

CONVERSION OF A TWO-STROKE ENGINE TO RUN ON AUTOGAS

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The main source of power for the internal combustion engines has been petrol and diesel. Over the years there have been many developments aimed at improving the efficiency of operation and reduction of pollution generated by diesel and petrol driven engines and attempts to find alternatives to these fuels. One possible alternative for petrol driven engines is the use of liquid petroleum gas (LPG), also known as autogas. Its use in engines has been implemented at two different stages. In one it is achieved at the stage of design and manufacture of the engine to use autogas as the primary fuel. Such vehicles are commercially available. In the other method, engines (vehicles) designed to run on petrol have been converted for the use of autogas. In some countries this has been encouraged by the state in view of the fact that autogas generates less harmful emissions, hence causing far less environmental damage than that caused by petrol engines.

In Sri Lanka the conversion process has been popular and is undertaken by a number of private organizations. The consumers are tempted by the price advantage offered by autogas more than its environmental impact. The government has authorized the supply and distribution of autogas for this purpose. However the authorities are yet to recognise the benefit of the use of autogas in vehicles and it is not legalized. Current conversion methods are limited to four-stroke engines.

This project has been undertaken to explore the possibility of converting the engines of three-wheeler vehicles to run on autogas. These vehicles are fitted with engines working on the two-stroke cycle, where the lubricant is supplied mixed with the petrol. This process cannot be achieved with autogas as it is supplied at a high pressure. The project addresses the following technical problems associated with the process.

- (a) matching power generation requirements;
- (b) providing an alternative fuel supply system;
- (c) design of a suitable lubricant supply system; and
- (d) providing additional cooling and supplementary systems, when necessary.

During the current phase of the project, the first two problems have been resolved successfully. The possibility of using autogas instead of petrol has been established, during trials under no-load and load conditions. The autogas was supplied using a valve designed for the purpose and with provision to revert back to petrol. However, there were problems of fine tuning, owing to the response of the valve diaphragm not being sufficiently sensitive. During the initial tests the full range of acceleration was achieved with a small range of accelerator setting. Hence subsequent trials were carried out using a valve with a more supple diaphragm.

During the trials, the lubricant supply was maintained through the existing carburetor and independent of the fuel or air supply system, and mostly manually adjusted. The present trials are aimed at providing a more integrated lubricant supply system. In the present designs of the valve, the venturi effect is to be used to maintain the lubricant supply. Trials will be continued following the design and manufacture of a new valve.