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## **Principles of the Automobile**

### **The Past, the Present, and the Future**

The car, the automobile, the motor carriage. No matter which name you assign to this iconic product, it plays a major role in our lives. It has been used in everything from simple daily life to military warfare to the entertainment of millions of fans around the world. However, do you know how it works? Or, what car manufacturers primarily focus on when considering its efficiency, safety, and future? In this article, we will dive into some of the particulars of its mechanics and issues as well as its history and future.

The history of the automobile has taken a long route through time. Even though it was invented in the late 1800s, the car first started to come to life when Dutch scientist Christiaan Huygens created the first internal combustion engine in 1680. Before this, there was another form of propulsion, steam. In 1769 Nicolas Joseph Cugnot invented a three-wheeled, steam-powered, rudimentary tractor used by the French army for hauling artillery. The first truly modern car can be attributed to Karl Benz, who in 1886 patented his Motorwagen. This was a revolutionary product that, just like the invention of the icebox, would forever change the world. It had considerably shrunk the size of the globe in terms of travel time.

One of the early popular cars, designed for the working man, was the Ford Model T, a plain and simple machine. To show an example of its simplistic design, Henry Ford once said, "Any customer can have a car painted any color that he wants, so long as it is black." It had

several major selling points above its competition. It was cheap enough that most people were able to buy one. Not to mention that it was reliable and relatively easy to fix. On top of all that, thanks to a production line, it was being manufactured quickly and was actually available for purchase unlike many of its competitors.

In the 1920s and 1930s, a new thing emerged in the automotive industry, planned obsolescence. Pioneered by Alfred P. Sloan Jr. of the General Motors Corporation, this method tricked customers into thinking that they needed a new car, even though their current one still worked. This was achieved by bringing new styling to the models to entice the consumers to trade in their old cars. It is still prevalent today, since most people do not drive cars from 20 years ago, even though they still work perfectly fine.

Since the beginning of the auto industry, efficiency has been something that car designers would strive for. In essence, efficiency, in aerodynamic terms, means what is the best shape for going through the air using the least amount of energy possible. A racing car generally has the best efficiency in terms of aerodynamics, but their major downside is that they are extremely impractical for daily use due to their hyper-focused makeup. Whereas a van, for example, is great for hauling furniture and packages yet, since it is plagued by drag, it would be beaten in a race by a car designed specifically for such a task. Fortunately, a van can still be created to efficiently slice through the air better than a box, thereby increasing fuel mileage and giving the vehicle better handling.

In addition to aerodynamics, the manufacturers heavily focus on the car's engine to improve its efficiency. The engine is what drives the car forward taking in fuel and releasing power. This power can be released in minimal amounts, just enough to get the chassis at highway speeds, or the flow can be unrestrained, able to reach unprecedented speeds. The amount of

energy that is produced is measured in horsepower. Invented by James Watt, the term horsepower is the measurement of one horse doing 33,000 foot-pounds of work every minute, or 550 pound-feet per second. When one horsepower is converted to Watts, it is found to equal 746 Watts.

As well as the engine, tires play a major part in the efficiency of a car. Even though we scarcely think about them, they have a large impact on the ride quality of the vehicle. Because tires are the only parts of a vehicle that touch the ground, they need to be able to hold a lot of weight. Also, different road surfaces and weather conditions determine how useful the particular tires will be. This is due to a grip. In the past, different types of rubber and grooves were used in different conditions, and every time the conditions changed, the tires also had to change. Fortunately, tire manufacturers have created a mix of both rubber and grooves so that you no longer have to swap to winter tires when it gets snowy and ice accumulates on the roads. However, there are still tire options available based on the main task the car will be performing. For instance, you would not pick off-roading tires for a street-specific car, nor vice versa. Each tire performs its job: off-roading tires may be very knobbly, whereas track-designed tires are much smoother. So tires are an extremely important piece of a car.

Another key car component is the brakes. A brake works by using hydraulics. When a driver applies their foot to the brake pedal, it sends pressure through hydraulic lines to the brake pads. These squeeze together on the sides of a disc, which is attached to the axle, and use the power of friction to stop the car. Heat plays a major role in the usage of these stopping forces. Too much heat and the brakes will give up; too little heat and the brakes will work very minimally. Fortunately, this type of brake issue does not usually happen to on-road cars; mostly large trucks, such as semis, can experience brake problems.

When thinking about brakes, the AntiLocking Braking System must be mentioned. ABS, as it is commonly known, is what keeps the wheels from locking up. This system senses when a wheel starts to lock up during braking and reduces the amount of pressure applied to the brake disc. Thereby, it allows the wheel to accelerate to the right speed, at which point the brakes are once again applied automatically to stop the vehicle properly. Having ABS allows the driver to safely steer the car during fast braking and still come quickly to a halt. It also prevents skidding to limit the possibility of crashing.

Although a car is a great tool used by many people, it also has some problems. First of all, the safety of vehicles needs continuous improvement. Even though there has been much done over the years, crashes and rollovers still occur every day.

Also, most cars today run on gasoline or diesel, both of which are sourced from crude oil. This poses an issue, as crude oil is not a renewable energy source and will eventually run out. Fortunately, there are other energy-sourced cars available.

One option for alternative energy source vehicles is the electric car. It creates its movement by taking electric energy that is stored in batteries and putting it into use with the motors that drive the wheels forward. As they require special stations to charge up, which are not yet widespread, and their batteries take much longer to replenish, they may not be the best long road trip vehicle. Despite that, they do have the advantage of being extremely quick off of the line. This is due to their almost instant rotational force on the motors since electricity moves extremely quickly. With a car like a Tesla, you can pretty much assure yourself of being the fastest person when pulling away from a stop light. Electric cars also happen to be some of the safest cars in crash test ratings.

Another alternative car available is hydrogen-fueled. It creates electricity from hydrogen to power motors that move the car. This is great in theory because hydrogen can be extracted from water, a renewable source, but, just like the battery-electric car, has only a few refilling stations that are few and far between. Hydrogen-fueled cars seem like an extremely practical solution but, unfortunately, have not caught on as a popular source of fuel. The reason for this may be that hydrogen must be extracted and compressed in tanks and therefore requires new infrastructure. Electric cars, however, also need special setups and yet they are gaining popularity. No matter what alternative energy source we consider, it seems that at the moment for many people, especially in rural areas, gas-powered vehicles are still the best option.

The future of the auto industry is always tantalizing, but it seems that the car manufacturers with the best software in their vehicles will rule the market. As technology is continually improving, the agreement seems to be that, in the future, we will have self-driving cars. Imagine going on a road trip and not having to worry about the driver getting tired. You would never have to stop for a hotel but simply drive through the night. Also, if all cars are self-driving fewer accidents would occur since there would be no human error.

Another future development that is happening right now is hybrid vehicles. They operate a gas engine for main usage and an electric motor to assist it, which boosts gas mileage. It has been used successfully in everything from Toyota Priuses to cutting-edge racing cars, to pickup trucks and SUVs.

In conclusion, we can agree that even though the automobile is very much integrated into our modern society, it is seldom questioned how it works. As we looked at the history of car development, the particulars of its mechanics, and what the future may hold for us, we can appreciate the complexity of this machine. Aerodynamic efficiency and engine performance go

hand in hand, yet they wouldn't work very well if there were no tires to go on the ground. And while tires are amazing by themselves, it still wouldn't be safe to drive if brakes wouldn't allow it to stop fast enough. As we approach the future, we can confidently predict that alternatively fueled and self-driving cars will be the most prevalent thought in the minds of the car manufacturers with safety and efficiency continuously improving.

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