



## Ch 15 – Chemical Effects of Electric Current

### Case Study

#### **Title:** Electroplating Woes

**Background:** ABC Electronics is a leading manufacturer of electronic components. In order to enhance the aesthetic appeal and corrosion resistance of their products, they use electroplating processes extensively. Electroplating involves the deposition of a thin layer of metal onto the surface of a substrate using electric current.

**Scenario:** ABC Electronics has been facing a series of quality issues with their electroplating process. The products are exhibiting inconsistent coating thickness, poor adhesion, and premature corrosion, leading to increased customer complaints. The production team suspects that the problems are related to the chemical effects of electric current during the electroplating process.

#### **Objectives:**

Identify the root causes of the electroplating issues.

Implement corrective measures to improve the quality and reliability of the electroplated products.

**Investigation and Analysis:** The team starts by thoroughly examining the electroplating setup and process parameters. They find irregularities in the current distribution across the plating bath, suspecting that some areas receive higher current density than others. This inconsistency is causing uneven deposition and affecting the coating quality.

Further investigation reveals that the electrolyte solution used for electroplating has become contaminated with impurities over time. The contaminants are affecting the chemical reactions occurring at the anode and cathode during the electroplating process, leading to inconsistent results.

#### **Corrective Measures:**

**Bath Maintenance:**

The electrolyte bath is thoroughly analyzed, and contaminated solutions are replaced.

Regular maintenance schedules are established to monitor and control impurity levels.

Improved Anode and Cathode Configuration:

The team modifies the anode and cathode configuration to ensure uniform current distribution.

Additional anodes are strategically placed to address localized high current density areas.

Process Control and Monitoring:

Implement real-time monitoring systems to track current distribution and adjust parameters as needed during the electroplating process.

Conduct regular audits to ensure adherence to process controls.

Employee Training:

Train operators on the importance of maintaining the electrolyte solution, recognizing signs of contamination, and adjusting process parameters.

Results: After implementing the corrective measures, ABC Electronics observes a significant improvement in the quality of their electroplated products. The coating thickness becomes consistent, adhesion improves, and instances of premature corrosion decrease. Customer complaints decrease, and the company re-establishes its reputation for delivering high-quality electronic components.