

Zinni® AL 450

Alkaline zinc nickel electrolyte with energy saving capabilities



General Metal Finishing

Corrosion protection coatings

atotech.com



The solution combining optimal thickness distribution with highest productivity

Production proven process

Zinni® AL 450 is one of the most-used alkaline zinc nickel plating processes worldwide. Thanks to its outstanding performance and high productivity, Zinni® AL 450 is particularly suitable for throughput-driven mass production.

Easy to use

The streamlined process control of Zinni® AL 450 is one of the many reasons for its success. Unlike other comparable processes, Zinni® AL 450 only requires a three-additive system for daily adjustments and maintenance. This simplification significantly reduces potential sources of error, making the process more robust. Zinni® AL 450 has been approved by several global automotive OEMs and fastener Tiers.

Features and benefits

- Alkaline ZnNi barrel process with improved carrier system
- Improved Zn working window without HCD burnings (± 1.5 g/l Zn)
- Very good throwing power
- High thickness in very low current density
- Homogenous appearance within 13 – 15% Ni
- Low Ni-concentration (1 g/l \pm 0.2 g/l) in electrolyte for improved cost
- Reduces energy consumption

High-efficiency alkaline zinc nickel electrolyte



Figure 1: Zinni® AL 450 shows homogeneous thickness distribution and deep throwing power even in LCD areas inside of a sleeve (cross-cut).

Figure 2: Competitor alkaline ZnNi electrolyte process shows insufficient and amorphous plating in LCD area.

Figure 3: Tubed part with narrowed area and cross-cut section exhibiting excellent throwing power and thickness distribution of Zinni® AL 450 with thickness increase up to 1.3 µm

Homogeneous thickness distribution and high throwing power

Figure 1 shows the optimal throwing power of Zinni® AL 450. Even in very low current density areas, such as the inside of a sleeve, Zinni® AL 450 provides sufficient layer thicknesses – which other comparable processes have difficulties to achieve. This is evidenced by the dark amorphous deposits shown in Figure 2. The high throwing power and excellent thickness distribution of Zinni® AL 450 can be witnessed in Figure 3, especially at the narrowed area of the tubed part. In this area, the thickness was increased from 0.8 to 1.3 µm under comparable plating conditions. The perfectly balanced Zinni® AL 450 electrolyte is highly resistant to burnings. It tolerates a zinc concentration of ±1.5 g/l without the need to adjust the carrier system providing greater flexibility for the zinc dissolution tank.

A process with high energy saving potential

Zinni® AL 450 contributes significantly to reducing energy consumption and related costs. In customer production using a large barrel plating line, chemical and energy consumption as well as the plating time of a standard alkaline zinc nickel electrolyte were compared to Zinni® AL 450. The measurements were taken at full production capacity under similar plating conditions requiring the same deposit properties after 800 Ah/l.

After a bath age of 800 Ah/l, the performance of the Zinni® AL 450 process was still close to that of the new make-up. With Zinni® AL 450, the energy consumption decreased by 50% and the plating time to 33 minutes. This result proves that when Zinni® AL 450 is used in large barrel lines, the barrel load can either be increased or the plating time for each barrel can be reduced.

| Electrolyte | V | A | Zn | Ni | NaOH [g/l] | Plating time [min] | Power consumption [kW/h] |
|--------------------------|---------|-----|------|-----|------------|--------------------|--------------------------|
| Conventional electrolyte | 11 – 13 | 180 | 10.5 | 1.9 | 144 | 51 | 1.836 |
| Zinni® AL 450 | 6 – 8 | 215 | 7.3 | 1.2 | 137 | 33 | 0.827 |

Parameters for both applications:
 Plating speed after 800 Ah/l bath lifetime
 Barrel loads: 15 kg
 14 – 16% nickel incorporation at a thickness of 6 – 8 µm

