

*Comparative study and Analysis of control design on
industrial boiler with different control techniques.*

A Thesis submitted to the department of Electrical Engineering in fulfilment of the requirements for
the degree of Master in engineering

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Table of Contents

LIST OF FIGURES	VII
LIST OF TABLES	IX
ABSTRACT.....	X
CHAPTER: 1 INTRODUCTION	1
1.1. Background	1
1.2. Contributions	1
1.3. Thesis overview.....	3
CHAPTER: 2 STUDY OF POPULAR CONTROL APPROACHES IN BOILER CONTROL INDUSTRY	5
2.1. Introduction	5
2.2. Trends in energy efficiency and improvement.....	6
2.2.1 First generation Bio-fuel technology.....	6
2.2.2 Second generation Bio-fuel technology	6
2.3. Operational improvements	7
2.3.1 Reducing Excess Air	7
2.3.2 Installing Economizer	8
2.3.3 Reducing Scale and Deposits.....	8
2.3.4 Reducing Blow down	8
2.3.5 Recovering Waste Heat from Blow down	8
2.3.6 Stopping Dynamic Operation	9
2.3.7 Reducing Boiler Pressure	9
2.3.8 Operating at Peak Efficiency	9
2.3.9 Preheating Combustion Air	9
2.3.10 Switching from Steam to Air Atomization.....	9
2.3.11 Switching to Lower Cost Fuel	9
2.4. Design process	10
2.5. Power plant process.....	11
2.5.1 Boiler steam generation process	12
2.5.2 Steam and boiler drum	13
2.5.3 Drum level measurement	14
2.6. Boiler control problem	15
2.7. Boiler drum level control.....	15

2.7.1	Drum level control strategies	16
2.8.	Combustion control.....	19
2.8.1	Excess air regulation	20
2.8.2	Oxygen trim.....	20
2.8.3	Burner modulation	21
2.8.4	Air/fuel cross-limiting	21
2.8.5	Enhanced cross-limiting.....	22
2.8.6	Total heat control	22
2.9.	Fuel transportation and processing	23
2.10.	Process control techniques.....	23
2.10.1	Conventional PID control technique.....	24
2.11.	State feedback controller design	27
2.11.1	Design of control systems	27
2.11.2	Classical proportional control (SISO)	27
2.11.3	State feedback control (SISO).....	29
2.11.4	Complete state controllability.....	31
2.11.5	Poles placement	32
2.11.6	State feedback with a full state observer	33
2.11.7	Complete state observability	36
2.11.8	Determining the observer gains.....	39
2.11.9	Principle of duality.....	40
2.11.10	State feedback assisted classical control (with present gains).....	41
2.11.11	Plant dynamics	44
2.11.12	Observer dynamics.....	44
2.11.13	Control Law.....	45
2.12.	Optimal linear quadratic regulator	46
2.13.	Fuzzy Logic and Fuzzy Control.....	49
2.13.1	Fuzzy Logic:	49
2.13.2	Linguistic Variable.....	52
2.13.3	Inference Rules:.....	52
2.13.4	Fuzzy Algorithms	53
2.13.5	Structure of Fuzzy Logic Controller.....	53
	Defuzzification	57
2.14.	Adaptive Control System.....	59
2.14.1	Direct Adaptive Controller	59
2.14.2	Indirect Adaptive Controller.....	60
2.15.	Fuzzy Model Reference Learning Controls.....	61
2.15.1	Fuzzy Controller.....	62
2.15.2	Reference Model	66
2.15.3	Learning Mechanism	67
2.15.4	Fuzzy Inverse Model	67
2.15.5	Knowledge-Base Modifier	68
2.15.6	Learning, Memorization, and Inverse Model Input Choice.....	69

2.16.	Early research contributions.....	70
2.16.1	History of boiler model development.....	70
2.16.2	Boiler control schemes	72

CHAPTER: 3 RESEARCH METHODOLOGY..... 73

3.1.	Introduction.....	73
3.2.	Methodology flow chart.....	75
3.3.	Boiler model design.....	77
3.3.1	The Controller.....	82
3.3.2	The control valve	83
3.3.3	A model of the closed-loop system	85
3.4.	Reviving research objectives	88
3.5.	Boiler model selection.....	89
3.6.	Model specifications	89
3.7.	Model characteristics	92
3.8.	Model linearization	94
3.9.	Stability analysis of models (I-III).....	96
3.9.1	Controllability.....	96
3.9.2	State controllability	97
3.9.3	Output controllability	97
3.9.4	Observability	97

CHAPTER: 4 THE CONVENTIONAL PID SCHEME..... 99

4.1.	Introduction.....	99
4.2.	Boiler model constraints	100
4.3.	Gain scheduling of PID parameters	104

CHAPTER: 5 STATE FEEDBACK CONTROLLER..... 105

5.1.	Introduction.....	105
5.2.	State feedback controller design	106
5.2.1	Observer design.....	107
5.3.	Drawbacks	111
5.4.	Optimal linear quadratic regulator (LQR)	111
5.4.1	Controller design.	111

5.5.	Drawbacks	116
CHAPTER: 6 FUZZY LOGIC CONTROLLERS.....		117
6.1.	Introduction	117
6.2.	Reference Model.....	118
6.3.	Fuzzy PD controller (Multiple Input and Single Output) MISO	118
6.4.	Learning Mechanism	120
6.5.	PI level controller	121
6.6.	Ratio control of combustion air.....	122
CHAPTER 7 CONCLUSION		123
REFERENCES.....		128
APPENDICES		131
Appendix-I		132
Appendix-II		133
Appendix-III		135
Appendix IV		137
Appendix V		138
Appendix VI		139

List of figures

Figure 1: Steam and water cycle	12
Figure 2: Boiler drum level measurement	15
Figure 3: Single element drum level control	17
Figure 4: Two element cascade control.....	18
Figure 5: Three element cascade control.....	19
Figure 6: Excess air control.....	20
Figure 7: Cross limiting combustion mechanism	21
Figure 8: Cross limiting combustion control with trim.....	22
Figure 9: Total heat control	23
Figure 10: Block diagram of a PID controller	24
Figure 11: Linear state space model of the plant.	27
Figure 12: Classical proportional control of a SISO system	28
Figure 13: State feedback control of a SISO plant	30
Figure 14: Linear state space model of the plant with two outputs	30
Figure 15: State observer model for a SISO system	34
Figure 16: State feedback control with full state observer (SISO system)	35
Figure 17: State feedback with an embedded classical control loop (SFACC scheme)	42
Figure 18: Introduce classical controller with gain into SFC scheme	43
Figure 19: State feedback control with SS gain block	45
Figure 20: Triangular membership functions	50
Figure 21: Gaussian membership function.....	50
Figure 22: Block diagram of fuzzy logic controller.....	54
Figure 23: Graphical construction of the control signal in fuzzy PD controllers.....	55
Figure 24: One input, output rule base with non-singleton output sets	58
Figure 25: Direct adaptive controllers.....	60
Figure 26: Indirect adaptive controllers	60
Figure 27: Fuzzy Model reference learning controller	62
Figure 28: Error universe of discourse.....	64
Figure 29: Response of boiler drum to a 36.2 kg/s change in the feedwater mass flow rate ..	78
Figure 30: Calculated relationship between absolute drum level and mass of water in drum	79
Figure 31: Rescaled version of fig.30, relative to the centre line of the drum	80
Figure 32: A block diagram of drum model.....	82
Figure 33: Block diagram of PI controller	82
Figure 34: Water mass flow rate vs. %age opening of the feedwater control valve.....	83
Figure 35: A block diagram of the feedwater control valve.....	84
Figure 36: A block diagram of P+I controller and feedwater control valve	85
Figure 37: A block diagram of drum level control system.....	85
Figure 38: A schematic picture of boiler system	89
Figure 39: Industrial steam generation plant	90
Figure 40: Step response of (a) pressure, (b) steam flow vs. (c) fuel flow	93
Figure 41: Simulation results of Model I, II and III tuned at different operating points	102
Figure 42: A combined pressure set-point profile with adaptive PID gains	104
Figure 43: Block diagram of two dimensional dynamical equation	108
Figure 44: State feedback controller response on linearised model I, II and III with reference pressure of 197, 260 and 400 PSI respectively	109
Figure 45: Comparison of state feedback controller on non-linear model with reference pressure of 197, 260 and 400 psi respectively	110

Figure 46: Integral control for steady state error design using LQR	112
Figure 47: Comparison of LQR on non-linear model with reference pressure input of 197, 260 and 400 psi respectively	115
Figure 48: A combined pressure set-point profile with LQR technique	116
Figure 49: Comparison of FMRLC on non-linear boiler model at 197,260 and 400psi.....	121
Figure 50: Results of four control schemes	124

List of tables

Table 1: Boiler model coefficients.....	92
Table 2: Boiler model characteristics.....	93
Table 3: Linearised operating points of model.....	94
Table 4: Eigen values of models.....	98
Table 5: Desired characteristics of control loops.....	100
Table 6: Time domain characteristics drum pressure, Excess Oxygen and steam flow.	101
Table 7: Model I, Controller parameters with pressure ref. input from 0 to 197 PSI.....	103
Table 8: Model II, Controller parameters with pressure ref. input from 197 to 260 PSI.....	103
Table 9: Model III, Controller parameters with pressure ref. input from 260 to 400 PSI	103
Table 10: Scaling factor for pressure loop	119
Table 11: Rule base for Fuzzy PD controller	119
Table 12: A comparison of controller energy	126
Table 13: Fuel consumption ratio with PID control	126

Abstract

Today, power Industry is facing challenges in maintaining their processes economical and emissions low. Need arise in this regard is to reconsider the operational philosophies of industries so that, industrial processes can be operated at new optimum levels where associated costs like operating, maintenance and outages can be minimized and maximum efficiencies can be achieved over running life of the plant. To achieve these objectives, expectations from control system increases much more than the conventional roles. It should be smart enough to monitor equipment deterioration, monitor process inefficiencies and reliability and respond to various time dependant equipment abnormalities like, aging, wear and tear and possibly equipment failures. Since widely used control scheme in industry is still conventional PID scheme, that is why, in this study, conventional PID control scheme is compared with state feedback controller, optimal linear quadratic regulator (LQR) and fuzzy model reference learning control (FMRLC) schemes. A non linear, multivariable, multiple input multiple output (MIMO) model of boiler from a power plant is used as a test bed with fuel flow, combustion air flow and feedwater flow as inputs. While steam pressure, excess oxygen, drum level and steam flow rate (boiler load) as outputs. The steam flow is the only output which is calculated as a function of fuel input and steam pressure. Since significant work has already been done to introduce load disturbances in the steam flow rate, hence disturbances in steam flow are not incorporated in this study. Finally, based on the simulated results, suitable control technique is suggested to operate the real world industrial boiler.