

CONTENTS

PART ONE. Heat Treatment of Steel	1
PART TWO Casting	
2.1 Sand Casting	15
2.2 Centrifugal Casting	19
2.3 Permanent-mold Casting of Aluminum	22
2.4 Permanent-mold Casting of Gray Iron	26
2.5 Die Casting	29
Die Casting of Zinc Alloys	32
2.6 Plaster-mold Casting	34
Investment Casting	38
PART THREE Hot Working	
3.1 Extrusion of Aluminum	49
3.2 Extrusion of Magnesium Alloys	59
3.3 Extrusion of Copper-base Alloys	63
3.4 Forging	66
3.5 Electric-resistance Upsetting	75
3.6 Cored Forging	78
3.7 Hot Forming Bending and Drawing	81
PART FOUR. Cold Working	
4.1 Cold Drawing	85
4.2 Cold Heading	91
4.3 Thread and Form Rolling	93
4.4 Metal Spinning	109
4.5 Stamping and Drawing	113
Stamping Design Tips	125
4.6 Rubber Hydropress Forming	128
4.7 Stretch Forming	133
4.8 Drop-hammer Forming	142
4.9 Press-brake Forming	147
4.10 Cold Bending of Shapes	153
4.11 Cold-roll Forming	167
4.12 Wire Forming	178
PART FIVE. Powder Metallurgy	181
5.1 Powdered-metal Friction Material	187
PART SIX. Welding and Cutting	

6.1 Flame Cutting	195
6.2 Welding Processes	204
6.3 Design for Welding	255
6.4 Resistance Welding	274
6.5 Furnace Brazing	327
6.6 Soldering	342
6.7 Metallizing	349
PART SEVEN. Machining	359
PART EIGHT. Finishing	
8.1 Cleaning of Metals	381
8.2 Barrel Tumbling	391
8.3 Brushing Polishing and Buffing	395
8.4 Coating and Protection	405
PART NINE. Electroforming	421
INDEX	425