

# NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

## Nondestructive Test Method Accurately Sorts Mixed Bolts

### The problem:

To develop a nondestructive test method of sorting copper plated steel bolts from nickel plated steel bolts. Large quantities of steel bolts had been received from vendors for installation on the Saturn IC stage. A portion of these bolts were copper plated and then cadmium plated; the others were nickel plated and then cadmium plated. Laboratory environmental corrosion tests indicated that the copper subplate was deleterious and presented a serious corrosion problem. Corrosion could occur if there were cadmium discontinuities, porosity, surface breaks, scratches, cuts, etc. All bolts presented a very similar appearance. Various X-ray techniques including absorption, backscatter, etc., were tried but were unsuccessful.

### The solution:

A method using neutron activation analysis. Copper and nickel plated steel bolt specimens of the same configuration are irradiated with thermal neutrons in a test reactor for a short time.

### How it's done:

After thermal neutron irradiation, the bolts are analyzed using scintillation energy readout equipment. The bolts having copper plating show a copper peak at 0.51 Mev as distinguished from Ni at 0.848 Mev.

### Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B66-10574

### Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: C. J. Dezeih  
(M-FS-1426)

Category 01