

How to Start
Packaging Business
*(Packaging of Food, Tin,
Pharmaceuticals, Drinking Water,
Aseptic, Flexible, etc.)*

Introduction

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 as old as the primitive 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.

Table of Contents

1. Adhesives for Packaging Industries

Typical Application in 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
Double 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 Filling
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

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

Standard 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

Grouping of Indian Timbers

Plywood Boxes - Battened Construction

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 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
Epilogue

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

Niir Project Consultancy Services (NPCS)
can provide Process Technology Book on
Packaging Industries

See more

<http://goo.gl/2nXkUk>

<http://goo.gl/FuqlZj>

<http://goo.gl/L70W3e>

Visit us at

www.entrepreneurindia.co

***Take a look at NIIR PROJECT CONSULTANCY
SERVICES on #StreetView***

<https://goo.gl/VstWkd>

Locate us on Google Maps

<https://goo.gl/maps/BKkUtq9gevT2>

Niir PROJECT CONSULTANCY SERVICES

An ISO 9001:2008 Company

Who are we?

- *One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services*
- *We adopt a systematic approach to provide the strong fundamental support needed for the effective delivery of services to our Clients' in India & abroad*

What do we offer?

- *Project Identification*
- *Detailed Project Reports/Pre-feasibility Reports*
- *Business Plan*
- *Industry Trends*
- *Market Research Reports*
- *Technology Books and Directory*
- *Databases on CD-ROM*
- *Laboratory Testing Services*
- *Turnkey Project Consultancy/Solutions*
- *Entrepreneur India (An Industrial Monthly Journal)*

How are we different ?

- *We have two decades long experience in project consultancy and market research field*
- *We empower our customers with the prerequisite know-how to take sound business decisions*
- *We help catalyze business growth by providing distinctive and profound market analysis*
- *We serve a wide array of customers , from individual entrepreneurs to Corporations and Foreign Investors*
- *We use authentic & reliable sources to ensure business precision*

Our Approach

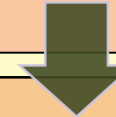
Requirement collection



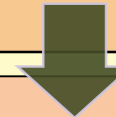
Thorough analysis of the project



Economic feasibility study of the Project



Market potential survey/research



Report Compilation

Who do we serve?

- *Public-sector Companies*
- *Corporates*
- *Government Undertakings*
- *Individual Entrepreneurs*
- *NRI's*
- *Foreign Investors*
- *Non-profit Organizations, NBFC's*
- *Educational Institutions*
- *Embassies & Consulates*
- *Consultancies*
- *Industry / trade associations*

Sectors We Cover

- *Ayurvedic And Herbal Medicines, Herbal Cosmetics*
- *Alcoholic And Non Alcoholic Beverages, Drinks*
- *Adhesives, Industrial Adhesive, Sealants, Glues, Gum & Resin*
- *Activated Carbon & Activated Charcoal*
- *Aluminium And Aluminium Extrusion Profiles & Sections,*
- *Bio-fertilizers And Biotechnology*
- *Breakfast Snacks And Cereal Food*
- *Bicycle Tyres & Tubes, Bicycle Parts, Bicycle Assembling*

- *Bamboo And Cane Based Projects*
- *Building Materials And Construction Projects*
- *Biodegradable & Bioplastic Based Projects*
- *Chemicals (Organic And Inorganic)*
- *Confectionery, Bakery/Baking And Other Food*
- *Cereal Processing*
- *Coconut And Coconut Based Products*
- *Cold Storage For Fruits & Vegetables*
- *Coal & Coal Byproduct*

- *Copper & Copper Based Projects*
- *Dairy/Milk Processing*
- *Disinfectants, Pesticides, Insecticides, Mosquito Repellents,*
- *Electrical, Electronic And Computer based Projects*
- *Essential Oils, Oils & Fats And Allied*
- *Engineering Goods*
- *Fibre Glass & Float Glass*
- *Fast Moving Consumer Goods*
- *Food, Bakery, Agro Processing*

- *Fruits & Vegetables Processing*
- *Ferro Alloys Based Projects*
- *Fertilizers & Biofertilizers*
- *Ginger & Ginger Based Projects*
- *Herbs And Medicinal Cultivation And Jatropha (Biofuel)*
- *Hotel & Hospitality Projects*
- *Hospital Based Projects*
- *Herbal Based Projects*
- *Inks, Stationery And Export Industries*

- *Infrastructure Projects*
- *Jute & Jute Based Products*
- *Leather And Leather Based Projects*
- *Leisure & Entertainment Based Projects*
- *Livestock Farming Of Birds & Animals*
- *Minerals And Minerals*
- *Maize Processing(Wet Milling) & Maize Based Projects*
- *Medical Plastics, Disposables Plastic Syringe, Blood Bags*
- *Organic Farming, Neem Products Etc.*

Sectors We Cover *Cont...*

- *Paints, Pigments, Varnish & Lacquer*
- *Paper And Paper Board, Paper Recycling Projects*
- *Printing Inks*
- *Packaging Based Projects*
- *Perfumes, Cosmetics And Flavours*
- *Power Generation Based Projects & Renewable Energy Based Projects*
- *Pharmaceuticals And Drugs*
- *Plantations, Farming And Cultivations*
- *Plastic Film, Plastic Waste And Plastic Compounds*
- *Plastic, PVC, PET, HDPE, LDPE Etc.*

- *Potato And Potato Based Projects*
- *Printing And Packaging*
- *Real Estate, Leisure And Hospitality*
- *Rubber And Rubber Products*
- *Soaps And Detergents*
- *Stationary Products*
- *Spices And Snacks Food*
- *Steel & Steel Products*
- *Textile Auxiliary And Chemicals*

- *Township & Residential Complex*
- *Textiles And Readymade Garments*
- *Waste Management & Recycling*
- *Wood & Wood Products*
- *Water Industry(Packaged Drinking Water & Mineral Water)*
- *Wire & Cable*

Niir Project Consultancy Services

106-E, Kamla Nagar, New Delhi-110007, India.

Email: npcs.ei@gmail.com , info@entrepreneurindia.co

Tel: +91-11-23843955, 23845654, 23845886

Mobile: +91-9811043595

Fax: +91-11-23841561

Website :

www.niir.org

www.entrepreneurindia.co

Take a look at NIIR PROJECT CONSULTANCY SERVICES on #StreetView

<https://goo.gl/VstWkd>

Follow Us



➤ <https://www.linkedin.com/company/niir-project-consultancy-services>



➤ <https://www.facebook.com/NIIR.ORG>



➤ <https://www.youtube.com/user/NIIRproject>



➤ <https://plus.google.com/+EntrepreneurIndiaNewDelhi>



➤ https://twitter.com/npcs_in



➤ <https://www.pinterest.com/npcsindia/>



THANK YOU!!!

**For more information, visit us
at:**

www.entrepreneurindia.co