



CLEANER PRODUCTION OPTIONS FOR SKIM RUBBER INDUSTRY - A CASE STUDY

By
PDT N Yasaratna

This thesis was submitted to the Department of Civil Engineering
of the University of Moratuwa in partial fulfilment of the Degree
of Master of Science in Environmental Engineering and
Management.

Department of Civil Engineering
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Sri Lanka

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Abstract

Rubber processing factories generate large amount of wastewater containing organic pollutants and various process chemicals. Rubber processing factory effluents exhibit high BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), ammonia, and suspended solid concentrations. Except for a few, most rubber processing factories in Sri Lanka do not adequately treat the effluents before discharge either due to high cost of treatment or use of inefficient methods for treatment. Due to the low operating margins of this vital industry, that utilizes a waste product as raw material, an introduction A of expensive pollution control methods would lead to the collapse of the industry.

In centrifuging plants the serum water contains 2.5% to 10.0% m/m.(I) dry rubber. Direct coagulation of this skim latex is not easy, because the colloid stability is enhanced by the high content of ammonia and protein containing substances, and by the small size of the dispersed rubber particles. One method of coagulation is by the addition of sulphuric acid where the skim is left to coagulate spontaneously. Then the coagulum is processed by conventional means, and made in to thick crepe.

The technology used in the selected factory for the case study, the production procedure is in primitive stage and this result in low productivity with high environmental damage. The industry discharges large volume of waste water and effluents consisting of 34 000 litres of serum and 4 000 litres of wastewater per day. Though the company has a large Treatment plant, the effectiveness of it is totally inadequate due its high retention time.

Few methodologies were used to find out the environmental damage by this factory, quantify the wastes and ways of maximum utilization of resources. Walk through audits; develop process flow charts, materials balance sheet, chemical analysis of raw material and the effluent and brainstorming are such methodologies.



The application of Cleaner Production (CP), apart from reducing pollution load brings in many other benefits to this type of industry, which include resource conservation, improvement in work environment, product quality improvement etc. Cleaner production is not only concerned with technology, but also with management, labour, organization and health and safety. Cleaner production solutions will help to improve the industry's financial bottom line and mitigate environmental damage through helping the industry to survive.

Fifteen cleaner production options were identified during the study. Waste free latex, de-ammoniation, avoidance of contaminants, control use of chemicals, improvement of coagulation process, technology improvement for skim separation, resource recovery, repair and maintenance, good house keeping, better storing of finished goods, modifying the air drying process, introduce proper drainage system for wastewater flowing, change the power generating system, and better scheduling are the identified CP options in the factory. Based on technical feasibility, financial viability and environmental desirability, an overall qualitative analysis was carried out for these options. According to the analysis the Proper mixing of skim latex with chemicals (Sulphuric acid), minimize rubber in waste streams, mechanized the skimming process, good house keeping practices (Introduce proper drainage system for w. water, separate and reuse water and storing finished goods) and de-ammoniating options were prioritised.

The proposed pollution prevention and pollution control measures would help to improve the environmental performance of skim rubber processing factories and grant resource conservation benefits to the industry.

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"To the best of my knowledge the above particulars are correct".

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