

**PERFORMANCE OF SOLID FUEL BURNERS IN SRI
LANKA**

G.P.R. Chandima

(128354U)

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Department of Mechanical Engineering

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Gamaralalage Prasad Ranil Chandima

(128354U)

Thesis submitted in partial fulfillment of the requirements for the degree
Master of Engineering

Department of Mechanical Engineering

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DECLARATION

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Signature:

Date:

G.P.R. Chandima

The above candidate has carried out research for the Master's Thesis under my supervision.

Signature:

Date:

Prof. K.K.C.K. Perera,
Senior Lecturer,
Dept. of Mechanical Engineering,
University of Moratuwa.

The above candidate has carried out research for the Master's Thesis under my supervision.

Signature:

Date:

Dr. R.A.C.P. Ranasinghe,
Senior Lecturer,
Department of Mechanical Engineering,
University of Moratuwa

ABSTRACT

The energy has been one of the main crises in the world; hence, it is essential to save and utilize it in its optimized form. One of the major fuels available in the world is fossil fuel. When harnessing energy from fossil fuel, burning process is used with the help of burners and boilers. The efficiency of these systems is very important to get the maximum energy conversion. Therefore, the performance of the burner and the boiler affect the fuel consumption. The old burners in industries will have to be evaluated for performance to decide whether they can be improved or weather to rehabilitate the burner unit. The performances vary with different factors which need to be found out in this thesis. Then the solutions can be introduced for the inefficiency in burner to get the optimum operation.

Burners use different types of firing technologies to harness the energy from the fuel. Its' technology, type of fuel used and size of the burner need to be identified in order to evaluate the performance of the burner. There are two methods used to evaluate the performances of burners. This research is focused on performance of solid fuel burners used in Sri Lanka. The existing burners can then be improved using performance results which is the focus in this research. Many burners used in country are conventional burners and they use basic technology for burning. Reduction of fuel wastage, improvement of safety and reduction of environmental pollution are some of the improvements from the performance evaluation.

The significant parameters that effect the performance of burner are identified using the indirect method. Those are moisture content of solid fuel, ambient temperature, carbon content of fuel, exhaust temperature and excess air supplied. Some of the parameters identified, can be optimized to improve the performance of burner as described. The direct method results and indirect method results are compared and it is evident that the indirect method interprets much descriptive results. The results are depend on specific heat capacity of flue gas but it won't depend on specific heat capacity of steam generated. Burners and boilers in other countries show more variations of efficiency with moisture content compared to the Sri Lanka's.

Key words: Fossil Fuels, Burner performances, fuel, efficiency.

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CONTENTS

Declaration	i
Abstract	ii
Acknowledgement.....	iii
Content	iv
List of figures	vii
List of tables	x
List of abbreviations.....	xi

Chapters

1. Introduction.....	1
1.1 Background.....	1
1.2 Motivation.....	2
1.3 Aim and objectives.....	3
1.4 Methodology.....	3
1.5 Structure of Thesis.....	4
1.5 Contribution to Knowledge.....	4
2. Classification of burners	5
2.1 Introduction.....	5
2.2 Classification of Burners.....	5
3. Solid fuel burners	15
3.1 Introduction	15
3.2 Coal Fired Burner	15

3.3 Bio Mass Burner.....	27
3.4 Gasifiers.....	30
3.5 Summary of literature Review.....	33
4. Burner Selection and Solid Fuel Burners used in Sri Lanka.....	34
4.1 Introduction.....	34
4.2 Solid Fuel Burners used in Sri Lanka.....	36
4.3 Results.....	49
5. Performance Evaluation of Burners.....	52
5.1 Introduction.....	52
5.2 Operational Factors Effecting to Boiler Performance.....	52
5.3 Performance Evaluation.....	53
5.4 Standards used for Efficiency Calculation.....	54
5.5 The Direct Method of Testing.....	55
5.6 The Indirect Method of Testing.....	58
6. Performance Calculation.....	63
6.1 Introduction.....	63
6.2 Calculation of the Boiler Efficiency by direct method.....	63
6.3 Calculation of the Coal Power station boiler efficiency by indirect method using ASME standard.....	66
6.4 Calculation of the other solid fuel burner efficiencies by Indirect method using reference 24	93
7. Results and Discussion.....	101
7.1 Introduction.....	101

7.2 Result and Discussion of the Coal Power station 1 Burner Indirect Method using ASME Standard PTC 4.....	101
7.3 Results and Discussion of other solid fuel boiler efficiencies by Indirect method using reference 24.....	105
7.4 Comparison Direct method results and Indirect method results.....	112
7.5 Identification of significant parameter.....	114
7.6 Improvements for the Burners.....	115
7.7 The important variation in analysis	117
7.8 Other improvemets based on observations	117
7.9 Comparison of the efficiency of boiler with moisture content in Sri Lanka and world scenario.....	121
8. Conclusion & Future Works	123
8.1 Future Works.....	127
References.....	129
Appendix A.....	131
Appendix B.....	133
Appendix C.....	142

LIST OF FIGURES

Figure: 1.1 Solid Fuel Burners used in Sri Lanka_.....	1
Figure: 1.2 Primary Energy Supplied by source	2
Figure: 2.1 Burner Classification	6
Figure: 2.2 Solid Fuel Burner Classification.....	7
Figure: 2.3 Schematic of an air/fuel burner	8
Figure: 2.4 Schematic of an Oxy/fuel burner.....	8
Figure: 2.5 An air-oxy/fuel burner.....	9
Figure: 2.6 Premixed burner	11
Figure: 2.7 The staged-air process.....	11
Figure: 2.8 Diffusion mixed burner burner	11
Figure: 2.9 A staged fuel burner.....	11
Figure:2.10 Direct fired process.....	13
Figure:2.11 Indirect fired process.....	13
Figure: 3.1 Fluidized bed combustion boiler	19
Figure: 3.2 The Roll wheel pulverizer	21
Figure: 3.3 Chain Grate Arrangement.....	23
Figure: 3.4 Under feed Stacker arrangements	24
Figure: 3.5 Tangential Firing of the Coal combustion chamber	27
Figure: 3.6 Biomass burner arrangement	28
Figure: 3.7 Classification of bio mass burners.....	29
Figure: 3.8 General Arrangement of Fix Bed Gassifier	31

Figure: 3.9 Classification of Gassifiers.....	32
Figure: 4.1 The Arrangement of the burners inside the boiler.....	37
Figure: 4.2 The Arrangement of the fuel atomization	39
Figure: 4.3 Arrangement of the Hot Water Generator..	41
Figure: 4.4 The vertically mounted boiler arrangement.	42
Figure: 4.5 The general arrangement of the burner equipment of Mahiyanganaya....	45
Figure: 4.6 The boiler arrangement of the Tea Factory.....	47
Figure: 4.7 The process diagramme of the Rice mill.....	48
Figure: 5.1 Burner Heat flow diagramme for direct method	56
Figure: 5.2 Burner Heat flow diagramme for indirect method.....	59
Figure: 7.1 Burner efficiency Vs Moisture Content of coal in Coal Power Station 1	101
Figure: 7.2 Coal Power Station 1 Burner efficiency Vs air temperature entering to burner.....	102
Figure: 7.3 The Coal Power Station 1 Burner efficiency Vs Carbon content of coal.....	103
Figure: 7.4 The Coal Power Station 1 Burner efficiency Vs HHV of coal.....	103
Figure: 7.5 The Coal Power Station 1 Burner efficiency Vs Flue gas temperature..	104
Figure: 7.6 The Variation of the Burner efficiency Vs Moisture Content of Fuel.....	105
Figure: 7.7 The Burner Efficiency Vs Carbon Content of Fuel with constant GCV.....	105

Figure: 7.8 Efficiency of the Boiler Vs Installation Year Indirect Method.....	107
Figure: 7.9 Burner efficiency Vs Flue gas temperature with constant ambient Temperature.....	107
Figure: 7.10 Efficiency Variation with Ambient Temperature in constant exhaust temperature.....	108
Figure: 7.11 Variation of the Efficiency of the burner Vs Excess Air supplied.....	109
Figure: 7.12 Variation of the Efficiency of the burner Vs Hydrogen percentage in Fuel.....	109
Figure: 7.13 Variation of the Efficiency of the burner Vs Oxygen percentage in Flue Gas.....	110
Figure: 7.14 Variation of the Efficiency of the burner Vs Cp value of Flue Gas....	111
Figure: 7.15 Variation of the Efficiency of the burner Vs Cp value of Superheated Steam.....	112
Figure: 7.16 Efficiency Variation of Direct Method and Indirect Method.....	114
Figure: 7.17 Comparison of the efficiency of boiler with moisture content in Sri Lanka and world senario.....	121
Figure: 7.18 Comparison of the efficiency of boiler with HHV in Sri Lanka and world senario.....	122
Figure: 8.1 Monogramme for the thermal efficiency vs Exhaust and Ambient temperature.....	126

LIST OF TABLES

Table 4.1: The summary of the collected details for performance evaluation.....	56
Table 5.1: Typical Instruments used for Boiler Performance Assessment.....	61
Table 6.1: Efficiency calculation of the boiler burner using the Direct Method.....	65
Table 6.2: Efficiency calculation of the boiler burner using the Direct Method which use the details for Indirect Method.....	65
Table 6.3: Loss Calculation and Efficiency of coal power station 1 using the Indirect Method.....	85
Table 6.4: The composition of the fuel for the 100kg fuel.....	93
Table 6.5: Calculated losses and total efficiency of the indirect method.....	100
Table 7.1: Comparison of direct method results and indirect method results.....	113
Table 8.1: Summary of the findings by Efficiency Calculation.....	124
Table 01: Collected data for Direct method efficiency calculation.....	128
Table 02: Collected Data for the Indirect Calculation.....	136
Table 03: Boiler efficiency with moisture content.....	142
Table 04: Boiler efficiency with Carbon content.....	143
Table 05: Boiler efficiency with Installation.....	143
Table 06: Boiler efficiency with Exhaust Temperature.....	144
Table 07: Boiler efficiency with Excess Air Percentage.....	145
Table 08: Boiler efficiency with Hydrogen Percentage in Fuel.....	146
Table 09: Boiler efficiency with Oxygen Percentage in flue Gas.....	147
Table 10: Boiler efficiency with Cp value of Flue Gas.....	148
Table 11: Boiler efficiency with Cp value of the superheated steam.....	148

LIST OF ABBRIVIATIONS

Abbreviation	Description
ASME	American Society of Mechanical Engineers
BS	British Standards
CO	Carbon Monoxide
FBC	Fluidized Bed Combustion
GCV	Gross Calorific Value
IS	Indian Standards
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Dioxide group
PJ	Pica Joule
PTC	Performance Test Code
SCADA	Sequential Control and Data Acquisition
SO ₂	Sulfur Dioxide
SO _x	Sulfur Dioxide group
TDS	Total Dissolve Solids
USA	United State Of America