Notice Inviting 'Expression of Interest' for Manufacturing of
'Biogas based 1-2 KW capacity spark Ignition Engine generator'

All Interested Manufacturers

Bio-Energy Technology Development Group of Ministry of New and Renewable Energy has sanctioned a project for the development of small capacity biogas engines at Department of Mechanical Engineering, Indian Institute of Science, Bangalore. Under the project 1-2 KW capacity spark ignition engine suitable for operation on 100% biogas has been developed. Broad features of the same are enclosed.

2. I request you to go through the details and contact Prof. Ravi Krishna so that the engine can be manufactured in India. In this connection it may be mentioned that under the National Biogas Manure Management Programme of the Ministry about 40 lakh biogas plants have been installed and this engine may be coupled with such plants for generation of energy. After getting the response it is also proposed to organize a meeting in Bangalore in the above regard.

3. I am looking forward for your response so that necessary tie-up/ link up could be established to make the engines a commercial product in India at an early date.

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13-15/2007-BE 01.07.2011

Sir,

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With best wishes,

Yours sincerely,

(Dr. A.R. Shukla)

1. Rocket Engineering Corporation Pvt Ltd
1328/23, Udyam Nagar, unit No. 1,
P.O. Box No. 178,
Y. P. Powar Nagar.
Kolhapur - 416001.
Maharashtra
Telephone No.: 0231-2693203

2. Kirloskar Oil Engines
Laxmanrao kirloskar road,
Pune- 411003
Maharashtra
Tel-020-25810341
Fax-020-25813208,209
contact person-
Mr. Dinesh Vyawahare- Marketing
dinesh@koel.co.in

3. Cummins Generator Technologies India Ltd.
Godrej Eternia-C,
B-wing, 5th floor,
Wakdewadi Mumbai-Pune road,
Shiwajinagar, Next to Shopper's Stop,
Pune 411005
Maharashtra
Board: 020-66246700
Fax: 020-66025331

4. Greaves Cotton Ltd.
16/3, Ali Asker Road,
Bangalore-560 052
Phone : 080-22262062
Fax : 080 - 22253472
E-mail : imsreepada@greavesmail.com

5. Honda Seil Power Products Ltd.
Plot No. 5, Sector 41, Kasna,
Greater Noida Industrial Development Area,
Distt. Gautam Budh Nagar, - 201306
Uttar Pradesh,
Tel : 0-120-234 1050-59 (10 lines).
Fax No. : 0-120-234 1078-79 (2 Lines).
E-Mail : Domestic : ho.mktg@hspp.com
Exports : honda.export@hspp.com

6. TVS motors Company
T S Rajagopalan
Secretary,
Jayalakhsmi Estates,
29 Haddows Road
Chennai-600006

7. Lombardini India Private Limited
J-2/1, M. I. D. C. Industrial Area,
Chikalthana,
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Maharashtra
Tel: +(91)-(240)-2486234
Fax: +(91)-(240)-2486234

8. Kinetic Engineering Limited
D-1 Block, Plot No. 18/2,
MIDC Chinchwad,
Pune 411 019
Tel : (020) 27474301-5
Fax : (020) 27475842-3
email : jane@kineticindia.com

9. Birla Yamaha
1st Floor, Prestige Samrah Plaza,
4/2, St. Mark's Road,
Bangalore - 560001,
Karnataka,
Phone:91-80-22270410/22480654
Fax: 91-80-22270410

10. Prakash Diesels Pvt. Ltd.,
Agra

11.Shri Ashish Mittal,
Director Tech.
Surya Gases Pvt. Ltd.,
Sarafa Bazar,
Gwalior
Phone: 0751-2332841
Fax: 0751-2632844
E-mail: suryagastech@rediffmail.com

12. Dr. S.V. Makadia,
Chairman,
Radha Renewable Energy Development Pvt. Ltd.

Plot No.2621/22, Gate No.1, Lodhika
G.I.D.C. Kalawad Road, District – Rajkot – 360485
Gujarat
Phone: 2827-287888
09879587891
Fax: 2827-287887

13. Sumit Gas
Kirti Nagar,
New Delhi

14.MNRE Website.

Technology Development of Efficient Biogas Gensets (1-2 kW)

R. V. Ravikrishna & H. N. Chanakya

Indian Institute of Science, Bangalore

Background

This document provides a summary of the work done at IISc, Bangalore on small, efficient SI engines running on biogas for stationary power generation in the range 1-2 kW. To give a background for this work, most of the efforts at the national level have typically focused towards conversion of diesel gensets to run on biogas in the single or dual-fuel mode resulting in large engines with poor efficiency values. Also, there is no efficient genset available in the 1 kW range. Most petrol-start, kerosene-run gensets converted to biogas operation have *overall* efficiencies (chemical to electrical) lower than 7%. This has been verified with systematic experiments conducted at IISc. At the international level, there are commercially available gas engines which run on biogas, however, these are typically very large engines generating several hundreds of kilowatts.

Prototype Development

Based on the work done as part of an MNRE project, significant knowledge has been generated towards development of a prototype biogas genset. The results of overall efficiencies obtained on a test bed with a 100-cc engine are shown in Figure 1. As observed from the Figure, a peak *overall* efficiency of 22% (this corresponds to an engine brake efficiency of 30%) at maximum load is obtained with the manifold injection strategy, and 18% with the conventional premixing strategy. As mentioned earlier, these efficiencies are much higher then what can be obtained with conventional petrol-start, kerosene-run genset modified to run on biogas.

Figure 2 shows a picture of the test rig, and Fig. 3 shows the manifold injection strategy. Figure 4 shows a laboratory level prototype being developed based on the premixed mode of fueling. This prototype is designated as Version-1. This version, which is based on this knowhow generated thus far, will have a gas carburettor, electronic governor, and a fixed optimal spark timing. This version when sent for

field trials is expected to deliver peak load *overall* efficiencies around 16%. As shown in Figure 1, the gas injection strategy incorporated by us is proven to yield higher efficiencies. However, in order to develop prototypes based on this concept, significant hardware development in terms of gas injector, ECU and low pressure pump is required. Also, a novel, direct mixture injection-based two-stroke engine (single cylinder, 50-70 cc) for two-wheeler applications has been successfully developed at IISc. There is enormous potential to adapt this engine for biogas operation with some modifications. It is hoped to initiate work soon with support from MNRE on these advanced concepts involving gas injection (designated as Version-2) and direct mixture injection-based two-stroke engine adapted for biogas operation (designated as Version-3). These engine concepts are expected to yield higher overall efficiencies.

Industry participation is welcomed at each of the following stages:

1. Commercialization of Version-1 prototype
2. Joint research, prototype development and commercialization of Version-2 concept
3. R&D and commercialization of Version-3 prototype

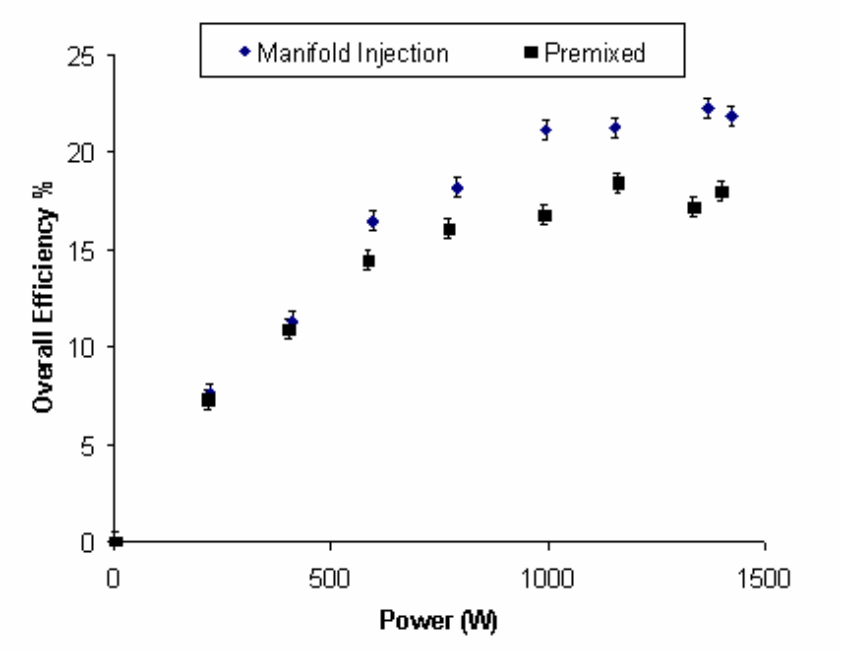

Figure 1. Comparison of overall efficiencies (chemical to electrical) with manifold injection and premixed mode of operation of a 100-cc single cylinder engine running on biogas

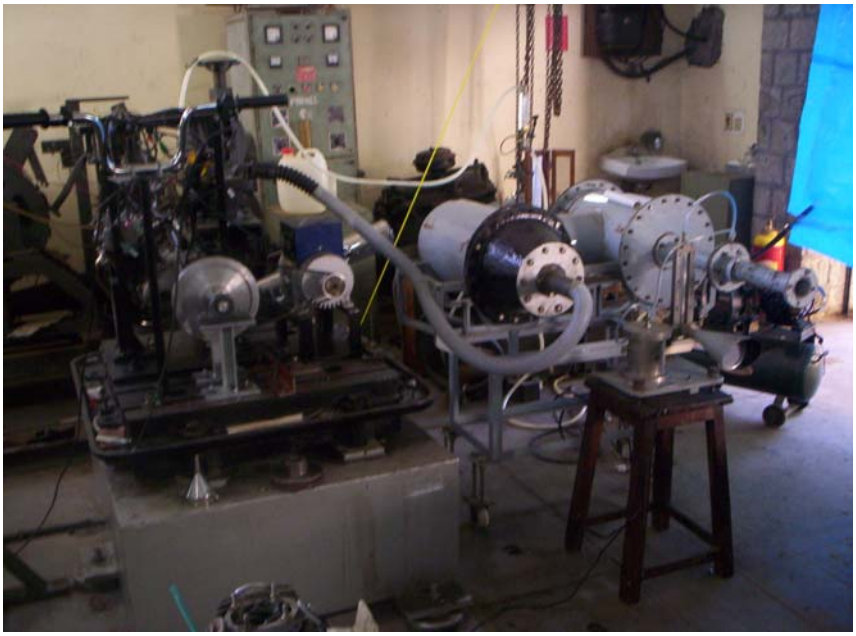

Figure 2. Picture of the experimental setup used in conducting the engine experiments with biogas. The airflow and fuel flow measurement rigs are also shown.

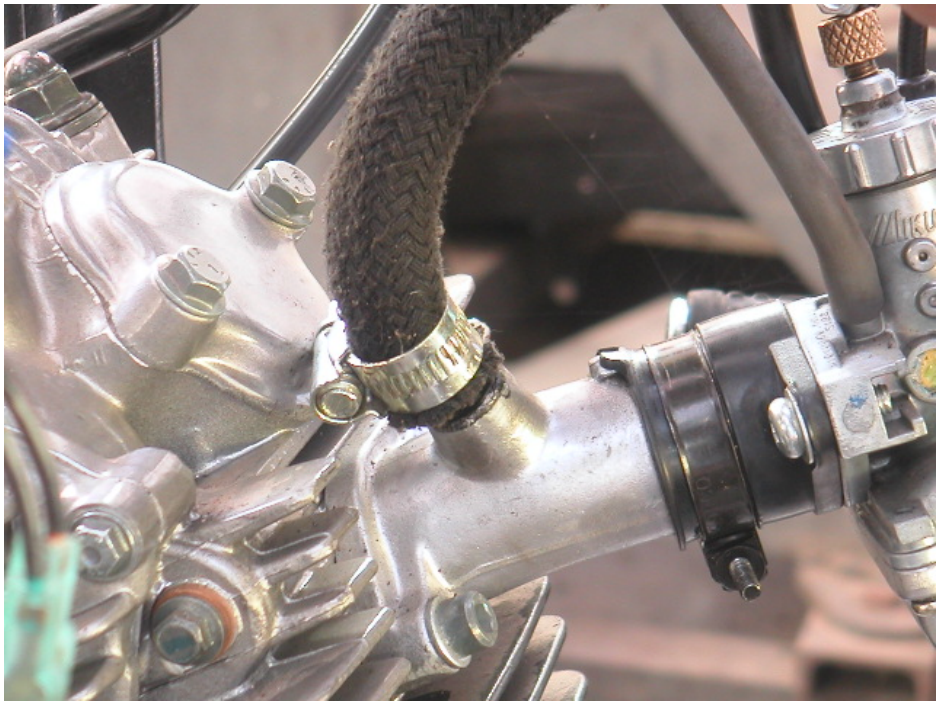

Figure 3. Manifold Gas Injection in the single cylinder 100-cc engine

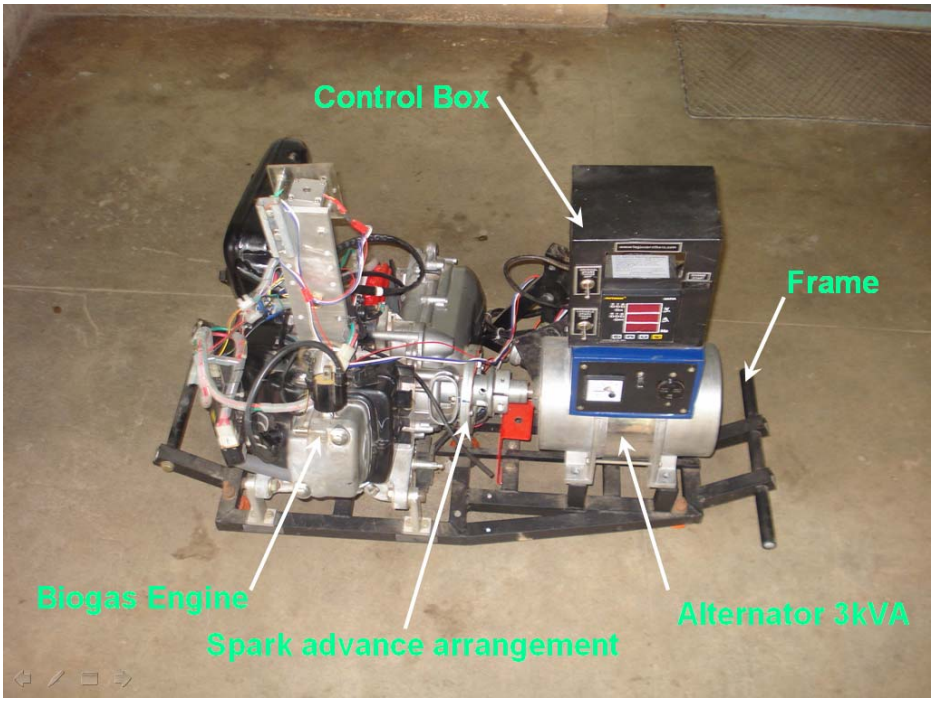

Figure 4. Laboratory Prototype of the Biogas genset (Version-1) showing the engine coupled to the alternator along with the control box, electronic governor and spark advance arrangement.