



# Global Funding for Rubber Innovation

*Nurturing Ideas for the Rubber Industry Globally*



## MIDSTREAM RUBBER SECTOR

# DRY RUBBER



# MIDSTREAM [DRY RUBBER]

## 1. Automation at SMR processing factories

- ❑ The manufacturing of SMR involves a lot of labor-intensive processes and is considered as 3D (Dirty, Dangerous and Difficult) industry especially in the loading and unloading, contamination removal, wet and dry process, biscuit removal, weighing, baling and packaging activities.
- ❑ Most of SMR manufacturer in Malaysia experience loss of production due to labor shortage as the local workforce and even some foreign workforce would rather work in different industry.
- ❑ Besides that, as most of the processes is manual and labor-intensive, the productivity is low

## 2. On-Line Contaminant Detector for Final Bale Inspection

- ❑ Final bale inspection process is important step in the manufacturing of SMR.
- ❑ This is to prevent contaminated product shipped to the customer and might affect their processing line and end product.
- ❑ Current practice of manual inspection is not thorough and is insufficient as contaminated product can get passed-through the inspection during high volume production.

## 3. Environmental Regulation - Odors

- ❑ Manufacturing of SMR releases odor to the environment that might cause displeasure to the surrounding neighborhood
- ❑ The odor originated from the constituents of the rubber itself. These constituents may also be released during the drying process of rubber crumb. The drying process is a crucial process for the removal of water from the rubber
- ❑ Currently, majority of SMR manufacturer find it difficult to adhere to the stringent regulations on odor limits which set at 25,000 ou/m<sup>3</sup> (Draft Odour Regulation, 2014)
- ❑ High capital investment need to be done to ensure that the factory adhere with the regulation

## 4. Solid Waste Management

- ❑ Most of the processing line wastes in SMR manufacturing plant are derived from the pre-cleaning process and tank cleaning activity.
- ❑ These wastes are mostly organic matter such as bark, twig, leaves and few inorganic matter such as dirt and raffia strings.
- ❑ Most of these wastes will flow alongside the processing wastewater and will be extracted at the rubber traps. If the wastes is not extracted properly, it will flow straight into the effluent treatment pond.
- ❑ As the accumulation of these wastes inside the effluent treatment pond increases, the efficiency of the effluent treatment process is reduced.
- ❑ Proper waste extraction process is required to prevent the accumulation of these wastes.

## 5. Environmental Regulation – Effluent Discharge

- ❑ Wastewater from the SMR manufacturer are a product of washing and cleaning processes of rubber cup lump and rubber crumb
- ❑ Currently, the regulations adopted by Department of Environmental (DOE) will not be a problem for manufacturers to adhere
- ❑ DOE is moving towards more stringent parameters for the effluent discharge into water ways and this might cause problem to SMR manufacturer as there will be some additional treatment processes that need to be installed.
- ❑ In addition, current wastewater ponds (anaerobic, aerobic, facultative) have already used up a lot of space to accommodate the amount of wastewater coming from the processing line.
- ❑ Improvement in terms of efficiency and handling capacity of the treatment process are encouraged.

# LATEX



## 1. Automation and Mechanization of Centrifuge Machine Operation and Cleaning Process

- ❑ Natural Rubber harvested from rubber tree which is called Field Latex (FL) has a dry rubber content (DRC) of about 25-40%. It also contains some magnesium ions, natural rubber protein and other impurities
- ❑ The FL is bulked, preserved and delivered to latex factory which will be treated with diammonium phosphate to chelate the free magnesium present. The FL is generally left overnight for the sludge to settle before being fed into the centrifuge machine
- ❑ The centrifuge machine functions to produce latex concentrate (LC) by removing all the non-rubber constituents in the FL
- ❑ Currently, the centrifugation process is done manually, and the centrifuge machine must be cleaned at regular interval of every 3-4 hours as there will be sludge, mainly soil or magnesium phosphate and coagulated rubber lumps accumulated inside the bowl
- ❑ The cleaning process of the machine can be quite difficult requiring the operator to dismantle the machine.



## 2. Identification of Protein Type in Natural Rubber Latex that Affect the Curing Process, Aging and Physical Properties of Final Dipped Articles

- ❑ Protein is one of the major component of non-rubber content in field latex (approximate 1.5 – 4 Wt%) which participate in the latex curing process. There are many types of protein in natural rubber latex (NRL) which affect the curing behavior of compounded latex and its effect on the aging resistance and physical properties (PP) of final dipped product
- ❑ Generally, it is desirable to remove/reduce the amount of protein in NRL as the final product may cause unwanted allergic reaction to the users. However, by lowering the amount of protein, the resulted NRL has slower curing rate and poor mechanical properties
- ❑ To identify the protein species/group of proteins that can affect the curing behavior, PP and aging resistance of final products
- ❑ To synthesize the protein species, identify above for commercial applications for the purposes of enhancing the cure rate and physical properties of the dipped products

## 3. Production of Ultra-Low or Zero Protein Artificial Natural Rubber Latex from Natural Rubber for Dipping Process

- ❑ Numerous researches have been attempted to remove/reduce the protein contents from Field Latex (FL). However, the results were not promising
- ❑ In many cases, removing the natural protein affect the latex's colloidal properties and its processability
- ❑ In this project, dry natural rubber with protein removed shall be used as the starting material instead of FL
- ❑ To remove the protein contents from dry natural rubber to be used as the starting material by using suitable technique
- ❑ To dissolve and emulsify the protein-free dry natural rubber into artificial rubber latex