
Index

- acidification 51
- acid rain 69
- additives for strength 11
- adhesion 31, 32, 45
- air knife coating 18
- air, manufacturing emissions 68, 69
- alum size 11, 12
- aluminium foil 5, 20–22, 30, 32, 46, 93, 97–9, 101–2, 106–7, 109, 129, 208, 228, 268, 319, 375
- Anaconda sealing (composite cans) 195
- anti-counterfeiting 307
- appearance properties 26–34
- aseptic packaging/processing 355–7, 374–5

- bags *see* paper bags
- bag in box 315, 341, 350, 361, 368,
- bag papers 21, 175–7
- barrier properties, (introductory summary) 5, 95–99
- basis weight 35
- beating 12, 13
- biodiversity 50, 55, 56, 59, 86
- bioplastics 5, 268
- blade coating 18
- bleaching process 10
- brightness 11, 27, 28
- brushing 19
- burst resistance 38, 39, 223, 224, 322, 323

- calendering 18, 21
- caliper (calliper) 4, 35
- carbon cycle 86
- carbon ‘fixing’ 55, 81, 82
- carbon footprint 81
- carton profile testing 291

- cast coating 19
- cellulose 6–9, 46, 309
- chemi-thermomechanical pulp, CTMP 9, 357
- chemical pulping 9, 10
- chemical recovery 67
- chemicals used in paper manufacture 11, 12, 47, 48, 67–68
- classifications of recovered waste paper and paperboard 10, 11, 75–7
- climate change 51, 52
- coated oriented polypropylene (OPP or EOPP) 103, 107, 130, 133–5, 268, 299
- coated with an insect repellent 5
- coating with mineral pigment 11, 18, 19
- Cobb test 44, 45
- colour 26–8
- combined heat and power (CHP) 65, 66, 78, 85
- composite cans
 - Anaconda sealing of liner 195
 - applications 189
 - barrier properties 195, 196
 - construction of sidewalls 195–196
 - convolute winding 185
 - definition 185
 - design 190–194
 - gas flushing 188, 197
 - glossary of composite can related terms 201–3
 - historical background 187–9
 - label printing 197–199
 - labeling and printing options 197–9
 - labeling options 199
 - linear draw 186
 - manufacture 185–7, 194–7

- composite cans (*cont'd*)
 - opening/closing options 191–193
 - single wrap 187
 - skiving of body ply 196
 - spiral winding 185
- compression strength 40–41, 305–6, 324–6
- consumption of paper and board 2
- corrosion inhibition, vapour-phase
 - inhibitor 5
- corrugated fibreboard
 - applications 313
 - description 313–15
 - pack designs 315–17
 - product safety 320–321
 - recycling 335–338
 - shelf/retail ready packaging 320
 - sustainability 321, 335–8
- corrugated fibreboard manufacture 326–34
 - adhesives 328–330, 335
 - die cutting 331
 - folder-gluer 331–333
 - good manufacturing practice 335
 - printing 333–335
 - stitching 331
 - taping 331
 - wash boarding 330–331
- corrugated fibreboard performance
 - bending stiffness 322
 - box and pallet tests 323–5
 - burst strength 322
 - cold glue 335
 - compression crush test, (CCT) 322
 - Concora Medium Test (CMT) 328
 - edge crush test, (ECT) 322
 - flat crush test 321
 - flatness 330
 - flute size 314
 - grammage 321, 327
 - hot-melt adhesives 335
 - inclined plane impact test 324–325
 - McKee formula 324
 - moisture content 323
 - pin adhesion test 323
 - properties and test methods 321–3
 - puncture 323
 - thickness (caliper) 321
- counterfeit prevention 307
- creaseability 41
- creasing 4, 41–2, 280–292, 329, 331–3
- cross direction (CD) 16, 35
- cylinder mould forming 17
- debris, e.g. clumps of fibres, particles
 - of coating etc. 33, 279–80
- deforestation 58
- de-inking 66, 69, 77
- Dennison Wax Number 31
- digital printing *see* printing
 - processes
- dimensional stability 35–7, 43–4,
- Dow Jones Sustainability Indexes 53
- Dust and debris *see* debris
- electron beam ink drying, EB 32
- elemental chlorine free, ECF 10
- embossing 292–3
- energy recovery 77–79
- energy sourcing 52–66
- equilibrium moisture content 35–7
- ethylene vinyl alcohol (EVOH) 5, 99, 359
- extrusion coating with polyethylene (PE) 5, 100–102
- fibre drums
 - applications 205–207
 - barrier, functional 213–214
 - cleanliness 214
 - drum designs 205–208
 - manufacture 198, 200, 205–12
 - opening/closing systems 210–212
 - performance 212–14
 - printing/decoration 214–15
 - standards 216
 - waste management 215
- fibre recovery 74–7
- fibre separation 8–10
- fibre, sources of 7–8
- fillers in paper manufacture 11
- finishing 19–20
- flatness 37, 43–4
- flexible packaging
 - applications for foods, electrical, chocolate and sugar confectionary, DIY, horticulture etc. 95–99
 - bags 92, 100, 109–10, 114–16

- cap liners, wads and diaphragms 91, 118–19
- direct seal paper 112
- ethylene vinyl acetate, EVA 95, 101–2
- horizontal f/f/s, flow wrap 116, 117, 119
- lids, lidding including die-cut lids 92, 100, 109, 113, 117
- manufacture 99–104
- medical packaging 109–14
- medium density PE 99
- microcrystalline wax 98, 100
- oriented polypropylene film, OPP 104, 107
- overwrapping 91, 118
- packaging machinery 114–18
- paper cushioning 121–122
- polyamide 104, 114
- pouches 91, 93, 109, 113–114, 116
- properties 92, 94–9
- regenerated cellulose film (RCF) 94
- release lacquer 104
- roll packs 114
- sachets 91, 93, 109, 114, 116
- sealing tapes 121
- solvent based coatings 100
- strip packs 109, 115
- Surlyn® 95, 99, 102, 114, 359
- tea and coffee 119–121
- Tyvek® 114
- vertical f/f/s 115
- waxed paper 100–101, 118
- flexible packaging machinery 114–118
 - horizontal form, fill, seal machine 114–117
 - horizontal form/fill/seal pouch/sachet machine 116
 - overwrapping machine 118
 - roll wrap 114
 - thermoforming, labelling and lidding, in-line 114, 117
 - tea and coffee bag machines 119–121
 - twist wrap 118
 - vertical form, fill, seal machines 115, 116
- flexible packaging manufacture 99–104
 - dispersion coating, paper/PVdC 100
 - dry bonding, lamination 106–107
 - extrusion coating with PE 100–102
 - extrusion lamination 107–108
 - hot-melt coating 103–104
 - lamination with water based adhesives 105–106
 - lamination with wax 108–109
 - metallization 102–103
 - printing 99–100
 - water based coatings 100
 - wax coatings 100
 - wax lamination 108–109
- flexible packaging performance
 - barrier properties 95–99
 - cold seal 104–105
 - ethylene oxide, EtO, sterilisation 109–111
 - gas barrier e.g. oxygen, carbon dioxide and nitrogen 99
 - heat sealing 95
 - light barrier 99
 - moisture and moisture vapour 97–98
 - oil, grease and fat barrier 99
 - radiation, gamma, sterilisation 109–111
 - steam sterilisable medical packaging paper 109–111
- flexography *see* printing processes
- fluorescent whitening agents (FWA) 10–11
- fluorocarbon 5, 12
- foldability 41
- folding boxboard, (FBB) 23–4
- folding carton manufacture 277–96
 - carton dimension checking 290–291
 - computer aided design, CAD 277
 - creasing 280–292
 - creasing internal delamination 290
 - crush cutting 284
 - cutting and creasing 288–92
 - dimension checking 286–287
 - dust and debris 279–80
 - embossing 292–3
 - flatbed platen dies 281–284
 - folder-gluer 294, 331–3
 - folding 287–292
 - gluing 294–5
 - hot foil stamping 293–4
 - notches 282
 - pressure or shear cutting 285–286

- folding carton manufacture (*cont'd*)
 - printing 277–80
 - rotary dies 284–287
 - warming up times for printing
 - efficiency 277–9
 - waxing 296
 - windowing 295
- folding carton performance
 - coefficient of friction 302
 - compression strength 266–7, 281, 291, 305–6
 - folding, foldability 287–292, 296–300
 - high speed video 303
 - hot melt gluing in packing 298–300
 - microwaveable 307–8
 - odour and taint testing 301–11
 - ovenable 307–8
 - packaging line efficiency 300–303
 - packing operation 296–303
 - product and consumer safety 309–10
 - runnability, packing line
 - efficiency 300–303
 - storage 300
 - susceptor 308
 - timing, cartonning machine 301–2
 - warming up times for packing
 - efficiency 300
- folding cartons
 - applications 266–7
 - carton erecting/closing 296–303
 - coatings/laminations 266
 - definition 265
 - designs 269–77
 - distribution and storage 303–6
 - easy open features 276–81, 298
 - grammage, basis weight 266
 - paperboard grades 22–5, 267–8
 - point of sale, purchase,
 - dispensing 306–307
 - storage *see* distribution
 - tamper, pilfer evidence 276
 - thickness, (calliper) 266
- food waste during distribution 54
- forest certification 59, 85
- forests 54–61, 84–6
- fossil based energy 52, 55–6, 62–6, 68, 71, 77–8, 82
- forming using wires 15–16
- forming using vats/cylinder moulds 16
- Fourdrinier 16
- fresh water 51–2, 66–7
- friction glazing 19
- gas chromatography 310–11
- gas flushing 92, 95–99, 188, 197, 395
- general information required for a new
 - package 394
- glassine 18, 21, 30
- global warming (alleged) 52, 55, 68
- gloss 30
- gluability 45–6
- grammage 3, 35, 48–49
- gravure *see* printing processes
- greaseproof 21–2
- greenhouse effect 55, 68, 78
- hand made paper 13–15
- high speed video 303
- hygro-sensitive 35–7
- hysteresis effect 36
- IGT printability test 31
- impregnating papers 22
- incineration 64, 73, 77–9
- ink and varnish absorption and
 - drying 31–2
- insect repellent treatment 5
- intelligent paperboard packaging
 - 308–9
- internal sizing 11, 12
- Inverform process 16
- Kraft or Sulphate process 9, 10
- label manufacture
 - bronzing 156
 - die cutting 156–159
 - digital die-cutting 158
 - digital printing 155–6
 - direct thermal printing 154
 - dot matrix printing 154
 - embossing 156
 - guillotining 156–157
 - hot foil blocking/stamping 152–3
 - lacquering 156

- laser cut die boards 158
- on-press slitting and sheeting 157–159
- printing 145–156
- punching 156–157
- variable information printing, electronic 153–5
- labels
 - active, intelligent labels 142–144
 - adhesives 136–139
 - application 159–163
 - collar or neck labels 142
 - colour change sterilisation labels 144
 - diffractive optically variable image devices, DOVIDs 145
 - guilloches 142
 - hologram labels 142
 - hot melt adhesive 137
 - in-mould labels 133
 - label paper substrates 129–31
 - label testing methods 164–7
 - leaflet and book labels 142
 - linerless self-adhesive labels 132
 - logistics labels 141
 - optically variable devices, OVIDs 142, 145
 - pre gummed labels 125
 - primary labels 117, 140
 - RFID labels 141
 - secondary labels 117, 141
 - security labels 142
 - self adhesive labels 126–129, 130–132
 - smart labels 142–4
 - solvent-based adhesives 138
 - swing tickets 142
 - tactile labels 142
 - tags 142
 - tie on labels 142
 - types of labels 128–36
 - waste and environmental issues
 - water-based adhesives 137–8
 - wet glue labels 125–126, 128–129
- laminating papers 22, 32
- lamination with plastic films 22
- land quality deterioration 51
- landfill 79, 85, 86
- landfill gas 63–4
- life cycle assessment, (LCA) 79–81, 379–381
- lightfastness 34
- lignin 8–9
- liquid packaging, paperboard-based
 - applications 378–9
 - aseptic processing 374–5
 - barriers 358–60
 - distribution, transit packaging 376–7, 382
 - heat sealing 353–60, 374–5
 - LCA, liquid packaging 79–81, 379–81
 - materials 391–4
 - opening, reclosure and tamper evidence 369–74
 - pack designs 361–9
 - post packaging sterilisation, retortable 375–6
 - printing and converting 360–361
 - recovery 381–2
 - recycling 381–2
 - resource reduction 379
 - systems approach 282
 - transit packaging 376–7
- machine direction, (MD) 15–16
- machine glazed, MG, finish 17, 21, 30
- machine glazing or ‘Yankee’ cylinder 17
- machine, MF, finish 21
- manufacture of paper and paperboard 1–2, 13–19
- Marbach Crease Bend Tester 292
- mass spectrometry 47, 311
- mechanical pulping 8–9, 23–4
- microcreping 22
- mineral pigment for surface coating 11, 18–19
- Modulus of Elasticity (E) or Young’s Modulus 37, 40
- moisture content 17, 35–6, 43
- mould inhibitor 5, 22
- moulded pulp packaging
 - applications 385–8
 - manufacture 389–92
 - pack design 385–8
 - printing and decoration 392
 - raw material 388–9

- multi-ply, sheet forming 16–17
- multiwall paper sacks
 - applications 217–18, 246
 - baling systems 247–8
 - definition 217
 - designs, open mouth 219–22
 - designs, valved sacks 222–5
 - environmental position 250–251
 - filler (filter) cords 231
 - handles 218, 223, 231
 - manufacturing tolerances 250
 - printing 232
 - sack identification 245
 - standards for paper sacks 249
 - sewn closures 225–6
 - tapes 221
 - threads 221
 - valve design 223–5
- multiwall sacks, materials 226–30
 - adhesives 231
 - bitumen laminated kraft 230
 - coated kraft 227–8
 - creped kraft 227
 - extensible kraft 227
 - laboratory testing of paper sack materials 232–5
 - laminated kraft, (aluminium foil, plastic film) 228, 230
 - laminated kraft, (woven and non-woven plastics) 230
 - PE coated kraft 229
 - PVdC coated kraft 230
 - scrim and cloth laminates 230
 - silicone coated kraft 229
 - use of PE liners 217, 220
 - waxed kraft 230
- multiwall sacks, performance
 - filling, weighing and closing 237–245
 - sack flattening and shaping 247
 - sack testing, drop testing 236–7
 - slip resistance, slip resistant agents 232, 235
 - weighing, filling and closing systems 237–48
- new product/package
 - development 393–398
- odour *see* taint and odour neutrality
- opacity 11, 30–31
- optical brightening agents (OBA) 10–11
- organic recycling, composting 75, 77
- ozone depletion 50
- package technical design 394–396
- package graphical/appearance design 397–398
- packaging brief/specification factors 393–398
- packaging development considerations 393–398
- packaging needs 4, 47
- packaging requirements 25–6
 - appearance properties 26–34
 - performance properties 34–47
- packaging waste 62, 73–9
- packaging waste recovery 73–9
- palletizing 25
- paper and paperboard
 - environmental impact of manufacture and use 61–73
 - fibre separation and processing 8–10, 12–13
 - manufacture 13–20
 - raw materials 6–8, 11–12
- paper and paperboard packaging types
 - composite cans 183–203
 - corrugated fibreboard packaging 313–339
 - fibre drums 205–216
 - flexible packaging 91–213
 - folding cartons 265–312
 - liquid packaging 253–383
 - moulded pulp packaging 385–292
 - multiwall paper sacks 217–251
 - paper bags 169–182
 - paper labels 125–168
 - rigid boxes 253–263
 - solid fibreboard packaging 341–352
- paper and paperboard packaging uses 3–4
 - requirements 3–5, 25–26
- paper bags
 - applications, uses 169–70
 - bag designs 170–175

- bag papers 175–7
- carrier bags 174–175
- dust bags 179
- flat bags 170–172
- heat sealed paper bags 178
- historical development 169, 181
- manufacture 177–9
- paper for paper bags 175–177
- performance testing 179–80
- printing 180–181
- printing paper bags 180–181
- satchel bags 170–172
- SOS bags 170–175
- steam sterilized hospital bags 179
- stringing 179
- strip window bags 172
- testing paper bags 179–180
- tin ties 179
- types of paper bags 170–175
- uses of paper bags 189–190
- wicketing 179
- paper labels *see* labels
- Parker PrintSurf (PPS), Bendtsen and Sheffield instruments 28
- performance properties 34–47
- photosynthesis 55–6
- pigment coating waste 73
- Pira Cartonboard Creaser 291
- Pira Crease Tester 292
- plantation forestry 57–8
- ply bond (interlayer) strength 12, 42–3
- points, (thickness) 4, 35
- pollution of rivers, lakes and seas 51–2, 69–71
- polyethylene terephthalate (PET or PETE) 5, 68, 99, 196
- polymethyl pentene (PMP) 5
- polypropylene (PP) 5, 68, 172, 272, 360, 375
- polyvinylidene chloride (PVdC) 5, 95, 97, 99, 100
- population 51, 52, 58
- porosity 44
- press section 10, 17
- print mottle 32
- printability 11, 30–31
- printing processes
 - digital 31, 94, 155–6, 277–80, 333–4
 - flexography 31, 94, 133, 138–40, 148, 180, 197, 232, 277–80, 332–4, 351
 - gravure 31, 94, 133, 150–151, 180, 197, 277–80, 361
 - letterpress 31, 133, 146–7, 277–80, 351
 - lithography 30, 133, 149–50, 197, 277–80, 333–4, 351
 - silk screen 31, 151–2, 180, 214, 277–80, 333–4
 - printing variable information (VIP), electronic
 - dot matrix printing 154
 - direct thermal printing 154
 - laser printing 153–4
 - ink jet printing 154–5
 - ion deposition 153
 - thermal transfer printing 154
 - product safety 22, 24, 47, 216, 309, 335
 - pulping 3, 7–10
 - puncture resistance 39
 - quality standards 48
 - rain forests 57–9
 - raw materials for paper and paperboard
 - manufacture 6–12
 - recovered fibre 10–11, 20, 24–5
 - recovered waste paper and paperboard
 - classification 11
 - recycling 10–11, 73, 75–7, 84–6
 - refiners 12
 - regenerated cellulose film, (RCF), 94
 - relative humidity (% RH) 8, 34–7, 300
 - renewable energy 56, 62–4, 77–81, 83, 86
 - rigid boxes
 - adhesives 257
 - applications 256
 - definition 253
 - designs 254–5, 257–8, 261–2
 - manufacture 258–62
 - paper and board used 256–7
 - printing 257
 - strengths, benefits and weaknesses 253–4
 - roll bar 18
 - rub resistance 33

- sack kraft 22, 226–30
- sealing 4, 20, 45–6
see also the various types of packaging
- secondary fibre *see* recovered fibre
- sheeting 20, 53
- shelf/retail ready packaging
 corrugated fibreboard 320
 solid fibreboard 350
- silicone 5, 21, 222, 229
- size, internal 11–12, 44–5
- size, surface 11–12, 17, 44–5
- slitting 20, 33
- solid bleached board (SBB or SBS) 22–3, 267
- solid fibreboard packaging
 applications 341–2, 345–50
 bag-in-box liquid containers 350
 cutting and creasing 252
 cutting and creasing 352
 description 341
 manufacture 351–2
 materials 341, 350
 pack designs 342–5
 partitions, divisions and fitments 348–50
 printing 351
 recycling, waterproofed collection boxes 350
 shelf/retail ready packaging 350
 slip sheet 347
 waste management 352
 water and water-vapour resistance 350–351
- solid unbleached board (SUB) 23, 267
- solid waste residues 62, 70, 73
- specifications 48
- spots (hickies) causing print blemishes 33, 279–80
- starch 12, 17
- sterilisable, retortable packaging/
 processing 375–6
- stiffness 17, 24, 30–40, 305, 322, 324
- stock preparation 12, 20, 27, 39
- stretch or elongation 22, 35, 37, 38, 41
- substance 3, 35
- sulphite process 9
- supercalender 18
- supercalendered, SC, finish 21
- surface cleanliness 33, 279–80
- surface pH 32
- surface smoothness 28
- surface strength 12, 31
- surface structure, sheet 28–30
- surface structure of fibre 12
- surface tension 32
- sustainable development 33–34, 53–54, 80, 85–6
- sustainable forest management 58, 61, 86
- taint and odour, neutrality/testing 46, 310–311
- tea and coffee packaging 119–112
- tearing resistance 38
- temperature equilibrium 36, 43
- tensile energy absorption, or TEA 38, 233
- tensile strength 35, 37–8, 41
- thermomechanical pulp, TMP 9
- thickness (caliper) 4, 7, 17, 20, 34, 35, 40, 48–49
- tissues (tea, coffee and wrapping) 1, 4, 20, 35, 46
- totally chlorine free, TCF 10
- transport, environmental concerns 68, 69, 73, 79
- types of packaging 4
- unlined chipboard 25
- urea and melamine formaldehyde, (wet strength) 12, 39, 227
- vapour phase inhibitor 5, 22
- varnishability 30–31
- vats and vat forming 13–14, 16–17
- vegetable parchment 21
- virgin, or primary, fibre 7–10, 22, 24, 46
- waste management options 72, 74–9
- waste minimization 74
- water 51, 52, 54, 61, 66–7, 69–71, 85
- water footprint 66
- water absorbency 44–5, 350–351
- water, manufacturing emissions 69–71
- water, WF, finish 21
- water usage 66–67

- wax size 17
- wax treatment 5, 12, 22, 98–100, 103,
108–9, 230, 296
- wettability 31, 32
- white lined chipboard, (WLC) 24–5, 27,
267
- whiteness 11, 27–8
- whitening (bleaching) 10, 11, 27
- wicking tests 45
- wire forming 13, 15, 16, 19
- wood usage 56, 58–61
- world concerns, population, resources
etc. 51–53
- world (apparent) consumption 1, 2
- world production 1, 2