









Participant Handbook Customized Courses under PMKVY (210 Hrs)

Sector Food Processing

Sub-Sector Multi-Sectorial

Occupation Packaging

Reference ID: FIC/Q7006, Version 1.0, NSQF level 2

Food Packer

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Shriram Bharatiya Kala Kendra, 1, Copernicus Marg, Mandi House, New Delhi-110001 Email: admin@ficsi.in

Website: www.ficsi.in

Phone: +91-97112 60230, +91-97112 60240

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Shri Narendra Modi Prime Minister of India







Certificate

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is hereby issued by the

FOOD INDUSTRY CAPACITY AND SKILL INITIATIVE

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of Job Role/ Qualification Pack: **Food Packer** QP No. **FIC/Q7006 NSQF level 2**

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About this book —

This book is designed to provide skill training and/ or upgrade the knowledge and basic skills to take up the job of 'Fish and Sea Food Processing Technician' and 'Fish and Sea Food Processor' in 'Food Processing' sector. All the activities carried out by a specialist are covered in this course. Upon successful completion of this course, the candidate will be eligible to work as a Fish and Sea Food Processing Technician.

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational Standards (NOS) is covered across Unit/s.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.

- FIC/N7024 Identify Packing Machines and Non-standard Production for Various Processed Food Products (FIC/Q7006)
- FIC/N9002 Use of Basic Health and Safety Practices in a Food Processing Facility (FIC/Q7006)
- DGT/VSQ/N0101 Employability Skills

-Symbols Used



Notos





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1. Introduction to training program and overview of food processing industry

Unit 1.1 - Introduction to food processing and overview Unit 1.2- Overview of packaging industry in India.

> FIC/N7024 (Part of - FIC/Q7006)

- Key Learning Outcomes

At the end of the module, the participants will be able to:

1. Introducing each other and rapport building with fellow participants and trainers

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- 2. State what is food processing.
- 3. State various sectors of food processing.
- 4. Overview of packaging industry in India.

Unit 1.1 Introduction to food processing and overview

Unit Objectives 🞯

At the end of this unit, the participants will be able to:

- 1. Introduce each other and build rapport with fellow participant and trainer
- 2. Know about purpose of training for this Job Role.
- 3. Know about training outcomes and skill card
- 4. Concept of food processing
- 5. Various sectors of food processing.

1.1.1 Skill Training Program

1.1.1.1 Training Purpose and Basis

This training programme is developed to impart specific knowledge and skills relevant to job role required to perform as a Packing machine worker – Food Processing. The training programme of Packing machine worker – Food Processing is based on Qualification Pack (QP) code FIC/Q7002. A QP consists of a set of National Occupational Standards (NOS). A NOS specify the standard competency a worker must gain while carrying out a function at the work place. The following NOS are compulsory to QP Packing machine worker-Food Processing:

Compulsory:

- 1. Work effectively with others (CSC/N1336)
- 2. Observe packing machines for various processed food products and identify non- standard output (FIC/7006)
- 3. Basic health and safety practices at food processing workplace (FIC/N9002)

Occupation Standards (OS) specifies the performance standards an individual must achieve while carrying out any function at work place; along with the knowledge and understanding they require achieving that standard consistently. These Occupational Standards are applicable both in the Indian as well as global contexts.

After successful completion of training and passing the assessment, you will be issued a certificate.



Fig.1.1.Skill card

1.1.1.2 About Skill card

Skill Card is is sued to Certified Trainers and Assessors, displaying the following:

- Name
- Unique ID
- Certification Grade
- Validity of the Certification

The skill card will have a quick response (QR) code and by scanning it, an employer will get all the information's about the skill development courses a person has taken out and type of certification she or he has been awarded. For a trained job seeker, it will lead to less hassle—he or she will not have to carry bundles of certificates. The card may be converted into a smart card, with an embedded chip over time.

1.1.1.3 Training Outcomes

After successful completion of this programme, participants will be able to:

- Perform various packing related activities
- Monitor the packaging production line
- Perform post packaging activities
- Understand and carry out safe working practice
- Understand the importance of working safely in an industry
- Understand the norms for working in a team

1.1.2 Concept of food processing

Food processing is the use of a set of techniques and methods to convert raw ingredients into valuable food or food into other forms to be used by humans or animals either in the home or by the food processing sector. Food processing takes clean, harvested crops or butchered animal products and utilizes these to produce attractive, for commercial use, and food products with more extended shelf life. The major segments in the Food Processing sector comprise of Fruits and Vegetables, Dairy, Edible Oils, Meat and Poultry, Non-alcoholic beverages, Grain-based products, Marine products, Sugar and sugar-based products, Alcoholic beverages, Pulses, Aerated beverages, Malted beverages, Spices, and Salt. Out of these segments, Dairy (16%), Grain-based Products (34%), Baker-based products (20%), and fish and meat products (14%) contribute to a major portion of industry revenues, apart from the manufacture of beverages. The major states in India where Food Processing is carried out are Andhra Pradesh (13.4% of India's Food Processing industry, and a centre for fruits, vegetables, and grains), Gujarat (12.7%, and a centre for edible oils and Dairy), Maharashtra (14%, and a centre for fruit, vegetables, grains, and beverages), and Uttar Pradesh (12%, across almost all product categories).

- Advantages of food processing include:
 - The prevention of foods from being damaged,
 - Commercial use of the food,
 - Safeguard from the harmful microbes and poisonous substances,
 - Availability of many food items during the off-season,
 - Ease of preparation for the consumer.

Food Packer



Scan this QR Code or click on below link to access video of Overview of the Food Industry

The Processed Food Industry is divided into the following broad segments:

- 1. Primary Processed Food which includes products such as fruits and vegetables, packed milk, unbranded edible oil, milled rice, flour, tea, coffee, pulses, spices, and salt, sold in packed or non-packed forms.
- 2. Value-added Processed Food which includes products such as processed fruits and vegetables, juices, jams, pickles, squashes, concentrate, processed dairy products (ghee, paneer, cheese, butter), processed poultry, processed marine products, confectionary, chocolates, alcoholic beverages.

1.1.3 Methods of food processing -

General food processing methods include:

- Removal of unwanted outer layers, such as potato peeling or the skinning of peaches
- Chopping or slicing, such as to produce diced carrots.
- Mincing and macerating.
- Liquefaction, such as to produce fruit juice.
- Fermentation as in beer breweries.
- Emulsification.
- Cooking, by methods such as baking, boiling, broiling, frying, steaming, or grilling.
- Mixing.
- Addition of gas such as air entrainment for bread or gasification of soft drinks
- Proofing.
- Drying.
- Pasteurization
- Freezing
- Packaging

1.1.4 Chain in food processing segment

Cooperatives
 Local Traders Examples: Conversion from grain to flours, sorting, grading and packaging
 Food Manufactures Value added products like conversion of products from flour, grains, fruits, cerals
 Packaging for containament and shelf life of food product Helps in storage and distribution
Rural and urban retails
 Whole shalers International retails

3

	Table 1.1	Various food sector and p	ackaging
Food Sectors	Raw materials	Processing techniques	Packaging of finished products
Milk and Milk products	Milk	Heating, drying, Pasteurization Homogenization	Flexible Pouch, PET, Cans, Tetra pack, Duplex Board Cartons, Laminated Plastic Pouches
Meat processing and preserving	Beef, lamb, pork, poultry	Slaughtering, cutting up, boning, comminuting, cooking	Loose or in cans, cardboard, Plast Trays with Peelable Lids, Plastic Pouches for Vacuum Packed, Laminated Plastic Pouches
Fish processing	All types of fish	Heading, gutting, filleting, cooking	Loose in refrigerated containers or in cans, Plastic Trays with Peelable Lids, Plastic Pouches
Fruit and vegetable preserving	Fresh fruit and vegetables	Blanching or cooking, grinding, vacuum- concentration of juices	Bags, cans or glass or plastic bottle Plastic Trays, board cartons, tetrapack, Laminated Pouch
Milling	Grains	Grinding, sifting, milling, rolling	Silos (conveyed pneumatically), sacks or bags to other processes, or boxed for retail trade, jute bag poly bag, laminated pouch, kraft paper with plastic
Baking	Flour and other dry raw material, water, fat etc	Kneading, fermentation, laminating surface treatments of seasoning	Plastic pouch, Box, Laminated pouch, Paper board
Biscuit making	Flour, butter, sugar, etc	Mixing, kneading, laminating moulding	Plastic pouch, Box, Laminated pouch, Paper board
Pasta manufacture	Flour, eggs	Kneading, grinding, cutting, extrusion or moulding	Plastic pouch, Box, Laminated pouch, Paper board
Sugar processing and refining	Sugar beet, sugar cane	Crushing, maceration, vacuum concentration, centrifuging, drying	plastic bag, glass bottle, laminated pouch
Chocolate making and confectionery	Cocoa bean sugar, fats	Roasting, grinding, mixing, conching, moulding	Laminated pouch, waxed and waterproof paper, cellulose film, aluminum foil & LDPE
Brewing	Barley, hops	Grain milling, malting, brewing, filter pressing, fermentation	Bottles, cans, barrels, tetra pack, Laminated pouch
Distilling and manufacture of other beverages	Fruit, grain, carbonated water	Distillation, blending, aeration	Barrels, bottles, cans, tetra pack, Laminated pouch

Various Sectors of Food Processing and packaging materials used

Unit 1.2 Overview of packaging Industry

Unit Objectives 🞯

At the end of this unit, the participants will be able to:

- Know overview of packaging industry in India
- Sub-sectors of packaging industry.

-1.2.1 Overview of packaging industry in India

The packaging is amongst the leading industries in India. It is developing at 22-25% per year. Expenses of processing and packaging food can be up to 40% less than parts of Europe which in combination with India's skillful workers, making India an attractive place for financing. In the export market presently, it is the fifth-largest sector of India's economy because the industry has recorded constant growth over the past several years & shows high potential for expansion. Almost all user divisions are growing appreciably like processed foods, fruit & marine products, hard & soft drinks, a great degree of potential exists for them.

Exports of packaging materials such as crown cork, lug caps, plastic film laminates, flattened cans, paper board & packaging machinery, printed sheets & components, craft paper is there from India. The imports of packaging material include coating & lining compounds, tinplate, and others. The fastest-growing packaging divisions are laminates & flexible packaging in India particularly Polyethylene Tetrapthalate & woven sacks. Packaging Industry has been a major area encouraging technology and innovation growth in the country over the last few years and has been adding value to the different manufacturing sectors which includes agriculture & fast-moving consumer goods sections.

While the global packaging business is growing & expanding day by day the Indian packaging business is growing rapidly. The Indian packaging industry has adding value to the various manufacturing sectors. The growth of the manufacturing industry, fast moving consumer goods, the healthcare sector, growing pharmaceutical and food processing sectors are driving the growth of the packaging industry. Now a days The Indian packaging industry is dominated by plastic flexible packaging due to the aesthetically attractive, cost-effective and sturdy. It is predicted that the rigid packaging growing at 15%, flexible packaging at 25% and the packaging industry in India expected to grow at 18% annually. Materials such as glass & rigid plastics account for 70% of the total packaging market in terms of India's beverage packaging. Material such as PET is most used to package water, estimating for around 55% of India's packaged water sector.

In recent years, because of the rise of packaged food consumption & awareness and demand for quality products India has seen sustainable packaging growth. The awareness of consumers regarding packaged food, particularly packaged food deliveries, has increased. New packaging regulations to replace the earlier 2011 provisions, was announced by the Food Safety and Standards Authority of India. According to the new regulations, for specific contaminates in plastic packaging materials, there is a migration limit of 60mg/kg or 10mg/dm². Now there is a ban on newspaper & recycled plastics used for food packaging. Revision of new labelling regulations has been done.

Predicted to reach a Compound Annual Growth Rate of 4.17% to \$142.2billion by 2023, it is estimated that the country will see continued demand for Polyethylene Tetrapthalate bottles, as well as a new demand for liquid packaging cartons, is predicted due to their more extended shelf life and ease in shipping.

According to the Report of Packaging Industry Association of India, "The Indian packaging industry is one of the fastest growing sectors spanning across almost every industry segment. The scope of food packaging is very broad. It encompasses technical activities such as machinery design, graphic design, package development, package manufacture, shelf life testing, distribution and marketing. It deals with various types and forms of food packages including metal can, glass containers, paper cartons, plastic containers and pouches. It involves the participation of packaging technologists, scientists and engineers, packaging material suppliers, packaging converters, packaging machinery manufacturers, food processors, food retailers and regulatory agencies.



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Scan this QR Code or click on below link to access Orientation Video of Packing Machine Worker



Scan this QR Code or click on below link to access video of Overview of The Food Packaging Industry









2. Organizational standards and norms

- Unit 2.1- Roles and responsibilities of a packing machine worker along with work ethics
- Unit 2.2- Personal hygiene and sanitation guidelines to be followed in food packaging
- Unit 2.3- Food safety hygiene standards to follow in a work environment
- Unit 2.4- Standard Operating Procedures of food processing industry

FIC/N7024 (Part of - FIC/Q7006)

- Key Learning Outcomes

At the end of the module, the participants will be able to:

- 1. Explain the roles and responsibility of packing machine worker
- 2. State how to conduct yourself at workplace
- 3. Apply personal hygiene sanitation guidelines
- 4. State food safety hygiene standards to follow in a work environment

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Unit 2.1 Roles and responsibilities of packing machine worker along with work ethics.

Unit Objectives 🞯

At the end of this unit, the participants will be able to:

- 1. State roles and responsibilities of packing machine worker.
- 2. Understand the importance of disciplined behavior for the success in workplace
- 3. Explain the generic skills needed for one to become successful packing machine worker
- 4. Explain the criteria's of a good listener;
- Explain the importance of effective communication to become a successful packing machine worker.
- 6. State the importance of interpersonal skills to maintain good relationships at the workplace
- 7. State the importance of working as a team in the workplace;
- 8. Explain the benefits of teamwork.
- 9. Understand common reasons for interpersonal conflicts in a workplace and how to tackle with them
- 10. How to escalate employee grievance to the management
- 11. Explain the procedure of handling grievance in an organization

2.1.1 Roles and responsibilities of packing machine worker -

Packing machine workers usually work at manufacturing companies. They ensure that the quality and quantity of packaged goods conform to the company's standards.

The primary responsibilities of packing machine worker are as follows:

Table 2.1 Roles & responsibilities of packing machine worker

Activity	Roles & Responsibilities			
Hygiene, Health and safety practices	 To understand the personal hygiene and sanitation guidelines Follow the food safety hygiene standards in a work environment. Maintain a clean work area by ensuring that floors are clean. Use protective clothing/equipment for specific tasks and work conditions. To know the various appropriate fire extinguishers on different types of fires correctly. To know how to free a person from electrocution. 			
Technical knowledge for packing machines for various processed food products	 Obtain packing specifications from supervisor. Ensure the packing machine is in operating condition. Perform packaging operations as per the customer orders. Identify food product to be packed and its specification in terms of quantity and quality. Ensure inflow of food product to be packed is suitable as per specifications 			

Activity	Roles & Responsibilities		
	 Identify packing material for particular product, their quantities To check quality criteria before packing. To check environmental requirements for packing of the particular food as per operational guidelines. Proper loading, positioning, or feeding the packing materials in the packing machine as per manufactures guidelines and packing specifications. Adjustment of operating parameters to correct the faults identified in the samples as per acceptable standards Report the discrepancies identified to the supervisor or maintenance staff as per operational guidelines. Perform integrity testing on the packed items as per operational guidelines. Segregate and labelled the non-standard materials and packages which do not meet the specification. Handing over standard and non-standard packed products as per operational guidelines, with minimum damage. Maintaining the supply of packing materials throughout the run. Identify discrepancies, non-standard out-put, problems and immediately report to the supervisor to ensure immediate resolution of the problem. Shut down the packing production line in case of emergencies. Storing re-usable materials and equipment in designated area To know regulations with respect to the food item being packed Cleaning of machine after use as per operational guidelines and manufacture's guidelines 		
Documentation and others	 Complete daily production reports and complete quality details, maintenance report and submit to Supervisors. Complete packaging orders within the deadlines. Stack packaged items in storage areas or on delivery pallets using pallet jacks or forklifts. Assist colleagues in their job duties when needed. Attend training programs sponsored by company for professional development. 		

2.1.2 Workplace Ethics -

It is described as a set of moral guidelines and obligations that guide a person's actions in his/her respective field of work. These standards can vary from industry to industry, and from position to position within an industry.

Some important points to be remembered are:

- Address seniors, assistants, and workers with respect
- > Follow the processes laid out in the manufacturing unit
- Follow food safety norms at all times
- > Do not compromise with the quality of the product at any given cost
- Perform your work with complete honesty
- > Perform your roles and responsibility with integrity
- Be a team player

2.1.2.1 Disciplined behavior

Disciplined behavior is important to improve workplace performance and to provide a safe and honest working environment.



2.1.2.3 Communication

Communication is the process of exchanging information by speaking, writing, or using some other medium. Effective communication is a basic prerequisite for the achievement of organizational goals.



Fig 2.2 Effective commuication

Communication flow in an organization

Within an organization, communication flows in five major directions-



Fig 2.3 Communication flow

- 1. Downward: Communication from management to subordinates is downward communication
- 2. Upward: Communication that flows to a higher level in an organization
- 3. Lateral: Communication between the same levels of hierarchy in an organization is called lateral communication
- 4. **Diagonal:** Communication between a supervisor-supervisors or worker worker of other workgroups is called diagonal communication
- 5. **External:** Communication between a management and external groups such as suppliers, vendors, banks, financial institutes etc.



Communication in the workplace

- ✓ Encourage two way communications in the workplace. Speak up if you are not clear the information received.
- Provide information to others clearly which help them understand
- Provide specific and descriptive feedback
- ✓ Be a good listener



2.1.2.4 Inter personal skills

Interpersonal skills are the ability to develop fruitful relationships with others. Knowing how to develop healthy working relationships with people at the workplace contributes significantly to your success as a production worker.

How to Develop Good Interpersonal Skills

Effective communication plays a key role in developing good interpersonal skills.

- 1. Non verbal communication which result in achieving positive interpersonal skills are:
 - Smile and eye contact
 - Correct postures and gestures

2. Good listening skills.

- It conveys that "you care"
- It enables you to understand other people's viewpoints and empathize with their situation.
- 3. Verbal communication which result in achieving positive interpersonal skills are:
 - Use of voice and intensity.

2.1.2.5 Work as a team

2.1.2.5.1 Team work

Team work promotes strong working relationships which eventually contribute higher productivity. When employees work together and succeed as a team, they are more likely to;

- ✓ Communicate well with others
- ✓ Support and get motivated
- ✓ Work cooperatively for the success of the organization





2.1.2.5.2 Conflict Resolution skills

Interpersonal conflicts: The conflict comprises a series of human affective states including anxiety, hostility, resistance, aggression, and competition. The common reasons for interpersonal conflicts in a workplace are;

- ✓ Lack of effective communication
- Individual differences on values and beliefs
- ✓ Lack of trust
- ✓ Incivility
- ✓ Stress

The conflict resolution process



Fig 2.9 Conflict resolution process

2.1.2.6 Grievance management in workplace

Grievance is a concern, problem, or complaint that an employee has regarding the work/workplace, or someone they work with which made him/her feel dissatisfied.

Types of grievances in the workplace include;

- ✓ Pay and benefits.
- ✓ Bullying/harassment.
- ✓ Work place risks and safety concerns.
- ✓ Workload.

Grievance procedure

- 1. The organization shall have a written grievance procedure, by which employee can escalate his/her issues
- 2. Investigating grievance:- the organization carryout investigation.
- 3. Grievance meeting: the organization holds a meeting so that the employee gets opportunity to explain the complaint.
- 4. Considering the evidences the organization decides whether to reject or hold the grievance.
- 5. The employee can go for appeal if he feels unfair to the decisions made by organization

Practical : Self quiz on work ethics

Aim: to get an understanding on how ethical person you are.

Materials required

✓ Stationary items, quiz format.

Name of participant:		Roll no:				
Dependability	1. Are you reliable?					
	Never	Seldom	Sometimes	Usually	Always	
	2. Do you follo	2. Do you follow rules?				
	Never	Seldom	Sometimes	Usually	Always	
Responsibility	1. Do you hone	or your word?				
	Never	Seldom	Sometimes	Usually	Always	
	2. While worki	ng, do you ever	do other things?			
	Never	Seldom	Sometimes	Usually	Always	
	3. Do you help your co-worker at work?					
	Never	Seldom	Sometimes	Usually	Always	
Honesty	1. Are you true to the words you make?					
	Never	Seldom	Sometimes	Usually	Always	
Level of rigor	1. Are you a hard worker?					
	Never	Seldom	Sometimes	Usually	Always	
Level of	1. Do you perform work that is not required of you?					
initiatives	Never	Seldom	Sometimes	Usually	Always	
	2. Do you work for extra time when the organization needs you					
	(e.g. testive se	asonj				
	Never	Seldom	Sometimes	Usually	Always	

Methodology

1. Fill the quiz format given by the trainer as honestly as possible.

Unit 2.2 Personal hygiene & sanitation guidelines to be followed in food packaging

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Describe different good hygienic practices to be followed in food processing industry
- Sanitation guidelines & Personal hygiene
- Importance of cleanliness while going for work

- 2.2.1 Personal hygiene & sanitation guidelines

Personal hygiene and sanitation guidelines include:

A. Health condition

Personnel suffering from any disease should not be permitted to enter into any food handling region. Personnel suffering from a disease should inform about the illness to the management quickly and a food handle should be medically examined as soon as possible.

Once a year, a medical examination of each and every personnel should be conducted and a record of the report signed by a certified medical practitioner should be maintained. All workers are to be vaccinated in case of an epidemic irrespective of the scheduled vaccination. Medical test to be conducted are as follows: –

- 1. Skin test
- 2. Eye Examination
- 3. Physical test

4. Agreement with a schedule of vaccine to be inoculated against an enteric group of illnesses

5. Any inspection which will be required for the confirmation of any contagious disease, that whether the person suspected is suffering or not.



Fig 2.10 Inspection of Health



Fig 2.11 Personal Cleanliness

The most important link in preventing foodborne disease is the personal cleanliness of food handlers. Personal hygiene practices should become a habit of food handlers.

- 1. Every food handler should carry proper clean protecting attire, face mask, gloves, footwear, and head covering.
- 2. Every food handler should always clean their hands using soap and clean unpolluted water, sanitize their hands and then dry with a neat cloth towel or hand drier or disposable paper.
- 3. Every food handler should completely avoid, spitting, smoking, sneezing, chewing coughing over any food.
- 4. After handling the raw food or any contaminated stuff, accessories, equipment or work surface, or after using the toilet, every food handler should wash their hands

- 5. Eating in the food preparation area should be completely avoided.
- 6. There should be complete avoidance of some habits such as running a finger through hair, scratching nose, rubbing, ears, eyes, and mouth, scratching parts of bodies, scratching beard, etc. In case of unavoidable conditions hands should be adequately washed before returning to do work after such activities.
- 7. Trimming of nails and hair should be done regularly by every food handler.
- 8. To avoid cross-contamination, food handlers should not handle dirty currency notes/cards.
- 9. Inside the food preparation area, street footwear should not be worn.



Unit 2.3 Food safety hygiene standards to follow in a work environment

Unit Objectives 🞯

At the end of this unit, the participants will be able to:

- In a work environment what food safety hygiene standards to be followed.
- Explain Schedule 4 of FSSAI
- What is the importance of schedule 4
- Introduction of single statute which are food related.
- List various general hygiene and sanitation practices by Food Business Operator
- Need of Food Safety for Food Business Operator

2.3.1 Food safety hygiene to be followed in a work environment

Based on implementation of Good Manufacturing Practices & Good Hygiene Practices by food businesses, Introduction of the concept of Food Safety Management System.

Schedule 4: General Hygienic & Sanitary practices to be followed by Food Business operators

Under Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011the Food Safety and Standards Authority of India (FSSAI), has made Schedule 4. Under these regulations, it is mandatory that every Food Business Operator has to follow hygienic and sanitary practices in premises where food is being manufactured. Schedule 4 is a set of mandatory provisions for assuring the safety of the food manufactured on any premises. To improve the sanitary and hygienic conditions at the premises to attain India HACCP standards FBOs shall continuously try.

The Schedule 4 is divided into five parts, naming Part I to Part V. The title of parts is as follows:

- Part 1 General Hygienic & Sanitary Practices to be followed by FBOs applying for Registration.
- Part 2 General Requirements on Hygienic and Sanitary Practices to be followed by all Food Business Operators applying for License
- Part 3 Hygienic & Sanitary Practices to be followed by FBOs involved in production, processing, warehousing & trading of Milk & Milk Products.
- Part 4 Hygienic & Sanitary Practices to be followed by FBOs engaged in production, processing, warehousing & trading of Meat & Meat Products.
- Part 5 Hygienic and Sanitary Practices to be followed by FBOs involved in catering/foodservice businesses.

The general sanitary and hygienic requirements are part of GMP and GHP. Below indicated generic guidelines are provided for food manufacturer/ processor/handler which will give fair idea about the practices to be followed.

The place where food is manufactured or handled, or processed shall comply with the following requirements:

- Location of the Premises
 - a. Free from filthy surroundings
 - b. Away from environmentally polluted areas.
 - c. Maintain an overall hygienic environment
 - d. In a sanitary place
- Food Transportation-:
 - 1. Maintain the required temperature
 - 2. In containers or packaged form
- Building Requirements-:
 - > The floor and skirted walls shall be washed as per the requirement with an effective disinfectant
 - No spraying shall be done while the conduct of business, but instead, fly flaps should be used to kill spray flies getting into the premises
 - Premises shall be kept free from all insects
- Potable water shall be used in the manufacturing and if required, chemical and bacteriological test of the water shall be done at regular intervals at any approved laboratory
- Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect-free
- The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain an overall hygienic environment.
- Floors, Ceilings, and walls must be maintained in good condition. They should be easy to clean and smooth with no flaking paint or plaster.
- Floors, Ceilings, and walls must be maintained in good condition. They should be easy to clean and smooth with no flaking paint or plaster.
- The premises shall be-:
 - cleaned,
 - > adequately lighted,
 - ventilated and sufficient free space for movement.
- Machinery and Equipment shall be of such design which will be eas cleaning. Arrangements for cleaning shall be provided.
- A constant supply of potable water shall be assured in the premises. In the case of irregular water supply, water used in food or washing should be made by sufficient storage arrangements.

- Do not use any container, vessel, tools or machine, the application of which may cause metallic contamination which is injurious to health. Brass or Copper vessels should have a proper lining that is used in the packing or storage of food.
- Pesticides or disinfectants should be kept away from food manufacturing / storing / handling areas and should be stored separately.
- All types of equipment should be maintained clean. They should be washed dried and stacked at the close of business to ensure independence from the growth of mould or fungi & infestation.
- To enable proper inspection, all kinds of equipment should be provided away from the walls.
- For the disposal of refuse, there should be an adequate drainage system along with sufficient provisions.
- Clean hand gloves, aprons and hair net should be used by the workers working in processing and preparation.
- Cleaned & trimmed fingernails should be maintained by all food handlers and should keep and wash their hands with soap, or detergent & water before starting work every time after using the toilet. Avoidance of scratching of hair, body parts should be there during food handling processes.
- Do not permit any persons to work who are suffering from infectious diseases. The person should not be allowed to come in direct contact with food in case of any cuts or wounds and it should always be remained covered.
- There should be the avoidance of wearing false nails or loose jewellery that might fall into food by every food handler.
- There should be proper cover to avoid contamination for all articles that are stored or are intended for sale and should be fit for consumption.
- While handling food chewing, smoking, eating, spitting & nose-blowing shall be forbidden within the premises.
- The vehicles used to carry foods must be kept in good conditions and must be clean.

Unit 2.4 Standard Operating Procedures of food processing industry

Unit Objectives 6

At the end of this unit, the participants will be able to:

- State Standard Operating Procedures
- Implications of Food Recall
- Explain benefits of Standard Operating Procedures

-2.4.1 Standard Operating Procedures

Hazard Analysis & Critical Control Points (HACCP) and Food Safety plan are core to Food Manufacturer's. These facilities require some pre-requisite program. These Standard Operating Procedures run on the basis of pre-requisite program.

An SOP refers to set of instructions written, documenting a food producers routine activity. SOP is generally applicable in the process of production, manufacturing along with job activities as well as support area process. They are specific to the food manufacturing plants, in relation to every kind of sanitary related process or jobs, the word SSOP stands for sanitation SOP.



The use of SOPs/SSOP is very much essential for holding a strong food quality, hygiene and safety system (see Figure 6.2.1), thus these documents help an individual to perform their jobs accordingly thereby providing the basic required knowledge. Thus SOPs and SSOPs help in enhancing the quality of a process via its constant applicability over a task or job. Also, if the SOPs are documented or written clearly they help in reduction of various kinds of miscommunication and variation in between any individual or the organizations.

Thus the word or term SOP indicates any kind of protocol, work instructionor job instruction.

-2.4.2 Implications of a Food Recall -

The significance of food plant SOPs/SSOPs, their usage and development cannot be overestimate. For example, according to the U.S. Food and Drug Administration's Reportable Food Registry annual report (fiscal year, September 2011–August 2012), undeclared allergens led to 37.9 percent of all food recalls . The reason behind these recalls when investigated was found to be either an SOP/SSOP which was not sufficient or the one which did not exist or due to non-compliance to appropriate measures which ranged from one or more than one , this included:

- Good Manufacturing Practices
- Raw material testing
- Label review
- Sanitation
- Residual chemical testing
- Housekeeping
- Rework
- Product process design
- Hold and release
- Recall procedures
- Training
- Storage
- Product sequencing
- Supplier approval
- Traceability

Further to createany harm and developing adverse publicity, recalls are costly :\$10 million per recall is the average cost estimated for with any kind of allergen related failure of SOP.
2.4.3 Benefits of SOPs

Besides help encouraging food safety and prevent food recalls, SOPs can do the following:

- Serve as the basis for implementing an effective program to include employee training as well as a tool for on-the-floor instruction and expansion.
- Identify control points, as well as their limits, to control and validate the process. Corrective actions and preventive actions can be identified to facilitate each process.
- Establish time, labor and material requirements for a job or task.
- Be used as checklists by internal audit team members during auditing the plant's programs and procedures.

Finally, the benefits of a valid SOP are reduced work effort, along with improved comparability, credibility and legal defensibility.

2.4.4 Developing and Maintaining SOPs/SSOPs

SOPs and SSOPs should adhere to the following food industry best practices.

2.2.4.1 Key Sections

The SOP/SSOP should be structured in such a way so that it delivers all appropriate information's. Any employee having knowledge in that area or about the equipment's and tools will understand it and accomplish the various roles both with safety and effectiveness with the help of these documents.

Title Page

Firstly identify the procedures name, date of issue or revision, identification number and applicable plant name and the section or department to which the SOP is applicable. This section also contains the respective signatures and dates of all the persons involved in preparation and sanctioning of the SOP. For SOPs retained on a programmed database electronic signatures are also acceptable.

• Table of Contents

It helps in instant reference and siting of precise indoor any kind of updates. It is principally significant for too long or comprehensive SOPs/SSOPs.

Introduction/Purpose

This portion will demonstrate significance of the SOP/SSOP thereby permitting the reader to get better understanding of "how" and "why" of the document being referred. It generally consists of background information and a brief synopsis.

• Responsibilities

This section will enlist all the responsibilities for the stakeholders, with respect to their position along with explanation.

Definitions

It will demonstrate a catalogue of phrases, words or any acronym along with their appropriate meanings. As the reader can already have some information's about the equipment or the task, hence only unfamiliar and uncommon words should be explained. For example, in a test procedure, Listeria might not be explained, but in case of environmental monitoring procedure, Listeria might involve description.

Materials

This section shows catalogue of all resources, equipments, specifications and subsidiary documents necessary to carry out the task

Safety

This section comprises catalogue of personal injury of any kind or loss-of-life warning, e.g. restricted space. This segment explains what can occur if the process is followed incorrectly or not followed.

• Procedure(s)

In the following section , every task, action or step to be undertaken in order will be enlisted. One SOP/SSOP document may comprise various ways for different processes or sub processes.

• Training

It enlist the instruction necessities for the SOP/SSOP and the training frequency (i.e., one-time or annually).

Documentation

Here Identification of the forms which are to be used and reports to be written is shown, the data and record storage location and duration are also present here.

• Compliance Verification and Validation

This section will define any control step and necessities for analysis or oversight. This stage includes a regular evaluation of the SOP/SSOP and matching actions like 'if we are doing what we are saying or not'. Validation, on the other hand will include a periodic reviewing of the records and their documentation. (Are the aims of the SOP being achieved?) All modifications should be informed and trended, and a remedial plan/preventive action plan should be established to address each opportunity.

• References

The present section gives info about list of all mentioned regulatory, facility or company quotation.

• Document Revision History

This segment give record of all the analysis, revisions and updates undertaken in the SOP/SSOP.

2.4.4.2 Content

SOPs and SSOPs should be clearly worded so as to be gladly understandable by a person knowledgeable about the general concept of the procedure. One can use diagrams, flow charts, pictures and computer screen shots to help break up long sections of text and to review a series of steps for the reader. These visual aids mainly help in delivering training of the SOP/SSOP.

One should be careful to include all necessary information without becoming too comprehensive

2.4.4.3 Development Process

While establishing an SOP/SSOP, a subject matter expert (SME) must set up a draft of the written process/method. This draft is then studied and evaluated by other plant specialist. The aim of review is to seek remarks, ideas and suggestions clarification and improvement.

When the SOP/SSOP has been prepared, the verification of the subject matter must be done. This is majorly adapted by making the SME "go" through the process, on the floor, taking into thought every single crucial parameter (e.g., equipment speed, time, location of the sample, etc.). The SOP/SSOP is updated with every single essential variation. Diagrams, pictures, flow charts and computer screen shots ought to be introduced at this time.

When final draft is made for the SOP/SSOP, equipment or any process expert, like coaching supervisor, must execute the process as composed or indicated. If possible, to correct recognize all voids, more than one review can be conducted. The professionals will then deliver the final amendments and modifications required in order to finish the SOP/SSOP.

When confirmed, the SOP/SSOP must then adopt the suitable and most suitable approval process, as recognized in the organization's policy, and must be written.

2.4.4.4 Revisions and Reviews

An SOP/SSOP can be regarded as a living document as it is changeable. Updates are essential for improving any procedure or task. Changes should be made often with active improvement. Tracking must be continuously done which can then be communicated efficiently.



Fig 2.14 Revisions and Reviews

The Continuous improvementcycle gives a perfect description by Deming circle variation referred as (PDCA) cycle

- Plan
- Do
- Check
- Act

The Deming circle is a four-step approach for controlling and maintaining developmental continuity of a process (Figure 2).

The stages of PDCA with respect to each consecutive Deming circle consist of four phases stated below:

• Plan (Develop Procedures)

Establish the SOPs and SSOPs, development of processes and goals which are essential to contribute towards preferred outcomes. Thereby giving rise to establishment of objectives, main concern and standards to accomplish. Forming these assumptions helps in bringing integrity and accuracy of the SOP/SSOP a part targeted for enhancement.

• Do (Perform Procedures)

Execute the SOPs/SSOPs, performing the plan, conducting the procedure and forming the final product. Data gathering for trending, charting and analysis.

• Check (Verify & Validate Procedures)

Examination of the actual result, thereby certifying and validating the SOPs/SSOPs, as depicted in "Do" phase. Comparing the results with the objectives of "Plan" phase. Reviewing any kind of deviation which might have occurred between the development and the implementation of the SOP/SSOP. The chart making process can help in creation of simpler ways to understand the trends over numerous Deming cycles.

Act (Revise & Improve Procedures)

A corrective action or preventive action (CAPA) plan is established as soon as any root cause has been identified for any difference among the actual and planned set of result. The application of these changes needs to be determined based on their implementation to the process or product. If, there is no improvement in the process even after one or two passes over the Deeming circle, the CAPA plan is refined and more details are added for next repetition of cycles. Otherwise, more concentration might be needed in various process stages.

Category 1	This is a new/revised document. All required personnel must read this version and complete the prescribed training.	
Category 2 This is a revised document in which only the area applicability has changed. All newly impacted person required to follow content must read version and compare the prescribed training.		
Category 3	3 This is a new/revised document. All personnel required to follow content must read this version.	
Category 4	This is a revised document in which only the area of applicability has changed. All newly impacted personnel required to follow content must read version.	
Category 5	No significant changes made to document content-no requirement to read or train.	

Fig 2.16 Revise & Improve Procedures

SOP/SSOP should be revised and updated in order to make all the stakeholders aware of the change that has been carried out , along with the degree of employee training essential at the organization (Table 1).

2.4.4.5 Document Control

It is the procedure of starting, bring up-to-date, altering and "expiring" documents of the company. Manual or electric system should be used to preserve these documents and official papers.

At a set time duration (i.e., instantly after production, daily, weekly, etc.), collection of all documents and records should be done. After compilation they should be stored in area where they can be accessed easily ,whenever reference is needed. The records archived will be relocated for long term storage (minimum of 2 years or shelf life plus 1 year) as soon as the period of short term storage gets over. The period may vary according to local, federal or state regulations.

The authorization of expired records and documents must be monitored on a programmed basis, in accordance with a standard policy.

2.4.4.6 Access

Employees should have easy access of each SOP and SSOP .Hence, the recently updated version of SOP and SSOP must be presented. Printed manual or electronic copy i.e. soft copy of the document should be made accessible. In case of printed manuals, utmost care should be taken to implement the actions and mention all current updates.

Physical copy must be available for any new employee or personnel working in new area, this will help them for quick reference of any newly assigned work or for training events.

Thus SOPs and SSOPs needs to be essential, preliminary and major part of all facilities involved in food safety program at food manufacturing plants.

Exercise

A) Answer the objective questions

- 1) Which one is considered as workplace ethics
 - a) Honesty
 - b) Positive attitude
 - c) Determined
 - d) All of these
- 2) A worker with good emotional intelligence would like to be observed engaging in the following behavior:
 - a) Deal effectively with an angry customer.
 - b) Recognizing when a coworker needs help but is too embarrassed to ask
 - c) Recognize that the boss is facing considerable pressure.
 - d) All of the above are behaviors of highly emotional intelligence people.
- 3) Schedule 4 is given by
 - a) FSSAI
 - b) CODEX
 - c) WHO
 - d) FDA
- 4) Food handler should _____ in workplace area.
 - a) Eat Food
 - b) Taste Food
 - c) Eat Pan Masala
 - d) None of these
- 5) Among these which are examples of Personal protective Equipments
 - a) Gloves
 - b) Safety Goggles
 - c) Aprons
 - d) All of these

B) Fill in the blanks:

Attitude, Ethics, success, appearance, organizational skills

- 1. Discipline is the key of _____in any business.
- 2. ____are those rules of conduct by which people regulate their conduct while dealing with other people in their everyday life.
- 3. It is important to have a good_____ to be successful in your career.
- 4. If you can keep things at work in order and have a neat workplace, then you have great----.
- 5. Having good personal hygiene including brushing teeth, wearing deodorant and to dress up appropriately is important for_____.

Food Packer

Personal Protective Equipments	Display
Protective Gloves	
Head Cap	
Aprons	
Safety Goggles	12
Safety Boots	
Mouth Mask	
Sanitizer	

D) How to conduct yourself at workplace

E) Describe the roles and responsibility of packing machine worker.

Food Packer

– Notes 📋 –

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3. Packing machines for various processed food products and identify nonstandard output

- Unit 3.1- Definition of packaging and food packaging system along with packing specification and materials
- Unit 3.2- Quality criteria required for packaging to before packing
- Unit 3.3- Food packaging line along with characteristics and classifications of packaging machines
- Unit 3.4- Types Of packing machines and their operating parameters
- Unit 3.5- Identification equipment faults and Operating parameters required to correct the faults identified
- Unit 3.6- Environmental requirements for packing of the particular food and waste management
- Unit 3.7- Integrity testing on the packaging items and identification of discrepancies and non-standard output
- Unit 3.8- Cleaning and documentation of packaging machine after use
- Unit 3.9- Food Safety and Standards Act, 2011 Packaging and Labeling
- Unit 3.10- Regulation with respect to the food item being packed

Unit 3.11- Hazards Analysis critical Control Points (HACCP) and ISO 22000

FIC/N7024 (Part of - FIC/Q7006)



- Key Learning Outcomes

At the end of the module, the participants will be able to:

- 1. Understand the concept of packaging
- 2. Understand the different food packaging system
- 3. Understand the specification of packaging material
- 4. Understand the requirement of material for different types of product

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- 5. Understand the different quality test and their significance for different types of packaging material
- 6. Understand the sequence of food packaging line
- 7. Understand the factors to select the packaging machinery
- 8. State the different types of packaging machine in general
- 9. Understand the working of different types of packaging machine
- 10. State the identification of equipment fault
- 11. Understand the Operating parameters required to correct the faults
- 12. Understand the suitable environments requirements for packing of the particular food
- 13. Understand the waste management in packaging industry

Unit 3.1 Definition of packaging and food packaging system along with packing specification and materials

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- 1. Understand the concept of packaging
- 2. Understand the different food packaging system
- 3. Understand the specification of packaging material
- 4. Understand the requirement of material for different types of product

3.1.1 Packaging

Packaging may be defined as the enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container form to perform one or more of the following functions: containment, protection, preservation, communication, utility and performance. If the device or container performs one or more of these functions, it is considered a package.

Other definitions of packaging include a co-ordinated system of preparing goods for transport, distribution, storage, retailing and end-use, a means of ensuring safe delivery to the ultimate consumer in sound condition at optimum cost.

3.1.1.1 Types of food packaging system

Food packaging is a system that involves certain physical components and operations. The major physical components are the food, the package and the environment. The major operations are the manufacture, the distributor, and the disposal of food package. In designing a food packaging system, these physical components and operation must be integrated efficiently to prevent over packaging and under packaging. A food packaging system involve up to four levels of packaging: primary packaging, secondary packaging, distribution or tertiary packaging, and unit load/quaternary package.

• Primary packaging

The first-level of package that directly contacts with the contained product is referred to as the "primary package.". It provides the initial, and usually the major protective barrier. The material used for primary packaging should be food grade. For example, a bottle of milk, wrap of chocolate, a pouch of chips, a beverage can or a jar, a paper envelope for a tea bag, an inner bag in a cereal box, and an individual wrap in a pouch are primary packages, and their main function is to contain and preserve the product.

Secondary packaging

The secondary package contains a number of primary packages and does not come in direct contact with food products. It protects the packages from damage during distribution and storage. It is the physical distribution carrier and is sometimes designed so that it can be used in retail outlets for the display of primary packages. A shrink wrap and a plastic ring connector that bundles two or more cans together to enhance ease of handling are examples of secondary packages.

• Tertiary package

The tertiary package contains a number of secondary packages. It is also referred to as the "distribution package." An example is a stretched wrapped of corrugated box. Its main function is to protect the product during distribution and to provide for efficient handling. It is used for bulk handling.

• Unit load/quaternary package

A unit load or quaternary package is used to facilitate the handling of a number of tertiary packages. An example is a large metal container holding several tertiary package to be placed inside a truck, train or ship. Its major role is to facilate long distance distributio

3.1.2 Packaging specification

The packaging specification defines all the necessary packing levels for a product in order, for example, to put away or transport the product. For a product, a packaging specification mainly describes in which quantities you can pack the product into which packaging materials in which sequence.

Packaging specification is a set of instructions for the employee in the warehouse. More specifically, the work steps that you enter in a packaging specification are intended as information for the employee. For example, give the employee exact instructions as to where to place the label on a box, or how a product should be stacked onto a pallet.

The objective of the packaging guideline is to protect all the goods from the various loads (e.g. pressure, shock, fall, vibration or temperature influences) in the course of the logistics chain so that the goods can be provided for use at the target location in sound condition.

Why are requirement of packaging specification?

- Product quality must be maintained.
- Customers must be able to easily access and use the product without harming themselves or contaminating the product.
- The component manufactures must be capable of making the components to the required specifications.
- The packaging equipment must be capable of handling the components & maintaining product quality & production efficiency.
- All aspects of a pack development that may give rise to quality problems must be identified & minimized by good design.
- One suitably experienced person should be assigned the responsibility of designing a pack .
- This packaging design coordinator must be fully aware of the involvement required by marketing, quality assurance & production.





Different types of packaging material with example of their use are illustrated below:

 $Some \, important \, considerations \, that \, will \, help \, you \, determine \, your \, packaging \, requirements$

Table 3.1 Consideration for packaging requirement

Parameter	Considerations
Weight	 Consider the strength and durability of the packaging box An appropriate box should be able to securely hold the weight of the content being shipped
Size and Shape	 Items should not touch the outer wall of the box Odd-shaped or rounded packaging may need extra attention
Form of Contents	 Special packaging materials and packing techniques are required for shipping liquids and powders
Value of Contents	Extra cushioning and protection may be required for high value goods
Fragility	 Extra cushioning and protection are required for fragile items Apply special handling label
Final Use	Does the box need to be retail ready?Do you want to avoid any markings on the box?
Regulations	Some regulated items may require specialist packaging

Packaging materials and their application in processed foods.

Table 3.2 Packaging material and their application

Parameter	Considerations	
Plastics	Plastic films (packed fruits and vegetables, cereals),bottles (milk, milk- based drinks, soups, fruit juices, and fruit drinks beverages, yogurt, rice, baked and confectionary product, grains	
Paper/cardboard/paper board	Bakery and confectionary, fruits and vegetables, ice cream, butter, for wrapping of food product.	
Metals	Tin foods and beverages (tomatoes, sweetcorn, sausages, milk, milo) etc.	
Glass	Fruit juices, jams, some pickles and chutneys, some sauces, Wines, vinegars, milk, some pickles and sauces.	



3.1.4 Specific requirements for food packaging

1. Paper and board materials intended to come in contact with food products-

- a) Paper and board material shall be of uniform formation, thickness and substance.
- b) It shall be free from visible specks, grease marks, cuts, pinholes and other blemishes.
- c) The paper used for the manufacture of boxes, cartons, plates, cups and paper lids or paper which are meant to be direct in contact with food shall be of food grade and shall be free from contaminant
- d) Paper and board materials used for the manufacturing of containers for packing or storing the food products shall conform to either of the Indian Standards specifications as provided in table 3.3.

Table 3.3.Paper and board materials intended to come in contact with food products

SI.No.	Material	Standard Specification
1	Grease proof paper	IS 6622
2	Vegetable parchment or Grease proof paper or Aluminium Foil Laminate –	IS 7161
3	Aluminium Foil Laminates for Packaging –	IS 8970
4	General purpose packing or wrapping Paper –	IS 6615
5	Folding Box Board, uncoated	IS 1776
6	Corrugated Fibre Board Boxes- Specification (Part 1)	IS 2771
7	The wax used for coating the paper or board shall be paraffin wax confirming to	Type I of IS 4654.

2. Glass containers intended to come in contact with food products-

- a) As far as possible, they shall be free from blisters, mould marks, stones and chippings and as far as possible shall be free from cords, seeds and other visible defects.
- b) They shall have a smooth surface without cracks, pinholes and sharp edges.
- c) The sealing surface shall be free from hairline cracks and prominent seam marks.

3. Metal and Metal Alloys intended to come in contact with food products-

a) A utensil or container made of the following materials or metals, when used in the preparation, packaging and storing of food shall be deemed to render it unfit for human consumption:-

(i) Containers which are rusty;

(ii) Enamelled containers which have become chipped and rusty;

(iii) Copper or brass containers which are not properly tinned.

- b) Appropriate grades of metal and metal alloys where applicable shall be used for packing or storing of food products.
- c) Metal and metal alloys used for the manufacturing of containers for packing or storing the food products shall conform to either of the Indian Standards specifications as provided in table 3.4.

	Table 3.4 Metal and Metal Alloys intended to come in contact with food products		
SI.No.	Material	Standard Specification	
1	Cold-reduced Electrolytic Tinplate	IS 1993/ISO 11949	
2	Cold reduced Electrolytic Chromium or Chromium Oxide Coated Steel	IS 12591/ISO 11950	
3	Wrought Aluminium and Aluminium Alloy Sheet and Strip for General Engineering	IS 737	
4	Aluminium and Aluminium Alloy Bare Foil for Food Packaging	IS 15392	
5	Specification for Crown Closures	IS 1994	
6	Specification for Round Open Top Sanitary Cans for Foods and Drinks	IS 9396 (Part 1)	
7	Specification for Round Open Top Sanitary cans for Foods and Drinks	IS 9396 (Part 2)	

4. Plastic materials intended to come in contact with food products:

(a) Plastic materials used for the manufacturing of containers for packing or storing the food products shall conform to either of the Indian Standards specifications as provided in table-3.5:

Table – 3.5: Plastic Materials intended to come in contact with food products

SI.No.	Material	Standard Specification
1	Specification for Polyethylene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 6622
2	Specification for Polystyrene for its safe use in contact with foodstuffs, pharmaceuticals and drinking water –	IS 10142
3	Specification for Polyvinyl Chloride (PVC) and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water –	IS 10151
4	Specification for Polypropylene and its copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water –	IS 10910
5	Specification for Ionomer Resins for its safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 11434
6	Specification for Ethylene Acrylic Acid (EAA) copolymers for their safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 11704
7	Specification for Polyalkylene Terephathalates (PET & PBT) for their safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 12252
8	Specification for Nylon 6 Polymer for its safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 12247
9	Specification for Ethylene Vinyl Acetate (EVA) copolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 13601
10	Specification for Ethylene Metha Acrylic Acid (EMAA) copolymers and terpolymers for its safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 13576

SI.No.	Material	Standard Specification
11	Specification for Polycarbonate Resins for its safe use in contact with foodstuffs, pharmaceuticals and drinking water –	IS 14971
12	Specification for Flexible Packaging Materials for packaging of Edible Oils, Ghee and Vanaspati	IS 14636
13	Specification for Polyalkylene Terephthalates (PET & PBT) for Moulding and Extrusion	IS 13193
14	Specification for Polyethylene Films and Sheets	IS 2508
15	Specification for Linear Low Density Polyethylene (LLDPE) Films	IS 14500
16	Specification for High Density Polyethylene Materials for Moulding and Extrusion	IS 7328
17	Specification for Melamine-Formaldehyde Resins for its safe use in contact with foodstuffs, pharmaceuticals and drinking water	IS 14999
18	Low Density Polyethylene Films –	IS 2508
19	Blow Moulded Polyolefin Containers - Part 2 : Over 5 Litres, Up to and Including 60 Litres Capacity	IS 7408
20	Stretch Cling Films	IS 14995

- For the drinking Water (both Packaged and Mineral Water) shall be packed in colourless, transparent and tamper-proof bottles or containers made of polyethylene (PE) conforming to IS: 10146 or polyvinyl chloride (PVC) conforming to IS: 10151 or polyalkylene terephthalate (PET and PBT) conforming to IS: 12252 or polypropylene (PP) conforming to IS: 10910 or food grade polycarbonate conforming to IS: 14971 or polystyrene conforming to IS: 10142 or sterile glass bottles only. The transparency of a container shall not be less than 85 percent in light transmittance
- All pigments or colorants as specified in Indian Standard IS: 9833 may be allowed in plastic containers of five litre and above made of Polycarbonate and Polyethylene Terephthalate (PET) used for packaging of mineral water and packaged drinking water. The transparency of such containers shall not be less than 85 percent in light transmittance.
 - a. All packaging materials of plastic origin shall pass the prescribed overall migration limit of 60mg/kg or 10mg/dm2 when tested as per IS 9845 with no visible colour migration.
 - b. Pigments or Colorants for use in plastics in contact with food products and drinking water shall conform to IS:9833
 - c. Products made of recycled plastics including carry bags shall not be used for packaging, storing, carrying or dispensing articles of food.
 - d. Plastic materials and articles shall not release the substances in quantities exceeding the specific migration limits listed under Table 4.

Table 3.6. Requirement for specific migration limits of substances from plastic materials intended to be in contact with articles of food.

SI.No.	Substances	Maximum Migration Limit (mg/Kg)
1	Barium	1.0
2	Cobalt	0.05
3	Copper	5.0
4	Iron	48.0
5	Lithium	0.6
6	Manganese	0.6
7	Zinc	25.0



Scan this QR Code or click on below link to access video of Different Types of Packaging



Scan this QR Code or click on below link to access video of Packaging and Storage of Finished Products

Unit 3.2 Quality criteria required for packaging before packing

Unit Objectives 6

At the end of this unit, the participants will be able to:

- State the different criteria required for packaging to before packing
- Explain the different quality test and their significance for different types of packaging materials

3.2.1 Need of quality in packaging

Quality of packaging system is important for proper protection of food product. Packaging defect can have serious consequences that may result in product recalls. It may related to breakage, problems relating to printing or inks, or errors on labels, migration of material, problems related to shelf life etc. Packaging quality control may be affected by following:

- Quality control on packaging materials
- Quality control on in-process materials and
- Quality control on finished products

To ensure high-quality of packed food products, the quality management system must take the following considerations/critical points:

- 1. Adequate facilities, trained personnel and approved procedures must be available for sampling.
- 2. Before packaging operations are begun, steps should be taken to ensure that the work area, packaging lines, printing machines and other equipment are clean and free from any products, materials or documents previously used, if these are not required for the current operation. The line-clearance should be performed according to an appropriate check-list
- 3. The name and batch number of the product being handled should be displayed at each packaging station or line.
- 4. The correct performance of any printing operation (for example code numbers, expiry dates) to be done separately or in the course of the packaging should be checked and recorded. Attention should be paid to printing by hand which should be re-checked at regular intervals
- 5. Samples of packaging materials, intermediate products and finished products must be taken by methods and personnel approved of by the quality control department.
- 6. Monitoring for environmental conditions for GMP purposes.
- 7. Test methods must be validated.
- Records must be made (manually and/or by recording instruments) demonstrating that all the required sampling, inspecting and testing procedures have actually been carried out and that any deviations have been fully recorded and investigated.

- 9. The finished products must contain ingredients complying with the qualitative and quantitative composition of the product described in the marketing authorization; the ingredients must be of the required purity, in their proper container, and correctly labeled.
- 10. On-line control of the product during packaging should include at least checking the following:
 - a) general appearance of the packages;
 - b) whether the packages are complete;
 - c) whether the correct products and packaging materials are used;
 - d) whether any over-printing is correct;
 - e) correct functioning of line monitors

3.2.2. Significance of different quality tests of packaging material

Quality Testing is essential for establishment of proper specifications for procurement and quality control of incoming raw material. The characteristics of packaging materials play an important role to select optimum packaging as per requirement. Properties of packaging materials affected by temperature and humidity. It is, therefore, necessary that test pieces should be subjected to standard pre-conditioning to bring them into an equilibrium state within a specified atmosphere. The test for different types of packaging materials and their significance are shown below:

SI.No.	Test	Significance
1	Caliper / Thickness	 To check conformity of thickness to desired specification.
2	Tensile Strength and % Elongation	 Its importance is a measure of the film's ability to stretch. During the unwinding operation, elongation is an important property. Too low an elongation is dangerous as any sudden imbalance in the unwinding operation could lead to breaking of the film.
3	Heat Seal Strength	 Heat sealability of a packaging film is one of the most important properties when considering its use on wrapping or bag making equipment.
4	Bond Strength	 The performance of multi-layer structure depends upon the ability of the laminate to function as a single unit The test indicates Reliability of continuing adhesion during packaging, sealing and storage
5	Hot Tack Strength	 It is the critical factor in selecting sealant layers in applications. Such as vertical form / fill / seal lines where liquids and other substances may contaminate the seal area. Testing is done while the seal is still hot.

Table 3.7 Significance of different quality test

SI.No.	Test	Significance
6	Shrinkage	• As a result of manufacturing process, internal stresses are locked into the film. and this can be released by heating.
7	Co-efficient of Friction (Static & Dynamic)	 The co-efficient of friction is related to the slip properties of plastic film films which are slippery over various surfaces have a low COF COF or slip properties of film are important in determining how that film will perform on conversion equipment final form such as in openability or stacking
8	Identification of Plastics	 Differential Scanning Calorimeter (DSC) is a fast method to identify the substrates in co-extruded films from melting temperatures of individual substrates. Multi-layer films can be easily checked by DSC to find out the individual and number of components along with concentration.
9	Leakage in Heat Sealed Packages	• To evaluate seal performance of the pouch
10	Dart Impact Test	 This test is carried out to evaluate the impact resistance of flexible plastic film. The impact strength of a film is a measure of its ability to withstand shock loading
11	Tear Strength	 Tear strength is an important property of packaging film
12	Melt Flow Index	 Indicates the flow characteristics of the material at different processing conditions.
13	Seam Strength	• Determines the strength of the fabric used for the manufacture of
14	Environmental Stress Crack Resistance	Indicates the stress crack resistance of plastic material
15	Closure Leakage Test	Indicates defects in closure system
16	Adhesion Strength of Pressure Sensitive tape	Evaluates the quality of adhesive used
17	Torque Test	• Determines the torque required for proper closure
18	Water Vapour Transmission Rate	• Most important property for moisture sensitive products. It decides shelf-life of the products ure

SI.No.	Test	Significance
19	Flex Resistance	 This test determines the resistance of flexible packaging materials to flex-formed pin holes. The resistance to repeated flexure or creasing is important The number of cycles to failure is recorded as the flex resistance
20	Oxygen Transmission Rate	 Most important property for gas sensitive products / vacuum packaging / gas packaging materials
21	Haze	 In certain applications, high clarity and minimal haze or frostiness is desirable. The hazemeter is setup to transmit a beam of light, which is diffused or scattered
22	Gloss	 Specular gloss correlates to the shine or sparkle of film Gloss in film can be optimised by adjustment of extrusion parameters
23	Determination of gross lidded capacity of open top sanitary c	• The principle of determining the gross-lidded capacity of OTS cans relies on obtaining the mass of water in the
24	Determination of themal shock resistance of glass containers	• The principle of determining the various stresses on the inside and outside surfaces
25	Determination of bursting strength of paper based packaging materials	To measure the rupture in many kinds of paper

Unit 3.3 Food packaging line along with characteristics and classifications of packaging machines

Unit Objectives 6

At the end of this unit, the participants will be able to:

- To understand the sequence of food packaging line
- Understand the factors to select the packaging machinery
- State the different types of packaging machine in genera

- 3.3.1 Food packaging line

The machinery, the product and the package are part of an integrated system of any packaging line. The majority of the operations on a packaging line are divided into two parts: First operation with the package itself, such as making or forming sachets, erecting or closing cartons, feeding and seaming cans, and presenting bottles to filler heads and capping them. Secondary operations, such as coding, labeling, detecting metal, check weighing and collation for dispatch. A typical packaging line in a food plant consists of:



1.

2

3.

4.

6.

8.

9.

Palletization 11.

Fig.3.3 Food Packaging line

The ability to run packaging materials efficiently on a packaging line is very much related to:

- 1. The packaging material must feed properly into the forming section of the machine.
- It must then enclose the product adequately and seal it efficiently. 2.
- It must then be collated and placed into its transport container, and 3.
- 4. Finally into a unit load or into a container for dispatch, without of waste.

3.3.2 Sub-systems of packing machine

A package is designed to protect and to sell the contained product and this generally requires a mechanical process to put the product into the package. The machine functions can be broken down into a number of subsystems.

- The product handling system-filling, weighing, conveying, loading, etc.
- The packaging handling system-unreeling, erecting, closing, sealing etc.
- The basic machine framework
- The power transmission
- The control system
- The timing system
- The lubrication system.

The general factor to select the packaging machinery depends on:

- Technical capabilities
- Safety of workers
- Maintainability
- Serviceability
- Ability to integrate into the packaging line
- Capital cost
- Floor space
- Flexibility (change-over, materials, etc.)
- Energy requirement
- Efficiency
- Ergonomics, etc.

Unit 3.4 Types of packing machines and their operating parameters

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- State the working of different types of packaging machine
- Understanding the operating parameters required for packing.

3.4.1 Classification of different types of packaging machine

- 1. Blister packs, skin packs and Vacuum Packaging Machines
- 2. Aseptic packaging system Carton, Can, Bottle, Sachet and Pouch, Cup systems
- 3. Shrink packaging
- 4. Stretch wrapping
- 5. Bottle capping equipment
- 6. Closure and closing operation
- 7. Seaming and Sealing Machines
- 8. Wrapping and bagging
- 9. Form-fill-seal machine
- 10. Cartoning Machines
- 11. Box, Case and Tray Forming,
- 12. Filling Machines: handling liquid, dry and powdered products

- 3.4.2 Bottling(Filling machine) -

At one time, bottling lines handled only glass bottles, whereas today the container can be not only of glass, but one of a variety of plastics with shape and stability as varied as marketing may demand. Different-shaped containers need handling in different ways, and their contents are filled according to their characteristics.

Considerations in selecting a filler

- **Types of products:** from very thin liquids to semi-liquid products, pastes, and solids; stable, volatile, explosive, hot, frozen products.
- Size, shape, and construction of the containers: glass bottles and jars, plastic bottles and cartons, paperboard boxes, metal cans, and plastic or paper bags.
- Way the product is measured: by volume, weight, or count.
- Desired speed of the operation: a relatively slow manual operation, semi-automatic, fully automatic (high speed lines)
- Special handling requirements of the product
- Cost of installation
- Operation

Filling liquids and semi liquid products

Variation in the product viscosity needs to be considered in selecting the type of liquid food fillers: low viscosity products of 1-10 centipoise such as wine, drinking water and vinegar; medium viscosity products of 10-2000 centipoise such as sauce and vegetable oil; high viscosity products with more than 2000 centipoise such as ketchup. Semi liquid with extremely viscous characteristics may have viscosity of up to 10000 centipoise and may be called semi solid or paste. Liquid filling also affected by temperature because food viscosity can change with temperature change.

- The containers may be made of plastic, metal, glass, treated paperboard, or a number of other materials.
- The shapes of the containers include those of bottles, jars, vials, tubes, cans, pouches, cartons, and drums shown in below



Fig 3.4 Different shape and size of package

Most liquid and semi-liquid products are filled by one of two major methods: **volumetric, or constant level filling.**

- In volumetric filling the amount of product is premeasured so that each container has the same volume of product. Volumetric filling is particularly appropriate for applications in the pharmaceutical industry where it is important that each container is accurately filled with a specific volume of product.
- The volume of product delivered into the container is determined by the volume of the filling chamber in which the piston is operating. This volume can be changed by adjusting the length of the piston's stroke. As the stroke is lengthened, the volume of the chamber is increased, and as the stroke is shortened, the volume of the chamber is decreased (Figure 3.5).
- Three popular types of volumetric filling methods: piston operation, diaphragm action, and timed flow.
- **1. Piston Volumetric Filling:** A piston filler (Figure 3.6) measures and delivers the product to the container by the action of a single piston for each filler head.



Fig 3.5. Piston volumetric filling with rotary valve



Fig 3.6. Piston volumetric filling with reciprocating valve

- 2. Diaphragm Volumetric Filling
 - The diaphragm type volumetric filler uses a flexible diaphragm and pneumatic pressure to move premeasured amounts of product from the supply tank into a controlled volume chamber and into the container.
 - The diaphragm volumetric filling systems are generally used to fill small-necked bottles with relatively expensive products because of their high level of accuracy and the small loss of product in filling.



3. Timed Flow Volumetric Filling

• The volume of product in each fill can also be regulated by controlling the amount of time the product flows at a constant rate through a standard sized tube into the container. Three popular ways of measuring and regulating the flow time are rotating metering discs are rotary, pumps, and augers.



Fig 3.8. Time flow volumetric filling by Rotating metering discs

3.4.3 Liquid Constant Level Filling

- Constant level filling techniques fill each container to the same level, so it is frequently called the "fill-to-a-level" method. Constant level filling is used with see-through bottles in which it is important that all of the bottles in a display appear to be filled to the same level, although the bottles may not be exactly the same size and the volumes may be slightly different.
- Five basic methods used for constant level filling of still liquids and semi-liquids: Pure gravity filling Pure vacuum filling Gravity vacuum filling Pure pressure filling Level sensing filling Pressure gravity filling for carbonated product

- 3.4.4 Filling dry goods (powders and granular material) -

There are four basic types of dry filling machines based upon the way the amount of product being delivered is measured:

By volume: the volumetric fillers deliver a constant volume of product to each container.By net weight: the net weight filler weighs the product before it is delivered into the package.By gross weight: the gross weight filler weighs the product in the containerBy count: the counter places the same number of items into each container.

The following dry product and container are used for filling of dry solids

- **Dry products:** light, heavy, sticky, very dry, flowing freely, some moved by force.
- **The containers:** as small as a capsule or as large as a one hundred pound bag or a 55 gallon drum. They can be boxes, cans, bottles, pouches, bags, drums, or other forms, and they may be made of a variety of rigid and flexible materials.

- 3.4.4 Form fill seal -

Form fill seal machines are the most widely-used automatic flexible packaging machine type. Form fill seal means an integrated operation of forming a package, filling the food product into the package, and sealing it usually in a single machinery or linked automated system. Solid, powder, liquid and viscous foods can be handled with form fill seal system.

Examples of common bag styles in form fill seal machines are below



Fig 3.9. Different style of bag for fill seal machine

- 1. Pillow bags are the most widely-used and economical packaging format, comprised of two flat panels sealed together on the top and bottom with a vertical seal down the back. This bag type is popular for value-brands, chips, single-serving snacks, and fractional packs of coffee.
- 2. Doypacks are stand-up pouches with an oval-shaped base. This bag type is growing in popularity for premium products in many industries, including snacks, coffee, and powder supplements.
- **3. Quad seal bags** have a rectangular bottom and can stand unassisted. This bag type has two side gussets and two panels joined together with four vertical seals, providing a more structured bag and modular look. This bag type is popular for premium coffee brands.
- 4. Flat bottom bags are similar to quad seal bags, featuring two gussets, but only have a single vertical seal. This bag type is popular for coffee and pet food.
- 5. Gusseted bags are similar to pillow bags but have side gussets, offering more internal space.
- 6. Three side seal bags are flat pouches sealed on three sides.
- **7. Sachets** are small, flat 4-side sealed packets, often used for single-serving condiments and spices.
- 8. Stick packs are very narrow pillow bags, used for single-serving powders and liquids.

The form fill seal machines are divided into vertical and horizontal types depending on the flow of the film, sheet or container. VFFS (Vertical form fill seal) machines have the advantage of occupying limited floor space and are more economical in cost, which makes them a top choice in many industries when square footage and budget are limited.

a. Vertical form fill seal machine

The vertical form fill seal machine transports the film and package from top to bottom direction in the course of forming, filling, sealing, and separation of individual package.

VFFS machines can be intermittent or continuous motion. Intermittent motion machines operate on the principle that vertical bag seals are made when the film is moving and horizontal seals occur when the film stops. Intermittent motion machines offer a suitable solution for applications where speed is not absolutely paramount.

Continuous motion machines operate on the principle that both vertical and horizontal bag seals are made when the film is in motion. These machines operate at the highest attainable speeds and require a reciprocating sealing jaw motion format

Principle of a how the mechanism works The principle



The VFFS machine can be divided into four functional areas:

(1) mixing, weighing, dosing;

(2) forming,

- (3) feeding, aligning, registration; and
- (4) closing, sealing, cutting.



Fig.3.11. Different function of component

b. Horizontal form fill seal machine

Horizontal form fill seal machine can handle various types of pouch and tray packages:

Three and four weld bags, pillow bags with side seam, thermoformed tray etc. Bag forming in horizontal machine is similar to that in vertical one, except that the film movement is horizontal in the former.

The most common horizontal applications are for 'solid', preformed single items or multipacks (e.g. candy bars, biscuits). Sachet packs typically have three- or (more usually) four-sided fin seals around the edges of the pack. The most common applications are virtually the same as for the vertical sachet machine-powdered, granular or similar products and liquids, e.g. instant soup, instant potato, instant desserts, etc.



Fig 3.12. Horizontal form fill seal machine

3.4.5 Wrapping operations

For wrapping mass-produced articles in a constant flow, automatic wrapping machines replace the manual operator.

a. Twist wrapping machines

The speed of packaging is greatly increased, and in the case of small objects such as toffees which are convenient to feed and wrap, speeds of up to 600 pieces per minute may be achieved by cutting a piece of film, forming it into a tube around the object and twisting the ends of the tube this is known as twist-wrapping.



Fig 3.13. Twist wrapping of toffees

b. Shrink wrapping machines

- Shrink wrapping includes packing of one or several articles with a thermoplastic film which when subjected to heat shrinks and form a tight wrap around the object.
- When heat is applied to this material it shrinks tightly over whatever it is covering. Heat can be applied with a hand held heat gun or the package can pass through a heat tunnel on a conveyor. It provides tightly wrap around the product.
- The result is a very tight wrap, conforming to the product shape Shrink Wrapping is done in 4 stages, namely
 - ➤ wrapping
 - > sealing
 - \succ shrinking
 - ➤ cooling





Fig 3.14. Recoiling of plastic polymer by application of heat



Fig 3.15. Shrink wrap machine

Plastics used for Shrink Wrapping

- The most commonly used shrink wrap is polyolefin.
- The most common plastic materials are polyethylene, polypropylene and poly vinyl chloride.

3.4.6 Operating parameters required for packing

Operating parameter required for packing depends on the following basic points

- 1. Nature of the Product
- 2. Product Dimensions
- 3. Pouch Material
- 4. Pouch Dimension/Size
- 5. Pouch Style
- 7. Hourly output of the product to be packed

The operating parameter of packing is essential for proper working of packaging line. These are the operating parameters for different types of packing machine:

Table 3.8 Operating parameter for machines

Machines	Operating parameter
1. Filling Machines: handling liquid, dry and powdered products	 Nozzle diameter Pressure Viscosity of liquid Speed of piston and cylinder Speed of conveyor Air pressre Filling speed Pumping speed Filling nozzle size Filling amount
2. Skin packaging	VacuumTemperature of heaterSuitable packaging material
3. Vacuum Packaging Machines	Vacuum pressureSealing temperature
4. Aseptic packaging system – Carton, Can, Bottle, Sachet and Pouch, Cup systems	 Package serilization Container sterilization Container closing in aseptic zone Suitable packaging material Heat seal Temperature and time combination for different operation
5. Shrink packaging	TemperatureTimepressure
6. Stretch wrapping	Sealing temperatureSuitable material
Unit 3.5 Identification equipment faults and Operating parameters required to correct the faults identified.

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- State the identification of equipment fault
- Understand the Operating parameters required to correct the faults.

3.5.1 Common defects in packaging machine

The most common defects in packaging machine

- Incorrect packing method
- Using the wrong packaging material
- Incorrect packing assortment
- Missing or incorrect cushioning material, or plug, for adequate protection
- Using the wrong carton size, leaving extra space inside of the carton, which leads to movement of the product that can damage it

The following are the different types of packaging machine and parameters required to correct the faults identified:

Table 3.3 Faults and possible cause	Table	3.9	Faults	and	possible	cause
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Machines	Faults	Possible cause (operating parameters)
	The machine does not power up	Incoming power issueMain disconnect is off
	The machine does not reset	 Safety circuit not reset Low air pressure Faulty wiring
Form fill seal machine	The temperature of the jaw is out of range	 Sealing jaws are not warmed up PLC fault Temperature sensor fault Heater fault
	Jaws are not working	 Low air pressure Air cylinder fault Cylinder slide fault Piston position sensor fault Air distribution fault

Machines	Faults	Possible cause (operating parameters)
	Printer does not work	 Printer is not ready to run Printer is switched off Printer cable is damaged or disconnected Printer ribbon is broken Printer is damaged
	Film is not tracking properly	 Film is not centered on spindle Film is not webbed up properly Rollers and dancer levels are parallel Film is loose on one side and tight on the other Splice table clamps down Rollers not spinning freely Auto film tracking not working Forming tube damaged or not installed properly Splice tape stuck in forming tube Pull belts not set up properly
	Bad vertical seals	 Forming tube backstop set improperly Incorrect distance between film and forming tube
	Bad cross (horizontal) seals	Product in end seal
	flat film stick together, it's called "blocking."	Film has been in excessive storage temperatures
Shrink wrapping	Shrink Bags Take Too Long To Seal	Temperature is too low
	Small brittle seals (frequently with pinholes and open areas)	Seal temperature is too hot
	The balloon effect occurs when the shrink film is exposed to hot air after sealing. The air inside of the bag expands and causes the shrink film to blow up	 This can be addressed by using film with vent holes (aka pre-perforated film) that allows air to escape as the film shrinks around the product.
	Split Seals	 Caused by too-thin film, or a bad roll of film Clean your sealing wire and make sure it's at the right temperature.

Machines	Faults	Possible cause (operating parameters)
	Machine and the Conveyor not getting start	• Connect the Main Cable if not connected.
		 On the Push Button and MCE inside the panel
	Bottles not getting stop	Check the Pneumatic Supply.
Filling machine	Improper Filing	Check the dozing unit.Check the distance of the bottle and the filling nozzle.
	Crowns not getting tight on the bottle	 Check the Pneumatic Pressure Check the height of the capping unit.
	Piston not moving	Air Supply abnormalMaterial viscosity
	Material Leaks	Check Sealing ring loose piston rod

─ Notes	

Unit 3.6 Environmental requirements for packing of the particular food and waste management

– Unit Objectives 🧭

At the end of this unit, the participants will be able to:

- Explain the suitable environmental requirements for packing of the particular food
- State the waste management in packing industry

- 3.6.1 Environmental requirements for packing -

The environments like Temperature, gas atmosphere, relative humidity, good manufacturing and hygienic practices during production, storage, distribution and display are the critical parameter that affects quality of packed product. The packing facilities shall be designed and constructed to:

- 1. Provide protection from dust, condensation, waste, pest access and other sources of contamination.
- 2. Well ventilated and enable monitoring and control of temperature and humidity in storage areas where specified.
- 3. Be easy to maintain and clean. All materials and products shall be stored off the floor and away from the walls to allow inspection and pest control activities to be carried out.
- 4. All packaged raw materials shall be checked for 'expiry date'/'best before'/'use by date', packaging integrity and storage conditions.
- 5. Raw material and ingredients shall be stored as per the storage conditions mentioned on the label or as specified by the vendor. Printed packaging materials shall be stored in safe, separate and secured manner.
- 6. The packaging materials or gases where used, shall be non-toxic and shall not pose threat to the safety and suitability of food under the specified conditions of storage and use.
- 7. Packaging materials shall be prepared/assembled in hygienic condition prior to use for batch/continuous systems.
- 8. Filling, Bottling, wrapping, packaging etc. shall be carried out hygienically.
- 9. All weighing scale used in packaging section shall be checked regularly against certified standards and their records to be maintained.

The temperature and relative humidity are required for packing of some of some food product is given below:

Operation / Process	Tem. °C	Humidity RH (%)
Fresh fruits	-1 to 4	90-95
Vegetable	-1 to 21	60-95
Fruit Powder Handling	20-22	35
Instant Coffee	26	25
Tomato Powder	19-23	25-35
Dry Soup Packaging	21	20
Energy Food Packaging	25	40-45
Instant Coffee Packaging	26	20
Milk Powder Packaging	22-25	35-40
Cracker & Wafer Packaging	21-29	35-40
Powdered Drink Mix Packaging	21	20
Confectionery – Starch Rooms	21-24	30-35
Spray Dried Milk Powder	10	35-40
Whey Powder Manufacturing / Storage	21-26	15-30

Table 3.10 Environment requirement of packaging of different food

- Notes	

3.6.2 Waste in packaging

According to the environment protection act, waste is any substance which constitutes scrap material, an effluent, unwanted surplus substance, article which requires disposing of as being broken, worn out, contaminated or otherwise spoiled.



3.6.3 Recycling-

- Recycling can be defined as the diversion of materials from the solid waste stream for use as raw materials in the manufacture of new products.
- Closed-Loop Recycling
 - Refers to the recycling of a particular material back into a similar product;
 - for example, the recycling of glass bottles back into new glass bottles
- Mainly rigid plastic materials are recycled. PET providing greatest tonnage followed by HDPE and PP.

Recycling of plastic

An international system of coding is used to identify types of plastics for the purpose of recycling. codes 1 and 2 are most widely recyclable. The general application of different types of plastics are shown in below given table.



Fig 3.17. Recycling codes

Code No.	Thermoplastic materials	Packaging application
1	Polyethylene terephthalate (PET)	Drinking bottles
		Microwavable packaging
		Soft-drink bottles
		Food jar for butter
		Jelly and
		Plastic films
2	Polypropylene (PP)	Drinking bottles
2		Bottles for milk and juice
3	Poly vinyl acetate (PVA)	Common food packaging
		Plastic bags
4	Poly vinyl chloride (PVC)	Frozen foods stretch films
		Container lid
		Food container
5	Polystyrene (PS)	Bottle caps
		Medicine bottles
		Straws
		Disposal cups
6	Low density polyethylene	Glasses
		Plates
		Spoon
7	High density polyethylene	Custom packaging

Table 3.11 Packaging application of thermoplastic materials

a. Plastic Recycling process

There are following Steps involved in the recycling process:

- Selection: The recyclers/reprocessors have to select the waste/scrap which are suitable for recycling/reprocessing
- **Segregation:** The plastics waste shall be segregated as per the codes 1-7 mentioned in the BIS guidelines and
- **Processing:** After selection and segregation of the pre-consumer waste (factory waste) shall be directly recycled. The post-consumer waste (used plastic waste) shall be washed, shredded, agglomerated and extruded.



Food Packer

b. Glass Recycling

The recycling process of glass depends entirely on the type of glass that will be produced.



c. Aluminum Recycling:

In contrast to many other materials, in the recycling of metal there are no quality losses. The followings are the flow diagramme for the recycling of aluminum material



Unit 3.7 Integrity testing on the packaging items and identification of discrepencies and non-standard output

Unit Objectives 🞯

At the end of this unit, the participants will be able to:

- Understand the integrity tests of different packaging items
- Understand the non-standard output

-3.7.1 Package integrity testing

The food packages closed with a closure or sealed by application of heat or adhesive should have adequate integrity to preserve and deliver the contained food through the distribution system for the required shelf life. Ingress of microorganisms, dust, and gases should be prevented or minimized to keep the food safety and quality. Therefore the integrity of the food packages should be assured by proper testing method before the products leave the manufacturing plant. In particular, there has been great emphasis on the package integrity for thermally processed foods of high moisture because their safety and stability after proper processing are threatened by post-process contamination through leaks.

Test methods recommended for detecting micro leak of different types of food packages

Package type	Recommended test method
Paper board package	Compression, dye penetration, electronic test, incubation, sound, visual inspection
Flexible pouch	Burst, compression, dye penetration, incubation, tensile test, visual inspection
Plastic package with heat-sealed lid	Burst, dye penetration, incubation, sound, tensile test, vaccum, visual inspection
Plastic can with double- seamed metal end	Incubation, proximity sensor, scope projection, sound, visual inspection
Metal double seamed can	Dye penetration, incubation, proximity sensor, scope projection, sound, vaccum, visual inspection
Glass jar with screw closure	Dye penetration, incubation, proximity sensor, scope projection, sound , vaccum, visual inspection

Table 3.12. Recommended test for package

- 3.7.2 Non standard outputs

Non standard may be defined as materials at any stage, which have been tested against a set of predefined specifications and found not meeting the specification fully. We can deal with such materials mainly in two ways:

1. Reprocess and retest the materials to see whether it meets our specific requirements.

2. Destroy or send it to the supplier. Rejected materials and products should clearly marked as such and stored separately in restricted areas.

Such areas in industry are normally painted RED in colour to make it distinguishable easily. Such materials should either be returned to the suppliers or reprocessed or destroyed. Reprocessed batches should be given a new number by means of which, such batches can be identified as reprocessed batches.

The non standard outputs can be classified mainly in two categories:

1. Trash : which do not have any resale value and may be disposed off by proper method depending upon the nature of the trash.

2. Scrap: which do have a resale value and may be sold to scrap dealers, after proper segregation.

Toxic substances and flammable materials should be stored in suitably enclosed cupboard, as required by national legislation. Waste materials should not be allowed to accumulate. It should be collected in suitable containers for removal to collection points outside the buildings, and disposed off safely and in a sanitary manner at regular intervals. Before disposal of these materials, they can be segregated in different categories:

- 1) Paper
- 2) Aluminium foils
- 3) Plastic
- 4) Glass
- 5) Metallic containers etc.

Food Packer



- Notes	

Unit 3.8 Cleaning and documentation of packaging machine after use

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Understand the cleaning procedure of packaging machine after use
- Understand the need for documenting of production details, quality details and maintenance details of packaging materials, processes, and finished packaged products.

- 3.8.1 Cleaning of packaging machine

Proper cleaning and maintenance are key to the durability, performance of any packing machine. Cleaning procedures, detergents used, and cleaning schedules depend on the type of product being processed as well as ambient environmental conditions (temperature, humidity, dust levels, vibrations, etc).

General cleaning procedure of machine are as follows:

- 1. Before cleaning, turn off and disconnect the power
- 2. Remove pouches and products from the pouch packing machine
- 3. Separate the electrical control cabinet from the machine if possible.
- 4. Remove debris and product residue from the machine by using low-pressure water or compressed air.
- 5. To remove microscopic debris or chemical substances, use a detergent for cleaning.
- 6. Recommended cleaning solutions are chlorinated alkaline detergents with 300 500 ppm of chlorine.
- 7. Use compressed air to remove water from the machine.
- 8. If the heat sealing jaws are dirty then remove the knife first and then clean the front faces of both jaws with water and a light cloth.
- 9. Wipe down all stainless steel guards with hot soapy water and then wipe dry.
- 10. Wipe down all film rollers, conveyor belts and dry.
- 11. Wipe down all guide bars, connecting rods, air cylinder rods, etc.

3.8.2 Documentation of production details

Documents shall contain all important information, to be kept up to date. It shall include provision for periodic review and revision as necessary. Appropriate records of raw material procurement, production processes, quality and sales are essential for success of any organization. This is to ensure that the business runs effectively and is profitable.

There are following reasons for documentation:

- It gives detailed knowledge about production.
- It helps to control product quality.
- It helps to keep track of the money invested in the business.
- It helps to identify the separate costs of product ingredients.
- It helps to identify the production cost of a particular process.
- It helps to ensure that quality assurance procedures are followed.
- It helps to ensure that the production unit is running smoothly/effectively.
- It works as an evidence for legal procedures.
- It helps to set an appropriate product price.
- It helps to take corrective measures at the right time.

-3.8.3 General requirements for documentation

- Good documentation constitutes an essential part of the quality assurance system
- Documents must be designed, prepared, reviewed.
- Documents must be approved, signed, and dated by the appropriate competent and authorized persons.
- Documents must be regularly reviewed and kept up-to-date
- Records of major equipment use, cleaning, sanitization and/or sterilization, and maintenance should show the date, time (if appropriate), product, and batch number of each batch processed in the equipment and the name and signature of the person who has performed the cleaning and maintenance.
- Keep it short and simple. Use bullet points and flow diagrams instead of long sentences and lengthy paragraphs.
- Clarity is important. Step-by-step instructions are easily understood.
- Use a standardized, consistent format. Although different programs may need different documents and records, using a similar approach will help staff learn quickly

Whats should be written in the document:

- Name of document
- Name of company, department or division
- Document number
- Revision number
- Page and number of pages of document
- Date of approved
- Effective date
- Name and signature of the person who prepared the document
- Content of procedure/instruction

The list of the most common types of documents are as:

- 1. Production document
- 2. Quality Control Documents
- 3. Standard operating procedures and records
- 4. Policies
- 5. Batch records
- 6. Test methods
- 7. Specifications
- 8. Logbooks

The important point written in the document of quality control documents 1. Specification of

Natural materials

- Starting and packaging materials
- Intermediate and bulk products
- Finished products (FP)

2. Testing Procedures and records (incl. analytical worksheets and/or laboratory notebooks)

- Analytical reports and/or certificates
- Data from environmental monitoring, if appropriate
- Procedures for and records of calibration of instruments and maintenance of equipment

The important points written in production documents are:

- Manufacturing Formula and Processing Instructions
- Packaging Instructions
- Batch Processing Records
- Batch Packaging Records

Written procedures and records must be available for receipt of each delivery of each starting materials and packaging material. Records of receipt should include the following:

- Name of material on delivery note and containers
- In-house name and/or code of material
- Date of receipt, date and signature of receiving staff
- Name of supplier and manufacturer
- Manufacturer's batch/reference no.
- Total quantity and no. of containers obtained
- Batch Number assigned after receipt
- Any relevant comment (e.g State of containers)

Unit 3.9 Food Safety and Standards Act, 2011 - Packaging and Labeling

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Understand the general requirement of packaging
- Understand the general requirement of labelling as per FSSAI

- 3.9.1 General requirements of packaging by FSSAI -

The objective of packaging is to delivering safe, wholesome, nutritious food to the consumer. To safeguard the interests of the consumer and the society at large, Packaging Laws and Regulations have been introduced by the Government. Under Food Safety and Standards Act, 2006, the regulations on packaging and labelling has come into force in 2011 as Food Safety and Standards (Packaging and Labelling) Regulations, 2011, that overrides all existing rules and regulations related to food packaging and labelling.

General Requirements for packaging of food

- Every food business operator shall ensure that the packaging material used shall be in accordance the regulations.
- Any material which comes in direct contact with food or likely to come in contact with food used for packaging, preparation, storing, wrapping, transportation and sale or service of food shall be of food grade quality.
- Packaging materials shall be suitable for the type of product, the conditions provided for storage and the equipment for filling, sealing and packaging of food as well as transportation conditions.
- Packaging materials shall be able to withstand mechanical, chemical or thermal stresses encountered during normal transportation. In case of flexible or semi-rigid containers, an overwrap packaging may be necessary.
- Food products shall be packed in clean, hygienic and tamper-proof package or container.
- The sealing material shall be compatible with the product and the containers as well as the closure systems used for the containers.
- Tin containers once used, shall not be re-used for packaging of food.
- Plastic containers of capacity 5 liter and above and Glass bottles, which are reused for packaging
 of food, shall be suitably durable, easy to clean or disinfect
- Printing inks for use on food packages shall conform to IS: 15495.
- Printed surface of packaging material shall not come into direct contact with food products.
- Newspaper or any such material shall not be used for storing and wrapping of food.
- In case of multilayer packaging, the layer which comes in direct contact with food or layers likely to come in contact with food should be food grade

-3.9.2 General requirements of FSSAI for labelling of food packaging

General requirement for Labeling of food packaging

- Every prepackaged food shall carry a label containing information as required here under unless otherwise provided, namely,—
- The particulars of declaration required under these Regulations to be specified on the label shall be in English or Hindi in Devnagri script: Provided that nothing herein contained shall prevent the use of any other language in addition to the language required under this regulation.
- Pre-packaged food shall not be described or presented on any label or in any labelling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect;
- Label in pre-packaged foods shall be applied in such a manner that they will not become separated from the container;
- Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use;
- Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it;
- License number shall be displayed on the principal display panel in the following format, namely:-



- 3.9.3 Labelling of Pre-packaged Foods

In addition to the general labeling requirements that should be specified above every package of food shall carry the following information on the label namely,—

1. The Name of Food:

The name of the food shall include trade name or description of food contained in the package. List of Ingredients: Except for single ingredient foods, a list of ingredients shall be declared on the label in the following manner:—

2. List of Ingredients:

Except for single ingredient foods, a list of ingredients shall be declared on the label in the following manner:—

a. The list of ingredients shall contain an appropriate title, such as the term "Ingredients";

b. The name of Ingredients used in the product shall be listed in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture;

C. A specific name shall be used for ingredients in the list of Ingredients

3. Nutritional information

4. Declaration regarding Veg or Non veg

5. Declaration regarding Food Additives-

6. Name and complete address of the manufacturer

7. Net quantity

8.Lot/Code/Batch identification

9. Date of manufacture or packing

10. Best Before and Use By Date

11. Country of origin for imported food

12. Instructions for use

– Notes	

Unit 3.10 Regulation with respect to the food item being packed

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

• Understand the specific packaging requirement of different type of food product

3.10.1 Packaging requirements for Milk and Milk Products –

- Bottling or filling of containers with heat-treated milk and milk product shall be carried out mechanically and the sealing of the containers shall be carried out automatically.
- Wrapping or packaging may not be re-used for dairy products, except where the containers are of a type which may be re-used after thorough cleaning and disinfecting.
- Sealing shall be carried out in the establishment in which the last heat-treatment of drinking milk
 or liquid milk-base products has been carried out, immediately after filling, by means of a sealing
 device which ensures that the milk is protected from any adverse effects of external origin on its
 characteristic. The sealing device shall be so designed that once the container has been opened,
 the evidence of opening remains clear and easy to check.
- Immediately after packaging, the dairy products shall be placed in the rooms provided for storage.

There are different packaging material used for packaging of milk and milk based products are follows:

Table 3.13 Packaging material used for packaing of milk and milk based products

	 Glass bottle with metal caps or plastic (polypropylene (PP) or High-densit polyethylene (HDPE)) caps.
	 Rigid Plastic container made up of High-density polyethylene (HDPE) or Polypropylene (PP) or Polystyrene (PS) with Plastic (PPor High-density polyethylene (HDPE) caps.
	• Flexible plastic pouch made of polyethylene (PE) or Polypropylene (PP) based co-extruded multi-layered material.
	 Aseptic and flexible packaging material (Paper board or Aluminium foil or polyethylene) based multi-layered structure.
	• Tin plate container.
Milk and milk product	 Paper-based lined cartons with a liner made of aluminum foil based laminated structure.
	 Plastic-based polypropylene (PP) or polystyrene (PS) cups with paper or Peel-off lid.
	Wax coated paper butter wrappers.
	 Paper and Paper Board based folding carton inside butter wrapped with butter paper
	 Metal Containers with plastic polypropylene (PP) caps or metal or plastic lid.
	Plastic pet container with plastic lid.
	• Thermoform cup or tray with paper or peel-off lids.
	 Paper and Paper Board setup boxes with or without lamination – plastic film inside.

3.10.2 Packaging requirements for Fruits and Vegetables Products

The general requirement for packaging for fruits and vegetables are:

- Every bottle in which any fruit product is packed shall be so sealed that it cannot be opened without destroying the licensing number and the special identification mark of the manufacture to be displayed on the top or neck of the bottle.
- For Canned fruits, juices and vegetables, sanitary top cans made up of suitable kind of tin plates shall be used.
- For Bottled fruits, juices and vegetables, only bottles/ jars capable of giving hermetic seal shall be used.
- Juices, squashes, crush, cordials, syrups, barley waters and other beverages shall be packed in clean bottles securely sealed. These products when frozen and sold in the form of ice shall be packed in suitable cartons. Juices and Pulps may be packed in wooden barrels when sulphited.
- For packing Preserves, Jams, Jellies, and Marmalades, new cans, clean jars, new canisters, bottles, chinaware jars, aluminium containers may be used and it shall be securely sealed.
- For Pickles, clean bottles, jars, wooden casks, tin containers covered from inside with polythene lining of 250 gauge or suitable lacquered cans shall be used.
- For Tomato Ketchups and Sauces, clean bottles shall be used. If acidity does not exceed 0.5% as acetic acid, open top sanitary cans may also be used.
- Candied fruits and peels and dried fruits and vegetables can be packed in paper bags, cardboard or wooden boxes, new tins, bottles, jars, aluminium and other suitable approved containers.
- Fruits and Vegetable products can also be packed in aseptic and flexible packaging material having food grade quality conforming to the standards laid down by BIS.

There are different packaging material used for packaging of fruits and vegetable products are follows:

Table 3.14 Packaging material for fruits and vegetable products

Fruit and Vegetable products	 Glass bottle with metal caps or plastic (polypropylene (PP) or High-density polyethylene (HDPE)) caps. Aluminum can with the easy open end. Tinplate container. Aseptic and flexible packaging material (Paper board or Aluminium foil or polyethylene) based multi-layered structure. Plastic rigid container (jar) made of either High-density polyethylene (HDPE) or Co-extruded structure with Plastic (polypropylene (PP) or High-density polyethylene (HDPE) caps. Stand up Pouch made up of Plastic based structure with the plastic spout. Flexible Plastic pouch made of either polyethylene (PE) or Laminated structure. Thermoformed Plastic container (Blister Pack) with aluminum foil or polyethylene (PE) based lid. Plastic trays with overwrap. Polyethylene terephthalate (PET) or polypropylene (PP) or Poly Vinyl Chloride (PVC) Punnets
	Chloride (PVC) Punnets Glass bottle with metal caps or plastic (polypropylene (PP) or High-density polyethylene (HDPE) caps.

- 3.10.3 Packaging material used for packaging of Cereals and cereal products

Table 3.15 Packaging material for cereals and ceral products

	• Tin container.					
	• Aluminum Foil Based laminated pouch in the metal container.					
	Wrapper made of wax-coated paper.					
	 Wrapper made of the three-layered laminated structure. 					
Cereals and cereal products	• Plastic-based multi-layered laminated pouch (heat sealed).					
	• Plastic-based thermoform container with plastic lid.					
	• Lined carton with a liner made of the multi-layered laminated structure.					
	• Plastic-based multi-layered laminated structured Zipper Pouch.					
	• Thermoform trays with plastic lids or overwraps.					
	Glass bottle with metal caps.					
	Polyethylene terephthalate (PET) or Plastic based rigid containers with					
	metal or plastic (polypropylene (PP) or High-density polyethylene					
	(HDPE) caps					

3.10.4 Packaging material used for packaging of Fats, oils and fat emulsions

Table 5.10 Packaging material for Fats, oils and fat emulsions
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	Tin plate container.					
	• Glass bottle with metal caps or plastic polypropylene (PP) or High-density					
	polyethylene (HDPE) caps.					
	• Plastic rigid container (jar) made of High-density polyethylene (HDPE).					
	• Plastic bottle or Jar Polyethylene terephthalate (PET) with plastic caps.					
Fats, oils and	• Plastic Pouch made of Multilayered laminated or co-extruded structure.					
fat emulsions	•Aseptic and flexible packaging material (Paper board or Aluminium foil					
	or polyethylene) based multi-layered structure.					
	• Plastic laminated pouch in duplex board box (Bag in Box).					
	• Thermoformed plastic-based jar with plastic caps.					
	Paper-based lined cartons with a liner made of aluminum foil based					
	laminated structure.					

	Ing material for Sweets and Confectionery			
Sweets and Confectionery	Metal Containers with plastic polypropylene (PP) caps or metal or plastic lid			
	Plastic based multi-layered laminated Heat-sealed pouches.			
	Composite containers made up of Paper Board or Aluminium foil or			
	plastic base films with plastic or metal lids.			
	Plastic-based rigid containers.			
	• Foil wrap.			
	• Plastic film-based twist wraps (Polyethylene terephthalate (PET) or			
	polypropylene (PP) or Poly Vinyl Chloride (PVC)			
	Thermoformed tray and punnet with lid.			
	Glass bottle with metal or plastic caps.			
	Plastic cups with a film lid.			

- 3.10.6 Packaging material used for packaging of Meat and Meat Products or Poultry Products

Table 3.18 Packaging material for Meat and Meat Products or Poultry Products

	Glass Jars with plastic (polypropylene (PP) or High-density polyethylene
	(HDPE) caps.
	Metal Containers with metal lid (lacquered tin containers).
Meat and Meat Products or Poultry Products	• Plastic-based flexible pouches in paper & paper Board carton.
	Plastic-based multi-layered flexible laminates heat sealed pouches.
	Plastic tray with overwrap.
	Aluminum foil wrap.
	Polyethylene terephthalate (PET) punnets or containers with plastic caps

- 3.10.7 Packaging material used for packaging Fish and fish products or Seafood

Table 3.19 Packaging material for Fish and fish products or Seafood

Fish and fish	Glass jars with plastic (PP or High-density polyethylene (HDPE) caps		
	Metal Containers with metal lid (lacquered tin containers).		
	Polyethylene terephthalate (PET) punnets or containers with plastic caps.		
Seafood	Plastic-based multi-layered flexible laminates heat sealed pouches.		
	Plastic tray with overwrap.		

- 3.10.8 Packaging material used for packaging Sweetening - agents including Honey

Table 3.20 Packaging material for Sweetening agents including Honey

Sweetening agents	Glass bottle with Metal Caps or Plastic (polypropylene (PP) or High-density polyethylene (HDPE) Caps.		
	Plastic-based Thermoformed container.		
including Honey	 Blister Pack with foil or polyethylene lid. 		
	Polyethylene Terephthalate (PET) container with Plastic Caps.		
	Plastic laminated Tube.		

- 3.10.9 Packaging material used for packaging Salt, spices, Condiments and related products

Table 3.21 Packaging material for Salt, spices, Condiments and related products

	Glass bottle with a metal lid or plastic (polypropylene (PP) or High-density
	polyethylene (HDPE) caps.
	Plastic-based rigid container with Plastic cap (Polyethylene terephthalate
Salt snices	(PET) and High-density polyethylene (HDPE) Containers).
Condiments and	Paper & Paper board or Aluminium foil or Plastic Film based Composite
related products	Container.
related products	Folding cartons with Plastic based flexible laminated structure (heat
	sealed) pouch placed inside.
	Plastic-based multi-layered layered laminated pouch (heat sealed).

- 3.10.10 Packaging material used for packaging Beverages (other than Dairy and Fruits & vegetables based)

Table 3.22 Packaging material for Beverages

	1				
	Plastic bottles made of either Polyethylene terephthalate (PET) or				
	Polycarbonate (PC) with Plastic (Polypropylene (PP) or High-density				
	polyethylene (HDPE) or Aluminium caps.				
	Heat sealed Plastic pouches made of Polyethylene (PE).				
	Glass bottles with metal caps or plastic caps.				
	• Plastic pouches made up of Polyethylene (PE) in Corrugated fiberboard				
	Boxes.				
Beverages (other	 Aluminum can with the easy open end. 				
than Dairy and	Tin plate container.				
Fruits & vegetables	Plastic pouch made of the laminated structure.				
based)	• Aseptic and flexible packaging material (Paper board or Aluminium foil or				
	polyethylene) based multi-layered structure.				
	Plastic-based multi-layered structure heat sealed pouches.				
	Plastic-based multi-layered structure heat sealed Zipper pouches or stand				
	up pouches.				
	Metal Containers with plastic or Polypropylene (PP) caps or metal or				
	plastic lid, Rigid Plastic container with plastic caps (Polypropylene (PP) Caps).				
	Wooden cask (for wines).				

Unit 3.11 Hazard Analysis and critical Control Points (HACCP) and ISO 22000

- Unit Objectives 🧭

At the end of this unit, the participants will be able to:

- Understand the hazards analysis critical control points in packaging
- Understand the ISO 22000 and its benefit

- **3.11.1 HACCP** -

HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product. Food safety systems based on the HACCP principles have been successfully applied in food processing plants, retail food stores, and food service operations. The seven principles of HACCP have been universally accepted by government agencies, trade associations and the food industry around the world.

DEFINITIONS

- **Control (verb):** To take all necessary actions to ensure and maintain compliance with criteria established in the HACCP plan.
- Control (noun): The state wherein correct procedures are being followed and criteria are being met.
- **Control measure:** Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.
- **Corrective action:** Any action to be taken when the results of monitoring at the CCP indicate a loss of control.
- Critical Control Point (CCP): A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.
- Critical limit: A criterion which separates acceptability from unacceptability.
- **Deviation:** Failure to meet a critical limit.
- **Flow diagram:** A systematic representation of the sequence of steps or operations used in the production or manufacture of a particular food item.
- **HACCP:** A system which identifies, evaluates, and controls hazards which are significant for food safety.
- **HACCP plan:** A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food safety in the segment of the food chain under consideration.
- **Hazard:** A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

- **Hazard analysis:** The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.
- **Monitor:** The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.
- **Step:** A point, procedure, operation or stage in the food chain including raw materials, from primary production to final consumption.
- Validation: Obtaining evidence that the elements of the HACCP plan are effective.
- Verification: The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

• HACCP principles

The seven hazard analysis and critical control point (HACCP) principles provide a systematic way of identifying food safety hazards, making sure that they are being managed responsibly and showing that this is being done continuously. In short this involves the following steps:

- Plan what needs to be done to maintain food safety and write it down.
- Do-what you planned to do to maintain food safety.
- Check that you are doing what you planned to do to maintain food safety and write down what was checked and when.
- Act to correct any food safety problems and write down what has been done about the problem and when.

• Application to Food Packaging

In recent years, suppliers of food product packaging have become increasingly considered a part of the food manufacturing industry. Several food safety certifications now designed for packaging have strong emphasis on HACCP.

An HACCP-based system operates on prerequisite programs which help management ensure that products are produced in a safe manner. Prerequisite programs are often times programs that are already in place at a packaging supplier as a part of the current quality management system. Prerequisite programs can include:

- 1. Good Manufacturing Practices
- 2. Integrated Pest Management System
- 3. Preventative Maintenance Program
- 4. Supplier Management Program
- 5. Traceability & Recall Program
- 6. Documentation and Record Keeping
- 7. Allergen Awareness Management Program
- 8. Foreign Material and Detection Control
- 9. Cleaning and Sanitation Program
- 10. Corrective Action Program

Food Packer

The seven core principle steps of HACCP are:

- Principle 1 Conduct a Hazard Analysis
- Principle 2 Determine Critical Control Points (CCPs)
- Principle 3 Establish Critical Limits
- Principle 4 Establish Monitoring Procedures
- Principle 5 Establish Corrective Actions
- Principle 6 Establish Verification Procedures
- Principle 7 Establish Record Keeping and Documentation Procedures

Preliminary Tasks in the Development of the HACCP Plan

There are following steps for development of the HACCP plan



3.11.2 ISO 22000

Food safety is related to the presence of and levels of food-borne hazards in food at the point of consumption. As food safety hazards may be introduced at any stage of the food chain, adequate control throughout the food chain is essential. Thus, food safety is a joint responsibility of all parties participating in the food chain. ISO() has a number of International Standards aimed at ensuring food safety throughout the supply chain

ISO 22000 ensures integrity of food supply chain by minimizing food-borne hazards throughout the food chain by ensuring that there are no weak links. It defines the steps an organization must take to demonstrate its ability to control food safety hazards and ensure that food is safe for human consumption.

The ISO 22000 international standard specifies the requirements for a food safety management system that involves the following elements:



Fig 3.25. Food Safety Management System

The ISO 22000 family addresses food safety management by providing guidelines and best practice for managing risks in all areas of food production. At the present time, the following standards will make up the ISO 22000 family of standards:

ISO 22000 - Food safety management systems - Requirements for any organization in the food chain. **ISO 22001 -** Guidelines on the application of ISO 9001:2000 for the food and drink industry (replaces: ISO 15161:2001).

ISO/TS 22002- Prerequisite programmes on food safety—Part 1: Food manufacturing; Part 2: Catering; Part 3: Farming; Part 4: Food packaging manufacturing; Part 6: Feed and animal food production

ISO TS 22003 - Food safety management systems for bodies providing audit and certification of food safety management systems.

ISO 22004 - Food safety management systems - Guidance on the application of ISO 22000:2005. **ISO 22005 -** Traceability in the feed and food chain - General principles and basic requirements for system design and implementation.

ISO 22006 - Quality management systems - Guidance on the application of ISO 9002:2000 for crop production.

ISO 22000 is also used as a basis for the Food Safety Systems Certification (FSSC) Scheme FSSC 22000. FSSC 22000 is a Global Food Safety Initiative (GFSI) approved scheme.

The manufacture of safe packaging and packaging materials is a critical part of ensuring the integrity and safety of the food supply chain. The packaging for food and feed has many essential functions from protecting its contents against contamination or damage, leakage or loss, to providing a show case for the marketing of the product to the consumer and the provision of obligatory product information.

The sector is bound by many regulations and there are a variety of elements in the production and function of food packaging that must be considered .Added to this is the wide variety of component materials which include glass, plastic, metal and paper all of which have their own inherent risks.

FSSC 22000 provides a certification Scheme that incorporates an in-depth hazard analysis in a robust food safety management system to control the food safety hazards, minimize risks and assure the production of safe packaging and packaging materials. The FSSC 22000 scheme was given full recognition in 2010 by the Global Food Safety Initiative (GFSI). It is an industry-driven initiative providing guidance on food safety management systems, which are necessary for safety throughout the supply chain. Using the international standards; ISO 22000 for food safety management systems with ISO/TS 22002-4, the sector specific pre-requisite programs for food packaging manufacturing and the FSSC 22000 additional requirements, FSSC 22000 ensures consistent, high quality audits which are monitored by an integrity program to measure and maintain performance for the delivery of safe packaging and packaging materials all over the world.

ISO 22000 benefits

ISO 22000 can contribute to the quality of life in general by:

- Ensuring safe food
- Reducing food borne diseases
- Better quality and safer jobs in the food industry
- Better utilization of resources
- More efficient validation and documentation of techniques, methods and procedures
- Increased profits
- Increased potential for economic growth and development

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– Notes	









4. Use of basic health and safety practices at a food processing facility

- Unit 4.1-Personal protective equipment (PPE) used in packaging work conditions
- Unit 4.2 -Responsibility of employer and employee for health and safety in workplace
- Unit 4.3-Identification of hazardous work in job-site and finding appropriate causes of risk/accidents in facility along with types of hazards
- Unit 4.4-Location of general health and safety equipment equipments and guidelines for working safely
- Unit 4.5-Handling of food and other related material along with house keeping practices
- Unit 4.6-Hazard signs and various policies in food processing unit Unit 4.7-Different types of fire extinguisher and rescue from fire
- Unit 4.8-Freeing person from electrocution and use of first aid kits
- Unit 4.9-Handling and reporting of an accident or medical emergency
- Unit 4.10-How to move people during emergency?

FIC/N9002 (Part of - FIC/Q7006)

Key Learning Outcomes

At the end of the module, the participants will be able to:

- 1. Use of protective clothes and equipments for particular tasks and work condition
- 2. Responsibility of employer and employee for health and safety in workplace
- Identification of hazardous work in job-site and finding appropriate causes of risk/accidents in facility
- 4. The appropriate way to deal with hazard to ensure safety in workplace.
- 5. Accident prevention in the work environment
- 6. Location of general health and safety equipment
- 7. Working safely in and around trenches, elevated places and confined areas.
- 8. Handling of food and other related material
- 9. Housekeeping practices.
- 10. Hazard signs
- 11. Various policies in food processing unit
- 12. Different type of fire extinguisher
- 13. Rescue during a fire hazard
- 14. Freeing person from electrocution
- 15. Using a First-Aid Kit
- 16. Handling an accident or medical emergency
- 17. Accident report
- 18. How to move people during emergency?

Unit 4.1 Personal protective equipment (PPE) used in packaging work conditions

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- 1. Use of personal protective equipment
- 2. Classification of personal protective equipment

4.1.1 What is personal protective equipment?

Personal Protective Equipment is any device or clothing worn by a worker to control the level of risk that when the worker when exposed to :

- Dangerous goods, hazardous chemicals, infectious substances
- Dust, fumes or particles
- Radiation (ionizing and non-ionizing), ultraviolet or solar radiation
- Noise
- Moving objects such as vehicles, trolleys and forklifts
- Flying objects when using machinery with moving parts
- Environmental factors, for example, high and low temperature

4.1.1.1 Classification of personal protective equipments

- > Personal protective equipment can be roughly classified into the following categories:
- (a) Protective clothing;
- (b) Hand and foot protective gears;
- (c) Rye and face protective equipment; and
- (d) Respiratory protective equipment.

⊢ Notes	

> Types of Personal Protective Equipment are:

There are different tasks and appropriate personal protection equipment to reduce the potential hazards which is shown in table 4.1

Table 4.1 personal protection equipment

Tasks	Potential Hazard	PPE
Instrument or equipment repair/service	Eye damage from foreign objects	Safety glasses No loose clothing or jewelry
Glassware washing	Skin lacerations	Safety glasses Heavy rubber gloves Lab coat, closed shoes, long pants, long skirt or equivalent leg covering (no shorts)
Working in Industrial lab with potential injury from falling equipment or tools (ex. Earthquake lab, Structural Engineering lab, etc.)	Head injury, foot injury	Hard hat Steel toe shoes
Automobile/Heavy Equipment Mechanic Work	Flying particles, petroleum solvents and wastes	Safety glasses, chemical resistant gloves
Low Voltage Electrified Equipment Work	Electric shock, falling	Electrically insulated gloves (rated for voltage of energized equipment), insulated blankets or mats, non-synthetic work clothing, fall protection when working at elevations
High Voltage Electrified Equipment Work	Electric shock, arc, explosion and burns, falling, confined spaces, vehicles in traffic areas	Hard hat, safety glasses, face shield, insulated gloves (rated for voltage of energized equipment), insulated blankets or mats, non-synthetic work clothes, safety shoes, fall protection when working at elevations, reflective clothing when working near traffic
Refuse Work	Noise, sharp objects, garbage	Hearing protection, safety glasses, cut/puncture resistant gloves, rubber gloves, safety shoes
Moving Work	Lifting/carrying	Safety shoes, gloves

> Different personal protection equipment and their application:

There are different types of personal protection equipment and their application which is shown in table 4.2

PPE	Specific Type	Applications
Safety glasses		Working with chemical, biological, radiation, physical hazards
Goggles		Working with particulates
Leather gloves	Va.	Handling sharp objects and metal, field work, welding
Wire mesh gloves		Working with sharp instruments or live animals
Electrical safety gloves		Electrical safety applications with higher hazard/risk or unknown
Disposable sleeves	*	Working with particulates or potent compounds

 Table 4.2 Application of personal protection equipment

PPE	Specific Type	Applications
Cooling vest		Hot environments
Shoe cover		Working with loud equipment, noises, sounds, alarms, etc
Ear plugs	<mark>1 111 -</mark>	Handling sharp objects and metal, field work, welding
Foot wear	<u>k</u>	Working with sharp instruments or live animals
Head protection		Electrical safety applications with higher hazard/risk or unknown
respirators		Working with particulates or potent compounds
Personal protection equipment for body part Different option of personal protection equipment for body parts are shown in table no.4.3 Table 4.3 Personal protection equipment for body part **Body Parts** Options Eyes Class 4 Class 6 Corrosive chemical splash, dust particle, flying objects, harmful gas, radiation Head & Neck Free falling material, head bumping with objects, tangling of hairs into machines, chemical drops and spatters, climate or temperature Ears High frequency sounds, undesirable noise Hands & arms Bruise, severe temperature and radiation, cuts and piercing, strike, chemicals, electric shock, vibration, biological agents and dipping in water for long durations Feet & Legs Different temperature conditions, electrostatic build-up, slipping on floor, cuts and punctures, free falling materials, weights, metal and chemical spatter, vehicles

Body Parts	Options
Lungs Oxygen-deficient atmospheres, dusts particles, poisonous gases and vapors.	
Whole body Free falling material, head bumping with Adverse temperature, chemical or metal spatter, spray from pressure leaks or spray guns, contaminated dust particles, strike or penetration, excessive clothing or tangling of own clothing	Controls Markey Mark

tes 🖺			

Unit 4.2 Responsibility of employer and employee for health and safety in workplace

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Know about various personnel in a workplace for ensuring safety and health.
- Understand the responsibility of worker.

4.2.1 Workplace safety

Workplace safety doesn't come from a single person. All the employees as well as employer are responsible for ensuring workplace. Both of them have different sets of roles to play in order to ensure that workplace safety is a primary thing.



- 4.2.2 Responsibility of employer

Being an employer, he/she must assure that:

- All work should be done without any risk of injury or disease
- All machines and equipment should perform their assigned functions safely
- All buildings and structures should be able to bear the stress.
- Buildings, excavation structures, machinery, equipment, tools, and places of employment should be maintained in proper condition so that worker's life will not be on risk.
- Systematic and regular basis inspections of sites, machines, tools should be done.
- Corrective action should be taken without any further delay.
- Worker should be supplied with necessary PPE.
- All workers should perform their duties safely.
- An accident prevention program should be there
- There should be proper safety measures from entry to exit.
- Fire extinguishers should be working properly.
- Person with disabilities(PWD) or mental impairment should not be assigned to those work which risk their as well as others life.
- Worker should not be allowed to work under any type of intoxication which risk life of worker as well as other persons.

Every worker in the workplace should be responsible for their safety i.e., the worker has right to deny to do any work or operate any machine when he/she has genuine reason that if he/she did it, it might risk their life. It is workers responsibility to wear proper outfit with respect to workplace including PPE. A worker should consider following responsibilities:

- A worker should not remove any safety part from machine which risks their life.
- Worker should possess complete knowledge about the instrument or machine which he/she is going to operate.
- Worker should ensure that while he/she operates machine or instrument no one should get injured from it.
- Ensure safe exit from and entry to workplace.
- You need to that the workplace is safe for mobilization of manpower, machines, and materials.
- Wear proper PPE while at some critical environment or machine.

Health and Safety Committees

In any organization, employer should have proper accident prevention programs as a responsible member of organization. A health and safety committee should be there as a part of program, if the number of employees is more than 20. In-case there are less than 20, it is not mandatory to have committee but should be done by company side.

There should be 4 experienced persons in this committee from workplace. Both employer and employee should be part of this committee keeping in mind that the number of employee should always be more than number of employer.

Unit 4.3 Identification of hazardous work in job-site and finding appropriate causes of risk/accidents in facility along with types of hazards

Unit Objectives 🞯

At the end of this unit, the participants will be able to:

- Identify the different possibilities of accidents that may occur in workplace.
- Know about various personnel in a workplace for ensuring safety and health.
- Understand the responsibility of worker.

4.3.1 Types of workplace accidents -

The Occupational Safety and Health Administration, frequently called OSHA for short, has a succinct definition for a workplace accident. It's an ''unplanned event that results in personal injury or property damage.'' OSHA is a government body tasked with helping keep workplaces safe for its employees. **Types of Workplace accidents:**

1. Overexertion: We do it all the time: pull a heavy load, carry equipments which are way too heavy or lift heavy boxes. Injuries from overexertion (sprains and strains) are the major workplace accident.

2. Falling: Just like in our opening example, falling from a particular place is a very big risk in many workplaces such as falling down from stairs.

Most common types of injuries keeping workers away from work



Sprains, strains or tears



Soreness or pain



Cuts, lacerations or punctures

Fig 4.2 Identification of hazardous work

3. Slips and trips: Have you ever seen the image of someone slipping on a banana peel? It's the same idea (probably minus the banana). Slips and trips can lead to muscular tension and other injuries.

head injuries in workplace. 5. Repetitive motion: Repetitive motion such as sitting continuosly for long duration in computer, holding weight or may be something else have a major impact on workers. Subsequently efficiency and effectiveness of the worker decreases. workplace injury events resulting in lost work days **Helpful Tips:** 1. OVEREXERTION Avoid bending, reaching and · Lifting or lowering twisting when lifting Repetitive motions Take frequent short breaks **OF INJURIES** 2. CONTACT WITH **OBJECTS AND** Store heavy objects OF INJURIES: EQUIPMENT close to the floor Be aware of moving · Struck by or against equipment/objects in object or equipment your work area Caught in or compressed Wear the proper by equipment or objects personal protective Struck, caught or crushed equipment in collapsing structure, equipment or material 3. SLIPS, TRIPS Place the base of ladders on an even, AND FALLS solid surface · Fails to a lower level OF INJURI Use good housekeeping · Falls on the same level practices Fig 4.3 Work place injury

4. Falling objects: Free falling objects in the processing facility, construction sites are of the major risk of

4.3.2 What are workplace hazards?

What is a workplace hazard?

In everyday life we may pass through any type of hazard. Knowing the possibility and its effect on us may be one thing which can ensure our safety. Even in workplace there are various hazards. If we can identify hazards, we can better know what should be needed to done in those situations so that any injury, damage, and time can be saved.

For any workplace, it is important to conduct a hazard assessment whether is work environment or an equipment. A hazard assessment should be thoroughly done so that there is minimum damage to worker, property or time. The various type of hazards that should be considered in a hazard assessment are:

1. Safety Hazards

Any unsafe working environment that can lead to injury, illness, and death is a safety hazard. These are most common type of hazards that are witnessed in a workplace. They include:

- Anything that can cause spills or trips such as cords running across the floor or ice
- Falling from heights such as elevated platforms, ladders, roofs,
- Unguarded machinery and moving machinery parts that a worker can accidentally touch
- Electrical hazards like torn cords, missing ground connection, faulty wiring
- Confined spaces.

2. Biological Hazards:

Coming in contact to any harm or illness which can be transferred while working with infected animal, plants or may be person possess biological hazards. Different things which can lead to biological hazards:

- Insect Bites
- Animal and bird droppings
- Bacteria and viruses
- Fungi/mold
- Plants
- Blood and other body fluids

3. Physical Hazards:

Anything which is present in environment and may harm us even without touching is a physical hazard. They include:

- Radiation: including ionizing, non-ionizing (EMF's, microwaves, radio waves, etc.)
- Exposing to sunlight/ultraviolet rays for long duration
- Extreme weather conditions
- High frequency sound

4. Ergonomic Hazards:

Any particular work, body posture, or work environment put undesirable pressure to body lead to ergonomic hazard. They can't be easily identified as you don't face the symptoms immediately. Doing it for a short duration may lead symptoms like soreness which may eventually turn into illness if continued in long term. They include:

- Improperly height of workstation and chairs
- Frequent lifting
- Poor body position
- Awkward repetitive movements,
- Applying too much force frequently
- Vibration

5. Chemical Hazards:

Any chemical solid, liquid or gas, when it is exposed to worker during preparation of chemical it possesses chemical hazards. This may lead to irritation, illness or respiration problems. In a workplace you should be careful with:

- Liquids like cleaning products, paints, acids, solvents Especially if chemicals are in an unlabeled container!
- Vapors and fumes that come from welding or exposure to solvents
- Gases like acetylene, propane, carbon monoxide and helium
- Flammable materials
- Pesticides

6. Work Organization Hazards:

Hazards or stressors that cause stress (short-term effects) and strain (long-term effects). These are hazards associated with workplace issues such as workload, lack of control and/or respect, etc. They include:

- Uneven workload
- Violence with colleagues in workplace
- The intensity and/or pace
- Respect (or lack thereof)
- Flexibility is less
- Control or say about things
- Social support or relations are not good
- Sexual harassment

Table 4.4 workplace safety

If you are working at elevated platforms	The ABC's of Fail Protoction B B Workplace Bafety Tips
Poor housekeeping	CAUTION WET FLOOR



Lockouts/Tagouts	
Chemicals in the workplace	DANGER SULFURIC ACID
Dealing with the fire	To remove the second se

-4.3.3 Prevention of accidents at workplace

How to prevent accidents and miss-happening in workplace?

Any unplanned incidents that leads to injuries, damage or any other losses to anyone or propert is an accident. One can never completely eliminate accidents, but there are always strategies and actions that may be taken to minimize accidents.

4.3.3.1 Do you know the possible hazards?

- Always be alert and aware of you environment. Look your workplace and identify the possible hazards.
- Identify various methods to minimize or completely removing hazards, and implement them.
- Make a report of possible unsafe places.
- Dress according to the weather conditions.
- Always conduct a hazard analysis in the facility.

4.3.3.2 Precautions to make a workplace safe

- Everything in workplace should be organized whether it is housekeeping or workplaces. Any type of negligence may lead to hazards.
- Inspection of the vehicle should be done regularly. DRIVE SAFELY.
- Always try to follow healthy and safe practices.
- Don't work continuously. Taking small breaks may help in reducing st ress and improve efficiency.
- Make sure your workstation is comfortable.

4.3.3.3 How to lift things properly?

Follow the following techniques to lift object to avoid any type of stress and hazards:

- Always carry objects from a powerful position
- You should keep the load close to you
- Try to move from side to side
- You should not be twisting while lifting a load

If a person is trained in body mechanics, it can help in limit strain injuries and the employee will be lifting and moving objects safely.

4.3.3.4 Personal Protective Equipment

Using the PPE properly can help in reducing the risk of getting injured. Hence it is recommended to the employee that you should use PPE in workplace.

4.3.3.5 Communication is the key

- Always acknowledge your seniors about safety hazards.
- Always take initiatives for the safety planning and put your opinion.
- Always follow the standards and do job carefully.

4.3.3.6 Education and Training

- Employer should always give proper training with reference to hazards in workplace.
- You can use internet as a source of training environment health and safety.
- Every employee should be actively participating in the maintaining safety in the workplace and facility.



Unit 4.4 Location of general health and safety equipment equipments and guidelines for working safely

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Understand about the possible locations for health and safety equipments.
- Know how to work around trenches, elevated place and confined areas.

4.4.1 Locations of health and safety equipments

We already have discussed about various types of hazards that might be occurring in a workplace. It is necessary to have proper general health and safety equipments in a workplace to avoid undesirable situations. Moreover the location of those equipments should be known to everyone to avoid the losses.

Equipment	Location
First aid kit	Every department (Office, Procurement, Production, Quality,
	Dispatch)
Personal Protective Equipment	Quality lab, maintenance, production, procurement, dispatch
Fire Extinguisher	Near office, machines, heating sources, and other equipments.
Helmets	Production, procurement, dispatch.
Chains	Workplaces at height

Table 4.5 Locations for health and safety equipments



Fig 4.4 Fire Emergency procedure

- 4.4.2 Guidelines for working safely —

- Guidelines to work in and around trenches
 - You should not put any heavy equipment near to a trench site.
 - Surcharge loads and trench edges should be at least 2 feet (0.6 meters) apart from each other.
 - You should know about the location of underground utilities.
 - Always check for proper level of oxygen, absence of hazardous fumes or any toxic gases.
 - You should always inspect your trench site before starting.
 - After rain, you should inspect the trench.
 - You should never work under raised loads.



Fig 4.5 work in and around trenches

Guidelines to work at elevated places

While you are supposed to work at elevated platforms, your employer should ensure that:

- All the work at elevated platforms is properly planned and organized.
- Risk assessment should be done prior working at elevated platforms.
- Equipment which is supposed to be selected and used should be appropriate.
- Worker should possess proper skills
- Every instrument should inspected and maintained prior to action
- Fragile surfaces are appropriately controlled for any types of risk



Guidelines to work at confined areas

The various important points that are considered while a safe system of work is developed are:

- Proper skills set, training, monitoring and fit
- Everyone should follow procedures for taking permissions for work
- One should look for air circulation and gas purge
- Minding the dangerous residues
- Checking and monitoring the workplace
- Mechanical, electrical and process segregation
- Availability of PPE
- Handling the equipments safely
- Communicating to the seniors
- Access and egress
- Always keep the flammable material apart which may risk life.



Fig 4.7 work at confined areas

- Notes	

Unit 4.5 Handling of food and other related material along with house keeping practices

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Understand the correct procedures to handle food and related material in workplace.
- Know housekeeping practices in the processing facility.

4.5.1 Handling of food and other related materials -

Food material should be handled properly in order to ensure the maximum safety, minimum contamination, and minimum wastage. This will ensure that the company is following the regulations in order to provide safest food to the consumer.



Material handling is done at three stages as per the above diagram. There are certain pre-requisites before a material is handled in the workplace which ensures the hygiene of the worker.



After washing the hands, person should:

- Apply sanitizer on his/her hands.
- He/she should wear gloves, apron, mask and headgear (as per the requirement).
- He/she should remove watch, bangles, any tread, ear rings, etc.



Fig.4.9. Wearing of mask, apron, gloves

For handling the material one should follow the basic requirements so that the minimum contamination takes place. It will ensure the maximum safety of the product.





Fig 4.10. Handling of equipment

4.5.2 Housekeeping Practices -

Every food processing professional understands that clean facilities are critical to food safety. They're also critical to the safety, health, and morale of everyone who works in your plant. The Occupational Safety and Health Administration (OSHA) issues general "housekeeping" guidelines for every workplace. What do those look like for food production?

Clean, dry floors

Clean, dry floors are a priority in every workspace. Whether planning a new facility or considering renovations, make sure your floor is made of material appropriate to your plant's needs. If your production involves wet processes, install proper drainage, and provide mats or elevated platforms for safe standing.

Clear walkways

Slips, trips, and falls are a leading cause of nonfatal workplace injuries. Make sure walkways and passageways are clear and navigable. Mark passageways with clear signage, and install mirrors to eliminate blind spots. Watch for trouble spots in your floors caused by rough junctions, worn carpeting, bulged out nails, or unsecured boards.

Effective sanitation

Food processing facilities have to be especially careful about spreading pathogens, both to workers and to food. The right vacuum filtration system will remove contaminants and keep them trapped, rather than releasing them back into the air. Know and use basic agents of sanitation on all your navigable surfaces.

Safe storage

Make sure clutter doesn't encroach on your workspaces. Items left in passageways or workspaces can endanger traffic flow and present ergonomics issues and injuries. Ensure your routes and workspaces stay clear by providing proper storage and organization. If that storage is overhead, make sure there's no risk of falling objects injuring anyone below.

ire awareness

Fire hazards in food processing arise primarily from flammable fluid leaks or dust accumulation. Hydraulic fluids used in food processing equipment must now be USDA-approved. OSHA also publishes a poster that lists the many types of food-related combustible dust.

Covers and guardrails

If your operations utilize any open tanks or vats, make sure they're properly covered and protected. Guardrails must protect all exposed sides of stairway floor openings and elevated walkways. Place adequate to eboards, screens, and removable or fixed standard railings around all ladderways, hatchways, and chute floor openings.

A culture of clean

Of course, your best housekeeping success depends on employees' shared efforts, and that requires a culture around cleaning. Housekeeping can't be a one-time thing, so put plans in writing and engage buyin by providing training and proper tools. Encourage everyone to report spills and other safety incidents. Workplace cleanliness isn't just safer. It improves health, productivity, and job satisfaction. Ultimately, your attention to housekeeping sends a message to employees that you care about their safety and wellbeing in the workplace.

- Notes	

Unit 4.6 Hazard signs and various policies in food processing unit

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Identify different hazards signs in packaging workplace
- Know about different policies of processing facility.

4.6.1 Signs for various hazards mentioned in a packaging workplace.

Different hazards signs that are displayed in a packaging workplace.







4.6.2 Policies in food processing unit

4.6.2.1 Food safety policy

We should be continuously enhancing the brand value that our employees are building and working to produce and serve, by maintaining the confidence of consumers for our products and services. It should be achieved by continuous modifying and implementing the quality and safety systems, standards and practice.

In our unit, all the operations should be done with a commitment to continuous enhancement. It should be recorded, assessed and authenticated for effectiveness with the help of internal and external audits. Our unit should be committed to these following principles of quality and food safety:

- All the products and services should be manufactured by following the standards and should be delivered to ensure maximum quality and safety.
- Products and services should meet the required standards with respect to quality and safety.
- We should create a sustainable culture for ensuring maximum quality and safety by means of implementing good procedure, getting certified and continuous improvement of efficient quality and FSMS complaints with the help of ISO 9001, FSSC 22000.
- Verify the efficiency and effectiveness through audits which are recognized by the ISO
- Conducting a risk assessment to meet the company goals for continuous enhancement and value creation.
- Creating structured programs for making up quality and food safety capability, idea orientation and environment.
- Making a schedule for reviewing the quality of product, SOPs, standards and food safety policies.
- We should be including the strategies for quality and safety in AGM so that they can be prioritized in the operations and would be followed to meet the requirements.
- Setting up weekly, monthly, quarterly and annually targets to make sure that there is continuous enhancement and all the standards are followed properly.
- Monitoring the quality from the vendor side so that the final product is of desired quality.
- Setting up guidelines for procuring raw materials from vendors.

4.6.2.2 Packaging policies

- It should attract the consumers.
- It should give the relevant information.
- It should be able to hold and gather the content in it.
- t should preserve and protect the content.
- Work from upstream to downstream all along the packaging life cycle.
- Combining continuous improvement and breakthrough innovation
- Build coalitions to scale up relevant waste management.

4.6.2.3 Pest control policy

- The processing facility must ensure food hygiene with respect to contamination and foreign biological hazards.
- Raw materials should be inspected for any type of infestation to ensure standards and quality of the product.
- FBO should ensure for pest free processing facility. Which ensure that the entry of any type of pest control is prohibited in the facility.
- All the pests should be properly controlled so that the company can meet the regulatory standards and ensure that there are no chances that a pest will migrate in the processing facility.
- FBOs should allow only verified and well recognized contractors in order to get the best pest control services.
- Use of restricted and harmful pesticides should avoided keeping safety as utmost priority.

Unit 4.7 Different types of fire extinguisher and rescue from fire

Unit Objectives

At the end of this unit, the participants will be able to:

- Know about types of fire extinguishers and how should we operate them.
- Understand about how to rescue during a fire hazard.

- 4.7.1 Types of fire extinguishers –

A fire extinguisher is an active instrument which helps in controlling small fire in emergency situations. It can't used for huge fire which are out of control. Such fires are controlled with the help of fire brigade. The different fire extinguisher generally used are:

1. Water and Foam

These types of extinguishers aim on controlling fire by working on the heat element (temperature) of the fire. Foaming agents helps to segregate the oxygen from the rest which create an oxygen deficit environment and hence helping in controlling the fire.





Fig 4.14. Water and Foam



2. Carbon Dioxide

CO2 type extinguisher takes the O2 (oxidizing) element of the triangle and also by taking out the heat with the help of very cold discharge material. This can be used in type B and type C fires.

Fig 4.15. Carbon Dioxide

3. Dry Chemical

These types of extinguishers focus on creating a hindrance in the chemical reaction, and hence controlling the fire.

Multipurpose dry chemicals types are leading in the usage for controlling the fire in today's world as these can control all the three type of fire (type A, B & C). Dry composition also works on type A fires by creating a fencing to oxygen and fuel. Basic dry chemicals can control only type B & type C fire. It is very necessary to use appropriate extinguisher for the type of fuel. Incorrect agent will not be able to successfully extinguish the fire as there are instance of being re-ignition of the fuel.



Fig 4.16. Dry Chemical

4. Dry Powder

These are quiet similar to dry chemical type. They control fire either by interrupting the supply of the fuel from oxidizing agent or by removal of heat.

These are only for Class D type fire or combustible metal fires.





5. Water Mist

These types of extinguisher focus on taking away heat from the fire. They are a better preference to clean agent extinguishers where cross-contamination is major risk.

Fig 4.18. Water Mist

6. Cartridge Operated Dry Chemical

These extinguishers work primarily on creating a barrier to chemical reaction.

The multipurpose dry chemical are similar to stored pressure dry chemical extinguishers, and are effective on A, B and C type fire. This agent also works by interrupting between oxidizing agent and fuel on Class A fires.

Class A fire: Trash-Wood-Paper

Class B fire: Liquids

Class C fire: Electrical equipments



Fig 4.19. Cartridge Operated Dry Chemical



4.7.2 Rescue during fire hazard

It is very important to safely vacate the persons from a building which is set on fire in the minimum amount of time from the safest path. This path needs to be shortest possible path and should be easily passable. It should be in proper condition so that in an emergency it can be used to evacuate the entrapped person in a building. The basic requirements are:

- Provision of a sufficient number of properly constructed, unimpeded capacity exit means accessible at all times.
- Alternate options should always be ready to use, if the existing one are unavailable for use due to fire, smoke and poisonous gases;



Fig 4.21. Escape plan during Fire

- The entire route should be protected with fire and other related consequences during the time of evacuation based upon the number of entrapped people, distance to be covered and capacity of exit
- One should adopt compartmentation and subsequent protective measures so that people entrapped in fire are evacuated successfully.
- There should be sufficient and trustworthy system of alarming during a fire so that everyone gets alerted.
- There should be proper areas to refuge the people in case of an emergency.
- Sufficient lighting and direction guide should be there in evacuation site.
- Formulating the organization and mock drill should be conducted for training purpose.

Unit 4.8 Freeing person from electrocution and use of first aid kits

– Unit Objectives 🎯

At the end of this unit, the participants will be able to:

- Understand about the various techniques which can help in freeing a person from electrocution.
- Understand to know about the various situations where a first-aid can be used.

4.8.1 Electrocution –

Electrocution is defined as the death of a person by electric shock, or when electric current passes through the body. The word is derived from two words electro and execution, but accidental deaths are also referred as electrocution. Simply being shocked, and not dying, is not electrocution.

The different consideration to free a person from being electrocuted:

- 1. Only use a non-conducting material for freeing up the person from being electrocution.
- 2. Do not free a person with direct contact.
- 3. Do not use a conducting material.
- 4. Make sure the material used for freeing up is not wet.
- 5. Wear shoes.
- 6. Put some dry jacket to maintain the body temperature of the person.



Fig 4.22. Various techniques for electrocution rescue

- 4.8.2 Need for first aid -

First aid is first treatment provided to a patient or sick person for any accident or sudden illness before an ambulance arrives, the arrival of a trained paramedic person or before arriving at a facility capable of providing professional medical attention. As a consequence of disaster or civil strife people suffer injuries which require urgent care and transportation to the nearest healthcare facility. People suffer accidents that require urgent care and mobilization to the nearest health facility as a result of tragedy or civil strife. The aims of first aid are:

- To save life,
- To avoid any further deterioration of someone's medical condition,
- To facilitate faster recovery, and
- To assist in ensuring safe transport to the nearby health facility

4.8.2.1 BLEEDING

The first step is to inspect the bleeding and you should call the ambulance immediately if any situation prevails:

- Bleeding is uncontrollable
- There are chances of internal bleeding
- Presence of wound in abdomen or chest
- Even after pressing firmly for 10 minutes, the bleeding is not stopping.
- Blood is continuously coming out of wound

First aid for bleeding

1. Stop Bleeding

- With the help of clean cloth, or tissues or a gauze, apply direct pressure on the cut and wound.
- Don't remove the cloth even if the material is drenched. Try to put additional cloth and continuously apply pressure.
- If bleeding is in arm or leg, you can lift it above the height of heart so that you can slow down bleeding.
- Before and after giving first aid treatment, ensure that you are washing your hands.
- Unless the bleeding is serious and does not stop with direct pressure, do not apply a tourniquet.
- 2. Clean Cut or Wound
- You should clean the cut or wound with warm water. If you use a soap, make sure you wash it thoroughly to prevent any type of irritation on the wound.
- Don't use any chemicals which can lead to deteriorative effects to skin.
- 3. Protect the Wound
- To minimize the risk of infection, apply antibiotic cream and use a sterile bandage for covering it properly.
- You should change your bandages on daily basis so that would get clean and dry.

4. Need of a doctor

- The wound is very deep or the edges are exposed.
- If a person get wound on face.
- If the dirt is not coming out from the wound.
- If the wound gets infected and showing symptoms such as redness, discharge or tenderness or if the person gets fever.
- If you feel numb around the wound
- If there are sign of red marks..
- If the wound is caused by an animal or human bite.
- In case if a person didn't had a tetanus in past 2-3 years and get a puncture wound or a deep cut.

4.8.2.2 BURNS

You should follow these things if you want to treat a burn:

- Remove the individual from the heat source immediately to inhibit any excessive burning.
- Use the running cool or lukewarm water for 20 minutes to cool down the burn. You should avoid using creams, greasy substance and even ice.
- You should remove clothes and jewellery from any nearby area of burn skin.
- Use a blanket to keep the person warm and avoid rubbing the person especially in the burn area.
- Protect the burn by putting a film sheet on it- a clean plastic can also be used on hands.
- Take painkillers to avoid pain. Such as paracetamol, ibuprofen.
- Don't lye down it you got burns around face or eyes. It avoids swelling in the facial region.

4.8.2.3 CHOKING

Choking generally takes place when an external substance went into the windpipe which may lead to blocking the air flow. A piece of swallowed food may also be the reason of choking. In children, it might be due to gulping of small things. First aid should be given to the person as soon as possible because it would lead to cutting off oxygen supply to brain.

The American Red Cross suggests a "five-and-five" method that should be given as a first aid when a person is not able to forcefully talk or cry or even laugh because of choking:

- Give 5 back blows. For a choking adult, stand to side just behind him. For a child, get on your knees behind child. Put one arm on chest for support. Ask the person to bend making body parallel to ground. With the help of your heel of hand, give five back knocks between the shoulder blades of person.
- **Give 5 abdominal thrusts**. Give 5 abdominal thrust to person.
- Stand behind individual. You should place one foot a little ahead of another for balancing yourself. Take your arms around the waist of individual. Tip the individual a little bit forward. You need to kneel behind a child who is choking.
- You should make a fist. Keep it above individual's navel.
- Hold your fist with your other hand. Give a sudden thrust to individual in the upward direction.
- Do it 6-10 times until the blockage is removed.
- Give 5 blows followed by 5 thrusts until the blockage is removed.

4.8.2.4 ELECTRIC SHOCK

The threat of an electrical current totally depends on the nature of current, what was the intensity of the voltage, in what manner current passed through the body, individual's health and fast the person was handled.

There might be burns or sometimes there are no any visuals on skin. In both the cases, an electric current may impact on the function of body parts, internal injuries, heart arrest or some other injury. Even a small amount of electricity can be deadly in some cases.

When should you need to call a doctor

A person should seek a doctor when he goes through a electric shock to ensure proper functioning of body parts.

Caution

- You should not make any direct contact with the person if electricity is still running on his/her body.
- You should immediately call an ambulance or your local emergency contact if the person gets a burn from a high-voltage line or lightning. You are not advised to move near to the high tension wires. Try to stand away from the wires.
- You should never move the individual who has undergone electrical until and unless he/she is in very big trouble.

When a person should seek an emergency

If a person faces these situations you should call an ambulance or local emergency contact immediately:

- Serious burns
- Confusion
- A person is not able to take breath properly
- Heart beat is not norma;
- Heart arrest
- In someone undergoes muscular pain and contractions
- A person faces seizures
- A person has lost is consciousness

If you are near to the person you are supposed to take these actions as soon as possible without waiting for any sort of help:

- If possible identify the source and turn it off. Or with the help on non conducting material drag it to some other position.
- In the absence of breath, conscious, movement and coughing, person nearby should initiate the CPR procedures as soon as possible.
- Maintain the temperature of injured person with the help of jacket or anything to cover the person.
- You should use a bandage. You should use a clean and sterile gauze bandage to cover burned areas of person. Don't use a towel or blanket.

> POISONING

You should call an ambulance immediately if the person has fallen and not breathing. If you found that a person has lost conscious but still breathing, you should:

- Without any delay you should call the ambulance.
- Make sure that the person is kept in recovery position.
- If you found that a person has lost conscious but facing problem in breathing, you should:
- Without any delay you should call the ambulance.
- You should start the CPR procedure for the person.

Swallowed

If individual is awake and vigilant and don't have a intuition of vomit, the individual should wash the mouth thoroughly. And source all the medicines which might be required in case of an emergency.

> On the skin

You should immediately remove the affected clothing and thoroughly wash the affected body parts with sufficient amount of water which is maintained at room temperature.

In the eye

Thoroughly wash your eyes for 15-20 min with water. The water stream should be gentle. Enable the water stream to flow through the eye from the inside to the outside corner. You should not use any type of eye drops.

Inhaled

You should immediately take the person to an open environment facilitating fresh air. Make sure you are wearing any tight clothes around your neck.

If you are present inside, try to open up doors and windows.

You should avoid any types of fumes. If the gas is highly poisonous, don't try to evacuate persons without any protective wearing. You can become yourself a victim.

Bites and stings

In about 2 percent of stings from ants, bees and wasps, severe allergic reactions occur. Symptoms such as swelling of the ears, lips and tongue, difficulty breathing or widespread rash may be life threatening and demand urgent medical attention.

4.8.2.6 BANDAGING

Bandaging protects a skin split that helps in stopping the bleeding and prevents any infections. Dressings are gauze or tissue pads which can be applied directly against the wound to soak up blood as well as other fluids. Tissue bandages protect and keep dressings in positions.



Step 1. Dress the wound

- The person who is giving treatment to the patient should wear gloves or something similar to Put on gloves or use other protection to avoid any direct contact with the person's blood.
- You should use mild soap and water to disinfect the wound.
- You should apply little amount of antibiotic.
- Always a clean dressing should be used for the wounds. In gauze dressings, faster healing takes
 place as it allows air into it for quick recovery. The special surface of a nonstick dressing doesn't
 allow to getting it attached to the wound.
- You can use multiple dressing for soaking the blood from the wound.

Step 2. Cover the bandage

- You should cover the bandage with the help of roller gauze or cloth strips for several times for covering the wound.
- Also have an extra inch in the dressing.
- Don't tie up the bandage so tight that it interrupts the blood flow in active part of the wound.

Step 3. Secure the bandage

- Ensure a knot or tape at the end.
- Never tie a bandage tightly that lead to pale or blue discoloration of tissue.

Step 4. Check circulation

- You should ensure after few minutes and hours that the blood circulation is proper under bandage. Pale color of the skin is sign of poor circulation. Poor circulation also creates numbness or tingling in the affected areas.
- You are advised to loosen up the bandage in case of poor circulation. If the condition is severe you may seek medical attention.

4.8.2.7 ARTIFICIAL RESPIRATION & CPR

Artificial respiration is a controlled technique for inducing breathing when someone's natural breathing cycle has stopped. If these techniques are applied on the right moment, it can save a person struggling form death from drowning in water, choking, Such techniques, if applied quickly and properly, can prevent some deaths from drowning, choking, strangulation, suffocation, carbon monoxide poisoning, and electric shock. Rescuing someone's life with this technique comprises these two steps:

- One should be able to establish and maintain a proper passage of air from upper respiration tract to the lungs.
- There should be an interchange of oxygen and carbon dioxide in terminal air sac inside lung while the person's heart should be functioning. This technique should be applied as soon as possible till the person starts breathing to make it a successful count.



Fig 4.24. Artificial respiration

CPR stands for Cardiopulmonary resuscitation. It is a lifesaving method that is effective in different situations such as a cardiac arrest or near drowning where someone has stopped breathing or their heartbeat. According to the American Heart Association, everybody should start a CPR with chest compressions. They have classified three categories of people for giving a CPR:

- Untrained. A untrained person is always advised to give only hand chest compressions i.e., you should be giving a continuous compressions until a medical team arrives at a rate of 100 to 120 per minute. Being an untrained person you should not try to rescue person's breath.
- Trained and ready to go. You should investigate about the person's heartbeat and breath. In the absence of breath for almost 10 seconds, you should start CPR immediately. After 30 chest compression you should give two breaths.
- Trained but rusty. You should be giving the only chest compression at rate of 100-120 compression per minute.







Fig 4.25. Cardiopulmonary resuscitation

Unit 4.9 Handling and reporting of an accident or medical emergency

- Unit Objectives 🧭

At the end of this unit, the participants will be able to:

- Know the way to respond in an accident or medical emergency.
- This aim of this unit is that, you would be able know how to prepare an accident/incident report.

4.9.1 Ways to respond medical emergency -

An emergency situation may arise at any moment of time, especially when you are estimating it the least. Whenever an accident or medical emergency arises you need to keep certain things

- 1. Don't panic. If you will panic, then it would be appropriate to take best decisions at that moment.
- 2. "Keep yourself a priority" If you consider yourself in a safe situation then only you should help others.
- 3. You should remember about these three components of life. Airways should not be blocked. Breathing should be ideal. Circulation should be there. Hence, creating A, B, C of life. If you find that person is not breathing, you should start giving assistance with proper techniques. In case of ceased circulation, you should immediately call an ambulance and seek support. You need to be properly trained in case you are giving a CPR.
- 4. Always check whether the person is bleeding or not. In such cases, firstly you should wear proper hand gloves to assist the person and then giving sufficient pressure on the spot to stop bleeding.
- 5. You are always advised to look for shock or fracture.
- 6. You should look for any medical conditions of the entrapped person in an emergency.
- 7. Loose the clothes around the person's neck.
- 8. You should not feed any unconscious person.
- 9. You should never mobilize the individual until the situation is out of control. Try to make the person quiet, and warm.

4.9.2 Preparation of accident report —

An accident report is a documentation of any accident in a organization. It makes a proper record whether there is any harm to persons or company assets. This can be used to record:

- Any type of major or minor injury or accidents
- Any close calls,
- Any damage to the company's assets
- Any issues that happened with respect to health and safety.
- Surpassing any security and
- Unsuitable behavior in workplace.

In the evaluation and review of a case, this can be used as a reference. This report comprises the root cause which was responsible for accident and what corrective actions were taken to remove the major risks and prevention of happening similar accidents in the future. This can be helpful for the safety purpose as it may be a record of various types of risks and hazards that were not identified earlier. An accident report is very useful for future purpose and can be accessed by:

• An official for understanding how to prepare an accident report;

- An employee or a worker who has encountered similar accident;
- Awareness are training in an organization.

Whether it is a small or a big accident, every one of them should be mentioned in an accident report. Once the incident report is prepared, the report is submitted to the concerned authorities in the processing site. In a food processing unit, concerned authorities may comprise Production Manager, Quality Manager, Plant Manager, HR executive and few more people.

The below is the format for reporting an incident/accident:

Response Question

Table 4.6 Document for reporting an incident/accident

Incident Details	
Enter Job Description	
Date &Time of Incident	
What was the incident?	
Were there any injuries?	
Description of injury	
Pictures of injury	
Was there any damage to property?	
Description of damage	
Picture of damage	
What caused incident in the workplace?	
What steps will be taken to overcome the incident	
in future?	
Opinion of the management	
SIGN of concerned authority	
	1

Unit 4.10 How to move people during emergency?

- Unit Objectives 🎯

At the end of this unit, the participants will be able to:

• This aim of this unit is that, you would be able to move injured and other people during an emergency.

-4.10.1 Steps to handle emergency situation

Whenever a situation like emergency arises we must follow specific steps in a proper manner to counter down the problems. The following steps should be considered:

- A person shouldn't get panic w.r.t. any emergency situation
- You should report about the situation to the concerned person or your supervisors.
- You should be prepared with portable fire extinguishers and water source.
- The workstation should be vacated considering the safety of every individual.
- You must do the following things after an emergency situation:
- You should be reporting this to the respective person on power or senior.
- You should take suitable steps to take corrective actions.

4.10.2 Different way to move an injures person -

If a situation arises where you are supposed to move a person, make sure that you are not creating any trouble to the person by bending or twisting. If the person is lying on the ground, grab the shoulders of the person and giving support to neck, you may drag the person in a decent manner to a safe location.



Fig 4.26. Way to move an injured person

If you are dragging the person from feet, ensure that you are taking them in a straight line. You are supposed to keep the person flat and straight, when they are suffering from sprain at neck or back. You need to ensure that neck and spine are in straight line so that you can carry the person safely.

At the emergency situations, if you find any hard surface which can be used to carry the patient, you should log roll the patient onto the surface so that you can take them to a safe place. When a patient is injured and you roll them from back to side without putting stress in their spine it is termed as a log roll. The technique aims at keeping the spinal cord straight while the patient is moved on the wood. In this one person safely hold the head and neck of the injured person while others try to roll the person carefully to the platform.



Fig. 4.27. log roll to move an injured person

On the count of three, all the persons (2-4) who are responsible for rolling the body of injured should roll the individual while at the same time the person who holds head and should also do the same to maintain alignment with body so that there are no complications. Immediately a hard portable surface is place below the person and he'll be rolled to their back safely.
4.10.3 Different ways to move people in an emergency

The various types of evacuation patterns are explained below. It solely depends on the type of emergency situation that which of the following we'll be choosing:

- Vertical Evacuation Vertical type of evacuation is the most common method which is preferred to exit a facility. It generally involves the use of stairs. Proper directions are generally provided with the exit signs to exit the facility. The persons that do not require any type of assistance can use the stairs for evacuation from a facility. Those who possess certain disabilities may take assistance from other people if they want to use. Those individuals who have to use crutches or other equipments will have to make their own choices whether they can use emergency exits, especially when it is a multi-storey facility.
- Horizontal Evacuation This type of evacuation is generally preferred when individuals are supposed to move away from one zone to some other in case of emergency. This is followed when the persons cannot evacuate and it is safe to stay at a safer zone until the rescue team approach.
- **Stay in Place** There are some scenarios where the individuals are not able to move to a different location. The person should stay in a safe room which has an outdoor window with a phone if the danger is severe. Usually, telephone lines remain in operation during an emergency situation. If the phone line doesn't work then on can call and wave from the outdoor window.

- Notes	

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5. Employability Skills



Scan/Click this QR Code to access eBook https://eskillindia.org/NewEmployability

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Participant Handbook

S.No	Unit Name	Topic Name	Page No	Link for QR Code	QR Code
1	Unit 1 - Introduction to training program and overview of food processing industry	Overview of The Food Industry	3	https://youtu.be/J-2EiMVNtpM	
2	Unit 1 - Introduction to training program and overview of food processing industry	Overview of the food packaging industry	8	https://youtu.be/yONbvwkdwaY	
3	Unit 1 - Introduction to training program and overview of food processing industry	Orientation Video of Packing Machine Worker	8	<u>https://youtu.be/tdn267WByO</u> Y	
4	Unit 3 - Packing machines for various processed food products and identify nonstandard output	Different Types of Packaging	47	https://youtu.be/iTNRv0IZacl_	
5	Unit 3 - Packing machines for various processed food products and identify nonstandard output	Packaging and Storage of Finished Product	47	https://youtu.be/Ta18d6JIO3o	
6	Unit 8 - Employability & Entrepreneurship Skills	Introduction to Entrepreneurship	248	https://youtu.be/BzeoC3mSDgg	
7	Unit 8 - Employability & Entrepreneurship Skills	Business Opportunities in Entrepreneurship	248	https://youtu.be/s8poBVRm-n8	
8	Unit 8 - Employability & Entrepreneurship Skills	Traits of an Entrepreneur	248	https://youtu.be/3uEgWH9oWls	
Employability Skills (30 Hrs)				https://eskillindia.org/ NewEmployability	

Food Packer



