

## CHROMATE CONVERSION COATING ON ZINC PLATING

S. KRISHNAMURTHY\*

*Formerly Chief Chemical Technologist, Indian Telephone Industries Ltd.  
Bangalore, India*

*(Received 16 November 1981)*

Irrespective of the type of plating adopted, the plated component is almost universally treated with some type of post plating process for improved corrosion resistance, appearance or any other specific reasons. Chromate conversion coatings are produced by dipping the zinc plated components in an acidified chromate/chromic acid solutions. Chromate coatings are protective films formed on metal surfaces by the reaction with aqueous solutions containing hexavalent chromium and active radicals. The chromate film improves the bonding of paint on the zinc surface, apart from the protection from corrosion. Storage of zinc plated parts in a warehouse during periods of high humidity or the packages of such products in boxes made of unseasoned wood or damp paper stock causes corrosion of zinc deposit, producing 'white rust.' These white products impair the operations of certain types of telecommunication equipments such as relays and switches. For such applications chromate coatings are used to retard the corrosion of zinc plated parts. Even in spite of chromate passivation, some components develop corrosion. There are a number proprietary chromating solutions. During the immersion process, zinc is attacked by the mineral acid with an attendant rise in  $pH$  of the solution next to the metal. At the same time hexavalent chromium is reduced to trivalent state. At a critical  $pH$  the trivalent chromium and hexavalent chromium are co-precipitated on the zinc surface. Generally, about a micron of zinc is dissolved during this process. There are a number of methods of evaluation of conversion coatings—salt spray, humidity, ISO standards for hexavalent chromium content, water immersion tests and the latest electrochemical tests. In this paper, an attempt has been made to assess the corrosion resistance of the conversion coating of zinc deposit and to evolve a process by which zinc plated and freshly chromated components can be handled in assembly line, after a reasonable hardening of the film, without damage to the chromate film and without impairing the protection afforded by the chromate film.

**Keywords :** Chromate Conversion Coating; Zinc Plating; Hexavalent Chromium; White Rust

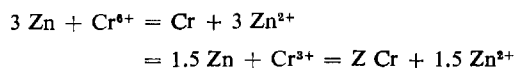
### Discussion

S. GURUSWAMY (*Central Electrochemical Research Institute, Karaikudi*) : There is a recent reference by a Japanese technician who says that the corrosion resistance of chromium plating is increased by electroorganic coating over chromium. Any comments please ?

\*Consulting Chemical Technologist, Shubodaya, 38, XI, Main Road, Bangalore-560 055.

S. KRISHNAMURTHY : This is well known and transparent coatings are used as a standard process in industry.

A. V. GORODYSKY (*Institute of General and Inorganic Chemistry, Ukrainian SSR Academy of Sciences, Kiev, USSR*) : For what purpose hexavalent chromium is applied for exchange process with Zn,



S. KRISHNAMURTHY : Hexavalent chromium does not replace zinc. Hexavalent chromium is formed on the surface of zinc (less than  $\frac{1}{2}$  micron) as a surface conversion and protects the steel by the well-known inhibiting action of chromate in moist condition. Further it improves the appearance. Hence, this has been accepted as a standard process for zinc plating.