HACCP for Packaging

Making sure the Pack fits the Product

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HACCP for Packaging

- HACCP well established in food industry worldwide (Codex Alimentarius)
- Principles of HACCP can be easily applied to non-food applications eg Packaging
- **No legal requirement for HACCP in non-food (packaging) site**
- Supplier requirement within standards (GFSI, BRC, FSSC, etc)

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The Food Industry uses: HACCP

Hazard	A system which
Analysis	identifies,
and	evaluates, and
Critical	controls
Control	hazards which are significant
Point	for **food** safety

(Codex Alimentarius Food Hygiene Basic Texts)

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HACCP for Packaging is therefore:

Hazard	A system which
Analysis	identifies,
and	evaluates, and
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Point	for **product** safety

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HACCP Principles

1. Identify potential hazards and measures for their control
2. Determine critical control points (CCP)
3. Establish critical limits which must be met to ensure each CCP is under control
4. Establish a monitoring system
5. Establish the corrective action to be taken when monitoring indicates that a CCP is not under control
6. Establish verification procedures to confirm that the HACCP system is working effectively
7. Establish documentation for procedures and records

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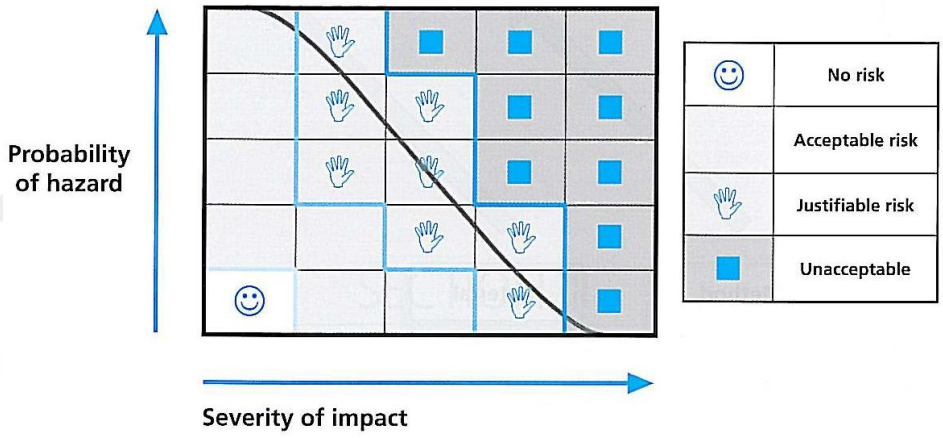
Realistic Hazards – Risks



From BRC/IoP V4 Interpretation Guideline

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What is packaging?

- Jars
- Bottles
- Cans
- Bags
- Pouches
- Wrappers
- Inserts
- Boxes
- Trays
- Labels

- Plastic
- Glass
- Metal
- Paper
- Board
- Corn Starch
- Banana Skin!

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Why do we need packaging?

- Protect from external influences
- Preserve to extend shelf life
- Promote to sell the product

Selection Criteria

- Inert and non-toxic
- Be easy for the consumer to use
- Provide product information
- Show evidence of tampering
- Meet required legislation

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Packaging provides barriers

- Microbiological
- Chemical
- Light
- Physical
- Moisture
- Gases
- Temperature control

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MATERIALS

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Plastic

Plastics

Two main types
- Thermosetting eg melamine
- Thermoplastic eg polythene, PET

Easily made into a range of shapes and sizes

Good Moisture barriers
- PP, PE, PVC

Good Oxygen Barriers
- EVOH, PVdC, PET

Polyethylene (PE)

- Heat-sealable thermoplastic
- Good barrier to water vapour
- Poor barrier (high permeability) to oxygen
- Recyclable
- LDPE - Melting point of 115°C
- HDPE - Melting point 130-135°C

Applications:

LDPE
- Light weight bags
- Heat seal layer laminates
- Film wraps
- Bread bags

HDPE
- Rigid bottles
- Trays (microwave)

Polypropylene (PP)

- Heat-sealable thermoplastic (broad spectrum)
- Flexible
- Good barrier to water vapour
- Poor barrier (high permeability) to oxygen
- Recyclable
- Melts at 168 – 170°C

Applications:

Rigid bottles
Bottle closures
Microwaveable food containers, trays
Sealant layer in retortable pouches

Polyethylene Terephtalate (PET)

- Heat-sealable thermoplastic
- Fairly good oxygen barrier
- Good water vapour barrier
- Good tensile strength and resistance to puncture
- Recyclable
- Good clarity (amorphous PET)
- High temperature applications (Crystallized PET)
- Melting point 267°C

Applications:

- Trays (CPET)
- Drink bottles (APET)
- Outer layer of laminate films

Polyamide (PA) or Nylon

- Heat-sealable thermoplastic
- Rigid, translucent and tough
- Fairly good barrier to gases and flavours
- Fairly poor moisture barrier
- Good tear/puncture resistance
- Recyclable

Applications:

Strength, rigidity and puncture resistance in multilayer structures

Boil-in Bag applications

Polyvinyl Chloride (PVC)

- Thermoplastic
- Good barrier to oxygen & moisture
- Excellent resistance to oil & grease
- Recyclable

Applications:

- Bottles, jars, trays
- Film wraps (Clingfilm)

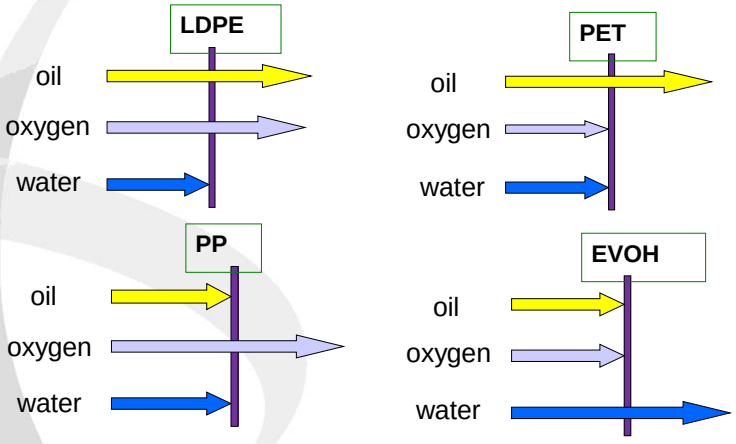
Polystyrene (PS)

- Thermoplastic
- Hard, brittle and stiff
- Permeability to gases (poor barrier)
- Poor moisture barrier
- Can be foamed (EPS)
- Recyclable

Applications:

- Salad bowls
- Food service packaging,
- Yogurt pots
- Foamed: Cushion packaging, thermal insulation

Barrier properties



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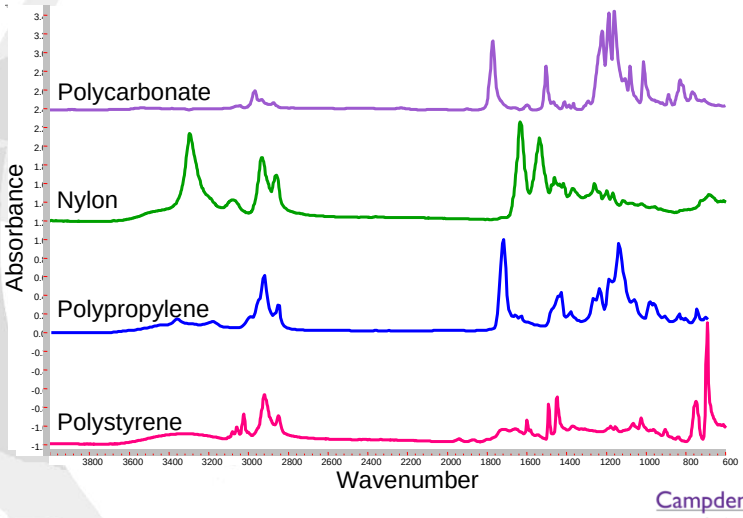
FT-IR - Fourier Transform Infra-Red Spectroscopy



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Metal

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Uses of Metal

- Can Making
  - Food
  - Petfood
  - Beverages
- Aerosols
- Closures
  - Crowns
  - Twist-Off
- General Line

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Metal

- Steel or aluminium
- Very good barrier
- Variety of shapes and sizes
- Designed for high speed filling
- Easy open features
- High quality decoration
- 100% recyclable
- Good temperature control

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Metal

- Corrosion from the food
- Overcome with the use of lacquers or coatings

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Pull Ends

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Closures - Bottles

ROPP – Roll-on Pilferproof
Crown (also twist)

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Closures – Wide Mouth Jars

- Steel (tinplate or TFS)
- Range of sizes and Depths
- Twist-Off (lug Caps)
- Lining Compound

General Line

These include

- Biscuit tins
- Novelty packs
- Large (25litre) oil drums

Trays

- Takeaway & Ready meal containers made from thicker foil with creased/folded corners
- Smoothwall containers - Formed and drawn in similar way to cans

Thin Foil

- Can be as thin as 6 micron
- Used for novelty shapes such as chocolates
- Good dead fold characteristics

Household Foil

- Vary in thickness from 11 micron up to 14 microns
- Cut to size and fed onto a core before being placed into a box

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Paper & Board

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Paper and board

- Good light barrier
- Poor oxygen and moisture barrier
- Lightweight
- Excellent surface for graphics
- Can withstand a variety of temperatures
- Recyclable

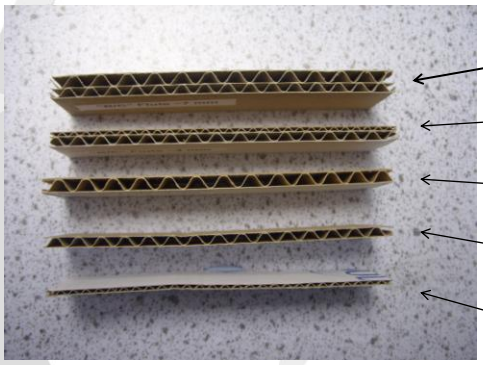
Performance

- Primarily strength
  - Printing
  - Constructing,
  - Packing
  - Protection of goods
    - Storage
    - Distribution
    - Sale
    - Consumer

Flutes

- Profile produced during manufacture
- Semi chemical flute for strength and humid conditions – mainly virgin fibre straight from the tree
- Recycled flute for general performance – recycled fibres

Corrugated Flute Profiles



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Cereals

- **Typical shelf life** of products made from cereals depends on the quantity and quality of oil contained in them.
  - Low oil (1.5 – 2%) – wheat, barley & rice have a *longer* shelf life (2 – 3 years) than
  - High oil (4 – 11%) – oats (6 months – 1 year).
- Conditions for optimum shelf life are
  - Cool (below 70°C), dark, dry and airtight atmospheres.

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Glass

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Glass

- Good gas & moisture barriers
- Promotes “Quality”
- Ideal for beverages
- Recyclable
- Not a good light barrier
- Susceptible to breakage
- Heavy

Main strengths of glass containers

- High strength
- Can be sterilized
- Closures can be resealable
- Good barrier
- Transparent or include selective light filters
- Show evidence of tampering
- Have seal integrity
- Sustainability

Main weaknesses of glass containers

- Heavier than other options
- Brittleness
- Susceptible to breakage
- Surface scratching
- Production line efficiency
- Light induced deterioration of products

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Types of caps

– Twist-off

– Push-and-twist (PT closures)

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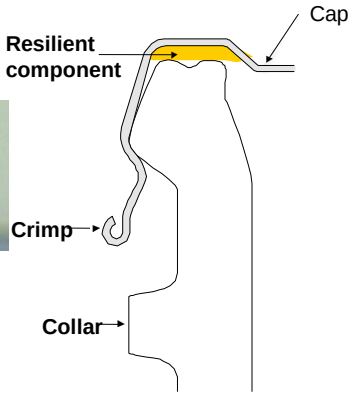
Types of caps

- Pressure seals
  - Crown and Twist Crown



  - Eurospin

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Types of closures

- Corks or Bungs

- Swing top

- Induction sealing: Heat sealed or adhered plasticized aluminium

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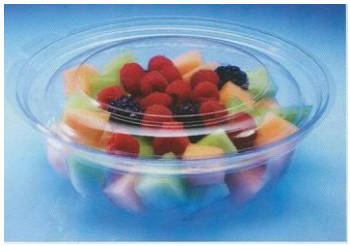
Sustainable materials

- Starch – can be home composted
- Polylactic acid (PLA) – industrial composting
- Cellulose – home composted
- Fibre – by product of sugar/palm cane



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Commercial Applications

- Composting - bags and sacks
- Food service tableware - cups, cutlery, plates
- Packaging - film wrapping, laminated paper, food containers
- Agriculture - mulch film, nursery pots, plant labels

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LEGISLATION & SPECIFICATIONS

What is in the specification?

- Legal aspects : Authorized uses
  - Food contact approval
  - Migration testing
  - Residual testing
- Technical aspects
  - Information needed to know if the product will be suitable for the proposed application

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Example : Technical specifications of a plastic pouch

Property	Value	Unit	Test method
Width	110±1	mm	Ruler
Length	170±1		
Thickness	100±7	μ	Micrometer
Seal strength	Over 5.0	kgf/15mm	ASTM F 88
W.V.T.R.	1.2	g/m^2·day	ASTM F1253 (38^{o}C, 90 %RH)
O.T.R.	2.7	cc/m^2·day	ASTM F1253 (23^{o}C, 50 %RH)
Tensile strength (LD/TD)	45/44	N/mm^2	ASTM D 882
Leakage test	no invisible leaks		JIS Z 0238
Retort test	No delamination		Pilot retort (125˚C, 30min)

Product-Packaging Interactions

- MAP (Modified Atmosphere Packaging)
  - Gas mixtures
  - Selective packaging (gas barriers)
- Canned Foods
  - Tin (elimination of oxygen - red colour in canned tomatoes)
- Flavour Changes
  - Scalping (d-limolene)
  - Taints (styrene)

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Other Factors

- Ageing Population
- Easy open features
- Malicious contamination
- 'Overpackaging'

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Thank you

Any Questions?

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Alan Campbell
Packaging & Manufacturing
Campden BRI
Chipping Campden
Glos
GL55 6LD, UK

alan.campbell@campdenbri.co.uk
www.campdenbri.co.uk