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NASA TECH BRIEF

Nickel/Tin Coating Protects Threaded Fasteners in Corrosive Environment

The problem: To provide an adequate corrosion-resistant coating for threaded fasteners used in corrosive environments. Cadmium and zinc have posed plating thickness control problems on complex surfaces such as threads and recessed socket heads.

The solution: A process by which parts are plated with 0.0001 to 0.0002 inch of electroless nickel and electroplating, over the nickel, 0.0001 to 0.0002 inch of tin.

How it's done: The electroless nickel is deposited by a conventional electroless nickel bath employing constant filtration. The tin is deposited from a bath containing 14 oz/gallon of potassium stannate and 2 oz/gallon of free potassium hydroxide. However, any electrodeposited tin such as from a fluoroborate or sulfuric acid bath, should produce an equivalent coating if thermally diffused. The use of diffusion is governed by the temperature of the corrosive environment to which the part is to be exposed. Diffusion is accomplished by heating the electroless nickel-coated workpiece to 485±10° F for two hours.

Notes:

1. Alloy steel fasteners treated with this coating have withstood 96 hours of salt spray without corrosive damage.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   P.O. Box 1537
   Houston, Texas, 77001
   Reference: B65-10398

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: James Charles and Lloyd Veeder
of North American Aviation, Inc.,
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