PULSE JET ENGINE

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ABSTRACT

As a final year project the group decided to design, fabricate and test a pulse jet engine. The design was targeted to produce 6 pounds of thrust. As there is no design guidelines or textbook material regarding pulse jet engine available for references, it was decided that data of historically functional pulse jet engines was collected and empirically correlated. The data collected include produced thrust, dimension of pulse jet engine components (viz. Tailpipe length, diameter) and valve area.

All components were desgined and fabricated from scratch. The pulse pulse jet engine was succesfully assembled. Testing was carried out using different fuels. The pulse jet failed to ignite with kerosene and petrol due to the difficulty in getting the correct proportion of fuel:air mixture. Subsequently liquefied petroleum gas (LPG) was selected based on its wider flammability limits.

After repeated toiling with different design parameters such as reed valve design and angle of reed valve retainer, the pulse jet engine was finally successfully started.

However, the engine can only run continously under constant supply of air from a vaccum cleaner. This can be sustained for about 15-20 seconds berfore the front of the engine caught fire. This was due to leakage of heat from the reed valve to the mixing index core of the engine.

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INTRODUCTION

Pulse jet engine is the simplest form of jet engine. These engines are all modelled on the engine built by Argus in Germany that powered the V1 Flying Bomb. Pulse jet being used widely in World War II to launch missiles. In the 1950's the pulse jet used to spray insecticide and nowadays it used to fly a model airplane.

There are two types of pulse jet engine; traditional pulse jet (with valve) and valve less pulse jet. For the traditional pulse jet the valve at in its front is open and shut and produces thrust intermittently rather than continuously.

Pulse Jet engines operate on the pulse or resonant jet cycle. This engine is much more efficient, however, having a very high cycle frequency. When pressurized air is supplied through the blowpipe of the fuel injector, a charge of fuel is drawn from the fuel tank, through the metering jet, and then through the spray orifices or openings. This charge is mixed with air as it passes through the intake venturi and valve ports to the valve. The resulting combustible mixture of fuel and air under pressure then opens the valve petals and passes into the combustion chamber. Here it is fired by the shark plug which receives its electric impulse from a small spark coil. The pressure resulting from combustion closes the valve and sets up a pressure wave of hot gas in the tail pipe of the engine. Once the initial charge has been inducted and fired as above, the operation is automatic. No further forced air supply or spark is required.