

October 1964

Brief 63-10612

NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Metals Plated on Fluorocarbon Polymers

The problem: Electroplating lead on fluorocarbon polymer (polytetrafluoroethylene) parts. Metals cannot be plated directly onto the surface of a fluorocarbon polymer.

The solution: Etching of the parts with sodium followed by successive depositions of silver and lead from ultrasonically agitated plating solutions.

How it's done: The parts are first cleaned in acetone, preferably with the aid of ultrasonic agitation. After masking portions not to be plated, the cleaned parts are immersed in an ultrasonically agitated organic solution of a sodium complex (which releases sodium when in contact with fluorocarbons) for a few minutes. The parts are periodically removed from the etching bath and inspected for satisfactory etch, as indicated by a uniform tan color on all exposed surfaces. After etching is completed, the parts are removed from the solution and rinsed with water. All masking tape is then removed, and the parts are successively washed under ultrasonic agitation in 10% sulfuric acid, distilled water, acetone, benzene, and again in acetone, and finally dried in an oven at 100°C.

The dried parts are silvered using Brashear's process (silver deposition from ammoniacal solution) with ultrasonic agitation of the solution. The silvering operation is preferably performed three times in order to ensure a satisfactory layer for electrodeposition of the lead. Silver deposited on unetched portions of the parts is easily rubbed off.

Lead is then plated onto the silvered surfaces from an ultrasonically agitated lead fluoborate bath. When a sufficiently thick coating has been deposited, the parts are removed, washed in water, and dried in an oven at 100°C. The lead plating may then be burnished to a smooth shiny surface; the burnishing and plating may be repeated as necessary to produce a uniform, pit-free surface.

Notes:

1. Metals other than lead may be electroplated on the silvered fluorocarbon parts. The metal plating can serve as an electrical conductor and permits bonding of the fluorocarbon polymer parts by soldering.
2. The lead coating is particularly impermeable to nitrogen tetroxide and other strong oxidizing agents.
3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California, 91103
Reference: B63-10612

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

Source: Stephen P. Vango, John B. Krasinsky, and Hadley Ford (JPL-544)