

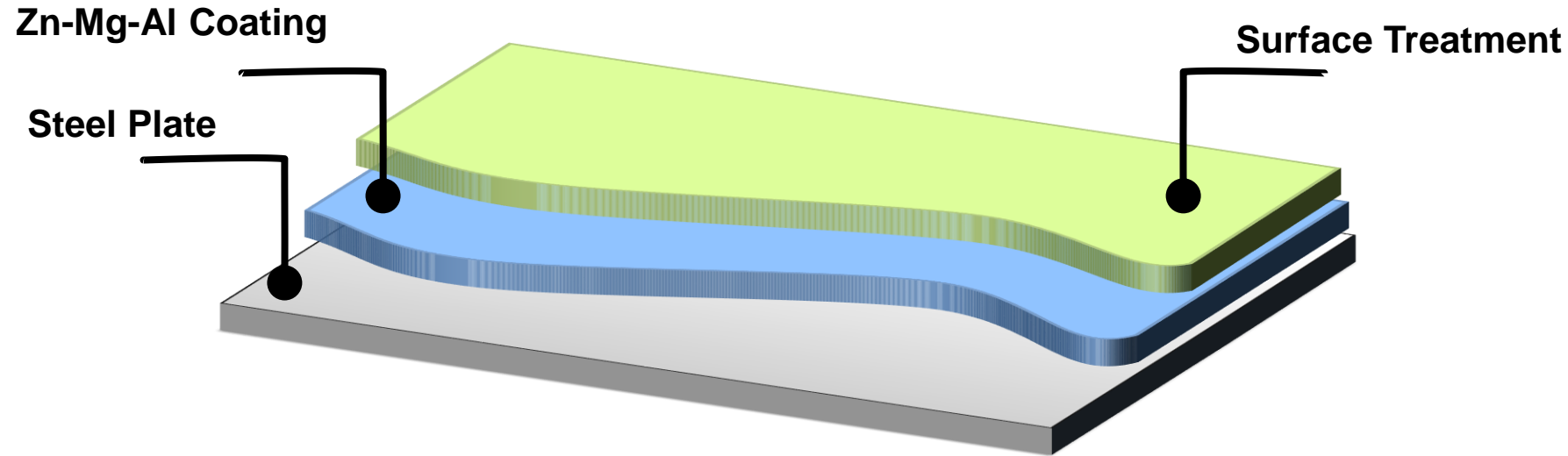
Brief Introduction of Zn-Mg-Al Alloy Product Development

Galvanized Zn-Mg-Al plate is an upgraded product of galvanized zinc plate. After upgrading, the corrosion resistance is correspondingly improved. Commercialization began in Japan in the 1990s.

After the 21st century, the industrialization of Zn-Mg-Al industry has developed rapidly. Major steel mills such as Europe, South Korea, Japan, and Australia have introduced their respective Zn-Mg-Al steel products. The coating composition and product characteristics have been differentiated and subdivided, and widely used in agriculture, construction, roads, railways, electrical equipment, civil buildings, home appliances, automobiles.

After 2014, various Chinese industry sectors began to invest in Zn-Mg-Al alloy products. However, the standards used are still implemented according to international standards.

Zn-Mg-Al Coated Product Introduction



Long Service Life : The corrosion resistance is more than doubled

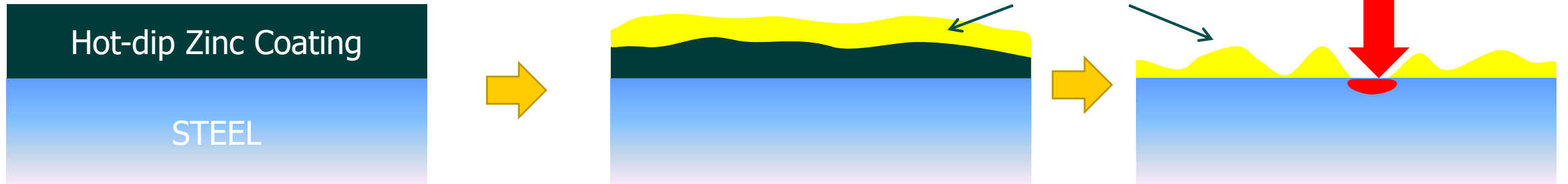
Low Coating Weight: Coating weight can be reduced by a third

Full Life Cycle Cost Reduction: Save maintenance costs

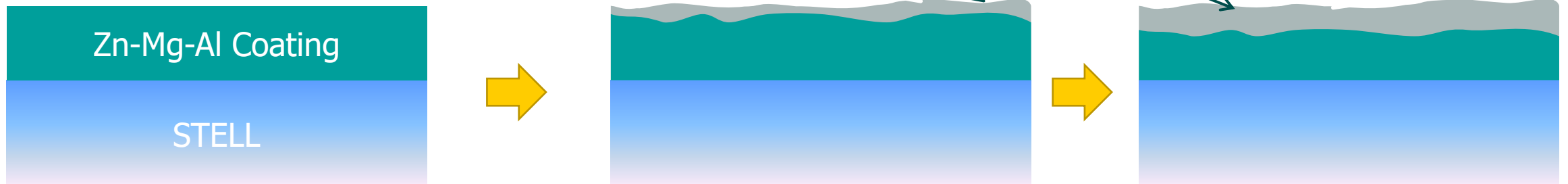
Zn-Mg-Al Coating Corrosion Resistance

Magnesium (Mg) in the coating is beneficial to delay the increase in the cathode pH value during the corrosion process, and promote the formation of very stable and well-structured oxides-chlorohydrate ($\text{Zn}_5(\text{OH})_8\text{Cl}_2 \cdot \text{H}_2\text{O}$), basic zinc carbonate As well as aluminum oxide, these oxides form a stable double-layer hydroxide protective film on the surface of the coating, thereby ensuring excellent corrosion resistance.

Zinc Oxide-based White Rust & Red Rust

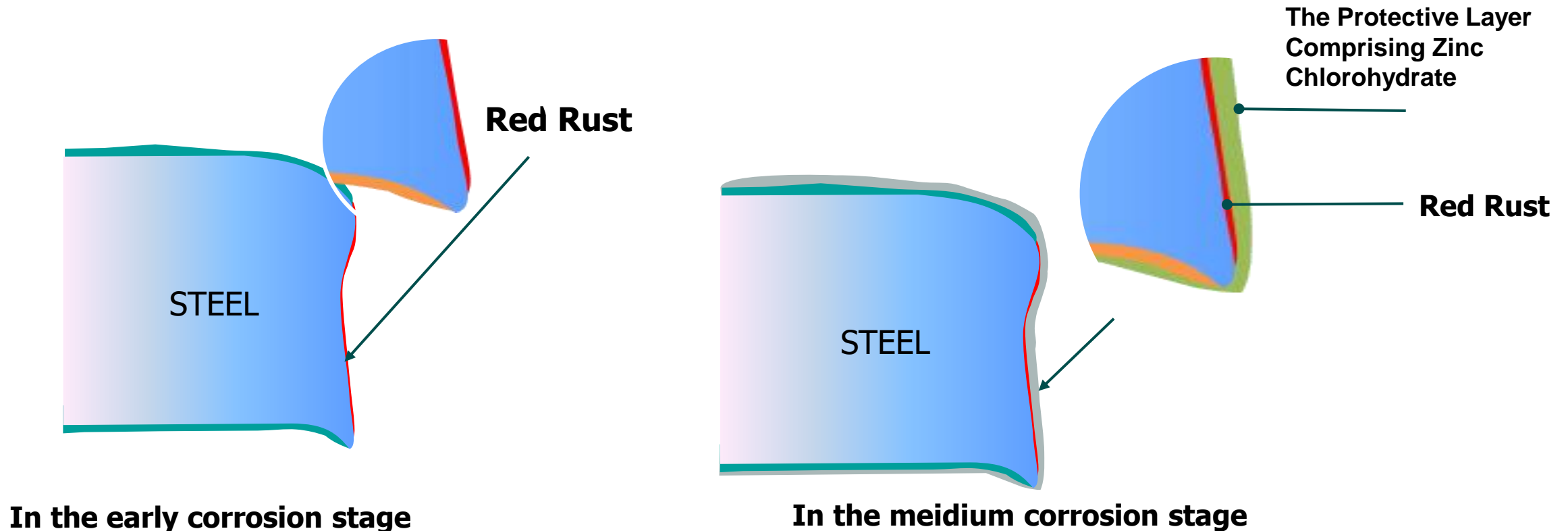


The Protective Layer Comprising Zinc Chlorohydrate

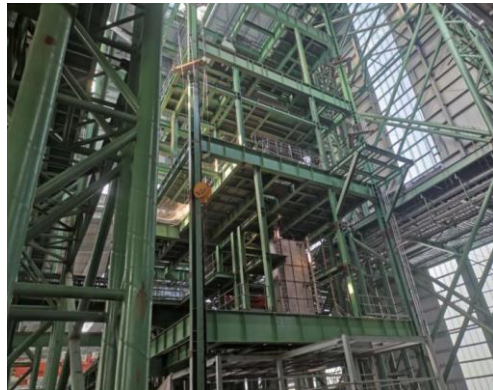
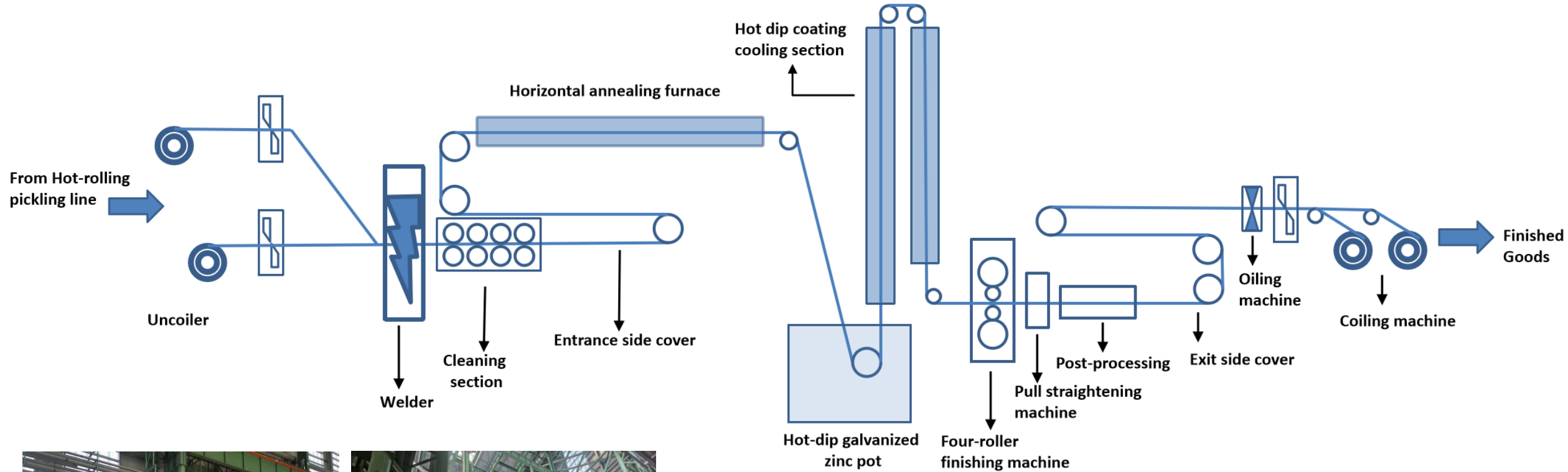


Zn-Mg-Al Coating Corrosion Resistance

The cut part of the steel plate processing is exposed to the air, which is prone to red rust corrosion. However, the alloying elements in the coating on the surface form water-soluble ions in the atmospheric corrosive environment. As the liquid film flows, it gradually covers the incision, forming a stable protective film, covering the red rust at the incision position, and significantly improving the corrosion resistance of the incision.

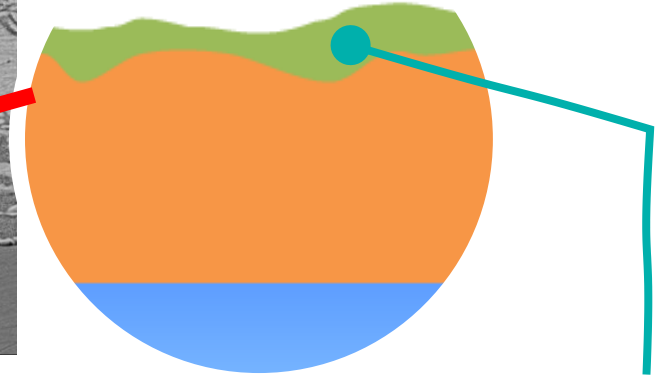
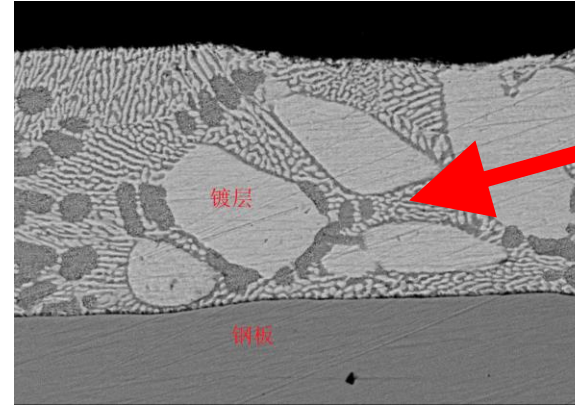


Manufacturing Process

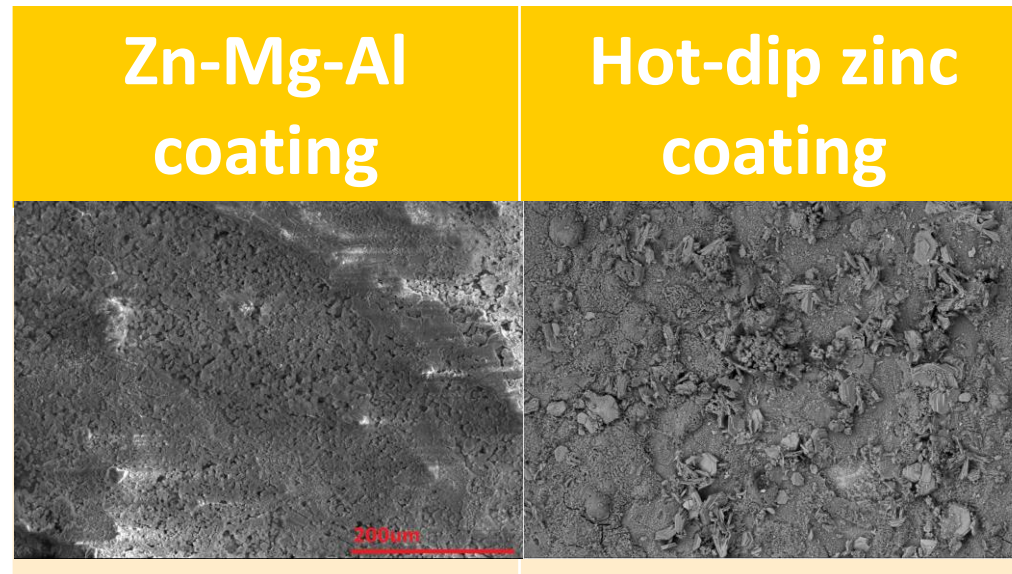


Quality Characteristics

The magnesium (Mg) in the zinc-aluminum-magnesium coating is beneficial to delay the increase the pH value of the cathode during the corrosion process, and promote the formation of a very stable and well-structured oxide-chlorohydrate ($\text{Zn}_5(\text{OH})_8\text{Cl}_2 \cdot \text{H}_2\text{O}$), alkali Formula zinc carbonate and aluminum oxide, etc., these oxides form a stable double-layer hydroxide protective film on the surface of the coating, thereby ensuring excellent corrosion resistance.



Dense protective film

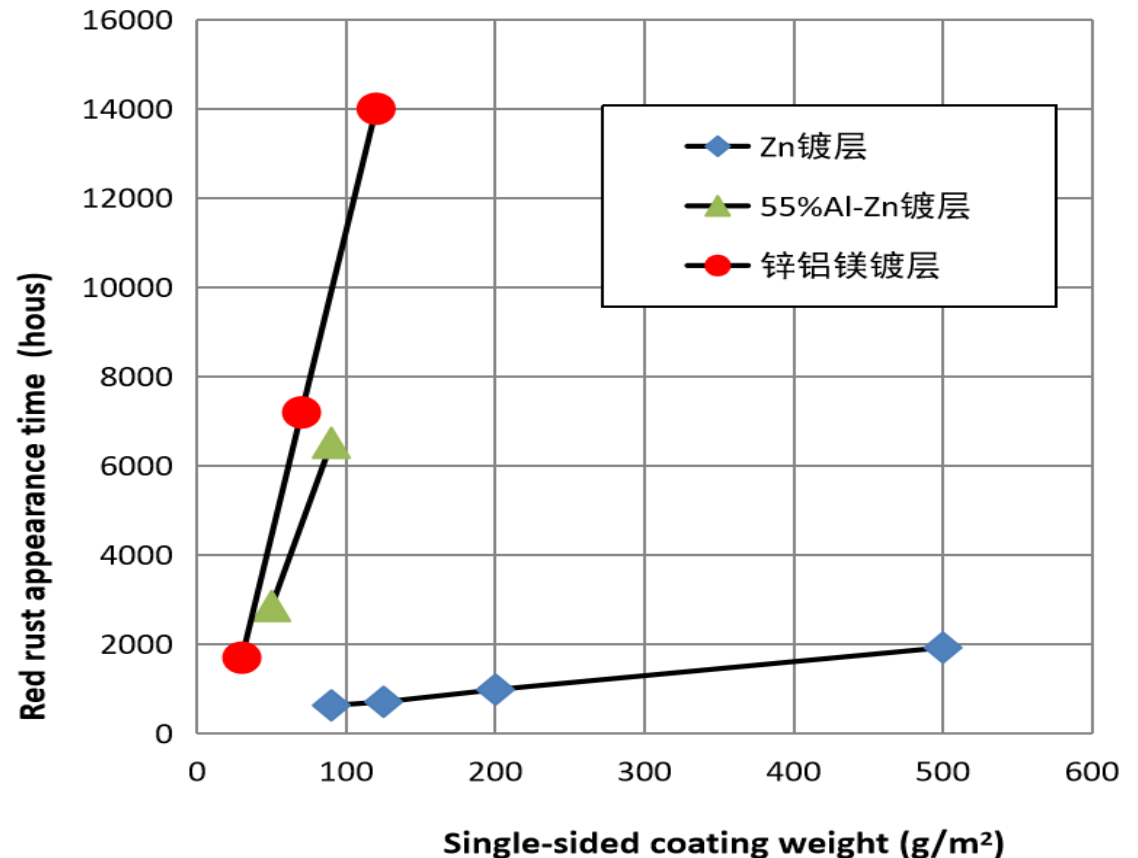


Quality Characteristics

Neutral salt spray test

The experimental results show that the zinc-aluminum-magnesium coating has better red rust corrosion resistance than hot-dip galvanizing and hot-dip galvanizing of Zn-%55 aluminum alloy.

Time of occurrence of red rust on various coated steel plates in salt spray test



Quality Characteristics

Acid and alkali corrosion resistance

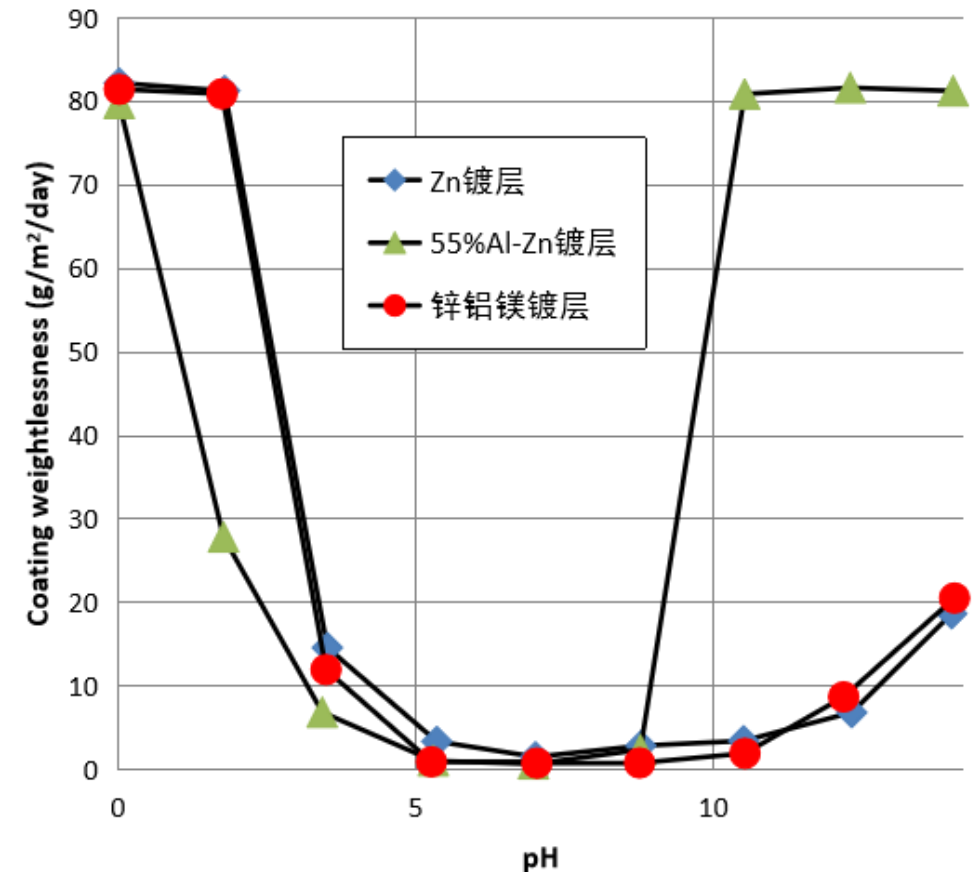
The experimental results show that the zinc-aluminum-magnesium coating has good corrosion resistance in alkaline solutions.

Test methods

Solution: Take the Na_2SO_4 aqueous solution containing 1g/L as the basic solution for the test. Add H_2SO_4 to the acid resistance test, and add NaOH to the alkali resistance test to control the pH value between 0-14 for debugging.

Put the sample (n=3) in the solution of each pH value of 30°C after debugging and soak for 24h, and then calculate the corrosion weight loss. The cut and back of the test specimen are protected by sealant.

Corrosion weight loss of various coated steel sheets in acid and alkaline aqueous solutions
(coating weight: 80/80 g/m², no treatment)



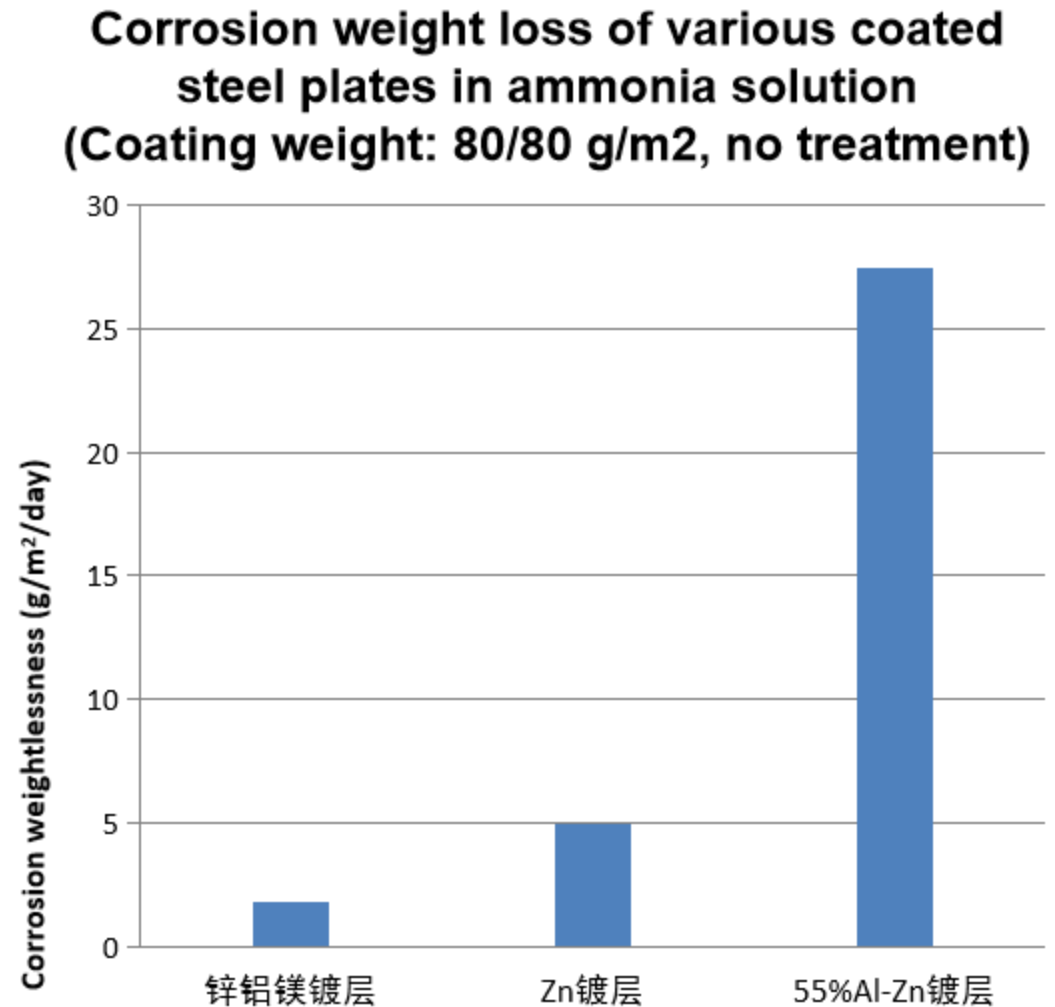
Quality Characteristics

Ammonia resistance

The experimental results show that zinc-aluminum-magnesium coating has better ammonia resistance than pure zinc coating and GL coating.

Test methods

After being immersed in 5% ammonia water at 22° C for 24h, the corrosion weight loss was measured. The cut and back of the test specimen are protected by sealant.



Quality Characteristics

Sulfur dioxide resistance

The experimental results show that the zinc-aluminum-magnesium coating has better resistance to sulfur dioxide than the pure zinc coating.

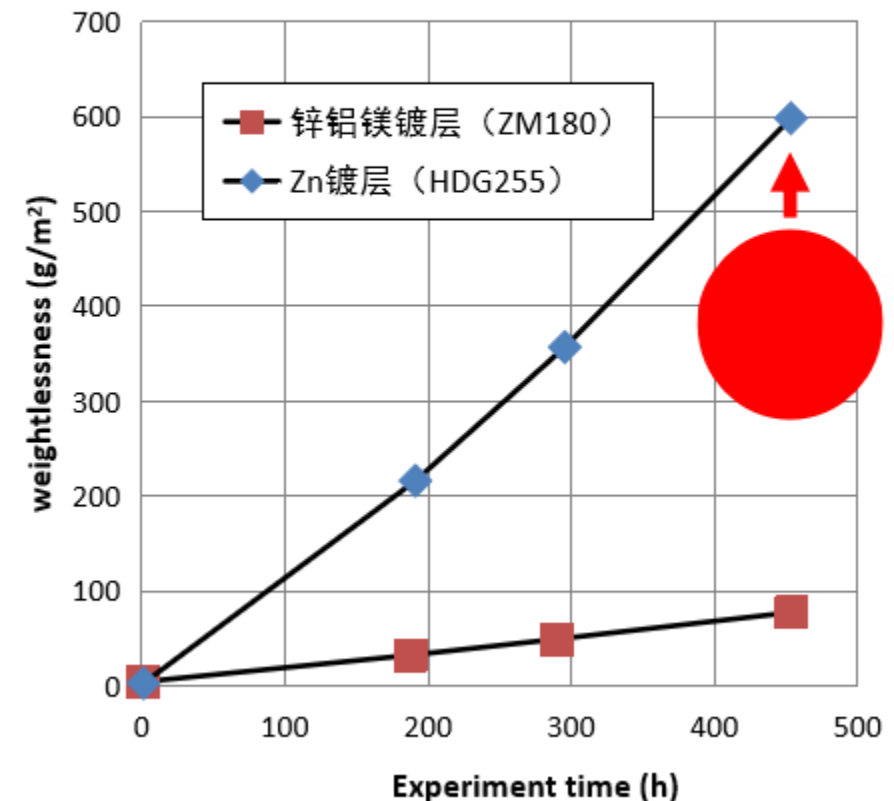
Test conditions

Sulfur dioxide concentration: 100ppm

Test temperature: 40°C

Relative humidity: above 98%

Corrosion weight loss of various coated steel plates in sulfur dioxide



Quality Characteristics

Acid rain resistance

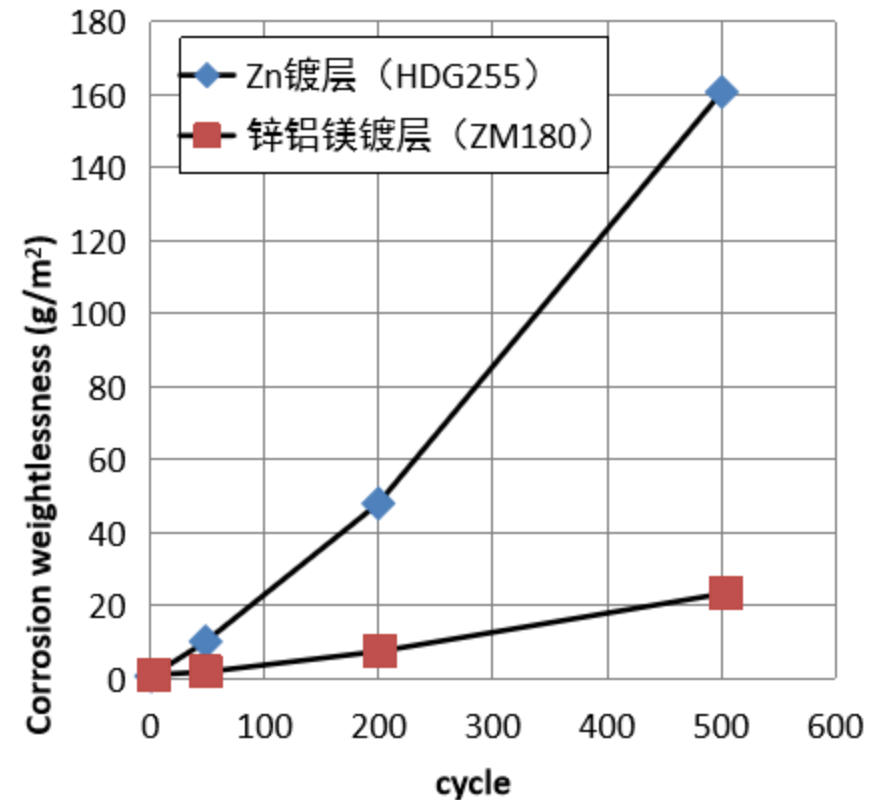
Test condition

Simulated acid rain spray for 1
hour, 35°C, pH=4

Dry, 4 hours, 50°C, RH=30%

Humidity, 3 hours, 50°C, RH=98%

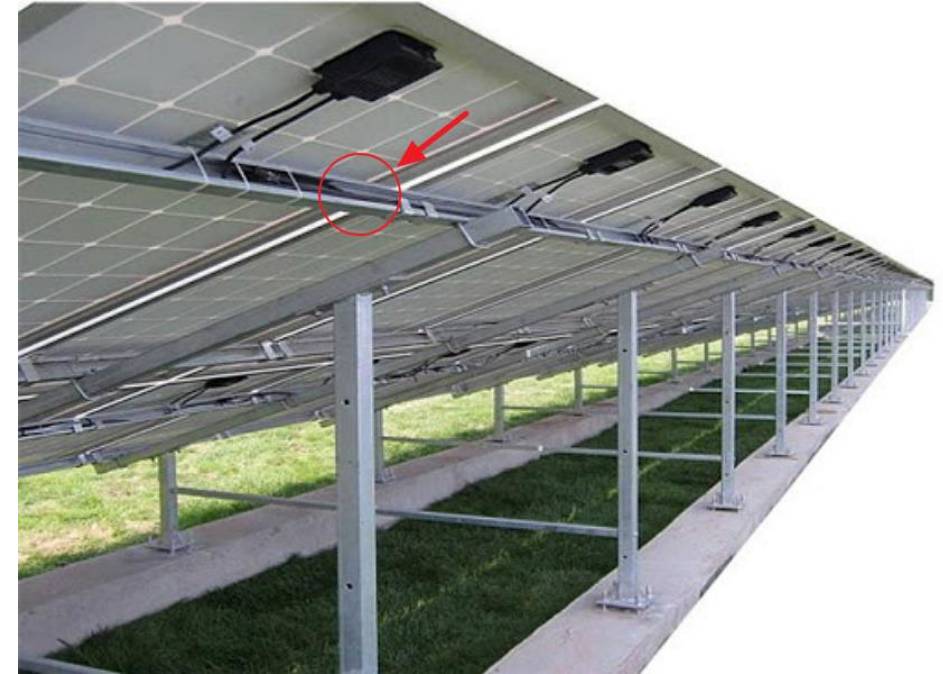
Corrosion weight loss of various coated steel plates in acid rain



Application



House truss



Solar brackets

承诺书

各位用户：

首钢京唐钢铁联合有限责任公司对用户郑重承诺如下：

首钢结构用锌铝镁镀层产品是首钢锌铝镁系列产品家族的一员，钢结构用锌铝镁镀层产品（符合 YBT 4761-2019、JIS G3323-2012、AS 1397-2011 中的 ZM 镀层、ASTM A1046/A1046M-2014 中的 type 1 镀层标准），自出厂之日起，在钢结构用途的正常加工和使用条件下，可以保证达到：

1. 30 年内，不会出现红锈
2. 35 年内，不会出现腐蚀穿孔

特别说明：

1. 正常储运和使用条件的含义如下：

- ① 在通常的气候条件下，且距离重工业和海岸线 1000 米以外
- ② 使用温度不超过 100℃
- ③ 用于首钢生产的镀层重量不低于 275 g/m²（双面）的结构用锌铝镁镀层产品
- ④ 钢板表面不存在腐蚀异物

2. 本承诺书不对下列情况造成的损伤进行保证：

- ① 加工前后或加工过程中镀层受到机械或化学损伤
- ② 深冲压导致镀层减薄
- ③ 与不匹配的惰性物质接触（如铅、石墨、铜合金、不锈钢等）
- ④ 长时间与沉积物、铁屑或者油污接触
- ⑤ 与长期潮湿混凝土和木材接触
- ⑥ 受其他不可控或不可预见的人为或自然灾害的影响

用户须知：

本质量承诺自生效之日起，用户必须提供下列完整的可追溯资料：

- ① 合同号、钢卷号
- ② 工程竣工验收记录
- ③ 原始钢卷采购凭证
- ④ 其他必要的资料文件等

本承诺书即日起生效，最终解释权归首钢京唐联合钢铁有限责任公司制造部。

首钢京唐钢铁联合有限责任公司制造部

2020 年 9 月

30 years warranty for Steel Structure

Relating to the quality of zinc-aluminum-magnesium alloy coated steel in accordance with specifications including QSGJS 0014-2020, YBT 4761-2019, JIS G3323-2012, AS 1397-2011, and type 1 in ASTM A1046/A1046M-2014, this warranty covers the steel structure integrity of hot-dip zinc-aluminum-magnesium alloy coated steel sheet, coated with 275 g/m², used for steel structure for a period of 30 years without red rust and a period of 35 years without perforation, from the date of shipping by Shougang Jingtang United Steel Co., Ltd.

Application conditions

- (1) Situated in areas with a distance of at least 1,000 meters from the seafront and without heavy industrial pollution (atmospheric corrosivity category C5 for steel from EN ISO 12944-2: 2017).
- (2) Temperature does not exceed 100℃.
- (3) Exposed to moderate corrosive emissions, in other words excluding the fallout of corrosive chemical products, deposits or particles of heavy metals such as lead, copper or stainless steel, alkaline products such as ash, impregnated wood, wet insulation materials such as graphite, scrap, soil, animal excrement or oil.
- (4) Without mechanical or chemical damage on the coating.
- (5) Without feed layer thinning due to deep stamping.
- (6) Without the effects of other uncontrollable or unforeseeable disasters or natural disasters.

All warranty claims should be sent as soon as possible in detail the precise identification of the materials deemed to be non-compliant, including the order number, the invoice number, the coil number, the shipping date and the installation date and project acceptance record.

Final interpretation right belongs to Shougang Jingtang United Steel Co., Ltd. Manufacture Division.

Shougang Jingtang United Steel Co., Ltd. Manufacture Division

Sep 2020