

**INTEGRATION OF REFINERY FLARE GAS SYSTEM
WITH FUEL GAS NETWORK FOR POWER
GENERATION**

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Engineering

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DECLARATION

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ABSTRACT

The high price of crude oil, strict environmental regulations and increasing demand for energy have made refineries adopt a more holistic approach to integrating energy, economics and environment in their design and operation. In this situation gas flaring can be considered as a major course for wasting energy in oil and gas refineries. It can be modified and use it for power generation and in-house heat generation. In this study a novel methodology is introduced to utilize the flare gas generated in a refinery through utilizing the pressure energy generated within the process. The proposed methodology uses pressure stages to regulate the pressures in predefined values and use either natural gas or LPG to makeup the gas requirement other than the gases from the process and flare system. Especial attention was given to regulate the existing FGN operation and to recover steady flow out for power generation. According to the cases analyzed with different input parameters, there was no observed variations in the vessel pressures and desired gas output flows. The gas flow from the plant values was set to vary up to 1574 g/s and the flare gas flow is varied up to 422 g/s. The profitability of using the flare gas recovered has been analyzed in 6 cases. Accordingly the total profit gain depends on the excess gases generated within the refinery, total gasses used in the process furnaces, total electricity demand and the makeup gas price. Considering LPG as a makeup gas and with the low LPG prices, there is maximum profit gain of 7,141,943 LKR in the situation where the power is generated using flare gas in the peak hours only.

Key words : Flare gas system, Fuel gas system, power generation, LPG, Natural gas

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TABLE OF CONTENTS

DECLARATION	i
ABSTRACT	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	ix
LIST OF TABLES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER 1 : INTRODUCTION	1
1.1. Background.....	1
1.2. Present status	2
1.3. Problem statement.....	2
1.4. Aim and Objectives.....	5
CHAPTER 2 : LITERATURE REVIEW	6
2.1. Introduction	6
2.2. Advantages of flare gas recovery.....	10
2.1. Environmental impacts of gas flaring	10
2.2. Economic impacts.....	11
2.3. Health and safety.....	11
2.4. Commercially available flare gas recovery options.....	12
2.5. GTL technology.....	12
2.1. Compression method.....	14
2.2. Electricity production from purge gases via gas turbines	14
2.3. Gas turbines to generate power using excess fuel gases	15
2.3.1. Combined cycle systems	16
2.3.2. Turbine Power Output	16
2.3.1. Simple cycle turbines system efficiency	16
2.3.2. Combined cycle turbines	17
2.3.3. Fuels used for gas turbine applications	17
2.3.4. Applications	17
2.4. Waste heat recovery	18

2.5. Waste heat recovery boilers.....	18
2.6. Heat recovery steam generator	19
2.7. Types of HRSG.....	20
2.7.1. Fired and Unfired	20
2.7.2. Single and multiple pressure operation	20
2.7.3. Horizontal and vertical	20
CHAPTER 3 : METHODOLOGY	21
3.1. Introduction	21
3.2. Typical fuel gas and flare gas networks.....	21
3.3. Model objective	23
3.3.1. Data on model formulation.....	23
3.3.2. Assumptions.....	23
3.4. Model development.....	24
3.4.1. Flow numbering	24
3.4.2. Vessel numbers	25
3.4.3. Pressure notations.....	25
3.4.4. Mass flow notations	26
3.4.5. Mass changes in vessels	26
3.4.6. Control valves	26
3.4.7. Gas flow in a pipe line.....	27
3.4.8. Van der Waals equation.....	28
3.5. Developing the model	29
3.5.1. Considering the F vessel.....	29
3.5.2. Considering the gas vessel i.....	29
3.5.3. Considering the FG vessel.....	30
3.5.4. Considering the Buff vessel.....	30
3.5.5. Flow i1	30
3.5.6. Flow 2.....	31
3.5.7. Flow 3.....	31
3.5.8. Flow i2.....	31
3.5.9. Flow LPG_F	32
3.5.10. Flow LPG_FG.....	32

3.5.11. Flow LPG_i.....	32
3.5.12. Flow LPG_bu.....	32
3.5.13. Flow j.....	33
3.5.14. Flow i_Buff_out.....	33
3.5.15. Flow i_Buff_in.....	33
3.6. Controlling actions. (Constraints for solving the equations).....	34
3.6.1. Stage 1	34
3.6.2. Stage 2.....	35
3.6.3. Stage 3.....	37
3.6.4. Stage 4.....	38
3.6.5. Stage 5.....	39
CHAPTER 4 : DYNAMIC SIMULATION.....	41
4.1. Initial Conditions	41
4.1.1. Initial setpressure conditions	41
4.1.2. Initial gas masses in vessels.....	42
4.1.3. Properties of pipes.....	42
4.2. Results	43
4.3. Heavy fluctuations in gas to flare and gas from the process	43
4.3.1. Process parameter variations	44
4.3.2. Excess flows from vessels	46
4.3.3. The two main flows to be regulated.....	47
4.3.4. Flow 1 and i3 flow rates both are zero	48
4.3.5. Process parameter variations	49
4.3.6. Excess flows from vessels	50
4.3.7. The two main flows to be maintained	51
4.4. Flow 1 is zero and i3 flow as a sin wave.....	52
4.4.1. Process parameter variations	53
4.4.2. Excess flows from vessels	54
4.4.3. The two main flows to be maintained	55
4.5. Flow 1 as a sin wave and flow i3 is zero.....	56
4.5.1. Process parameter variations	57
4.5.2. Excess flows from vessels	58

4.5.3. The two main flows to be maintained	59
4.6. Flow 1 and flow i3 as coinciding sin waves.....	60
4.6.1. Process parameter variation.....	61
4.6.2. Excess flows from vessels	62
4.6.3. The two main flows to be maintained	63
4.7. Flow 1 in a sin wave and flow i3 in a cosine wave coinciding ...	63
4.7.1. Process parameter variation.....	64
4.7.2. Excess flows from vessels	66
4.7.3. The two main flows to be maintained	67
4.8. Flow 1 in a cosine wave and flow i3 as a sin wave coinciding ...	68
4.8.1. Process parameter variation.....	69
4.8.2. Excess flows from vessels	70
4.8.3. The two main flows to be maintained	70
4.9. Discussion.....	71
CHAPTER 5 : CASE STUDY	73
5.1. Background.....	73
5.2. Flare gas recovery	74
5.3. Data collection	75
5.4. Current situation	75
5.4.1. Gas from fuel gas network to flare.....	76
5.4.2. Gases goes directly to flare system.....	76
5.4.3. Total gas to flare	77
5.4.4. Current LPG make up flow.....	78
5.4.5. Total Fuel gas to Units	78
5.5. Case 1	79
5.5.1. Flow description.....	79
5.5.2. Total Gases generated in 18 bar.....	81
5.5.3. Gases having pressurebelow 18 bar	82
5.6. Case 2	83
5.6.1. Flow description.....	83
5.6.2. Total Gases in 12 bar.....	86
5.6.3. Gases in pressures below 18 bar and 12 bar	86

5.7. Case 3	87
5.7.1. Flow description.....	87
5.7.2. Total Gases in 7 bar.....	89
5.7.3. Total Gases in above 3 bar and below 7 bar	90
5.8. Discussion.....	92
CHAPTER 6 : ENERGY SAVINGS.....	93
6.1. Introduction	93
6.1.1. Situation 1	94
6.1.2. Situation 2.....	96
6.1.3. Situation 3.....	98
6.1.4. Situation 4.....	99
6.1.5. Situation 5.....	99
6.2. Discussion.....	101
CHAPTER 7 : CONCLUSION AND FUTURE WORK	102
REFERENCES	104
APPENDIX A	107
A.1. Energy potential of the flare gas	107
A.1.1 Element wise weight fraction.....	107
A.1.2. Estimating energy potential	107
APPENDIX B.....	109
APPENDIX C.....	134

LIST OF FIGURES

Figure 1-1	: Flare stacks	1
Figure 1-2	: Flare gas generated	3
Figure 1-3	: Total Fuel Gas from the process	4
Figure 1-4	: Total Fuel Gas to process heaters	4
Figure 2-1	: Global gas flaring and oil production 1996-2015	7
Figure 2-2	: The top 30 gas flaring countries	7
Figure 2-3	: Top 30 countries by flaring intensity	8
Figure 2-4	: Flaring intensity	8
Figure 2-5	: A simple flare gas recovery system.....	10
Figure 2-6	: GTL Process	13
Figure 2-7	: GTL Simple process flow diagram	13
Figure 2-8	: Gas turbine 1	15
Figure 2-9	: Electricity cogeneration	16
Figure 2-10	: Heat recovery steam generator.....	19
Figure 3-1	: Typical fuel gas network.....	22
Figure 3-2	: Typical flare gas network.....	22
Figure 3-3	: Model schematic.....	24
Figure 4-1	: Vessel input parameter variation – Analysis 1.....	44
Figure 4-2	: Vessel pressures and mass accumulation variation- Analysis 1.....	45
Figure 4-3	: Excess flow generation - Analysis 1.....	46
Figure 4-4	: The regulated flows- Analysis 1.....	47
Figure 4-5	: Vessel input parameter variation – Analysis 2.....	48
Figure 4-6	: Vessel pressures and mass accumulation variation – Analysis 2.....	49
Figure 4-7	: Excess flow generation – Analysis 2.....	50
Figure 4-8	: The regulated flows - Analysis 2.....	51
Figure 4-9	: Vessel input parameter variation – Analysis 3.....	52
Figure 4-10	: Vessel pressures and mass accumulation variation – Analysis 3.....	53
Figure 4-11	: Excess flow generation – Analysis 3.....	54
Figure 4-12	: The regulated flows – Analysis 3.....	55
Figure 4-13	: Vessel input parameter variation – Analysis 4.....	56

Figure 4-14	: Vessel pressures and mass accumulation variation – Analysis 4	57
Figure 4-15	: Excess flow generation – Analysis 4	58
Figure 4-16	: The regulated flows – Analysis 4	59
Figure 4-17	: Vessel input parameter variation – Analysis 5	60
Figure 4-18	: Vessel pressures and mass accumulation variation – Analysis 5	61
Figure 4-19	: Excess flow generation – Analysis 5	62
Figure 4-20	: The regulated flows – Analysis 5	63
Figure 4-21	: Vessel input parameter variation – Analysis 6	64
Figure 4-22	: Vessel pressures and mass accumulation variation – Analysis 6	65
Figure 4-23	: Excess flow generation – Analysis 6	66
Figure 4-24	: The regulated flows – Analysis 6	67
Figure 4-25	: Vessel input parameter variation – Analysis 7	68
Figure 4-26	: Vessel pressures and mass accumulation variation – Analysis 7	69
Figure 4-27	: Excess flow generation – Analysis 7	70
Figure 4-28	: The regulated flows – Analysis 7	71
Figure 5-1	: Fuel gas to flare	76
Figure 5-2	: Gases goes directly to flare system	77
Figure 5-3	: Total gas to flare	77
Figure 5-4	: Current LPG make up flow	78
Figure 5-5	: Total Fuel gas to Units	79
Figure 5-6	: Case 1 with only 18 bar vessel	81
Figure 5-7	: Total Gases in 18 bar	82
Figure 5-8	: Gases having pressure below 18 bar	83
Figure 5-9	: Case 2	85
Figure 5-10	: Total Gases in 12 bar	86
Figure 5-11	: Rest gases except gases having 18 bar and 12 bar	87
Figure 5-12	: Total Gases in 7 bar	89
Figure 5-13	: Total Gases in above 3 bar and below 7 bar	90
Figure 5-14	: Case 3	91
Figure 5-15	: Total LPG or makeup gas requirement	92

LIST OF TABLES

Table 4-1	: Pipe diameters	42
Table 6-1	: Purchased electricity cost.....	93
Table 6-2	: Generating power using the flare gas recovery system	95
Table 6-3	: Generating only the peak and day loads using flare gas recovery ...	96
Table 6-4	: Generating only the peak and day loads	98
Table 6-5	: Generating electricity only for the peak loads.....	100
Table A-1	: Average flare gas composition.....	107
Table A-2	: Element wise weight fraction.....	107

LIST OF ABBREVIATIONS

GGFR	-	Global Gas Flaring Reduction (GGFR)
FGN	-	Fuel gas network
CEB	-	Ceylon electricity board
HRSG	-	Heat recovery steam generation
GTL	-	Gas to liquid technology