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TYPICAL GREEN/BLUE SCREEN FILM SCHEDULE
With Machine Information

TYPICAL RED SCREEN FILM SCHEDULE
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1. Equipment

- a. Model No. L2799-F7 Modified (Green/Blue Machine) 62
Head In-Line Automatic Screen Coating Machine, equipped with all supporting equipment.
- b. Model No. L2801F-10 Lighthouse with lens and setup for green and blue.
- c. Four slurry dispensers equipped with automatic controls.
- d. PVA Container [3 gal. (11.4 l) stainless steel] equipped with level control.
- e. Two slurry containers with paddle mixers [20 gal. (75.7 l) stainless steel cans] .
- f. Sponges
- g. Beakers, graduates, etc., necessary for controls.
- h. Two dispenser filling funnels [160 stainless steel mesh (98 microns)].
- i. Centrifuge, 2 water pumps for slurry collection.

2. Materials:

- H7 Hydrofluoric acid
- W60D de-ionized water
- filtered high pressure air
- P377D Polyvinyl alcohol (.5%)
- 2905A2 Zinc Cadmium Sulfide activated slurry, green [(composed of 2905B2 (filler) and 2905C2 (charge))].
- Z153D2 Zinc Sulfide, activated slurry, blue, [composed of Z153E2 (filler) and Z153F2 (charge)].
- S277E Sodium Hydroxide
- S646A Caustic Defoamer or
- S646B Caustic Defoamer

3. Procedure

A. Start-up

1. Obtain green and blue slurries from the mixing room, fill dispensing containers, and begin mixing. Note: Green slurry filler should be used in the charge dispenser to maintain a controlled level and to maintain a proper slurry PVA/phosphor ratio.
2. Open six-foot valves
 - a. De-ionized water
 - b. Hot tap water
 - c. Cold tap water
 - d. High pressure air valves should always remain open in order to furnish cooling for exposure lighthouse mercury arc lamp.
3. Push master control panel main power switch to "on" position
4. Turn on all required spin position motors and check spin speeds.
5. Turn on all required heaters and check heaters to be sure they are on. Make sure all air dryers are on.
6. Turn on developing cycle switches.
7. Dispenser Control Panel
 - Push all switches to "on" position (dispensing solenoids shall be flushed prior to startup and after four or more empty heads during the day's operation.)
8. Master Control Panel Setting
 - a. Turn Index switch to "automatic".
 - b. Turn Index timer switch to "on" position.
 - c. Check timer setting for proper time cycle.
 - d. Machine should be indexing and the dispenser and salvage cycle should be operating at this point.

9. Panel Wash Cycle

- a. Rinse thoroughly and change acid tanks of the regularly scheduled basis.
- b. Push washing cycle control panel main switches to "On" position.
- c. Be sure all individual wash cycle switches are on.
- d. Check entire washing cycle at least once per hour to assure proper operating conditions.

B. Operational Procedures by Positions

Position # 61 Load Position

1. Remove cap assembly from truck or conveyor and place on carrier.
2. Clamp firmly in position so that carrier clamp and lever and twelve o'clock cap position are on the same side.
 - a. Cap assemblies which have one color printed and have been rejected at green final inspection will remain on the machine for wash out.
 - b. Filmed and aluminized scrap cap assemblies which have been recovered are to be loaded on this machine.
3. Remove the cap from the cap assembly, inspect and mark dents and place the mask in the carrier.

Position #62 Load Position (see position #61)

Position #1 Tap water wetting position

Position #2 Caustic wash Note: Once per shift, check caustic concentration per schedule 1, 34-33-75. Adjust by adding Sodium hydroxide to make 2% \pm 1 $\frac{1}{2}$ %.

Position #3 Tap water rinse

Position #4&5 Hydrofluoric acid wash

Note: 1. Once per shift check hydrofluoric acid concentration per Sch. 2, 34-33-63.
2. Adjust by adding hydrofluoric acid to make a 12% \pm 4% concentration

Position 6&7 De-Ionized Water

Position #8 PVA Precoat Application

Position #9 Spin

Position #10&11 Spin Dry

Position #15 Screen application, green, automatic

Note: 1. Disperse about 120 ml of green slurry from charge dispenser into the center of the cap, automatically operated. Volume control operated automatically by selector switch at this station and switch tripper located on the cap carrier frame.

Position #16 Slurry Salvage

Note: 1. Salvage slurry forced to corners during multi-speed spin out, using the automatic salvage device. Salvage the material through

the device into the charge dispenser through a 165 mesh (94 microns) stainless steel filter. The second and third spin speeds are controlled by a selector switch at this position and a switch tripper on the cap carrier frame.

Position #17 Spin dry with side calrod heater (round).
Position #18 Spin dry with side calrod heater (round).
Position #19 Spin dry with side calrod heater (split) and wash excessive slurry foam sidewall. A selector switch in this position activated by a switch tripper in the cap carrier frame activates or cancels this.
Position #20 Spin dry with side calrod heater (split) and wash excessive slurry from sidewall.
Position #21 Spin dry and wash excessive slurry from sidewall calrod heater (split).
Position #22 Spin dry and wash excessive slurry from sidewall.
Position #23 Spin dry. Automatic sidewall wiping with sponge.
Position #24 Spin dry - Calrod heater.
Position 25&26 Blowers with air-conditioned air.
Position #27 Spin dry.
Position #28 Screen application visual inspection and mask insertion.

- Notes :
1. Inspect screen for defects.
 2. Position cap carrier so that lever of cap locking device will heat bottom.
 3. Remove mask from carrier. Inspect for obvious mask defects. Recover mask defects per Sch. 4, 20-13T-600.
 4. Insert springs in the bottom stud (12 o'clock stud) and then the 3:00 and 9:00 studs simultaneously.
 5. Insert the remaining spring on the remaining stud.
 6. Be sure that all four springs are properly seated in the four studs by pressing all four corners. (Not opposite diagonal corners at same time.)
 7. Rejectable screens are recorded in the appropriate column in the scrap sheet. The mask of a rejectable screened cap remains on the mask carrier.
 8. Slurry two clear caps per shift, except when multi-types are being run in the same room, slurry one clear cap/per type/per shift. Dry and expose with proper screen weight lighthouse. Develop cap on machine and scrap remaining phosphor into an aluminum dish. Dry at 110° to 150° C for 10 to 15 min. and record final weight. Divide weights by areas exposed, average these screen weights, record, and plot control charts maintained for this purpose. The following limits will appear on control charts. Call attention of Quality Control, Screen Process Engineer or Foreman to any valves exceeding

limits in order to correct by proper adjustments.

Green Screen weight limit - pg. 0-2-34-17-14V.

Note: For controls to obtain the required screen weight, the Quality Control

Inspector shall take and record four specific gravity readings per shift.

For procedures, see the following:

For screen weight - Sch. 4, 34-37-52.

Position 29-32 Green Exposure Positions. See page 0-2, 34-17-14V.

- Notes:
1. Remove mask-cap assembly from carrier, again checking mask assembly for correct insertion and place on lighthouse. Make certain that cap is properly located against lighthouse stops.
 2. Set exposure time obtained from lighthouse intensity charts. For 110° types where masks have been segregated into cells by mask hole size, use the standard exposure time for the average group. At the option of the screen room engineer either lighthouse times or intensities may then be adjusted to maintain a constant IT factor for all cells.
 3. Expose screen by opening shutter. Examine cap for visible mask or screen defects.
 4. After exposure, cap is returned to empty carrier and clasped into position so that carrier clamping lever and twelve o'clock cap position are on the same side. (At the bottom as viewed by operator).
 5. Remove the cap assembly from the cap studs by disengaging the springs from the top stud (6 o'clock) and both side studs (3 o'clock and 9 o'clock studs) simultaneously, then disengaging the spring from the remaining stud.
 6. Place the mask assembly on the mask carrier with the 6 o'clock spring facing the operator.
 7. Rejected screens from visual inspection will be allowed to pass unexposed.
 8. Cap temperature as measured in center of top cap shall be maintained within $\pm 3^{\circ}\text{C}$ of blue or red cap temperatures.
 9. Mask assembly temperature at insertion shall be maintained at room temperature.

Position 33-35 Green Developing Positions

- Notes:
1. Exposed screens are developed and all excess phosphor is removed.
 2. Unexposed screens are washed out.

Position #36 Spin dry.

Position #37 Spin dry with calrod heat (round).

Position #38 Spin with calrod heat.

Position #39 Spin dry.

Position 40&41 Spin dry.

Position #42 Idle.

Position #43 Final inspection position.

8. Slurry two clear caps per shift, except when multi-types are being run in the same room, slurry one clear cap/per type/per shift. Dry and expose with proper screen weight lighthouse mask placed on lighthouse. Develop cap on machine and scrape remaining phosphor into an aluminum dish. Dry at 110°C to 150°C, for 10 to 15 min. Then dry at 450°C for 30 min. and record final weight. Divide weight by exposed areas, average these screen weights, record, and plot screen weights (mg/cm²) on control charts. Call attention of Quality Control, Screen Process Engineer, or Foreman to any values exceeding limits in order to correct by proper adjustments. Blue Screen weight limits: Page 0-2, 34-17-14V.
Note: For controls to obtain the required screen weight, the QC inspector shall take and record four specific gravity readings per shift. For procedures, see the following:
For screen weight: Sch. 4, 34-37-50
For specific gravity: Sch.1, 34-37-52

Position #60&61

Unload and Blue Exposure Position




Notes:

1. Remove blue passable screened cap from machine, together with respective mask assembly inserted and place on blue lighthouse for exposure. See page 0-2, 34-17-14V.
 - a. Blue exposure procedure is same as designated for green at positions 29-32.
2. Leave blue application scrap screens on machine with mask on mask carrier for reprocessing through complete cycle.
3. Cap temperature as measured in center of top cap shall maintained within $\pm 3^{\circ}\text{C}$, of green and red cap temperatures.
4. The mask assembly temperature at insertion shall be maintained at room temperature.

MACHINE INFORMATION

Machine Index 20 sec. + 3 sec. warning = 23 seconds.

Area	Position	Operation	Setting	Head Rotation	Cap Angle
Washing	1	Water Rinse	Timer 15 sec.	30 rpm	20°
	2	Caustic Rinse	Timer 15 sec. 90-100°C	30 rpm	20°
	3	Water Rinse	Index Setting	30 rpm	20°
	4	HF Wash	Timer 13 sec.	6 rpm	20°
	5	HF Wash	Timer 13 sec.	6 rpm	20°
	6&7	Deionized water rinse	Index setting	30 rpm	20°
Precoat	8	PVA Coat	Timer, 5 sec. delay, 10 on.	166 rpm	20°
	9	Spin			
	10	Calrod drying	Heater 90%	150 rpm	25°
	11	Calrod drying	Heater 85%	110 rpm	25°
	12&13	Spin dry		110 rpm	25°
	14	Spin dry		10 rpm	75°
Green Dispense	15	Green Screen Application	Timer 0 sec. delay, 4-16 sec. dispense time, 4 sec. up-tilt Rheostat, High speed 20-30	10-12 rpm	75°
			Rheostat low speed 20-30	6-8 rpm	155°
			Traverse Rheostat 0-60		
Green Salvage	16	Automatic Salvage (selector switch allows 2 or more types to be processed with different parameters.)	Variac, slow, 50-100, Variac med., 50-100. Timer 2 sec.	75-80 rpm	150°
			Variac high, 70-120	80-85 rpm	
			Timer 12 sec, Variac 4th 50-100	130-140 rpm	
Green Drying	17	Calrod drying	Heater 90-100	80 rpm	75°
	18	Calrod drying	Heater 90-100	65 rpm	75°
	19	Calrod drying, rim wash (selector switch allows 2 or more types to be processed with different parameters.)	Heater 50% timer-16 sec.	10 rpm	75°
	20	Calrod drying, rim wash	In wash, 14 sec.		
			Heater 50% timer, 16 sec. In wash, 14 sec.	10 rpm	75°

	21	Dry and rim wash	Heater 50%, timer 16 sec. In, wash 14 sec.	10 rpm	75°
	22	Dry and rim wash	Heater 50%, timer 16 sec. In, wash 14 sec.	10 rpm	75°
	23	Auto wipe side-wall	Timer 16 sec.	30 rpm	15°
	24	Spin drying	Heater 35%	110 rpm	15°
	25&26	Air blowers	Pressure 40PSI	110 rpm	15°
	27	Idle		110 rpm	75°
Green Visual Inspection	28	Visual Inspection and insert mask		-0-	140°
Green Exposure	29-32	Screen exposure	L.H. to proper time for its intensity	-0-	120°
Green Developing	33	1st green developing	Nozzle 10-15 PSI, eight #3 nozzles on four manifolds 	30 rpm	75°
	34	Second green developing	Nozzle 10-15 PSI Six #3 nozzles 	30 rpm	75°
	35	Third green developing	Nozzle 10-15 PSI Two #3 nozzles One open pipe 	30 rpm	75°
Drying	36	Spin dry		90 rpm	75°
	37	Calrod drying	Heater 100 & 85	110 rpm	15°
	38	Calrod drying	Heater 100 & 85	110 rpm	15°
	39	Spin drying		110 rpm	15°
	40	Spin drying		110 rpm	15°
	41	Spin drying		110 rpm	15°
	42	Idle		10 rpm	75°
Green Inspection	43	Green Field Inspection		-0-	120°
	44	Idle		-0-	75°
Blue Dispensing	45	Blue Screen Application	Timer 0 sec. delay, 1 sec. uptilt, 4-16 sec. dispense. Rheostat, high 20-35 Rheostat, low 20-35 Rheostat, -- 0-50	10-12 rpm 6-8 rpm	165° 155°
Blue Salvage	46	Automatic Salvage (selector switch allows 2 or more types to be processed with different parameters.)	Variac low, 60-100 Variac med. 60-120 Timer 1-4 sec. Variac high, 70-120 Timer 13 sec. Variac, 4th 80-120	75-80 rpm 80-85 rpm 125-130 rpm 75-80 rpm	150°

Blue Drying	47	Calrod drying	Heater 85-100%	80 rpm	75°
	48	Calrod drying	Heater 85-100%	60 rpm	75°
	49	Calrod drying & rim wash (selector switch allows 2 or more types to be processed with different parameters.)	Heater 85-100% Timer 16 sec. In Wash 14 sec.	10 rpm	75°
	50	Calrod drying & rim wash	Heater 95-100% Timer 16 sec. In Wash 14 sec.	10 rpm	75°
	51	Calrod drying & rim wash	Heater 100%, timer 16 sec. In, wash 14 sec.	10 rpm	75°
	52	Calrod dry and rim wash	Heater 100%, timer 16 sec. In, wash 14 sec.	10 rpm	75°
	53	Auto wipe side-wall	Heater 100%, timer 16 sec.	10 rpm	
	54	Dry	Heater 85-100%	30 rpm	15°
	55&56	Air blowers		110 rpm	15°
	57	Dry		10 rpm	75°
58	Idle				
Blue Visual Inspection	59	Visual inspection and insert mask			140°
Blue Exposure & Load	60-61	Blue screen exposure, load caps and masks.	L. H. to proper time for its intensity		120°
	62	Load caps and masks			120°

TYPICAL RED/SCREEN FILM SCHEDULE (Sch. #44, Initially for 19V-90° types)

1. Equipment: (same as green/blue with following exceptions)
 - a. Two slurry dispensers with automatic controls instead of four (4).
 - b. No PVA container.
 - c. Film pressure 20 gal. can.
 - d. One slurry container with paddle mixers (20 ga.) instead of two (2).
 - e. One dispenser container filling funnel (115 Stainless Steel mesh, 131 microns) instead of two (2).
 - f. Lighthouses with lens and setup for red.

2. Materials: (Same as green/blue with following exceptions)
 - a. No hydrofluoric acid.
 - b. No PVA.
 - c. Y913A2 Yttrium oxysulfide, activated slurry, red. (Y913A2 is the dispensed slurry, composed of Y913B2.)
 - d. No zinc or zinc cadmium sulfide.
 - e. No sodium hydroxide.
 - f. No caustic defoamer.
 - g. A361K2 15% emulsion film material.

3. Procedure:

Red screen schedule very similar to blue screening which took place on green/blue machine with obvious material and equipment (particularly lighthouse) differences.
Filming cycle starts at position 45.

Position #45 Film application, automatic--Selector switch in this position activated by a tripper switch fastened to the cap carrier frame allows two or more types to be processed differently.

Position #46 Spin dry with side calrod heater. Selector switch allows two or more types to be processed differently.

Position #47-49 Spin dry, film trim, and heat.

Note: 1. Water trimmers are to apply water to seal land only from off the trim roller. Water must not be applied directly on the inside skirt over the RULP film. One to three trimmers may be used as needed.

Position #50 Spin dry with calrod heater.

Position #51-55 Spin dry.

Position #56-57 Idle.

Position #58-59 Final inspection stations.

- Note:
1. Inspect per Sch 5, 25-9-1C.
 2. Code non-uniform film rejects with "X" at center of 9 o'clock outside sidewall for final evaluation at final insertion light box (optional).
 3. Flag good caps which did not have film applied for the cap to be reprocessed through the filming cycle.
 4. Flag good screened caps which have been trimmed to remove blemishes to send them through a developing cycle.
 5. Mark scrap screens so that the cap-mask assembly is not sent to aluminizing process.

Position #60 Number caps and unload masks from the mask carrier.

- Notes:
1. Mark the lighthouse numbers and sequence number on the designated portion of the 9 o'clock sidewall.
 2. Inspect the mask for obvious dents. If dented, hold the mask and cap for registry check.
 3. If good assembly, load the mask on the transport conveyor.

Position #61-62 Unload Positions

- Notes:
1. Caps with acceptable screens are removed from the carrier and placed on the transport conveyor.
 2. Caps with rejected screens are removed from the carrier and returned to the load end of the green/blue machine for reprocessing.
 3. Caps with unmarked dents will be set aside for registry check per Sch. 1, 34-37-54.

MACHINE INFORMATION

Machine index 21.5 sec. + 3 sec. warning = 24.5 sec.

(Starting with film cycle, prior red screening is very similar to green/blue screening.)

Area	Position	Operation	Setting	Head Rotation	Cap Angle
Film Dispense	45	Dispense Film	Dispense timer 2 3/4 sec. high rheostat 50 low rheostat 24 volume 90 uptilt timer - 1 1/2		180° 164°
Film Drying	46	Spin off excess film and calrod drying	Heater 80-90% 1st speed rheostat - 75 2nd speed rheostat - 75 3rd speed rheostat - 20	variable	75°
	46 1/2	Film splash gate	Timer 20 sec.		
	47	Calrod drying and rim wash	Heater 60-8-, wash 16 in 16	10 rpm	75°
	48	Calrod drying and rim wash	Heater 60 -80, timer 16 sec. In, wash 14 sec.	10 rpm	75°
	49	Calrod drying and rim wash	Heater 85-100, timer 16 sec. In, wash 14 sec.	10 rpm	75°
	50	Calrod drying	Heater 85%, Timer 15 sec.	10 rpm	75°
	51-	Spin Dry			75°
	52-55	Spin Dry		30 rpm	75°
	56-57	Idle			
Complete Screen	58	U.V. and film inspection		-0-	120°
Final Inspection	59	Final Inspection		-0-	120°
	60	Number caps and unload masks.		-0-	75°
	61-62	Unload-load		-0-	120°