Investigation of Cleaner Production Options in Latex Dipping Industries

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Introduction

Cleaner Production technology is a systematic and a planned procedure for identifying, quantifying and finding options to minimize wastes. It is defined as a continuous application of an integrated, preventive, environmental strategy applied to processes, products and services to increase overall efficiency and reduce risks to humans and the environment. Implementation of Cleaner Production options will increase profits and simultaneously reduce the need of the end of pipe pollution controls. Sri Lankan rubber sector plays a vital role among the industries operating in the country as its contribution for the economy is significant. The latex dipping industry consumes large amount of natural rubber latex, hundreds of chemicals and massive water quantity. The efficient use of available resources is very much important to the industry. This assessment was conducted at Lalan Rubber's (Pvt) Ltd, Seethawaka where manufacture Latex examination gloves. The main objective of the assessment was to identify the major waste causes of manufacturing latex dipped products and generating options to minimize them.

Methodology

Planning and organization of the assessment were done after spending some time to understand the organization before starting the assessment. The top management commitment was obtained by conducting several awareness programmes. Cleaner production assessment team was established with 14 members representing six different departments in the factory. The technical executive of the factory was nominated as the team leader. Then the main objective of the assessment was settled as identifying the areas of waste generation and option generation to the identified causes within the four month time period. The qualitative review was done with the preparation of process flow diagram by considering all possible waste streams. Inputs, process and outputs were clearly identified in each process step. After drawing the process flow diagram, the main waste causes for latex and water wastes were identified. The collected data were analyzed by doing a Pearson correlation, descriptive statistics and Pareto analysis.

Table 1: Example - Work sheet No: A1:Water usage for refilling, tank solution and cleaning of acid rinse tanks for one day in all five plants

	Plant 1	2 & 4	Plant 3	Plant 5	Total
Acid					
Acid rinse					
Alkaline					
Alkaline rinse					

Results and Discussion

The first finding was the completion of the process flow diagram.

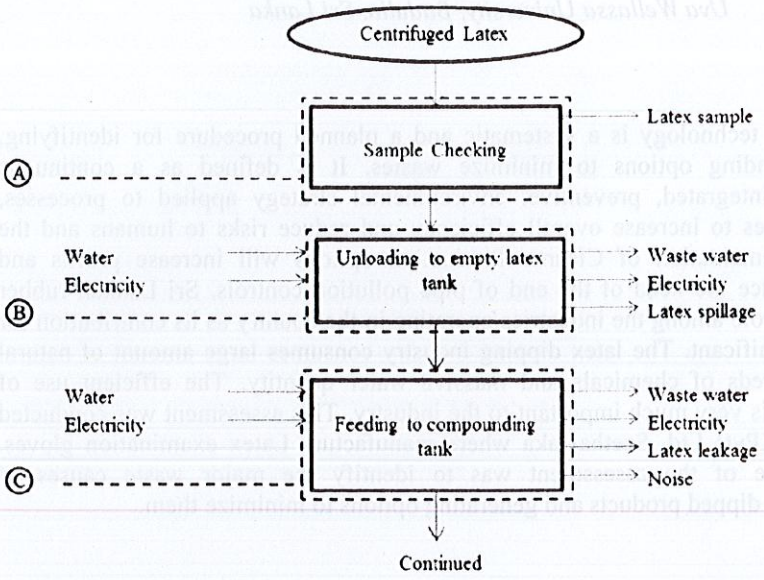

Figure 1: The process flow diagram of manufacturing latex examination gloves (To be continued)

Table 2: Pearson correlation P-Values to identify the relationship between the total latex wastage and each waste cause

	TSC Sample	DRC sample	Sample leftover	Retention sample
Total Latex Wastage	-0.546	-0.065	0.911	0.897
	0.341	0.917	0.032	0.039

	Coagulated rubber	Horse/ pump washing	Compound tank	Coagulated compound
Total Latex Wastage	0.471	-0.125	0.499	0.254
	0.424	0.842	0.393	0.681

Cell Contents: Pearson correlation

P-Value

The significant factors for the total latex wastage were latex retention samples and the latex leftovers (Table 2).

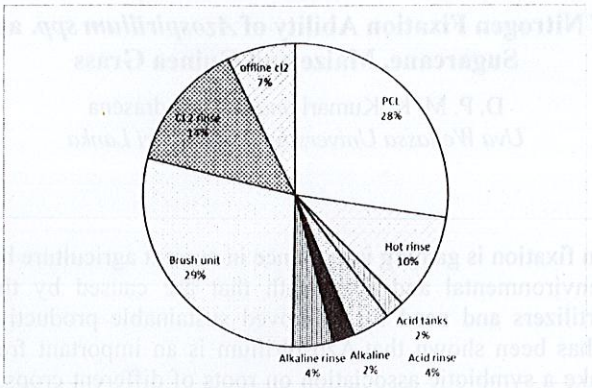

Figure 2: Percentage contribution of each waste water stream out of total waste water for one day production of 1.5 million examination gloves

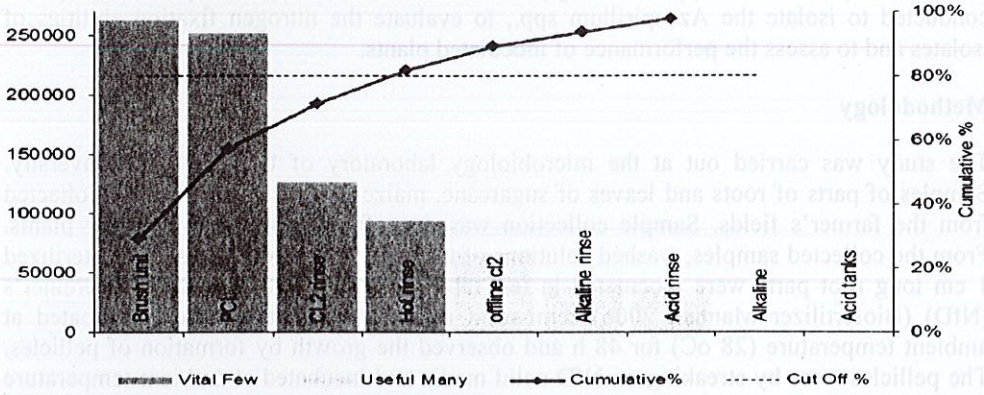

Figure 3: Pareto analysis for daily water usage for production purpose as a single use

Figure 3 shows the 80% of water wastage from process tank is due to 20% of major causes. They were from Brush Units, PCL Tanks, Chlorine Rinse Tanks and Hot rinse tanks.

Conclusion

Options to minimize the latex wastage can be given as reducing the amount of sample keeping up to the optimum volume needed for the testing, and replacing the retention latex back to the compound tanks after the retention period. 80% of water can be used in the process tanks can be reused of recycle in many processes such as thirdly rinsed water reuse for first rinsing, former washing, and other tank washing.

References

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