PRODUCTION & QUALITY CONTROL IN PRAN AGRICULTURAL MARKETING COMPANY LIMITED

BY

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment of B.Sc. in Nutrition and Food Engineering

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APPROVAL

This internship report entitled "**Production & Quality Control in Pran Agricultural Marketing Company Limited"** submitted by **MUNIR IBN MAHIN**, has been accepted by the Department of Nutrition and Food Engineering at Daffodil International University as meeting the necessary requirements for the partial fulfilment of the B.Sc. degree in Nutrition and Food Engineering. The style and contents of the work have also been approved. The presentation was conducted in April of 2022.

EXAMINING COMMITTEE

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DECLARATION

The undersigned affirms that the present internship was conducted under the guidance of **Md. Harun-Ar Rashid**, Assistant Professor at the Department of NFE, Daffodil International University. The author of this project affirms that it has not been previously submitted for the purpose of obtaining any degree or diploma, nor has any portion of it been utilized for such purposes.

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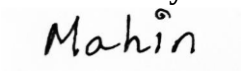

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EXECUTIVE SUMMERY

The Internship was conducted at Pran Agricultural Marketing Co. Ltd. Situated at Ghorashal, Palash, Narshingdi from 13th September to 27th September 2022. This factory mainly manufactures difference types of food products. To prepare this food items they use sugar, stabilizers, emulsifiers, water, food grade flavor, fruit pulp, skim milk powder, milk whey powder, glucose syrup etc. They follow some process for making or produce this product they have their own plant designed flow diagram. They mainly check physical, chemical, microbiological test for quality control.

My report is based on the productions of various products that are hazard free productions and qualified. I have observed the drink, snacks and confectionery production for 15 days with the pure drinking water. I have also observed the ETP of PRAN AMCL.

The report contains information of the organization itself, production flow diagram, Sanitation, hygienic facilities of the overall industries and certification.

Keywords: PRAN, AMCL, PCL, PFL, CSD, Snacks, Drink, Production, Qc, Flowchart,

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ACRONYMS

Sl. no	Acronyms	Full Forms
1	PRAN	Programme for Rural Advancement Nationally
2	AMCL	Agricultural marketing co. Ltd.
3	PFL	PRAN Foods Ltd.
4	PCL	PRAN Confectionery Limited
5	QC	Quality Control
6	QA	Quality Assurance
7	CSD	Carbonated Soft Drink
8	SKU	Stock Keeping Unit
9	CCP	Critical Control Point
10	UGT	Under Ground Tank
11	MGF	Multi Grade Filter
12	ACF	Activated Carbon Filter
13	CF	Cartridge Filtration
14	RO	Reverse Osmosis
15	RT	Reserve Tank
16	MF	Membrane Filtration
17	HBC	Hard Boiled Candy
18	RT	Room Temperature
19	TDS	Total Dissolved Solids
20	CFU	Colony Forming Units
21	LOD	Loss on Drying
22	EMF	Electric Muffle Furnace
23	LS	Longitudinal Seal
24	TS	Transversal Sealing
25	PET	Polyethylene terephthalate
26	CIP	Clean-in-place
27	COP	Clean-out-of-place
28	HACCP	Hazard Analysis Critical Control Point
29	PRPs	Pre-requisite Programs
30	SOP	Standard Operating Procedure
31	ISO	International Organization for Standardization
32	OEE	Overall equipment effectiveness
33	TQM	Total quality management
34	ETP	Effluent treatment plant

CHAPTER 1

1. Introduction

1.1 About company

Leading food, beverage, and plastic manufacturing firm PRAN-RFL Group is the market leader in Bangladesh. It is one of Bangladesh's most successful businesses. Their objectives are to end poverty and advance Bangladesh's agriculture industry. Their mission statement is to create jobs and restore respect for our rivals' dignity.

Figure 1.1: Pran

They have been working to enhance the rural and agricultural areas of our nation since 1981. In addition, they are Bangladesh's biggest agricultural processor.

Millions of people throughout the world respect PRAN, the biggest food-and-beverage firm in Bangladesh.

PRAN stands for the taste of life and implies "life." They deliver this flavor to 145 countries every day with their extensive line of agro-food products from 10 distinct categories, including baked goods, drinks, juices, carbonated beverages, mineral water, snacks, confectionary, and biscuits. They are the biggest food-and-beverage firm in Bangladesh, and millions of people throughout the world respect them.

PRAN has been striving to enhance rural livelihoods since its founding in 1981 through boosting the national and rural economies, generating employment, and exporting.

PRAN is dedicated to improving both society and the environment. They routinely support the neighborhood and seek for ways to lessen their environmental effect in an effort to build a greener future.

Due to the visionary leadership of Late Amjad Khan Chowdhury, PRAN Foods has established itself in the Bangladeshi food manufacturing industry since 1981. Rangpur Foundry was the prior moniker for the organization.

Better water and sanitation solutions were the initial focus of PRAN-RFL, which eventually broadened its scope to encompass health, nutrition, and wellbeing via PRAN Foods. We had a beneficial effect on rural livelihood, the country's foreign exchange reserves, and job development throughout the process. They understand how important it is to fulfill their social and environmental obligations.

1.2 Company's mission & vision

- Company's Mission**:**
  "Poverty and hunger are curses".

- Company's Vision:
  "To generate employment and earn dignity and self-respect for our compatriots through profitable enterprises".

1.3 Agricultural marketing co. Ltd. (AMCL)

The major producer and exporter of agricultural products from Bangladesh is PRAN. Bangladesh has an agriculturally oriented economy. Therefore, our goal is to improve the agriculture industry. Keeping this in mind, we work to increase demand for agricultural goods produced by our local farmers and we promote the production of additional agricultural products by providing enough training and financial assistance to our underprivileged farmers. We wish to engage in larger-scale contract farming. Again, jobs are generated for processing this food. In our opinion, doing so will increase employment. We believe that this product should be made available in every nook and cranny of our nation so that every customer has the freedom to consume.

Agricultural Marketing Co. Ltd.'s policy is to market goods of consistently high quality both domestically and internationally in accordance with international standards, produced hygienically in line with good manufacturing practices in cutting-edge facilities and processes, packaged appropriately, and committed at all times to these goals. AMCL has chosen to base their quality management system on the ISO-9001 standard. As a result, an organization-wide system of recorded guidelines and instructions outlining business processes, responsibilities, and authority has been built. The management is dedicated to providing the tools and fostering an atmosphere where each person may contribute their knowledge, abilities, and suggestions to a never-ending process of innovation and progress in all facets of the organization.

1.4 Work of quality control (QC)

1. Checking Raw Materials (RM).
2. Checking Packaging Materials (PM).
3. Checking Finished Goods (FG).

1.5 Work of quality assurance (QA)

There are three types of tests for Quality Assurance (QA):

1. **Physical.** *[Raw Materials, Packaging Materials, Finished Goods]*
2. **Chemical.** *[Raw Materials -Mandatory, Packaging Materials, Finished Goods]*
3. **Microbiological.** *[Raw Materials, Finished Goods*

CHAPTER 2

2. Factory Units

2.1 Introduction

This report contains information obtained from a 15-day internship program at PRAN, *Ghorashal, Palash Upazila, Narshingdi*. followed by AMCL, PFL, and PCL. In this report, I have mentioned their finished goods, product specs, production flowcharts, QC testing, and many other details that the reader may discover by delving through it. I attempted to make this report as efferent as possible so that the reader could readily grasp my findings.

Throughout my internship, I have learned about new products, processes, and how the industry operates. During this time, I also had the opportunity to see some real-life industry issues. The table below provides general information about my group members, the allocated production line, and the time range.

Table 2.1: Internship time period distribution

Sl. No.	Section	Timeline	Group Members
1	Agricultural Marketing Co. Ltd.	13.09.22 – 17.09.22	Munir Ibn Mahin
2	PRAN Foods Ltd.	18.09.22 – 21.09.22	Most. Fatema Akter
3	PRAN Confectionery Ltd.	22.09.22 - 27.09.22	Sraboni Saha

2.2 Factory unit

1. AMCL (Agricultural Marketing Company Limited)
2. PFL (PRAN Foods Limited)
3. PCL (PRAN Confectionery Limited)

2.3 AMCL (Agricultural Marketing Company Limited)

The following listed beverage products are manufactured by AMCL:

Table 2.3: AMCL manufactured product lists

Sl no.	Product Name	Category	Sl no.	Product Name
1	PRAN UP		14	PRAN Fruitix
2	Tango		15	PRAN Frooto
3	Cheer Up		16	PRAN Mango Fruit Drink
4	Maxx		17	Fazlee Mango Fruit Drink
5	PRAN Apple Fizz		18	FruitFun Mango Fruit Drink
6	Colors Drink	Beverages	19	Robust
7	Bulldozer		20	Kofi House
8	Power		21	Latina
9	PRAN Drinking Water		22	Oscar
10	Crystal Premium Drinking Water		23	Braver
11	PRAN Litchi		24	PRAN Robo Drinks
12	Drinko		25	PRAN Ice Lolly
13	Sundrop			

2.4 PFL (Pran Foods Limited)

The following listed snacks products are manufactured by PFL

Table 2.4: PFL manufactured product lists

Sl no.	Product Name	Category	Sl no.	Product Name
1	PRAN Peanut Bar	Snacks	14	PRAN Chanachur
2	PRAN Potatos		15	PRAN Puffed Rice
3	PRAN Potato Sticks		16	PRAN Jhal Muri
4	PRAN Potato Crackers		17	PRAN Flattened Rice
5	PRAN Zeros Chips		18	Mithai Soan Papdi
6	Krako		19	PRAN Noodles
7	PRAN Puff Corn		20	Mr Noodles
8	Snacker Pop Chips		21	The Chef Macaroni
9	PRAN Chicken Bite		22	PRAN Badam Bhaja
10	Twister Chips		23	PRAN Dal
11	PRAN Tomtom Potato Cracker		24	Pran Fried Peas
12	PRAN Mango Bar		25	PRAN Papar
13	PRAN Jhal Chanachur			

2.5 PCL (Pran Confectionery Limited)

The list of confectionery items is provided below:

Table 2.5: PCL manufactured product lists

Sl no.	Product Name	Category	Sl no.	Product Name
1	Pluto		16	PRAN Bubble Gum
2	Chocobean		17	Koko Candy
3	PRAN Chocolord		18	PRAN Hajom Candy
4	Treat		19	PRAN PNut Candy
5	Sixers		20	Plus Plus Candy
6	Babylon		21	Sunny Choco Choco
7	PRAN Pudding	Confectionery	22	Pran Choco Choco
8	PRAN Coffee Candy		23	PRAN Milky Stick
9	Aamrosh Candy		24	PRAN Lollipop
10	PRAN MR. Mango Candy		25	Wonder Kids
11	Atom		26	NAPLES Chocolate Spread
12	Fruitfil Chewing Gum		27	2in1 Eclair
13	Xcel		28	Treat Yummy Éclair
14	PRAN Layer		29	Sunny Toffee
15	PRAN Éclair			

CHAPTER 3

3. AMCL Section

3.1 AMCL Section

From 13th September to 17th September,2022. I have visited these following production lines in AMCL.

Table 3.1: Production line visiting timeframe

Date	Sectors	Products	Supervised By
13.0922	Powder Drink Line	KoFi House (Instant Coffee)-14g KoFi House (Powdered Coffee)-1gm	Mr. Riyad Khan Trainee-Executive QC
14.09.22	Drink Line 02	PRAN Litchi-125ml	
15.09.22	Ice Pop Line	PRAN Ice Lolly PRAN Mango Fruit Drink (Tetra Pack)-250ml	
16.09.22	Weekend (Friday)		
17.09.22	CSD Plant	Double Dozer-250ml PET Bulldozer-250ml Can Cheer Up-250ml	Mr. Zubayer Officer-Quality Control & Microbiology
25.09.22	Hot Fill-line CSD	PRAN Fruitix-250ml PET Power 250ml CAN	
26.09.22	AMCL	PRAN Drinking Water	Zahidul Islam Officer-Quality Control & Microbiology

3.2 Product list

3.2.1 SKU: KoFi House (Instant Coffee)-14g

Ingredients: Sugar, Coffee powder, non-dairy creamer, CMS, Anti-caking (SiO_2, Cassonade.

Name	**Kofi House 3in1 Instant coffee**
Available Sizes	14gm
Category	Beverages
Sub Category	Hot Beverages
Pack Type	Sachet
Flavor	Coffee
Manufacturer	AMCL
Country Of Origin	Bangladesh

Figure 3.2.1 SKU: KoFi House

3.2.2 SKU: KoFi House (Powdered Coffee)-1gm

Ingredients: Coffee beans Powder

3.2.3 SKU: PRAN Litchi-125ml

Ingredients: Sugar. Xanthan Gum, Water, Sodium benzoate, Aspartame, Citric acid, Cellulose, Ascorbic acid, Potassium sorbate, Flavor
Net Content: 125ml

Name	**PRAN Litchi**
Available Sizes	125 ml
Category	Beverages
Sub Category	Flavored Drinks
Pack Type	HDPE
Flavor	Litchi
Manufacturer	AMCL
Country Of Origin	Bangladesh

Figure 3.2.3 SKU: PRAN Litchi

3.2.4 SKU: PRAN Ice Lolly

Ingredients: Citric acid, Sugar, CMC, Color, Potassium Sorbate, Salt, Flavor, Xanthan Gum

3.2.5 SKU: PRAN Mango Fruit Drink (Tetra Pack)-250ml

Ingredients: Mango Pulp, Ascorbic acid, Potassium sorbate, Color, Beta-carotene, Xanthan Gum, Sodium citrate.

Name	**PRAN Mango Fruit Drink Tetra Pack**
Available Sizes	250ml
Category	Beverages
Sub Category	Fruit Drink
Pack Type	Tetra Pack
Flavor	Mango
Manufacturer	AMCL
Country Of Origin	Bangladesh

Figure 3.2.5 : PRAN Mango

3.2.6 SKU: Double Dozer-250ml PET

Ingredients: Carbonated water , Sugar, Citric acid, tri-sodium citrate, Sodium benzoate, Eurocent Sunset yellow, Mixed fruit flavor, Aspartame

Name	**Double dozer 250ml PET**
Available Sizes	250ml
Category	Beverages
Sub Category	Carbonated Soft Drinks
Pack Type	PET
Flavor	Energy Drink
Manufacturer	AMCL
Country Of Origin	Bangladesh

Figure 3.2.6 SKU: Double Dozer

3.2.7 SKU: Bulldozer-250ml Can

Ingredients: Carbonated water, Sugar, Citric acid, Sodium citrate, Citric acid, Sodium Benzoate, caffeine, vitamins, Permitted Food Color(E-110), Flavor.

Name	**Bulldozer 250ml CAN**
Available Sizes	250ml
Category	Beverages
Sub Category	Carbonated Soft Drinks
Pack Type	CAN
Flavor	Energy Drink
Manufacturer	AMCL
Country Of Origin	Bangladesh

Figure 3.2.7 SKU: Bulldozer

3.2.8 SKU: Cheer Up-250ml

Ingredients: Carbonated water, Sugar, Citric acid, Tri-sodium citrate, Aspartame, Sodium benzoate, Lemon lime flavor.

Name	**Cheer Up**
Available Sizes	250ml
Category	Beverages
Sub Category	Carbonated Soft Drinks
Pack Type	Label
Flavor	Lemon
Manufacturer	AMCL
Country Of Origin	Bangladesh

Figure 3.2.8 SKU: Cheer Up

3.2.9 SKU: PRAN Fruitix-250ml PET

Ingredients:

Name	**PRAN Fruitix**
Available Sizes	250 ml
Category	Beverages
Sub Category	Fruit Drink
Pack Type	PET
Flavor	Mango
Manufacturer	AMCL
Country of Origin	Bangladesh

Figure 3.2.9 SKU: PRAN Fruitix

3.2.10 SKU: Power CAN-250ml

Ingredients: Carbonated water, Sugar, Citric acid, Sodium citrate, Sodium Benzoate, Taurine, Glucuronolactone, Inositol, caffeine, vitamins (B_3, B_5, B_6, B_{12}), Permitted Food Color(E-110), Flavor, Artificial color-mixed fruits.

Name	**Power**
Available Sizes	250ml
Category	Beverages
Sub Category	Carbonated Soft Drinks
Pack Type	Aluminum Can
Flavor	Energy Drink
Manufacturer	AMCL
Country of Origin	Bangladesh

Figure 3.2.10 SKU: Power CAN

3.2.11 SKU: PRAN Drinking Water

Name	**PRAN Drinking Water**
Available Sizes	250ml
Category	Beverages
Sub Category	Drinking Water
Pack Type	PET
Flavor	n/a
Manufacturer	AMCL
Country of Origin	Bangladesh

Figure 3.2.11 SKU: PRAN Drinking Water

3.3 Product flowchart

3.3.1 Flowchart: KoFi House (Instant Coffee)-14g

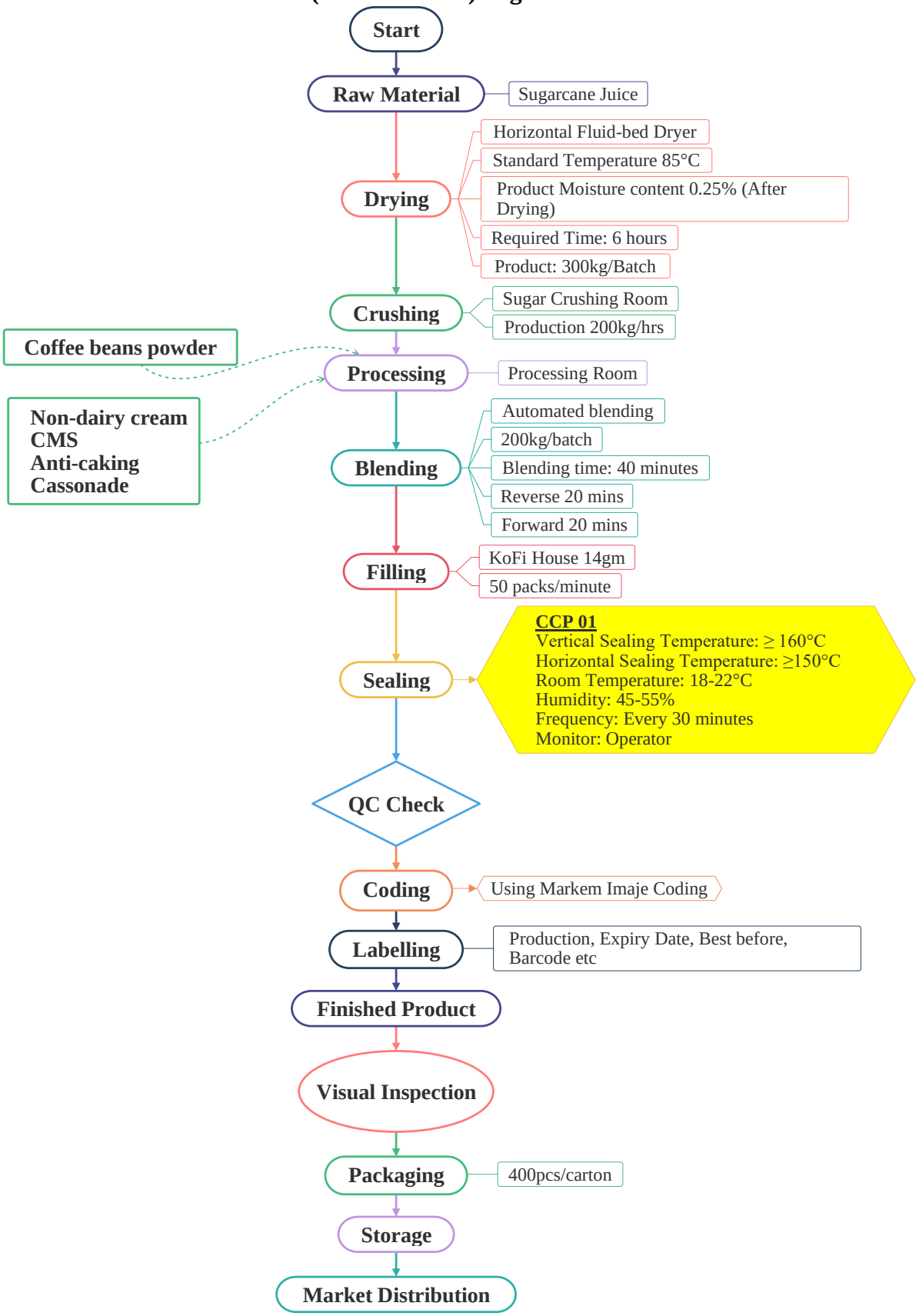


Figure 3.3.1: KoFi House (Instant Coffee)

3.3.2 Flowchart: KoFi House (Powdered Coffee)-1gm

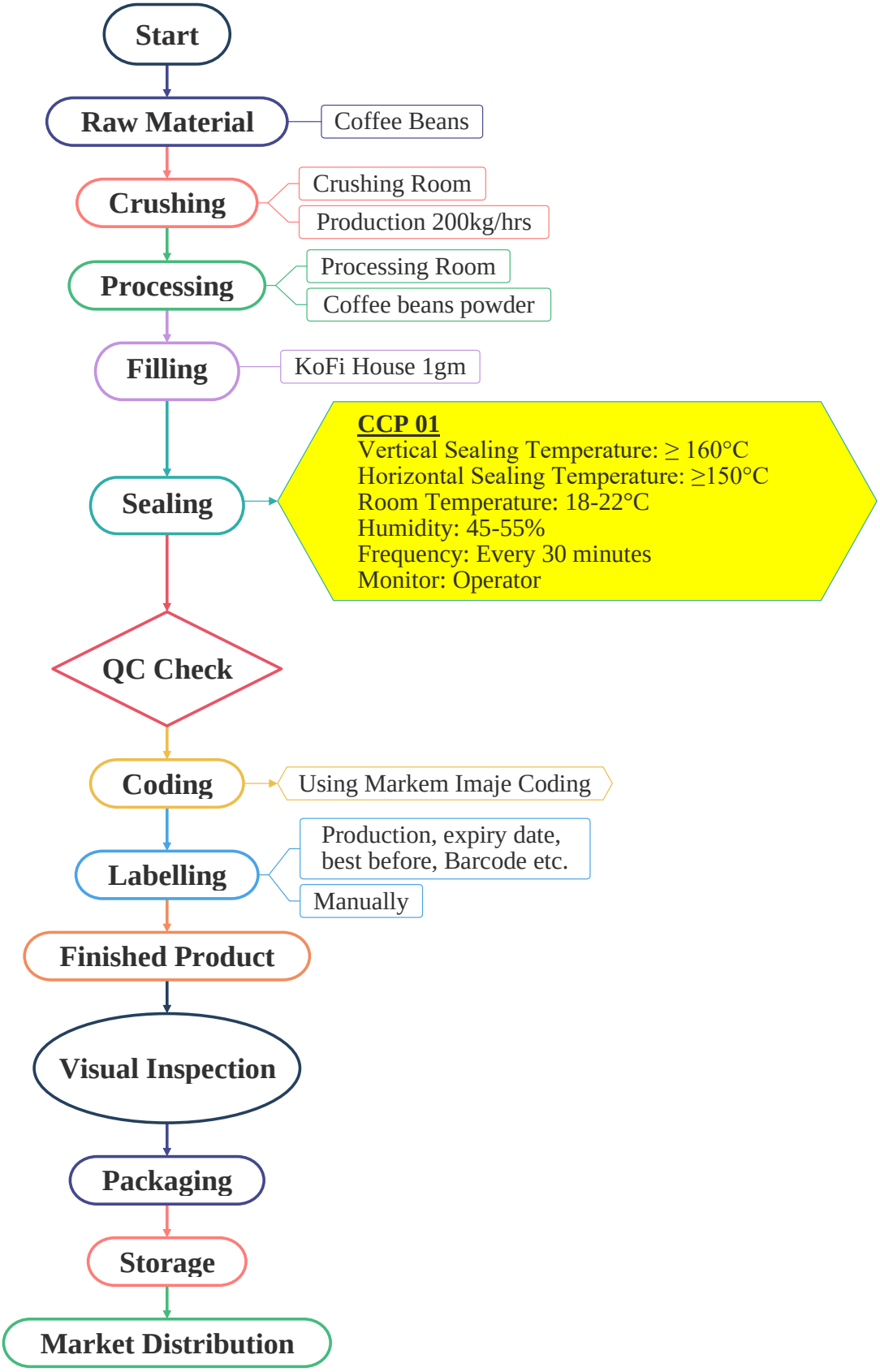


Figure 3.3.2 : KoFi House (Powdered Coffee)

3.3.3 Flowchart: PRAN Litchi-125ml

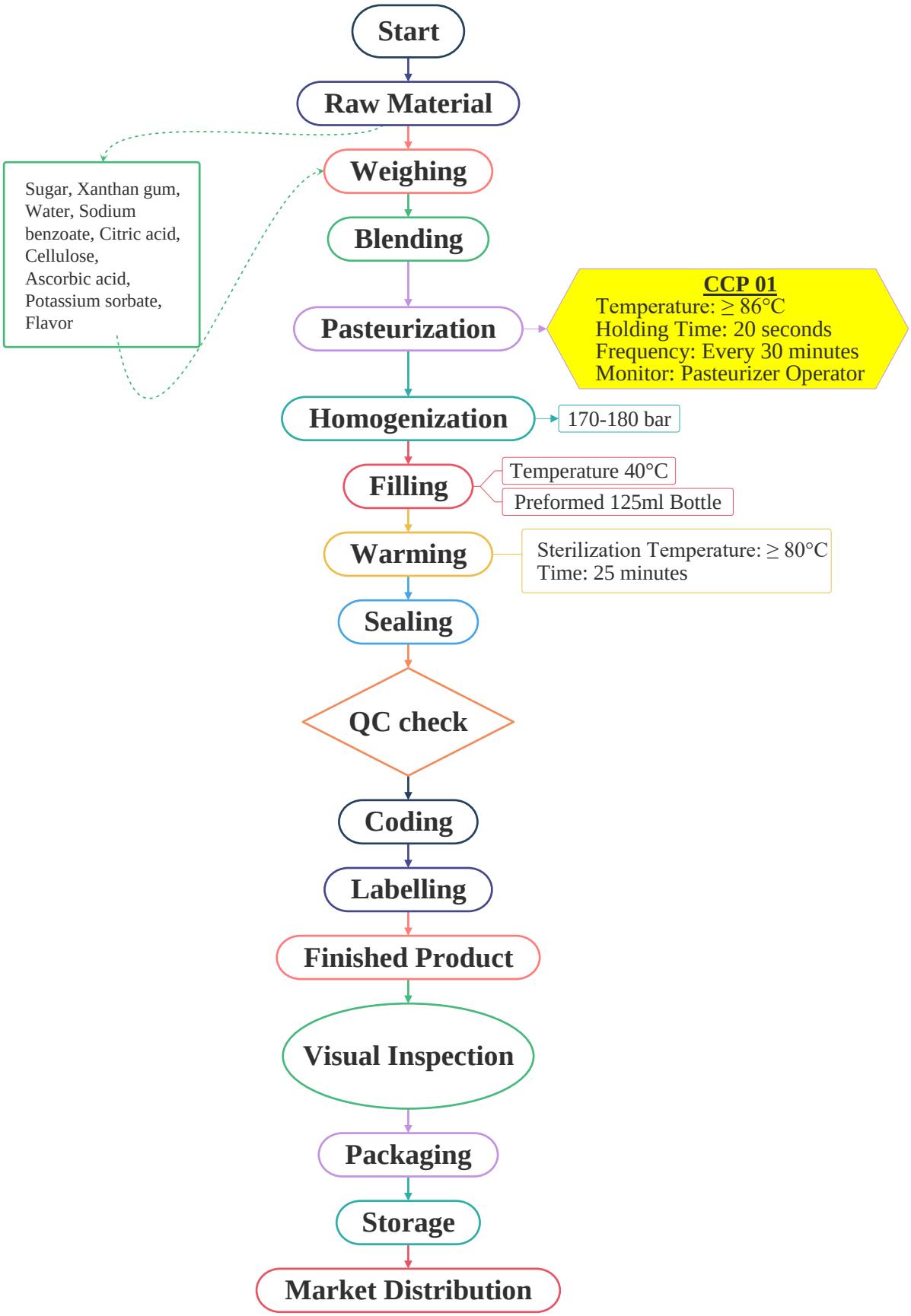


Figure 3.3.3: PRAN Litchi

3.3.4 Flowchart: PRAN Ice Lolly

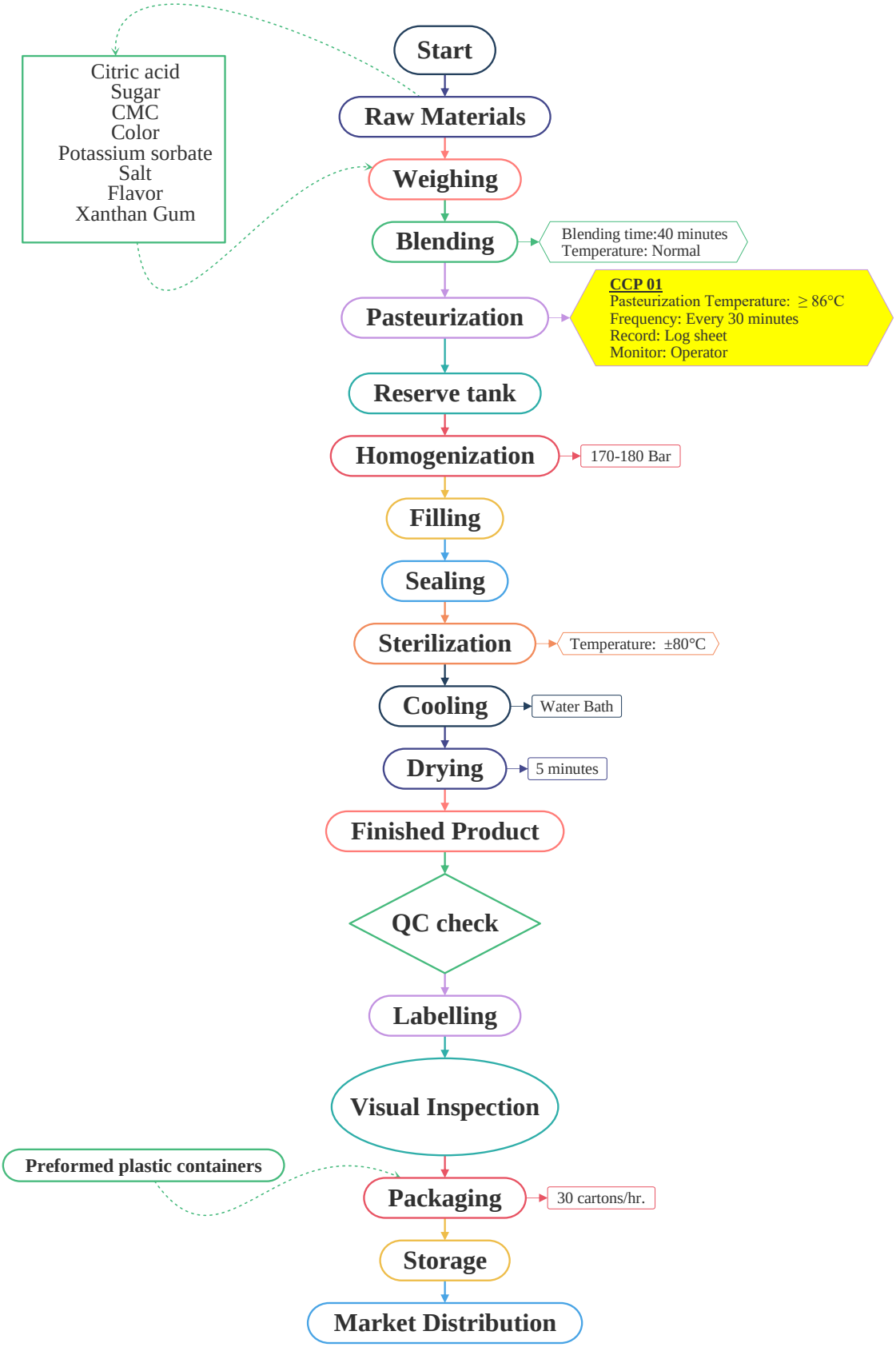


Figure 3.3.4: PRAN Ice Lolly

3.3.5 Flowchart: PRAN Mango Fruit Drink (Tetra Pack)-250ml

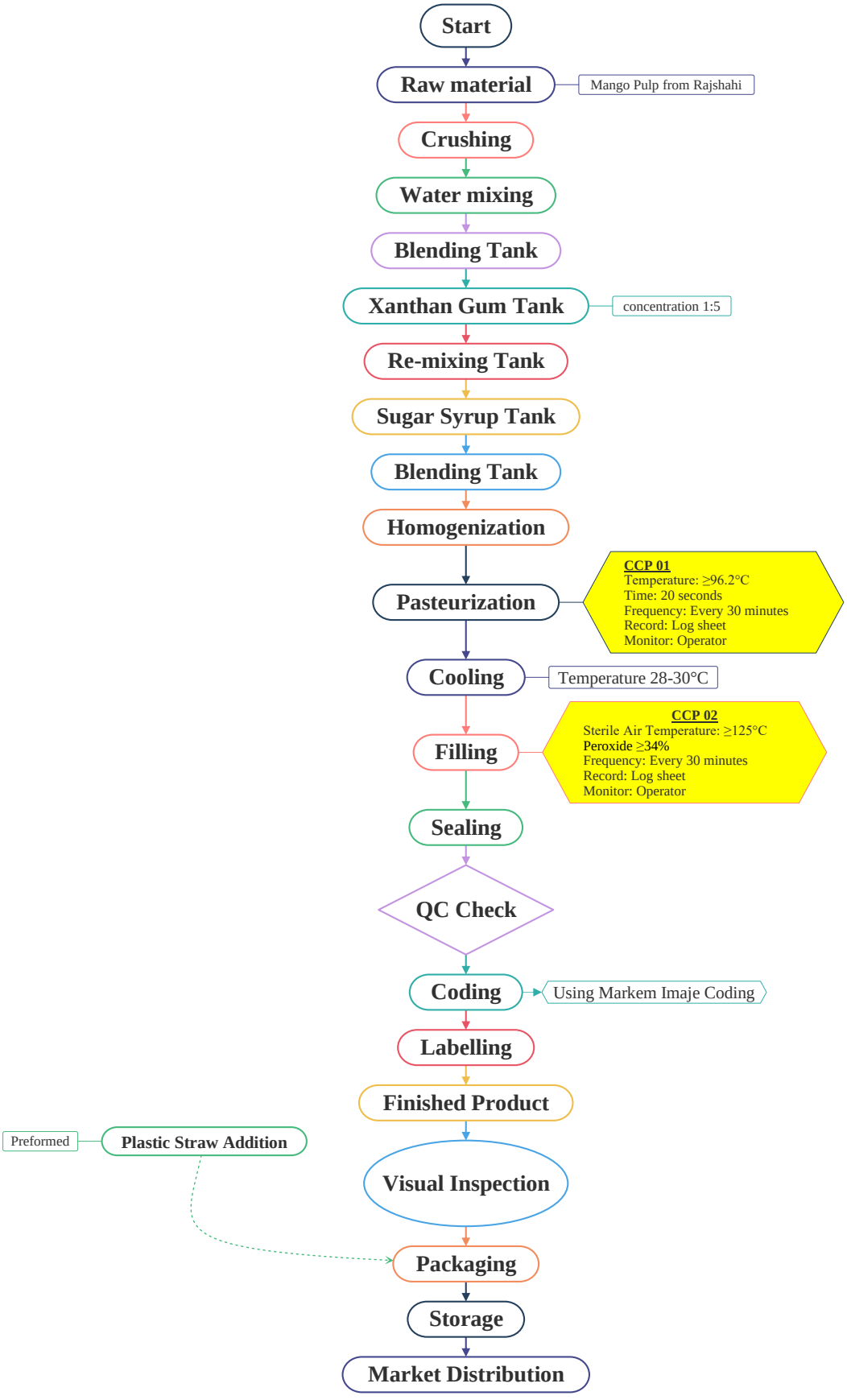


Figure 3.3.5 Flowchart: PRAN Mango Fruit Drink (Tetra Pack)

3.3.6 Flowchart: Double Dozer-250ml PET

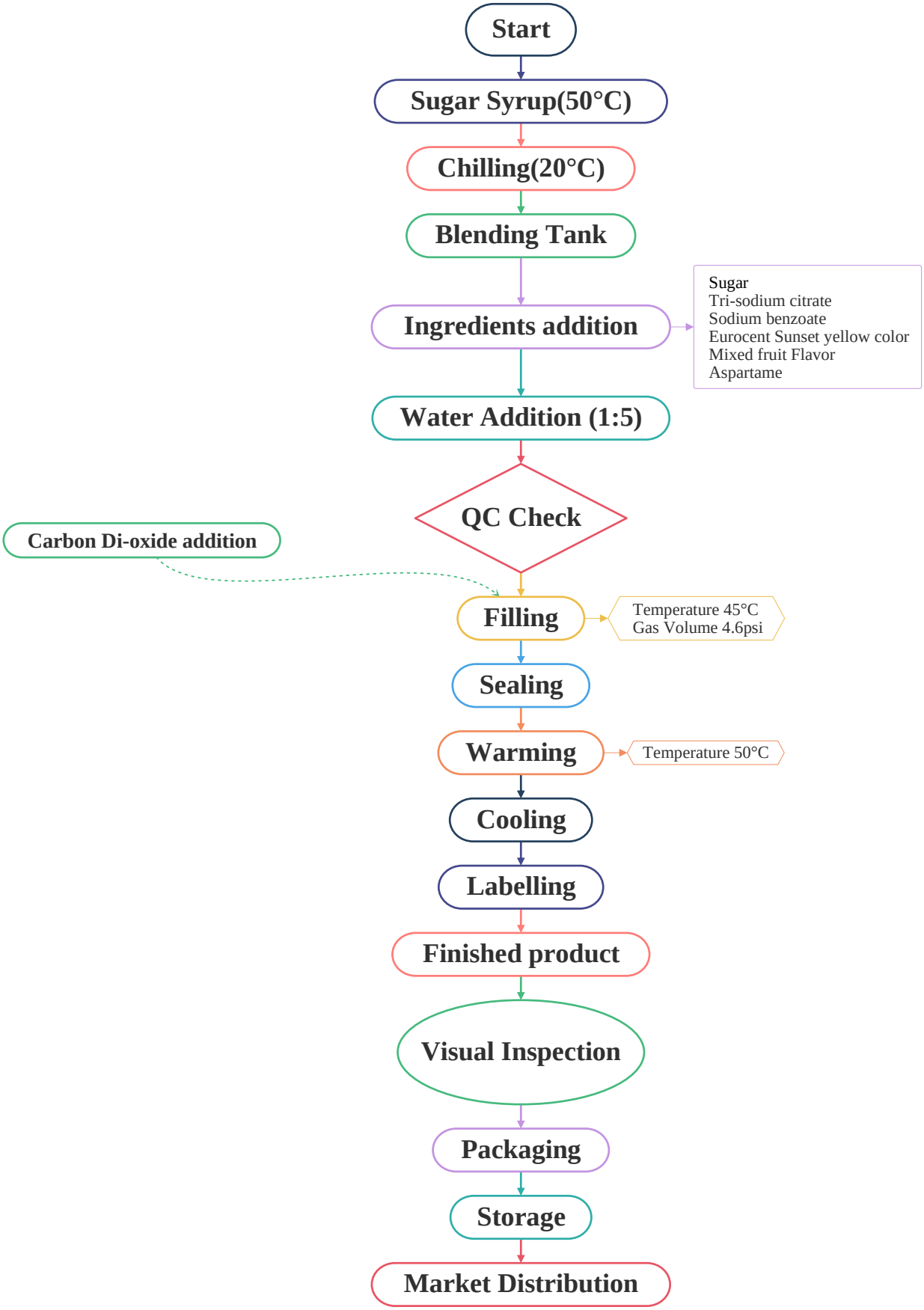


Figure 3.3.7 Flowchart: Bulldozer

3.3.7 Flowchart: Bulldozer-250ml Can

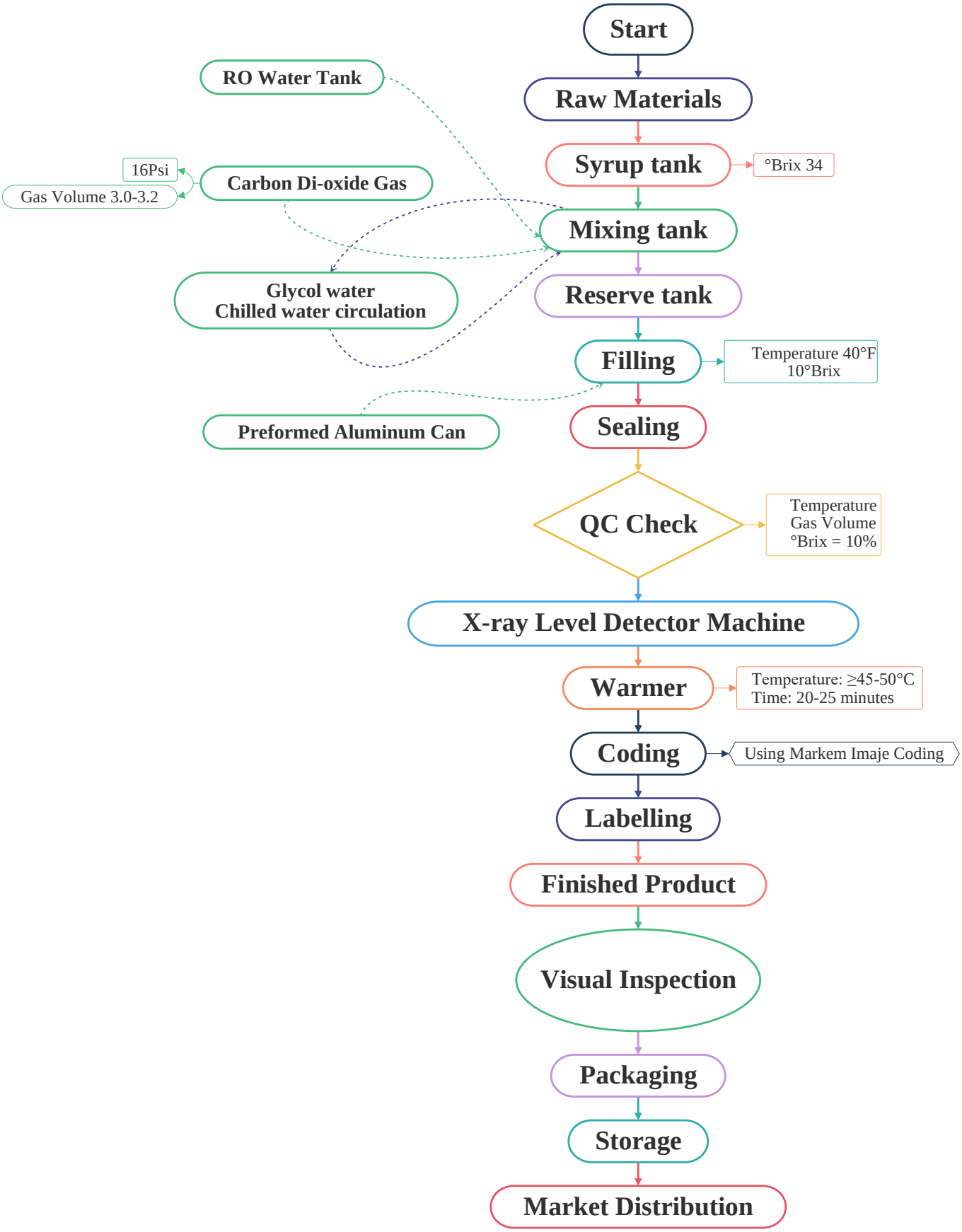


Figure 3.3.7 Flowchart: Bulldozer

3.3.8 Flowchart: Cheer Up-250ml

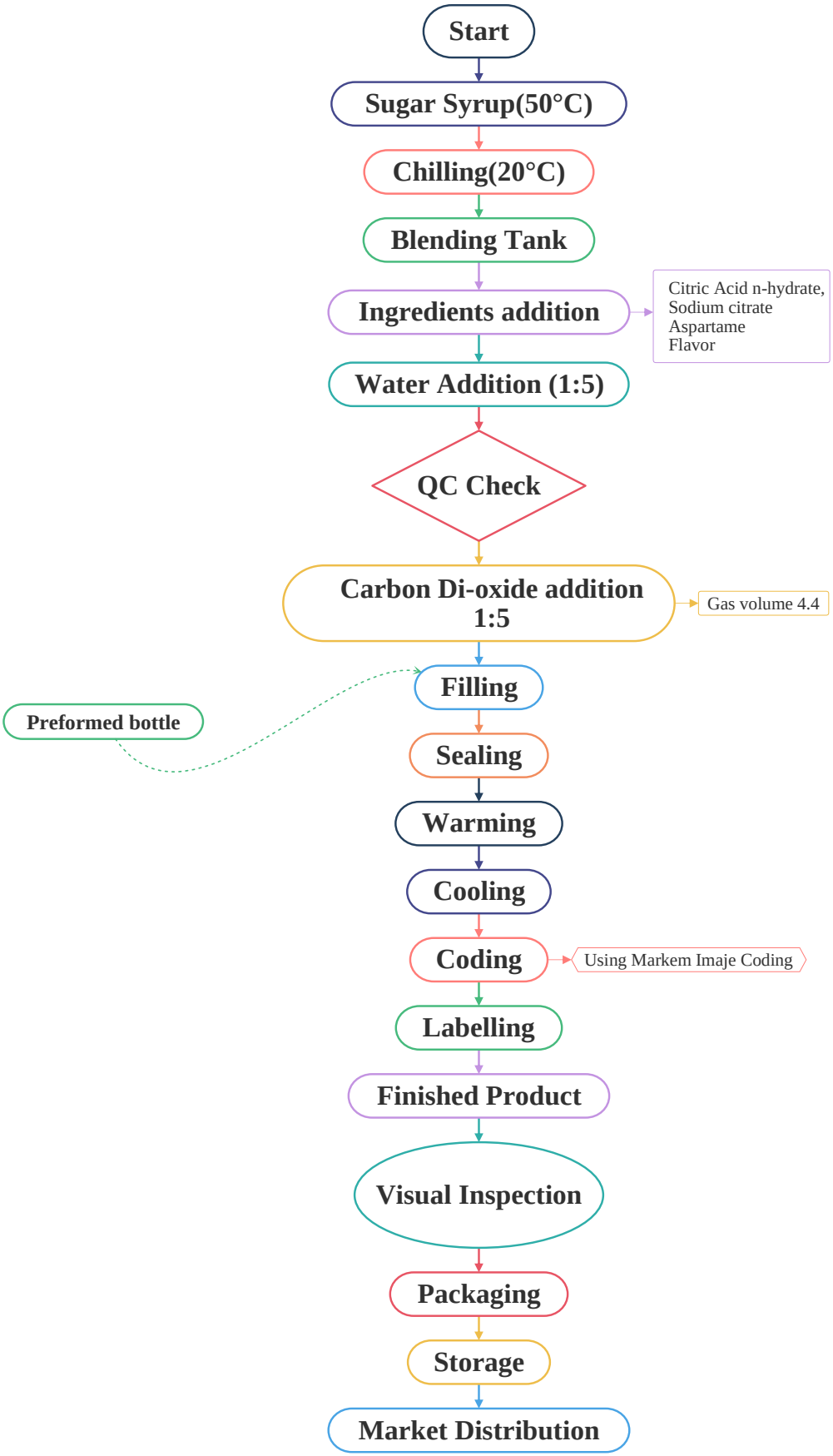


Figure 3.3.8 Flowchart: Cheer Up

3.3.9 Flowchart: PRAN Fruitix-250ml PET

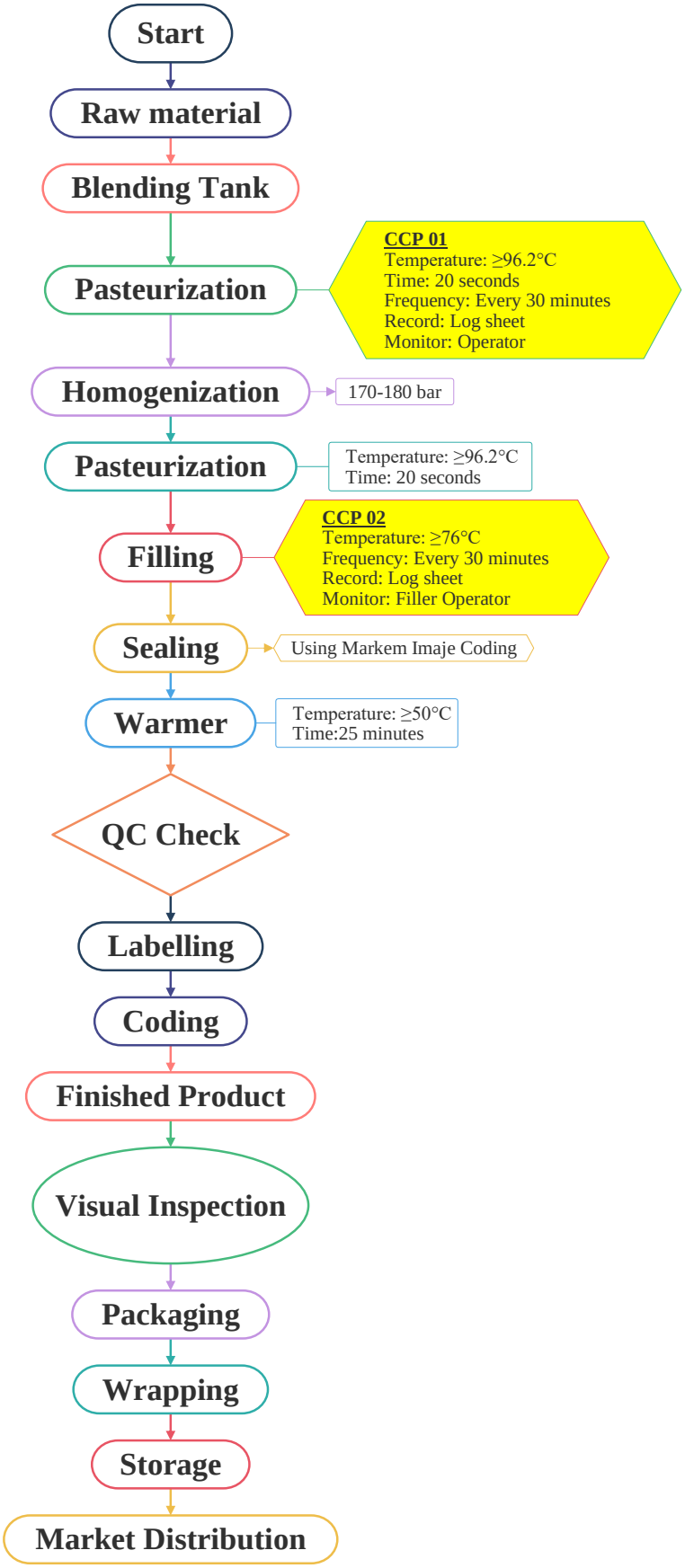


Figure 3.3.9 Flowchart: PRAN Fruitix

3.3.10 Flowchart: Power - 250ml CAN

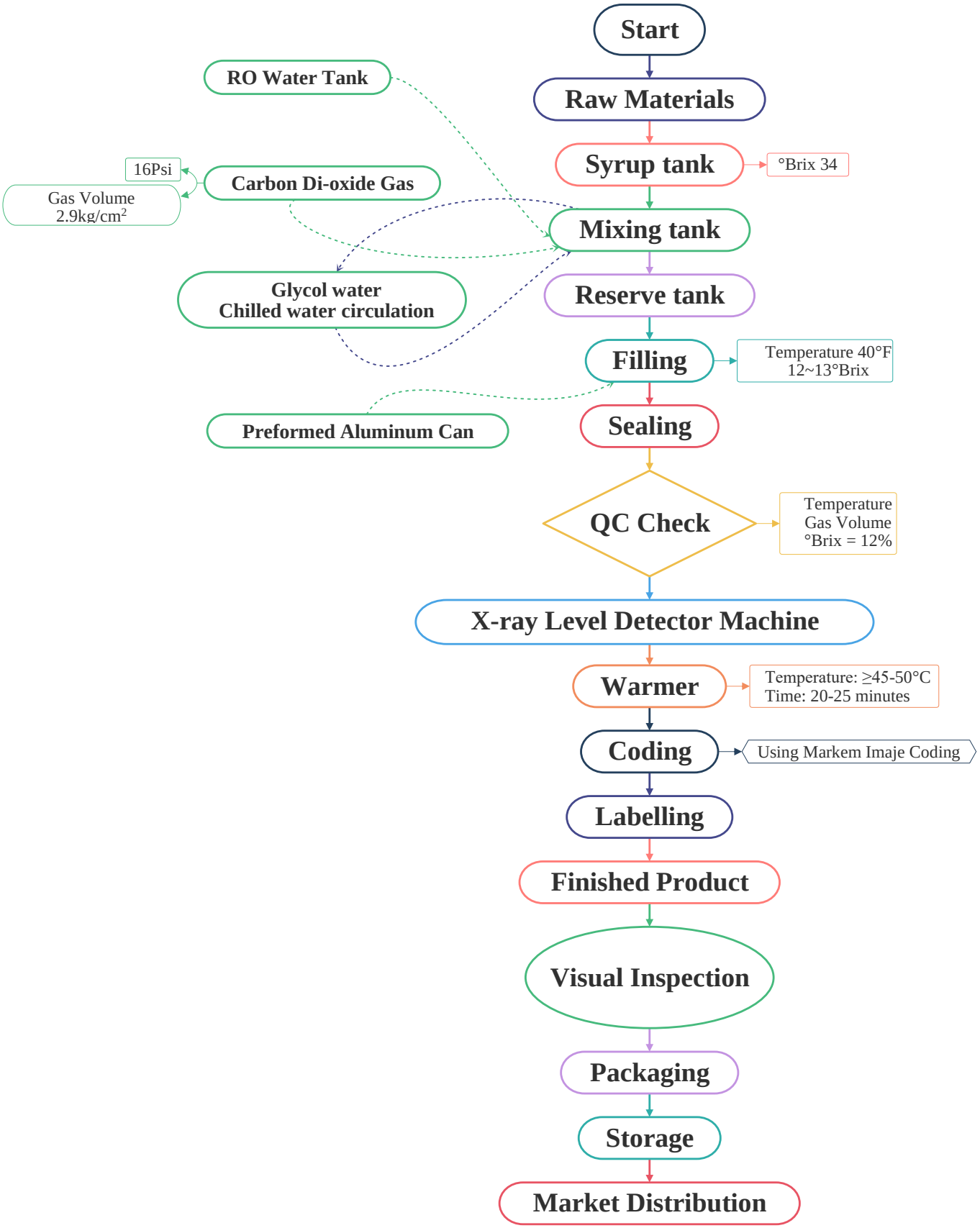


Figure 3.3.10 : Power

3.3.11 Flowchart: PRAN Drinking Water

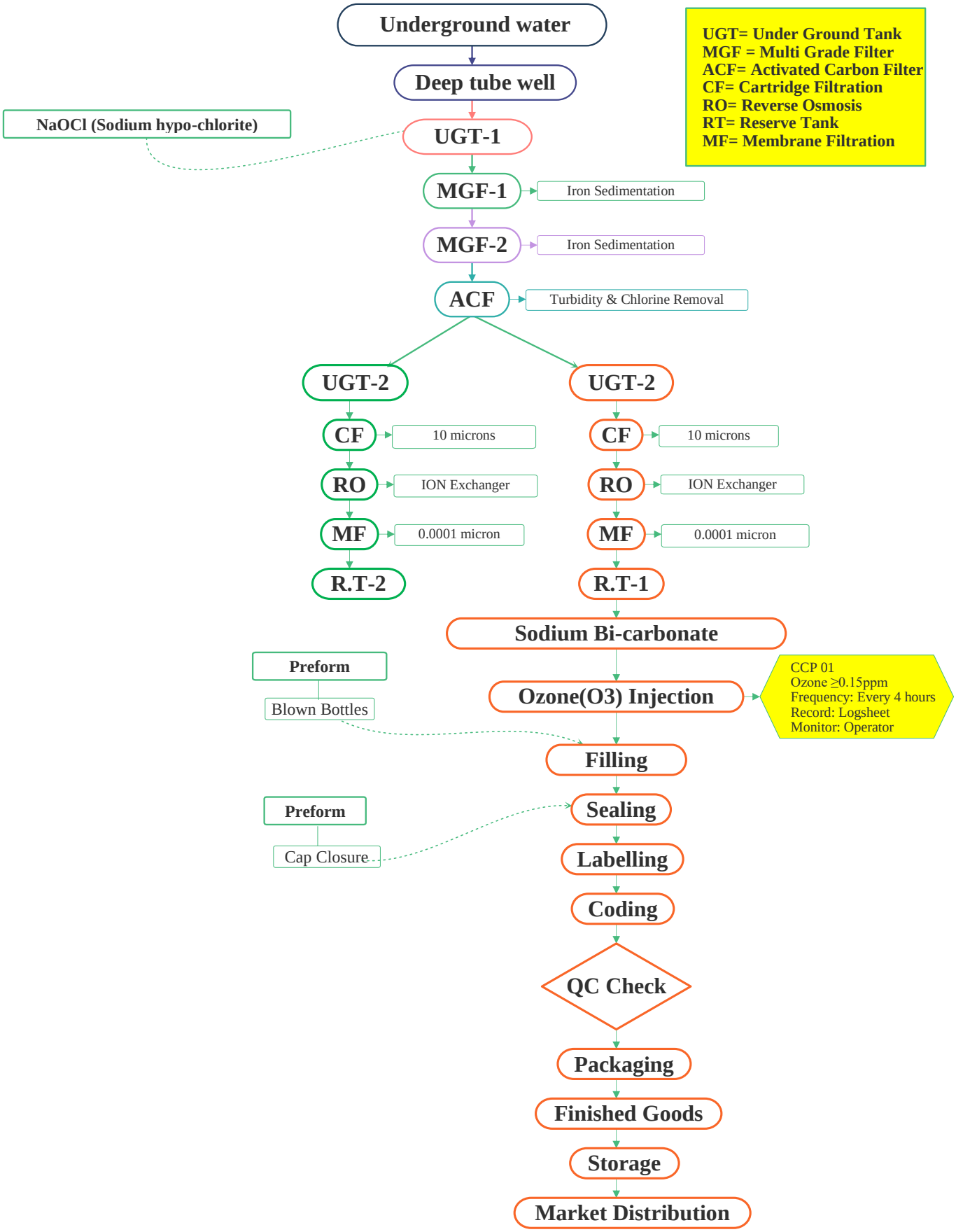


Figure 3.3.11: PRAN Drinking Water

CHAPTER 4

4. PFL Section

4.1 PFL section

From 18th September to 21th September,2022. I have visited these following production lines in PFL.

Table 4.1: PFL Production line visiting timeframe

Date	Sector	Product	Supervised By
18.09.22		No activity due to Audit	
19.09.22	Snacks Line	PRAN Chanachur	Mr. Khiran - QC
		PRAN Jhal Chanachur	
		PRAN Jhal Muri	
		PRAN Dal	
20.09.22		PRAN Potato Sticks	
		PRAN Potato Crackers	
21.09.22		PRAN Badam Bhaja	

4.2 Product list

4.2.1 SKU: PRAN Chanachur

Ingredients: Chickpeas, Chickpeas flour, spilt chickpeas, Peanuts, flattened rice, Edible vegetable oil, Salt, Sodium bicarbonate, Taste enhancer

Name	PRAN Chanachur
Available Sizes	300gm
Category	Snacks
Sub Category	Local Ethnic Snacks
Pack Type	Pouch
Flavor	Bombay mix
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.1 SKU: PRAN Chanachur

4.2.2 SKU: PRAN Jhal Chanachur

Ingredients: Chickpeas, Chickpeas flour, lentils, spilt chickpeas, Peanuts, flattened rice, Edible vegetable oil, Salt, Sodium bicarbonate, Taste enhancer, Spices powder.

Name	**PRAN Jhal Chanachur**
Available Sizes	300 gm
Category	Snacks
Sub Category	Local Ethnic Snacks
Pack Type	Pouch
Flavor	Spicy
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.2 SKU: PRAN Jhal Chanachur

4.2.3 SKU: PRAN Jhal Muri

Ingredients: Puffed rice, Peanuts, mustard oil, Monosodium glutamate, monosodium sulphate, wasabi seasoning, sodium chloride, red chili powder.

Name	PRAN Jhal Muri
Available Sizes	35 gm
Category	Snacks
Sub Category	Local Ethnic Snacks
Pack Type	Pouch
Flavor	N/A
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.3 SKU: PRAN Jhal Muri

4.2.4 SKU: PRAN Dal

Ingredients: Pulse, Edible vegetable oil (Palm oil), Monosodium Glutamate, Monosodium sulphate, spices powder, red chili, Turmeric powder, cinnamon powder.

Name	**PRAN Dal**
Available Sizes	28 gm
Category	Snacks
Sub Category	Nuts & Pulses
Pack Type	Pouch
Flavor	Regular
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.4 SKU: PRAN Dal

4.2.5 SKU: PRAN Potato Sticks

Ingredients: Potato Flakes, Tapioca Starch,Sugar, Edible Palm Oil, Sodium Chloride, Monosodium Glutamate, Monosodium Sulphate, Citric Acid, Seasonings

Name	**PRAN Potato Sticks**
Available Sizes	25gm
Category	Snacks
Sub Category	Chips & Crackers
Pack Type	Pouch
Flavor	N/A
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.5 SKU: PRAN Potato Sticks

4.2.6 SKU: PRAN Potato Crackers

Ingredients: Potato Flakes, Tapioca Starch, Potato Starch, Sugar, Wheat Flour, Edible Palm Oil, Sodium Chloride, Monosodium Glutamate, Monosodium Sulphate, Citric Acid, Spices and Herbs

Name	PRAN Potato Cracker
Available Sizes	25gm
Category	Snacks
Sub Category	Chips & Crackers
Pack Type	Pouch
Flavor	N/A
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.6 SKU: PRAN Potato Crackers

4.2.7 SKU: PRAN Badam Bhaja

Ingredients: Peanuts, Gram flour (Beson), sugar, wheat flour, citric acid, salt, water

Name	**PRAN Badam Bhaja**
Available Sizes	30gm
Category	Snacks
Sub Category	Nuts & Pulses
Pack Type	Pouch
Flavor	Regular
Manufacturer	PRAN FOODS LTD
Country Of Origin	Bangladesh

Figure 4.2.7 SKU: PRAN Badam Bhaja

4.3 Product flowchart

4.3.1 Flowchart: PRAN Chanachur

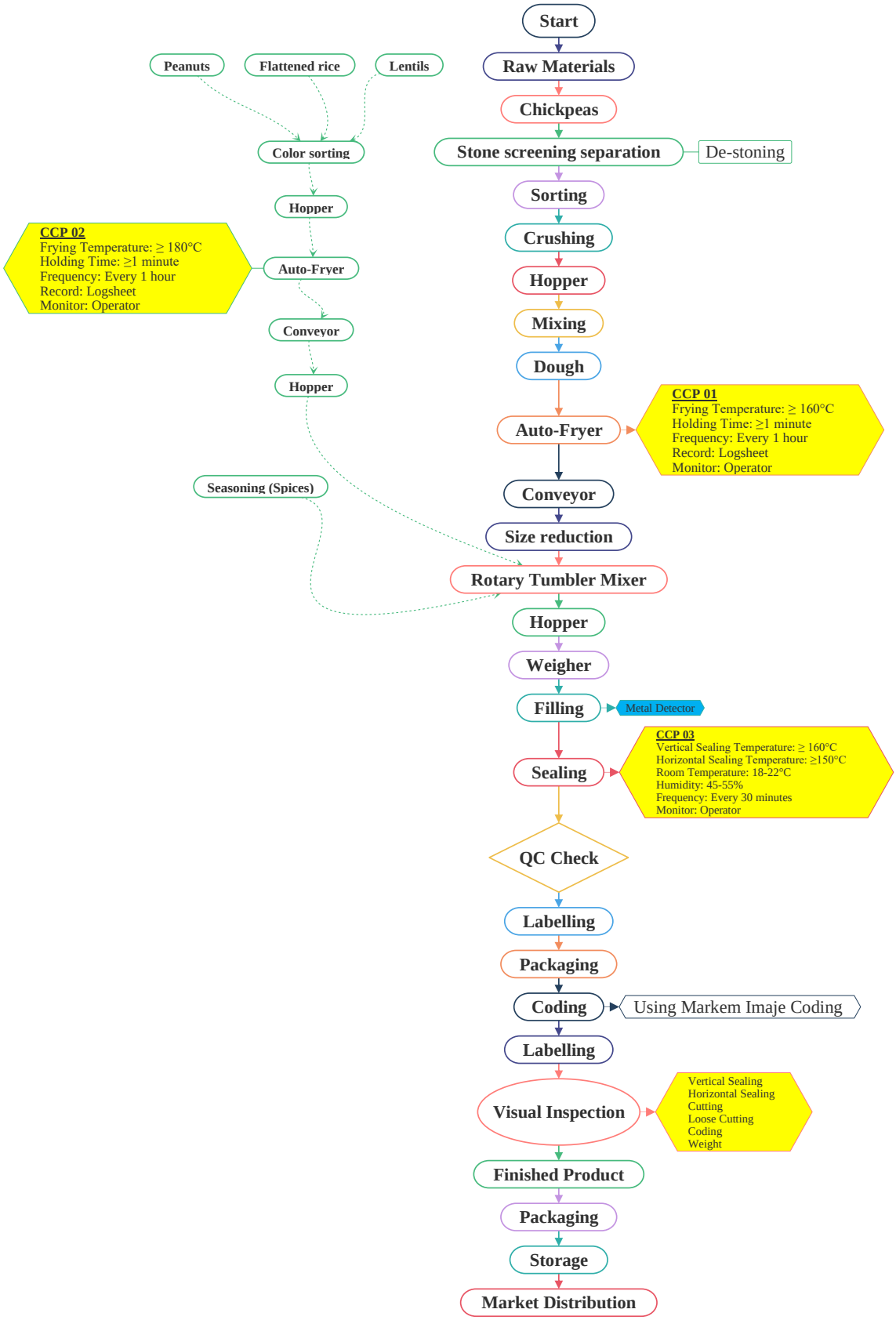


Figure 4.3.1 Flowchart: PRAN Chanachur

4.3.2 Flowchart: PRAN Jhal Chanachur

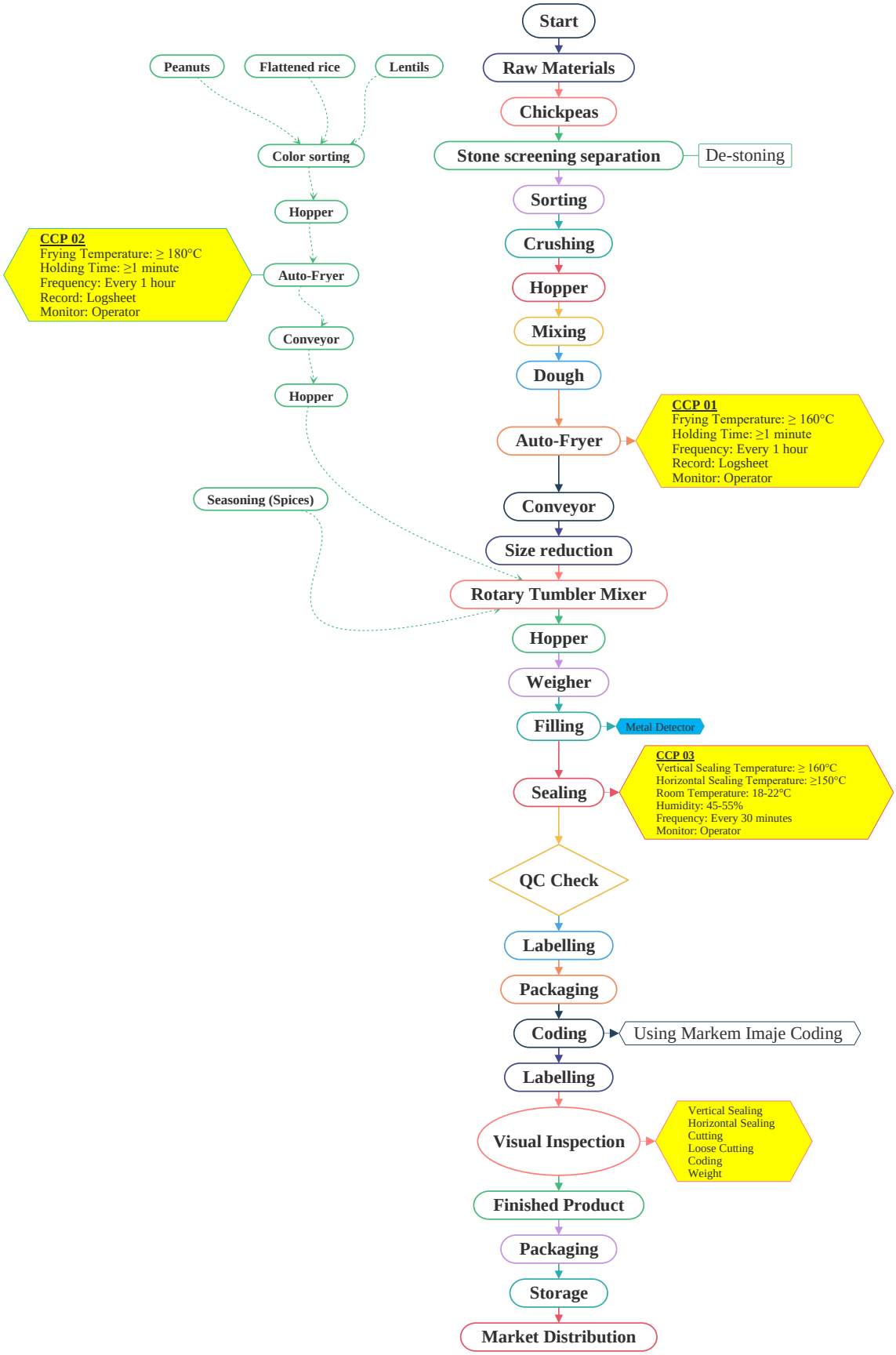


Figure 4.3.2 Flowchart: PRAN Jhal Chanachur

4.3.3 Flowchart: PRAN Jhal Muri

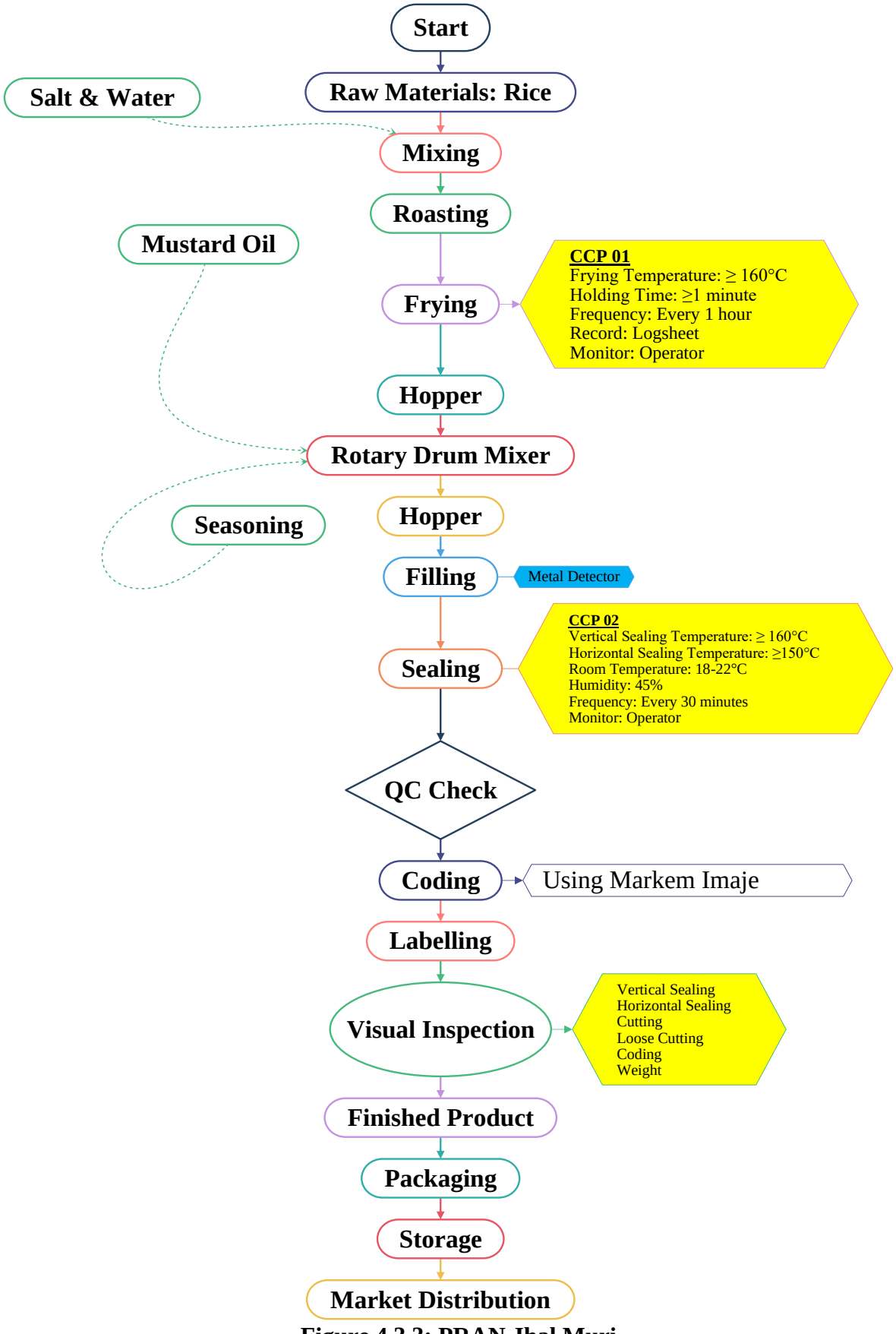


Figure 4.3.3: PRAN Jhal Muri

4.3.4 Flowchart: PRAN Dal

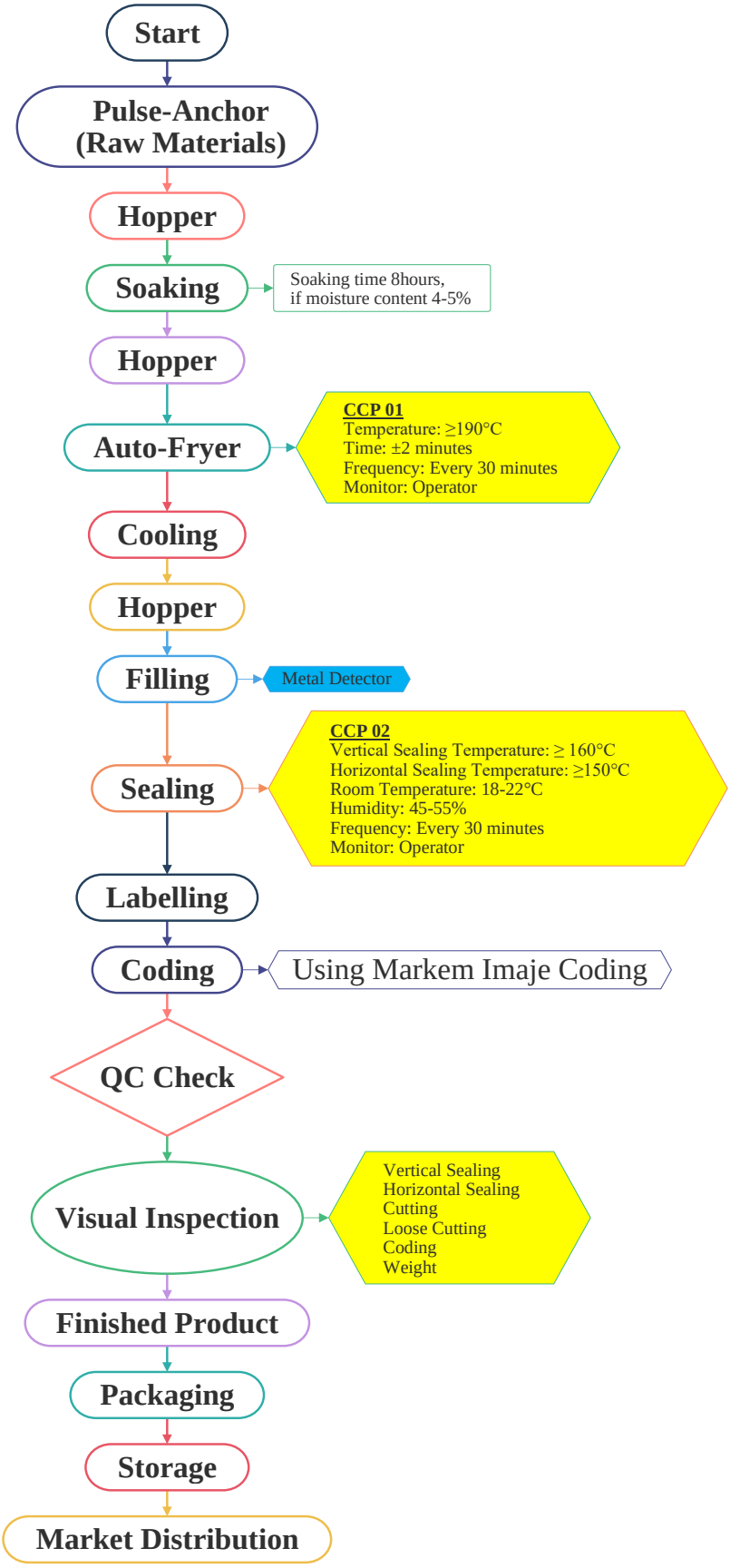


Figure 4.3.4 Flowchart: PRAN Dal

4.3.5 Flowchart: PRAN Potato Sticks

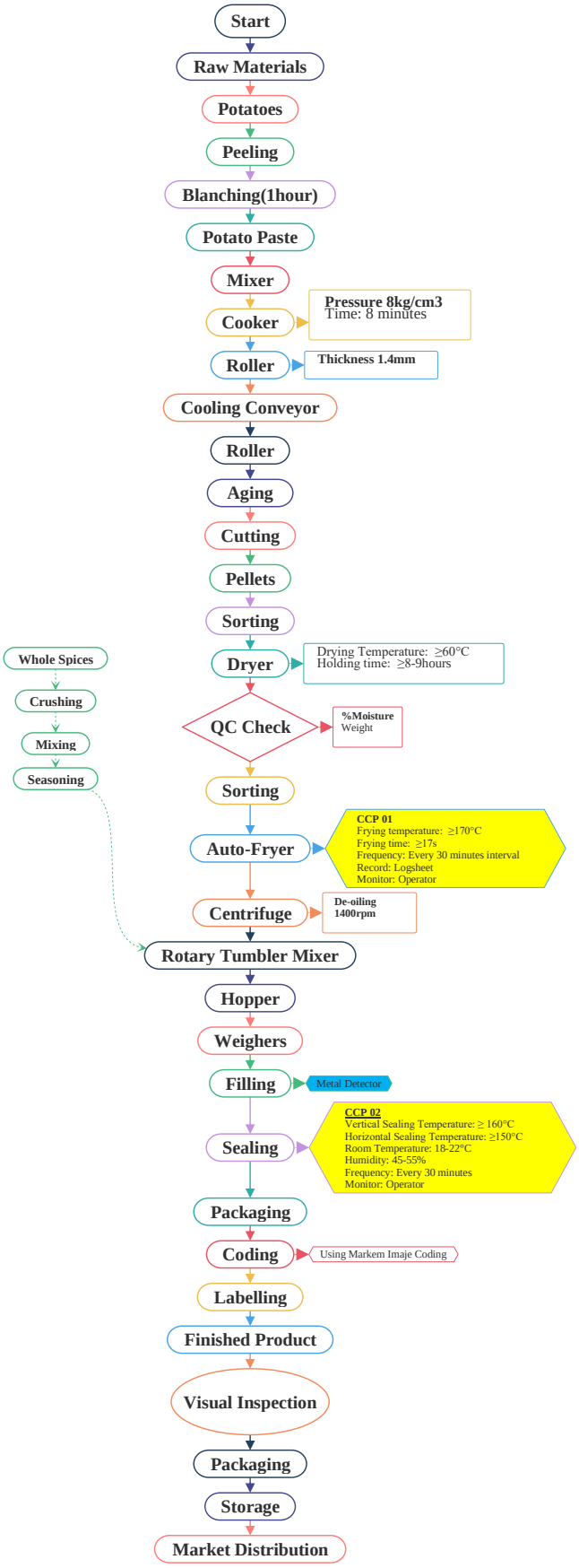


Figure 4.3.5 Flowchart: PRAN Potato Sticks

4.3.6 Flowchart: PRAN Potato Crackers

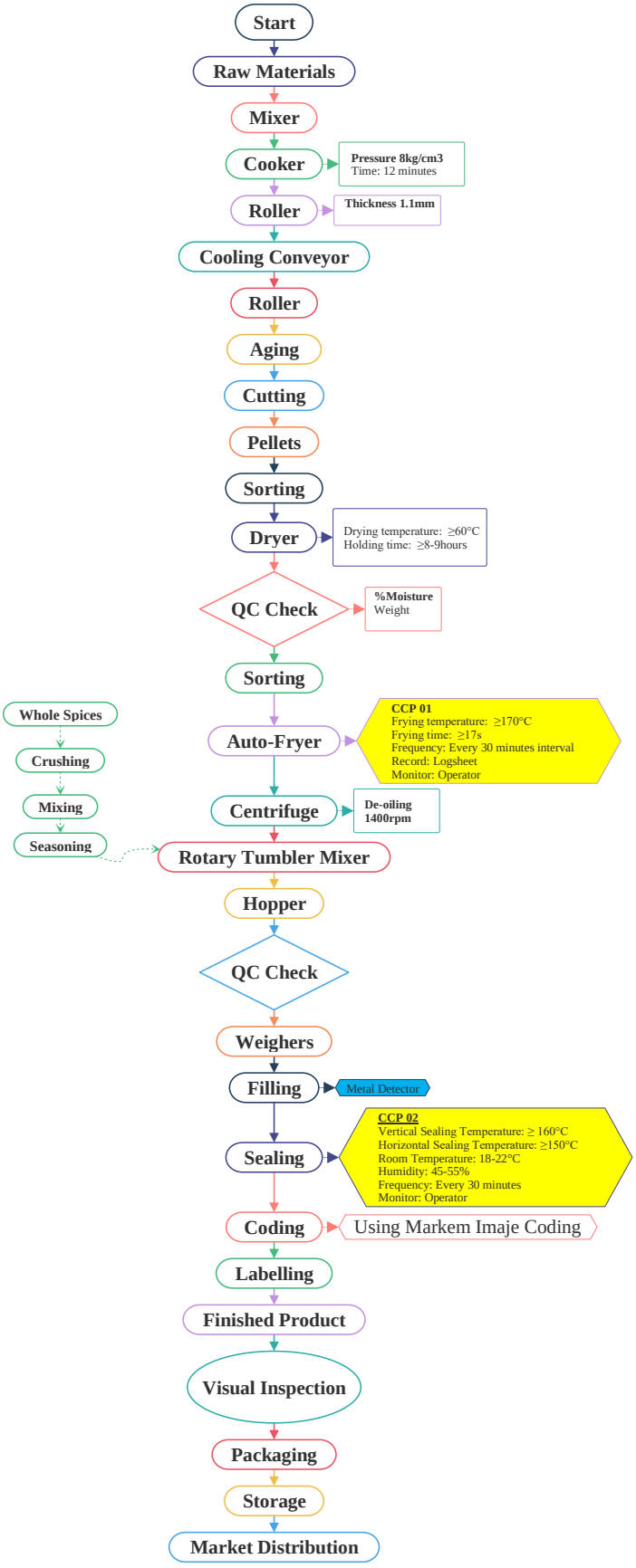


Figure 4.3.6 Flowchart: PRAN Potato Crackers

4.3.7 Flowchart: PRAN Badam Bhaja

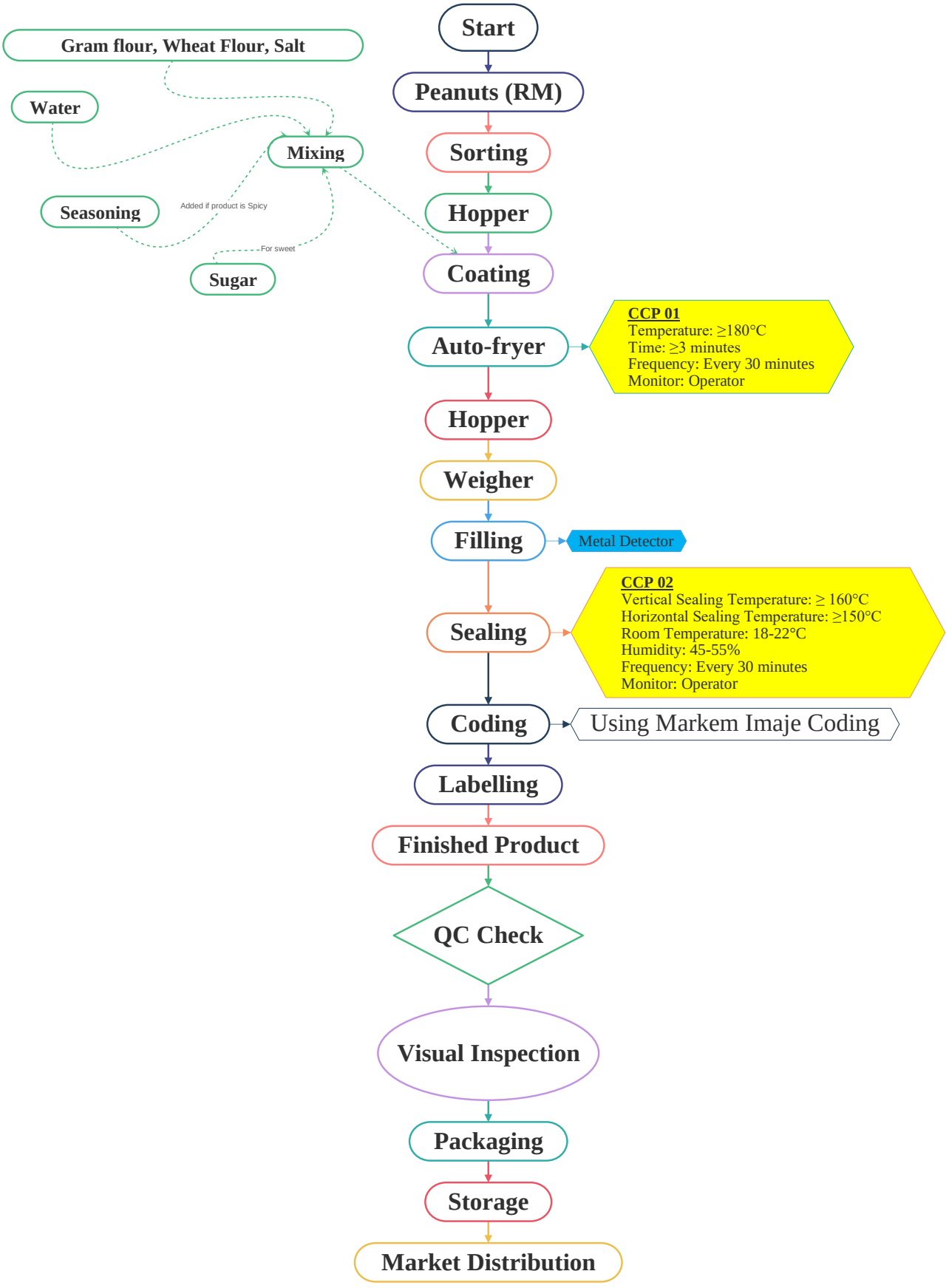


Figure 4.3.7: PRAN Badam Bhaja

CHAPTER 5

5. PCL Section

5.1 PCL section

From 22th September to 27th September,2022. I have visited these following production lines in PCL.

Table 5.1: PCL Production line visiting timeframe

Date	Sector	Product	Supervised By
22.09.22	HBC Building	PRAN Lollipop 2in1 Eclair	Mr. Towhidul Islam (Tareque) Officer-QC & Microbiology
23.09.22	Weekend (Friday)		
24.09.22 25.09.22	HBC Building	Re-visited Lollipop Re-visited Eclair Choco Choco Milky Stick King Fruto Toffee	Mr. Yousuf - QC
26.09.22 27.09.22	ETP (Effluent Treatment Plant) Revisited Every production Line		Mr. Zahidul Islam Officer-QC & Microbiology

5.2 Product list

5.2.1 SKU: PRAN Lollipop

Ingredients: Sugar, Liquid Glucose, Sodium Citrate, Citric Acid, Buffer Lactic Acid, Lecithin, Flavor, Salt, Water

Name	**PRAN Lollipop**
Available Sizes	10gm X 6 pcs
Category	Confectionery
Sub Category	Lollipop
Pack Type	Pouch
Flavor	Litchi
Manufacturer	PCL
Country Of Origin	Bangladesh

Figure 5.2.1: PRAN Lollipop

5.2.2 SKU: 2in1 Eclair

Ingredients: Glucose Syrup (Corn), Milk Chocolate (20%), Vegetable Oil, Cocoa Powder, Emulsifier, Soy Lecithin, Salt, Skim Milk Powder, Whey Powder, Acidity Regulator, Butter Milk, Flavor

Name	**2in1 Eclair**
Available Sizes	-
Category	Confectionery
Sub Category	Toffee
Pack Type	Wrapping
Flavor	Chocolate
Manufacturer	PCL
Country Of Origin	Bangladesh

Figure 5.2.2 SKU: 2in1 Eclair

5.2.3 SKU: PRAN Choco Choco

Ingredients: Sugar, Milk powder, Palm Oil, Cocoa Powder, Lecithin, Flavor, Food color.

Name	**PRAN Choco Choco**
Available Sizes	4gm X 20pcsn
Category	Confectionery
Sub Category	Liquid Chocolate
Pack Type	Pouch Pack
Flavor	Chocolate
Manufacturer	PCL
Country Of Origin	Bangladesh

Figure 5.2.3 SKU: PRAN Choco Choco

5.2.4 SKU: PRAN Milky Stick

Ingredients: Sugar, Milk powder, Palm Oil, Lecithin, Flavor, Food color.

Name	**PRAN Milky Stick**
Available Sizes	4gm X 20pcs
Category	Confectionery
Sub Category	Liquid Chocolate
Pack Type	Pouch Pack
Flavor	Milk
Manufacturer	PCL
Country Of Origin	Bangladesh

Figure 5.2.4 SKU: PRAN Milky Stick

5.2.4 SKU: Fruto Toffee Milk

Ingredients: Sugar, Liquid Glucose, Milk powder, Palm Oil, Lecithin, Sorbitol powder, GMS, Salt, Gelatin, Orange emulsion, Flavor, Food color.

Name	**Fruto Toffee**
Available Sizes	2.5g X200pcs
Category	Confectionery
Sub Category	Soft chewing Candy
Pack Type	Label
Flavor	Milk
Manufacturer	PCL
Country Of Origin	Bangladesh

Figure 5.2.4 SKU: Fruto Toffee Milk

5.3 Product flowchart

5.3.1 Flowchart: PRAN Lollipop

Figure 5.3.1 Flowchart: PRAN Lollipop

5.3.2 Flowchart: 2in1 Éclair

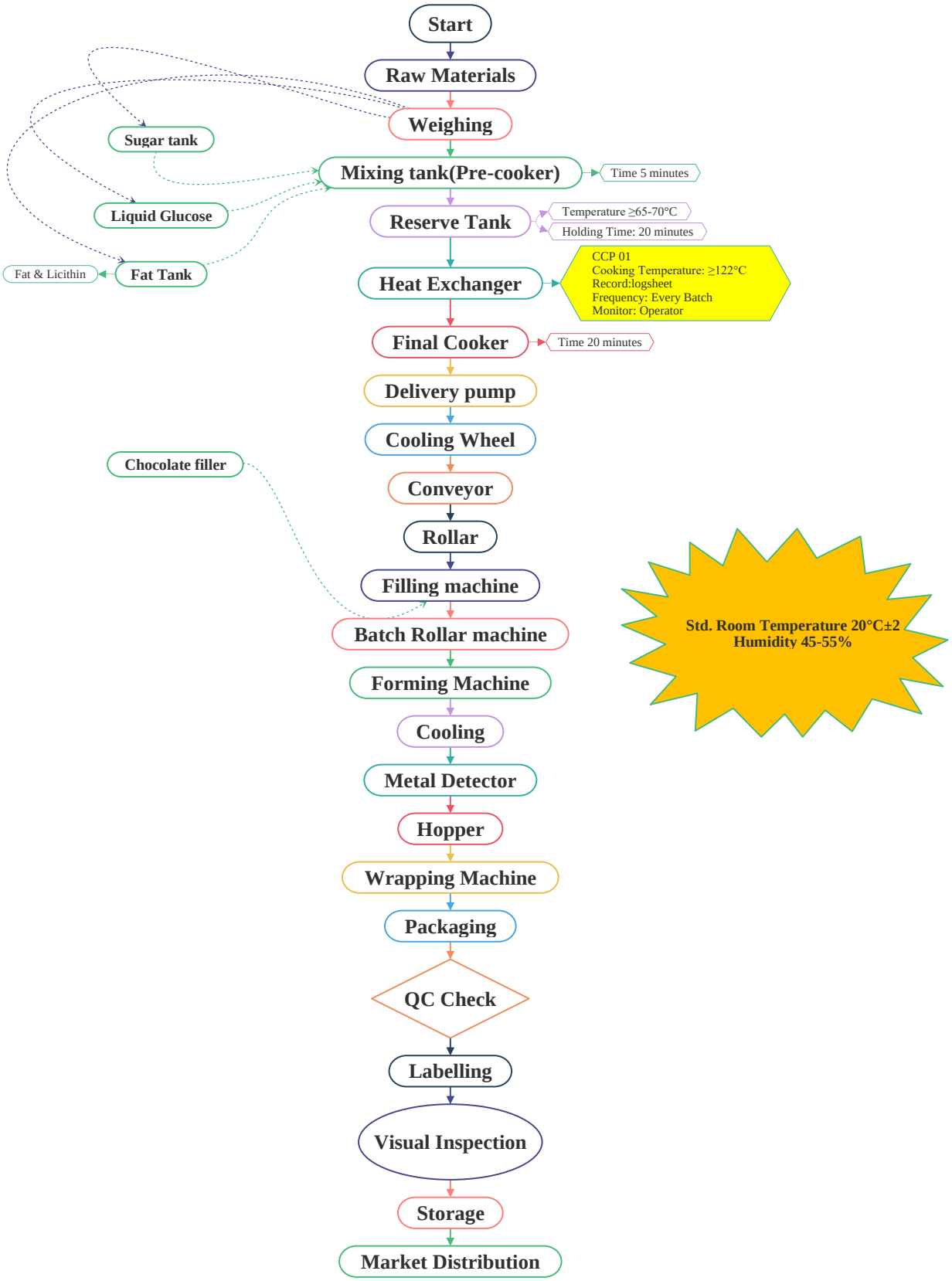


Figure 5.3.2 Flowchart: 2in1 Éclair

5.3.3 Flowchart: PRAN Choco Choco

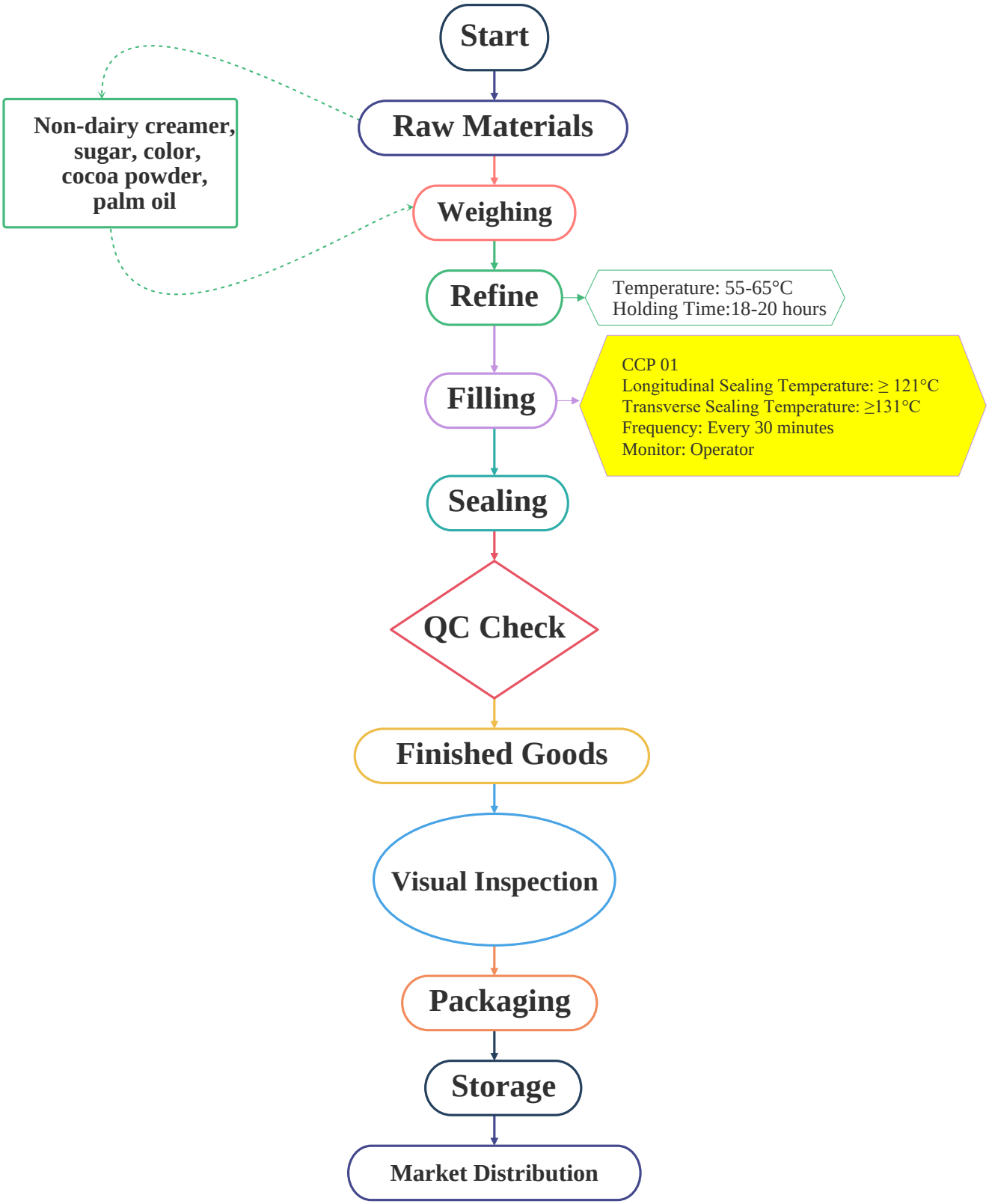


Figure 5.3.3 Flowchart: PRAN Choco Choco

5.3.4 Flowchart: PRAN Milky Stick

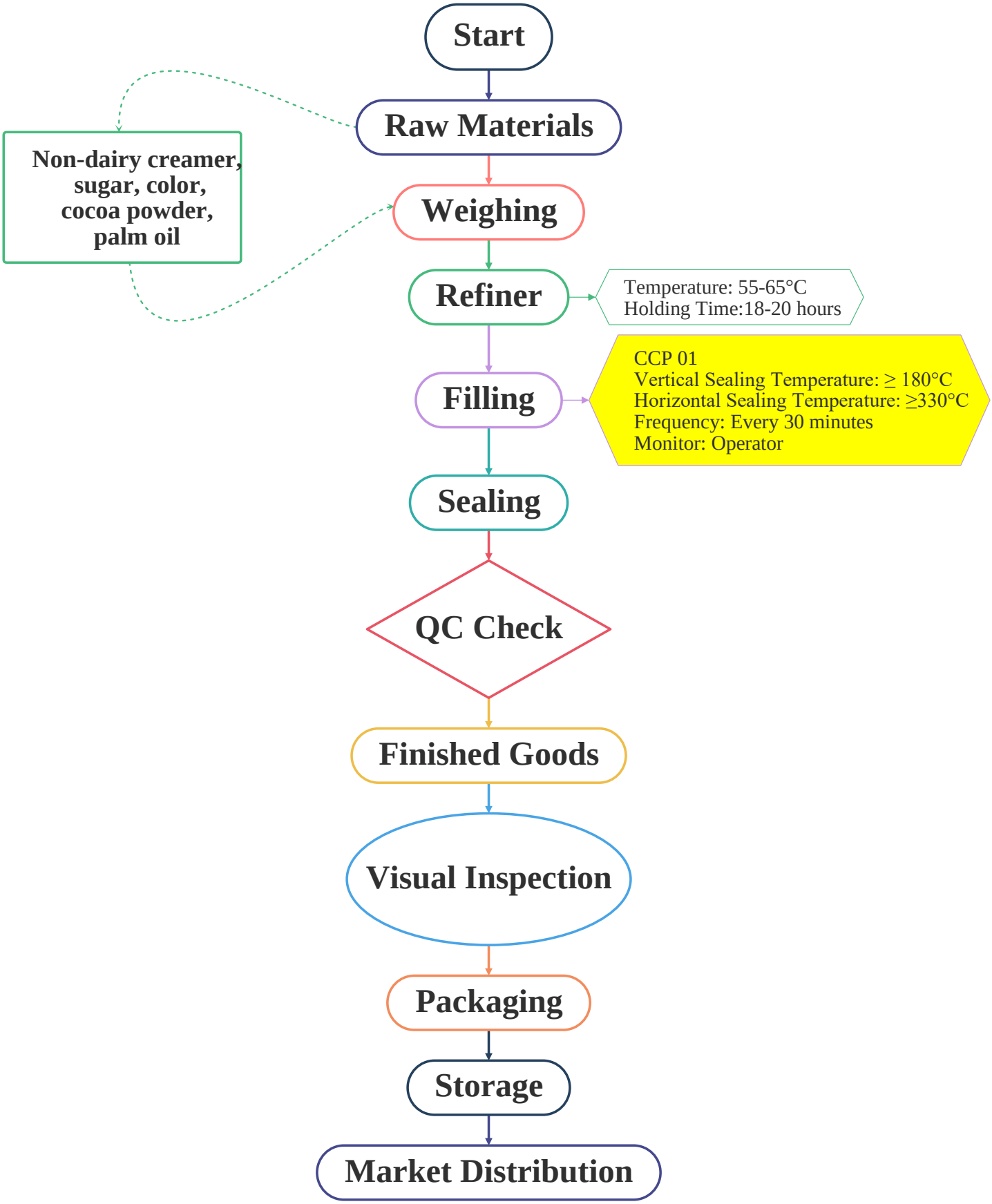


Figure 5.3.4 Flowchart: PRAN Milky Stick

5.3.5 Flowchart: Fruto Toffee

Figure 5.3.5 Flowchart: Fruto Toffee

CHAPTER 6

6. Lab Testing

6.1 QC parameter test

6.1.1 Determination of fat

Apparatus:

1. Butyrometer (Using for measuring fat content)
2. Aluminum stopper
3. Centrifuge machine (1100 RPM)

Reagents:

1. 96% sulfuric acid
2. Amyl alcohol
3. Distill water

Procedure:

1. First 0.5 gm fat sample was taken, 10.75 ml sulfuric acid was added and also 1ml amyl alcohol was added in a butyrometer.
2. It was shaken well with aluminum stopper by hand for 2 minutes
3. The sample was centrifuged carefully at 1100 RPM for 5min.
4. The fat content was determined.

6.1.2 Determination of per-oxide value

Reagents:

1. Per oxide value (Prepare solution: Chloroform 20ml, Acetic acid 10ml, total solution 30ml)
2. Starch solution (Prepare solution: 0.5gm starch in 100gm boil distil water)
3. Potassium iodide (Prepare solution: 8gm potassium iodide in 6gm distil water)
4. Sodium thiosulfate ($Na_2S_20_3$) – 0.1N solution prepare

Procedure:

1. First 5gm oil was taken. (Room temperature)
2. Per-oxide value solution was added into the sample.
3. Then 0.5ml potassium iodide solution was added.
4. Rest in dark room for 1 minute
5. After that, 30 ml distil water and 5 drops starch solution was added. The solution turns into light blue color.
6. The solution was titrated with sodium thiosulfate until the color became less.
7. The burette reading was noted
8. Calculation.

Formula:

$$\text{Per-oxide value} = \frac{(B.R \times Normality\ of\ sodium\ thiosulfate \times mass \times 1000)}{sample\ weight}$$

6.1.3 Determination of iodine value

Reagents:

1. 0.1N silver nitrate (AgNO3)
2. 5% potassium chromate indicator (K2CrO4)

Procedure:

1. First, 5gm sample was taken, and 45ml distil water was added (10% solution)
2. It was well dissolved.
3. Then,1ml K_2CrO_4 indicator was added. The color turned into pale yellow.
4. Titration was done with silver nitrate (0.1N solution).
5. The burette reading was taken.
6. Calculation

Formula:

$$\text{Iodine value} = \frac{(B.R \times normality\ of\ AgNO3 \times 0.00584 \times 100)}{sample\ weight \times 0.1}$$

6.1.4 Determination of free fatty acid

Reagents:

1. Ethanol
2. 0.1N NaOH
3. Fat sample
4. Phenolphthalein indicator

Procedure:

1. First, 5gm sample was taken in a conical flask (250ml)
2. In another conical flask, ethanol solution for neutralization was taken and 5-6 drops of phenolphthalein indicator was added and mixed with 5gm sample
3. The color of solution change, mixed it well by heating.
4. Again, phenolphthalein indicator was added and titrated it with NaOH solution.
5. the color was observed for 1minute.
6. Calculation

Formula:

$$\text{FFA} = \frac{(B.R * Normality\ of\ NaOH * Mass * 100)}{Sample\ weight * 1000}$$

6.1.5 Determination of acidity

Apparatus:

- Beaker
- Dropper
- Burette 10ml.
- Conical flask

Reagents:

- 0.225N NaOH
- Distill water
- Phenolphthalein indicator

Procedure:

1. First,10ml sample was taken into a conical flask by using burette.
2. Then 1-3 drops of phenolphthalein indicator was added.
3. It was shaken well.
4. After that, it was titrated with 0.225N NaOH by burette(2ml).
5. Continued the titration until the solution color turns into faint pink.
6. Calculation.

Formula:

$$\text{Acidity\%} = \frac{(Burette\ reading \times\ normality\ of\ NaOH \times Mass \times 100)}{sample\ weight \times 1000}$$

Formula 02:

$$\text{Acidity\%} = (B.R\ \times factor - Std.Acidity) \times Batch\ volume\ \times 10)$$

Factor: 0.144
Std. Acidity: 0.18

6.1.6 Total hardness test

Reagents:

- Hardness buffer
- Reagent
- EDTA
- Phenolphthalein indicator

Procedure:

- First, 100ml water sample was taken in a conical flask
- Then 5 drops of hardness buffer and hardness reagent was added to the sample.
- After that, started the titration with EDTA solution.
- Observed the color change until it turned into dark violate color.
- Calculation

Formula:

$$\text{Total hardness} = \frac{volume\ of\ EDTA \times Normality\ of\ EDTA \times 50 \times 1000}{volume\ of\ sample}$$

6.2.7 Chlorine test by spectrometer

Reagents:

1. Water = 10ml
2. DPD Reagent

Procedure:

1. First,10ml of sample water was taken in a glass cell.
2. Turned on the spectrometer and select program for chlorine(P__), and adjusted the wavelength to 530nm.
3. Inserted the cell into spectrometer, and calibrated to zero.
4. The cell was taken out and DPD reagent was added to it.

5. Inserted the cell again into the spectrometer and started the timer by pressing [shift+5] button.
6. Waited till the time count down is completed.
7. After that, the reading was taken.

6.1.8 Iron(Fe) test by spectrometer

Reagents:

1. Water = 10ml
2. DPD Reagent

Procedure:

1. First,10ml of sample water was taken in a glass cell.
2. Turned on the spectrometer and select program for iron(P265), and adjusted the wavelength to 510nm.
3. Inserted the cell into spectrometer, and calibrated to zero.
4. The cell was taken out and DPD reagent was added to it.
5. Inserted the cell again into the spectrometer and started the timer by pressing [shift+5] button.
6. Waited till the time count down is completed.
7. After that, the reading was taken.

6.2 Test for tetra pack

6.2.1 Red Ink Test

Determines leakage around the punched and sealed hole.

Figure :6.2.1 Red Ink Test

6.2.2 Visual Check

Visual inspection for the detection of damages on the inner patch, which could cause leakages.

Figure 6.2.2 Visual Check

6.2.3 Pull Tab Position

This test confirms that the inner patch, tab, and hole are all three in the proper positions. The seal of the package is disrupted if any of them are positioned incorrectly.

Additionally, a poorly placed tab might end up becoming snagged underneath the cap, making it challenging for the customer to open.

Figure 6.2.3 Pull Tab

6.2.4 Copper Test

When we've determined that there is a break in the inner plastic layers and wish to pinpoint its specific location, we can do this test. Where the product comes into touch with the aluminum foil will be revealed by the test.

Figure 6.2.4 Copper Test

6.2.5 Conductivity Test

Figure 6.2.5 Conductivity Test

Through this test, it will be possible to see if the inner plastic layers of the packing material have broken, allowing the product to come into touch with the aluminum foil.

If the test yields a positive result, the package may be faulty, and a red ink test should be carried out.

6.2.6 Inside Layer Ruptures *(Visual Check)*

Figure Visual Check

We may spot scratches and damage on the inner layers by physically inspecting the interior surface of the packing material. Even if the scratches are minor and do not lead to damaged shipments, they are a warning sign and should prompt preventive measures.

6.2.7 Red Ink Injection in Air Gap of the LS-strip

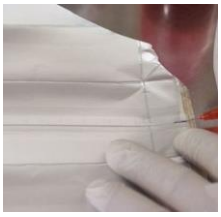


Figure 6.2.7 Red Ink Injection

This test will determine if the package is leaking underneath the LS-strip.

6.2.8 Longitudinal Seal Tearing (LS Tear Down)

Figure 6.2.7 LS Tear Down

This test evaluates the effectiveness of the longitudinal seal. You may determine that the seal is mechanically more robust than the packing material by physically ripping the seal. We have a blocked seal, which is a poor seal, if the sealing is less durable than the package material.

When the packages exit the machine, the only method to find a blocked longitudinal seal is to manually rip the seal. Other tests won't pick up a blocked seal, such the conductivity test and the red ink test.

6.2.9 Accurate Check (Tear Down Test)

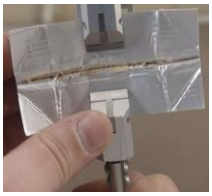


Figure 6.2.9 Accurate Check

This test evaluates the transversal seal's effectiveness. You may determine that the seal is mechanically more robust than the packing material by physically ripping the seal. We have a blocked seal, which is a poor seal, when the sealing is less durable than the package material.

The transversal seal must be manually torn as soon as the packages exit the machine in order to reveal a blocked transversal seal. Other tests won't pick up a blocked seal, such the conductivity test and the red ink test.

6.2.10 Transversal Sealing *(Rough Check)*

Figure 6.2.10 Transversal Sealing

If there is any major defect in the machine's sealing components, such as missing rubber dollies or an inductor failure, the rough inspection will quickly reveal it.

6.2.11 Flap Sealing

In order to ensure package integrity and line efficiency, flap sealing is crucial. If unsealed flaps become trapped in the final folder, conveyor, or distribution machinery, they might lead to needless pauses and waste.

Figure 6.2.11 Flap Sealing

6.2.12 LS-overlap

Checked the tube diameter dimension and the breadth of the packing material by measuring the LS-overlap. These factors are crucial for producing well-shaped packaging.

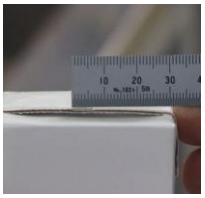


Figure 6.2.12 LS-overlap

6.2.13 Crack test for PET Bottles/ Alu CAN

Apparatus:

1. PET Bottles
2. Air Compressor

Reagents:

1. NaOH Solution (0.2%)
2. Water

Procedure:

1. Water that has been cooled to 22°C is poured into each bottle to the net goal level.
2. Compressed air is used to pressurize bottles to a comparable internal pressure of 77Psi.
3. Each bottle is marked on the fill line and put in a separate pocket of 0.2% Sodium Hydroxide solution after 5 minutes.
4. The containers stay in the caustic solution until they rupture catastrophically or start to leak through base fractures.
5. For each container, the duration to failure and the place where it occurred are recorded.

CHAPTER 7

7.1 CIP & COP

7.1.1 CIP(Clean-In-Place)

The cleaning technique known as "clean-in-place" (CIP) is mostly employed in the food industries. Without requiring disassembly, CIP may be used to clean fittings, filters, process equipment, and inner surfaces of pipelines.

7.1.2 For same Product:

Step 1: Pre-rinse with Normal water for 5 minutes
Step 2: Flashing with warm water(50°C) for 10 minutes.
Step 3: Caustic (1.5-2% NaOH solution) circulation for 15-20minutes at 80°C.
Step 4: Final Rinse by flashing with warm water (50°C) for 10 minutes.
Step 5: Sanitizing rinse by using RO cold water.

7.1.3 For different Product:

Step 1: Pre-rinse with Normal water (RO) for 5 minutes
Step 2: Flashing with warm water(50°C) for 10 minutes.
Step 3: Caustic wash (1.5-2% NaOH solution) circulation for 15-20 minutes at 80°C.
Step 4: Intermediate Rinse with Nitric Acid (1% HNO_3 solution), circulated for 15-20minutes at 80°C.
Step 5: Final Rinse by flashing with warm water (50°C) for 10 minutes.
Step 6: Sanitizing rinse by using RO cold water.

Note: The pH is checked for the drain out water (step: sanitizing rinse), and compared with the pH of pre-rinse water, to determine the pH of the line is neutral (6.4-7.4) and stop the CIP system.

7.1.4 Some advantages to CIP systems:

- Highly consistent outcomes
- Significantly less labor demanding than manual cleaning
- No disassembly or reassembly required
- Significantly faster than manual cleaning
- Documentation
- Less risk for workers, as there is less exposure to chemicals
- Contributes to the efficient management of water and chemical expenses

7.1.5 Some disadvantages to CIP systems:

- The initial expenditures for CIP systems are often greater.

7.1.6 COP (Clean-Out-Of-Place)

Components of machinery that aren't accessible to the CIP system can be cleaned via a system called clean-out-of-place (COP). Fittings, clamps, product-handling instruments, tank vents, pump rotors and impellers, casings and hoses are all examples of equipment. This kind

of device might also be used to facilitate the cleaning of small, intricate, or otherwise challenging pieces of industrial equipment. If a CIP system is out of the question due to cost, a COP system can be employed in conjunction with hand cleanings.

7.1.7 Some advantages to COP systems:

- Provides a cost reduction over manual cleanings, saves on time, chemical, and water use
- Typically requires a cheaper initial investment than CIP systems
- Produces consistent results
- Reduces labor costs
- Decreases the likelihood of the operator being put in danger by high temperatures and excessive chemical concentrations

7.1.8 Disadvantages to COP systems:

- Loading and unloading the COP washer is more time-consuming than using a CIP system in instances when both are appropriate.

7.2 Hazard analysis critical control point (HACCP)

7.2.1 Pre-requisite programs

Pre-requisite Programs (PRPs): Procedures, such as Good Manufacturing Practices, that address operating circumstances and serve as the HACCP system's building blocks are known as pre-requisite programs (PRPs)..

The Pre-requisite programs which should be considered are given below:

1. Premises
2. Transportation, Receiving and Storage
3. Equipment
4. Personnel
5. Sanitation and Pest Control
6. Product Recalls and Traceability
7. Supplier Quality Assurance and Approved Supplier List (ASL)
8. Standard Operating Procedure (SOP)
9. Allergens & Allergen Control Program

Figure 7.2.1a: Pest controlling

Figure 7.2.1b: Cleaning Floor

Figure 7.2.1c: Pest Control

7.2.1 Steps to implement HACCP plan

Preliminary steps:
Step 01 - HACCP team formation
Step 02 - product description
Step 03 – Product's intended use identification
Step 04 – Process flow diagram construction
Step 05 - on site verification

7.2.3 Application of HACCP principles

Principle 1 - Hazard Analysis Conduct
Principle 2 – CCP determination
Principle 3 - Critical Limits establishment
Principle 4 – Monitoring
Principle 5 - Corrective Action
Principle 6 – Verification
Principle 7 – Record & Documentation

7.3 ISO 9001:2015 quality management systems

The document that explains all of the requirements for a quality management system is known as ISO 9001. (QMS). Organizations use the standard to show that they can consistently create goods and services that meet the requirements set by consumers and authorities.

When a business meets the criteria outlined in ISO 9001:2015, it is considered to have a quality management system.

a) it must demonstrate that it is capable of consistently providing products and services that fulfill the standards imposed by customers as well as any applicable legislative and regulatory requirements; and

b) Increases customer happiness through the effective use of the system, which includes tools for the system's ongoing development and the assurance of compliance with both client needs and, when necessary, relevant legal and regulatory requirements. No matter the type of business, size, or products and services it provides, all of the ISO 9001:2015 standards are intended to be generic in nature and applicable to any organization.

7.4 AMCL & PFL certifications

Table 7.1: AMCL & PFL certifications

Sl. no.	Company Name	Certification	Certificate no.	Issue	Expiry
01	Agricultural Marketing Co. Ltd.	GMP-HACCP	HACCP-196/20	07.04.2020	06.04.2023
02	PRAN Foods Ltd.	GMP-HACCP	HACCP-199/20	11.05.2020	10.05.2023
03	PRAN Foods Ltd.	ISO 9001:2015	IFC-Q-05-19-I-2192N	16.05.2019	15.05.2022

7.5 Overall equipment effectiveness – OEE

A manufacturing operation's Overall Equipment Effectiveness (OEE) is a measurement of how well it is utilized in comparison to its full capability throughout the periods of time when it is

scheduled to run. This comparison is made during the production process. It determines what proportion of the total time spent producing is actually productive. When the overall equipment effectiveness (OEE) is at 100%, it indicates that the production of only high-quality components occurs at full speed and without interruptions.

$$\text{Availability} = \frac{Actual\ Run\ Time}{Design\ Run\ Time} \times 100$$

$$\text{Performance} = \frac{Actual\ Output}{Target\ Output} \times 100$$

$$\text{Quality} = \frac{Total\ Goods\ Output}{Total\ Output} \times 100$$

$$\text{OEE} = Availability \times Performance \times Quality$$

7.6 Total quality management-TQM

Total Quality Management (TQM) seeks to "create and sustain a culture where employees continuously improve their ability to deliver highly valuable on-demand goods and services to customers." Executives must actively manage quality through funding, staffing, goal-setting, and training, according to "management," which stresses this requirement. The word "total" emphasizes the fact that divisions other than production—such as sales and marketing, accounting and finance, engineering and design—must also enhance their business practices. TQM efforts frequently depend heavily on the tools and methods of quality control that have already been developed, even though there isn't a method that is generally accepted.

Table 7.2: Total Quality Management

TQM	Description
First In First Out (FIFO)	• Product management • Evaluation
Quality Control (QC)	• Physical, Chemical, microbiological parameter for raw materials received and finished goods must be check
Pest Control	• Biological pest control • Mechanical pest control • Chemical pest control for agricultural commodity
Standard Operating Procedures (SOP)	• Identify CCP(s) • Set limits • Monitor and control the process
Clean In Place (CIP)	• To prevent cross contamination
Good Manufacturing Practices (GMP)	• Documentation • Implementation

7.7 Six sigma

The Six Sigma method makes use of statistics and data analysis to pinpoint and eliminate errors or flaws. This strategy seeks to lengthen cycle times while lowering manufacturing fault rates to no more than 3.4 defects per million units or events.

Table 7.3: Six Sigma

Sigma Level	Defects per million	Yield
6	3.4	99.99966%
5	230	99.977%
4	6210	99.38%
3	66,800	93.32%
2	308,000	69.15%
1	690,000	30.85%

7.8 LEAN Six sigma: 8 wastes

Table 7.4: Eight Wastes of Lean Six Sigma

Sl. no.	Wastes	Description
1	Inventory	Resources and products in excess that are not being processed.
2	Talent	Underutilizing the abilities, expertise, and skills of others.
3	Waiting	Waiting for the next stage of a procedure is a waste of time.
4	Motion	Unnecessary human mobility (e.g.-walking)
5	Defects	Rework, discard, and inaccurate information-related efforts
6	Transportations	Transportation of goods and commodities without necessity.
7	Overprocessing	More work is done, or the quality is greater than what the client requested
8	Overproduction	Production that is either excessive or takes place before it is required

7.9 Halal

Halal certification is applicable to the food, cosmetic, and pharmaceutical industries. This certification verifies that a product was produced in full compliance with the precepts of Islamic Law, that it does not contain any components that are considered "prohibited," and that it has not come into any kind of contact with any substances or objects that are considered "impure." Halal certification can be obtained through an independent third party.

The purpose of this certification is to:

- Assure customers who practice Islam that their religious tenets have been taken into consideration.
- Guarantee that the product meets high standards of both cleanliness and safety.
- In order to fulfill the ever-increasing demand for halal food and goods on the Italian and worldwide markets.

7.10 Effluent treatment plant(ETP)

In order to release clean water into the environment that is free of the harmful effects of effluent, a type of waste water treatment process known as an Effluent Treatment Plant (ETP) was created. Industrial effluents comprise a variety of substances depending on the industry. Some effluents contain grease and lubricants, while others have toxic materials. (e.g., cyanide). Biodegradable organic contaminants are present in the effluents from food and beverage producers. Industrial waste water requires specialized treatment known as ETP because it includes a variety of contaminants.

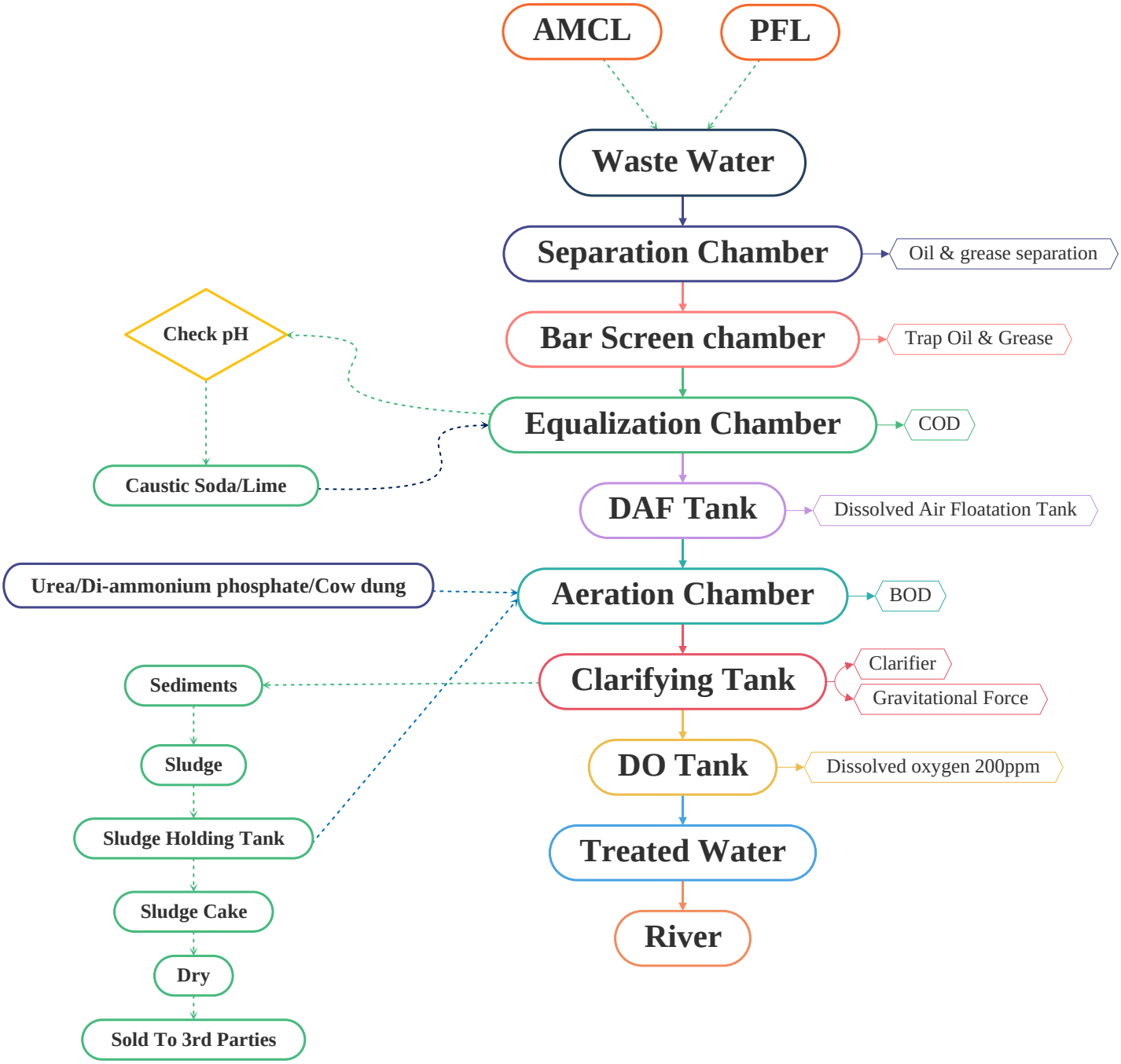


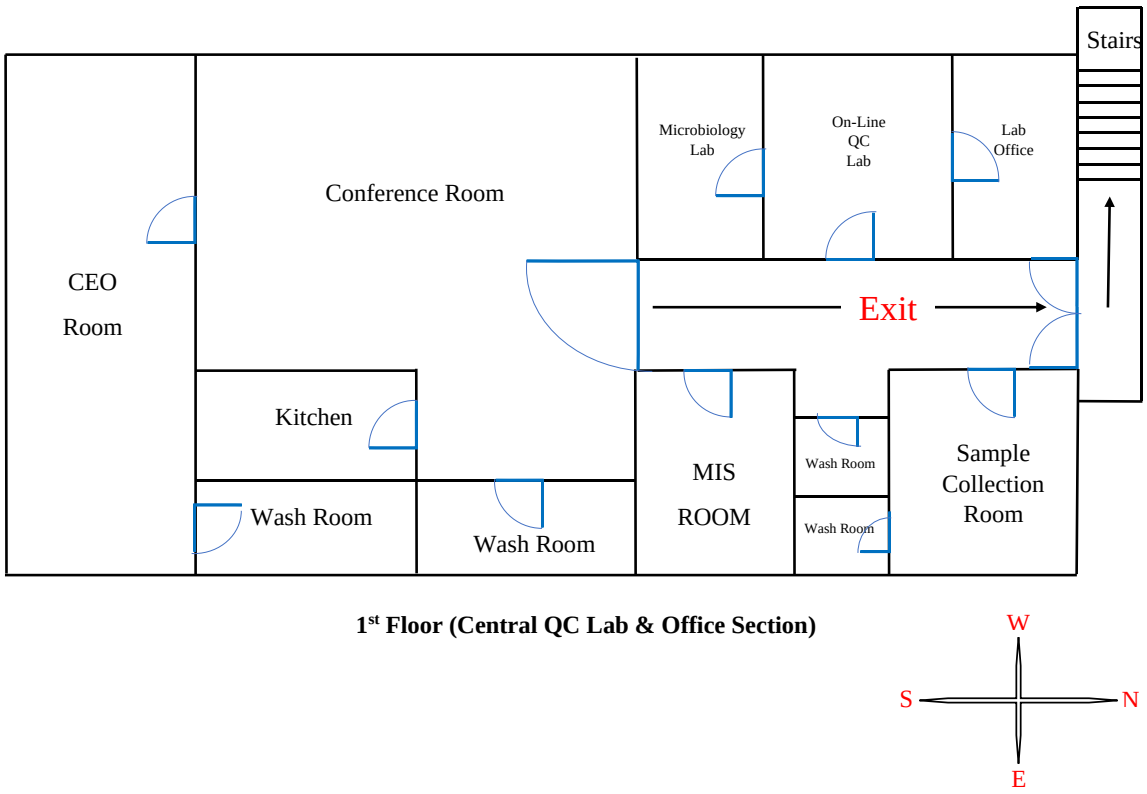
Figure 7.10 Effluent treatment plant (ETP)

CHAPTER 8

8.1 Plant layout

Within a manufacturing facility, the arrangement of machinery, work spaces, and service areas is referred to as the plant layout. The layout of a plant involves the creation of a physical link between the building, the equipment, and the production activities. This is done so that the manufacturing process may be carried out in an effective manner.

8.2 Central QC layout



1st Floor (Central QC Lab & Office Section)

Figure 8.1: Central QC layout

8.3 Powder drink production line layout

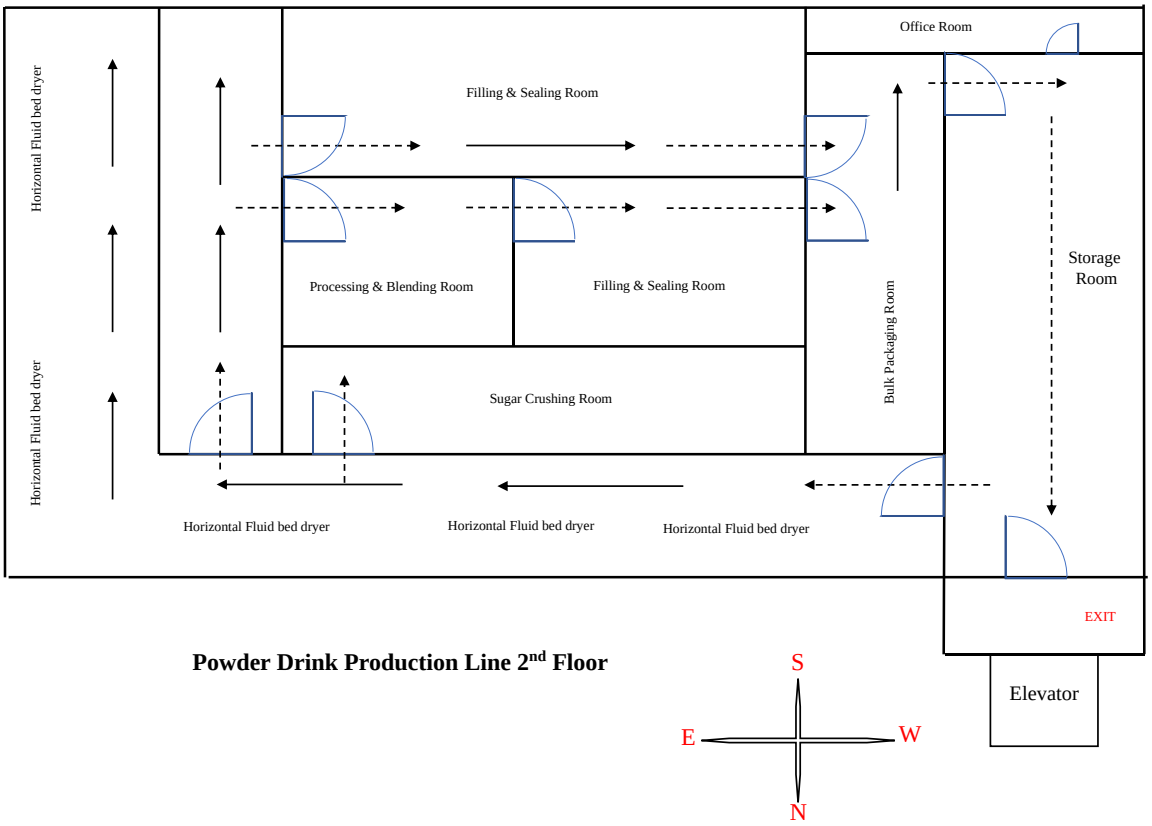


Figure 8.2 Powder drink production line layout

8.4 Litchi drink production line layout

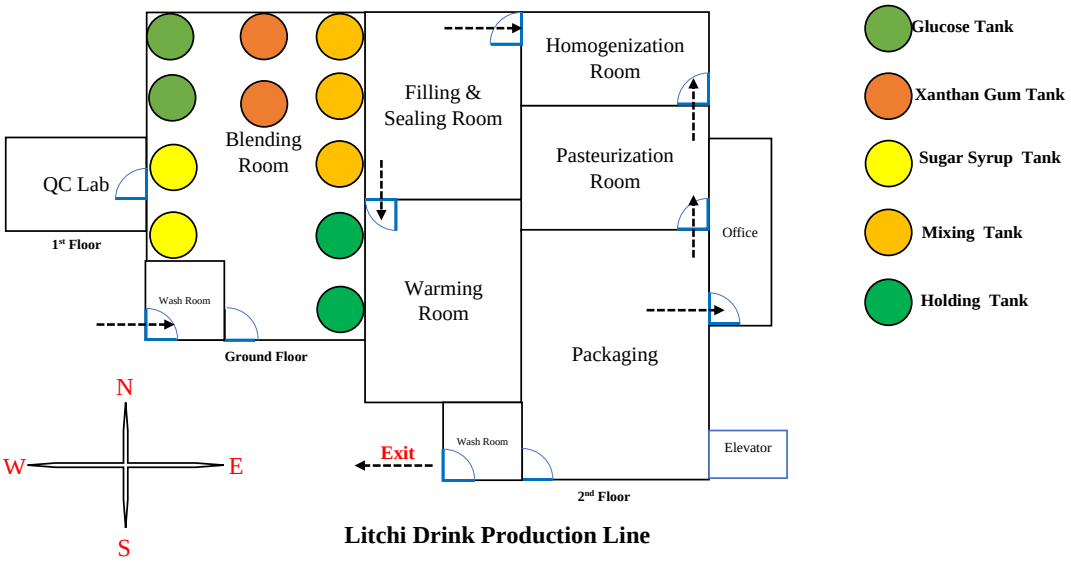


Figure 8.3: Litchi drink production line layout

8.5 Ice pop line layout

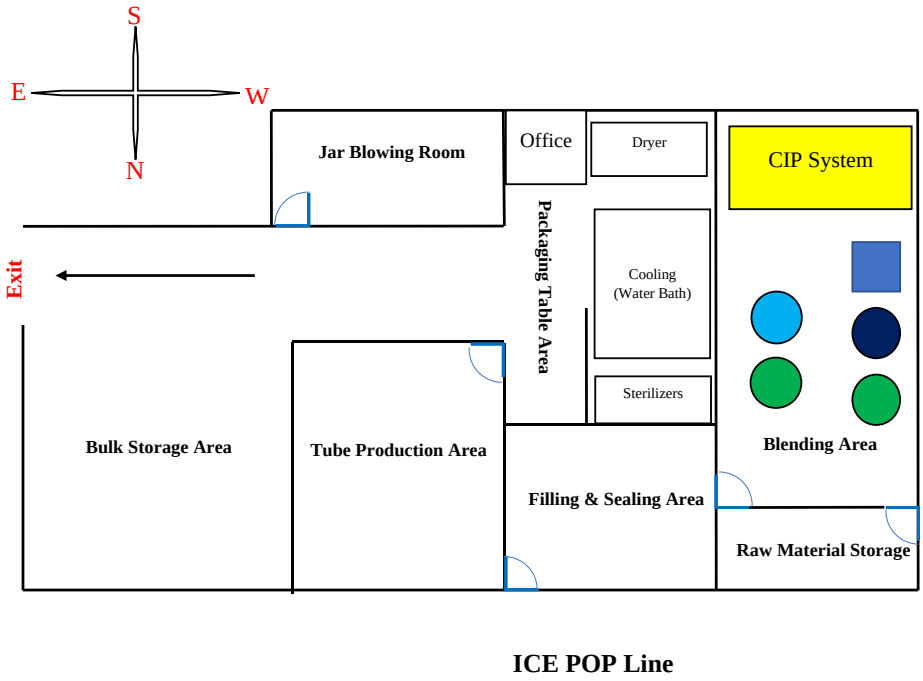


Figure 8.4: Ice pop line layout

8.6 Tetra pak aseptic line layout

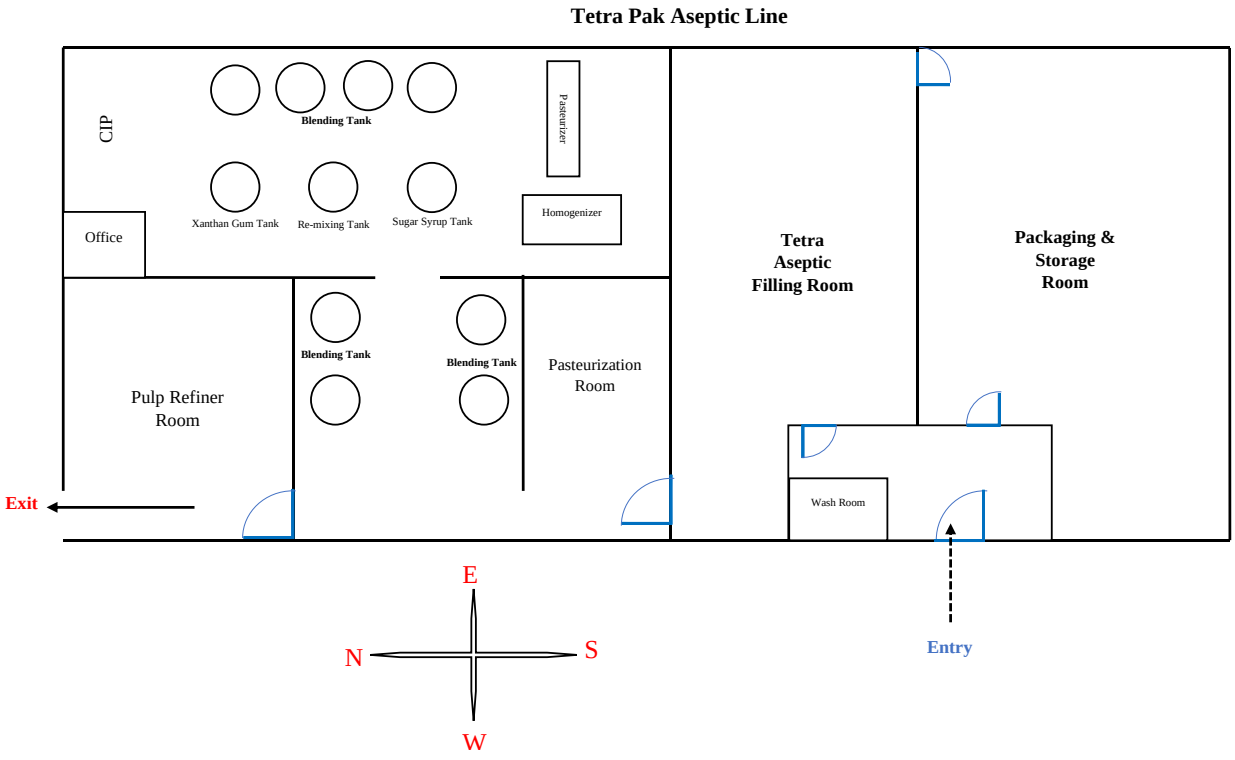


Figure 8.5: Tetra pak aseptic line layout

8.7 PRAN AMCL factory layout

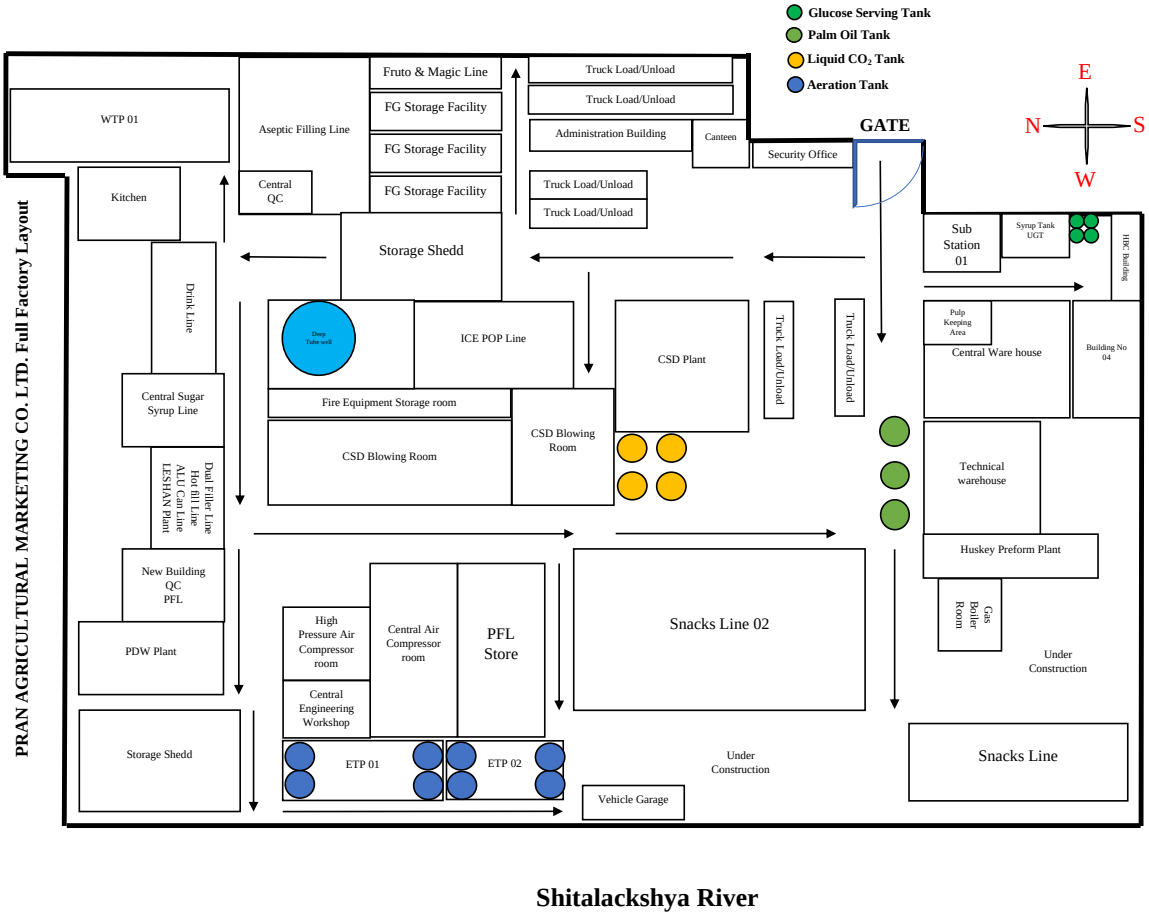


Figure 8.6: PRAN AMCL factory layout

Figure 8.7: PRAN AMCL Factory Map from Google Earth

CHAPTER 9

9.1 Conclusion

The Internship was conducted at PRAN-Agricultural Marketing Co. Ltd from 13th September,2022 to 27 September, 2022. This factory mainly manufactures different varieties of products under three main section AMCL, PFL, & PCL.

AMCL manufactures products are mainly Fruit drinks, drinking water, Carbonated soft liquid & liquefied chocolate. PRAN Foods Ltd. Mainly manufactures snack items (*such as Chanachur, Chips, Jhal muri, Badam Bhaja, Dal Bhaja, Chera Bhaja),* and Confectioneries *(Lollipop, Lozenges, Toffee).*

To prepare these food items they are used Carbonated water, Sugar, Citric acid, Sodium citrate, Sodium Benzoate, caffeine, vitamins, Permitted Food Color(E-110), Flavor. sugar, stabilizers, emulsifiers, water, food grade flavor, fruit pulp, skim milk powder, milk whey powder, glucose syrup, seasonings, spices & herbs etc.