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MUC-ABG-262

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Series A.

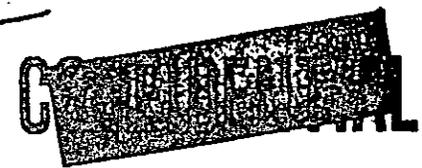
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CLASSIFICATION CANCELLED
DATE AUG 17 1962
For the Atomic Energy Commission

RAYMOND A. CARPENTER *Ca*
for the
Chief, Declassification Branch

August 19, 1944

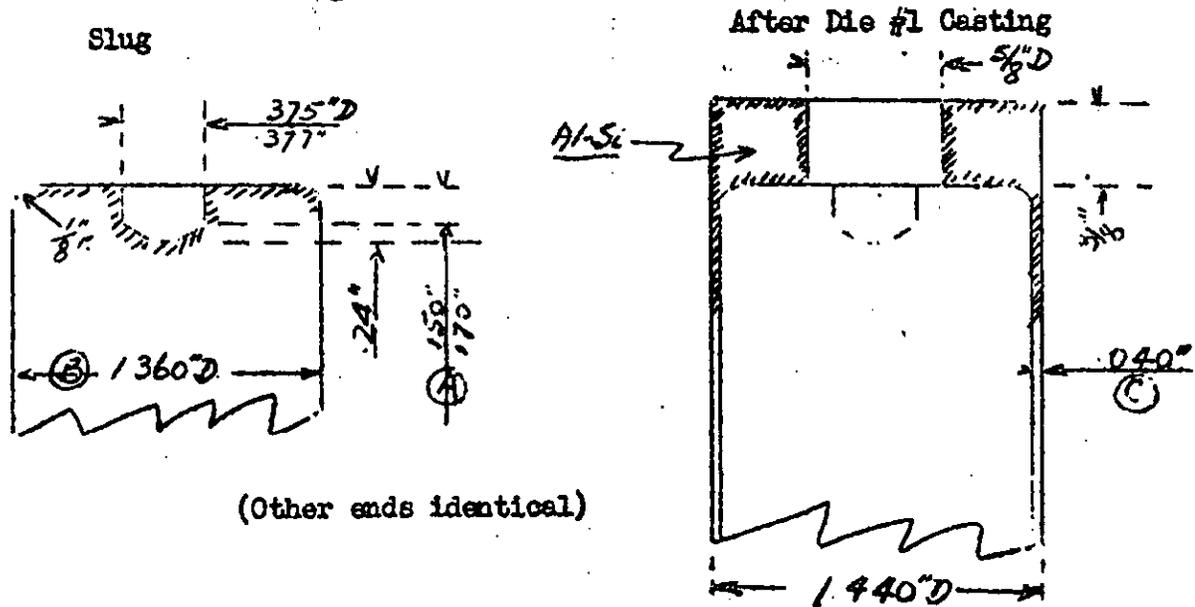


To: File

From: A. B. Greninger

In Re: Experimental Die Casting of Al-Si Coatings on Slugs, Alcoa,
Garwood, New Jersey, August 9 to 12, 1944

Die #1 had been changed by Alcoa in order to get away from the use of aluminum pins on the insert (see MUC-ABG-261). Also this is the first time that sand blast equipment was available (the sand blast machine and zinc dip pot had been shipped from Site B and installed in the Alcoa plant next to our die casting machine); all Al-Si coatings made this week were on slugs that have been sand blasted just before casting. Some work was done on casting around slugs that had been zinc dipped just prior to die casting. The insert design is now the following:



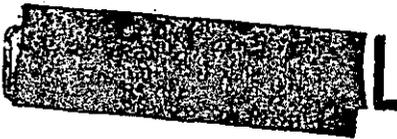
(Other ends identical)

Dimension (A) on pieces used so far has been about 0.200"; we feel quite sure that the 0.150" - .170" dimension will be practical and will be used henceforth.

Dimensions (B) and (C) are correct as stated for all pieces cast this week. We may find in attempts to produce a bond, that a .060" or .050" annulus will be needed. This would mean either a) slug diameter of 1.540" or 1.520", or b) a slug diameter of 1.360", and machining of coating to .040" after casting.

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The die was found to work very satisfactorily with this new type of insert, and none of the previous defects of eccentricity was had. Die #2, which will provide the closure on both ends of the piece produced by Die #1, is also to be tried out on August 22.

Barrel Experiment: Die #1 had also been modified to provide an opening downwards so that 5 lbs. of Al-Si could be made to flow through the die around the surface of the slug and overflow into a barrel located underneath the die. Under these conditions "barrel type" castings were made with hardly any pressure at all and resulting coatings were, of course, very porous and imperfect. However, the experiments were run not to produce a coating but to determine what bonding success might be had from the flowing of various quantities of Al-Si over the slug at different temperatures. With the Al-Si pot operating at 1800°F, barrel type coatings produced no bonding whatever. With the Al-Si pot running at 1500°F (810°C) pieces were bonded completely; even those which had received only a one pound overflow. At this high operating temperature, considerable trouble was had with sticking of the plunger, and J. N. Smith feels that this operating temperature is somewhat too high for real production, but that 1400°F might be tolerated.

Zinc Dipping: Several pieces were cast using slugs that had been zinc dipped and wiped and introduced into the die right after wiping. At the time of casting, the slug temperature was probably somewhere between 350 and 420°C. These pieces were cast with the normal die; that is, without the barrel opening. On none of these pieces was there any evidence of bonding. One piece was cast without wiping. The piece was introduced into the die after removing from the zinc dip pot and consequently had a considerable amount of molten zinc on the surface. This piece was very well bonded throughout most of the surface, but this technique would obviously be unsatisfactory inasmuch as too much zinc would be introduced into the Al-Si.

1" Lengths: Twelve 1" lengths of tuballoy were coated by die casting, using the normal #1 die (see MUC-ABG-231). These pieces were made for use in corrosion tests of die cast, bonded coatings. The open ends of these pieces, after arrival at Site B, were plugged up with aluminum plugs, and have now been placed in static corrosion test with holes drilled through the die cast coating into the tuballoy. One piece was examined metallographically by D. L. Schwartz, who reported this morning that no unwetted areas were found, and that the compound layer thickness was .05 mils, on the average.

Program: Die #1 is now being modified by Alcoa to provide two reservoirs within the die of approximately 40 cubic inches (about 4 lbs.). This will allow die casting plus washing under the full pressure of about 5000 p.s.i., and it is hoped that at a satisfactory pot temperature, bonding of the entire surface of a W slug can be produced. Die #1 has now been modified so often it is not considered to be really good equipment for the job, and if with the last modification it should prove satisfactory, we shall begin construction of a new die to take the place of Die #1. The first trials on Die #2 will be made during the week of August 20.

TECHNICAL DIVISION
A. B. Greninger, Assoc. Director

ABG/JK

