

# Contents

Publisher's Foreword	xi
General Editor's Message	xiii
Preface	xvii

## Part I: Management

<b>1. Essentials of Quality Control</b>	<b>3</b>
What Is Quality Control	3
What Is Quality?	4
What Is Management?	6
References	10
<b>2. The Role of the Foreman</b>	<b>11</b>
What Is a Foreman?	11
Basic Duties of the Foreman	11
Management Points for the Foreman	15
Positive Human Relations in the Workplace	16
Responding to Change	17
Changing the Workplace Culture	19
Education and Training	21
Boosting Creativity and the Desire to Improve	22
Quality Assurance On-site	23
Building Quality Characteristics into the Workplace	24
Fundamentals of Quality Assurance	26
Quality Assurance Checkpoints	28
Preventing Problems from Recurring	30
References	31
<b>3. How to Implement Improvements</b>	<b>33</b>
Understanding the Problem	33
Checklists for Problem Identification	33
Understanding the Situation through Data	34
Setting Improvement Objectives	35
Factor Analysis	36
Discussing Improvement Themes	39
Implementing the Improvement Plan	41
Evaluating the Results of Improvements	42

Making Improvements Permanent	42
References	44
<b>4. Process Control</b>	<b>45</b>
The Management Cycle	45
Management Procedure	45
Going Around the PDCA Circle	46
Manufacturing Process Management	46
Material Management	47
Management of Machinery and Equipment	48
Operator Management	48
Managing Operating Methods	49
Managing Safety, Power, and Energy	50
Process Control Standards	51
Defining the Control Points	51
Selecting Control Points	54
Determining the Management Method	54
Managing the Workplace	55
Sorting and Selection in the Workplace	56
Management by Visual Control	57
Fostering Quality Consciousness	58
Fact-based Decision Making	58
Mistake-proofing Devices	59
Creating a Comfortable, Cooperative Workplace	59
Responding to Future Automation	60
References	61
<b>5. Standardizing Operations</b>	<b>63</b>
Operation Standardization Objectives	63
Basic Standardization Terminology	63
Work Standards for a Company	
Standardization System	64
Operation Standards	65
References	73
<b>6. Leadership</b>	<b>75</b>
The Leadership of the Foreman	75
Guidelines for Exercising Leadership	75
Checklists for Exercising Leadership	77
References	81

<b>7. Small Group Activities</b>	<b>83</b>
What Is a QC Circle?	83
Basic Quality Circle Concepts	84
Preparing for QC Circle Activities	84
Introducing QC Circle Activities	86
Promoting QC Circle Activities	88
The QC Circle Promotion Organization	96
Managing QC Circle Promotion	97
Leadership Roles in the QC Circle Program	105
References	107

## Part II: Tools

<b>8. Applying Methods</b>	<b>111</b>
Use a Method Suited to Your Objectives	111
Fundamentals of Applying QC Methods	111
<b>9. How to Collect Data</b>	<b>115</b>
The Goal of Data Collection	115
Populations and Samples	116
Types of Data	118
Recording Data	118
<b>10. Graphs</b>	<b>121</b>
Graph Classification	121
Bar Graphs	121
How to Make a Bar Graph	121
Ways to Read and Use Bar Graphs	125
Line Graphs	126
How to Make a Line Graph	126
Ways to Read and Use Line Graphs	129
Pie Charts	130
How to Make a Pie Chart	130
Ways to Read and Use Pie Charts	133
Band Graph	134
How to Make a Band Graph	134
Ways to Read and Use Band Graphs	137
References	137

<b>11. Pareto Diagrams</b>	<b>139</b>
How to Make a Pareto Diagram	139
Ways to Use Pareto Diagrams	144
References	147
<b>12. Cause-and-effect Diagrams</b>	<b>149</b>
How to Make a Cause-and-effect Diagram	150
Ways to Use Cause-and-effect Diagrams	157
References	158
<b>13. Check Sheets</b>	<b>159</b>
How to Make a Check Sheet	160
Ways to Use Check Sheets	163
References	169
<b>14. Histograms</b>	<b>171</b>
How to Make a Histogram	171
Ways to Use Histograms	175
<b>15. Stratification</b>	<b>179</b>
Using Stratification with the QC Tools	180
References	183
<b>16. Quantitative Expressions of the Data Distribution</b>	<b>185</b>
Expressing the Median Value of a Distribution	185
Mean Value: $\bar{x}$	185
Median Value: $\tilde{x}$	187
Expressing the Spread of the Distribution	188
Range: $R$	188
Variance: $V$	189
Standard Deviation: $s$	191
Determining Mean Value and Standard Deviation Using a Frequency Table	191
Notes on Rounding Values	193
<b>17. Process Capability</b>	<b>195</b>
Process Capability Charts	195
Process Capability Index	197
Estimating Percentage Defective	202

<b>18. Control Charts</b>	<b>205</b>
Making Control Charts with Measured Values	205
$\bar{x}$ -R Control Charts	205
$\tilde{x}$ -R Control Charts	210
x Control Charts	214
Making Control Charts with Counted (Numerical) Values	218
pn Control Charts	218
p Control Charts	220
c Control Charts	224
u Control Charts	225
How to Read Control Charts	228
Ways to Use Control Charts	232
For Analyzing the Process	232
For Managing the Process	232
<b>19. Scatter Diagrams and Correlation</b>	<b>237</b>
What Is Correlation?	237
How to Make a Scatter Diagram	237
The Correlation Sign Test	240
<b>20. Affinity Diagrams</b>	<b>245</b>
How to Make an Affinity Diagram	246
Ways to Use Affinity Diagrams	248
References	250
<b>21. Relations Diagrams</b>	<b>251</b>
How to Make a Relations Diagram	252
Ways to Use Relations Diagrams	254
References	256
<b>22. Systematic Diagrams</b>	<b>257</b>
Types of Systematic Diagrams	257
How to Make a Systematic Diagram	258
Ways to Use Systematic Diagrams	260
References	262
<b>23. Matrix Diagrams</b>	<b>265</b>
How to Make a Matrix Diagram	266
Ways to Use Matrix Diagrams	268
References	272

<b>24. Arrow Diagrams</b>	<b>273</b>
How to Make an Arrow Diagram	274
Ways to Use Arrow Diagrams	278
References	280
<b>Appendices</b>	<b>281</b>
1. Quality Month Themes and Slogans	281
2. Chronology of Standardization and Quality Control	285
About the Editors	289
Index	291