

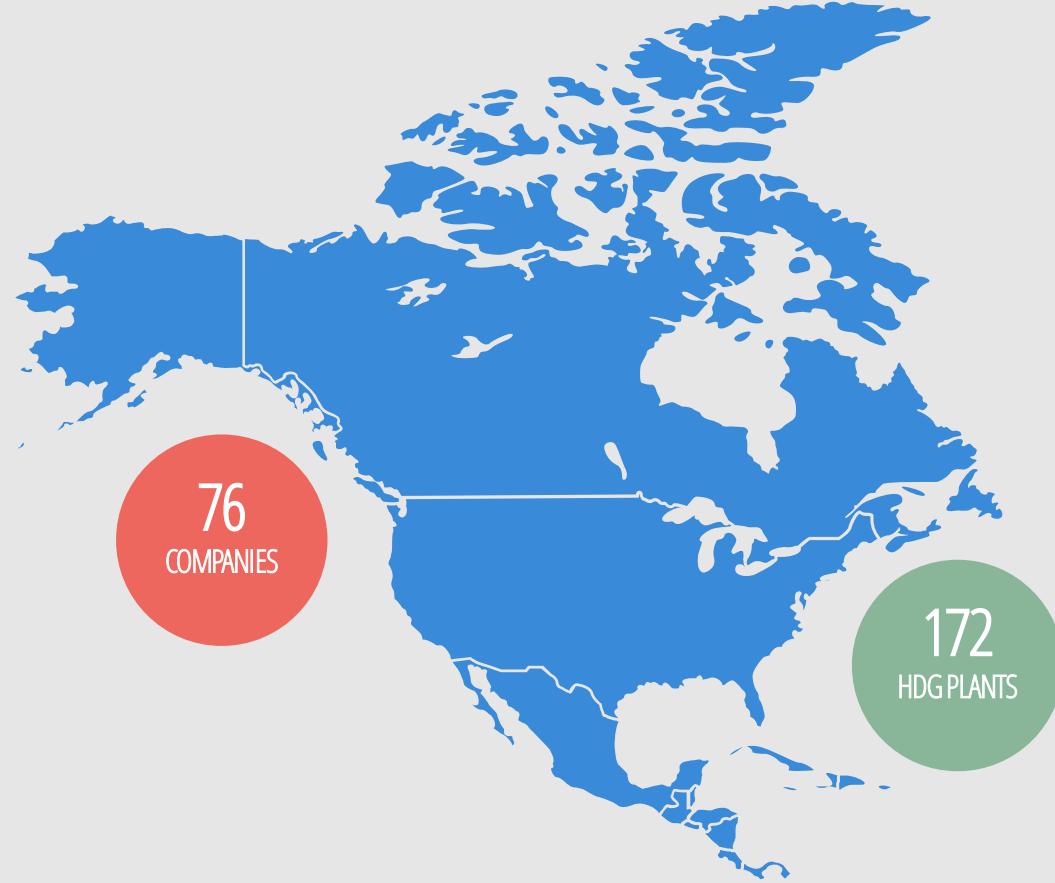
TOOLS AND RESOURCES TO DESIGNING COST-EFFECTIVE STEEL BRIDGES

STEEL BRIDGES IN ACTION: SUMMER WEBINAR SERIES



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



AGA TOOLS & RESOURCES

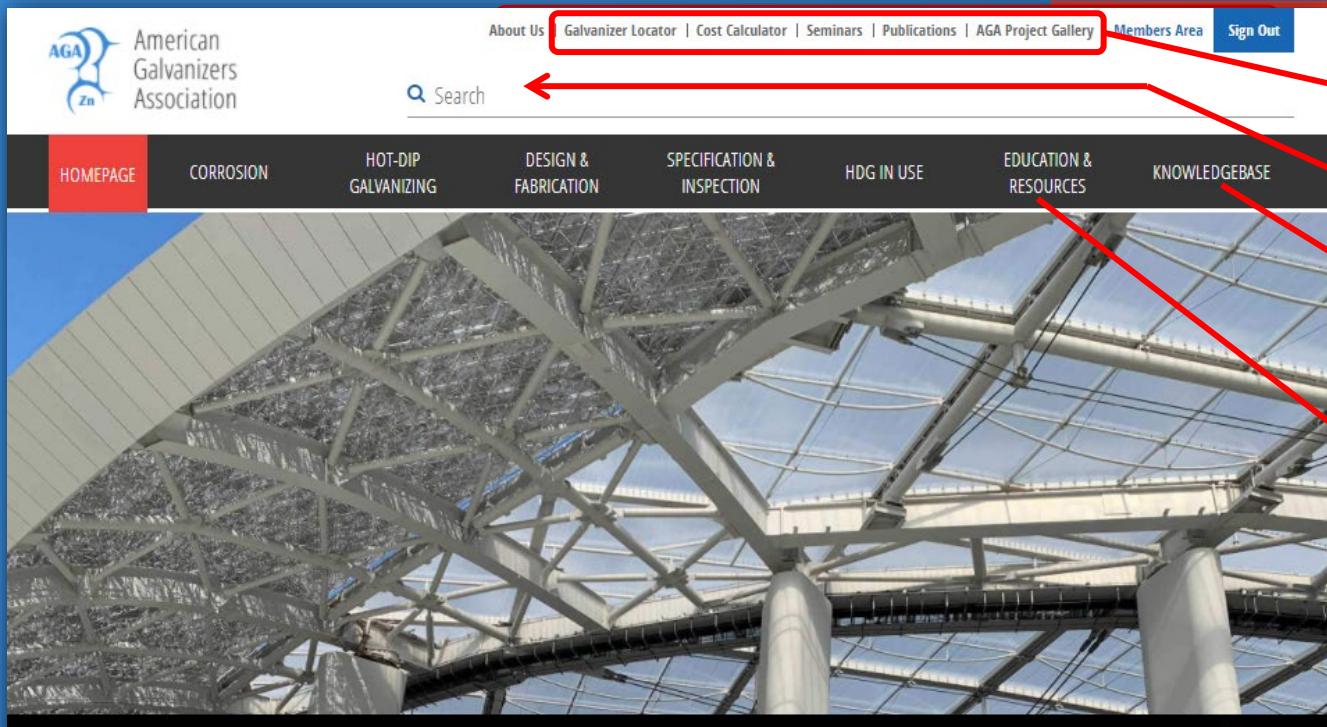
MIRA GUT BRIDGE

Cape Breton, Nova Scotia | 2023

536 tons – The entire superstructure is galvanized. The asphalt on the bridge surface is the only non HDG.



Website - Galvanizeit.org



The screenshot shows the homepage of Galvanizeit.org. The header features the American Galvanizers Association logo and navigation links for About Us, Galvanizer Locator, Cost Calculator, Seminars, Publications, AGA Project Gallery, Members Area, and Sign Out. A red box highlights the 'Members Area' and 'Sign Out' links. Below the header is a search bar with a magnifying glass icon. A red arrow points from the 'Search' label to the search bar. The main content area features a large image of the interior of the SoFi Stadium in Los Angeles, Inglewood, CA. Below the image, there is a 'Learn More' button and a navigation bar with arrows. The footer contains the American Galvanizers Association logo, a brief description of the AGA's mission, and a sidebar with links to Galvanizer Locations, Cost Calculator, Lunch and Learn, Publications, and Project Gallery. The footer also includes the website address, galvanizeit.org, and a copyright notice for 2025.

American Galvanizers Association

The American Galvanizers Association (AGA) is a non-profit trade association dedicated to serving the needs of after-fabrication galvanizers, fabricators, specifiers, architects, engineers, and contractors. The AGA provides technical support on today's innovative applications and state-of-the-art technological developments in hot-dip galvanizing for corrosion control. The AGA also provides a number of services to galvanizers and zinc producers in the industry. The AGA celebrates 87 years of preserving the past, enhancing the present, and protecting the future.

Members Area Sign Out

Search

Tools & AGA Resources

Robust Search Function

Knowledgebase

Education & Resources

Galvanizer Locations

Cost Calculator

Lunch and Learn

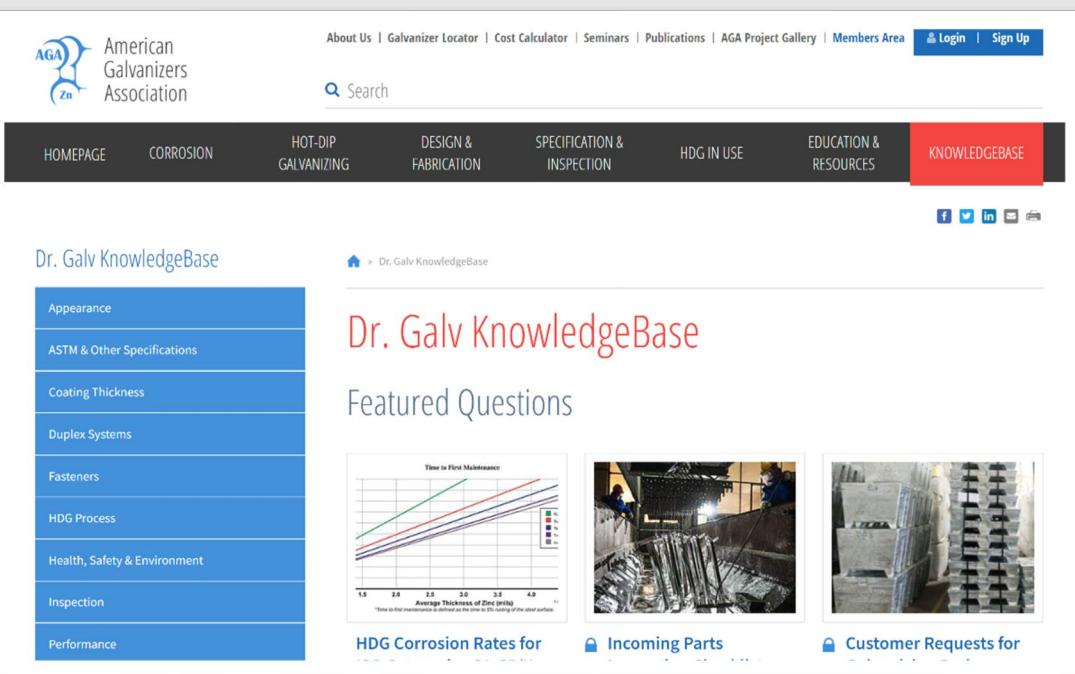
Publications

Project Gallery

galvanizeit.org

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Dr. Galv™ Knowledgebase



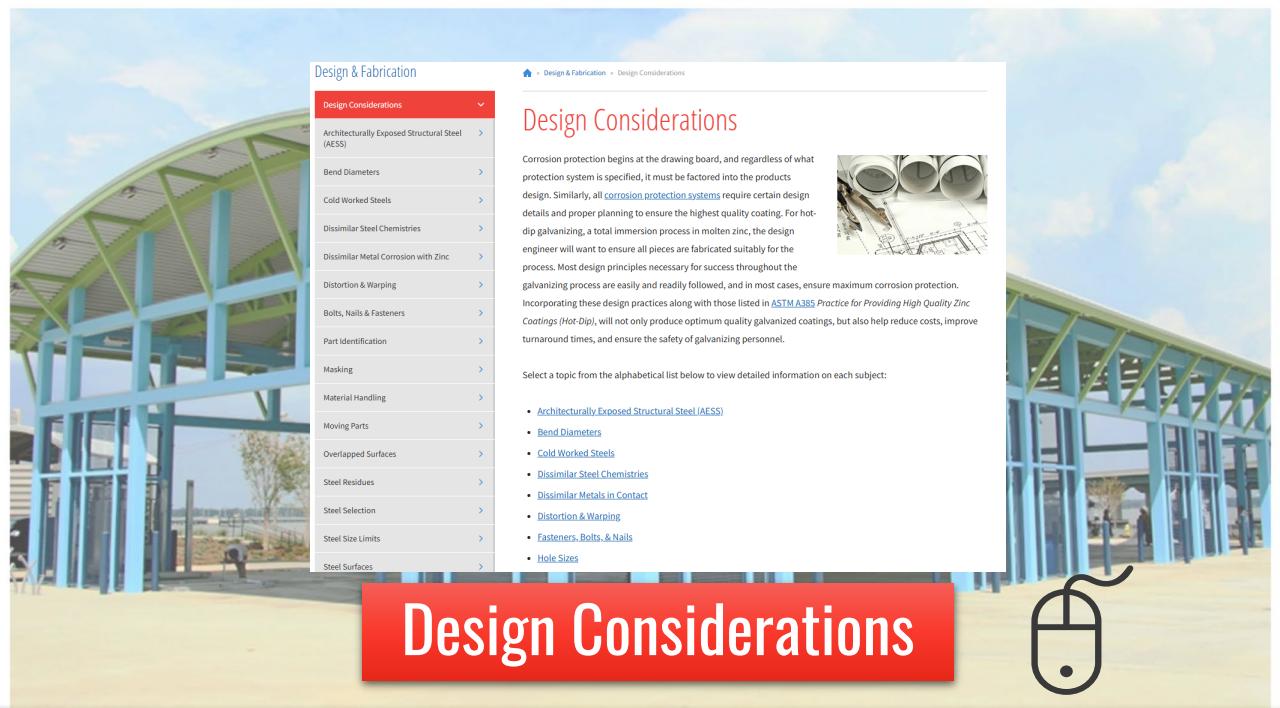
The screenshot shows the homepage of the Dr. Galv KnowledgeBase. At the top, there is a navigation bar with links to About Us, Galvanizer Locator, Cost Calculator, Seminars, Publications, AGA Project Gallery, Members Area, Login, and Sign Up. Below the navigation bar is a search bar. The main menu includes links to HOMEPAGE, CORROSION, HOT-DIP GALVANIZING, DESIGN & FABRICATION, SPECIFICATION & INSPECTION, HDG IN USE, EDUCATION & RESOURCES, and KNOWLEDGEBASE. The KNOWLEDGEBASE menu item is highlighted with a red background. Below the menu is a sidebar with links to Appearance, ASTM & Other Specifications, Coating Thickness, Duplex Systems, Fasteners, HDG Process, Health, Safety & Environment, Inspection, and Performance. The main content area features the title 'Dr. Galv KnowledgeBase' and 'Featured Questions'. It includes a graph titled 'Time to First Maintenance' showing maintenance intervals versus average zinc thickness, and two images: one of a worker in a factory and another of a stack of galvanized products. Below these are links for 'HDG Corrosion Rates for' and 'Incoming Parts'.

- 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

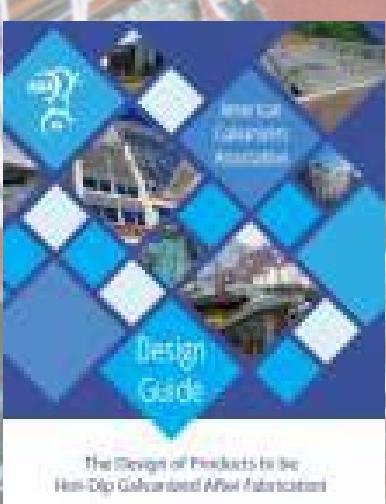
Corrosion protection begins at the drawing board, and regardless of what protection system is specified, it must be factored into the products design. Similarly, all [corrosion protection systems](#) require certain design details and proper planning to ensure the highest quality coating. For hot-dip 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 A385 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:

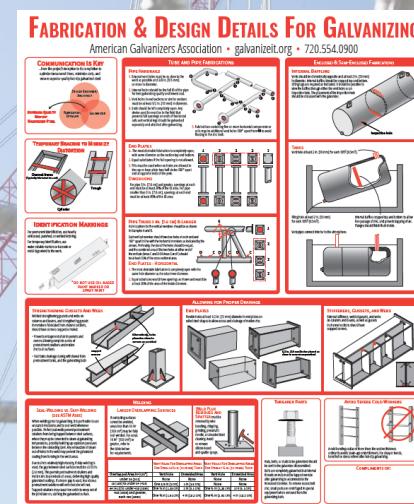
- [Architecturally Exposed Structural Steel \(AESS\)](#)
- [Bend Diameters](#)
- [Cold Worked Steels](#)
- [Dissimilar Steel Chemistries](#)
- [Dissimilar Metals in Contact](#)
- [Distortion & Warping](#)
- [Fasteners, Bolts, & Nails](#)
- [Hole Sizes](#)

Design Considerations

A computer mouse icon is located in the bottom right corner of the image.



Design Guide



Design Poster

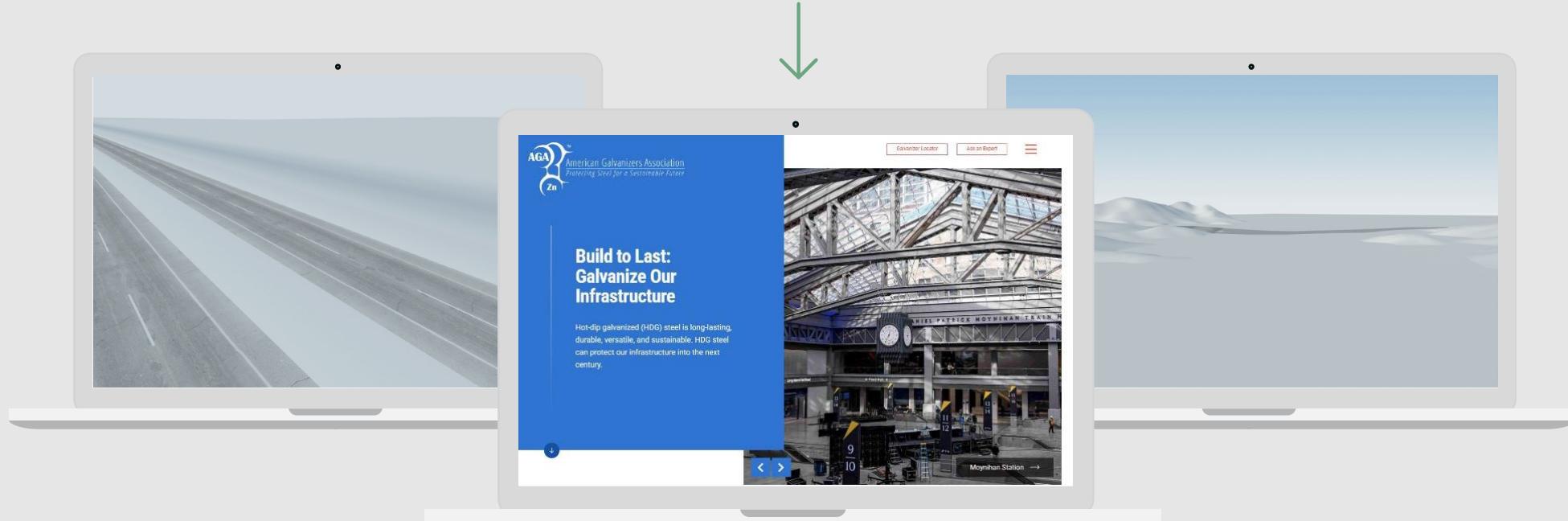


HDG Markets & Products Website

<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



galvanizeit.org

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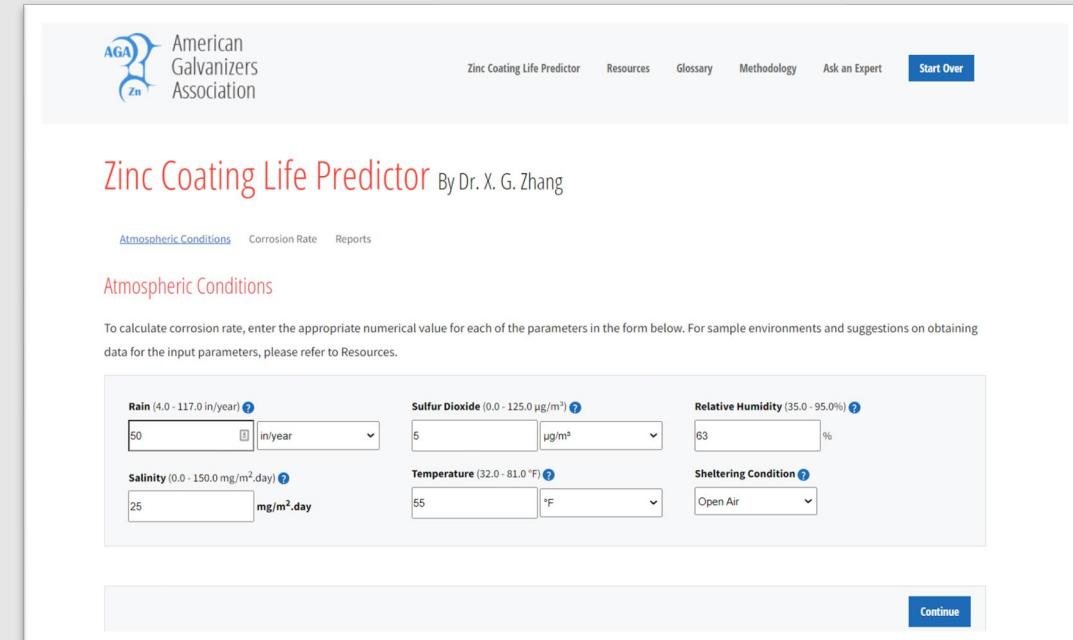
HDG Components in Bridges & Highways

markets.galvanizeit.org



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**



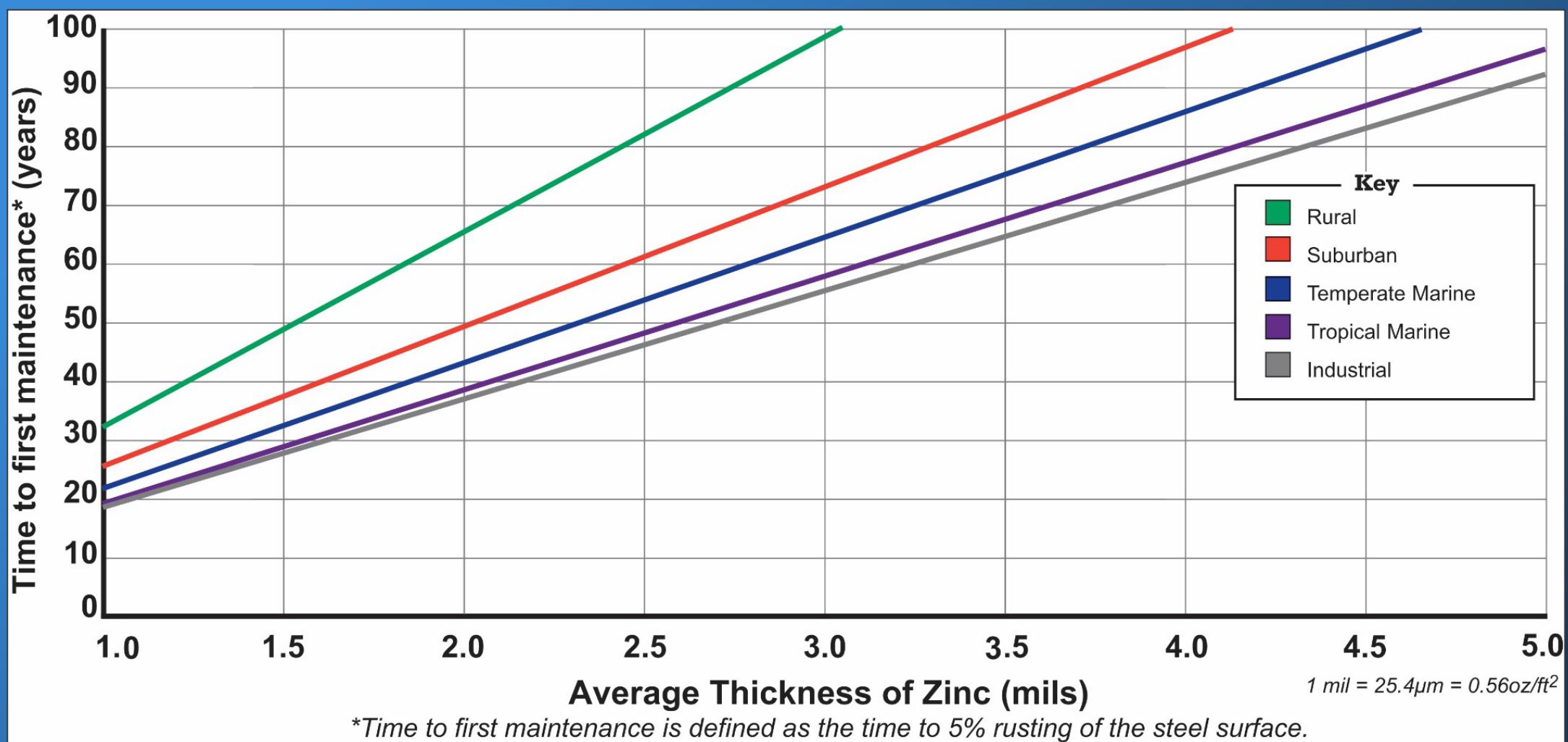
Atmospheric Conditions

To calculate corrosion rate, enter the appropriate numerical value for each of the parameters in the form below. For sample environments and suggestions on obtaining data for the input parameters, please refer to Resources.

| | | |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
| Rain (4.0 - 117.0 in/year) <input type="text" value="50"/> in/year | Sulfur Dioxide (0.0 - 125.0 µg/m³) <input type="text" value="5"/> µg/m³ | Relative Humidity (35.0 - 95.0%) <input type="text" value="63"/> % |
| Salinity (0.0 - 150.0 mg/m².day) <input type="text" value="25"/> mg/m².day | Temperature (32.0 - 81.0 °F) <input type="text" value="55"/> °F | Sheltering Condition <input type="text" value="Open Air"/> |

Continue

Time to First Maintenance Chart



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)

CHART 1
High Chlorides >20 PPM

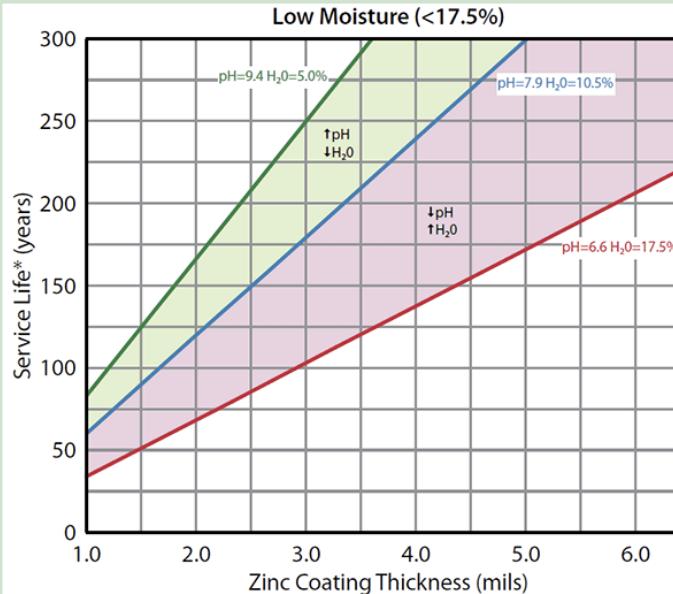


CHART 3
Low Chlorides <20 PPM

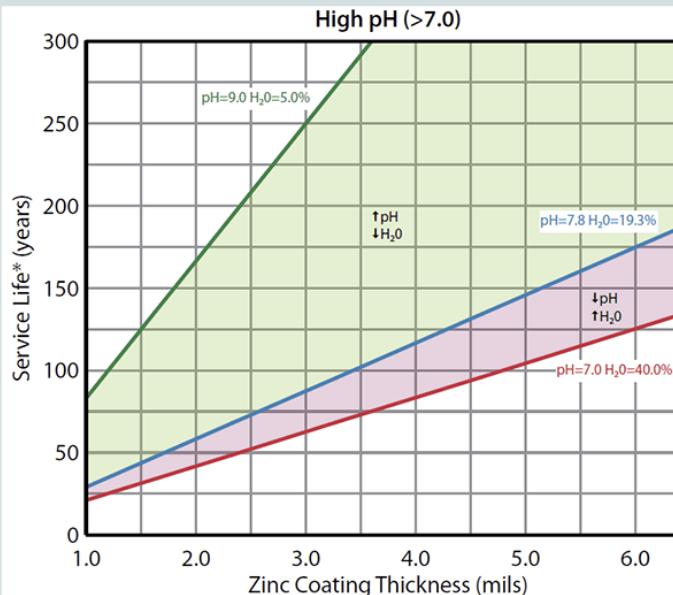


CHART 2
High Moisture (>17.5%)

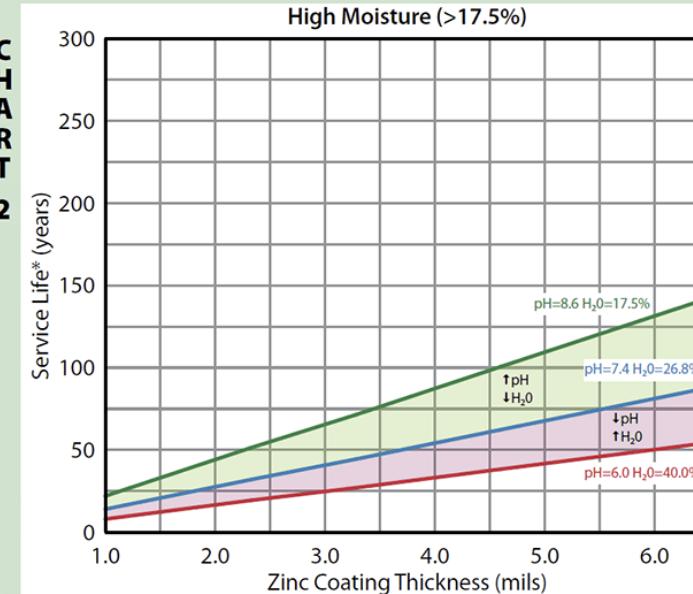
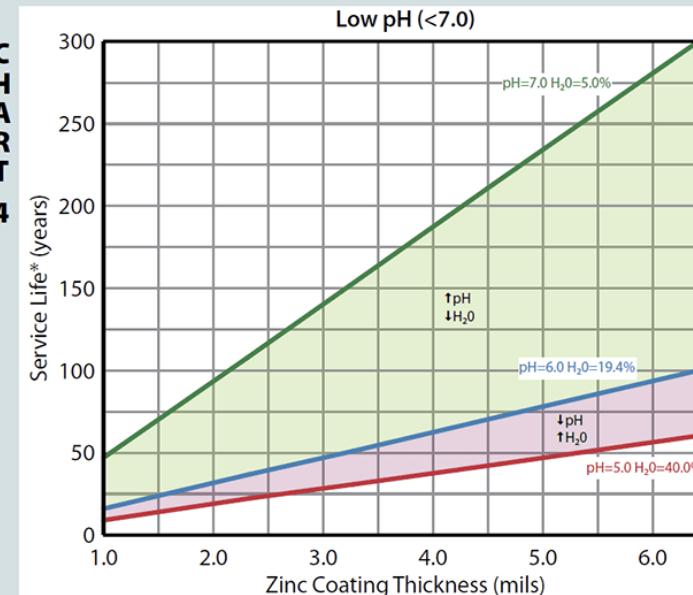


CHART 4
Low pH (<7.0)



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

1 mil = 25.4 μ m = 0.56 oz/ft²

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 'Life-Cycle Cost Calculator' page of the American Galvanizers Association (AGA). The top navigation bar includes links for 'About the Calculator', 'Ask an Expert', and 'Start Over'. The main title 'Life-Cycle Cost Calculator' is displayed in red. Below it, a breadcrumb navigation shows 'System Selection > 1. Coatings > 2. Preferences > 3. Project Specs > 4. Report'. The 'System Selection' section asks 'Which corrosion protection system do you want to compare?' with a dropdown menu labeled '- Select One -'. A 'Continue' button is located at the bottom right of this section. The footer contains the AGA logo, the text 'Brought to you by the American Galvanizers Association', and a copyright notice. It also includes an 'About This Calculator' section with a detailed disclaimer, the AGA address (6881 South Holly Circle, Suite 108, Centennial, Colorado 80112), and contact information (Phone: 720.554.0900, Fax: 720.554.0909). The footer is divided into 'American Galvanizers Association' and 'General Information' sections.

LCCC: Inputs

PROJECT SIZE

Enter amount of steel to be coated.

ft² 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 ft² / ton

Large Structural
100 ft² / ton

Medium Structural
200 ft² / ton

Light Structural
400 ft² / ton

Light Trusses
500 ft² / 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 |
|------------------------|--------------|----------------|
| Initial Cost | | |
| Per ft ² | \$2.16 | \$4.98 |
| Total | \$108,000.00 | \$249,050.00 |
| Life-Cycle Cost | | |
| Per ft ² | \$2.16 | \$31.39 |
| Total | \$108,000.00 | \$1,569,500.00 |
| AEAC | | |
| Per ft ² | \$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 |
| Total Price / ft² | \$2.16 | \$2.16 | \$2.16 |

| 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 |
| Total Price / ft² | \$22.91 | \$99.52 | \$31.39 |

PRINT PREVIEW

CUSTOMIZE REPORT

Project Name

Subtitle

Your Company's Name

Address

City, State & Zip

Your Name

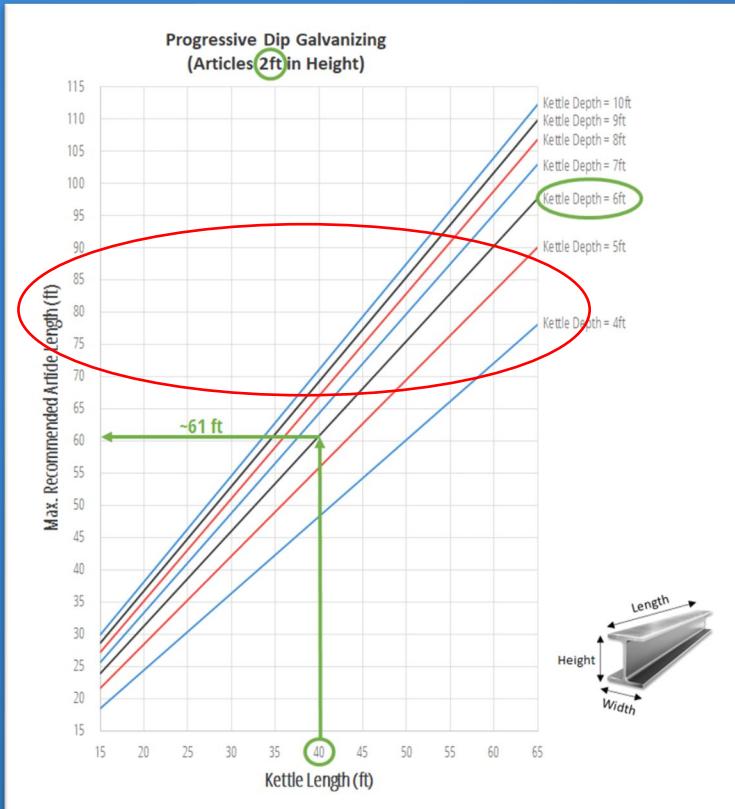
Title

Tel

Email

Update

AGA Resources for Progressive Dipping



Progressive Dip Charts

The search results page shows a search bar for 'Address/Zip' (77584) and 'SEARCH' button. Below the search bar, a note states: '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.' The results section is titled 'Galvanizers:' and lists two entries:

- 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'
- 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'

Galvanizer Locator
(sort by Kettle Size)
galvanizeit.org
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The calculator interface includes the AGA logo and the tagline 'Protecting Steel for a Sustainable Future'. It features two main sections: 'USER INPUTS' and 'Progressive Dip Calculator'.

USER INPUTS

| | |
|--------------------------|-----------------------------------------------------------|
| Enter Kettle Dimensions: | K (Kettle Depth) <input type="text" value="72"/> inches |
| | L (Kettle Length) <input type="text" value="600"/> inches |
| | W (Kettle Width) <input type="text" value="60"/> inches |

| | |
|---------------------------|---------------------------------------------------|
| Enter Article Dimensions: | (S) Height <input type="text" value="34"/> inches |
| | Length <input type="text" value="780"/> inches |
| | Width <input type="text" value="16"/> inches |

Progressive Dip Calculator

Allowable Angles in the Bath:

| | |
|-----------|-------|
| θ minimum | 6.1 ° |
| θ maximum | 6.3 ° |

Can This Article be Fully Galvanized?

Article Orientation:

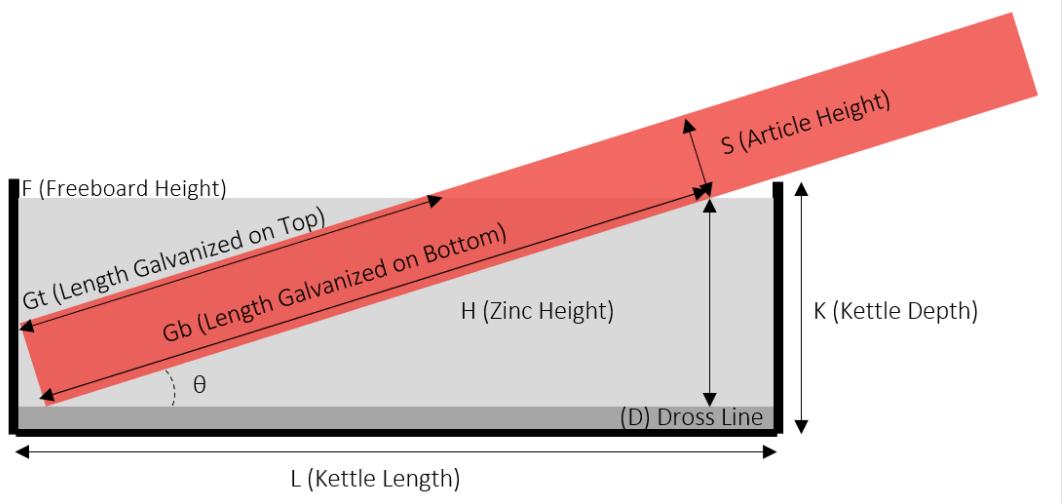
Dip Method: Progressive Dip

The calculator displays a diagram of a kettle with dimensions: K (Kettle Depth) = 72in, L (Kettle Length) = 600in, D (Dross Line) = 60in, H (Zinc Height) = 60in, G_t (Length Galvanized on Top) = 245in, G_b (Length Galvanized on Bottom) = 562in, and G_t + G_b (Max. Progressive Dip Length) = 807.1in. The angle θ = 6.1° is also indicated.



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

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

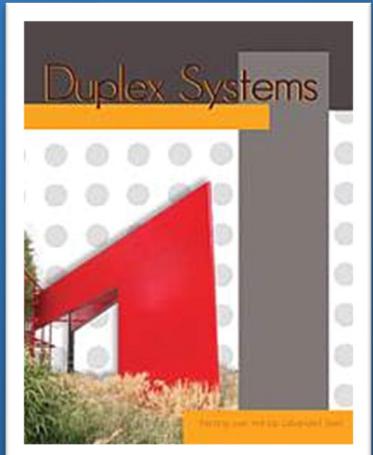
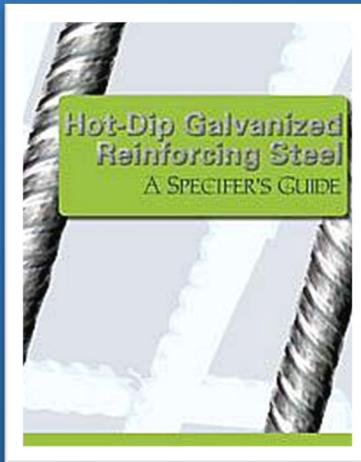
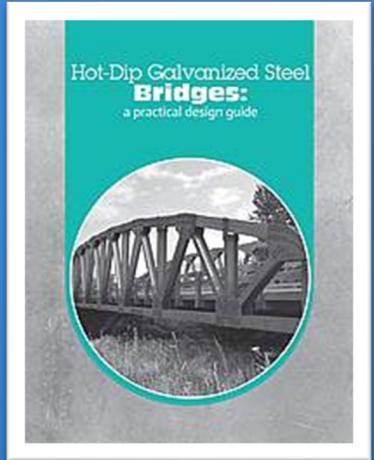


 Inspection of HDG Products Guide (PDF)



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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- Live Q&A
- galvanizeit.org/webinar

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- Over 12 course available

→ Lunch & Learn

- US and Canada Only





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

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