

TRIP REPORT

LAMP DIVISION
CLEVELAND, OHIO

OCTOBER 17-18, 1960

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10/27/60

Places:

Miniature Lamp Dept., Adv. Mfg. Eng'g.
Lamp Equipment Operation
Euclid Lamp Plant

Date:

October 17-18, 1960

Visiting Personnel:

E. M. Krackhardt

Object of Trip:

To discuss the availability of coil winding facilities for CRT Product Design Engineering.

Persons Contacted:

Miniature Lamp Mfg. Eng'g.
J. Ochwat, Mgr. Mfg. Eng'g.
George Fabritus

Euclid Lamp Plant
Ray Anderson
Frank Koshack

Large Lamp Mfg. Eng'g.
Art Lamp, Supervisor
Page Russell, Proj. Eng.

Lamp Equipment Operation
Fred Iden, Field Service Eng'g.

Introduction

Our interest in coiling equipment arose from the need to supply folded coil heaters for the mica gun designs. This gun assembly is the basis for much development work for medium and low wattage guns and has required a wide range of heater voltages. It seemed desirable to be in a position to quickly wind experimental coils for evaluation and to have control over the quality of the heaters.

Discussion

Prior to this trip, heaters, specifications, and the desired range of heater parameters were sent to Mr. Fabritus as set forth in the following letter, dated October 10, 1960:

Dear Mr. Fabritus,

I am sending 3 each of the various heaters we use and are interested in winding, along with heater specifications. The heaters are identified as follows:

1. Drwg. No. M16000 FN
2. Drwg. No. K-69982-32A-311
3. Drwg. No. K-69982-32A-320 (.090" body length)
4. Drwg. No. K-69982-32A-320 (.120" body length)
5. Drwg. No. K-69982-32A-324
6. Type 21EAP₄
7. Type 2EP₄

Since our winding facilities will be for engineering development, the following ranges in coil specifications are suggested.

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|------------------------|-------------------------|
| 1. Wire size: | .001" to .004" diameter |
| 2. Turns/inch: | 50 to 500 TPI |
| 3. Body length: | .060" to .500" |
| 4. Uncoated coil I.D.: | .005" to .010" |
| 5. Leg length: | .050" to .500" |

We hope for an early decision on the machine type, delivery, and cost. I am available for any questions concerning this matter.

Very truly yours,

Elliott M. Krackhardt
Equipment Tube Prod. Eng'g.
CATHODE RAY TUBE DEPARTMENT

In a meeting with George Fabritus of Miniature Lamp Department, Art Lamp of Large Lamp Department, and Fred Iden of Lamp Equipment Operation, the type of coil winding and auxiliary equipment needed to make the specified heaters was discussed. Coil winder, Type 4G81, Model 6, is the machine which will wind all the various folded coils. This type machine produces skip wound coils on a continuous mandrel. Unfortunately, the coil winder, Type B173, with retractable mandrel (which would cost considerably less) will not wind the necessary range of coils because the required mandrel size is below the practical limit for this machine. There are no Type 4G81 coil winding machines available nor due to the long life of these machines do they have component parts available. Through Art Lamp, however, Large Lamp could be contracted to build this machine. Fred Iden, Field Service Engineer for the Lamp Equipment Operation, priced the 4G81 coil winder with all necessary accessories at \$12,100 for a single machine. If more coiling machines were being built the unit cost would be cut to about half this figure.

The steps for fabricating folded coil heaters were layed out as follows:

1. Coil onto continuous mandrel.
2. Anneal coils at approximately 1110°C in hydrogen furnace.
3. Cut into individual coils.
4. Bend into "hairpin" coil.
5. Dissolve out mandrel.
6. Boil and rinse coils.
7. Clean by firing at 1130°C in hydrogen furnace.
8. Coat.
9. Fire coating in hydrogen furnace.

All process instruction may be obtained from William Baxter, Advanced Engineering Standardizing, Nela Park. Either steel or molybdenum mandrel wire can be used. The Lamp Departments use steel but iron can induce embrittlement of the tungsten so the coils must be thoroughly cleaned. Molybdenum, besides being non-contaminating, may be fired at higher temperatures allowing more freedom in annealing the coils. Auxilliary equipment needed includes a bobbin winder, a coil cutter, a coil bending fixture, etching and washing baths with hot plate and a small batch hydrogen furnace. This auxilliary equipment, less the hydrogen furnace, would cost about \$1,000.

The Euclid Plant winds a tremendous variety of coils (including a coil with 2/10 mil wire on a 2 mil mandrel). The personnel at Cleveland expressed a real desire to wind our coils for us. I feel we would get prompter delivery and information on new developments would be confidential. Our present source (E.T.C.) does not keep competitor information confidential. However, we would have to coat the coils; this involves cataphoretic coating equipment and a high temperature hydrogen furnace.

Conclusions

In view of the large expense involved in coiling and auxilliary equipment, it would not seem wise to undertake the fabrication of folded coil heaters at this time.

Elliott M. Krackhardt
Equipment Tube Prod. Eng'g.
CATHODE RAY TUBE DEPARTMENT