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October 19, 1943

To: J. Chipman

From: John P. Howe

In Re: Trip to Cleveland, Ohio, October 11, 1943

This is to report on the conference held on October 11th in which the progress of the coating work at the Grasselli Laboratories was reviewed. Those present were: A. S. Weygandt; J. C. Woodhouse; M. T. Goebel; L. R. Westbrook; A. G. Gray; J. P. Howe; E. R. Boller.

ELECTROPLATING - A. G. Gray

Gray summarized the progress in electroplating, much as is given in the weekly reports of the Technical Division. The main points were: Work is concentrated around iron plating. For this, ferrous ammonium sulfate bath is best and one requirement appears to be the absence of chloride ion. Various pre-treatments have been tried, including anodizing in 25% phosphoric acid, with no success, and anodizing in 10% trichloroacetic acid, with considerable success. The main uses for iron plates have been: (1) a base for the aluminum-silicon hot dip; (2) soldering; and (3) alloying by heat treatment followed by soldering. It appears that under favorable conditions, the iron plate does alloy to the base metal. Moreover, one specimen plated from the ferrous ammonium sulfate bath proved to be sufficiently adherent for the soldering process without heat treatment. The men working with the hot dip have found that aluminum-silicon applied over the iron plate contains approximately 0.1% more base metal than the melt.

The possible harm to the corrosion resistance of aluminum-silicon due to the presence of copper and tin which is used as a coat over the iron to aid in wetting was mentioned by the writer.

Some attention is being given to chromium plating aluminum caps to be used at the ends of slugs where wetting by a dipping melt might be undesirable.

HOT DIP - E. R. Boller

Aluminum-Silicon Coatings: A process for applying thick coats of aluminum-silicon to slugs was described by Boller. An outline of this, made by Woodhouse, is as follows:

- (1) Nitric acid pickle
- (2) Dip in alkali-chloride flux

CLASSIFICATION CANCELLED

DATE MAR 6 1989
For the Atomic Energy Commission

ROBERT L. JACKSON *RLL*
Chief, Declassification Branch

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- (3) Hot dip in alloy of 47% copper, 53% tin - temperature, 700°C - time, 22-25 seconds - thickness of coat, approximately 0.5 mil
- (4) Hot dip in tin - temperature, 400°C - time, 5 seconds
- (5) Centrifuge
- (6) Hot dip in aluminum-silicon - temperature, 620°C - time, 4 seconds - thickness, approximately 5 mils.
- (7) Lift from melt - place aluminum cap on each end - time, 2 seconds
- (8) Redip in aluminum-silicon - temperature, 620°C - time, 1 second
- (9) Roll on transite rollers - add weighed amount of aluminum-silicon, equivalent to 40-50 mils thickness which has been preheated to 800°C - time, 10 seconds
- (10) Quench

Considerable time was spent in discussing this process.

The writer asked that considerable time and attention be given to methods of testing the coat for porosity and uniformity of thickness.

It should be pointed out that in addition to the above steps, a final one of machining the coat to proper overall diameter and squaring of the ends is essential.

Woodhouse proposed that Boller write up his procedure in order that it may be presented as an alternative to jacketing and some decision as to the time and effort spent on it be made.

Such coats, when dissolved, yield a sludge due to the silicon content. When applied over bronze, as described, the coats dissolve slowly when this region is reached. A few tried over an iron plate have dissolved very easily.

Bonded Jackets: Little work has been done on the problem of bonding a jacket to a slug using the aluminum-silicon alloy due to the lack of slugs of proper size. A small furnace has been constructed to hold cans at the proper temperature while the slug is being inserted.

Woodhouse asked whether it was necessary to write up this procedure in order to have it considered along with other jacketing methods. The writer pointed out that Chicago had already asked that this method be studied and that it could be considered as a method, if it can be proven to work.

Corrosion Testing: A design has been made for a dynamic testing system along the general lines of the one in existence in Chicago. It is proposed to use a steam jacketed, glass lined tank for make-up, and a stainless steel pump together with aluminum tubes for circulation. Purchase orders are ready for the necessary materials and Weygandt asked for a decision by Thursday.

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REPORTS

744P Woodhouse has received programs from Hilberry's office which are to be submitted with P reports. He has, however, received no instructions as to how to submit these reports. ||||

Following the conference, the writer witnessed the application of thick aluminum-silicon coats by the process described above. Some difficulties were encountered which apparently were due to timing of the various steps. Much of the value of the method depends on the ease in which proper timing can be achieved. A section of a coat, after it had been machined, was examined under the microscope. The total variation in thickness appeared to be 20%. One void was visible in this particular section.

TECHNICAL DIVISION

John P. Howe, Assoc. Section Chief

John P. Howe

JPH/c

cc-Weygandt

Woodhouse

Goebel

Westbrook

Gray

Greeninger

Cooper

Foster

Reading file

Technical file

JPH file

Boller

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