OPALON COMPOUND

TENTATIVE OPERATING INSTRUCTIONS

FOR NORTH AND SOUTH MILL ROLLS

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531.00 - Objective

This procedure d scribes the operation of the North and South mill r lls as part of the Opalon compounding line. It is bas d on the tentative process issued on April 28, 1953, by Research entitled "Opalon Dry Blending and Compounding." It includes operation of two belt conveyors (Banbury to South mill and South mill to North mill) and one roller conveyor (North roll to cooling tank).

532.00 - Summary

Th fused stock is discharged from the Banbury via the belt conveyor to the South mill roll. A by-pass chute is provided for discharging directly to the North mill roll if desired. The purpose of the South mill is to blend the fused stock from the Banbury into a homogeneous mass. The operator achieves this by cutting the stock back and forth. The stock is then removed by a set of knives as a continuous ribbon and conveyed to the North mill.

The North mill will serve primarily as a stock reservoir for the cooling and cutting section of the line. The stock is removed as a continuous ribbon and is carried over a roller conveyor to the cooling tank.

533.00 - Equipment

Se Plastics Division Engineering Report 85D for a complete description of equipment. The major items are listed as follows:

Equipment No.	Name and Manufacturer	Description
01-436	Conveyor, Banbury to South Mill, Pembroke	See Pembroke Conveyor drawing dated 5/12/53 and Monsanto drawing D-6228.
01-440	South Compounding Mill, Farrel-Birmingham	22" x 60", F-B drawing number 2-1779.
01-444	Strip Conveyor, South Mill to North Mill, Pembroke	See Pembroke Conveyor drawing dated 5/12/53 and Monsanto drawing D-6228.
01-448	North Compounding Mill, Farrel- Birmingham	22" x 60", F-B drawing number 2-1779.
----	Strip Conveyor, North Mill to Cooling Tank	Standard roller conveyor, 12" wide by 7'-0" long, seven idling rollers.

4. When the oil temperature has reached 90°F and the oil pressure is at least 12-15 psig, close the steam valve to the oil tank.

5. The cold water valve 17 (located above west end of rolls) for the oil cooling coils should be opened to maintain an oil temperature of 120°F to 140°F.

6. Start the motor ventilation system (switch on south wall, first floor of 85B).

7. Start the mill rolls by pressing the start button on the instrument panel.

8. Check the safety bar. The rolls should stop within approximately four inches of travel. If the safety bar is not functioning properly, do not operate the mill roll.

9. Turn the roll temperature control instruments on. Isolate the steam control valves by checking valves 3, 4, 5 and 6 as being closed.

10. Open the steam by-pass valves (7 and 8) slightly to allow a small flow of steam.

11. Open vlaves 9, 11, 13 and 15 at the steam traps. Check to insure that trap by-pass valves 10 and 14 are closed.

12. Check to insure that drain valves 12 and 16 are closed.

13. Heat the rolls to specified temperature at the rate of 20 to 30°C per hour.

14. The tentative specified roll temperatures are:

    a. South mill - front 125°C
                    rear 120°C

    b. North mill - front 125°C
                    rear 120°C

15. When the rolls have reached the desired temperatures, close steam by-pass valves 7 and 8. Open the valves before and after the steam control valves (3, 4, 5, and 6).

16. Check the instrument set temperature as prescribed in step 14.

17. Start the Banbury conveyor which will carry the stock from the Banbury to the South mill.

18. Start the mill conveyor which will carry the stock strip from the South mill to the North mill.

19. Push the button to signal the Banbury operator for the batch.

Note: If the mill rolls must be shut down for periods exceeding 20 minutes while at temperatures of 90°C or higher, raise the stock guides 1/8 inch before attempting to start again.

534.30 - Milling Operations

A. South Mill

1. When the fused Banbury batch is dropped to the roll nips, guide the stock to form a blanket around the front roll.

2. Work the stock only enough to obtain a homogeneous compound by cutting it back and forth.

3. Adjust the roll spacings to give a ribbon 1/4 inch in thickness.

4. Place the stripping knives against the face of the front roll (left side) to remove a continuous ribbon. Guide this ribbon to the mill conveyor.

Note: The width of the strip removed will depend upon the desired production rate.

5. Work the stock over to the left side of the rolls and ring the Banbury operator for another batch.

6. When the batch is dropped, work it into a homogeneous blanket on the right side of the roll.

7. Operation from batch to batch will then be routine. The mill roll operator will have to keep close watch to insure that a sufficient reservoir of stock is maintained on the North mill roll.

8. Check stock temperature frequently with a needle pyrometer. The stock temperature should not exceed 310°F.

B. North Mill

1. The strip stock from the South mill should be banded on th front roll. Very little working of stock should be required on this mill.

2. Adjust the roll spacings to give a ribbon 3/16 inch in thickness.

3. Place the stripping knives against the face of the front roll (left side) to remove a continuous ribbon. Guide this ribbon over the roller conveyor to the cooling section.

Note: Approximate width of strip from North roll versus pounds per hour (67 ft./min. and specific gravity of 1.375) is as follows:

5" x 3/16" = 2250#/hr.
4" x 3/16" = 1800#/hr.

4. Check stock temperature frequently with a needle pyrometer. The stock temperature should not exceed 310°F.

534.40 - Shut-Down

1. Shut off steam to rolls and open the drain valves. Do not apply cold water to the rolls.

2. Stop the Banbury conveyor and the mill conveyor.

3. When the rolls have cooled to 90°C, stop the mill motor and lubricating pump.

4. Turn off the power to the roll temperature recording controllers.

5. Close the valve for the cooling water to the oil tank.

534.50 - Operating Difficulties

A. Foreign Material

If foreign objects drop onto the rolls, stop the mill motor. Open the roll nips and remove the object. If it is necessary to work above the roll crown near the nips, lock out the mill motor disconnect switch. If the stock is contaminated, remove it from the rolls in slabs and hang on drums to cool.

B. Off-Color Batch

1. Cut the ribbon feed to the strip conveyor.

2. Remove the batch in slabs.

3. Hang the slabs on fiber drums to cool.

4. When the mills are clear, signal the Banbury operator for the next batch.

C. Un-Fused Batch

1. Attempt to fuse the batch on the rolls by working with other fused stock.

2. If the premix is in specification, the Banbury mixer should properly fused the batches. If this condition persists, the Banbury operator and assistant foreman should be notified.

534.60 - Emergencies

Smoke or Fire from Mill Motor or Mill Area

1. Stop motor by pressing button on panel.
2. Call fire department.
3. Use the CO_2 fire extinguishers. Do not use water.

534.70 - Cleaning

1. Follow the lockout procedure outlined in the "Safety" section.
2. Clean the conveyor from the Banbury.
3. Clean premix and color off the mill roll hood and overhead.
4. Wipe any premix and color off the rolls and saddles. Dioctyl phthalate may be used.
5. Sweep all loose material from the stock pan.

535.00 - Discussion

A. Compounding Stock Temperature

One of the important justifications for the Banbury-mill roll compounding line is improved product quality. Results of Research investigations indicate that compound produced by the Banbury-mill roll method is superior to extrusion compounded material. The major reason is the lower stock temperatures (310°F or less) encountered in the Banbury-mill roll process versus the high stock temperatures (360-400°F) encountered in the extrusion compounding process. Therefore, stock temperatures should be maintained at the lowest levels consistent with satisfactory compounding of premix into a homogeneous product.

B. Contamination

This is a most important factor that must be kept under control. Contamination of any nature can't be tolerated in the production of either electrical or profile compounds.

C. Mill Roll Lubrication

The mill roll bearings are lubricated by circulating oil that should be maintained at 120-140°F and approximately 15 psig. Manual adjustment of the valve controlling the cooling water to the oil tank will be required. Recent experience with the mill rolls in the Farrel calender line indicated that oil temperatures might rise to at least 150°F. The bearings are also equipped with cooling water facilities. However, Farrel engineers have recently recommended that the cooling water should not be used.

D. Milling Rates

The width of the strips removed from the mill rolls will depend upon the desired production rates. The following approximate figures are calculated using a compound specific gravity of 1.375.

1. South mill - operating at roll surface speed of 101 feet per minute.

$2.5" \times 1/4" = 2250\#/hr.$
$2" \times 1/4" = 1800\#/hr.$

2. North mill - operating at roll surface speed of 67 feet per minute.

$5" \times 3/16" = 2250\#/hr.$
$4" \times 3/16" = 1800\#/hr.$

Uniformity of pellet size is desirable. Therefore, the ribbon thickness of 3/16 inch from the North mill should be adhered to. The operator should check the thickness frequently.

543.00 - Equipment

See Plastics Division Engineering Report 85D for a complete description of equipment. The major items are listed as follows:

Equipment No.	Name and Manufacturer	Description
01-450	Strip Cooling Tank	See Monsanto drawing D-6226.
----	Belt Conveyor Pull Section, Cooling Tank to Dicer, Pembroke	Driven by 1/2 H.P. Varidrive motor.
01-452	Dicer, Cumberland	Cumberland drawing number A-18001
01-454	Product Screening	Rotex shaker, Day. Fitted with perforated metal sheet, circular openings 3/8 inch in diameter.
01-456	Conveyor, Product to Bagout Hopper	Includes Buffalo Electric Blower, size 5 1/2, type E, and associated piping and hoppers. See Monsanto drawing numbers C-4104-1 to C-4104-12, inclusive. Also C-4110, C-4100, A-4225, C-4108, C-4117, C-4109, B-2248 and C-4115.
01-458	Bag Packer, St. Regis Paper Co.	Machine number 6471, type 301 FB.

536.00 - Safety

A. Safety Equipment

1. Fire extinguishers.

2. Safety bars for opening rolls.

3. R-1000 AD type respirators for use in areas containing premix dust.

4. R-31 type respirators for use in areas containing harmful fumes.

5. Gloves, etc.

B. Safe Practices

1. Keep hands below the crown of the rolls at all times. Do not attempt to retrieve any object falling into the stock or nips while the mill is running. Stop the mill immediately.

2. The mill rolls are provided with safety bars. These must be checked once per shift. The rolls should stop within four inches of travel.

3. The mill motor disconnect switch must be locked out according to Plant Bulletin E-210 whenever the mill rolls are shut down for cleaning or maintenance. Obtain the lock from the assistant foreman.

4. Gloves must be worn when working with heated equipment or hot stock.

5. Dioctyl phthalate is the only solvent that can be used for cleaning purposes.

6. Use extreme care in handling knives for cutting stock.

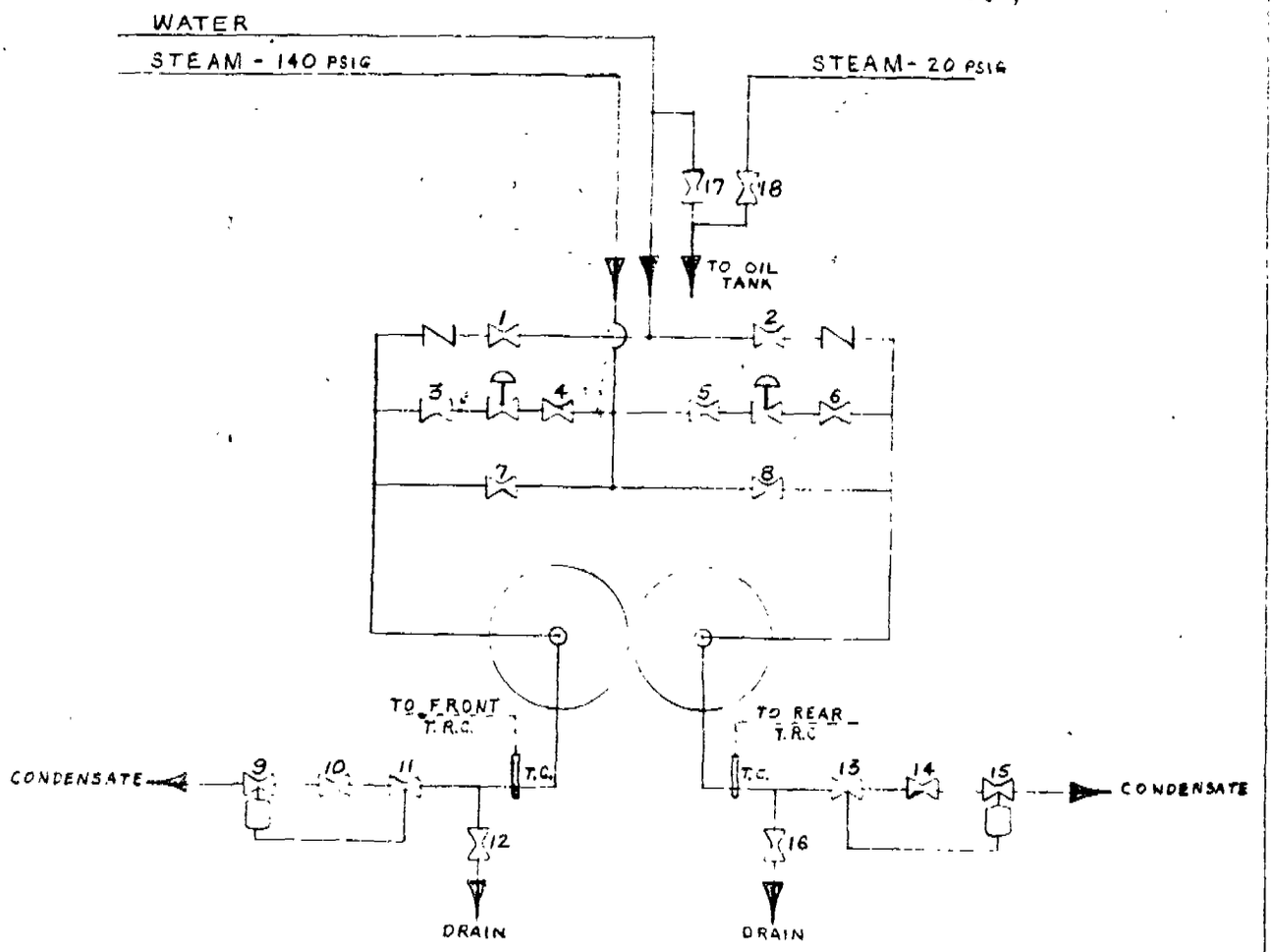
537.00 - Records

There are no formal records for the mill roll operator to keep. However, the mill roll operator shall be responsible for changing the charts at 6:00 A.M. on each operating day for the roll temperature controllers. These charts should be forwarded to the Assistant Foreman at the end of the shift.

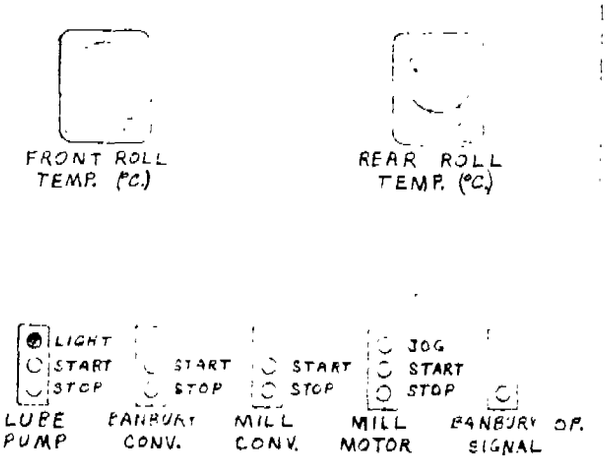
FIGURE 1

NORTH AND SOUTH MILL ROLLS
OPALON COMPOUND LINE

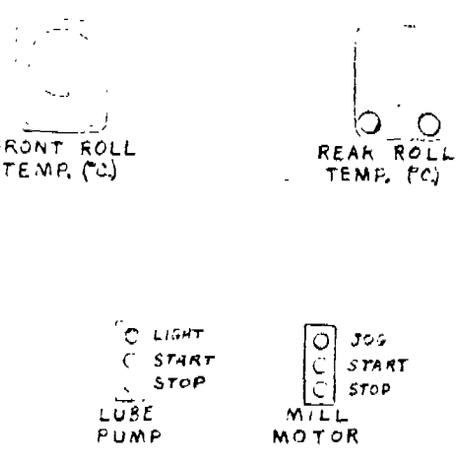
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SOUTH MILL ROLL INSTRUMENT PANEL



NORTH MILL ROLL INSTRUMENT PANEL



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