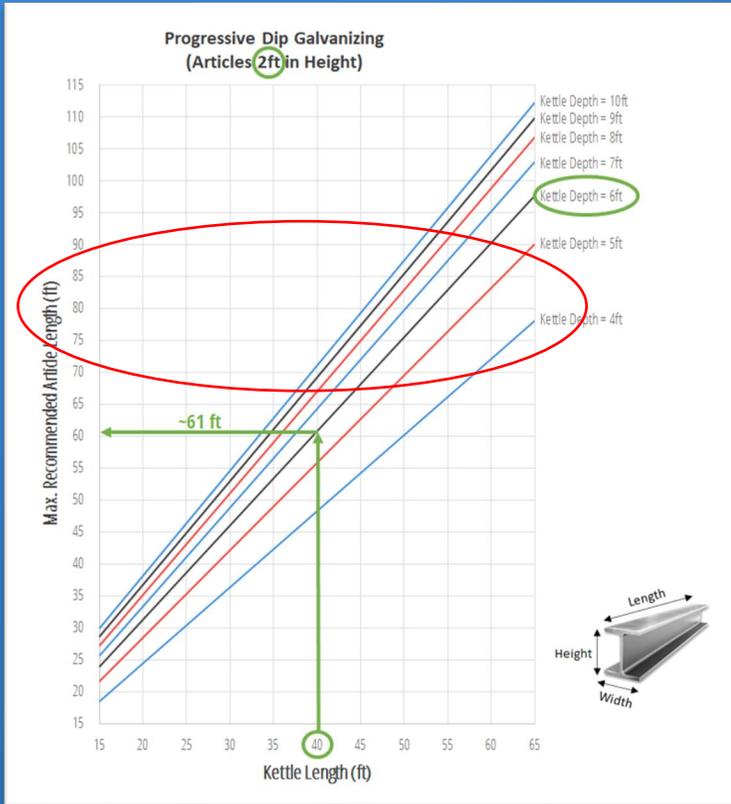
Title

Tel

Email

Update

# AGA Resources for Progressive Dipping



Galvanizer Locator  
(sort by Kettle Size)

## 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 Houston, TX 77041 United States  
Phone: (713) 466-4161 Website

Kettle(s) (L x W x D):  
61' x 7'3" x 7'3"  
42' x 5' x 6'

[View Portfolio](#)

---

**AZZ Galvanizing - Houston West**

9103 fairbanks, N. Houston Houston, TX 77064  
Phone: (832) 467-3772 Website

Kettle(s) (L x W x D):  
62' x 8' x 10'

Progressive Dip Charts

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:** |

**Dip Method:** Progressive Dip

**Diagram Labels:**

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

**Overlap Diagram:**

- Gt (Length Galvanized on Top)
- Gb (Length Galvanized on Bottom)
- OVERLAP LINE
- Gt + Gb (Max. Progressive Dip Length) = 807.1in

Progressive Dip Calculator

# Progressive Dipping

→ Depends on:

→ Kettle dimensions

→ Part dimensions

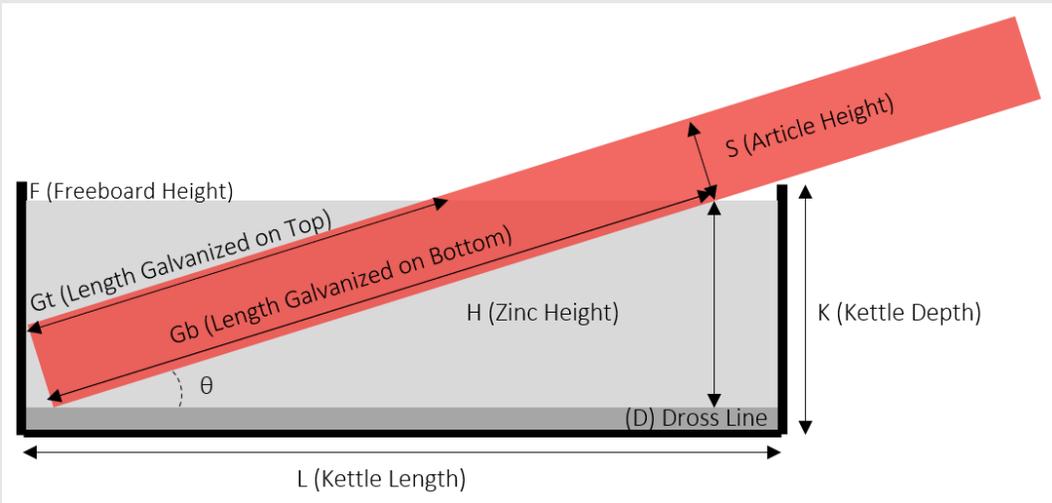
→ Material handling capabilities  
(layout, cranes)

→ Managing Expectations:

→ Overlap line appearance and roughness

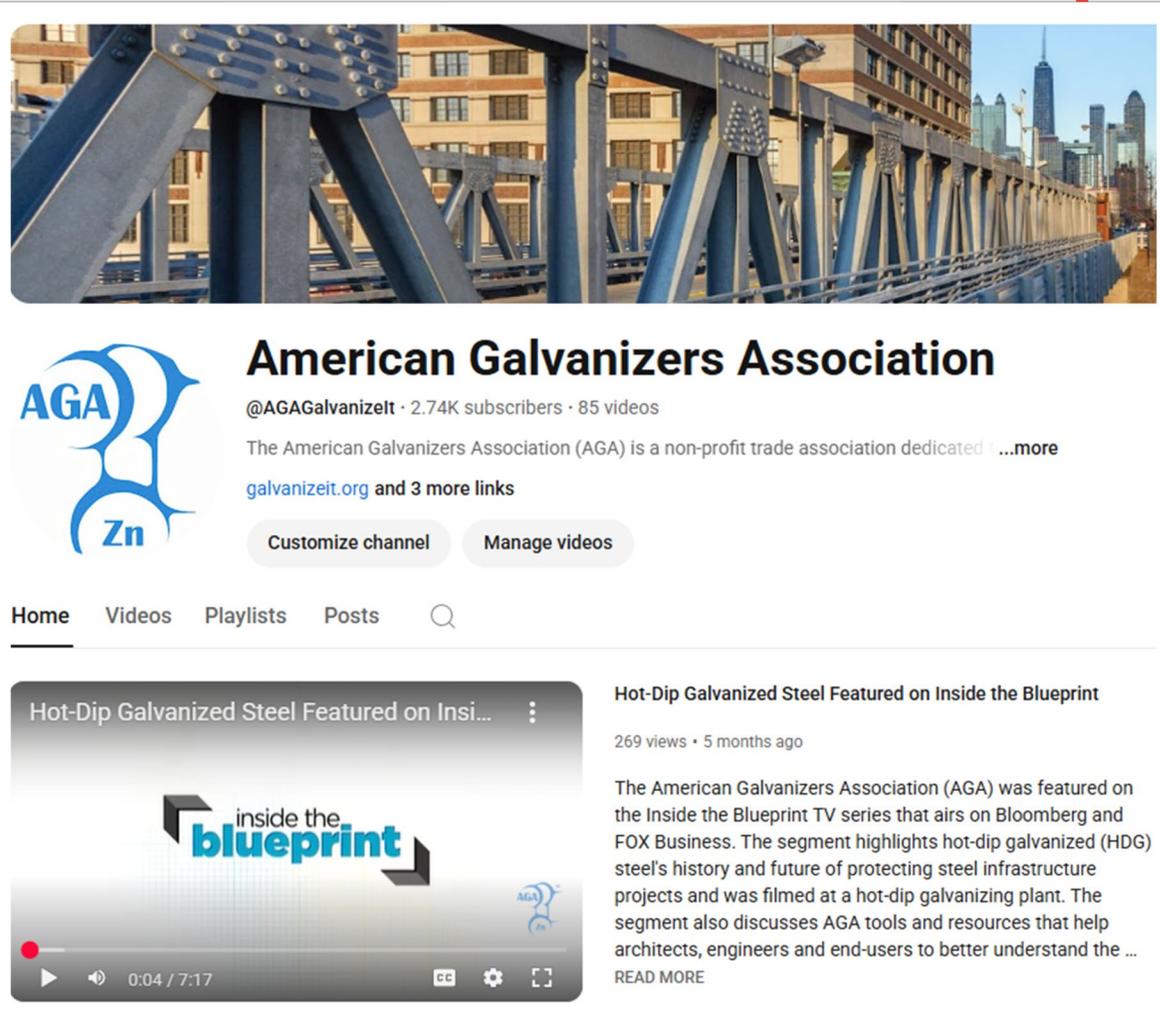
→ Uneven heating

→ Increased susceptibility to warpage



# YouTube Channel

- Interviews with architects, engineers and other end-users to get their take on how HDG has performed
- At least 10 years of service
- Riviere Cochon Gras Bridge
  - <https://www.youtube.com/watch?v=iJ7qXkV6WDI&t=25s>
- Buffalo Creek Bridge
  - <https://www.youtube.com/watch?v=JpSJ4hi7r-w>
- Irondequoit Bay Seasonal Bridge
  - <https://www.youtube.com/watch?v=bEhkHevhbJw&t=1s>
- Stearns Bayou Bridge
  - <https://www.youtube.com/watch?v=3FoA7GOIHGk>
- HDG Reinforcing Steel in Concrete
  - <https://www.youtube.com/watch?v=NN-BeG4JbII>



**AGA**  
Zn

## American Galvanizers Association

@AGAGalvanizeit · 2.74K subscribers · 85 videos

The American Galvanizers Association (AGA) is a non-profit trade association dedicated to...more  
[galvanizeit.org](http://galvanizeit.org) and 3 more links

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Hot-Dip Galvanized Steel Featured on Inside the Blueprint

269 views · 5 months ago

The American Galvanizers Association (AGA) was featured on the Inside the Blueprint TV series that airs on Bloomberg and FOX Business. The segment highlights hot-dip galvanized (HDG) steel's history and future of protecting steel infrastructure projects and was filmed at a hot-dip galvanizing plant. The segment also discusses AGA tools and resources that help architects, engineers and end-users to better understand the ...

READ MORE

# Inspection

- Steel inspected after galvanizing to verify conformance to specs
- Visual inspection with naked eye
- Coating thickness checked by magnetic thickness gauge
- Inspection of HDG Steel Products Guide
- [AGA Online Inspection Course](#)
- Download free Inspection App
  - [galvanizeit.org/mobile](https://galvanizeit.org/mobile)



[galvanizeit.org](https://galvanizeit.org)

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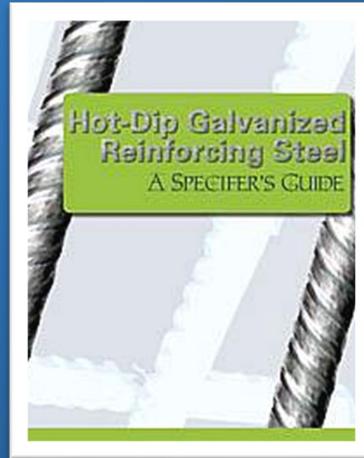
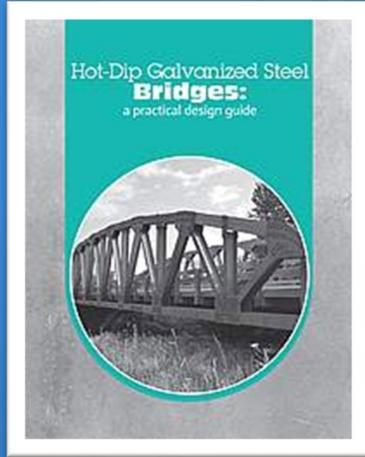


 Inspection of HDG Products Guide (PDF)



# Publications

More than 40 pubs available | Download free PDFs online



→ **Bridge Specific Publications**

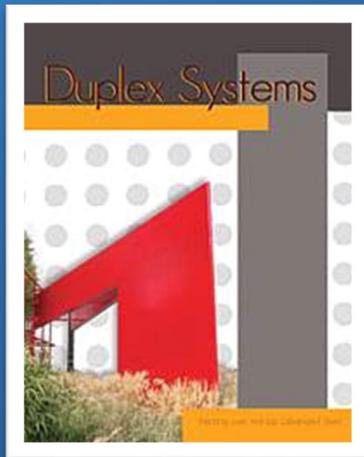
→ **Hot-Dip Galvanized Steel Bridges:  
A Practical Design Guide**

→ **Hot-Dip Galvanized Reinforcing  
Steel: A Specifier's Guide**

→ **Duplex Systems: Painting over HDG**

→ **Inspection of Hot-Dip Galvanized  
Steel Products**

→ **Hot-Dip Galvanizing for  
Sustainable Design**



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# *Galvanize It!* Seminars

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## → Live Webinars

→ 2-4 a month

→ Live Q&A

→ [galvanizeit.org/webinar](https://galvanizeit.org/webinar)

## → On-Demand Course

→ Over 12 course available

## → Lunch & Learn

→ US and Canada Only

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# COLLABORATION & COLLECTIVE EFFORTS

PARTNERING ORGANIZATIONS

## HILTON COLLEGE STATION, TX REMODEL

College Station, TX | 2023

170 tons – Columns, Braces,  
Sun Shades



# Short Span Steel Bridge Alliance (SSSBA)

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- Established in 2012
  - AISI, NSBA, Professors, Bridge Manufacturers, County Engineers
- Target: Bridges up to 140 feet
  - County/Local “off system” bridges
  - Size Limitations & Headaches reduced
- Results
  - Press-Brake Tub Girder/Folded Plate
  - Galvanizing “preferred” solution



# Rebar Focus Group

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- AGA Subcommittee focused on growing the HDG rebar market
- Dedicated website for galvanized rebar information
  - Performance, Mechanical Properties, Field Handling
  - Standards
  - Case Studies
  - Publications
  - FAQs
- [galvanizedrebar.com](https://galvanizedrebar.com)



[galvanizeit.org](https://galvanizeit.org)

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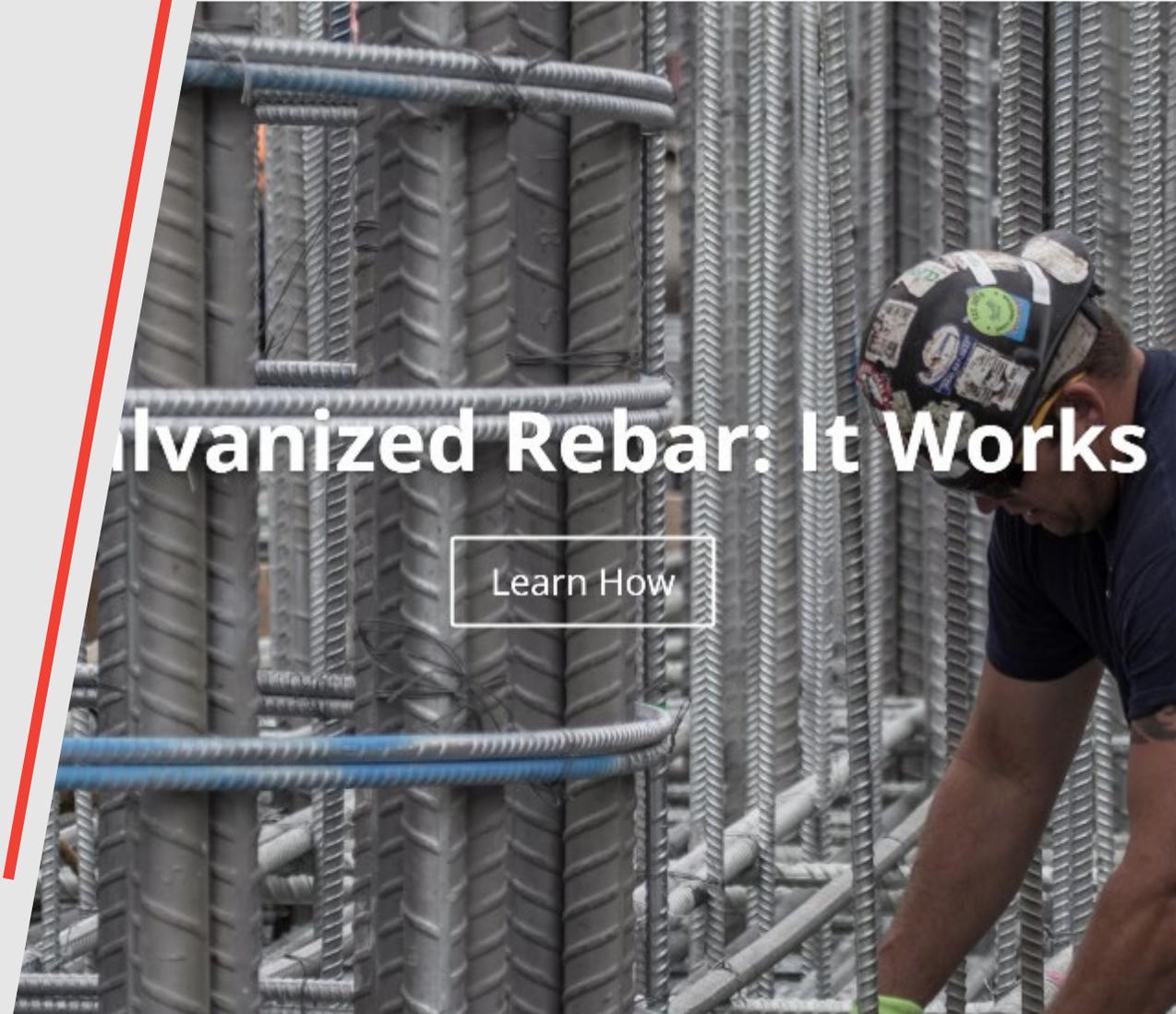
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[Publicat](#)



## Galvanized Rebar: It Works

[Learn How](#)



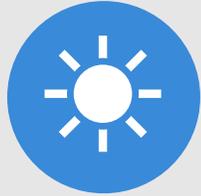
# Bridge Resources

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- Push back on increased marketing for Uncoated Weathering Steel (UWS)
  - Bridge Washing calculator (coming soon)
  - Demonstrate the maintenance costs for UWS previously marketed as no maintenance
  - HDG Bridge Design Guide (English)
    - Mirror the comprehensive NSBA guide on UWS
    - Translation to Spanish pending more members

# Clean Energy Steel Construction Center (CESCC)

New AGA/IZA Collaboration Group



## Solar

33 tons/MW of Steel  
950 GW planned 2030



## T&D

30 tons/MW of steel  
70-80% HDG; 60% expansion



## Wind

4,000 tons per 17 MW Tower (off)  
500 tons for 3 MW Tower (on)



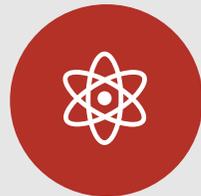
## Battery Storage

Current IZA Initiative  
Storage Facilities (future)



## Natural Gas

Future Target



## Nuclear

Future Target



## Hydropower

Future Target



## Hydrogen

Future Target

# CESCC Overview

2025 Plans

## MISSION

Champion the use of North American made steel products across the clean energy spectrum.

## Branding

Website & Member Outreach

## Marketing

How to Take Advantage of the IRA & Simplified Supply Chain

## Technical

Foreign vs. Domestic Steel & Soil Corrosion Rate Study

## Solar

- Review of Codes
- EPC Database
- Case Study HDG vs. Black
- Education Program
- Industry Presentations



## Wind

- Education Program
- Industry Presentations

## Transmission & Distribution

- Continue Momentum of SUPC
- Engagement w/ Code Setting Bodies & Specifications
- Permitting/Const. Cycle
- Organizing the Grid (no single entity)
- Long Distance Lines



# SUMMARY





# QUESTIONS?

[GALVANIZEIT.ORG](https://galvanizeit.org)



American Galvanizers Association  
*Protecting Steel for a Sustainable Future*

## OFFICE



6881 S Holly Cir, Ste. 108

Centennial, CO 80112

(720) 554-0900

[aga@galvanizeit.org](mailto:aga@galvanizeit.org)

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