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Design and Fabrication of Biomass Gasifier

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ABSTRACT

Today's Energy Hungry World is consuming non-renewable sources of energy such as fossil fuels at alarming rates, which has increased the importance of developing renewable energy sources. Biomass is one such source of renewable energy which is abundantly available in India in the form of industrial and agricultural by-products. In this project we aim to contribute in a small way to this changing face of sustainable energy resources by designing and fabricating a Downdraft gasifier using two sources of biomass viz. rice husk and wood pellets. The syn-gas subsequently produced are used to run an I.C. Engine and a performance analysis would be conducted. High heat transfer rates of the walls and tubes may allow the particles of biomass to achieve a high enough temperature necessary for Substantial tar destruction and complete gasification of greater than 90 per cent of the biomass particles into reaction products including hydrogen and carbon monoxide gas in a very short residence time between a range of 0.01 and 5 seconds.

KEYWORDS: biomass gasification boiler, air compressor, fuel port, reactor

Introduction

Biomass is the oldest source of energy and currently biomass accounts for approximately 10% of total primary energy consumption. Most of the developing countries has growing their interest in biofuel development and providing greater access to clean liquid fuels while helping to address the issues such as increase in global warming and fuel price concerns associated with petroleum fuels. But most is the energy security. Abundant biomass is available throughout the world which can be converted into convenient energy. Dense biomass include, plant waste, animal waste, municipal waste, forest waste food waste, vegetable seeds and crops residues. Biomass is traditionally available in solid form Biomass is well-thought-out as a better source of energy because it bargains energy security, reduced GHG emission and rural employability. This Biomass

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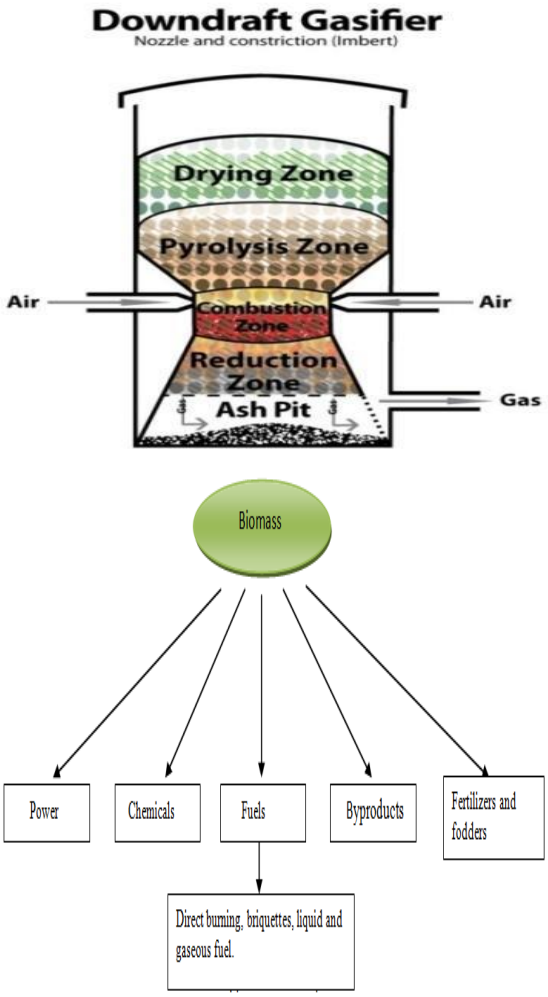

2.Working Principle

Biomass gasification is basically the conversion of solid biofuels into a combustible gas mixture known as „syn-gas" or „producer gas." A gasifier is a chemical reactor that performs this conversion can be converted into heat and power by adopting appropriate method. Fig. 1 shows the utilization of biomass to get various different outputs

residues corresponding to a potential of about 17,000 MW.

Classification of Biomass Gasifier

Gasifiers are classified as per the type of bed
(1) fixed bed and
(2) fluidized bed.

Components of gasifier

Hopper
Gasification Zone

Outer Cylinder

Construction

In order to assemble the gasifier components, first of all gasification zone is placed inside the casing of gasification zone.
Now gas outlet plate is welded at the top of the gasification zone. The complete assembly of gasification zone, casing and gas outlet cover plate casing and gas outlet Now the above shown assembly is placed inside the outer cylinder and tightens with the help of nut and bolts.Hopper with its cover plat is now welded at the top of the above assembly making the design of complete gasifier unit. Isometric, top, front and side view of the complete gasifier unit

Conclusion

- Higher amount of diesel fuel can be saved by replacing diesel with producer gas although there would be a reduction in brake thermal efficiency which is due to lower heating value of producer gas and insufficient amount of oxygen supply.
- NO emission was found to be very low in dual fuel which is a great advantage of dual fuel mode over diesel fuel alone.
- CO and HC emission was observed very high in dual fuel mode which gives an indication of insufficient oxygen in combustion chamber.

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