TRIP REPORT

Plant Visited - Du Mont Laboratories
Clifton (Allwood), New Jersey

Date - May 15, 1953

Persons making visit - R. W. Bryant
C. E. Buchwald
W. L. Jones

Persons contacted - Kenneth Hoaglund - Manager of Engineering
Eric Pohle - Asst. " " "
Al Stedman - Chief Chemist
William Carlin - Manager of Manufacture

FACTORY, PERSONNEL AND OUTPUT

The factory contained about 160,000 sq. ft. devoted to picture tubes of which 100,000 sq. ft. was used for manufacture. The direct labor was approximately 350 people. Process control is handled by six engineers. The output was reported as 3000 to 3500 tubes per day with 21" cylindrical electrostatics accounting for 75%, 17" electrostatics for 20% and the remainder spread among 21" electromagnetics, 19" metal and replacement types. Factory supervision is headed by a manager of manufacture on the first shift and superintendents on the 2nd and 3rd shifts.

MOUNTING

Mounting for T.V. as well as I & M tubes was done in a single area with approximately 110 bench positions. Due to over-capacity in mounting, they cut back whenever the inventory builds up and, unfortunately, the section was not working the day we were there. Parts were purchased from Volkert prepinned. For special small running parts hand pinning was performed on a small air cylinder operated hand-fed unit. Beading fixtures were water-cooled and operated in such a way that the hot bead was raised 2 or 3" to meet the mandrel as the fixture was swung downward. Fires were automatically timed to insure proper heating of the glass. Multiform beads are used on electrostatic cages and on quite a number of their oscilloscope types.

Du Mont uses 2 single channel Kemet getters. They do not like King getters. Their cathode cap material is Driver Harris 599 nickel and their mix is Baker R 500 carbonates. Completed mounts are not stored in heated cabinets.

Eric Pohle stated that Du Mont produces 30 types of oscilloscopes, each made with 5 to 8 screen types.

WATER

Water is given no pre-treatment before deionizing. Their facilities were severely overloaded and they used considerable quantities of distilled water. Additional deionizing equipment is planned.

BULB WASH

Bulbs are washed on a Rotary machine of Du Mont's own design, using polyethylene tanks and surrounded with rubber curtains. The three machines each have a capacity of 120 bulbs per hour using 10% ammonium bifluoride. The sequence of washing operations are: Three fluoride washes and 6 tap water. deionized water is not used since their water treatment capacity is limited.

SCREENING

Du Mont's screening facilities consist of one RCA type screening conveyor (which was not in operation at the time of our visit as it had just been relocated) located in one air conditioned room with a foundation for an Allied 4 wide 27" conveyor. The reported output from this machine, which will handle up to 21" size 3 wide, was 3000 to 3100 per day. A second air conditioned screening room contained two 4 position tables for 27", six 6 position tables for 17" and three 5 position tables for 19" through 21".

Of all the plants visited, Du Mont was the only place which had a markedly different method for screening. The phosphor is not prepared as a slurry or suspension in the normal way. By means of a powder measuring machine manufactured by G. Diehl Mateer Company, the proper quantity of phosphor is dispensed into a milk bottle. To this is added the required amount of kasil. Mix is accomplished by swirling the bottle for a few moments immediately before pouring into the dispenser.

The formulation of the solutions for 21" tubes is as follows: 18 liters of cushion water are added containing 250 parts per million of barium acetate as the electrolyte. The quantity of kasil is 325 cc's of 10% solids. The quantity of phosphor is 8.2 grams of type "E" U.S. Radium. The cushion water temperature is maintained at 55 to 57°F, and the phosphor-kasil mix is at 80 to 85°F. When questioned concerning the control of yellow centers, Stedman answered that their difficulties had been eliminated when they had gone to dry phosphor dispensing. Process control reports from the factory showed that the dry dispenser had an accuracy of better than $\pm$ 1%.

The average screening losses for the 21" size was 5 to 7%. The factory reports for the previous day were shown and indicated that of 1732 screened, only 146 were lost, primarily due to holes.

Settling time was 10 to 12 minutes. On the tilt tables the pour-off required 1 3/4 minutes (use antigurgle tubes) and on the belt, 2 3/4 minutes. Because of the large amount of cushion water, it was necessary to pump off the excess before decanting.

Screening (cont'd)

The dispensers were of the conventional design except for the tip which was constructed of plastic. Depending upon the size, either 9 or 11 holes were used. A sample of the tip was obtained and is available for examination.

ALUMINIZING

Aluminizing was only being done on an experimental basis and no information was obtained concerning the formulation of their lacquer. They were presently working with 500 to 600 second nitrocellulose. They had been using dioctyl phthalate as a plasticizer but had recently shifted to Atlas plasticizer Pycol 76. To work out some of the filming problems they have recently hired a lacquer chemist. Their biggest problem at the present time is film separation on drying.

For aluminizing they had 3 positions of their own construction using what appeared to be rather poor vacuum technique inasmuch as they had two diffusion pumps connected in parallel and backed by separate Welch pumps. They were presently using a 20-minute cycle on 21" tubes. Evaporation was carried out at 1/10 of a micron. They recently have had considerable difficulty with the aluminum balling up and shorting out their filament which is of a stranded type. Shrinkage reports showed that on May 15th, 36 tubes out of 40 aluminized were satisfactory.

INSIDE PAINTING

For painting 24" and 27" tubes, 2 single position rotators of conventional design were available. For smaller bulbs, they had an 8 head 3 position indexing machine of their own construction. The unit consisted of an Eisler stem machine mounted on a platform with outriggers extending approximately 3 feet beyond the turret. The tubes were suspended in hangers from these outriggers approximately 3 feet above the floor and were rotated at about 70 RPM.

Each operator had a separate type of brush; the first scalloped the top edge; the second completed the cone painting; and the third painted and cleaned the neck. The loader removed the tubes and placed them on either of two 6 position rotary drying tables which acted as transfers to the bake ovens. With 3 painters, the output is 260 per hour as compared with 18 per hour from single position inside painters (the best either DuMont or Federal can do).

BULB BAKE

For bulb bake 7 electrically heated Steiner Ives small single position inline bake ovens were used. They reported high bulb breakage with these units. Five of the ovens will be replaced shortly with a new lehr, gas fired. This will relieve their electrical load which is now at the peak of the power company's local capacity.

SEAL-IN

Machines available were one 6 head Kahle, two 12 head machines capable of handling 17" on every head and 21" on every other, and one 16 head machine. Seal-in shrinkage was reported as 1½%.

The stem used by DuMont is unique to the industry. The lead wires are first beaded and then sealed to the periphery of the tubulation flare. No pressing is used.

They reported a scrap to seal loss of 12 to 14% consisting mainly of broken tubulations, cracked tips and other glass losses.

EXHAUST

Exhaust equipment consisted of 4 modified DP1 inlines operating on a continuous index. One of the machines had 80 buggies and handled 21" tubes at 48 to 54 per hour. Three other machines had 54 buggies and handled either 17" or 21" at 43½ per hour, or 27" tubes at 5 per hour.

They attempt to maintain a temperature in excess of 350° for 20 minutes with a temperature of 385° to 400° at the center of the faceplate for a period of 3 to 5 minutes. The exit temperature is 180° to 200°C. The getter is flashed immediately before tip-off which is a hand operation without lifting aids. Primary implosion losses are 0.1 to 0.2%.

DuMont has carried out some experimentation using the Corning can, but do not plan to introduce it into the factory. Tipping-off at 325°C and using a 35 minute cycle, the cathode emission was poor. Some improvement was obtained with a 40 minute cycle.

TUBE FINISHING

For base threading, the tubes were removed from the OH conveyor system and transferred to a threading table. For baking, the tubes were placed on a narrow slow moving belt and the cement cured by electrically heated caps. After baking, the lead wires were trimmed using a toenail clipper (Red Cross Peditrim). No-Korode pase was used as a flux and solder was applied with an iron as a small "cap" at the end of the pin. Of all of the plants visited, this operation at DuMont was the poorest seen.

Following this, the tube was returned face down to the conveyor for the aging operation. As the tube reached the end of the aging cycle, an automatic checking circuit monitored the tube for shorts and opens which rang a bell and stopped the conveyor. Tubes showing opens were returned immediately for re-soldering. After aging, the tubes were given a high voltage treatment of interrupted D.C. For electrostatics this amounted to 30 KV; with electromagnetics the voltage was lowered to 25 KV. Five test sets were located at the end of each basing and aging conveyor. The sets were equipped with carousel turrets and so designed that any size could be accommodated by changing the tube cradle. To adjust the ion trap, the tube was rotated rather than the reverse. Gas is checked last at a separate position of the turn table.

Tube Finishing (cont'd)

Two water curtain spray booths were used for outside painting of both glass and metal tubes. Production per booth was timed at 4 per minute. The anti-corona lacquer was colored for rapid identification. Tubes were placed on pallets and moved on "roller skate" conveyors to packing.

QUALITY PLAN

Initial testing was under the supervision of Quality Control. Readings are recorded on 5 tubes per type per day. 102 life positions were available; 42 for 17" size; 30 for 21" & 27" and 30 receiver chassis for 21" & 27". In the case of the chassis, the anode voltage was obtained from separate supplies. Heater cycling is used, 13 minutes on 7 minutes off for 500 operating hours.

REWORK

To remove bump checks and scratches, wet belt grinders with two different grades of grit are used. The action seemed to be quite rapid. Two single position buffing positions completed the rebuffing. Five reneck lathes were in use.

METAL TUBES

DuMont had 1 single position funnel sealer, 1 single position face plate sealer and 2 face plate annealing ovens for 30" tubes. For 19" metals, one rotary neck sealer and 2 rotary face plate sealers were available. Very few metal tubes were in process and the few that we did see were apparently field returns being reprocessed. From the condition of the equipment it appeared that it was not used much.

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