Anak Agung <agung589e@akprind.ac.id>

[J. Adv. Res. Fluid Mech. Therm. Sc.] Submission Acknowledgement

Nor Azwadi Che Sidik <azwadi@akademiabaru.com> Thu, Jun 10, 2021 at 4:23 PM
To: Susastiawan Anak Agung <agung589E@akprind.ac.id>

Susastiawan Anak Agung:

Thank you for submitting the manuscript, "The effect of compression ratio on performance of generator set fuelled with raw biogas " to Journal of Advanced Research in Fluid Mechanics and Thermal Sciences. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Submission URL: https://akademiabaru.com/submit/index.php/arfmts/authorDashboard/submission/3916
Username: agung589e_akprind

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Nor Azwadi Che Sidik

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences

Anak Agung <agung589e@akprind.ac.id>

[J. Adv. Res. Fluid Mech. Therm. Sc.] Editor Decision

Nor Azwadi Che Sidik <azwadi@akademiabaru.com> Wed, Aug 4, 2021 at 12:58 PM
To: Susastriawan Anak Agung <agung589E@akprind.ac.id>, "Prof. Sudarsono" <sudarsono1574@akprind.ac.id>, Badrawada I Gusti Gde <goesti@akprind.ac.id>, Hary Wibowo <harywib@akprind.ac.id>, Linggar Jati <linggarjati@gmail.com>

Susastriawan Anak Agung, Prof. Sudarsono, Badrawada I Gusti Gde, Hary Wibowo, Linggar Jati:

We have reached a decision regarding your submission to Journal of Advanced Research in Fluid Mechanics and Thermal Sciences, "The effect of compression ratio on performance of generator set fuelled with raw biogas ".

Our decision is: Revisions Required
(Please upload the revised manuscript file in OJS SYESTEM under Review Tab at Revision section)

Please submit the revised article by 15 Aug 2021

_____

Please cite few articles from

http://www.akademiabaru.com/submit/index.php/araset

http://www.akademiabaru.com/submit/index.php/cfdl

http://www.akademiabaru.com/submit/index.php/arms

http://www.akademiabaru.com/submit/index.php/armne

http://www.akademiabaru.com/submit/index.php/arnht

http://www.akademiabaru.com/submit/index.php/arefmht

http://www.akademiabaru.com/submit/index.php/aram

http://www.akademiabaru.com/submit/index.php/ard

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences

W-3916-Manuscript without authors details-18358-1-4-20210610_Review 1.pdf
806K

COMMENTS :

1) In abstract as well as Page 5. Line 138, the generator capacity/output is mentioned as 3 kW whereas on Page 6 Table 3 the output is mentioned 5 kW. There is a contradiction in specifications. Which amongst the two is correct ?

2) Page 4 lines 94 to 121 leads to too much of unwarranted information which can be avoided

3) Page 7 lines 179-194 : Does the generator have a governor ? All gasoline/LPG generators have mechanical governors. Between lines 179-194 it is unclear if the experimentations are conducted without a governor and the engine speed is governed purely by the virtue of gas throttling. If so, why wasn't the inbuilt governor not put to use ?
It is necessary to test the engine at constant speeds especially if coupled with an alternator since alternators have to be run at the rated speed.

4) Page 7 Figure-6 : The graphs should be at rated rpm (± 200 rpm) as it directly affects the frequency which is responsible for the change in the power output values when the equation $P= VI \cos \phi$ ($\cos \phi = 1$ for single phase gensets) is used.

5) Page 7 Figure-6 : The peak rpm is close to 4200 and in such cases the frequency would have been extremely high which is not healthy for the alternator. However, Figure 7 on Page 8 stands correct. Hence Figure 6 on Page 7 can be eliminated.

6) Page 9 Figure-9 : BSFC values are extremely high to begin with (except for the last few readings). The BSFC values should never be greater than 1. Need to recalculate the BSFC values. Consider the effect of CO2 and other impurities present in biogas to calculate the BSFC values.

7) Page 9 Figure-10 : Brake Thermal Efficiency (BTE) values of 46.93 is extremely high for biogas (only possible for extremely large capacity engines having high volumetric efficiencies). For smaller engines BTE will fall in the range of 15-20 % depending on gas quality as well as any specific design changes made to the engine.
It is advisable to compare the results between gasoline and biogas fuels at the standard compression ratio (as per the make of manufacturer) to get a better clarity on the results.

8) No where it has been mentioned as to how the compression ratio is varied for the engine. Engines of these generators are of Monoblock type with a fixed compression ratio around 8.4:1 that doesn't allow the scope to increase the Compression Ratio. How is the compression ratio raised from the standard value to 9.5 and 10.5 needs to be mentioned.

9) Mentioning of engine CC is a critical parameter and needs to be mentioned in the engine specification along with the rated speed for the generator.

10) NOTE : Gensets of 3 kW capacity on gasoline/LPG can generate 800 Watts to 1100 Watts using raw biogas as fuel depending on the source (cow dung/food waste/sewage waste etc). What is the raw material source for the biogas plant used during the research purpose.

Revision
Detail Response to Reviewers's Comments

I have revised the manuscript entitled **"The effect of compression ratio on performance of generator set fuelled with raw biogas"** as the Editor's and Reviewers's comments and suggestions. The revisions are colored in **Blue** in the Revised Manuscript. Meanwhile, detail response to the reviewers's comments and suggestions are as follows:

Reviewer's Comment

1. In abstract as well as Page 5. Line 138, the generator capacity/output is mentioned as 3 kW whereas on Page 6 Table 3 the output is mentioned 5 kW. There is a contradiction in specifications. Which amongst the two is correct?

Response:
The correct is 3 kW. Thus I have revised the specification in Table 3

Table 3.
Specification of the engine

Engine	Specification
Fuel	Bi-fuel (Gasoline or LPG)
Type	4-stroke, OHV, single cylinder, 196 CC
Power	3 kW at rated speed 3000 rpm
Compression ratio	8.5 (Standard)
Cooling system	Air cooled

Reviewer's Comment
2. Page 4 lines 94 to 121 leads to too much of unwarranted information which can be avoided

Response:
I reduced the unwarranted information and also deleted the Fig 1 and Fig 2. However, the Fig 3 remain and become Fig 1 in the revision. In my opinion the graph of compression ratio vs thermal efficiency is relevant with the discussion. The revision in this section becomes

In four stroke IC engine, compression ratio is defined as a ratio between maximum cylinder volume when the piston at bottom dead centre (BDC) to the minimum cylinder volume when the piston at top dead centre (TDC) as illustrated. However, the selection of compression ratio is limited by octane number of the fuel. Typically, compression ratio of spark ignition engine lies between 7 and 10 as shown in **Fig 1.** By increasing compression ratio, thermal efficiency of the engine increases [26]. Combustion characteristic of the biogas is an important parameter that has to be considered related with compression ratio. Increasing compression ratio rises pressure as well as temperature of the mixture at the end of compression stroke. This affects the mixture burning during the combustion process of the internal combustion engine. The combustion mechanism of biogas is mainly based on the combustion of CO, CH_4 and H_2 [17].

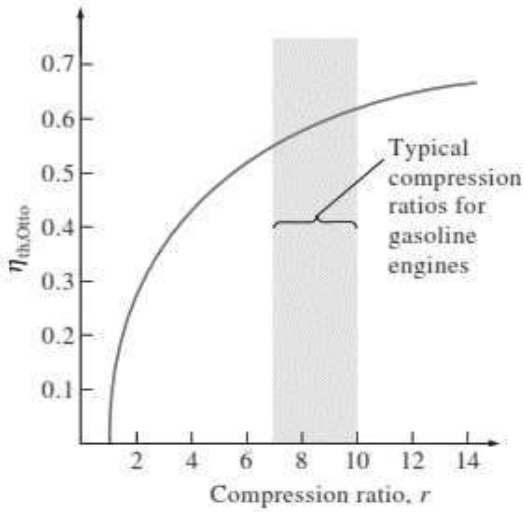

Fig. 1. An effect of compression ratio on thermal efficiency [26]

Reviewer's Comment

3. Page 7 lines 179-194 : Does the generator have a governor ? All gasoline/LPG generators have mechanical governors. Between lines 179-194 it is unclear if the experimentations are conducted without a governor and the engine speed is governed purely by the virtue of gas throttling. If so, why wasn't the inbuilt governor not put to use ?
   It is necessary to test the engine at constant speeds especially if coupled with an alternator since alternators have to be run at the rated speed.

   Response:
   Thank you for the reminder. Yes, it is. The generator has a governor. I have revised the discussion of the Fig. 6 (rotational speed). Fig 6 becomes Fig 3 in revised manuscript. The revision is

   …… Theoretically, the engine rotational speed should not reduce since the generator is equipped with a mechanical governor. The governor adjusts the fuel flow rate according to the load applied on the engine. Governor regulates amount of fuel injected to the combustion chamber. More amount of fuel is injected at higher load, thus the engine speed is kept constant. However, the reduction of engine rotational speed is observed at increasing electric load occurs during the investigation. This is due to a low pressure of biogas in the cylinder which means that the amount of biogas used is limited. The amount of biogas supplied to the combustion chamber is less than the requirement at increasing electrical load, even though the generator has a mechanical governor……

Reviewer's Comment

4. Page 7 Figure-6 : The graphs should be at rated rpm (± 200 rpm) as it directly affects the frequency which is responsible for the change in the power output values when the equation P= VI Cos Ø (Cos Ø = 1 for single phase gensets) is used.

   Response:
   I have added more discussion regarding Fig. 6. (Fig 3 in revised manuscript)
   …… In order to get more comprehensive result of an effect of compression ratio on engine rotational speed, the engine has to be tested at its rated speed, such that at 3000 rpm. In accordance with generator frequency and power output (P = V I Cos Ø), the engine rotational speed should be at 3000 rpm $\pm$ 200 rpm.

Reviewer's Comment

5. Page 7 Figure-6 : The peak rpm is close to 4200 and in such cases the frequency would have been extremely high which is not healthy for the alternator. However, Figure 7 on Page 8 stands correct. Hence Figure 6 on Page 7 can be eliminated.

Response:

The very high engine speed at 60 W load is caused by sudden opening of the fuel valve at the beginning of the test, in which very much fuel flows to the engine. More discussion is been added regarding Fig.6. (Fig 6 become Fig 3 in revised manuscript). The additional discussion is:

……From Fig. 3, it can be seen that very high engine rotational speed is observed at electric load 60 W. This may due to sudden opening of fuel valve from the biogas cylinder to the engine, in which more amount of biogas flows to the combustion chamber, results more power developed. Meanwhile the electric load applied is only 60 W, thus the engine rotational speed steps up abruptly from its rated speed, i.e. 3000 rpm.....

Reviewer's Comment

6. Page 9 Figure-9 : BSFC values are extremely high to begin with (except for the last few readings). The BSFC values should never be greater than 1. Need to recalculate the BSFC values. Consider the effect of CO2 and other impurities present in biogas to calculate the BSFC values

Response:

Fig 9 becomes Fig 6 in revised manuscript

The Bsfc of the present work is comparable with other previous work. I have compared the value in the discussion as

……Typically, the bsfc ranges from 0.5 to 8 kg/kW.h in the present work. The value is comparable with the work obtained by Haryanto *et a*l, 2019 [27] which obtained the bsfc of biogas fuel home scale genset was in the range of 2 – 17 g/W.h.

Reviewer's Comment

7. Page 9 Figure-10 : Brake Thermal Efficiency (BTE) values of 46.93 is extremely high for biogas (only possible for extremely large capacity engines having high volumetric efficiencies). For smaller engines BTE will fall in the range of 15-20 % depending on gas quality as well as any specific design changes made to the engine. It is advisable to compare the results between gasoline and biogas fuels at the standard compression ratio (as per the make of manufacturer) to get a better clarity on the results.

Response;

I am sorry for the mistake in typing the value of the BTE. As can be seen in the graph, the maximum BTE is about 27% at load of 700 W. I have added the revision in last sentence of BTE discussion. Fig 10 becomes Fig 7 in revised manuscript

….. The maximum thermal efficiency of about 27% is observed at load test of 780 W

Reviewer's Comment

8. No where it has been mentioned as to how the compression ratio is varied for the engine. Engines of these generators are of Monoblock type with a fixed compression ratio around 8.4:1 that doesn't allow the scope to increase the Compression Ratio. How is the compression ratio raised from the standard value to 9.5 and 10.5 needs to be mentioned.

Response

I have mention how to increase or reduce compression ratio of the engine in Section 2.1 as

….. In the standard condition, the engine has compression ratio of 8.5 which its maximum and clearance volume are 196 cc and 23 cc. In order to reduce or to increase compression ratio, the cylinder head of the engine is modified. To obtain compression ratio of 7.5, the cylinder head is trimmed in such away the clearance volume becomes 26 cc. Meanwhile to set the compression ratio of 9.5, the additional packing is attached on the internal surface of cylinder head in such away the clearance volume becomes 20.6 cc

Reviewer's Comment

9. Mentioning of engine CC is a critical parameter and needs to be mentioned in the engine specification along with the rated speed for the generator.

Response

Engine's capacity and rated speed have been added in Table 1.

Table 3.
Specification of the engine

Engine	**Specification**
Fuel	Bi-fuel (Gasoline or LPG)
Type	4-stroke, OHV, single cylinder, 196 CC
Power	3 kW at rated speed 3000 rpm
Compression ratio	8.5 (Standard)
Cooling system	Air cooled

Reviewer's Comment

10. NOTE : Gensets of 3 kW capacity on gasoline/LPG can generate 800 Watts to 1100 Watts using raw biogas as fuel depending on the source (cow dung/food waste/sewage waste etc). What is the raw material source for the biogas plant used during the research purpose.

Response:

In the present work. The raw material of the biogas is a cow dung. I have added this information in section of experimental set up. The additional information is

…….The raw biogas is collected from biogas digester using 3 kg LPG tank. The raw material for producing a raw biogas is a cow dung……..

Anak Agung <agung589e@akprind.ac.id>

[J. Adv. Res. Fluid Mech. Therm. Sc.] Editor Decision

Nor Azwadi Che Sidik <azwadi@akademiabaru.com> Thu, Aug 5, 2021 at 10:51 PM
To: Susastriawan Anak Agung <agung589E@akprind.ac.id>, "Prof. Sudarsono" <sudarsono1574@akprind.ac.id>, Badrawada I Gusti Gde <goesti@akprind.ac.id>, Hary Wibowo <harywib@akprind.ac.id>, Linggar Jati <linggarjati@gmail.com>

Susastriawan Anak Agung, Prof. Sudarsono, Badrawada I Gusti Gde, Hary Wibowo, Linggar Jati:

ACCEPTANCE FOR PUBLICATION IN THE **JOURNAL OF ADVANCED RESEARCH IN FLUID MECHANICS AND THERMAL SCIENCES** (2289-7879) – SCOPUS INDEXED

The reviewers have completed the review for your submission to Journal of Advanced Research in Fluid Mechanics and Thermal Sciences, "The effect of compression ratio on performance of generator set fuelled with raw biogas ".

Our decision is to: **Accept for publication**

Please make payment of Article Processing Charge of USD350 (International Corresponding Author) or RM1000 (Malaysian Corresponding Author).
The payment can be accomplished through

1) Bank in, Bank transfer or Telegraphic transfer to the following details:
Beneficiary: AKADEMIA BARU PUBLISHING (M) SDN. BHD
Bank's Name: Maybank
Account number: 562263543306
Swift code: MBBEMYKL
Full Address: No. 7 & 9, Jalan 9/9c, Seksyen 9 Bandar Baru Bangi, 43650 Bangi, Selangor, Malaysia

2) Payment by ConfBay Online Payment Gateway (Credit card/paypal, etc):
Register and upload the accepted paper here
https://submit.confbay.com/conf/arfmts
You will receive an invoice and guide for making online payment

Please email the proof of payment to finance@akademiabaru.com before we can begin copyediting of the accepted article.

Thank you

Truly

Editor-in-chief, Journal of Advanced Research in Fluid Mechanics and Thermal Sciences

–

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences

W-3916-Manuscript without authors details-18358-1-4-20210610_Review 1.pdf
806K