CONTENTS

		Page
1.	OCCURRENCE AND PRODUCTION I History II Sources III Mining and Ore Treatment IV Metal Extraction Processes V Recovery from Residues and Scrap VI Use of Energy VII Economics and Prices References and Further Reading	1 3 3 4 6 23 30 31 34
2.	PROPERTIES I General Physical and Mechanical properties II Metallurgical Structure III Alloying Elements and Impurities References and Further Reading	36 36 44 49 57
3.	EARLY USES AND DEVELOPMENT I Early Uses II Coatings III Casting IV Wrought Materials V Brass VI Other Zinc Uses References and Further Reading	59 59 61 70 72 74 74 76
4.	SPECIFICATIONS AND TESTING I Nomenclature II Specifications III Analysis and Testing References and Further Reading	77 77 78 93 96
5.	CORROSION RESISTANCE I General Principles and Surface Reactions II Atmospheric Corrosion III Corrosion in Water IV Corrosion by Chemicals V Soil Corrosion VI Bimetallic Corrosion VII Corrosion Fatigue VIII Contact with Other materials IX Corrosion Testing References and Further Reading	97 97 100 106 114 116 116 121 121 123 125
6.	HOW ZINC CAN PROTECT STEEL I Corrosion Processes II Barrier Coatings III Sacrificial Effect IV Combined Effect References and Further Reading	128 128 129 129 133 134
7.	ANODES FOR CATHODIC PROTECTION I Principles of Cathodic Protection	135 135

	II III IV	Sacrificial Anode Specifications Practical Considerations Typical Installations	136 137 138	
	1,	References and Further Reading	140	
8.	THE I	FAMILY OF ZINC COATINGS Types	142 142	
	II	General Properties and Relative Merits	149	
	III	Design for Coating	165	
	IV	Joining	169	
	V	Duplex Coatings	171	
	VI	Uses and Statistics	172	
		References and Further Reading	173	
9.		OY COATINGS	174	
	I	Reasons for Alloying and background	174	
	II III	5% Aluminium 55% aluminium	176 184	
	IV	Intermediate Aluminium Contents	191	
	V	Zinc-Iron	191	
	VI		192	
		Zinc-Cobalt	196	
		Other alloy Coatings	196	
	IX	Composite Coatings	197	
		References and Further Reading	198	
10.		DUCTS GALVANIZED AFTER FABRICATION	201	
	I	Process Man for the in Process	201	
	II III	Manufacturing Practice Nature of the Coating	205 209	
	IV	Effect of Alloying Additions in the Bath	213	
	V	Effect of Alloying Additions to Iron	217	
	VI	Treatments to Deal with Continuously Cast Steel	222	
		Galvanizing of Threaded Work	224	
		Design for Galvanizing	227	
	IX	Specification, Inspection and Testing	231	
	X	Properties of Galvanized Products	232	
	XI	Uses	234	
		References and Further Reading	238	
11.	TUB I	BE GALVANIZING Introduction	243 143	
	II	Process for Inside and Outside Galvanizing	244	
	III	Outside-only Process	244	
	IV	Uses	245	
		References and Further Reading	246	
12.	WIRE GALVANIZING			
	I	Introduction	247	
	II	Galvanizing Practice	247	
	III	Nature of the Coated Steel	250	
	IV	Properties and uses References and Further Reading	251 252	
13.				
	I	Introduction	253 253	
	II	Galvanizing Processes	253	
	III	Nature of the Coated Steel	262	
	IV	Properties and Uses	264	
		References and Further Reading	268	

14.	ELECTROPLATED COATINGS I Processes for Products and for Continuous Sheet or Wire Coils II Nature of the Coating III Alloying elements IV Plant Facilities V Properties and Design VI Uses References and Further Reading	269 269 275 275 276 279 282 283
15.	MECHANICAL AND ADHESIVE-BONDED COATINGS I Introduction II Process III Nature of the Coating IV Plant Facilities V Properties and Design VI Uses References and Further Reading	285 285 286 288 288 289 290
16.	SHERARDIZING I Process II Nature of the Coating and Its Inspection III Plant Facilities IV Properties V Design for Sherardizing and Its Uses References and Further Reading	292 292 294 299 300 300 301
17.	SPRAYED COATINGS I Process II Nature of the Coating and Inspection III Alloying Elements IV Plant Facilities V Properties VI Design and Fabrication VII Uses References and Further Reading	302 302 313 314 314 315 317 319 321
18.	ZINC INCORPORATED INTO COATINGS I Types of Zinc II Types of coating Containing Zinc III Zinc-Rich Systems IV Zinc-Dust/Zinc –Oxide Systems V Propertary Systems References and Further Reading	323 323 326 327 332 333 334
19.	FABRICATION AND JOINING OF ZINC-COATED STEEL I Fabrication and Forming II Welding III Brazing and Soldering IV Adhesive Bonding V Mechanical Fixing – Influence of Zinc Coatings on Fastening References and Further Reading	335 335 337 352 353 354 361
20.	DUPLEX COATINGS I Introduction II Choice and Pretreatment of Zinc Coating III Paints IV Powder Coatings V Laminates VI Testing and Properties VII Design, Fabrication and Uses References and Further Reading	363 363 366 370 384 385 386 388 393

21.	ECONOMICS OF PROTECTION BY COATINGS I Introduction II Initial Costs III Maintenance Costs	395 395 396 401
	IV Overall Cost Assessments V Case Histories References and Further Reading	403 404 405
22.	ZINC BATTERIES I Introduction and History II Primary and Secondary Zinc Batteries III Electrolytes for Primary Zinc Batteries IV Recargeable Zinc Batteries References and Further Reading	406 406 408 415 418 419
23.	PRESSURE DIE-CASTING PROCESSES I Introduction II Alloys and Properties III Pressure Die-Casting Processes References and Further Reading	421 421 423 442 472
24.	GRAVITY CASTING PROCESSES I Introduction II Alloys and Properties III Gravity Die-Casting Techniques IV Casting of Slurries (Liquid –Solid Mixes) V Prototype Production References and Further Reading	475 475 476 496 501 502 502
25.	THE CAST ZINC ALLOY PRODUCT I Introduction II General Properties III Finishing Castings IV Assembly Techniques References and Further Reading	504 504 504 512 524 527
26.	DESIGNING FOR PRODUCTION AS ZINC ALLOY DIE CASTINGS I Introduction II Basic Principles III Design Details for Castings IV Zinc Alloy Castings to Replace Other Materials References and Further Reading	529 529 531 533 544 549
27.	ROLLED ZINC I Introduction II Production III Alloys, Properties and Fabrication IV Sheet in Building V Photoengraving Plates VI Superplastic Alloys References and Further Reading	551 551 552 552 558 564 566 569
28.	OTHER WROUGHT AND SPECIAL PRODUCTS I Extrusion and Forging Alloys II Wire III Powder Metalurgy Products IV dispersion-Strengthened Zinc alloys (Composites) References and Further Reading	571 571 573 574 575 577
29.	ZINC DUST AND COMPOUNDS I Zinc Dust	578 578

	II	Zinc Oxide and Chemicals	587
		References and Further Reading	590
30.	ZINC AS AN ALLOYING ELEMENT		592
	I	Introduction	592
	II	Brass	593
	III	Other Alloys	600
		References and Further Reading	601
31.	ZINC AND HEALTH		603
	I	The Need for Zinc	603
	II	Toxicity and Industrial Hazards	612
		References and Further Reading	612
32.	PROSPECTS FOR ZINC		614
	I	Availability	614
	II	Demand	614
		References and Further Reading	617
Inde	X		619