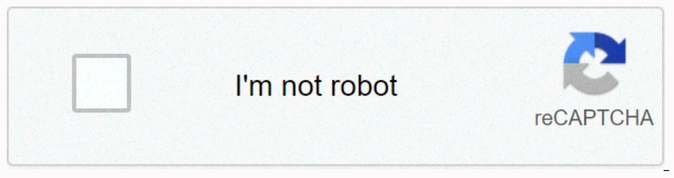

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Design for electrical and computer engineers pdf

Most people know that the Ford Model T was the first truly affordable car. But do you know what kind of engine he had? Released in 1908, the original T model packed a 2.9-liter four-cylinder engine with just 22 horsepower. It's a small outlet for its size compared to today's engines, but it certainly beats the engine in what's considered the first car -- benz's patent engine in 1885. The car had a single piston engine and produced only two-thirds of a single horsepower. Advertising as you can see, car engines have been steady in evolution since the very beginning of motoring. Today they are stronger, calmer, more durable, less polluting and more efficient than the fuel they had been before, thanks to ongoing advances in engine design and technology. Automotive engineers are constantly working on ways to improve the internal combustion engine and carry it into the future. How many other inventions do you know that have been continuously refined for more than 150 years? In this article, we will take a look at 10 of the biggest and most remarkable engine improvements of all time. From fuel injections to hybrid engines, we'll take a look at where the engines have been, and hopefully get some insight into where they're headed. Benefits of Contents: More fuel efficient, less polluting bugs: More complex, more expensive to build ads to remember when our Motorwagen patent benz talked about? In addition to having a single piston, or cylinder, like many early engines, it was a two-time engine. Stroke refers to the movement of the piston in the engine. Four-time engines were one of the first improvements made to internal combustion engines in the late 1800s. On a four-time, four-time engine, there are four steps that the engine takes while burning gasoline: consumption, compression, power, and exhaust [Source: CompGoParts.com]. These steps all occur when the piston moves up and down twice. Previously, simpler two-time engines do the same -- burning gasoline to create mechanical movement -- but they do it in two phases. Today, two-time engines are found on small equipment such as lawn mowers, small motorcycles, and large, industrial engines. Almost all cars use a four-time cycle. Four-time engines carry numerous benefits, including improved fuel economy, greater durability, more power and turks, and cleaner emissions. However, compared to two-time engines, making them more complex and expensive, requiring the use of valves for consumption and exhaust of gases. Despite this, four-time engines have become the standard of the automobile industry and are not likely to go out anytime soon. We will learn more about the role of valves and how they are improved upon later in this article. Next, we learn about compulsory induction, and how it made its way from planes on everyday cars. Benefits: Power without increasing engine size bugs: fuel consumption, turbo delay engine advertising requires three things to generate momentum: fuel, air, and ignition. Cramming will increase more air to a power engine produced by motor pistons. A longstanding way to do this, and the way it becomes increasingly popular until late, is to use compulsory induction. You may know this process better by the sectors that make it happen -- turbochargers and superchargers. In a compulsory induction motor, higher-pressure air is forced into the combustion chamber than usual, creating higher compression and more power than any engine stroke [Source: Bowman]. Turbochargers and superchargers are essentially air compressors that sink more air into the engine. Compulsory induction systems were used on aircraft engines long before they began to be added to vehicle engines in the 1920s. They are particularly useful for small engines because they can generate a lot of extra power without increasing engine size or causing a dramatic drop in fuel economy. A good example is a turbocharged Mini Cooper S, which only has a 1.6-liter engine, but in some applications produces more than 200 horsepower. In addition, high-performance cars such as the Porsche 911 Turbo or the ZR-1 light frigate use mandatory induction to achieve extraordinary gains in power. Bugs? Cars with turbochargers often require premium gasoline. Then there's the issue of turbo delays, where power gains don't feel until turbocharger spools up on higher revolutions per minute (RPM). Engineers have helped alleviate both of those bugs in recent years. And as fuel economy and emissions standards become more stringent, many automakers are turning to mandatory induction on smaller engines instead of making larger engines. In the newest Hyundai Sonata, for example, the superior engine that can be purchased is no longer a V6, but a four-cylinder turbo. Next, we'll discuss why carburetors have practically become a thing of the past thanks to fuel injections. Benefits: Better throttle response, increased fuel efficiency, more power, easier starting bugs: more complexity and potentially expensive advertising repairs for decades, was the preferred method for mixing fuel and air and depositing it into the carb engine combustion room. Press the accelerator pedal to complete the trotel and the carburetor will allow more air and fuel to the engine. Since the late 1980s, carbohydrates have almost entirely replaced fuel injections, which make the system far more complex and effective than mixing fuel and air. Fuel injectors spray gasoline into several times as much air consumption, where fuel and air are mixed together into a fine mist. That mixture is brought into the combustion chamber by the valve on each cylinder during the consumption process. The engine computer on the board controls the fuel injection process. then why did he do it? Carb replacement injections? Put simply, fuel injection works only better in every aspect. Computer-controlled fuel-controlled engines start easier, especially on cold days, when carbohydrates could trick things up. Engines with fuel injections are also more efficient and responsive to changes in throttle [Source: Automedia]. They have drawbacks in terms of increasing their complexity. Fuel injection systems are also more costly to repair than carbohydrates. However, they have become the industry standard for fuel delivery, and it doesn't look like carburetors will be making a comeback anytime soon. In this next section, we will discuss the next step in fuel injection technology, known as direct injection. Benefits: More power, better fuel economy bugs: More expensive to take, relatively new direct injection advertising technology is more refinement of improvements made by fuel injections. As you may have guessed of its name, it allows fuel injections to skip a step, which adds efficiency to the engine, and more power and improves fuel economy as a result. On a direct injection engine, the fuel is sprinkled directly into the combustion chamber, not into the air receiving multiples. Motor computers then make sure the fuel is burned exactly when and where it is needed, reducing waste. Direct injection provides a leaner combination of fuel that burns more efficiently. In some ways, powerful engines make gasoline more like diesel engines that have always used some kind of direct injection. As we have already learned, direct injection engines boast increased power and fuel economy over standing fuel injection systems. But they also have their drawbacks. For one, technology is relatively new, having come to market only in the last decade or so. More and more companies are starting to increase their use of direct injections, but it hasn't become standard yet. Sometimes, direct injection engines can showcase the construction of carbon deposits on incoming valves, which can cause reliability issues. Some vehicle theoners have also expressed difficulty in modifying direct injection engines. Despite these issues, direct injection of new technology is hot in the automotive world right now. Expect it on more and more cars as time goes on. Next, let's look at the use of aluminum motor blocks versus old-school iron blocks. Benefits: Lighter weight leads to greater efficiency and better bug handling: Can warp on high temperature advertising over the past few years, cars have been trending towards lighter weight in many ways. Automakers are looking for ways to lose the weight of a car in order to produce an economy and better fuel performance. One way they have done this is largely by replacing engines made of iron with aluminum ones. For years, iron engine blocks were the industry's standard. The majority of all new small engines use aluminum instead, though many large V8 engines still use iron blocks. Aluminum weighs far less than iron -- typically, an aluminum engine weighs half the weight of an iron. That translates to a lighter overall weight for the car, which means better handling and greater fuel efficiency [Source: Murphy]. Aluminum has some bugs, however. As a metal, it is not as strong as iron and does not hold up to high levels of heat as well. Many of the early engines of the aluminum block had problems with the screws and varning of cylinders, leading to concerns of durability. Those problems have been largely solved, however, and aluminum has clearly stated itself as the future of engines because of its weight-saving properties. In this next section, we will talk about how to revolutionize the design of the Kamshft engine. Benefits: Better performance bugs: Increased complexity ads you've probably heard the term DOHC or dual overhead camshafts when someone is talking about an engine. Most people know it as a desirable feature to have, but what does it mean? The term refers to the number of overhead kameshfts above each cylinder in the engine. Kameshfts are part of your car's valve, a system that controls the flow of fuel and air into cylinders. For decades, cars primarily had OHV engines, meaning overhead valves, also called pushruds. Pushrods are driven by kameshfts inside the engine block. This setup adds mass to the engine and can limit its overall speed. At the overhead cam setup, the camshaft is much smaller and placed on top of its cylinder head, rather than on the engine block. There is one in an overhead cam engine (SOHC), while a DOHC engine has two. The benefit of setting up overhead cam is that it allows for more consumption and exhaust valves, meaning fuel, air and exhaust can move more freely through the engine, adding power. While many car companies have done away with pushrod engines, DOHC and SOHC have not planted them perfectly. Chrysler is still using pushrods to generate a lot of power for its Hemy V8 engines; General Motors is enjoying pushrods in some of its high-tech, modern V8s as well. But DOHC and SOHC engines have been prominent on engines, especially smaller ones, since the 1980s. The drawback of having little overhead is that they increase complexity and cost. Are you still considering a trend here? Next we will learn more still about how milk affects performance when we talk about variable milk timing. Benefits: Fuel economy, more flexible power delivery bugs: More cost to generate ads if you're all familiar with Honda engines, you've almost certainly heard the term VTEC. People who cook their Hondas to run often speak of kicking VTEC. But what exactly does that mean? VTEC refers to variable valve timing and electronic control lift, a form of Tap timing. There are times when an engine needs more airf streaming, such as when it's hard to accelerate, but a traditional engine often doesn't allow enough airfly, resulting in less performance. Variable valve timing means that the airf stream in and out of the valves slows or sped up if needed [Source: Autropolis]. Honda is hardly the only car company to offer such a system. Toyota has a system called VVT-i, for the timing of an asymmerated variable valve, and BMW and has a system called Valvetronic or VANOS, which stands for Nockenwellensteuerung variable meaning variable low-latch control. While they all work a little differently, they all do the same thing -- allowing more air and fuel to enter the valves at different speeds. This makes a motor more flexible and allows it to deliver peak performance in different situations. It also boosts fuel economy. Many engines now have a kind of variable valve timing, often controlled by computers on the engine board. We will talk about how motor computers revolutionize design in this next section. Pros: Fuel economy, better detection of problem bugs: cost, advertising the complexity of an engine is an incredibly complex device. It has dozens of moving sections and scores of different processes that are taking place at once. That's why modern cars are all set up by a computer on board called the Engine Control Unit, or ECU. The ECU makes sure that processes such as ignition timing, air/fuel mixtures, fuel injections, idle speeds, and others operate the way they are supposed to. It monitors what flows in the engine using an array of sensors and performs millions of calculations per second in order to keep things operating properly. Other computers in the car control things like electrical systems, airbags, internal temperature, traction control, anti-lock brakes and automatic transmission. Cars have become increasingly computerized since the first diagnostic computers on board (OBD) were added in the 1980s. This is the computer responsible for the Check Engine light on your dashboard. A mechanic can connect a computer to the OBD port and get a sense of the problem areas of your car. They can't use OBD to immediately know what's wrong with your car, but it gives them a big starting point. By making the engine more efficient, motor computers can lead to greater fuel efficiency and easier detection of problems. But they also make the engines far more sophisticated, and they can trick them for weekend mechanics to work on. Next: Let's learn why diesel engines are not the last smoked, noisy, low-powered oil burners. Pros: Turk, fuel economy, cleaner emissions bugs: fuel costs, low RPMs, higher initial cost ads we've talked about a lot about petrol engines so far, but what about diesel engines? Diesel never has big sellers in the united states . Despite its superior fuel economy over similar gas engines, many Americans still see diesels as noisy, sooty, stinky, unreliable engines of the 1970s and 1980s. It's not like that anymore. The modern diesel engine is powerful, clean and highly fuel efficient. Today's engines use a low-sulfur form of diesel fuel, and in-car systems help eliminate particles and excess pollution. Diesels made by companies such as Fulax Wagon, Mercedes-Benz, BMW, Volvo and others boast engine improvements such as turbocharged, sophisticated fuel injections, and computer control to provide a driving experience that is both efficient and high in Turk [Source:Bosch]. Diesel engines have drawbacks that are mainly low RPM levels and higher cost of diesel fuel. But because many of them can achieve well over 40 miles per gallon (17 kilometers per liter) on the highway, the driver needs to pay for that much less fuel often. And if you're wondering if modern diesel delivers good performance, look over the last few 24 hours of Le Mans racing, where Audi is dominated by the use of a diesel racing car. Finally, we'll look at the current leader in green cars -- hybrid engines. Pros: Fuel economy bugs: higher initial cost, combined complexity of high gas prices, increased environmental awareness among drivers, and government regulations raising fuel economy and emissions standards have forced engines to go green more than ever. One of the biggest engine improvements used to increase efficiency in recent years is the hybrid engine. Hybrids were vague a decade ago, but now everyone knows how they work -- an electric motor partnered with a traditional gasoline engine to achieve high fuel economy numbers, but without the anxiety of the range of an electric motor, where the driver always wonders what will happen when the charge is over. The Toyota Prius remains the best-selling hybrid car in the United States. It has a 1.8-liter four-cylinder engine with an electric motor that produces 134 horsepower. At low speeds, the electric motor operates alone, meaning the car does not use gas at all. At other times it helps the gasoline engine. The total closes are about 50 miles per gallon (21.3 km per liter) in both town and highway [Source: AOL Auto]. Hybrids like the Prius represent the latest evolution in internal combustion technology. While their benefits come in the form of fuel efficiency, there are also drawbacks. Hybrids have a higher initial cost than their non-hybrid counterparts, and some have argued that gas should be much more expensive than it is now (unbelievable to sound) before the driver resizes the extra cost of the hybrid car. However, it is clear that engines are trending toward reducing greenhouse gas emissions and greater fuel efficiency. While electric only Becoming more common, it's clear the internal combustion engine is not going anywhere quite yet. It will simply continue to evolve better and better, just like it did from the days of the Model T. Is it possible for something as simple as a new engine ride to increase engine response in your car or truck? Find out in HowStuffWorks. AOL Autos. Best Selling Hybrids: November 2010. (June 17, 2011) . Variable tap timing. (June 17, 2011) Robert. The joint diesel rail injection system explained. Swedespeed.com (June 17, 2011) Zach. Pushing air: More power through compulsory induction. DriverSide.com (June 15, 2011) . 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