

Contents

Part I Basics of Lean Production

1	Introduction Lean Production	3
1.1	Lean Production	4
1.2	Is Lean up to Date?	5
1.3	Lean at Work	5
1.4	The Lean Production Roadmap	6
1.5	The Expert Questions	6
1.6	Introduction of Knalsch GmbH	7
	References	8
2	Challenges	9
2.1	Trends and Challenges	10
2.2	Crisis	12
2.3	Business Administration	14
2.4	Customer	17
2.5	Expert Questions	19
2.6	Summary	20
	References	21
3	Waste	23
3.1	Processes	24
3.2	Value Creation	24
3.3	Safety	25
3.4	The Seven Types of Waste	26
3.5	The Eighth Type of Waste	32
3.6	Classification of Activities	33
3.7	Process Analysis	34
3.8	Optimization	36
3.9	Expert Questions	38
3.10	Summary	38
	References	39
		vii

4	Stabilization	41
4.1	Loss Factors	42
4.2	The 3 Mu	44
4.3	Inventory	45
4.4	Lead Time	48
4.5	Levelling and Balancing	54
4.6	Flexibility	56
4.7	Expert Questions	56
4.8	Summary	57
	References	58
5	Flow	59
5.1	Batch Size	60
5.2	Layout	63
5.3	Production in Flow	63
5.4	Expert Questions	65
5.5	Summary	66
	References	66
6	Tact	67
6.1	Bottleneck	68
6.2	Customer Tact Time	69
6.3	Line Balancing	70
6.4	Visualization of the Line	73
6.5	Special Features and Cycle Time Calculations	74
6.6	Dealing with Job Cuts	77
6.7	Expert Questions	78
6.8	Summary	79
	References	80
7	Pull	81
7.1	Just-in-Time	82
7.2	Kanban	84
7.3	Kanban Environment	89
7.4	One-Piece Flow in Customer Sequence	91
7.5	Pacemaker	93
7.6	Configurations of Flow Systems	95
7.7	Expert Questions	97
7.8	Summary	97
	References	99

8	Value Stream	101
8.1	Value Stream Mapping	102
8.2	Value Stream Symbols and Representation	103
8.3	Value Stream Design	106
8.4	Key Figures in the Value Stream	111
8.5	Design Principles for the Future State Value Stream	113
8.6	Expert Questions	114
8.7	Summary	115
	References	116
9	Perfection	117
9.1	Understanding of Quality	118
9.2	The Jidoka Principle	120
9.3	Poka Yoke	123
9.4	Expert Questions	125
9.5	Summary	126
	References	127
10	Standardization	129
10.1	Standards	130
10.2	The 5S or 6S Methodology	133
10.3	Visualization and Standard Description	139
10.4	Examples of Standards	141
10.5	Role of Leadership in Standards	143
10.6	Expert Questions	145
10.7	Summary	146
	References	147
11	Continuous Improvement	149
11.1	Kaizen	150
11.2	Kaikaku	152
11.3	PDCA Cycle	154
11.4	Improvement Kata	156
11.5	Sustainable Improvement	158
11.6	Expert Questions	159
11.7	Summary	159
	References	160
12	Production Area Assembly	163
12.1	Manual Activities	164
12.2	Ergonomics	165
12.3	Flexible Manpower System	167
12.4	Flexible Employee Deployment	171

12.5	Expert Questions	172
12.6	Summary	172
	References	173
13	Production Area Manufacturing	175
13.1	Automation	176
13.2	Overall Equipment Effectiveness	178
13.3	Total Productive Maintenance	181
13.4	Quick Changeover	185
13.5	Expert Questions	191
13.6	Summary	191
	References	194
14	Lean and Production Systems	195
14.1	Mass Production	196
14.2	History of the Toyota Production System	197
14.3	Lean and Production Systems	200
14.4	Implementation	204
14.5	Vision and Key Figures	206
14.6	Expert Questions	207
14.7	Summary	207
	References	209
 Part II Deepening: Lean Management		
15	Introduction Lean Management	213
15.1	Lean Management	213
15.2	The Lean Management Network Plan	214
16	Administration	217
16.1	Indirect Areas	218
16.2	Waste in the Indirect Sector	220
16.3	Methods of Analysis	222
16.4	Process Visualization	224
16.5	Lean in the Indirect Area	226
16.6	Expert Questions	230
16.7	Summary	231
	References	232
17	Product Design	233
17.1	Optimization of Value-Added Time	234
17.2	Design for Manufacturing	236
17.3	Design for X	239
17.4	Measurement of Product Design	243

17.5	Expert Questions	244
17.6	Summary	245
	References	246
18	Product Development Process	249
18.1	Situation of Product Development	250
18.2	Lean Development	251
18.3	Lean Methods in Product Development	254
18.4	Expert Questions	256
18.5	Summary	256
	References	257
19	Production Engineering	259
19.1	Lean Engineering	260
19.2	Planning Principles	261
19.3	Cardboard Engineering	263
19.4	Factory Planning	265
19.5	Expert Questions	266
19.6	Summary	267
	References	267
20	Low-Cost Automation	269
20.1	Karakuri	270
20.2	Low-Cost Intelligent Automation	273
20.3	Implementation	274
20.4	Expert Questions	275
20.5	Summary	276
	References	277
21	Supply Chain	279
21.1	Line Back	280
21.2	Grip-Optimized Material Placement	281
21.3	Delivery	282
21.4	Minomi	285
21.5	Order Picking	288
21.6	Supply Chain Management	289
21.7	Expert Questions	292
21.8	Summary	293
	References	294
22	Sustainability	295
22.1	Lean and Green	296
22.2	Resource Efficiency	297
22.3	Energy Efficiency	300

22.4	Disassembly and Recycling	302
22.5	Expert Questions	302
22.6	Summary	303
	References	304
23	Key Performance Indicators	307
23.1	Key Figure Logic	308
23.2	Benchmarking	312
23.3	Learning to See	314
23.4	Expert Questions	316
23.5	Summary	316
	References	317
24	Policy Deployment	319
24.1	Hoshin Kanri	320
24.2	North Star and Blue Sky	321
24.3	Target Break-down Process	322
24.4	Expert Questions	324
24.5	Summary	325
	References	326
25	Shop Floor Management	327
25.1	Management at the Shop Floor	328
25.2	Visual Management	331
25.3	Communication Structure	334
25.4	Problem-solving Process	335
25.5	Standard-based Process Observation	344
25.6	Expert Questions	346
25.7	Summary	347
	References	348
26	Leadership and Culture	349
26.1	Lean Leadership	350
26.2	Failure Culture: Learning Culture	352
26.3	Learning Organization	354
26.4	Lean Transformation	355
26.5	Expert Questions	360
26.6	Summary	361
	References	362
27	People	365
27.1	Lean and People	366
27.2	People at the Centre	367
27.3	Human Resources Development	369

27.4	Sustainable Value Creation Through Appreciation	370
27.5	Expert Questions	371
27.6	Summary	372
	References	373
28	Digitization	375
28.1	Digital Processes	376
28.2	Industry 4.0	377
28.3	Digital Shop Floor Management	379
28.4	Expert Questions	380
28.5	Summary	380
	References	381
29	Support Organization	383
29.1	Lower Management Level	384
29.2	Kaizen Team and Lean Experts	385
29.3	Kaizen Workshop	386
29.4	Lean Organization and Training Center	387
29.5	Expert Questions	388
29.6	Summary	388
	References	389
30	Consulting and Projects	391
30.1	Project and Request	392
30.2	Project Objective and Management	393
30.3	Project Procedure	398
30.4	Lean Understanding and Awareness	400
30.5	Communication and Presentation	401
30.6	Potentials and Economic Efficiency Calculation	402
30.7	Expert Questions	403
30.8	Summary	404
	References	405
31	Change Management	407
31.1	Change	408
31.2	Levels of Change	409
31.3	Intrinsic Change Curve	410
31.4	Resistance	413
31.5	Enabling and Motivating	414
31.6	Expert Questions	416
31.7	Summary	416
	References	417

Part III Annex

32	Glossary of Japanese Lean Terms	421
	References	430
33	Solutions to the Exercises	431
33.1	Chapter 6: Tact	431
33.2	Chapter 7: Pull	432
33.3	Chapter 8: Value Stream	434
33.4	Chapter 9: Perfection	436
33.5	Chapter 13: Production Area Manufacturing	437
33.6	Chapter 30: Consulting and Projects	438
	Index	441