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

Jayasinghe Arachchige Amila Indika

(128362R)

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Department of Mechanical Engineering

University of Moratuwa
Sri Lanka

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DECLARATION

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J. A. A. Indika

Registration Number: 128362R

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 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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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