Table of Contents

INTRODUCTION TO THE FOURTH EDITION  XI

FOREWORD  XIII

ABOUT THE AUTHOR  XV

1 WHAT IS A CONTROL VALVE AND HOW DOES IT AFFECT MY CONTROL LOOP?  1
   What to Look for in a Good Control Valve Design, 6
   References, 8

2 WHY NOT USE A SPEED-CONTROLLED PUMP?  9
   References, 10

3 WHAT VALVE TYPE SHALL I CHOOSE?  11
   Selecting the Right Valve Type, 11
   Criteria for Valve Selection: A Summary, 16

4 THE SELF-ACTING REGULATOR, WHY NOT?  19
   References, 20

5 VALVE SIZING MADE EASY  21
   Valve Sizing, 21
   What are the Right Flow Conditions?, 25
   Pipe Reducers, 26
   Correcting for Viscosity, 28
   Sizing Control Valves for Viscous Fluids - An Explanation, 37
   Metric Units, 39
   What Size Valve to Choose, 40
   Adjustable Travel - Adjustable Cv, 42
   References, 45

6 SIZING AND SELECTION—LET THE COMPUTER DO IT ALL!  47
   Partial Tabulation of Vendors Offering Computer Programs
   for Control Valve Sizing and Selection, 49

7 WHAT ABOUT FAIL-SAFE?  51
8 WHY MOST PEOPLE CHOOSE “EQUAL PERCENTAGE” AS A FLOW CHARACTERISTIC 53
   How to Calculate the “Installed” Flow Characteristic, 57
   References, 60

9 VALVE POSITIONERS 61
   When to Use Valve Positioners, 61
   What to Look for When Specifying Positioners or Transducers, 63
   Smart Positioners – Smart Valves, 65
   Accessories and Software, 69
   Connecting It All to the Control System, 70
   References, 71

10 THE MYSTERY OF LINE PRESSURE-PRODUCED VALVE STEM FORCES, OR SELECTING THE CORRECT ACTUATOR SIZE 73
   The Valve Does Not Close Properly, 73
   Control Valve Data Sheet, 74
   The Valve Is Unstable, 76
   References, 80

11 HOW TO INSTALL A CONTROL VALVE 81
   Other Things That Can Go Wrong, 82
   References, 83

12 HOW GOOD IS THE VALVE THAT I PURCHASED? 85
   References, 89

13 WHEN DO I NEED TO “HARD FACE” THE VALVE TRIM AND OTHER QUESTIONS CONCERNING VALVE MATERIAL 91
   Erosion Caused by Solid Particles in the Fluid Stream or Granular Materials such as Coal Slurry, 91
   Cavitation, 92
   Erosion by Wet Steam, 92
   References, 93

14 CONCERN FOR THE ENVIRONMENT 95
   Will My Valve Be Too Noisy?, 95
   Methods of Aerodynamic Valve Noise Reduction, 100
   How About Cavitation?, 106
   Noise Produced by Turbulence and Cavitation of Liquids, 111
   Avoidance of Leaky Valve Stem Packings, 111
   Bellows Seals, 114
   References, 115

15 SEAT LEAKAGE AND SEAT MATERIALS 117
Table of Contents

16 VALVES FOR SANITARY OR ASEP TIC SERVICE 121
    References, 127

17 FIFTEEN COMMANDMENTS: WHAT YOU SHALL NOT DO! 129

18 ELECTRIC VERSUS PNEUMATIC ACTUATORS 131
    References, 133

19 SAVING ENERGY 135
    References, 136

20 THE BUS SYSTEM TO THE RESCUE, OR WHAT THE FUTURE MAY BRING 137
    The Coming Wireless Ethernet, 141
    Thinking “Green” and Saving Energy, 142
    References, 143
    Bibliography, 143

APPENDIX A: REFERENCES—TABLES AND FIGURES 145

APPENDIX B: CONTROL VALVE STANDARDS AND RECOMMENDED PRACTICES 155

INDEX 159