
Contents

1	What are Decisions?	1
1.1	Understanding the Decision Process.....	1
1.2	What It Is to “Make Decisions”.....	1
1.3	Route to Decisions.....	5
1.4	Decisions and Doubts.....	7
2	Describing and Transferring the Decision Process	13
2.1	The Need to Know the Decision Process.....	13
2.2	Method of Recording and Transferring the Decision Process	16
2.3	Actual Methods for Transferring Decision Processes.....	20
2.4	Diagrams for Expressing the Decision Process	22
2.5	Example of Recording the Decision Process	27
	2.5.1 Describing What Happened.....	27
	2.5.2 Processes and Contents from This Event.....	33
3	Decisions in Design	39
3.1	Questions about Design	39
3.2	The Mind’s Decision Process During Design.....	40
3.3	Constraints and Evaluation of Design	43
3.4	Describing the Design Content.....	46
3.5	Designers Want to Know the Reason for the Designs	47
3.6	Design Support Systems the Designer Wants	49
4	Sample Decisions in Design	55
4.1	Hydraulic Cylinder – the Mind Process of Designing One	56
4.2	Designed a Torque Sensor	65
4.3	Designed a Positioning Table	77
	4.3.1 Design Specification of the Positioning Table.....	77
	4.3.2 Analyzing the Functional Requirements.....	78
	4.3.3 Discussing and Determining the Basic Mechanism.....	78
	4.3.4 Producing the Structure	80
4.4	Built an Intelligent Grinding Tool for Producing Flat Wafer Surfaces ..	82

4.5	Planned and Proposed the Nanomanufacturing World Project	86
4.6	Developed the Control System for Automatic Grinding of Turbine Blades	90
4.7	Built “Creative Design Engine” for Assisting Idea Generation	98
4.8	Guided Students’ Free Imagination in Building Stirling Engines	102
5	Real Decisions in Manufacturing	113
5.1	Decision-Making in Technology Development	114
5.1.1	Finding Out the Real Safety System at Mt Usu – Thinking 1	114
5.1.2	Designed a Pressure Sensor Exposed to Severe Conditions – Thinking 2	118
5.1.3	Reduced the Weight of an Automobile Compressor – Thinking 3	122
5.1.4	Automated the Narita Express Car Junction Hood – Thinking 4	127
5.1.5	Developed a Telescopic Arm Clamshell Digger – Development 1	131
5.1.6	Developed an Automatic Segment Construction Robot for Sealed Tunnels – Development 2	137
5.1.7	Developed a System for Preventing Mobile Crane Overturn – Development 3	142
5.1.8	Modified the Lighting Unit of a Wafer Character Recognition Machine – Practice 1	148
5.1.9	Succeeded in Laser Welding by Controlling Its Tip Distance – Practice 2	154
5.1.10	Applied IC Tagging for Managing Metal Mold Parts – Practice 3	158
5.1.11	Modified a Sandblast Machine for PDP Class Substrate Machining – Practice 4	161
5.1.12	Installed a New Cable on a Multi-Joint Robot – Modification 1	164
5.1.13	Modified a Material Cooling System but Could Not Cut the Cost – Modification 2	170
5.1.14	Successfully Anchored a Floating DNA Fiber in Liquid – Research 1	171
5.1.15	Made DNA with Fluorescent Molecule Visible in Liquid – Research 2	176
5.1.16	Built a Microscopic Assembly Tool – Research 3	180
5.1.17	Accomplished Wide-Range High-Precision Positioning – Research 4	185
5.2	Decision-Making in Technology Management	189
5.2.1	Selected a 3D CAD System – System Introduction 1	189
5.2.2	Arbitrarily Selected a CAM System – System Introduction 2	192
5.2.3	Evaluated a Technology for Breaking Rocks with Electromagnetic Force – Technology Introduction 1	195

5.2.4 To Introduce a New Forming Method to Our Main Factory or Not – Practical Solution 1	198
6 Decisions about Individuals and Organizations.....	203
6.1 Decisions about Occupations.....	204
6.1.1 Jumped to a Small Company for a New World – Job Change 1.....	204
6.1.2 Moved from Manufacturing to Consulting – Job Change 2.....	207
6.1.3 Moved from a Company to School for a Diploma – Job Change 3.....	210
6.1.4 Resigned from a Trading Company and Became Independent – Entrepreneurship 1.....	212
6.1.5 Started a New Business in the US for Building a Bridge over the Pacific – Entrepreneurship 2.....	218
6.1.6 I Became Disabled and Selected the Course of My Life – Turning 1.....	221
6.1.7 Jumped into an Unexplored Research Area – Turning 2.....	225
6.1.8 Built a New Lab and Research Group in a Conventional Field – Turning 3.....	227
6.2 Decisions about Corporate Management.....	231
6.2.1 My Company will Disappear in One and a Half Years – Operation 1.....	231
6.2.2 Forced an Organizational Change in a Traditional University – Operation 1.....	233
6.2.3 Located a New Factory – Investment.....	236
6.2.4 Selected My Successor and Recommended Him – Resources 1.....	239
6.2.5 Restructured a Department with My Own Thoughts and Failed – Resources 2.....	241
6.2.6 Started a Young Engineers Training Program – Management 1.....	243
6.2.7 Applied to a MITI Project but I Was Declined – Management 2.....	246
Applying the Mind Activity for Manufacturing.....	249
7.1 Where in Manufacturing to Apply the Mind Activity.....	249
7.2 Decisions by INCS.....	250
7.3 Implementation by INCS.....	252
7.4 Outcome of the INCS Development.....	256
7.5 Where Does This Lead Us to in the Future?.....	257
Postscript.....	261
Index.....	263

