

Zn-Al-Mg Coated PV Mounting System

Delivering Exceptional Value for Your Solar Projects

DEVELOP SOLAR-Expert in Solar Project Cost Optimization



Table of Contents



01. Project Challenges

Analyzing current pain points



02. Core Solution

Innovative approach & strategy



03. Product Advantages

Strength, Weight & Cost benefits



04. Technical Advantages

Superior corrosion resistance



05. Performance & Cost

Detailed data comparison



06. Application Scenarios

Diverse use cases



07. Project Case

Successful implementation stories



08. Company Strength

Our capabilities & expertise



09. Contact Information

Get in touch with us

Project Challenges



Pressure to Reduce LCOE

Developers face immense pressure to continuously reduce the Levelized Cost of Energy.



Rising Logistics & Installation Costs

Transportation and on-site installation costs of steel are very high in remote areas like deserts.



Long-Term Corrosion Risk

In coastal or high-humidity environments, corrosion affects reliability and maintenance costs.



Offshore Solar Project - Harsh Environmental Conditions

Core Solution

High-strength steel Zn-Al-Mg coated PV mounting system

Same+ Structural Performance, Less Steel, Lower Cost

❖ Material Upgrade

Use 750MPa high-strength steel instead of traditional Q235 steel for superior durability.



↓ Steel Reduction

Under the premise of ensuring structural safety, steel consumption can be reduced by 15-30%.



📁 Goal Achievement

Optimize from the source of materials to directly reduce the initial investment cost of the project.



Product Advantages: Strength, Weight & Cost



Superior Strength

Yield strength $\geq 700\text{MPa}$, more than 3 times that of traditional Q235 steel, allowing thinner sections.



Weight Reduction

25% lighter than traditional solutions, greatly reducing transportation and installation costs.



Cost Optimization

Material cost reduced by ~15%, transportation by 15-25%, achieving direct CAPEX reduction.

COMPARATIVE ANALYSIS: MATERIAL PERFORMANCE DATA

Comparative Analysis: Solar Mounting Materials			
Dimension	High-Strength ZAM Steel (700MPa Yield)	Traditional HIG Steel (Q235/Q355)	Aluminum Alloy (6000-T6)
Representative	★★★★★ (Best for Ground Mount)	★★★★ (Standard)	★★★ (Best for Coastal)
Mechanical Properties	Superior Strength: Yield strength $\geq 700\text{MPa}$ (vs. 235-355 MPa for HIG). Tensile strength $\geq 780\text{MPa}$. Superior corrosion resistance (Zn-Ni coating) allows for thinner walls with same load capacity.	Standard Yield Strength: Q235 (235 MPa) / Q355 (355 MPa). Standard corrosion resistance. Requires thicker sections to meet structural requirements.	Good Yield Strength: ~200-250 MPa. Good corrosion resistance. Requires thicker sections to meet structural requirements.
Corrosion Resistance	"Self-Healing" Technology: Coating (Zn, Al, Ni) actively seals scratches. Superior salt-crystallization resistance. Lifespan ≥ 30 years (Self-repairs at cut edges).	Passive Protection: Coating (Zn, Al, Ni). Long-term salt-crystallization resistance. Lifespan ≥ 20 years (Needs regular maintenance).	Standard Coatings: Powder Coating. Good corrosion resistance. Not suitable for coastal areas with high salt fog. Lifespan ≥ 15 years (Requires regular maintenance).
Weight & Logistics	Significant Weight Reduction: 25% lighter than Q235. Rail transport reduced by 15-20%.	Higher weight \Rightarrow More rails \Rightarrow More structural steel.	Lightest Density: ~2.7 g/cm ³ . However, larger cross-sections are needed for strength.
Cost Efficiency (CAPEX)	Lowest Cost (Per kW): Material Cost Savings $\geq 15\%$. Transport Cost Reduced by 15-25% due to lighter weight.	Higher Cost: Material cost savings to high load capacity \Rightarrow Expensive high-strength steel.	Expensive: Typically 1.5-2x cost of steel products. Only competitive for small modules.
Processing & Eco	Green & Efficient: Pre-galvanized and cold-formed. No post-galvanizing required. Zero post-galvanizing and transport costs.	Standard Cold Forming: Requires post-galvanizing. High galvanizing cost. Risk of surface damage and transport costs.	Complex: High precision but energy-intensive production.

The adjacent chart provides a detailed technical comparison between High-Strength ZAM Steel and traditional materials (Q235/Q355 Steel, Aluminum Alloy). Key highlights include:

- **Mechanical Properties:** High-strength Steel offers 3x the strength advantage, enabling structural design with thinner walls.
- **Corrosion Resistance:** Features "Self-Healing" technology with a lifespan exceeding 30 years.
- **Eco-Friendliness:** Pre-galvanized and cold-formed, eliminating the need for post-galvanizing processes.

Performance & Cost Detailed Comparison

Comparative Analysis: Solar Mounting Materials			
Dimension	High-Strength ZM Steel (S750HLD+ZMA)	Traditional HDG Steel (Q235B/Q355B)	Aluminum Alloy (Al6005-T5)
Recommendation	★★★★★ (Best for Ground-Mount)	★★★ (Standard)	★★ (Best for Rooftop)
Mechanical Properties	Superior Strength • Yield Strength: ≥ 700 MPa• Tensile Strength: ≥ 750 MPa• Advantage: 3x stronger than Q235, allowing for thinner walls with same load capacity.	Standard• Yield Strength: $\sim 235/355$ MPa• Tensile Strength: $\sim 370-470$ MPa• Drawback: Requires thicker material to meet structural calculations.	Weaker• Yield Strength: ~ 240 MPa• Drawback: Low elastic modulus; prone to deformation under heavy loads; not ideal for large spans.
Corrosion Resistance	"Self-Healing" Technology• Coating: Zn-Al-Mg Alloy• Salt Spray Test: 5,040h (No Red Rust)• Lifespan: 30+ Years (Self-repairs at cut edges).	Passive Protection• Coating: Pure Zinc ($\geq 65\mu\text{m}$)• Salt Spray Test: ~ 800 h (Red Rust)• Lifespan: 15-20 Years (Rusts easily at drill holes/cuts).	Natural Oxidation• Excellent corrosion resistance, but not suitable for coastal areas with high salt fog .• Drawback: Cannot "heal" physical damage or scratches.
Weight & Logistics	Significant Weight Reduction • 25% Lighter than Q235• Wall thickness reduced to 1.5-2.0mm.	Heavy• High density + thick walls = Heavy structural load.	Lightest• Density is 1/3 of steel• However, larger cross-sections are needed for strength.
Cost Efficiency (CAPEX)	Lowest Cost (Best ROI)• Material Cost : Savings of 15%• Transport Cost : Reduced by 15-25% due to lighter weight.	Baseline Cost• Moderate material price, but high total steel tonnage• Expensive post-galvanizing fees.	Expensive• Typically 1.3-1.5x the cost of steel brackets• Only competitive for small rooftops.
Processing & Eco	Green & Efficient • Pre-galvanized, cold-formed directly• No post-galvanizing required• Short production lead time .	High Energy Consumption• Requires post-fabrication hot-dip galvanizing• Risk of deformation and transport delays.	Extrusion• High precision but energy-intensive production.

Mechanical Strength

Superior Load Bearing Capacity

Corrosion Resistance

Zn-Al-Mg Coating Technology

Cost Efficiency

Optimized Total Ownership Cost

Technical Advantages: Superior Corrosion Resistance



Ultra-Long Corrosion Resistance

Passed 5040h neutral salt spray test (no red rust), 6x better than traditional hot-dip galvanizing.



Unique "Self-Healing" Technology

Alloy elements migrate to scratches to form a new protective layer, effectively preventing corrosion spread.

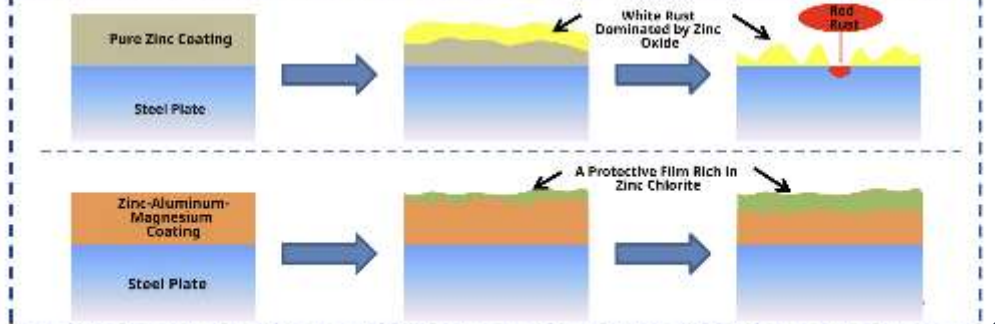


Ultra-Long Service Life

Designed for >30 years in C1-C4 environments, significantly reducing long-term maintenance costs.

Product Feature- The Principle Behind Flat Surface Corrosion Resistance

The Al and Mg elements in the coating dissolve into the thin liquid film on the coating surface, where they combine with hydroxide ions and carbonate ions to form a dense protective layer—including zinc chlorite—covering the entire coating surface. This reduces cathodic current density and significantly slows down the corrosion rate of the coating.

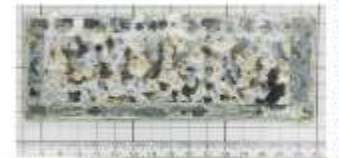


Section 2.1.5 Characteristic Test 1 - Planar Corrosion Resistance

After 800 hours of neutral salt spray test, a large amount of red rust appeared on the surface of Z1200 coating, while after 5040 hours of neutral salt spray test, no red rust appeared on the surface of ZM275 coating.

Neutral salt spray test was conducted at the National Materials Corrosion and Protection Science Data Center;
The test materials are SOZAMC material ZM275 and pure zinc-coated material Z1200.

HDG
Z1200
800h



ZAM
ZM275
5040h



Salt Spray Test Comparison: ZAM vs HDG

Application Scenarios

Our High-Strength Steel Zn-Al-Mg Coated PV Mounting System is engineered to excel in diverse challenging environments:



Desert Environment

Resistant to wind and sand erosion.
Lightweight design for easy transportation and installation.



Coastal Environment

Excellent corrosion resistance,
perfectly coping with high salt spray
and high humidity challenges.



Large-Scale Ground PV

High strength with low cost,
providing an ideal structural
solution for large-scale utility
projects.

Reliable, Economical, and Adaptable Solutions for Global Renewable Energy Projects

Project Case

CGN Zhaoyuan 400MW Offshore Solar Power Project

- Project Challenge:** Coastal corrosive environment with high salt spray and high humidity.
- Solution:** We provided a customized High-Strength Steel Zn-Al-Mg Coated PV Mounting System.
- Project Outcome:** Successfully met the challenges of the harsh marine environment and ensured the long-term stable operation of the project.

Engineering Excellence · Sustainable Future



Project Site: CGN Zhaoyuan Offshore PV Farm



Company Strength

PRODUCTION PROCESS



Strong Manufacturing

Three major production bases with an annual PV mounting capacity of 500,000 tons.



Advanced Equipment

Equipped with automated lines: CNC laser cutting, intelligent robotic welding.



Authoritative Certifications

ISO9001, ISO14001, ISO45001 certified international quality management systems.



R&D Innovation

Numerous invention & utility model patents; participates in industry standard formulation.

Committed to delivering stable, reliable products and services through technological innovation and manufacturing excellence.



Thank You



Philip Dong



philipdong802@gmail.com

sales@guardrail-solar.com



+86 13105318619(Phone/WhatsApp)



www.guardrail-solar.com



Please send us your drawings, and we will provide you with a satisfactory cost optimization solution.