A REVIEW ON 2 STROKE ENGINE

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Abstract— **Two-stroke engines have dropped out of the automobile market for a long time due to severe drawbacks. Unfortunately, the comparison with the performances of four-stroke engines was not in favour of two-stroke ones. Nevertheless, the needs of a [4] more compact engine with a better ratio of the mass and size versus power motivated research efforts at the beginning of the 90's. Regrettably, these efforts did not result in commercial success and automobile manufacturers kept four-stroke engine architecture as base architecture. However, the two-stroke engine is a highly favourable concept for downsizing and cost reduction by reducing the number of cylinders without NVH penalties. All that added to the maturity of CFD calculations and the availability of high power electronic for control and fuel injection encouraged the Renault research division to have a closer look into its architecture.**

I. INTRODUCTION

Before examining the individual parts and the [1] materials selected for the engine a general idea of the engine must be presented first. As in any application the entire system should be understood before breaking it down into smaller parts. If the system being designed is not considered the individual parts may be designed without consideration to the other applications such as size and shape. This project incorporated the design of a 2 stroke engine. The 2 stroke engine is much different then the engines in most cars today. Unlike [7] 4 stroke motors there are no valves or cam shafts needed. Therefore there is no need for timing belts of chains, valves, valve springs, rollers, pushrods or any of those elements required for 4 stroke engines. The basis is that it is simpler and fewer parts go into the design. The less parts there are the lower the cost and the less parts than can break. These engines are used in such applications as lawn mowers, dirt bikes, mopeds, and other similar applications. A simple cross section of a two stroke engine can be seen below in Figure 1.

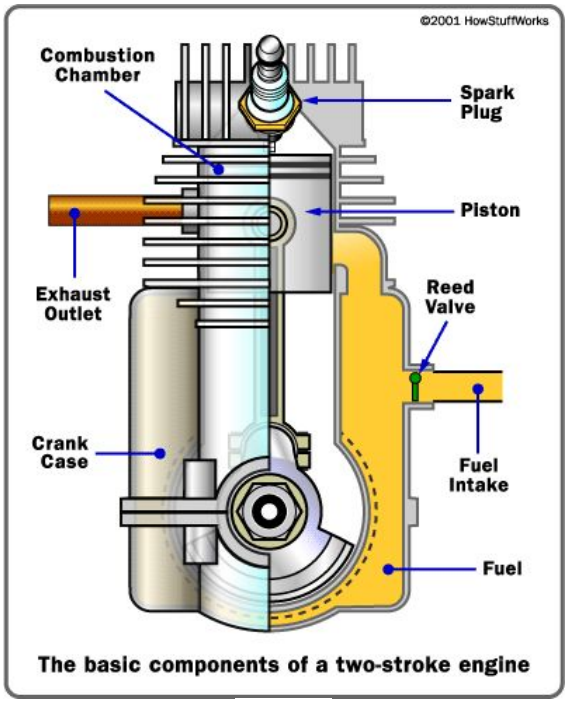

Figure 1.

II. SYSTEM FOR REVERSING 2 STROKE ENGINE

A system for reversing the direction of a two-stroke, internal combustion engine provided with a spark ignition system, the engine having at least one cylinder and a piston reciprocating therein and connected to drive a rotary crankshaft, the system comprising: a manually operable inverse command button; trigger means located proximate a rotary member driven by the crankshaft, a cooperating member carried on the rotary member and cooperating with the trigger means as the rotary member rotates to generate a train of pulses; means detecting the direction of rotation of the crankshaft and [2] generating a direction signal indicative of direction of rotation; a microprocessor control unit receiving the train of pulses, the direction signal and an output from the inverse command button and connected to control the spark ignition system, the microprocessor monitoring the speed and direction of rotation of the rotary member on the basis of the train of pulses and the direction signal, the microprocessor operable when the inverse command button is pushed to 1) stop ignition thereby causing the engine to slow down, 2) when the engine speed falls below a predetermined level momentarily generate an ignition spark at an angle sufficiently in advance of top dead center to reverse the direction of rotation of the crankshaft, and 3) when the engine is reversed continue ignition at an appropriate timing for reverse rotation.

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III. SUPERCHARGER SYSTEM FOR TWO-STROKE ENGINES

A supercharger system for a two-stroke internal combustion engine includes a gearbox, compressor, [3] airbox and an exhaust flow restrictor. The compressor may be a belt driven impeller to create positive pressure to the engine air intake. Restricting the flow of the exhaust slows down the exhaust to inhibit blow-through in the combustion chamber which would prematurely force unburned air and fuel from the combustion chamber of the engine. The gearbox is self-lubricating and contains only two gears and an internal reservoir arranged using a metering conduit so that consistent lubrication occurs at higher angles of inclination when the engine is in use.

IV. LUBRICATION SYSTEM FOR TWO STROKE ENGINE

A lubricating system for a two cycle crankcase compression internal enginewherein lubricant is delivered to a main bearing of the crankshaft for its lubrication. The crankshaft has a throw adjacent this bearing and an oil receiving groove in a face of the throw receives oil leaking from the bearing. A cross drilled passageway delivers the accumulated oil by centrigfugal force to the connecting rod journal for its lubrication.

V. TWO STROKE ENGINE CONVERSION

A method is provided for converting a conventional four stroke internal combustion engine having four cylinders into a two stroke engine. The camshaft assembly including the camshaft having cams thereon and the drive assembly which couples the camshaft to the crankshaft are replaced with a modified camshaft assembly such that the inlet and exhaust valves are each opened once per revolution of the camshaft. The resulting two stroke engine includes two pairs of pistons, each pair of pistons having a first and second piston which are fired synchronously. The pairs of pistons being spaced 180 degrees apart such that two pistons are fired synchronously for every half rotation of the crankshaft.

VI. COOLING SYSTEM FOR A TWO STROKE ENGINE

A cooling system for a two-stroke engine including a water jacketed cylinder having cooling passages located beneath the exhaust port and beneath the transfer ports in the cylinder wall. Liquid coolant flows upwardly from the crankcase structure into the cylinder wall cooling jacket and finally upwardly into the head

VII. SEMI-SYNTHETIC TWO-STROKE ENGINE OIL FORMULATION

A semi-synthetic two-stroke engine oil formulation which comprises a base oil consisting of a high-viscosity mineral oil, a medium-viscosity mineral oil, a solvent and a mixture of [5] three polyisobutylenes with different molecular weights, and appropriate detergents and dispersants. This semi-synthetic two-stroke engine has both high lubricity and high detergency, and also meets the requirements of low smoke and low exhaust system blocking.

VIII. EXHAUST GAS RECIRCULATION IN A TWO STROKE ENGINE

A method of operating a two stroke cycle crankcase scavenged internal combustion engine, comprising selectively delivering exhaust gas from a location downstream of the engine exhaust port to the engine crankcase to be delivered together with air in the crankcase to the engine combustion chamber. The quantity of exhaust gas delivered to the crankcase during each engine cycle is controlled according with engine operating conditions and the rate of supply of exhaust gas to the crankcase is controlled relative to engine operating conditions such as by an ECU managed valve that responds to [9] engine operating conditions such as load, speed and temperature. The exhaust gas is admitted to the crankcase during a period when the pressure in the crankcase is below that of the available exhaust gas.

IX. EXHAUST-OUTLET CONTROL FOR 2-STROKE ENGINE

An exhaust valve assembly for a two stroke internal combustion engine having a cylinder with at least one main exhaust port and one auxiliary exhaust port is disclosed. The assembly comprises a main exhaust valve for at least partially closing the main exhaust port, an auxiliary exhaust valve for at least partially closing the auxiliary exhaust port, the auxiliary exhaust valve being separate from the main exhaust valve, and an actuator for actuation of the main exhaust valve and the auxiliary exhaust valve, wherein the actuator is connected to the main exhaust valve and the auxiliary exhaust valve is connected to the actuator by the main exhaust valve.

X. DUAL FUEL NATURAL GAS/DIESEL 2-STROKE ENGINE

A dual fuel, [6] natural gas/diesel two-stroke engine includes a cylinder and a piston in the cylinder, and inlet ports around the cylinder which are uncovered by downward movement of the piston. A blower forces air through the inlet ports when the latter is uncovered, and the engine includes an exhaust port and valve for exhausting combustion gases once each cycle. [8] Diesel injection takes place near top dead center to ignite the gaseous mixture. An injector is provided for injecting natural gas into the cylinder once each cycle, including a delivery conduit which opens into the cylinder at a location above the inlet ports for air, such that the piston when descending completely uncovers the conduit before beginning to uncover the air inlet ports.

XI. CRANKCASE SCAVENGED TWO-STROKE ENGINES

A crankcase scavenged two-stroke engine includes a piston reciprocably mounted in a cylinder. The cylinder wall has an exhaust port and a rear transfer port opposed thereto formed in it. The rear transfer port communicates with the interior of the crankcase via a rear transfer passage and is arranged to open before the exhaust port closes, whereby, in use, the cylinder is scavenged. An inlet duct is arranged to supply combustion air to the crankcase and a throttling valve is arranged to throttle the flow of air through the inlet duct. A carburettor is arranged to supply fuel into the inlet duct. [8] The interior of the crankcase is divided into at least two separate crankcase volumes, a rich volume (V1,V2) and a lean volume (V3). Each crankcase volume communicates with the cylinder via a respective hole in the crankcase wall.

The cylinder wall also has at least one lateral transfer port formed in it at a position between the rear transfer port and the exhaust port. The lateral transfer port is arranged to open before the exhaust port closes. The lateral transfer port communicates with the lean volume (V3) via a lateral transfer passage. The rear transfer port communicates with the rich volume (V1,V2). The inlet duct is divided over at least part of its length into at least two inlet passages, a rich passage and a lean passage, which communicate with the rich volume (V1,V2) and the lean volume (V3), respectively. The carburettor and/or the throttle valve are so constructed and arranged that, under high load operation, substantially all the fuel supplied by the carburettor is introduced into the rich passage and, under low load operation, the fuel supplied by the carburettor is introduced into both the rich and lean passages.

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