# Handbook on Modern Packaging Industries (2nd Revised Edition)

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Packaging is a means of ensuring the safe delivery of a product to the ultimate consumer in a sound condition at the minimal overall cost. Packaging not only differentiates one brand from another but also, at times, gives a preview of the product being sold. Although it is a subject of recent technological origin, the art of packaging is a sold as the primitative humans. Packaging is the science, art, and technology of enclosing or protecting products for distribution, storage, sale, and use, also refers to the process of design, evaluation, and production of packages and can be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sells. In many countries it is fully integrated into government, business, institutional, industrial, and personal use. The continual technological growth systems have undergone significant changes in recent years. A lot of packaging process has been streamlined to give a more scientific and rational approach. The role of packaging continues from the coordinated system of preparing goods to the end use. It has become a big tool for launching new specific products in different shapes and sizes. The packaging industrial growth has led to greater specialization and sophistication from the point of view of health (in the case of packaged foods and medicines) and environment friendliness of packing material. The demands on the packaging industry are challenging, given the increasing environmental awareness among communities. The packaging industry is growing at the rate of 22 to 25 per cent per annum thus is to play a unique role in preserving the wealth or value created by many industries.

This book describes the techniques and process behind packaging of different specific products which are used in our day to day life. The specific products include cereal, spices, edible oils, drinking water, chocolate and confectionery, fruits and vegetables, marine products and many more. Some of the vital contents of the book are adhesives for packaging industries, factors affecting adhesion, tin plate containers for foods, pharmaceuticals and cosmetics, tin plate usage in packaging, packaging of cereals and cereal products, trends in packaging of spices and spice products, packaging of edible oils, vanaspati and ghee, metal containers for food packaging, packaging aspects of sugar and chocolate confectionery, packaging for irradiated foods, packing of meat & meat products in tin containers etc.

This book is an invaluable resource for all its readers, entrepreneurs, scientists, existing industries, technical institution, etc in the field of packaging.

# Classification (a) Loss of water or solvent (b) Loss of Heat Theories of adhesion a. Mechanical Interlocking b. Electrostatic Interaction c. Diffusion Theory

d. Absorption Theory

Factors affecting adhesion

Spreading

Roughness

**Porosity** 

Diffusion

Rheology

**Thickness** 

Pressure

Starch

**Degradation Products of Starch** 

Comparison between starch and Sodium Silicate

Polyurethane

Basic urethane chemistry

Acrylics

Casein

Natural Rubber

Polyvinyl Acetate

Polyvinyl Alcohols

#### 2. Tin Plate Containers for Foods, Pharmaceuticals

and Cosmetics

Manufacturing Process

Can Sealants

#### 3. Tinplate Containers

Definition

Uses

**Types** 

Open Top containers

General Line containers

Nomenclature

Manufacturer of Tinplate containers

Decoration

Sizing

Coating

**Printing** 

Varnishing

Lacquering

Manufacture in Press Shop

Slitting

Component/end manufacture on presses

**Ancillary operations** 

Manufacture of Assembly Lines

Slitting

Notching

Folding Forming

Locking

Soldering/Cementing

Flanging

End seaming

Ancillary operations (if any)

Packing/Palletising

Flattened Cans

**Process Control** 

**Blackplate Containers** 

**Tinplate Closures** 

#### 4. Metal Container Industry In India

Raw Material

Manufacturing Process

#### 5. Tin Plate Usage In Packaging

Round Ends tinplate Layout Systems And Procedures

Straight and Single

**Double Row Staggered** 

Straight, Single Scrolled

**Duble Row Staggered Scrolled** 

Multiple Row Fully Stagered Plain

Double Row Staggered With Primary (deep)

or Secondary Scroll

Coil Feed: Single Or Multiple Die Set up:

#### 6. Packaging of Cereals and Cereal Products

**Spoilage Factors** 

Whole Grains & Split Pulses

Jute Bags

Advantages of Jute Bags and Jute Fabrics

High mechanical strength

Soft surface with high resistance to friction

Porous structure

Disadvantages of Jute Bags

Availability

Mineral oil contamination

Insect breeding

Cost

High Density Polyethylene (HDPE)/

Propylene (PP) Woven Sacks

Manufacturing Process of HDPE Woven Sacks

Extrusion Of Slit Film

Looming

Lamination

Cutting

Stitching

Printing

Bale Pressing and Packing

Advantages of HDPE & PP Woven Sacks

Disadvantages of HDPE & PP Woven Sacks

Quality Parameters to be Considered for Woven Sacks

Consumer Packs for Whole Food Grains

Milled Grain Products (Flours)

**Bulk Packs** 

**Consumer Packs** 

High Molecular High Density Polyethylene (HMHDPE)

Co-Extruded Films

Biaxially Oriented Polypropylene Film: (BOPP)

Laminates

Processed Cereal and Pulse Products

Cereal Based Convenience Foods

Weaning Foods

#### 7. Trends in Packaging of Spices and Spice Products

Packaging of Ground Spices

Bulk Packaging and Storage of Whole Spices

Packaging of Oleoresins and Volatile Oils

Insect Infestation and Fumigation

Literature Data on Packaging

**Future Trends** 

## 8. Packaging of Edible Oils, Vanaspati and Ghee

Introduction

**Spoilage Factors** 

Distribution Pattern

Packaging Systems/Types of Pack

Package Types

**Tinplate Containers** 

**Glass Bottles** 

Semi-Rigid Containers

HDPE (High Density Polyethylene) Containers

PET (Polyethylene Terephthalate) Bottles

PVC (Poly Vinyl Chloride) Bottles

Other Semi-rigid Packs

Flexible Pouches

Analysis of Needs and Shifts

Structures and Critical Polymers

**Critical Polymers** 

Polyester

A Closer Look

Flexibles as Economical Media

Flexibles as Effective Solid Waste Reducing Media

Indian Standard for Packaging of Edible Oils, Vanaspati and Ghee

Legislations

Conclusion

#### 9. Metal Containers for Food Packaging

**Abstract** 

Introduction

**Tinplate Containers** 

Developments in Tinplate Manufacture

Structure of Tincoating

Light tin coated steel (LTS)

Developments in can fabrication

Two Piece Cans

Drawn Thin Redraw (DTR) and precision sidewall thickness

control (PSTC) process

Plain Cans

Acid resistant lacquered cans

Sulphur resistant lacquered cans

High Tin Fillet (HTF) can

Corrosion problem in food cans and its inhibition

Quality control tests

Thickness of tinplate

Grain structure of tincoating

Coating continuity (porosity) test (ISV)

Tin oxide

Chromium in passivation layer

Special property tests

**Tincoating** 

Tin Free Steel Cans

Manufacture

Cansuper

Hinac coat

Hi-top

Stainless weirchrome

Fabrication of TFS cans

Mira seam

Conoweld

Forge welding

Advantages and Disadvantages of Tin Free Steel

Physical characteristics of HI-Top Plate

Corrosion resistance

Lacquering quality

**Formability** 

Weldability and solderability

Canning Food Products in Tin-free steel cans

Fish products

Meat products

Fruit and Vegetable products

Aluminium containers

Package forms

Aluminium closures and ends

Conventional closures

Easy open ends are of two types

Packaging of Food Products in Aluminium Cans

Fruit and vegetable products

Lacquered cans

Meat products

Marine products

Milk products

Alcoholic drinks

Corrosion in Aluminium cans

External decoration and Printing

Future Scope

Evaluation of indigenous electrolytic tinplate

Assessment of differential tinplate Evaluation of indigenous aluminium cans for processed foods Acknowledgement

#### 10. Packaging of Drinking Water

**Brief History** 

Main Processing System

**Packaging Materials** 

Bottle Filling113

**Bottle Labelling** 

#### 11. Bottle Labelling

Introduction

The Product Group

Packaging Materials for Snack Foods

Packaging Systems

Gas flushing

Compensated vacuum

#### 12. Packaging Aspects of Sugar and Chocolate Confectionery

Introduction

Packaging Requirements

Packaging Requirements

**Sugar Confectionery** 

Chocolates

Packaging Materials and Packages

**Packaging Materials** 

#### 13. Packaging for Biscuits

Protection Presentation, Information and Convenience

The Wrapping Materials

The Packaging Styles

#### 14. Packaging Trends for Cheese and Other Dairy Products

Milk Powder-Bulk

Milk Powder-Retail

**Butter** 

**Yogurt** 

Ice Cream

Cheese

Cheese - Retail

#### 15. Packaging of Milk

#### 16. Packaging of Fish

Introduction

Important Quality Aspects of Fresh Fish

**Packaging Concepts** 

Vacuum Packaging

Modified Atmosphere Packaging

**Active Packaging** 

Packaging Requirements

Examples

#### Conclusion

#### Final Remarks and Future Developments

#### 17. Packaging for Irradiated Foods

Food Borne Illness is a Global Concern

Commercialization of Food Irradiation Worldwide

Food Irradiation in the U.S.A.

Barriers to Widespread Commercialization of

Food Irradiation in the U.S.A.

The Consumer Acceptance Barrier

The Cost Barrier

The Capacity Barrier

The Regulatory Barrier

Pasteurized Milk Case History

Packaging for Irradiation

Packaging Materials for use during Irradiation of Food

What action should Food Processors Take?

# 18. Development in Modified Atmosphere Packaging Of Meat, Poultry and Fish

Introduction

Historical Development

Modified Atmosphere Technology

Equipments and Films For MAP

Patents Available

Effects of Gases on MAP Foods

Effect of MAP on the Quality of Fresh Meats

Effect of Map on Processed Meats

Package Integrity and Quality of MAP Foods

Safety Concerns of MAP Muscle Foods

Cost Benefit Relationship

#### 19. Packing of Meat & Meat Products in Tin Containers

**Raw Materials** 

Cans and Lids

Coating

Vinyl Lacquers

Phenolic Lacquers

Corrosion

Internal Corrosion

Filling Operations

Can Seaming

**Dehydrated Meat Products** 

#### 20. Aseptic Packaging

Microbiological Aspects of Aseptic Packaging

Sterilization of the Packaging Material Food Contact Surface

The Tetra Classic Aseptic System (TCA)

The TBA/3-System

The TBA/8 and TBA/9 Systems

The TBA/10-System

#### 21. Aluminium Cans for Heat-Sterilized Food Products

Summary

Current Usage Characteristics Recent Innovations Material Recyclability Conclusion

#### 22. Aluminium Container for Fish Canning

Introduction

Materials and Methods

Results and Discussion

Conclusion

#### 23. Aluminium in Flexible Packaging

Introduction

Benefits of Aluminium based Packaging Materials

Technical properties of Aluminium Foil

Some Technical Applications of Aluminium Foil

Other way of Classifying Applications

Various Popularly known product groups and structures

Why Aluminium is preferred in Various Applications

Machines and Equipment for the manufacture of

Flexible Packaging Material

Wet Laminating Machine

Dry Laminating Machine

Hot Coating Laminating Machine

**Extrusion Laminating Machines** 

**Coating Machine** 

**Printing Machines** 

Various QC Test Relevant to Applications

Modern Trends in Packaging

X. New Technologies

Solventless Lamination

Advantages of Solventless Lamination

**Digital Printing** 

#### 24. Aluminium Foil in Pharmaceutical

Packaging-Recent Developments

Influential factors on pharmaceutical products

The Alu-Alu blister (Formpack)

Multi Axial Dehnung (Stretching)

Lidding foils

Summary and outlook

#### 25. Aluminium Foil

Stadard Conditions of Bare Aluminium Foil

Standard Finishes of Bare Aluminium Foil

#### 26. Aluminium and Foil Production Methods

How Aluminium is Made

Rolling Aluminium Foil

27. Aluminium In Packaging: Current Scenerio

28. The Process of Producing Collapsible Aluminium Tubes Accumulator Producing Tubes of different Diameters and Forms

Chains in Dryers and Ovens

**Lubrication of Machines** 

**Technical Developments** 

### 29. Aluminium Cans in Packaging

Introduction

Aluminium

**Properties** 

Manufacturing Process

Coating and Decoration

Recycling

Easy Open Ends

Lacquers and Coating

Testing and Quality Control

**Future** 

# 30. Aluminium Foils for Composite Containers

Aluminium Foil Membrane on Tin Cans

#### 31. Aluminium Collapsible Tubes

#### 32. Aluminium collapsible tubes their suitability-reliability-availability

#### 33. Pharmaceutical Packaging Collapsible Tubes

**Pharmaceutical Containers** 

Collapsible Tubes

Advantages of collapsible tubes

Pharmaceutical Forms Packed in Collapsible Tubes

Selection in metal collapsible tubes

Testing of collapsible tubes

Eye Ointment tube

Shelf life tests

Filling of collapsible tubes

#### 34. The Birth of an Aluminium Collapsible Tube

#### 35. Embossing Aluminium Foil

#### 36. Wooden Containers

Classification of Timbers

Seasoning of Wood

Physical and Mechanical Properties of Timber

**Mechanical Properties** 

Methods of Preservation of Timber

Form and size of Each Component

Thickness of Components

Size and Spacing of Nails

Number of Planks in a Shook

Type of Joints

Style of Container

Reinforcements
Workmanship
Consideration for a Design of the Box
Easy Load
Average Load
Difficult Load

Plywood Boxes - Battened Construction

**Grouping of Indian Timbers** 

37. Tinplate Container for Packaging of Fruit and Vegetable Products Abstract Introduction Standards for Metal Containers

Summary

38. Tetra Pak Application in Food Packaging Introduction

39. Printing on Foil

40. Aerosol

A Pressurised Form of Packaging and Dispensing a product

41. Foil Bag, Pouch and Envelope Production Envelope making Pouch making Folding Carton Production Foil/Fibre can and Drum Production

- 42. Packaging of Cashew Kernels in Tin Plate Containers
- 43. Packaging of Paints in Tin Plate Containers
- 44. Application to Food Packaging-Form-Fill-Seal Machines
- 45. Shrink Packaging-Food Products
- 46. The Aerosol Package-Container Manufacture
- 47. Sterilization Methods for Packaging Materials used in aseptic systems Testing Procedures Requirement of Aseptic Systems

48. Blow Moulded Containers for Food Packaging Basic Process Concepts Technology Development for Food Packaging Aseptic Containers Barrier Containers PET Containers Newer Developments

49. Thermoformed and Blow Moulded Containers for Food Packaging Applications Introduction

Polypropylene Polystyrene

50. Role of BOPP Films in Food Packaging

Introduction

Manufacture

Properties of BOPP Films

Advantages

Role of BOPP Film in Food Packaging

New Developments in BOPP Films

Conclusion

51. Modified Atmosphere Packaging of Fresh Fruits and Vegetables

Factor Influencing Shelf-life of Fruits and Vegetables

Respiratory Metabolism

Controlled Atmosphere (CA) Storage Technology

Advantages of MAP Technology

Limitations of MAP Technology

Dynamics of Gaseous Exchange in MAP

MA Package Design

Mathematical Modelling of Gaseous Exchange in MAP

Computer-Aided Design of MAP

Verification of Predicted Values

Tailored Plastics Film-Laminates

#### 52. Plastics

Distinction Between Plastics, Fibres and Elastomers Techniques of Polymerization **Processing of Plastics** 

Compression Moulding

#### 53. Plastic Corrugated Board

54. Polyester Film

#### 55. Nylon-6 Film - A Revolution in Packaging

56. Plastic Woven Sacks

Introduction

Plastic Woven Sack Materials

High Density Polyethylene (HDPE)

Polypropylene (PP)

Method of Making Woven Sacks

Flexible Intermediate Bulk Containers (FIBC)

Construction of FIBC

Use of Woven Sacks/FIBC

Conclusion

#### 57. Low Density Polyethylene

Additives

#### 58. High Density Polyethylene

- 59. PVC in Packaging
- 60. Biaxially Oriented Polypropylene Film
- 61. Expanded Polyethylene Material
- 62. Expanded Polystyrene

Properties of EPS

63. Shrink and Stretch Wrapping

Shrink Packaging

Stretch Wrapping

Pilfer- Proof Packs

Pallet Stretch Wrapping

64. New Developments Paper pulp Based Moulded Containers for Fruits and Vegetables

Apple Tray Packaging Concept

**Consumer Pack Trays** 

Tray Hand Wrapping Machine

Conclusion

- 65. Solid Fibre Board Box as a Transport Pack
- B. Combination Board-What is it?
- C. Solid fibre board with moisture/water proof inner or outer lining
- D. Solid Fibre Board with Hessian Lining

Conclusion

66. "Quality Control-Specifications and Performance Requirements of Fird Boxes"

**Quality Control** 

**Quality Control on Cor** 

Specifications and Performance Requirements of Fibreboard Boxes

67. Folding Board Cartons and Coated Cartons Manufacture

Introduction

Relevant Properties of Paper/Board for Carton Manufacture

Grammage

Caliper

**Bursting Strength** 

Shade

**Grain Direction** 

**Folding** 

Moisture Content

Stiffness

Manufacturing Process

Computer Controlled Inking

- 68. Cellulosic Films
- 69. Multiwall Paper Sacks
- 70. Speciality Papers for Packaging
- 71. Flexible Packaging Laminates and Coatings Application

Disaster Relief Packages Snack Food Packaging Corn Chins

Corn Chips

Cross Laminated Film

Modified Atmosphere Packaging

Fresh Red Meat

Fish

Cold Seal Adhesives for Flexible Packaging

Hot Melt Adhesives

Metallising Film/Paper

## 72. Adhesive Tapes

Introduction

#### 73. G.I. Drums-Oil Drums-Closures

Introduction

Capacity

Type of Drums

Standardisation of Metal Container

Selection of Drums

Manufacture of Drums

Reconditioning Industry

**Quality Control** 

Closures

**Essential Functions of Closures** 

Recent Development in Drums

Market Analysis

Market Share and Competitors Activities

# 74. Packaging in Glass Containers

**Testing** 

## 75. Laminated Tubes

Introduction

**Market Trends** 

#### 76. Converting Materials and Methods

Coatings

Adhesives

**Laminating Materials** 

Laminating Aluminium Foil

Coating Aluminium Foil

#### 77. Aseptic Packaging Materials and Package Forms

#### 78. Printing Inks for Food Packaging

Printing Processes and Printing Inks

Dispersion

Hue and Strength

**Drying Time** 

Strength (Concentration of Pigment): Reduction Test

#### 79. Closures in Food Packaging

Introduction
Functions of a closure
Components involved in a good seal
Materials used in the manufacture of closures
Resilient Materials
Facing Materials
Compatibility of closures and migration limits
Factors Effecting A Good Seal
Types of closures
Roll-on-Pilferproof Closures
Screw Caps
Lug Cap
Crown Caps
Plastic Closures

80. Packaging Laws and Regulations SWMA PFA Rules Ingredients Other Labelling Rules under PFA FPO Rules MFPO Rules Agmark Rules

Directory Section
Suppliers of Machinery & Plants
Suppliers of Raw Materials

# **About NIIR**

**Epilogue** 

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Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

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