

# INVESTIGATION OF THE DEGREASING PROCESS TO IMPROVE ADHESION BETWEEN OXIDIZED GALVANNEALED COATING AND ELECTROPLATED NICKEL

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## ABSTRACT

To protect the base metal from corrosion, different types of coating systems and coating process are an area of continuous development. Galvannealed (GA) coating is one of the most suitable coated sheet to satisfy the requirement in automobile industry. It was observed that the zinc starts to oxidise or corrode during transport or storage time. To delay this oxidation or corrosion of zinc, a secondary coating is being given after GA sheet production, that is also improve certain properties of the GA coating like, welding, high temperature performance etc. Many times, it is seen that the adhesion of secondary coating like electroplating deteriorates due to use of older and oxidized GA sheets. Generally, before electroplating, the GA sheet was cleaned by convention degreasing (Ammonium chloride-  $\text{NH}_4\text{Cl}$ , pH 4.0) process. In this present work, it was investigated that zinc oxide layer (i.e. corroded zinc) was formed on top of older GA surface cannot be removed or dissolved by conventional alkaline solution. This has resulted in poor adhesion between GA and secondary electroplated coating. Those secondary coating peeled off during high temperature process and  $90^\circ$  bend test. In this work, modifications were done during degreasing process which improve the adhesion of secondary electroplated coating. High concentration degreasing solution (pH 12.5) was used and the dipping time of the sample into the degreasing solution was increased from 20-30 sec to 40-90 sec. This enhances the dissolution of the zinc oxide layer from top of the GA coating and improves the adhesion between GA and electroplating coating. Ni anode, conventional Watt's bath and current density  $400 \text{ A/m}^2$  for 5 & 8 minutes were maintained for electroplating. Ni coating thickness was maintained 3-6  $\mu$ . Coating thickness, cross-section, compositional analysis was done by using scanning electron microscopy (SEM), adhesion was checked by high temp  $90^\circ$  bend test, Additionally the wettability property also improved (turns hydrophobic from hydrophilic) due to Ni electroplating which was confirmed by contact angle instrument.

**Keywords:** Oxidised galvannealed, coating adhesion, Ni electroplating, high concentration degreasing solution, high temp process, hydrophobic, contact angle.

