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O T T A W A

July 27, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1914.

Preferred Method of Applying a  
Corrosion-Resistant Coating to  
Used Magnesium Parts.

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Background:

A request was received from Colonel E. C. Thorne of the Directorate of Engineer Development, Department of National Defence (Army), Ottawa, Ontario, asking that an investigation be made of methods of removing a protective coating from used magnesium bridge parts and of applying a new protective coating to the parts.

The parts previously had been given the hydrofluoric acid-dichromate (sometimes known as the Dow No. 7) treatment. Then some of them were painted with Zincrosel primer followed by

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(Background, cont'd) -

top coats. The others were painted with zinc chromate primer, followed by top coats. The assembled parts contained some aluminium, steel, and (in some cases) tygon, as well as magnesium.

Possible Alternatives:

The following alternatives appeared to be possible:

- I. Entirely remove the old coating from the magnesium, then either
  - (a) apply a new hydrofluoric acid-dichromate coating and follow it with zinc chromate primer and top coats,
  - or
  - (b) apply a nitric acid-dichromate (sometimes known as Chrome Pickle) coating and follow it with zinc chromate primer and top coats.
- II. Remove all loose coating from the bridge parts. Then apply zinc chromate primer to the bare metal and follow that by a top coat over the entire surface.

EXPERIMENTAL WORK:

In investigating the feasibility of Alternative I the first step was to find a suitable method of removing the old coatings. After investigating several methods it was decided that the following would be most satisfactory:

Immerse the coated bridge parts in a boiling aqueous solution of trisodium phosphate, 60 to 100 grams per litre (8 to 14 oz./gallon), for 10 minutes, then remove any loose particles of paint with water from a hose.

After removing the coating by this method, a number of samples were given the hydrofluoric acid-dichromate treatment.

A satisfactory coating was produced on the magnesium, but the hydrofluoric acid attacked the aluminium parts violently. During the five minutes of treatment an average of 0.0036 inch of aluminium was removed from the surface of the aluminium hinges and rivets. This was enough to loosen the rivets in some cases. In addition, the bath tended to heat up, which further increased the rate of corrosion of the aluminium.

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(Experimental Work, cont'd) -

It is felt that the hydrofluoric acid-dichromate method should not be used, in view of this violent attack on the aluminium.

Satisfactory results were obtained when attempts were made to apply the nitric acid-dichromate treatment to the parts.

Conclusions:

It is concluded that either Alternative I(b) or Alternative II would be feasible.

Without a lengthy investigation it is difficult to determine which of these alternatives would give most satisfactory results in service. There can be no doubt that Alternative I(b) would be cheaper and less time-consuming. It should be added that the trisodium phosphate solution attacks the aluminium. However, the rate of this attack is much less than in the case of the hydrofluoric acid.

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