



Daffodil
International
University

Internship Report

on

**“Production and Manufacturing process in PRAN-RFL
(Mymensingh Agro Limited)”**

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Submitted to

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LETTER OF TRANSMITTAL

Date: September 11, 2022

To

Ms. Fouzia Akter

Assistant Professor and Head

Department of Nutrition and Food Engineering

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Subject: Submission of Internship report

Dear Sir,

It is a great delight and honor for me to have the opportunity to submit Internship report titled “Production and Manufacturing process in PRAN-RFL (Mymensingh Agro Limited)” as a part of the fulfillment of Nutrition and Food Engineering (NFE) program curriculum.

I have prepared this report based on the acquired knowledge during my internship period in Mymensingh Agro Limited. . This report is based on the production and manufacturing process of several Products of that organization. During the period of my internship I have also obtained knowledge about the organizational culture of PRAN-RFL group which one is a great consumer product producing organization of the country. On the other hand, the project enriched me with the opportunities to building networks with the corporate area.

I therefore, would like to place this report to your judgment and suggestion. Your kind advice will encourage me to perform better planning in future.



Sincerely Yours,

Sk. Saleh Ahammad

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DECLARATION

This Dissertation entitled “Production and Manufacturing process in PRAN-RFL (Mymensingh Agro Limited)” is being submitted to the Department of Nutrition and Food Engineering, Faculty of Allied Health Sciences, Daffodil International University, Bangladesh as a part of partial fulfillment of the requirements for the degree of Bachelor of Science in Nutrition of Food Engineering. The entire report based on the knowledge and skills that I have acquired in my internship period and did not submit before in support or an application for another degree or qualification of this university or any other institution.

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Acknowledgement

First I wish to express my gratefulness to the almighty ALLAH for giving me the ability and opportunity to perform my responsibilities as an intern and complete the report within the scheduled time.

I am deeply pleased to my Department Head, **Ms. Fouzia Akter**, Daffodil International University for his whole-hearted supervision during my organizational attachment period. I am also grateful to **Md. Moklesur Rahman**, Manager-R&D PRAN Food Ltd. It would have been very difficult to prepare this report without their guidance and helps.

I would like to give thanks **Ms. Nasima Akter Mukta**, Lecturer (Senior Scale), Dept. of Nutrition and Food Engineering. Their sincere guidance and support inevitably helped me to steep the study report.

Abstracts

PRAN food factory is a popular and famous food factory in Bangladesh and also in other countries. Their aim to produce quality food in a healthy environment. I got an opportunity to do an internship at Mymensingh Agro Limited which one is an industry of PRAN-RFL group. My internship starts on 07 November 2021 and ends on 18 November 2021. Their manufactured various types of food products are also exported abroad. They have so many sectors and amongst them WTP, ETP, RO and boiler, Drinking water, CSD, HOTFILL, Drinks, Packmat, Candy, R&D etc. WTP has some sectors, PH, TDS, CL, FE, and Hardness. I was assigned to Water and Beverage section and learnt practically to measure the quality parameters of water and beverages and also the manufacturing process as well. This report is based on my practical experiences. PRAN maintain all the quality parameters very carefully as the quality of the products measuring all the quality parameters. Some products of PRAN food factory- PRAN frooto mango juice, PRAN cool, Sundrop, Coco chu, Drinko, Tamarid drink, PRAN alovera fresh, Dr. Aloe [Alovera drink], Lemon ice tea less sugar, PRAN apple drink, Lacchi, PRAN drinking water, Oscar, Power, Fizz, PRAN lemon, Tango, PRAN up, Premio chocolate wafer, PRAN crunchy wafer, PRAN special dry cake, All time dry cake biscute, Hurray wafer Etc.

TABLE OF CONTENTS

CONTENTS

Chapter	Topic	Page
	Cover page	vi
	Letter of Transmittal	vi
	Declaration	vi
	Acknowledgement	vi
	Abstract	vi
	Table of Content	vi-vi
	List of Abbreviations	vi
1	Introduction	1-2
2	Water Treatment Plant (WTP)	3-5
3	Bottled Water	6-8
4	Carbonated Soft Drink & Activities	9-13
4.1	Syrup Processing	10
4.2	Raw Materials	11
4.3	Chemical Mixing Process	11
4.4	Manufacturing Process	12-13
5	Hot-Filling Technique	14-17
5.1	Raw Materials	15
5.2	Chemical Mixing Tank	15-16
5.3	Processing of Hot-Fill	16-17
6	Drinks	18-22
6.1	Raw Materials	19
6.2	Chemical Mixing	20

6.3	Manufacturing Process of Lassi Drinks	21-22
7	Pack-Mat Line	23-25
8	Candy Preparation	26-28
8.2	Raw Materials	27
8.3	Production Process	27-28
9	Tests for Quality Control	29-32
10	Conclusion & References	33-35

List of Abbreviations:

- WTP- Water Treatment Plant
- RO- Reverse Osmosis
- UGT- Underground Tank
- ACF- Activated Carbon Filter
- UV- Ultraviolet
- CFR- Code of Federal Regulation
- QC- Quality Control
- QA- Quality Assurance
- MGF- Multi Grade Filter
- CHO- Carbohydrate
- SF- Softner Filter
- TDS- Total Dissolved Solid
- EBT- Eriochrom Black T
- EDTA- Ethylene Di-Amine Tetra Acetic Acid
- PRP- Prerequisite Program
- GSP- Good Storage Practice
- GMP- Good Manufacturing Practice
- HACCP- Hazard Analysis Critical Point
- CIP- Cleaning In Place
- BSTI- Bangladesh Standard & Testing Institute
- ISO- International Organization for Standardization
- FDA- Food & Drug Administration
- COP- Cleaning Outer Place
- PP- Polypropylene
- LDPE- Low Density Polyethylene

Chapter 1

Introduction

In 1981, in the hands of visionary Major General Amjad Khan Chowdhury. He saw an excellent business Opportunity in Bangladesh's optimal cultivating environment. This inspired him to create an epoch-making business to redefine the nation's food manufacturing industry while serving society and its people. And that's how PRAN was born. (Daily voice, 2014)

Later in 1986, PRAN extended its operations by entering into agriculture through contract farming, and in 1992, with its food processing plant in Ghorashal, PRAN further established its position in the industry. (Kumar N, 2013)

Mission statement of PRAN Foods Ltd.

Poverty and hunger are curses. Our aim is to generate employment and earn dignity and self-respect for our compatriots through profitable enterprises. (Shanjabin S, 2021)

Vision statement of PRAN Foods Ltd.

Improving Livelihood. (Shanjabin S, 2021)

Slogan statement of PRAN Foods Ltd.

PRAN means life, and we stand for the taste of life. (Shanjabin S, 2021)

Chapter 2

Water Treatment Plant (WTP)

2.1 Water Treatment Plant (WTP) Process:

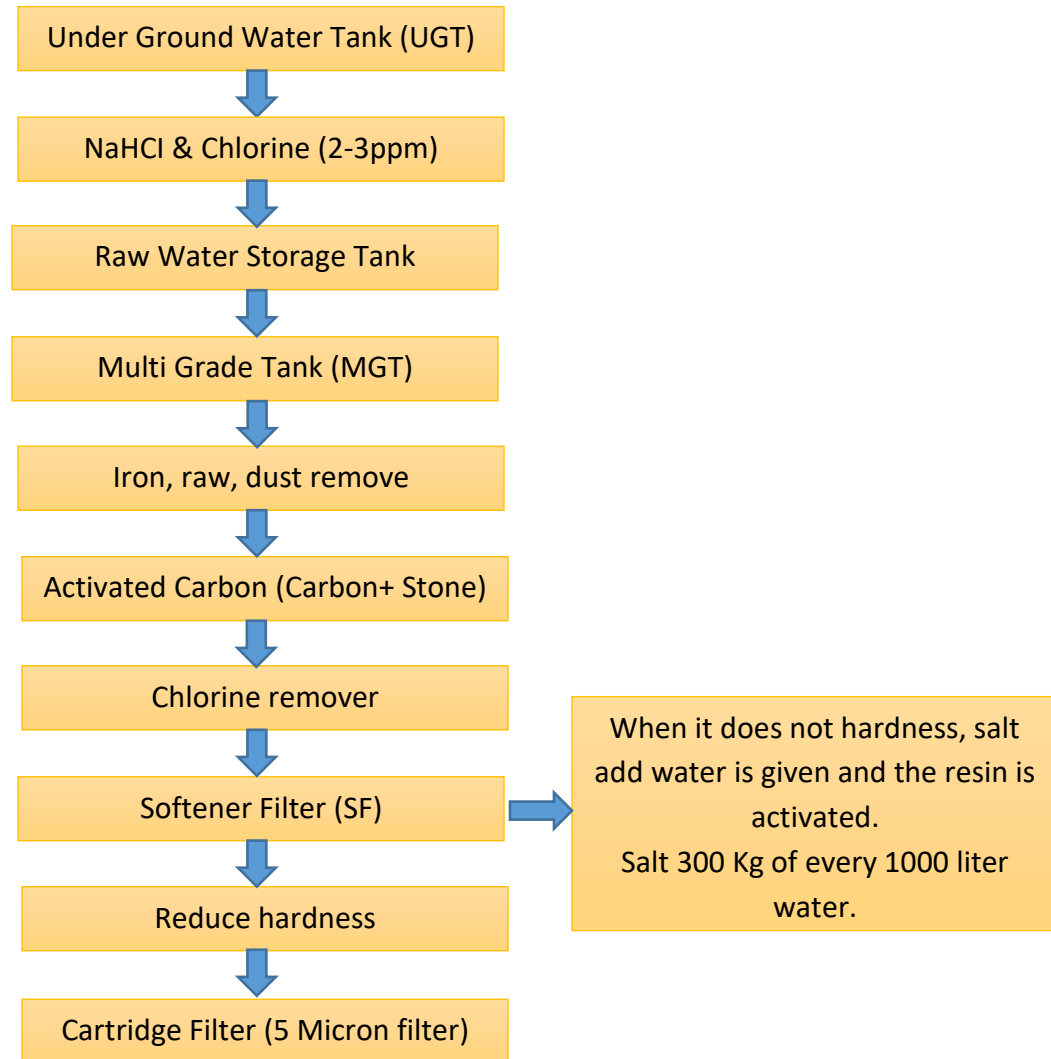


Fig 1: flow chart of Water Treatment Plant (WTP) Process

At first collect the water from rivers, lakes, ponds. All of this carried various type of bacteria, dust, animal excrement, drain dirt etc. So these waters are unfit for consumption and have to go through many processors to make them fit for consumption. There are several steps in the water treatment plant (WTP) at MAL (Mymensingh Agro Limited) and this are:

- Under Ground Tank: In this step Sodium Hypochlorite and Chlorine (which must be 2-3 ppm) are mix with water, it's called chlorination of water. It's helps to destroy bacteria, viruses and any kind of life threatening micro-organisms which is very important.
- Raw Water Tank: In this step water stored before the final process of water treatment.
- Multi Grade Filtration (MGF): MGF also known as sediment filtration. MGF removes physical particles like Iron, raw, dust etc. It's able to removes particle size up to 50 micron.



Fig 2: Water Treatment Plant (WTP)

- Activated Carbon Filter (ACF): Activated carbon filter (ACF) contain carbon and stone which remove the chlorine from the water.
- Softener Filter: Softener filter uses to reduce hardness of water. Every 12 hour softener filter need to calibrate with salt add water is given and the resin is activated. Salt 300 Kg of every 1000 liter water.
- Cartridge Filter: In this stage prime or major object is to remove from water such as tiny particle and salt. It's able to removes particle size up to 5 micron.

This water is uses in process of Juice, Drinks and Beverages, Carbonated Soft Drink are flow through Reverse Osmosis Filtration.

Chapter 3

Bottled Water

3.1 Process of Bottled Water/ Drinking Water:

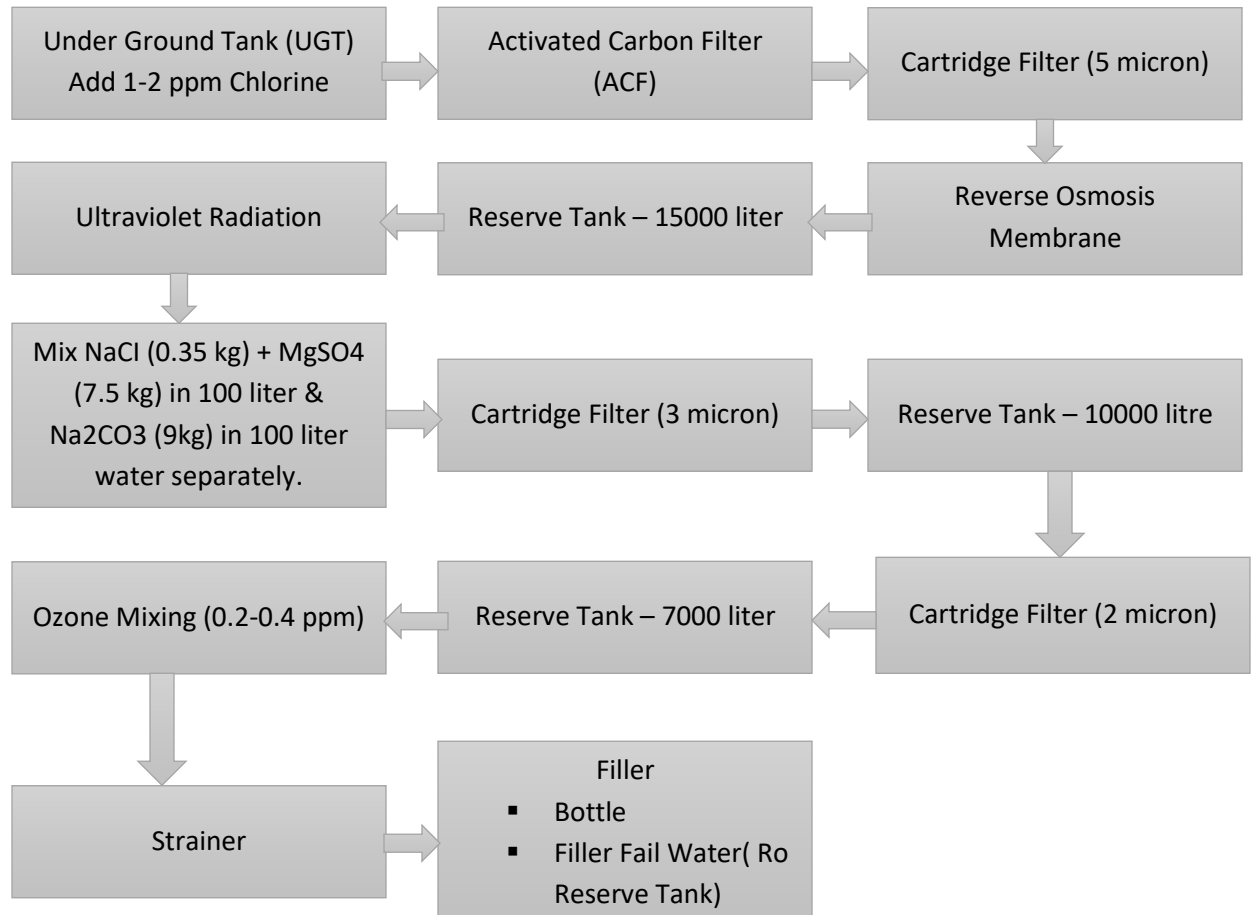


Fig 3: Bottled Water Process

Water is flow through reverse osmosis plant from WTP. RO water store 2 reserve tank each tank volume is 15000 liter. From RO water tank the water pass in ultraviolet radiation and mixing some chemicals that is Sodium Chloride (NaCl) 0.35 kg in 100 liter water, Magnesium Sulphate (MgSO4) 7.5 kg in 100 liter water and Sodium bicarbonate (Na2CO3) 9kg in 100 liter water separately. Then the water pass through the 2 cartridge filter which one remove 3 micron and another one remove 2 micron size bacteria and any kind of particle. Then ozone mixing which is 0.2-0.4 ppm in the water and the water pass through strainer. After strainer water goes to filler section and this section the water is to bottled, and filler fail water store in RO reserve tank.



Fig 4: Ozone mixing pump & Cartridge filter

Chapter 4

Carbonated Soft Drink (CSD)

4.1 Syrup processing:

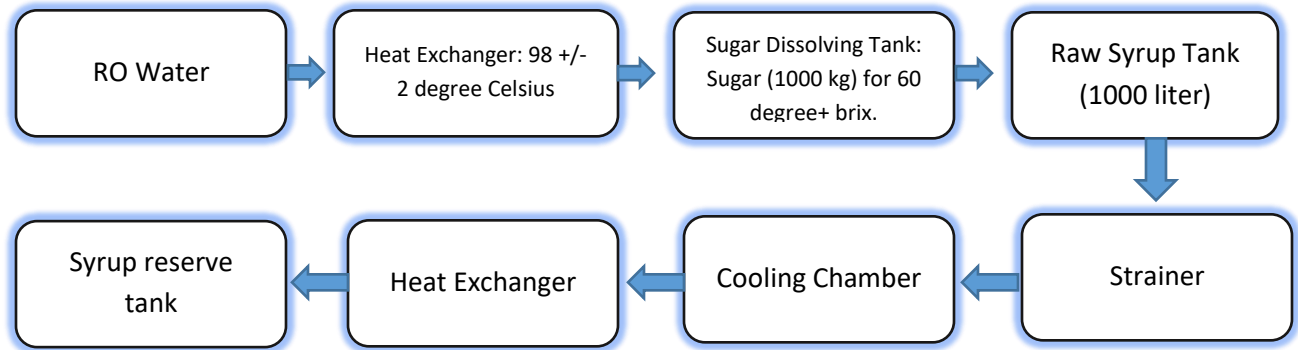


Fig 5: Syrup processing

Water comes from WTP that passes RO and Heat Exchanger (98 +/-2 degree Celsius) and store Sugar Dissolving Tank. Sugar Dissolving Tank maintain 85 +/-2 degree Celsius temperature and Sugar (1000 kg) for 60 degree+ brix. After dissolving the sugar it store in raw syrup tank (1000 liter) and goes to cooling chamber through strainer which remove any kind of dust and insoluble particle. Then it again passes heat exchanger and store final syrup reserve tank. This syrup is uses for production of drinks, hot-fill and beverage etc.



Fig 6: Plate Heat Exenger

4.2 Raw Materials:

Power energy drinks is most popular carbonated soft drinks of PRAN. In power energy drinks 8000 liter in Mymensingh Agro Limited products contains –

- ❖ Food color- 256 gram (Sunset Yellow)
- ❖ Energy Flavor- 22 liter,
- ❖ Energy Power Blend- 160 kg,
- ❖ Sodium Benzoate- 5.36 kg,
- ❖ Tri-sodium Citrate Dehydrate- 12.8 kg,
- ❖ Citric Acid Anhydrous- 175 kg,
- ❖ Caffeine BP Anhydrous – 9.28 kg.

Must maintain degree brix which is different in local market and export products. Local market contain 18 degree brix and export products contain 15 degree brix.

4.3 Chemical Mixing Process:

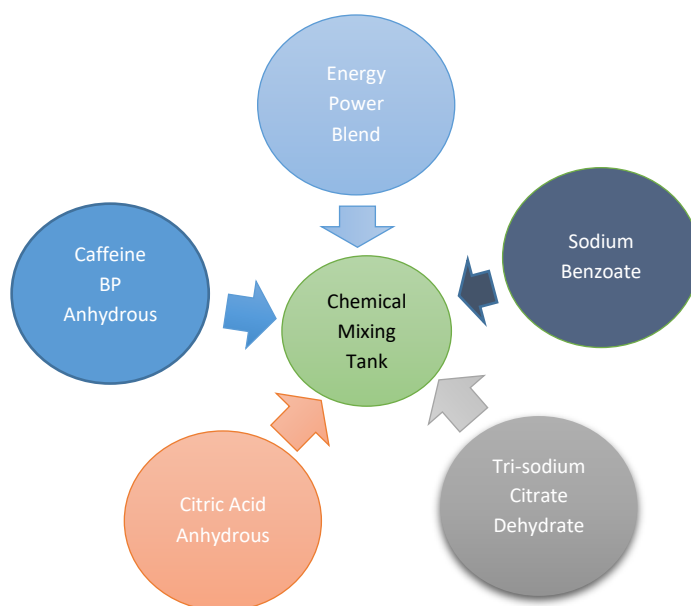


Fig 7: Chemical mixing process

All of this chemical mixed in chemical mixing tank and then it used in product preparation process. Energy Power Blend- 160 kg, Sodium Benzoate- 5.36 kg, Tri-sodium Citrate Dehydrate- 12.8 kg, Citric Acid Anhydrous- 175 kg, Caffeine BP Anhydrous – 9.28 kg mix in mixing tank and store in the final dissolve tank.

4.4 Manufacturing Process of Carbonated Soft Drink:

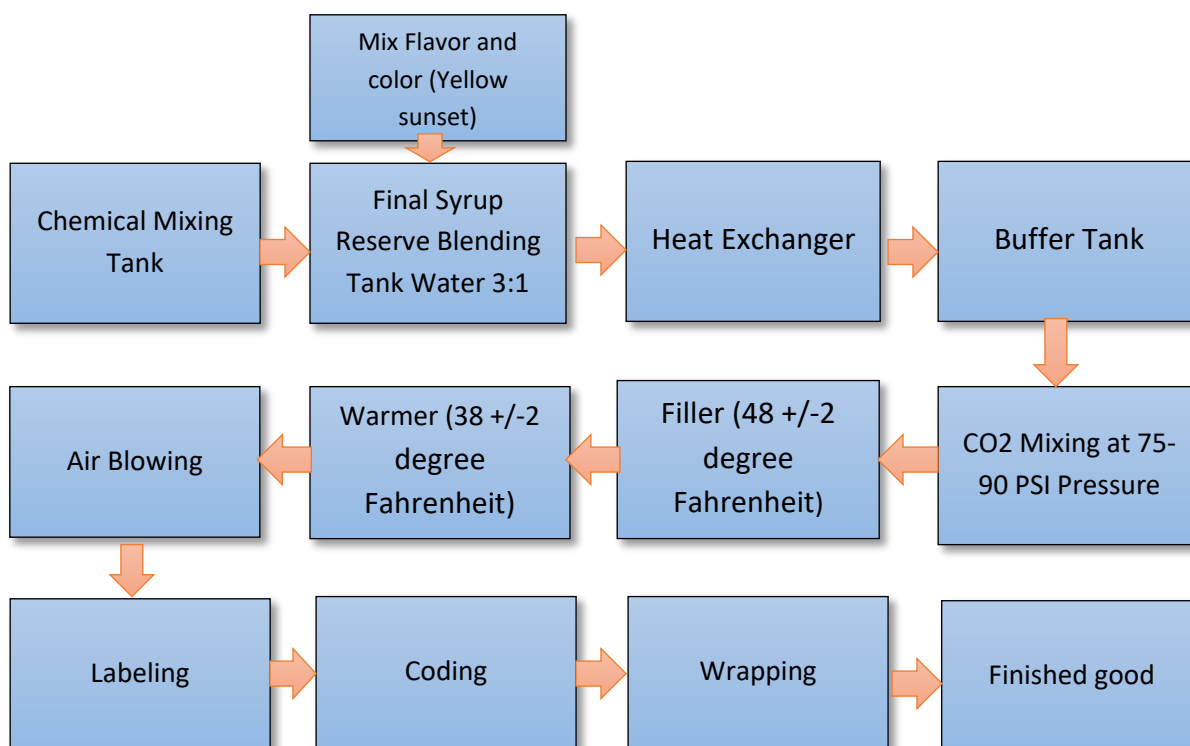


Fig 8: Carbonated soft drinks process

1. Chemical Mixing Tank: All the chemical (Energy Power Blend, Sodium Benzoate, Tri-sodium Citrate Dehydrate, Citric Acid Anhydrous, Caffeine BP) mixing in this tank before store in final syrup reserve tank.
2. Final Syrup Reserve Blending: In this step mix all ingredients like flavor, food color (yellow sunset), chemical and water. Water must be RO water and ratio is 3:1.
3. Heat Exchanger: The product is ready to go in next level then the product passes the heat exchanger at 85 +/-2 degree Celsius.
4. Buffer Tank: Its helps maintain the products temperature.
5. Carbon Dioxide Mixing: Before the filling process carbon dioxide mixing with the products. Carbon Dioxide mixing at 75-9- PSI pressure to maintain gas volume 4.4 PSI.
6. Warmer: Before storage the products at room temperature the products must be warmed at 38 +/-2 degree Celsius.

7. Air blower: In this stage remove the moisture outside the products.
8. Labeling: Labeling is necessary because it contain brand name, nutrition value, company name, expire date etc.
9. Coding: Coding is very important. Because it contain manufacture date, expire dare and price.



Fig 9: Chemical Preparation & Final Chemical Mixing Tank

10. Wrapping: Products are ready to sell or store in storage room. 24 pieces of CSD are wrapped together.
11. Finished Goods: Products are ready to store or distribution.

Chapter 5

Hot-Filling Technique

5.1 Raw materials:

Hot-fill is a process which increase products self-life and safety by using sterilizing method. In this process it sterilized products as well as products bottle, cap or closure. Mango pulp is the main material of hot-fill which is collected in the mango season. Mango collect in Rajshahi and preserve it. 10-12% mango pulp are using in hot-fill drink. Some hot-fill drinks products are- PRAN Frooto, PRAN Apple Fizz, Fazlee and Sundrop etc. Some of materials Sugar (66 degree brix), Sodium Citrate, Aspartame, Food color, Citric Acid, Sodium benzoate, Potassium Meta bisulphate, Pectin, Xanthan Gum and water.



Fig 10: Mango Pulp

5.2 Chemical Mixing Process:

Before the final blending mixer the chemical are mixed in chemical mixer tank. In Hot-fill chemical are mixed two different tank 1. Blending Tank & 2. Chemical Mixing Tank.

- i. Blending Tank: Sugar (66 degree brix) and Xanthan Gum mixes which ratio is 5:1, Sugar 5% and Gum 1% at 55 degree Celsius for 15-20 minute.
- ii. Chemical Mixing Tank: In this step, Sodium Citrate, Aspartame, Food color, Citric Acid, Sodium benzoate, Potassium Meta Bisulphate, Pectin are mixes

together for 5 minutes. After mixing chemical are store in final blending tank with mango pulp.



Fig 11: Raw Materials Production Line

5.3 Process of Hot-Fill:

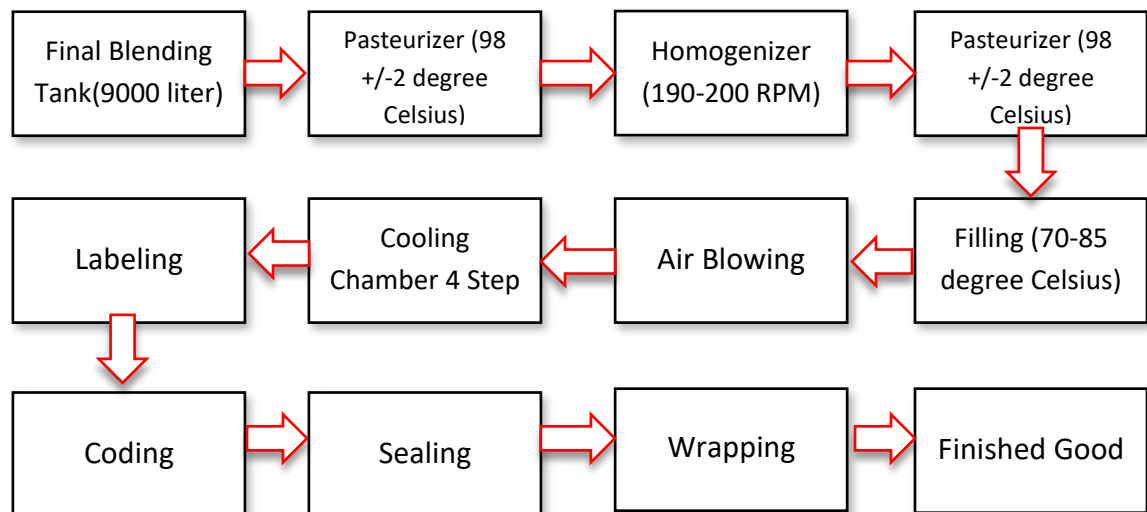


Fig 12: Hot fill process

- Final Blending Tank: All raw materials, Chemicals and Pulp are store in this tank and mixing 1 hour.
- Pasteurizer: After mixing in final blending tank, the mixer passes in pasteurizer at 98 +/-2 degree Celsius.
- Homogenizer: Products are homogenized at 190-200 rpm (rotation per minute) in 2 minutes.
- Pasteurizer: In this stage pasteurizer done at 98 +/-2 degree Celsius in 2 minutes.
- Filler: Before bottle filling bottle must wash at 2.5 kg water pressure and then fill the bottle at 70-80 degree Celsius.
- Air blower: In this stage remove the moisture outside the products.
- Labeling: Labeling is necessary because it contain brand name, nutrition value, company name, expire date etc.
- Coding: Coding is very important. Because it contain manufacture date, expire dare and price.
- Wrapping: Products are ready to sell or store in storage room. 24 pieces of CSD are wrapped together.
- Finished Goods: Products are ready to store or distribution.



Fig 13: Pasteurizer & Homogenizer

Chapter 6

Drinks

6.1 Raw Materials:

If we talk about drinks, Lassi (a yoghurt based drink) is the first thing that comes to our mind, because PRAN Company Lassi is very popular. Some of other popular drinks in PRAN are: Drinko (3 flavor), PRAN Apple drink, Tamarind drink, PRAN Cool, COCO-CHU, Dr. Aloe etc. PRAN Company's drinks are also exported abroad. Some ingredients differ between local market products and export products. The differences of ingredients are down:

For Local Market		For Export	
Ingredients	%	Ingredients	%
Milk powder	2.5	Milk powder	20
Sugar	12.50	Sugar	12.5
Pectin	0.45	Pectin	0.45
Aspartame	0.0025	Strawberry Flavor	0.05
Ak. Sugar	0.00313	Alluring Red Color	0.0003
Potassium Sorbet	0.03	Potassium Sorbet	0.03
Sodium Citrate	0.03	Sodium Citrate	0.05
Citric Acid	0.22	Citric Acid	0.22
Lactic Acid	0.24	Lactic Acid	0.24
Yoghurt	0.045	Yoghurt	0.0125
Milk Flavor	0.023	Milk Flavor	0.05
Water	83.95199	Water	85.57
Ethyl Maltose	0.00438		

Table 1: Lassi drinks ingredients

6.2 Chemical Mixing:

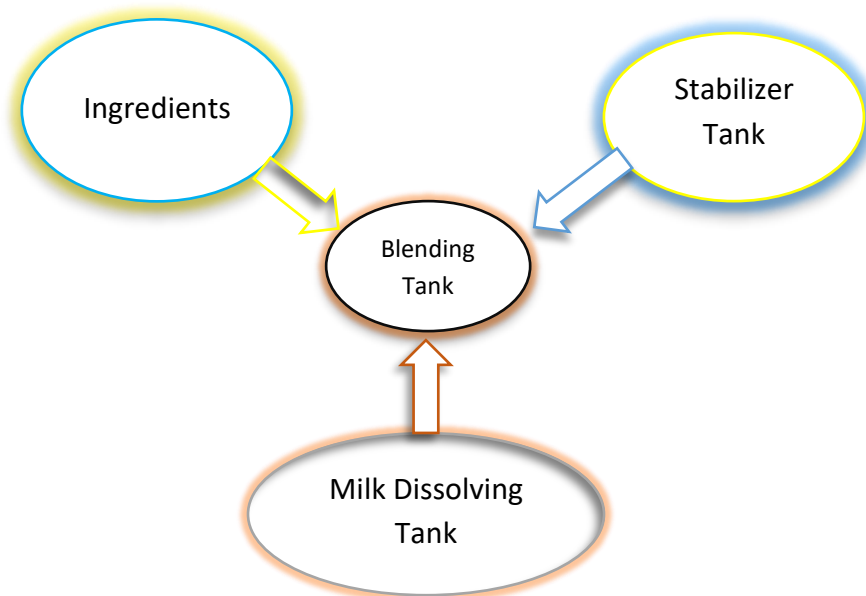


Fig 14: Chemical mixing process

Ingredients: Sugar, Flavor, Lactic Acid, Citric Acid all of this ingredients mix in blending tank.

Stabilizer Tank: Pectin 1:5 Sugar, Potassium Sorbet, Ak. Sugar, Ethyl Maltose, Aspartame all are this ingredients mix in stabilizer tank at 80-85 degree Celsius for 20 minutes.

Milk Dissolving Tank: Milk powder mixed in this tank with water at 50-55 degree Celsius for 20 minutes.



Fig 15: Stabilizer

6.3 Manufacturing Process of Lassi Drinks:

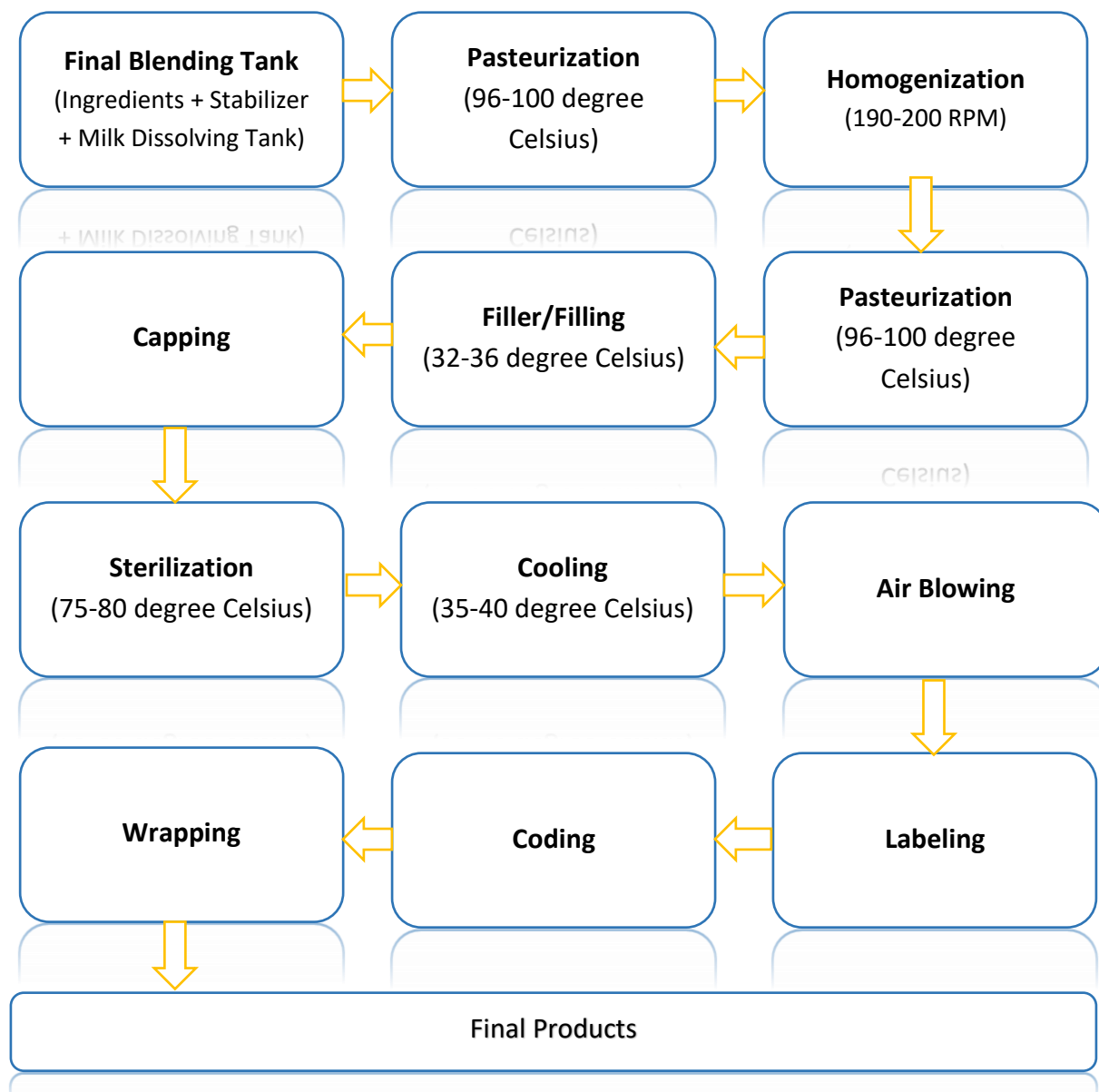


Fig 16: Lassi drinks process

1. Final Blending Tank: Ingredients, stabilizer tank and milk dissolving tank all of this tanks products stored in final blending tank.
2. Pasteurizer: After mixing all ingredients in final blending tank, the mixer passes in pasteurizer at 96-100 degree Celsius for 30 seconds.

3. Homogenizer: Products are homogenized at 220 rpm (rotation per minute) in 15 seconds.
4. Pasteurizer: In this stage pasteurizer done at 96-100 degree Celsius for 30 seconds.
5. Filler: Then the products filled in 32-32 degree Celsius.
6. Capping: Products bottle must be capped.
7. Sterilization: Before goes to the next stage products must be sterilized.
8. Cooling: Products must be cool at 35-40 degree Celsius.
9. Air blower: In this stage remove the moisture outside the products.
10. Labeling: Labeling is necessary because it contain brand name, nutrition value, company name, expire date etc.
11. Coding: Coding is very important. Because it contain manufacture date, expire dare and price.
12. Wrapping: Products are ready to sell or store in storage room. 6 or 12 pieces of drinks are wrapped together.
13. Finished Goods: Products are ready to store or distribution.

Chapter 7

Pack-Mat Line

7.1 Some machine in pack-mat line:

1. C/M Slitter and Inspection Rewinder Machine.
2. Three Layer Co-extrusion High Speed Inflation Machine.
3. Rewinding Check Machine.
4. Lamination m/c .02
5. Curing Chamber
6. Printing Machine.

Printing Machine has 3 category:

1. 8 Color Printing Machine.
2. 9 Color Printing Machine.
3. 10 Color Printing Machine.



Fig 17: Color Printing Machine & C/M Slitter and Inspection Rewinder Machine

8 Color Printing Machine: It has 8 different color chamber. The printing foil or paper pass through every chamber and then the paper or foil are printed. The color chamber are:

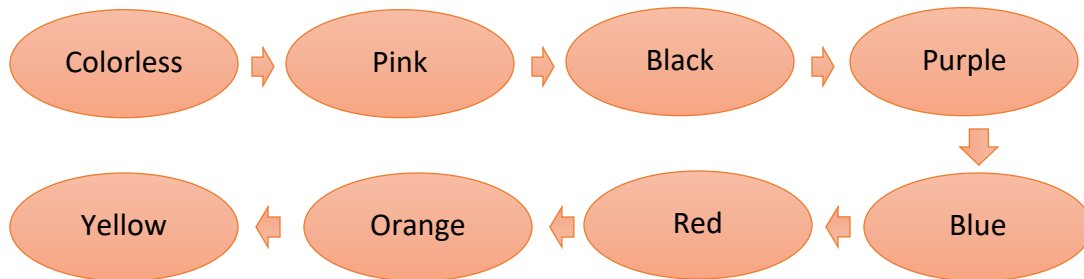


Fig 18: Color printing machine

7.2 Curing Chamber:

- i. Used for getting better material.
- ii. Duration is 24-48 hour at 50-60 degree Celsius.



Fig 19: Three Layer Co-extrusion High Speed Inflation Machine

Chapter 8

Candy Preparation

8.1 Plus Plus candy production process with Ingredients – (for 100 kg base)

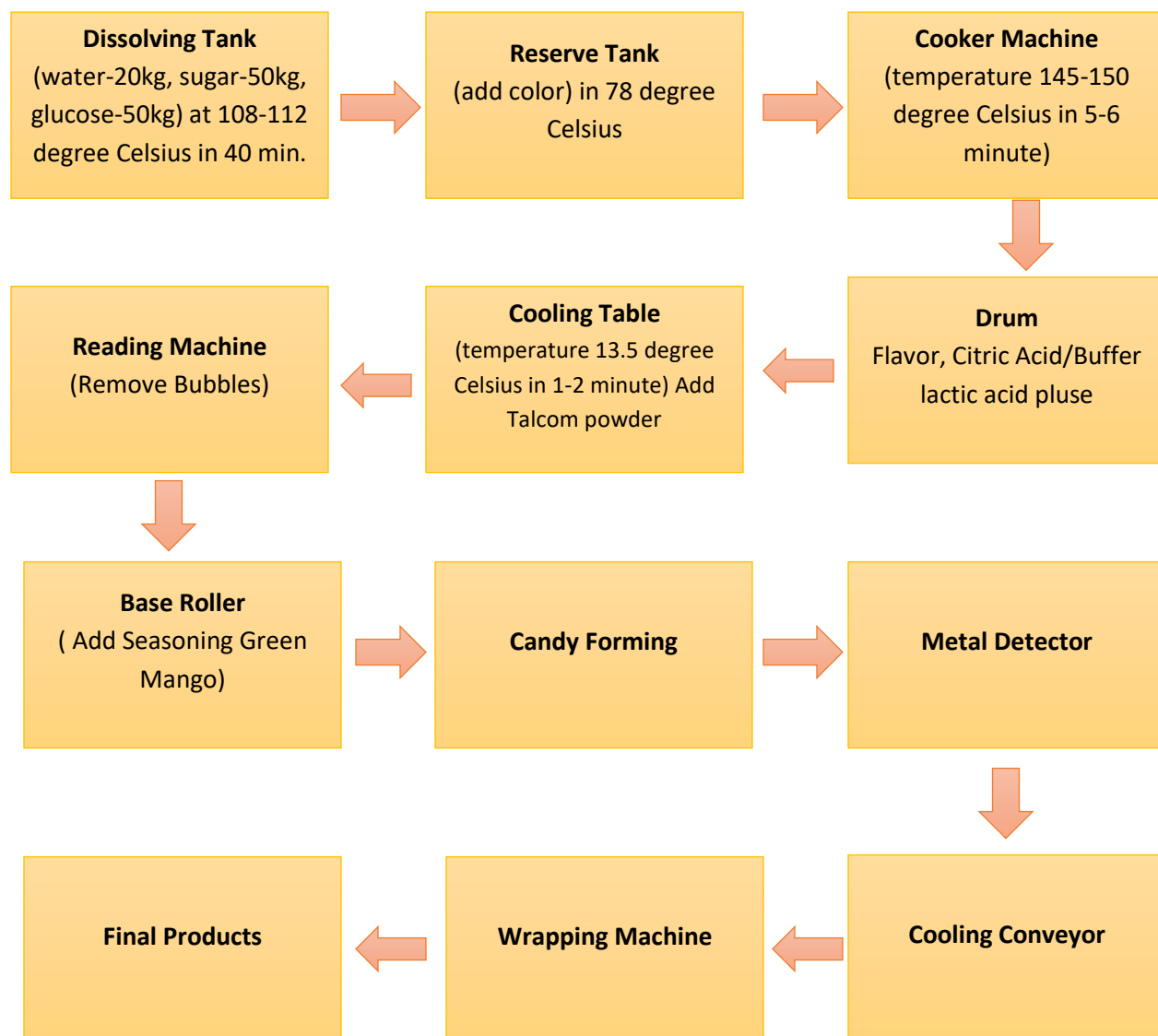


Fig 20: Candy process

1. **Dissolving Tank:** water-20kg, sugar-50kg, glucose-50kg mixed in this tank which temperature is at 108-112 degree Celsius in 40 minutes.
2. **Reserve Tank:** In this section add color in 78 degree Celsius.
3. **Cooker Machine:** Cook all ingredients at 145-150 degree Celsius in 5-6 minute.
4. **Drum:** Flavor, Citric Acid/Buffer lactic acid all of this chemical and flavor are mixed in the drum.



Fig 21: Mixer Tank

5. **Cooling Table:** In this section cool the mixture at 13.5 degree Celsius for 1-2 minute and add Talcom powder.
6. **Reading Machine:** This machine removes Bubbles.
7. **Base Roller:** Base are rolled and add Seasoning Green Mango in this step.
8. **Candy Forming:** Candy can be formed in this section.
9. **Metal Detector:** If any metal is mixed in the base it can be detected.
10. **Cooling Conveyor:** It used for maintain the candy temperature and room temperature.
11. **Wrapping Machine:** According to candy size and shape it can be wrapped.
12. **Finished Goods:** Products are ready to store or distribution.

Chapter 9

Tests for Quality Control

9.1 Drinking Water Line:

Test Name	Standard Parameter (SP)
pH Test	6.5-7.5
TDS Test	≤ 150 ppm
Hardness Test	≤ 50 ppm
Iron Test	≤ 0.05 ppm
Chlorine Test	0.0-0.01 ppm

Table 2: Drinking water SP

- i. **pH Test:** The pH test is done with a pH meter.



Fig 22: pH Meter

- ii. **TDS Test:** The TDS (Total Dissolved Solid) test is done with a TDS meter.

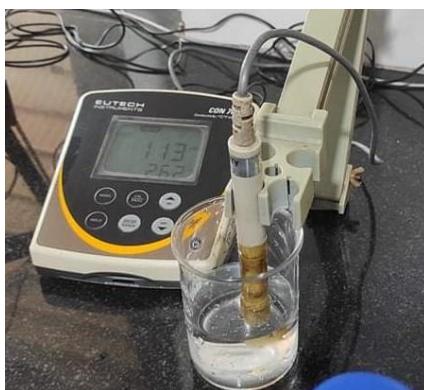


Fig 23: TDS Meter

9.2 Carbonated Soft Drink Line (Power):

- i. Bottle Analytical Test: Top load test- 28-29 kg mm. Base clearance- 1.74 mm. Cork- 15-20 lbs.
- ii. Gas Volume Test: The gas inside the bottle is 4.4 PSI.



Fig 24: Gas Volume Test

- iii. Syrup Brix: 61 degree brix syrup is used in production. But the final brix is used in production which is standard local 18 & export 15.
- iv. Stretch Checking Test: 2% Sodium hydroxide (NaOH) solution for 20-25 minutes is done by this test.
- v. Torte Test: 15-20 LBS is standard range.

9.3 Hit-Fill Line:

Test Name	Standard Value (SV)
Acidity	0.23
Brix	12.8
Homogenization	190-200 rpm
Pasteurization	98 +/-2 degree Celsius

Table 3: Hot fill SV

9.4 Drinks Line (Lassi):

Test Name	Standard Value (SV)
Hardness	5 max.
pH	5.7-6.2
TDS	20 max
Homogenization	190-200 rpm
Pasteurization	98 +/-2 degree Celsius
Brix	13.5

Table 4: Drinks SV

9.5 Pack-Mat Line:

Lamination of QC checking parameter:

- Treatment of film.
- Thickness of film.
- Adhesiveness condition.
- Green bond of film (20/30 minute)
- Blister or bubble condition of film.
- Wrinkles condition of film.
- Delamination condition of film.

Chapter 10

Conclusion

I have gained knowledge and skills on production and quality area during my internship in the Mymensingh Agro Limited (MAL). PRAN is the continuously growing food industries in Bangladesh. PRAN is now popular in many other countries. I have acquired practical knowledge as well as skills in water treatment process, carbonated soft drinks manufacturing, hot-fill, pack-mat, and candy processing etc. I was mainly assigned to production line. Different production lines have different productions, and thus follow different cleaning processes. I observed each step in production area and quality control and also learned about the machines. I also observed raw materials storage room temperature, shortening, ingredients process, blending, aging, storage etc. Products self-life or storage life depends on products packaging. PRAN produce their own food packaging products and use their food products. For packaging they use high quality packaging material like, low density polyethylene, polypropylene, high density polyethylene, aluminum foil.

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