Contents

About the Author vii
Acknowledgements ix
Introduction xi

Part One: Understanding Design 1

1 The Nature of Design 3
Design Activities 3
Design Problems 11
Problem Structures 14

2 Design Ability 19
What Designers Say 19
How Designers Think 21
Learning to Design 25

3 The Design Process 29
Descriptive Models 29
Prescriptive Models 34
An Integrative Model 41

Part Two: Doing Design 43

4 New Design Procedures 45
Systematic Procedures 45
Design Methods 46
Creative Methods 48
Rational Methods 55

5 Identifying Opportunities 59
The User Scenarios Method 60

6 Clarifying Objectives 77
The Objectives Tree Method 78

7 Establishing Functions 93
The Function Analysis Method 94

8 Setting Requirements 105
The Performance Specification Method 106

9 Determining Characteristics **121**
The Quality Function Deployment Method 122

10 Generating Alternatives **137**
The Morphological Chart Method 138

11 Evaluating Alternatives **151**
The Weighted Objectives Method 152

12 Improving Details **173**
The Value Engineering Method 174

Part Three: Managing Design *191*

13 Design Strategies **193**
What is a Design Strategy? 193
Frameworks for Action 197
Strategy Control 199
Setting Strategies and Choosing Tactics 200

14 Product Development **203**
Product Design 203
Product Planning 204
Product Innovation 208

References **213**
Index **215**