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Chemical Milling Solution Produces Smooth Surface Finish on Aluminum

The problem:

To provide an etchant that will chemically mill end-grain surfaces on 7075-T6 aluminum plate with the least amount of thickness variation and pitting. Commercially available etchants do not produce the required end-grain surface finish.

The solution:

An etchant composition containing the following technical grade reagents in ounces per gallon of water: 24 to 36 sodium hydroxide, 16 to 32 sodium meta-aluminate, 12 to 24 sodium sulfide, 0.5 to 1.5 sulfur, and 0.04 to 0.08 sodium gluconate (wetting agent).

How it's done:

The elementary sulfur is thoroughly mixed into a solution of the caustic soda and salts. The preparation is applied at a temperature of 150° to 160° F to the surface to be etched.

Notes:

1. Tests have shown that this etchant is capable of removing 30 mils of aluminum from the end grain of 7075-T6 aluminum plate in approximately 1 hour, leaving an essentially pit-free surface. This etchant was found to be superior to a large number of commercial as well as experimental acidic and

alkaline etchants with respect to the surface finish obtained.

2. The sulfur and sulfide contents of the etchant, which are depleted (together with the sodium hydroxide) by reaction with the aluminum and by oxidation by the air during agitation or storage, must be replenished in the proper proportions to produce the desired results in routine usage. However, analytical control procedures for these constituents have not yet been developed.
3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B66-10312

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: H. C. Lorenzen, et al
of North American Aviation, Inc.
(MSC-549)

Category 03