

Application of Electronic Control System in Finishing House At Tamil Nadu Newsprint And Papers Limited

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ABSTRACT

The paper deals briefly with the use of Microprocessor based system in the Finishing House at Tamil Nadu Newsprint and Papers limited. Also is included a short description of the plant, controls and the performance assessment of the system as well as the advantages of using the system.

INTRODUCTION

The Finishing House at Tamil Nadu Newsprint and Papers Limited is designed to handle about 900 reels per day with a diameter of 860 mm and width of 840 mm which works out as equivalent to 350 tonnes of paper. For handling such large quantum of reels and for ensuring good quality packing, it was decided to mechanize and automate the reel handling and wrapping systems so that above part of the mill operations would not be constraint on the mill production. Accordingly M/s. KONE CORPORATION, FINLAND were selected to supply and install Reel Handling Equipment while Reel Wrapping Equipment has been supplied and installed by M/S. LAMB, AG, SWITZERLAND. Both the above suppliers have coordinated their systems for compatibility to each other and the control system for the above is Microprocessor based. Initially, for about six months, these equipments were operated without automatic control and subsequently they have been on automatic operation which has since then given satisfactory performance.

EQUIPMENT DESCRIPTION

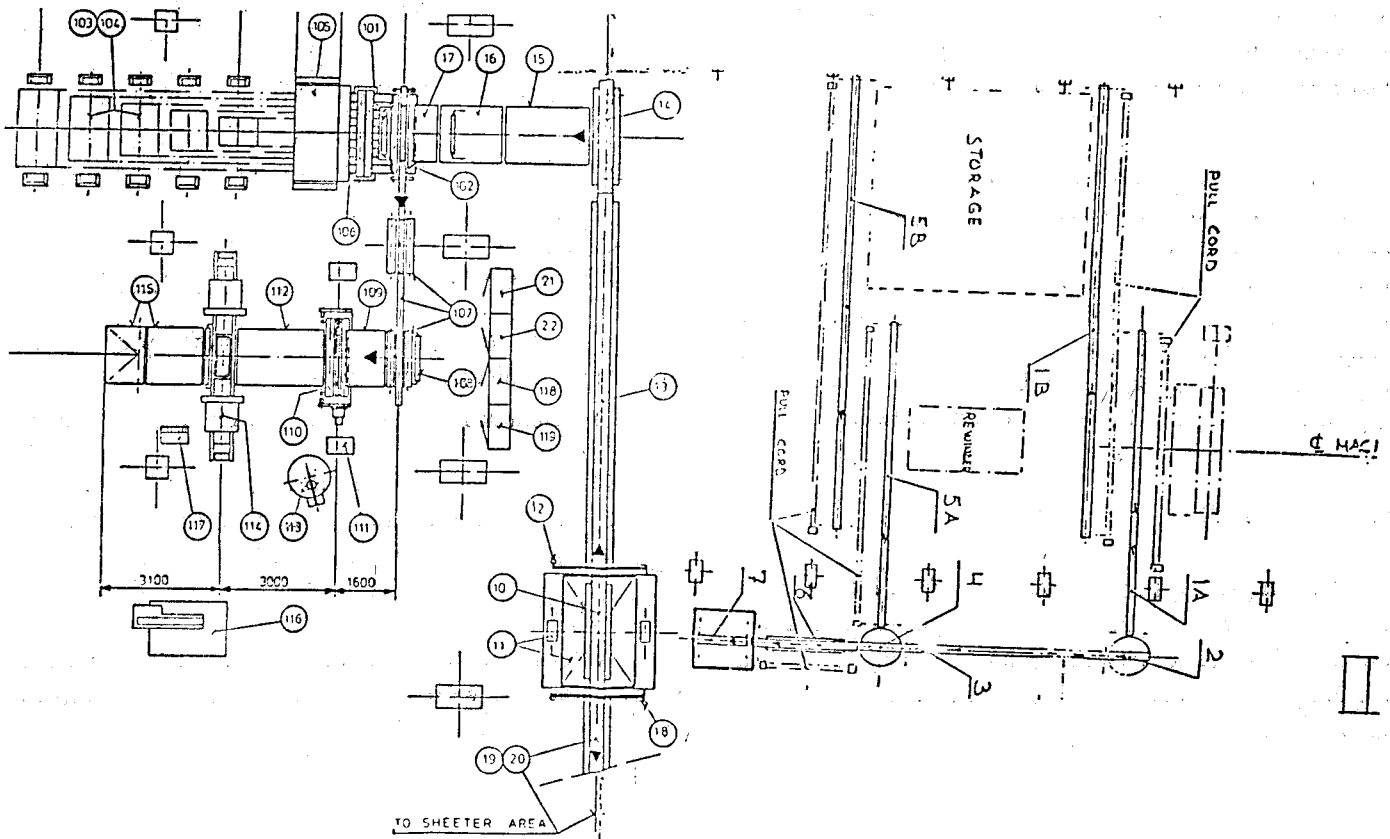
The layout of equipment is indicated in Figure—1. Paper reels from Machine winder are conveyed through the belt conveyor (1—A), turn table (2) on to another conveyor (3) and final conveyor belt scale where they are weighed one by one. The weighing device also prints a ticket. From the belt scale, Reel gets lowered to the ground floor through a lowerator (70) Reels for storing pass thorough conveyor (101) and reels for wrapping pass through conveyor (13), the choice of the route being decided by the Operator.

On the Wrapping machine side, reel is automatically centered on the conveyor in front of the Wrapping line (14) by Reel Centering/Measuring device. From there, the reel is ejected on to the Ramp (15) which lifts the Reel and passes on to the Wrapping Station (105). The preselected Wrapper is then automatically fed from the Wrapper Unwind stand (104) to the Wrapper Dispenser (105). As soon as the final layer of the Wrapper is applied, it is automatically cut off and the Gluer (106) sprays adhesive to the wrapper tail. The Reel is made to rotate for one additional turn until wrapper tail is safely sealed to the reel body.

From the Wrapping Station, the reel is transferred laterally by the Indexing Conveyor (107) to the center line of Crimping and Heading Station. The reel is then pushed off by a Roll Kicker (108) into the Crimping (110). Here an Operator places the inside heads on either roll face and the crimping cycle is initiated. After completion of the crimping the wrapped and crimped reel is ejected into the Heading Station (114). Here both the outside heads which are preglued on the Head Gluer (113) are placed manually into position on to the platens of the Pneumatic Header. The two heated Press platens move towards the reel end seal the outside heads to the reel. When the scaling cycle is completed, the header press is automatically opened and the reel is ejected to a Receiver (115). At the Receiver the wrapped roll gets weighed for its gross weight by a precision microprocessor based weigh scale. From the receiver, a Roll Upender turns the reels upright so that it rests on its side and it is then moved through rollers

*Tamil Nadu Newsprint and Papers Limited

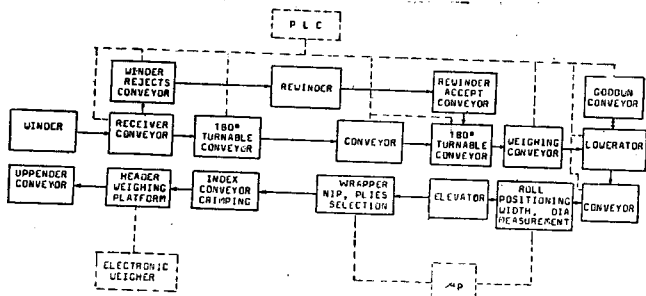
FIG. 1
REEL HANDLING SYSTEM



on to the exit belt conveyor from where the reels are removed by Forklifts for storage in the Godown.

DETAILS OF CONTROLS (Fig 2)

Conveyor Control System



REEL HANDLING FLOW DIAGRAM
FIG. 2

The system is based on a Programmable Logic Controller (PLC). The initiating signals are from photo

cells and limit switches installed at predetermined points along conveyors and Lowerator. The PLC is based on 8085 Microprocessor and has completely eliminated the necessity of relay circuits. All the operating programmes are entered in EPROM so that programmes are not lost due to power failures. An on-line electronic weigher with print out and totaliser is provided for accounting the reels processed.

Reel Wrapping System :

The reel length measurement, reel diameter measurement, selection of nip and dispensing the length of Wrapper paper are controlled by microprocessor. Reel length is based on speed of the belt conveyor and duration of interruption of the optical path of a photo-due to movement of reel. Reel diameter is measured by an ultrasonic sensor. These two signals are fed to the Microprocessor which computes the length and

diameter of the reel. Different widths of Wrapper available are entered into the Microprocessor manually by the Operator. Based on the reel length and diameter computed, the microprocessor selects the proper nip and dispenses required length of paper for wrapping.

After wrapping operation is completed, subsequent operations like transfer of reel to Crimper, transferring reel from crimper to header for fixing outside heads and thereupon transferring finished reel to belt conveyor through an Upender are controlled by relay logics activated by limit switches and photo cells. An electronic weighing system has been provided ahead of Upender to indicate the weight of finished reel.

CONCLUSION

The above systems have been functioning satisfactorily and down time of the systems due to malfunctioning/failures of electronics has been negligible. The efficiency of the control system can be ascertained from the following :

Operations done manually	Operations done through the system but on Manual mode	Operations done through the system in automatic mode
1) 40 persons per shift required	12 persons per shift required	3 persons per shift required
2) A few reels, now and then, were getting damaged as the reels were being rolled manually.	Not able to finish more than 250t/day.	Max capacity of 400t/day achieved.

Apart from the above, the following specific advantages are available by using the above systems :

- 1) Obtaining uniform and well wrapped paper reels.
- 2) Steady rate of reels flow into the Godown.
- 3) Reduction in floor area of Finishing House.
- 4) Reduction in waste materials.

ACKNOWLEDGEMENT

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