

AUTOMATING THE LATEX FRACTIONATION PROCESS IN THE CREPE RUBBER INDUSTRY

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May 2022

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Thesis/Dissertation submitted in partial fulfillment of the requirements
for the degree
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Acknowledgments

Following this master's program and completing the research project has been a great academic challenge I had to go through. I would like to acknowledge the support and guidance of the following individuals who made it a possibility.

First and foremost, I pay my sincere gratitude to Prof. AGBP Jayasekara and Dr. HHMP Rathnayake, who accepted to supervise my research despite their busy schedules. Their mentoring, wisdom and commitment encouraged and inspired me.

Also, I am grateful to remind and extend my gratitude towards Mr. Ruwan Kumara who drew my attention to this project by introducing me the rubber industry and showing me the potential areas to be developed.

I also would respectfully thank the Head of the Department, all the lecturers, and other staff members of the Department of Electrical Engineering, the Faculty of Engineering for their help lent to me during the degree program. Finally, I thank my parents for their continuous support and motivation.

Abstract

Sri Lanka is the largest manufacturer and exporter of natural Crepe rubber which is one of the purest forms of natural rubber manufactured. Crepe rubber should be manufactured in clean hygienic and controlled conditions in order to maintain its pale color and hardness in the final product. Since the inception of the Rubber industry in Sri Lanka in 1876, there hasn't been much of a development in the manufacturing processes. We still rely on the mechanisms that the British introduced in the colonial era. The initial stage of manufacturing is called rubber fractionation, a process that is specific to crepe rubber production which is done to remove the impurities in the natural rubber latex. This process includes dry rubber content measurement, standardization (dilution to the standard) of the latex, addition of sodium bisulphite/metabisulphite and agitation for around 2 hours. These are high labor-intensive tasks and when closely observed many inefficiencies and health hazards for those who are involved could be identified. Also, the labor shortages have been a major bottleneck in the crepe rubber manufacturing process.

The objectives of the project are increasing the efficiency and output yield by reducing the process time and wastage of latex and also minimizing the human involvement in the fractionation process hence reducing the health hazards faced by the employees involved. To achieve these objectives firstly, a more efficient and reliable dry rubber content measurement method that enables high precision standardization and chemical dosing are proposed as an alternative to the current measurement using the metrolac. Then an automated solution is proposed through a working demonstration of a prototype to perform the current manual tasks of standardization, chemical dosing, agitation and determining the process end. The prototype enabled the entire fractionation process to be performed in much lesser times than the observed processes in the manufacturing facilities with higher accuracies in standardization and chemical dosing. Hence suggested improvements are proved viable to be implemented in the manufacturing facilities which will give the manufacturers a high output yield, reduce rubber wastages and enable compliance with export standards in the final crepe sheets. The ultimate goal of this study is to make a contribution to the development of the Crepe rubber industry in Sri Lanka.

Keywords: Crepe rubber, Dry rubber content, Fractionation

Table of Contents

Declaration	i
Acknowledgments.....	ii
Abstract	iii
List of Figures	vii
List of Tables.....	ix
List of Abbreviations.....	x
1. INTRODUCTION	1
1.1 Crepe Rubber Industry	1
1.1.1 Types of Crepe Rubber	2
1.1.2 Important Stages in Crepe Rubber Manufacturing	2
1.1.3 Declining Production Volume for Natural Crepe rubber.....	2
1.2 Fractionation Process	3
1.2.1 Importance of Fractionation Process.....	4
1.2.2 Issues in the fractionation Process	4
1.3 Aim and Research Objectives	5
1.3.1 Research Objectives	6
1.4 Chapter Outline	6
1.4.1 Introduction.....	6
1.4.2 Review of Literature	6
1.4.3 Improving the fractionation process of the crepe rubber manufacturing	6
1.4.4 Summary and Recommendations.....	7
2. REVIEW OF LITERATURE	8
2.1 Status of Research on Crepe Rubber Production improvement	8
2.2 Fractionation Process	8
2.2.1 Standardization of DRC	9
2.2.2 Addition of Sodium Bisulphite/Metabisulphite	9

2.2.3	Agitation.....	9
2.3	DRC Measurement	10
2.3.1	Importance of determining the DRC in field latex.....	11
2.3.2	Current Method of DRC Measurement.....	11
2.3.3	Effect on temperature for DRC	13
2.3.4	Consequences of misestimating the DRC	15
2.3.5	Other existing/researched methods for DRC Measuring	16
2.4	Room for Improvement and Research Gaps Identified.....	17
2.4.1	Estimating the DRC in a more accurate manner	17
2.4.2	Reliably determining the end of the Fractionation process.....	17
2.4.3	Minimizing Human Involvement in the process.....	17
3.	IMPROVING THE FRACTIONATION PROCESS OF THE CREPE RUBBER MANUFACTURING.....	18
3.1	Measuring the Dry Rubber Content	18
3.1.1	Evaluating Effect of Temperature on DRC.....	18
3.1.2	Evaluating the error when using the standard chart at the extreme temperatures measured.....	19
3.1.3	The proposed method to measure DRC	21
	Assumptions when Interpolating and Extrapolating the Values	24
3.1.4	Comparing the temperature corrected DRC measurement chart with the laboratory method.	24
3.2	Determining the completion of fractionation	27
3.2.1	Fractionation Process in a Prototype Environment.....	29
3.3	The automated solution to perform the fractionation process	30
3.3.1	Control Process	31
3.3.2	Sensors and Actuators used.....	31
3.4	Observations on pH variation.....	35
4.	SUMMARY AND CONCLUSIONS	38

4.1	Suggested Improvements to the current process	38
4.1.1	Replace the metrolac with volume - weight measurement system	38
4.1.2	Accompany the density measurement with a temperature measurement and using the temperature corrected DRC estimation chart.....	38
4.1.3	Automated chemical dosing & dilution	38
4.1.4	Using a Mechanical agitator along with aeration.....	38
4.1.5	pH monitoring to determine the process end	39
4.2	Industrial Implementation	39
4.2.1	The estimated cost of implementation	39
4.3	Benefits for the manufacturer due to the Suggested Improvements.....	40
4.3.1	Superior quality in the crepe sheets	40
4.3.2	Prevention of the health hazards faced by the laborers.....	40
4.3.3	Increase in output yield	40
4.3.4	Reliably determining the end of the process	40
4.3.5	Production cost savings.....	40
4.3.6	Reduced process time.....	41
4.4	Research Contribution	41
4.5	Limitations to the study	41
4.6	Further Improvements	42
	References	43

List of Figures

Figure 1 : Outer appearance of Crepe rubber Sheets	1
Figure 2 : Crepe rubber manufacturing process [2]	2
Figure 3: Latex Crepe production in Sri Lanka from 1980-2018 [6].....	3
Figure 4 : Rubber fractionation Process.....	3
Figure 5: Froth that start forming on top of the latex (This contains non-rubber constituents including carotenoids and other pigments in the field latex).....	4
Figure 6: Health complications due to exposure to harmful chemicals.....	5
Figure 7: Laborers in direct contact with chemicals	5
Figure 8: Recommended steps for fractionation. Adapted from [7]	8
Figure 9: Laborers adding Sodium Bisulphite to the diluted field latex	9
Figure 10: Agitation of the Latex.....	10
Figure 11 : Metrolac used for the DRC measurement	11
Figure 12 : Taking the metrolac reading. Adapted from [7]	13
Figure 13: Variation of environmental temperature near the manufacturing facility of study [14]	18
Figure 14: Evaluating the error when using the standard chart at the extreme temperatures measured.....	20
Figure 15: DRC error at different temperatures (when using the standard chart)	21
Figure 16: Comparing results of the DRC estimations with Metro_E and Metro_N. Adapted from [8].....	25
Figure 17: The variances observed in the Dry rubber content % estimated with the Metrolac with the use of Metro_E and Metro_N charts and the % DRC measured in the research laboratory, Adapted from [8]	26
Figure 18: Variance detected in the DRC percentage estimated with Metrolac with the use of existing and new temperature corrected charts and the temperature of latex solution. Adapted from [8].....	27
Figure 19: Determining the completion of fractionation	28
Figure 20: pH variation during the fractionation process 1	28
Figure 21: pH variation during the fractionation process 2	29
Figure 22: Apparatus for testing samples for DRC measurement	30
Figure 23: The operation process of the automated solution	31
Figure 24: Control Process of the automated solution.....	31

Figure 25: Load cells and ADCs.....	32
Figure 26: Temperature sensor probe (DS18B20).....	32
Figure 27: Flow meter and Electronic Solenoids.....	33
Figure 28: Apparatus for mechanical agitation and aeration.....	34
Figure 29: pH sensing apparatus.....	35
Figure 30: Control board.....	35
Figure 31: pH variation in the prototype simulated processes.....	36
Figure 32: pH variation in all processes.....	36

List of Tables

Table 1: Standard Metrolac Chart for DRC measurement. Adapted from [7].....	12
Table 2 :Temperature corrected DRC estimation chart with metrolac by Kudeligama et al. Adapted from [8]	15
Table 3 : Consequences of misestimating the DRC.....	15
Table 4: Methods of calculating the DRC	16
Table 5: Temperature variations in sample field latex sets.....	19
Table 6: Time taken for the fractionation process	19
Table 7: Mapping the absolute density with Metrolac reading.....	22
Table 8: Corresponding undiluted latex density	22
Table 9: Mapping the absolute densities of field latex, diluted latex, DRC, and metrolac reading.....	22
Table 10: Derived DRC reference chart with temperature adjustments	23
Table 11: Recorded process times for the processes observed	29
Table 12: Parameters of the samples tested in the prototype tank	29
Table 13: Estimated cost of implementation.....	39

List of Abbreviations

Abbreviation	Description
BS	British Standard
DRC	Dry Rubber Content
ISO	International Organization for Standardization
LDRC	Laboratory measured dry rubber content using ISO/BS method
MDRC	Metrolac measured dry rubber content
Metro_E	Standard existing metrolac ready-reckoner chart
Metro_N	Temperature corrected metrolac ready-reckoner chart
RRISL	Rubber research institute of Sri Lanka
RSS	Ribbed smoked sheet rubber
TS	Total Solid
TSR	Technically specified natural rubber