SEMINAR REPORT ON 4 STROKE PETROL ENGINE pdf

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The Beare Head uses a piston and ports very much like a two stroke engine to replace the overhead valve system that is found in four stroke engines today. The four- stroke block, piston and crankshaft remain unaltered. Six Stroke engine, the name itself indicates a cycle of six strokes out of which two are useful power strokes. According to its mechanical design, the six-stroke engine with external and internal combustion and double flow is similar to the actual internal reciprocating combustion engine. However, it differentiates itself entirely, due to its thermodynamic cycle and a modified cylinder head with two supplementary chambers: In this the cylinder and the combustion chamber are separated which gives more freedom for design analysis. Several advantages result from this, one very important being the increase in thermal efficiency. It consists of two cycles of operations namely external combustion cycle and internal combustion cycle, each cycle having four events. In addition to the two valves in the four stroke engine two more valves are incorporated which are operated by a piston arrangement. The Six Stroke is thermodynamically more efficient because the change in volume of the power stroke is greater than the intake stroke and the compression stroke. The combustion chamber is totally enclosed within the air-heating chamber. By heat exchange through the glowing combustion chamber walls, air pressure in the heating chamber increases and generate power for an a supplementary work stroke. IN the contemporary internal combustion engine, the necessary cooling of the combustion chamber walls generate important calorific losses. The six-stroke engine is supplemented with two chambers, which allow parallel function and results a full eight-event cycle: In the internal combustion there is direct contact between air and the working fluid, whereas there is no direct contact between air and the working fluid in the external combustion process. Those events that affect the motion of the crankshaft are called dynamic events and those, which do not effect are called static events. Pure air intake in the cylinder dynamic event 1. Heating chamber valve 3. Wall of combustion chamber. Pure air compression in the heating chamber. Combustion gases expanding in the cylinder, work dynamic event. Combustion gases exhaust dynamic event. Keeping pure air pressure in closed chamber where a maximum heat exchange occurs with the combustion chambers walls, without direct action on the crankshaft static event. Expansion of the Super heat air in the cylinder work dynamic Event. Re-compressions of pure heated air in the combustion chamber Dynamic event. No direct contact between the air and the heating source. Event 1 Pure air intake in the cylinder dynamic event. Event 2 Compression of pure air in the heating chamber dynamic event. Event 3 Keeping pure air pressure in closed chamber where a maximum heat exchange occurs with the combustion chambers walls, without direct action on the crankshaft static event. Event 4 Expansion of the super heated air in the cylinder, work dynamic event. Event 5 Re-compression of pure heated air in the combustion chamber dynamic event www. Event 6 Fuel injection and combustion n closed combustion chamber, without direct action on the crankshaft static event. Event 7 Combustion gases expanding in the cylinder, work dynamic event. Event 8 Combustion gases exhaust dynamic event. The sketches shows the cylinder head equipped with both chambers and four valves of which two are conventional intake and exhaust. The two others are made of heavy-duty heat-resisting material. During the combustion and the air heating processes, the valves could open under the pressure within the chambers. To avoid this, a piston is installed on both valve shafts which compensate this pressure. Being a six-stroke cycle, the camshaft speed in one third of the crankshaft speed. The combustion chambers walls are glowing when the engine is running. Their small thickness allows heat exchange with the air-heating chamber, which is surrounding the combustion chamber. The air-heating chamber is isolated from the cylinder head to reduce thermal loss. The combustion and air-heating chambers have different compression ratio. The compression ratio is high for the heating chamber, which operates on an external cycle and is supplied solely with pure air. On the other hand, the compression ratio is low for the combustion chamber because of effectively increased volumen, which operates on internal combustion cycle. The combustion of all injected fuel is insured, first, by the supply of preheated pure air in the combustion chamber, then, by the glowing walls of the chamber, which acts as multiple spark plugs. In order to facilitate cold starts, the combustion chamber is fitted with a heater plug glow plug. In contrast to a diesel engine, which requires a heavy construction, this multi-fuel engine, which can also use diesel fuel, may be built in a much lighter fashion than that of a gas engine, especially in the case of all moving parts. As well as regulating the intake and exhaust strokes, the valves of the heating and the combustion chambers allow significantly additional adjustments for improving efficiency and reducing noise. The six stroke is thermodynamically more efficient because the change in volume of the power stroke is greater than the intake stroke, the compression stroke and the Six stroke engine is fundamentally superior to the four stroke because the head is no longer parasitic but is a net contributor to â€" and an integral part of â€" the power generation within exhaust stroke. The compression ratios can be increased because of the absent of hot spots and the rate of change in volume during the critical combustion period is less than in a Four stroke. The absence of valves within the combustion chamber allows considerable design freedom. Main advantages of the six-stroke engine: The specific power of the six-stroke engine will not be less than that of a four-stroke petrol engine, the increase in thermal efficiency compensating for the issue due to the two additional strokes. Two expansions work in six strokes: This lead to very smooth operation at low speed without any significant effects on consumption and the emission of pollutants, the combustion not being affected by the engine speed. These advantages are very important in improving the performance of car in town traffic. Dramatic reduction in pollution: Multifuel par excellence, it can use the most varied fuels, of any origin fossil or vegetable , from diesel to L. The difference in inflammability or antiknock rating does not present any problem in combustion. Methanol-petrol mixture is also recommended. Vol ume angle diagram for 4 stroke engine Volume angle diagram for 6 stroke engine www. Only improvements of the current technology can help it progress within reasonable time and financial limits. The six-stroke engine fits perfectly into this view. An allied with the so-responsive pickup and a wide spread of usable power, makes the bike ridiculously easy to ride. You hardly need to use the gearbox, just park it in top gear and ride. And hands-on assessment of the six-stroke leads to some inescapable conclusions. The industry trend away from cheaper two-stroke power in favor of costlier but cleaner four- stroke engines in both Europe, Japan and South East Asia makes a concept like the Beare six-stroke, which offers the best of both worlds, project a strong case towards volume manufacture. Excerpts from Beare technology. High speed internal combustion engines by John B.

2: Four-stroke engine - Wikipedia

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Published on Jan 10, Abstract The Internal Combustion Engine is an engine in which the combustion of a fuel generally, fossil fuel occurs with an oxidizer usually air in a combustion chamber. In an internal combustion engine the expansion of the high temperature and pressure gases, which are produced by the combustion, directly applies force to a movable component of the engine, such as the pistons or turbine blades and by moving it over a distance, generate useful mechanical energy. The term internal combustion engine usually refers to an engine in which combustion is intermittent, such as the more familiar four-stroke and two-stroke piston engines, along with variants, such as the Wankel rotary engine. A second class of internal combustion engines use continuous combustion: Invention of the two-stroke cycle is attributed to Scottish engineer Dugald Clerk who in patented his design, his engine having a separate charging cylinder. The crankcase-scavenged engine, employing the area below the piston as a charging pump, is generally credited to Englishman Joseph Day and Frederick Cock for the piston-controlled inlet port. A two-stroke engine is an internal combustion engine that completes the thermodynamic cycle in two movements of the piston compared to twice that number for a four-stroke engine. This increased efficiency is accomplished by using the beginning of the compression stroke and the end of the combustion stroke to perform simultaneously the intake and exhaust or scavenging functions. In this way two-stroke engines often provide strikingly high specific power. Gasoline spark ignition versions are particularly useful in lightweight portable applications such as chainsaws and the concept is also used in diesel compression ignition engines in large and non-weight sensitive applications such as ships and locomotives. Today, internal combustion engines in cars, trucks, motorcycles, aircraft, construction machinery and many others, most commonly use a four-stroke cycle. The four strokes refer to intake, compression, combustion power , and exhaust strokes that occur during two crankshaft rotations per working cycle of the gasoline engine and diesel engine. A less technical description of the four-stroke cycle is, "Suction, Compression, Ignition, Exhaust" The cycle begins at top dead center TDC , when the piston is farthest away from the axis of the crankshaft. Common rail direct fuel injection is a modern variant of direct fuel injection system for petrol and diesel engines. The common rail system prototype was developed in the late s by Robert Huber of Switzerland and the technology further developed by Dr. The first successful usage in production vehicle began in Japan by the mids. Shohei Itoh and Masahiko Miyaki of the Denso Corporation, a Japanese automotive parts manufacturer, developed the common rail fuel system for heavy duty vehicles and turned it into practical use on their ECD-U2 common-rail system mounted on the Hino Rising Ranger truck and sold for general use in Denso claims the first commercial high pressure common rail system in Modern common rail systems, whilst working on the same principle, are governed by an engine control unit ECU which opens each injector electronically rather than mechanically. This was extensively prototyped in the s with collaboration between Magneti Marelli, Centro Ricerche Fiat and Elasis. After research and development by the Fiat Group, the design was acquired by the German company Robert Bosch GmbH for completion of development and refinement for mass-production. In hindsight the sale appeared to be a tactical error for Fiat as the new technology proved to be highly profitable. The company had little choice but to sell, however, as it was in a poor financial state at the time and lacked the resources to complete development on its own. The first passenger car that used the common rail system was the model Alfa Romeo 1. Common rail engines have been used in marine and locomotive applications for some time. The Cooper-Bessemer GN-8 circa is an example of a hydraulically operated common rail diesel engine, also known as a modified common rail. Principle Solenoid or piezoelectric valves make possible fine electronic control over the fuel injection time and quantity, and the higher pressure that the common rail technology makes available provides better fuel atomisation. Some advanced common rail fuel systems perform as many as five injections per stroke. Common rail engines require no heating up time [citation needed] and produce lower engine noise and emissions than older systems. Diesel engines have historically used various forms of fuel injection. While these older systems provided accurate fuel quantity and injection timing control they were limited by several factors: This typically meant that the highest injection pressure could only be achieved at the highest engine speed and the maximum achievable injection pressure decreased as engine speed decreased. This relationship is true with all pumps, even those used on common rail systems; with the unit or distributor systems, however, the injection pressure is tied to the instantaneous pressure of a single pumping event with no accumulator and thus the relationship is more prominent and troublesome. Next More Seminar Topics: Are you interested in this topic. Then mail to us immediately to get the full report.

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Wall of combustion chamber. The sketches shows the cylinder head equipped with both chambers and four valves of which two are conventional intake and exhaust. The two others are made of heavy-duty heat-resisting material. During the combustion and the air heating processes, the valves could open under the pressure within the chambers. To avoid this, a piston is installed on both valve shafts which compensate this pressure. Being a six-stroke cycle, the camshaft speed in one third of the crankshaft speed. The combustion chambers walls are glowing when the engine is running. Their small thickness allows heat exchange with the air-heating chamber, which is surrounding the combustion chamber. The air-heating chamber is isolated from the cylinder head to reduce thermal loss. The combustion and air-heating chambers have different compression ratio. The compression ratio is high for the heating chamber, which operates on an external cycle and is supplied solely with pure air. On the other hand, the compression ratio is low for the combustion chamber because of effectively increased volumen, which operates on internal combustion cycle. The combustion of all injected fuel is insured, first, by the supply of preheated pure air in the combustion chamber, then, by the glowing walls of the chamber, which acts as multiple spark plugs. In order to facilitate cold starts, the combustion chamber is fitted with a heater plug glow plug. In contrast to a diesel engine, which requires a heavy construction, this multi-fuel engine, which can also use diesel fuel, may be built in a much lighter fashion than that of a gas engine, especially in the case of all moving parts. As well as regulating the intake and exhaust strokes, the valves of the heating and the combustion chambers allow significantly additional adjustments for improving efficiency and reducing noise. The six stroke is thermodynamically more efficient because the change in volume of the power stroke is greater than the intake stroke, the compression stroke and the Six stroke engine is fundamentally superior to the four stroke because the head is no longer parasitic but is a net contributor to â€" and an integral part of â€" the power generation within exhaust stroke. The compression ratios can be increased because of the absent of hot spots and the rate of change in volume during the critical combustion period is less than in a Four stroke. The absence of valves within the combustion chamber allows considerable design freedom. The specific power of the six-stroke engine will not be less than that of a four-stroke petrol engine, the increase in thermal efficiency compensating for the issue due to the two additional strokes. Two expansions work in six strokes: This lead to very smooth operation at low speed without any significant effects on consumption and the emission of pollutants, the combustion not being affected by the engine speed. These advantages are very important in improving the performance of car in town traffic. Dramatic reduction in pollution: Multifuel par excellence, it can use the most varied fuels, of any origin fossil or vegetable , from diesel to L. The difference in inflammability or antiknock rating does not present any problem in combustion. Methanol-petrol mixture is also recommended. Only improvements of the current technology can help it progress within reasonable time and financial limits. The six-stroke engine fits perfectly into this view. An allied with the so-responsive pickup and a wide spread of usable power, makes the bike ridiculously easy to ride. You hardly need to use the gearbox, just park it in top gear and ride. And hands-on assessment of the six-stroke leads to some inescapable conclusions. The industry trend away from cheaper two-stroke power in favor of costlier but cleaner four-stroke engines in both Europe, Japan and South East Asia makes a concept like the Beare six-stroke, which offers the best of both worlds, project a strong case towards volume manufacture. Next More Seminar Topics: Are you interested in this topic. Then mail to us immediately to get the full report.

4: Download the Seminar Report for Dual Fuel Engine

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Generally a combustion engine is defined as a machine that produces power mechanical by the combustion of substance like water or a fuel. Engines are classified into various categories based on the type of cycle they use, the layout, the energy source used, the cooling mechanism employed or its use. The oxidizer used for combustion is usually air. The gases produced as a result of combustion are high temperature and pressure. These gases exert pressure on components such as a piston which moves over and produces energy mechanical. Here these fluids are heated in an external chamber like boiler and steam is used to drive the engine. Steam Engine Working of a Four Stroke Petrol Engine A stroke is the movement of the piston from the top, to the bottom of the cylinder. As the name suggest the Four Stroke Petrol Engine uses a cycle of four strokes and petrol as the fuel. Each cycle includes 2 rotations of the crankshaft and four strokes, namely: An Intake Stroke 3. A Combustion Stroke also called Power Stroke 4. An Exhaust Stroke Intake Stroke: As the name suggests in this stroke the intake of fuel takes place. Thus the pressure inside the cylinder reduces. Now the intake valve opens and the fuel and air mixture enters the cylinder. The valve then closes. This stroke is known as compression stroke because the compression of the fuel mixture takes place at this stage. When the intake valve closes exhaust valve is already closed , the piston forced back to the top of the cylinder and the fuel mixture gets compressed. An engine is considered more efficient if its compression ratio is higher. Now in case of petrol engine when the fuel mixture compresses to the maximum value the spark plug produces spark which ignites the fuel mixture. The combustion leads to the production of high pressure gases. Due to this tremendous force the piston is driven back to the bottom of the cylinder. As the piston moves downwards, the crankshaft rotates which rotates the wheels of the vehicle Exhaust and Inlet Valve Overlap Exhaust and inlet valve overlap is the transition between the exhaust and inlet strokes and is a practical necessity for the efficient running of any internal combustion engine. Given the constraints imposed by the operation of mechanical valves and the inertia of the air in the inlet manifold, it is necessary to begin opening the inlet valve before the piston reaches Top Dead Centre TDC on the exhaust stroke. Likewise, in order to effectively remove all of the combustion gases, the exhaust valve remains open until after TDC. Thus, there is a point in each full cycle when both exhaust and inlet valves are open. The number of degrees over which this occurs and the proportional split across TDC is very much dependent on the engine design and the speed at which it operates. How the modern engine uses energy to make the wheels turn Air enters the engine through the air cleaner and proceeds to the throttle plate. You control the amount of air that passes through the throttle plate and into the engine with the gas pedal. It is then distributed through a series of passages called the intake manifold, to each cylinder. At some point after the air cleaner, depending on the engine, fuel is added to the air-stream by either a fuel injection system or, in older vehicles, by the carburettor. Once the fuel is vaporized into the air stream, the mixture is drawn into each cylinder as that cylinder begins its intake stroke. When the piston reaches the bottom of the cylinder, the intake valve closes and the piston begins moving up in the cylinder compressing the charge. When the piston reaches the top, the spark plug ignites the fuel-air mixture causing a powerful expansion of the gas, which pushes the piston back down with great force against the crankshaft, just like a bicycle rider pushing against the pedals to make the bike go.

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5: presentation seminar report on four stroke petrol engine pdf

seminar report for 2 stroke petrol engine Nov GMT A new generation of two stroke engine - 2 Background Since the two stroke engine fires on every.

Exhaust The maximum amount of power generated by an engine is determined by the maximum amount of air ingested. The amount of power generated by a piston engine is related to its size cylinder volume , whether it is a two-stroke engine or four-stroke design, volumetric efficiency , losses, air-to-fuel ratio, the calorific value of the fuel, oxygen content of the air and speed RPM. The speed is ultimately limited by material strength and lubrication. Valves, pistons and connecting rods suffer severe acceleration forces. At high engine speed, physical breakage and piston ring flutter can occur, resulting in power loss or even engine destruction. Piston ring flutter occurs when the rings oscillate vertically within the piston grooves they reside in. Ring flutter compromises the seal between the ring and the cylinder wall, which causes a loss of cylinder pressure and power. If an engine spins too quickly, valve springs cannot act quickly enough to close the valves. At high speeds the lubrication of piston cylinder wall interface tends to break down. This process is called porting , and it can be done by hand or with a CNC machine. A large part of the waste energy is in the form of heat that is released to the environment through coolant, fins etc. Many methods have been devised in order to extract waste heat out of an engine exhaust and use it further to extract some useful work, decreasing the exhaust pollutants at the same time. Use of Rankine Cycle, Turbocharging and Thermo electric Generation can be very useful as a waste heat recovery system. Though waste heat recovery systems are being used frequently among all the devices but still some issues like their low efficiency at lower heat supply rates and high pumping losses remain a cause of concern for the researchers. Supercharging[edit] One way to increase engine power is to force more air into the cylinder so that more power can be produced from each power stroke. This can be done using some type of air compression device known as a supercharger , which can be powered by the engine crankshaft. Supercharging increases the power output limits of an internal combustion engine relative to its displacement. Most commonly, the supercharger is always running, but there have been designs that allow it to be cut out or run at varying speeds relative to engine speed. Mechanically driven supercharging has the disadvantage that some of the output power is used to drive the supercharger, while power is wasted in the high pressure exhaust, as the air has been compressed twice and then gains more potential volume in the combustion but it is only expanded in one stage. A turbocharger is incorporated into the exhaust system of a vehicle to make use of the expelled exhaust. It consists of a two piece, high-speed turbine assembly with one side that compresses the intake air, and the other side that is powered by the exhaust gas outflow. When idling, and at low-to-moderate speeds, the turbine produces little power from the small exhaust volume, the turbocharger has little effect and the engine operates nearly in a naturally aspirated manner. Thus, additional power and speed is expelled through the function of this turbine. Turbocharging allows for more efficient engine operation because it is driven by exhaust pressure that would otherwise be mostly wasted, but there is a design limitation known as turbo lag. The increased engine power is not immediately available due to the need to sharply increase engine RPM, to build up pressure and to spin up the turbo, before the turbo starts to do any useful air compression. The increased intake volume causes increased exhaust and spins the turbo faster, and so forth until steady high power operation is reached. Another difficulty is that the higher exhaust pressure causes the exhaust gas to transfer more of its heat to the mechanical parts of the engine. Rod and piston-to-stroke ratio[edit] The rod-to-stroke ratio is the ratio of the length of the connecting rod to the length of the piston stroke. A longer rod reduces sidewise pressure of the piston on the cylinder wall and the stress forces, increasing engine life. It also increases the cost and engine height and weight. A "square engine" is an engine with a bore diameter equal to its stroke length. An engine where the bore diameter is larger than its stroke length is an oversquare engine, conversely, an engine with a bore diameter that is smaller than its stroke length is an undersquare engine. Valve train[edit] The valves are typically operated by a camshaft rotating at half the speed of the crankshaft. It has a series of cams along its length, each designed to open a valve during the appropriate part of an intake or exhaust stroke. A tappet between valve and cam is a contact surface on which the cam slides to open the valve. In other engine designs the camshaft is in the crankcase , in which case each cam usually contacts a push rod , which contacts a rocker arm that opens a valve, or in case of a flathead engine a push rod is not necessary. The overhead cam design typically allows higher engine speeds because it provides the most direct path between cam and valve. Valve clearance[edit] Valve clearance refers to the small gap between a valve lifter and a valve stem that ensures that the valve completely closes. On engines with mechanical valve adjustment, excessive clearance causes noise from the valve train. A too small valve clearance can result in the valves not closing properly, this results in a loss of performance and possibly overheating of exhaust valves. Most modern production engines use hydraulic lifters to automatically compensate for valve train component wear. Dirty engine oil may cause lifter failure. The use of a Turbocharger in Diesel engines is very effective by boosting incoming air pressure and in effect, provides the same increase in performance as having more displacement. Modern engines are often intentionally built to be slightly less efficient than they could otherwise be. This is necessary for emission controls such as exhaust gas recirculation and catalytic converters that reduce smog and other atmospheric pollutants. Reductions in efficiency may be counteracted with an engine control unit using lean burn techniques. Some potential solutions to increase fuel efficiency to meet new mandates include firing after the piston is farthest from the crankshaft, known as top dead centre , and applying the Miller cycle. Together, this redesign could significantly reduce fuel consumption and NOx emissions. Starting position, intake stroke, and compression stroke. Ignition of fuel, power stroke, and exhaust stroke.

6: abstract of four stroke petrol engine

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a seminar report on multi-mode 2/4 stroke internal combustion engine 1. 1 A Seminar On "MULTI-MODE 2/4-STROKE INTERNAL COMBUSTION ENGINE" By Mr. MOHAMMED HUSAIN ESMAIL MASALAWALA Under The Guidance Of Prof. C. P. SHINDE Submitted In Partial Fulfillment of the Requirement For Bachelor of Engineering (Mechanical)Degree of University of Pune Department of Mechanical Engineering Late G.N.

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