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To: J. Chipman  
From: J. P. Howe

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This is to report a visit by R. C. Grills and J. P. Howe to Battelle Memorial Institute on December 7, 1943.

Hydrogen in Clinton Slugs

The bulk of the evidence from hydrogen analyses at Battelle was that hydrogen picked up by slugs in the hydrogen test is on the surface only. An analysis published in the last monthly report showed only one slug to have a high hydrogen content throughout. It must be remembered that approximately  $\frac{1}{2}$  of the metal used at Clinton was outgassed. The data show clearly that the surface must be cleaned in order to remove hydride before recanning. On additional Clinton slugs sent to Battelle for hydrogen analysis, two determinations will be made, one on the uncleaned closure and the other on the cleaned closure end. A point made some time previously was reiterated to the effect that butt end slugs often contain defects and when these are present there is always an excess of hydrogen.

Discussion on Electroplating

The plating of palladium from a Pallite bath has been studied. The bulk of this material is in the last monthly report. Preliminary data on the diffusion of solder show that at 190° a tin-lead solder diffuses at approximately 0.3 of a mil in 160 hours. The tin-zinc solder, which, of course, is not molten at 190°, diffused much less. In order to assist in the experiments on the protection of aluminum insulator caps, Battelle will plate palladium over an initial copper plate on aluminum and send samples to Dr. Mike Miller at the Aluminum Research Laboratories.

Hot Dip

The apparatus and procedure for applying a magnesium coat by hot dipping were discussed. Approximately 50% of the slugs crack when wet by the magnesium. Inasmuch as this is very difficult to understand, and if it depends on the properties of the metal, is very serious, it will be investigated further by the Battelle group.

There appears to be little hope for bonding magnesium to aluminum because of the occurrence of a very brittle alloy under all conditions.

Coats produced by hot dipping in eutectic mixture of 90% copper and 10% magnesium have an excellent appearance. Work will be done to see if this constitutes a suitable precoat for aluminum-silicon.

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Progress on the spinning down of the end of a can is satisfactory. Russell feels that the spinning problem can be solved. No progress was reported on the spot welding of the small hole left after spinning. No complications in this process due to a solder bond between can and slug were foreseen.

### Thermal Stresses and Mechanical Requirements on Coatings

Mr. Jackson agreed to undertake calculations on:

1. Stresses set up in the bond between the slug and the jacket due to the temperature gradient within the slug.
2. An analogous problem of a hollow tube heated internally in order to determine the heat flux necessary to set the same peripheral stresses.
3. Stresses set up in a doughnut shaped section due to a tapered pin being driven in.

Conditions are as follows:

1. Axial temperature 330°C - peripheral temperature 75°C - diameter of rod 1.38"
2. 1.38" O.D - 9/16" I.D.
3. 1.1" O.D. - 5/8" I.D.

### Scaling

Work on the scaling of heavy metal in air has just been started. Argon of low purity has been received for similar work in inert gases.

### Additional Work

Russell expressed willingness to help us with our identification of film forming materials by electron diffraction experiments.

Technical Division  
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Reading file

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