

Table of Contents

Preface	vii
Acknowledgments	ix
Introduction	xi
I.1 Scope	xi
I.2 History of Advanced High-Strength Steel	xi
I.3 Steel Technology Studies	xii
Chapter 1 Advanced High-Strength Steel Technology	1
1.1 Characteristics and Metallurgy	1
1.2 Drivers for Advanced High-Strength Steels	7
1.3 Growth in Advanced High-Strength Steel Usage	11
1.4 Making Advanced High-Strength Steels	15
1.5 Coatings for Advanced High-Strength Steels	26
1.6 References	29
Chapter 2 Impediments and Enablers for Advanced High-Strength Steels	31
2.1 Forming Advanced High-Strength Steels	31
2.2 Welding Advanced High-Strength Steels	47
2.3 Fatigue Life with Advanced High-Strength Steels	52
2.4 Stiffness Retention When Using Advanced High-Strength Steels	54
2.5 Computer-Aided Engineering and Advanced High-Strength Steels	56
2.6 Variability of Advanced High-Strength Steels	58
2.7 Service and Repair of Advanced High-Strength Steels	59
2.8 References	61
Chapter 3 Example Applications of Advanced High-Strength Steels	63
3.1 Architectural Enablers for Advanced High-Strength Steels	63
3.2 IMPACT Applications	74
3.3 Body Structure Safety Application	86
3.4 Auto/Steel Partnership Closure Application	97
3.5 Reference	105
Chapter 4 Comparison of Advanced High-Strength Steels with Alternative Materials	107
4.1 Material Comparison Overview	107
4.2 Elementary Structural Mechanics	108

4.3 Generalization of Elementary Theory	111
4.4 Recent Comparisons of Advanced High-Strength Steels and Aluminum.....	120
4.5 Relative Costing of AHSS and Alternative Materials	134
4.6 References.....	143
Chapter 5 Future Direction of Advanced High-Strength Steels	145
5.1 Press-Hardened Steel Applications	145
5.2 Second Generation Advanced High-Strength Steels	148
5.3 Third Generation Advanced High-Strength Steels	149
5.4 Ultimate Weight Benefits of Advanced High-Strength Steels	156
5.5 References.....	174
Chapter 6 Conclusions and Recommendations	175
Index	179
About the Author	184