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(N-281)

M1.04-4

November 23, 1943

To: A. B. Greninger

From: J. M. Simmons

In Re: Trip to Detroit, New Kensington, Ft. Wayne, from November 12-18, 1943

On this trip, the following companies were visited:

(1) Wolverine Tube Division, Detroit

(2) Revere Copper and Brass Co., Detroit

(3) Aluminum Co. of America, New Kensington

(4) Joslyn Manufacturing Co., Ft Wayne

The information obtained is given below:

I. Wolverine Tube Division, Detroit, Michigan, November 13

Mr. Hill of Wolverine informed me that they have supplied to Progressive Welding Co. of Detroit all material for experimental Al welding as requested by Battelle. He also stated that Battelle has been furnished with an Al spinning machine for which Battelle is to make all necessary clamps as well as the spinning tool, that Wolverine will not make the spinning tool.

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IV-281

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II. Revere Copper and Brass Co., Detroit, Michigan, November 13-14

Extrusion of tuballoy rods takes place at RCB only on Saturday and Sunday because of security problems. Billets are heated for 90 minutes in a city-gas atmosphere furnace at 1840° - 1870°F; the billet temperature, measured by an optical pyrometer, is 1680°F on removal from the furnace.

The extrusion cycle is 1.5 minutes. The time is broken down as follows:

a. Removal of billet from furnace, brushing away of oxide scale, transportation of billet to press and seating in holder (billet holder is gas heated at 900° - 950°F) 30 seconds.

b. Seating of die against die holder in press, adjustment of dummy block (steel) between billet and ram - 15 seconds

c. Extrusion - 5 seconds

d. Disengagement of die and rod from press, cut off of butt end of billet, removal of rod from die - 10 seconds.

e. Straightening and quenching of rod - 30 seconds.

[redacted]

Quenching of the extruded rod takes place very close to the upper limit of the beta range.

The rods, as extruded, are 1.5", +0" - .01" diameter, 6½' - 7' long, with an average taper of 10 mils. Production rate is an average 275 rods/day; extruded rod weight is about 92 o/o of billet weight. The rod surface is relatively smooth; occasionally the butt end of the rod is very rough and torn for a distance of 6". This probably comes from low soaking temperature in the furnace before extrusion.

Several billets, on removal from the furnace, were observed to be very pyrophoric when brushed. On extrusion, these billets crumbled and broke into short lengths. These billet numbers were:

A 6288 S
A 6388 S
A 6393 S
A 6415 S
A 6416 S
A 6417 S

100 rods, average diameter 1.190", average length 10', were extruded November 15, and after outgassing and straightening, are to be shipped to Chicago to be used in the grinding program at Fort Wayne.

III. Aluminum Co. of America, New Kensington, Pa., November 15 - 16

November 15 was spent in conference and inspection with Mr. Daniels of DuPont and Mr. Fletcher of ACA; November 16 was spent in the canning unit at ACA.

Mr. Daniels stated that 100 slugs, canned at ACA, and containing six leakers by the deflection test, were sent to Wilmington and subjected to the autoclave test. After nine hours, five hours at 500 psi, four hours at 500 psi; H_2O at 100°C, the slugs showed no detectable leaks. They are to be sent back to ACA to be stripped and examined for corrosion.

3300 slugs at ACA have been subjected to three types of deflection test, the "end-seal" test, "side-seal" test, and a modification of the "side-seal" test, called the "M-test." (The M-test is merely a refinement of the side seal test, more precautions being taken to insure that no jar to the machine or table causes the dial gauge to vary). None of these slugs were tested before crimping.

2000 slugs have been canned, subjected to all three tests, both before and after crimping, and accepted for shipping to Clinton.

Some doubt remains as to the ultimate disposal of the 3300 slugs which were not tested before crimping. This question will be settled between DuPont and Chicago.

In production, 500 slugs/shift can be canned and tested, giving a rate of 3000 slugs/week. Fifty tons of tuballoy remain to be canned, 20 tons being at Clinton, requiring stripping, cleaning, and grooving. Ten tons/month are required by DuPont for Clinton.

ACA has a three-part program; to produce

A. Double welded cap for single can

B. Double cap on a single can, and

C. Double can

On A, no satisfactory results have been obtained. Fletcher feels that the quality of welding does not improve with dual welds; he says that it is not possible to get two good seam welds within 3/16". His attitude is, why work for a double weld if we can't get a good single weld? Daniels agreed to drop further work at this time.

Agreement was reached that B can be produced, that it is an alternate to double bonding. The design for the double caps has yet to be reached.

On C, Fletcher has produced some double canned slugs, the cans having been sectioned and apparently making good contact at the interfaces. These cans were drawn over steel slugs. An attempt to reproduce the canning, using tuballoy slugs, will be made soon.

Production was resumed at ACA on November 15, the two weeks prior having been spent in retests and development of this M-test. First day production data is:

Slugs canned	462
Leakers before crimping	35
Leakers before and after crimping	19
Leakers after crimping	6
Overall o/o of leakers	8.87

The crimped rim of one of the slugs which leaked after crimping but not before was machined away and the surface of the cap inspected. On crimping, because of excess of metal left above weld, the rim folded in and gouged deeply into the cap. One of the cuts appeared deep enough to have penetrated the cap. This was verified by tests and inspection.

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A group of canned slugs has been held and retested once a week, the leakers being discarded after each test. These slugs were not tested before crimping. The results:

No. Slugs	Rejects from Leaks 10/20	10/27	11/3	11/12	o/o rejects
407	18	23	31	3	18.4

Fourteen boxes of slugs, whose origin is questionable, (one inspector informed me they were from Clinton, while McKinney would not say where they were from) were stripped at ACA, sent to Baker for grooving and cleaning (our understanding is that Baker cleans all slugs being prepared for recanning) and returned to ACA for canning. Some of these slugs were covered with an extremely heavy hydride deposit, yet all were canned.

A number of slugs were found which showed a very small progressive leak while undergoing tests, these leaks increasing only as much as .1 mil/minute in some cases. About 50 of this type were found and were tested on a .0001 dial gauge. All showed leaks, increasing with time. These were considered to be leakers and were discarded.

IV. Joslyn Manufacturing Co., Ft. Wayne, Indiana, November 17

Mr. Van Echo and I made arrangements with Mr. Fry of Joslyn to conduct a rod finishing program at Ft. Wayne. These rods, of various diameters, lengths, and tolerances, are for Dr. Zinn. The grinding will be done on centerless grinders, with a preliminary investigation of rough turning.

Mr. Fry is building a ventilator system for the centerless grinders at the request of Dr. J. J. Nickson of the Health Group. Operations will begin at Joslyn as soon as the necessary material is delivered to us from ECB.

TECHNICAL DIVISION
A.B.Greninger, Section Chief

J. M. Simmons

JMS:JK

J. M. Simmons

cc C. M. Cooper
J. Chipman
J. P. Howe
J. B. Miles
M. D. Whitaker
Reading File
Technical File
JMS File

ABC