

Project Profile

Evaporator Saves Electroplater Millions in Disposal Costs

The Facility

The AK Steel Middletown Works plates zinc nickel alloy onto steel strip. They started up their first plating line in 1991 and expanded from twenty-one to thirty-two cells in 1995.

Project Overview

In order to maximize line speed and thus the production, the strip needed to be rinsed immediately after plating. The rinse water diluted electrolyte solution and a portion of the electrolyte had to be disposed to maintain the required electrolytic balance in the solution. The excess diluted electrolyte could not be discharged locally, so it had to be trucked away.

AK Steel needed a system to remove the excess water to allow all of the electrolyte to be recycled. They wanted an energy efficient system that was easy to operate with minimal attention. The system was also required to eliminate the high disposal costs.

Aqua-Chem ICD delivered the system equipment in five months. Based on the detailed drawings provided, the system was installed in less than two months. Commissioning followed and the system was operating and passed performance test in less than eight months from order placement

Scope of Service

Aqua-Chem ICD worked closely with AK Steel to design the best possible system for their needs. After a thorough evaluation of all possible evaporator types and energy sources, Aqua-Chem ICD proposed a vertical-tube falling-film evaporator with thermal vapor compression. The system features provides the following benefits:

- Low steam and cooling water consumption to minimize operating costs.
- Automatic “one-button” start-up, shut-down, and operation to virtually eliminate operator time.
- High reliability with simple components to reduce maintenance requirements.
- Fast equipment delivery and ease of installation to eliminate the electrolyte disposal costs.
- Provide high purity distillate at less than five mg/l TDS to be used for plating rinsewater without further treatment.



Design Water Analysis

Maximize Evaporator Rate	100 gpm (25 m ³ /hr)
Distillate Purity	5 mg/l
Feed pH	1-2
Feed Solids (by weight)	15 – 22%
Design Operating Temp	145°F (63°C)
Maximum Steam Required	23,600 lb/hr (10.7f/h)
Maximum Cooling water Requirement	2,550 gpm (580 m ³ /hr)

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Process Flow Diagram

