Zero Discharge Of Industrial Effluent In RCF Base Paper Industry

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ABSTRACT

Due to stringent environmental regulations, the paper mills are moving ahead for closed mill concept with an ultimate target of closing the water circuit completely so that the mill does not have to purge any water nor does it take any clean water from the water resources. The present paper highlights the efforts made by the mill to achieve Zero Liquid Discharge (ZLD) through adoption of environmentally sound innovative technology developed in-house for ZLD of effluent. The mill is operating on ZLD since 2005 and the experience of which is being shared.

Introduction

The present paper highlights the efforts made by the mill to achieve Zero Liquid Discharge through adoption of environmentally sound innovative technology developed in-house for ZLD of effluent. Consumption of water in Paper mill is very high. It can be reduced by arranging proper water cycle and non generation of industrial effluent during entire manufacturing process. The goal to reduce water consumption was clear for which we started a process of close loop of water cycle at each level. Since 2005, the mill is operating on ZLD.

Paper making involves chemical engineering unit operations during entire process like disintegration, separation, filtration, evaporation and drying. Water is a conveyer of fibers for all the unit operations. Water, after conveying fibers from one operation to another operation and finally through the process of separation and filtration, filtrate goes back to previous operation to carry new fibers and the cycle goes on. During all operations except evaporation and drying there is no water loss from the process.

Unit : Vaibhav Paper Boards Private Limited, (winner of commendation certificate)
Plot No. 1810/1811, Phase - III, GIDC Indl. Area, Vapi - 396195 (Gujarat)

The water loss during evaporation due to drying is made up with fresh water and that is the only actual consumption of water for paper making process to achieve Zero Discharge. The water circuit is designed with complete closed loops at every stage of process. The fresh make-up water is added in the process to the extent of evaporation losses occurred during drying of paper.

By adopting the simple concept of closed loop, the cost involved is almost negligible for technology, equipments, additional man-power etc., resulting into low operating cost in comparison to the capital and operative cost of installing new technology.

Chemicals, like coagulants and flocculants i.e. Polyacrylamides and bentonite are used in the process at particular points, as per required dosages, which helps in keeping the water free from fibers and fines and retain them with paper increasing yield, conserving raw materials and chemicals.

During entire process mechanical equipments operating continuously imparts heat to fluid raising the temperature of the recycling water to the extent of 50°C thus the energy

required to heat fresh water is reduced. The viscosity of water also reduced, improving filtration rate at less power consumption. In entire process fluid was kept in motion resulting elimination of slime (Bacterial growth) and foul odour. This finally resulted to 100 % use of the all resources.

Financially it is a sustainable technology as the process changes do not require any major new investments.

Description Of Water Management

1. Fresh water addition points

a) Gland cooling at fan pump, refiners and pressure screen.
b) All chemicals preparations.
c) Trim nozzles (edge cutters).

The quantum of fresh water is controlled at above points and the fresh water addition is maintained as per the evaporation at dryer part of paper machine. Fresh water showers are not used at wire and press part.

2. Generation points of recycled water

a) Decker thickener
b) Fourdrinier wire part
c) Press part
d) Vacuum separators

3. Application points of recycled water

a) Pulper
b) Decker thickener shower
c) Turbo separator dilution
d) High density cleaner fibremizer

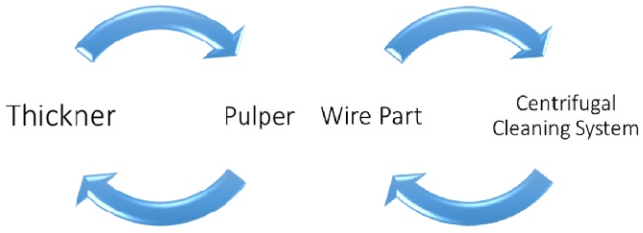
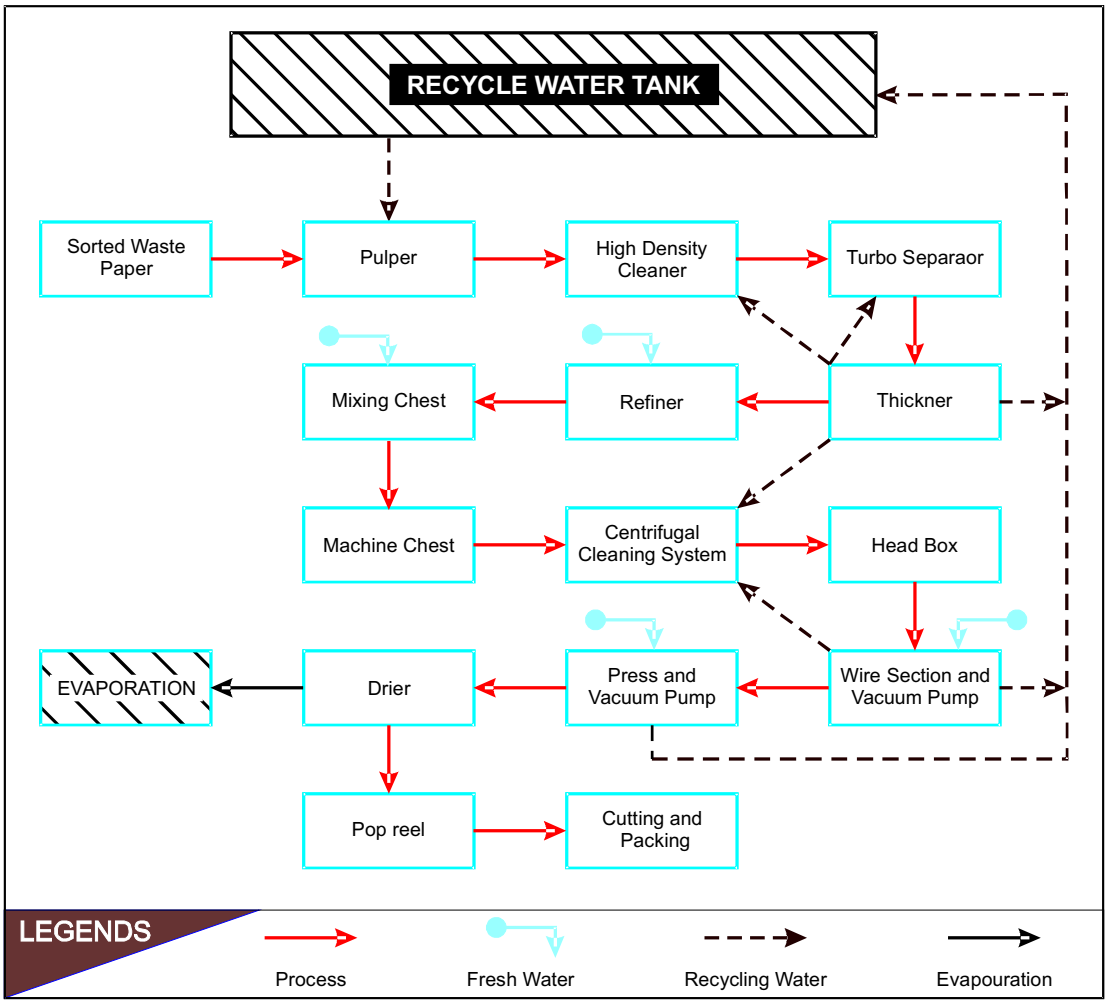


Figure 1 : Schematic Diagram for Recycling of Waste Water



e) Certicleaners rejects pits
f) Hose tapping for stock preparation, wire part and press part
g) Knock down shower at wire part

4. Circulation of water have short and closed loop

A holding tank collects the recycling water which is excess at
(i) all closed loops,
(ii) vacuum pump sealing water and
(iii) press part drainage.

5. Overall use of recycled water

a) White water of wire part drainage is taken to three places i.e.
   (i) Fan pump silo,
   (ii) Seal pit no. 1,
   (iii) Seal pit no. 2.

b) The fan pump silo delivers white water along with stock to centricleaner, head box and finally to wire.

c) Seal pit no. 1 delivers the white water to vacuum pump sealing.
d) Seal pit no. 2 delivers the white water to knock down shower on wire and starch preparation tank.
e) The over flow water from silo goes to holding tank.
f) The squeezed water from press part goes to holding tank.
g) The sucked water from felt and sealing water from vacuum pump goes to holding tank.
h) Finally the recycled water from holding tank is utilized completely in pulper.

The drained water from decker thickner in excess is collected in a tank and is utilized continuously to decker thickner shower, turbo separator dilution, high density fibermizer, dilution to centricleaner pits and hosing purposes at pulp mill and paper machine.

Result And Discussion

Zero discharge of industrial effluent is achieved leading to conservation of natural resource i.e. water. Water has been consumed only to the extent of 1.5 to 1.7 Kl per MT of paper manufactured compared to 8 Kl to 10 Kl per MT before closing of water circuit. Saving in power has also been achieved with current consumption of 275 to 290 KWH to manufacture 1 MT of paper. Saving in chemicals and raw materials has also been achieved alongwith elimination of effluent treatment plant resulted in saving of capital cost, operational cost with additional benefit of elimination of foul odor within industry premises as well as from end product. Due to closing of water loop, the soil quality and ground water remained unaffected.

Hence it can be considered that it is an innovative step by using the same machinery and process, to create and achieve new results by improved process.

Conclusions

Over and above this replicable manufacturing process have benefits, concepts and environmentally friendly technology, are and will be beneficial continuously forever.