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## Improve the operation of IC engine with 100% biogas as fuel

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### ABSTRACT

World is facing energy crisis due to the increased industrialization coupled with rapid population growth. Limited reserved of fossil fuels, increasing use pattern of energy, fluctuating prices of petroleum products and the deteriorating environmental conditions are adversely affecting whole world. Hence, it must be necessitate concentrating our efforts to search for environmental friendly renewable fuels. Biogas is one of the ideal and clean energy rich fuel and can be used to produce heat, power and also used as vehicle fuel. A 5HP (3.7kW), Kirloskar diesel engine was modified to run on 100% biogas as fuel. The conversion kit used in the selected engine was provided by M/s Gas technologies India, New Delhi. The five different engine timings were selected for study. The engine parameters were studied to improve the operation of the engine on 100% biogas as fuel. The engine timing of 41°bTDC gave optimized results for the selected engine.

**Key words :** Biogas, IC engine

### INTRODUCTION

Biogas is the one of the potential energy source with multiple benefits. Now a day it is used to produce electricity by using modified IC engine. For generation of biogas only wastes are required. The biogas was never ending environmental friendly renewable energy source as long as human and animals exist on the earth. Amongst the renewable sources available in abundance of energy, biomass is one of the most potential energy sources. Under most circumstances methane is an ideal fuel, compared to other fuels, as it produces a few atmospheric pollutants and generates less carbon dioxide per unit energy (Chynoweth *et al.*, 2001). Also, biogas burning gives less concentration of particles and negligible dust. The technology helps to conserve forest, improves the health of rural people.

With the adoption of agricultural mechanization, the energy demand has increased many folds. Diesel and electricity are the main source of power supply to rural sector. The fluctuating prices of diesel and its unassured availability during peak seasons of agro-operations hamper the yield badly. Similarly, erratic power cut during the peak season of irrigation and threshing causes considerable stress to farmers and they are not able to take benefit of the technological developments. Hence, there is urgent

need of a self-sustainable energy supply system to agro-catchments. Biogas technology could be one of the approaches.

Biogas can be used as a fuel in SI and CI engines with doing some required modifications. Biogas fueled dual fuel engines are available in the country but replacement of diesel in the tune of 70-80% is only possible through use of these engines (Ray,2007) but there is urgent need to develop biogas based engine genset system capable of running on 100% biogas.

### MATERIALS AND METHODS

#### Engine modifications:

The capability of any fuel and engine is important factor for successful operation of the engine. Since, biogas is a lower calorific value fuel, it does not have good auto ignition properties, hence it can not be burnt directly in CI engines. So, some modifications in diesel engine are required to use 100% biogas fuel. Biogas is an alternative fuel for diesel engine. The 5HP Kirloskar make naturally aspirated modified diesel engine was used for the study. The modified engine was used to run on 100% biogas as fuel. The conversion kit was provided by M/s Gas Technologies India, New Delhi. The technical specifications of used test engine are given in (Table 1).

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