

NASA TECH BRIEF



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Coating Protects Magnesium-Lithium Alloys Against Corrosion

A coating applied in accordance with the following procedure will protect newly developed magnesium-lithium alloys against corrosion:

1. Heat the ingots to approximately 450°F (450° to 500°F) in a commercial nitrate-nitrite fused salt bath to which 0.5 percent by weight of sodium dichromate is added.
2. Remove the ingots from the bath and roll to the desired plate or sheet thickness at 450° to 500°F. The alloy is kept at this temperature by heating in the salt bath between passes.
3. If a higher rolling temperature (e.g., 600°F) is mandatory, then the ingots should be heated in air to 600°F, rolled to just over the desired thickness and then dipped in the 450°F salt bath immediately before making the final rolling pass.
4. After rolling operations are complete, the alloy is given a final 10 to 15 minute dip in the 450°F salt bath to repair any surface scratches introduced into the coating.

The coating, which is black in color, is very tough at room temperature. It is adherently bonded to the metal, and cannot be removed by peeling, scraping, or chipping. It is very thin and ductile, and does not increase alloy density. X-ray fluorescence analysis revealed that chromium was the major constituent in the coating. As expected from its dull black color, the coating has a very low light reflectance.

A slurry of TiO_2 and Al_2O_3 in water with a potassium silicate binder proved to be excellent for a top-coating on the black coating for the purpose of providing high reflectivity. No special pre-treatments are

necessary. The slurry is merely brushed or sprayed on the black coating and allowed to dry. Drying is accomplished in only a few minutes and post heat treatment is unnecessary.

The black coating is apparently an excellent base for any paint, and by itself fully protects the magnesium-lithium alloy from corrosion in a 3 percent sodium chloride solution.

Note:

Other protective coatings for the magnesium-lithium alloys are described in NASA SP-5068, "Properties and Current Applications of Magnesium-Lithium Alloys", available from the U.S. Government Printing Office, Washington, D.C. 20402; price 40 cents. Inquiries may also be directed to:

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Reference: B67-10149

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No patent action is contemplated by NASA.

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