CHAPTER 1

INTRODUCTION

1.1 Importance and Reasons for Research

Plastic is desirable material to produce many products such container, equipment, etc. because it has a low weight, hardness, easy formation and low production cost. It is provided to make several products with a high demand. In the end of usage, plastic products occur much garbage too. Because of a hard degradation, plastics have a long time to dispose by landfill. Although an incineration method has a short time and rapidly disposal, this method releases a toxic gas that is harmful to the human and environment. This method isn't favorite to dispose the plastic garbage. A recycle method is provided to manage this garbage and the recycling plastic is cleaned and blended with new plastic gains to produce a product. From this method, about 200 recycling plastic factories are established in Thailand and proceed to recycle plastic garbage.

Water is an essential resource for all industries. Recycling plastic industry is one of sector which water is a main resource for operation. Thus, a major environmental aspect for this sector is high water consumption and amount of wastewater from washing a contaminant in recycled plastic.

Recycling plastic industry consist of three main steps. First, plastic garbage is sorted by type of plastic and grinded to small size. Second, these plastics are washed in a machine to remove the dust and contaminant by using water and cleaning agent, after plastic is put in a pit to rinse the cleaning agent contamination with fresh water. Final step, the plastic is dried by hot air, melted and extruded to product. The product that is made from the recycle plastic has poor properties. Sometime the recycle plastic grain is blended with new plastic grain to improve the properties.

From visiting the factory, the rinsing step has much water consumption, Due to the contaminant in the water such as soil precipitate and oil, it can't be reused the same process. The wastewater treatment plant in the factory has a limit of treatment capacity. Then the wastewater which occurs from the rinsing process can't be compleltly treated. If the factory has an improvement at rinsing process by using Cleaner Technology's concept, which focuses on a decreasing of the resource consumption, the factory can be decreased the water consumption and the wastewater from this process and reduced the operation of the wastewater treatment too.

As seen from the background data, a motivation of research are as follows. First, to provide a mathematical model of rinsing which has been studied in the past for improve a drag out rinsing in recycled plastic plant. Second, to decrease an environmental aspect in recycled plastic plant based on the optimization result.

1.2 Research Objective

The objectives of this research are

1. to study and formulate a mathematical model of a rinsing process.

2. to optimize the rinsing model under constrain for recycled plastic plant which it can be decreased water consumption and discharge of wastewater in the rinsing process.

1.3 Scope of Research

The scopes of research are the following

1. The data for formulated mathematical model is provided from the experiment and visiting recycling plastic plant.

2. The rinsing model and optimization result has no implementation.

3. The modeling and optimization are simulated based on Matlab software.

1.4 Contribution of Research

The contributions for this research are that

1. A mathematical model of a rinsing process for a recycled plastic plant.

2. The optimization result with decreasing water consumption and discharge of wastewater in recycling plastic plant about 70-80%.

1.5 Methodology of Research

The methodology of this research are

1. Research and review the rinsing process form the document.

2. Study the rinsing process in the factory.

3. Formulate a mathematical model that is representative of this system.

4. Do an experiment to collect data.

4. Validate the simulation result with the real data.

5. Improve the mathematical model and validate again.

6. Optimize the model to find the optimum point for decreasing water consumption and discharge of wastewater.

7. Summarize and make a document.

1.6 Sequence of Research Presentation

This thesis is organized as follows:

Chapter 1 is an introduction to this research. This chapter consists of Importance and reasons for research, research objective, scope of research, contribution of research and methodology of research.

Chapter 2 presents the literature review about a modeling of the rinsing process in many industrial sectors and the application of dynamics optimization.

Chapter 3 defines background information of rinsing process and the theory with involving this research.

Chapter 4 describes a detail of research methodology.

Chapter 5 presents a result of modeling of rinsing process and optimization of this model.

Chapter 6 presents the conclusion of research and recommendation for the future work.