

CHAPTER 5

PAPER MILLS

5.1 General considerations.

Most of paper mills in Thailand are of small production capacity using waste paper as a principal raw material. Since, in general, the raw materials, the manufacturing processes and operations in all mills are quite similar, the characteristics of wastewater from these mills do not differ much. In paper making process, the use of chemicals that may influence the wastewater characteristics are only in the stock preparation section. Such chemicals are used to improve some physical properties of paper, e.g. the water penetration resistance. The rosin size is a cheap and widely used chemical that has to be used together with alum. The dosages of 2% rosin size and 3% alum on the weight of dry paper are considered normal. Rosin sizing is performed effectively at the pH of 4.5 - 5 after addition of alum.

Practically, no chemical dissolution of carbohydrates in pulp has taken place during the paper making process; therefore, the main source of contamination are from dirt in the waste paper, small fibres from the pulp stock and the unretained wet - end additives. From the paper making point

of view, the high total solid content in the overall waste stream is largely caused by dirt and fibres from the two major streams : the thickener filtrate and the paper machine white water. The recovery of fibres from the waste stream will improve not only the wastewater quality but also the mill economy.

5.2 Paper board manufacturing process description :

Type of paper machine : Cylinder machine

Production capacity : 10 - 12 tons per day
(box board & poster board)

Raw material : Bleached pulp and waste paper

Wet end additives : Rosin size and alum

Major wastewater discharge

- Thickener filtrate : 70 - 80 tons water per ton paper
- Cylinder machine : 100 - 120 tons water per ton paper

The different grades of waste paper are selected and repulped in the hydropulpers at the consistency of 3 % approximately. Since the waste papers for the middle and bottom layers usually contain considerable amounts of dirt, the pulp stocks are sent to the cleaning and screening units. In cleaning operation, the diluted stocks are passed through

the rifflers to trap the heavy solids and then screened to remove the poorly disintergrated pulp. Separation of the solid impurities is finally completed by the use of the centri - cleaners. The clean stocks are thickened to an appropriate consistency and subsequently pumped to the refiners. The purpose of refining is to improve the formation of the sheet during sheet forming process. The properly refined pulp stocks are further pumped to the mixing chests where the rosin size and alum are added. However, the previously described procedure is different for preparation of pulp stock for the surface layer. The surface layer, which is made from bleached pulp and waste paper from printing house, is practically clean and, therefore, needs no cleaning operation. After refining and sizing, all pulp stocks are pumped to the paper machine, where the pulp stocks undergo the following operations : sheet forming on the cylinder moulds by dewatering action, sheet dewatering in presses and drying of paper board in the multicylinder dryers. The simplified flow diagram of the whole process is shown in Fig. 2

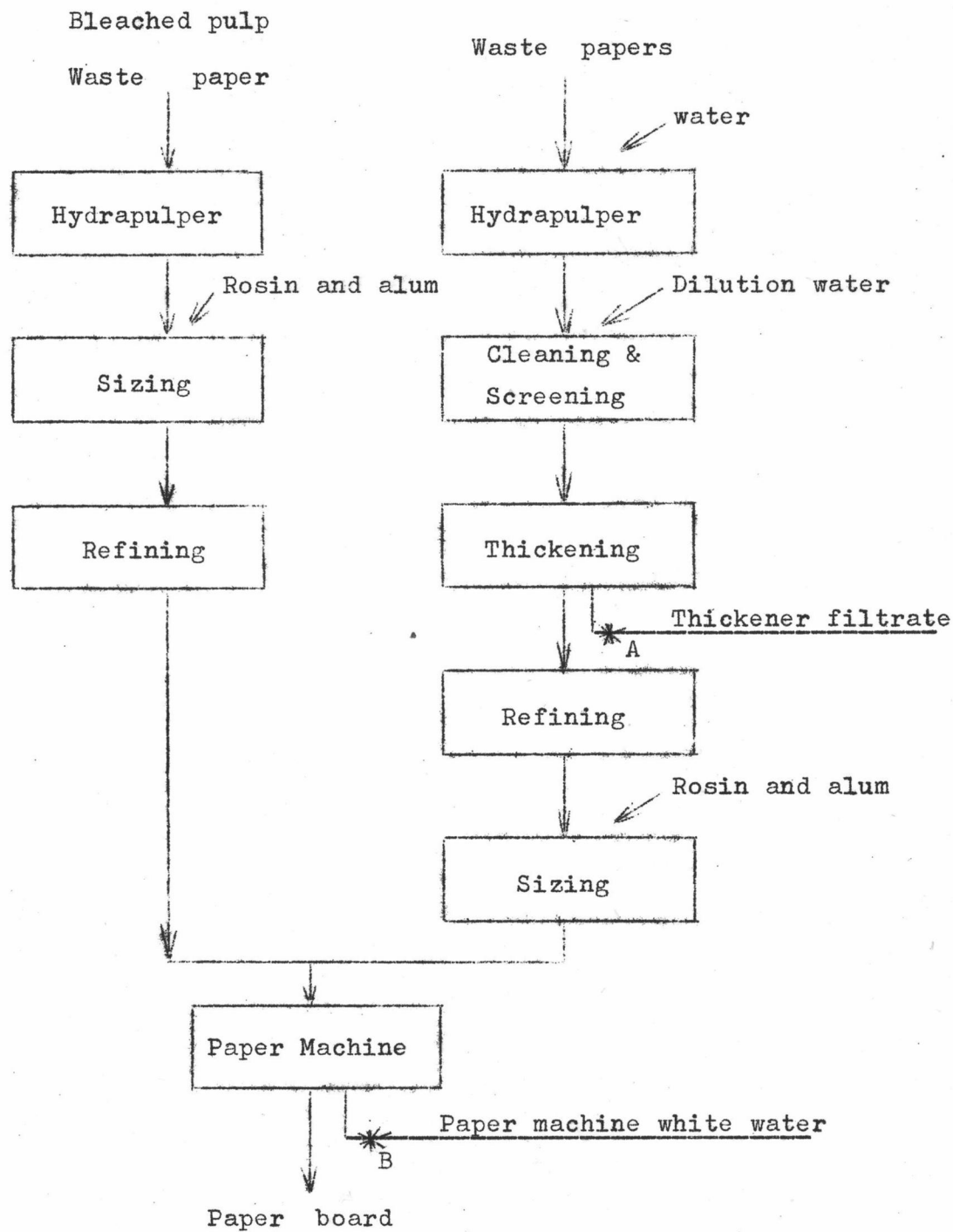


FIG. 2 FLOW DIAGRAM