Cars: Yesterday, Today, and Tomorrow

What You Already Know

Technology is the use of scientific knowledge for a purpose. The invention of modern airplanes, for example, is the result of the work of many inventors who worked to create new devices and solve problems. Sometimes the work of inventors results in improvements rather than in the creation of completely new devices. The Wright brothers first flew a plane at Kitty Hawk, North Carolina, more than a hundred years ago. Today’s airplanes reach speeds that the Wrights never dreamed of, but they are still basically the same type of machine as the Wright brothers’ plane.

Technology affects the way that we work. Modern manufacturing uses an assembly line able to produce large numbers of products. In this system, a product such as a car moves through a factory. Different groups of people or robots add parts to the car as it goes along.

The invention of the microchip in the late 1950s helped to start the computer age. Today, there are computers that fit in the palm of your hand. If your computer is connected to the World Wide Web, you can get information about almost any subject.

Advances in technology have even allowed us to leave the Earth to explore space. In 1961 a Soviet astronaut named Yuri Gagarin became the first human to enter space. In 1969 American Neil Armstrong became the first person to walk on the Moon. Today, several countries are working together to operate a space station orbiting the Earth.
Try to imagine life without technology. What would you miss the most? There would be no television, telephones, or computers. You would have to make your own clothes. If you wanted to hear music, you would have to play it yourself. One invention you would probably miss a lot is the automobile. Keep reading to learn more about this important machine and the ways it has changed our lives.
The Horseless Carriage

In some ways the automobile began with the invention of the wheel. That breakthrough occurred about four thousand years ago. The next big step was the invention of the steam engine. In 1769 a three-wheeled, steam-powered vehicle was invented by Nicholas-Joseph Cugnot. This invention was not designed to transport people though. It was built to haul cannons. It moved at a maximum speed of about three kilometers per hour, and had to stop often to build up steam.

At the beginning of the 1800s, a few people in England had steam-powered vehicles, which were allowed on private tracks only. Many of them looked just like horse-drawn carriages, but without the horses. By the middle of that century, steam-powered vehicles were being used for England’s first bus system.

The new vehicles competed with horse-drawn carriages and railroad companies in England. These businesses urged the government to tax the steam-powered carriages. Unable to pay the taxes, they soon went out of business.

By the early 1900s steam-powered cars were being built in the United States. The most famous was the Stanley Steamer, named for the builders Francis and Freelan Stanley. A Stanley steam car set a world speed record of over two hundred kilometers per hour in 1906.

Inventors around the world also worked with other sources of power, such as kerosene and electricity. Cars with electric engines were especially popular in the 1800s and early 1900s. Electric vehicles were very quiet, so they didn’t scare their passengers or other drivers’ horses. But electric cars were not very practical. They had to stop often to recharge their batteries.
The First Car

Historians disagree over who invented the first modern car. This is due in part to the fact that many people around the world invented and improved different parts of what was finally called an automobile.

Some historians say the inventor of the car was Gottlieb Daimler, while others believe it was Karl Benz. Both were German engineers, and both invented vehicles powered by gasoline engines. Both produced vehicles that were similar to present-day cars.

On January 29, 1886, Karl Benz's gas-fueled motor vehicle design was recognized by the German government. For this reason, Benz is generally considered the automobile's inventor. In March of the same year, Daimler installed a gas engine on a fourwheeled carriage. His vehicle was more like today's cars.

Benz's car had three wheels, which made it easy to steer. Daimler's design had four wheels. At that time, roads were very rough. They were usually unpaved, with two deep ruts made by carriage wheels. Daimler's four-wheelers rode in these ruts just like a carriage. But Benz's three-wheeled cars did not fit into the ruts, making for a very rough ride.

Benz's three-wheeled cars did not sell very well. So in 1891 he changed his design to a four-wheeled vehicle, similar to Daimler's. Benz's new car was much more popular than the three-wheeled vehicle. By 1900 his company was the largest automaker in the world.
Mass Production

At the beginning of the 1900s there were several thousand cars in use in the United States. Only the very rich could afford these cars. Driving a car was more of an expensive hobby than a useful way to get around. Soon all of this would change. Mass production would make the automobile the most popular method of transportation in the United States. The use of the assembly line made automobiles much cheaper to build.

In the beginning every car was made to order, so each car was unique. The first car to be standardized was Benz’s 1894 Velo. More than one hundred Velos were built in 1895.

The first U.S. auto to be mass produced was the 1901 Oldsmobile called the Curved Dash. Unlike other cars at the time, Oldsmobiles were built on an assembly line. In 1901 an amazing 425 Curved Dash Oldsmobiles were built.

It was Henry Ford, however, who really began modern auto manufacturing. Ford improved the assembly line process by adding a conveyor belt. Before, cars had to be pushed from one group of workers to the next. The conveyor belt did this automatically, allowing the assembly line to move much faster. By 1916 Ford’s company was assembling two thousand cars every day! Ford’s changes decreased the cost of cars so much that many more people could afford to buy them. He built over 15 million of his Model T automobiles between 1908 and 1927. When it was introduced, the Model T cost $850. By 1925 better manufacturing methods had decreased the price to $300.
A Century of Cars

1900–1939

These years brought great changes in automobiles—how they looked, how they were manufactured, and how they were powered.

At the beginning of the 1900s, headlights and windshield wipers were invented and soon became standard features. Gasoline engines became the most common source of auto power. These engines were more convenient to use than steam or electric engines. Gas-powered cars could also travel at a faster rate. In 1906 the Rolls-Royce company was started in England. It produced luxury cars, such as the Silver Ghost. This model earned a reputation as the best car in the world. The very first Rolls-Royce, built in 1906, still runs.

The electric starter was added to cars after 1911. Before this, cars had to be started with a hand crank. Cars also began to have tops on them that helped keep out rain and wind. A running board, which looked like a step, was added to each side to help drivers and passengers step up into their vehicles.

In the 1930s cars became more powerful and more comfortable. Their bodies had smooth shapes that cut through the air easily. An improved suspension system made the ride smoother on bumpy roads. Improved brakes and engines brought more safety and increased speed.
1940–1969

The automatic transmission was a major breakthrough in the 1940s. It shifted the car’s gears automatically, making driving easier. This era also saw advances in headlights.

European and American car designs began to differ in the 1950s. European cars tended to be small and light. In America, however, cars became longer, larger, and heavier. American cars were designed for style and comfort instead of efficiency. They had fins at the back and cone-shaped parts at the front. The 1959 Cadillac had fins almost four feet high! The large American cars had more power than those in Europe, and also provided a smoother ride. Unfortunately, they also burned more gas. Power steering and power brakes helped make these large, heavy cars easier to drive. Air conditioning and electric powered windows also became available.

The Volkswagen Beetle was the first German car imported to the United States. At first, these small, efficient cars were not very popular. Only two Beetles were sold when they were first offered in the United States in 1949. Americans were used to bigger, more comfortable vehicles. Before long, however, Americans began to want smaller cars, and imports started selling well in the United States. Smaller cars used less gas and were easier to park than large cars. In response, American automakers began designing smaller cars called compacts. The Nash Rambler was the first American compact car.

By 1960 almost a third of the cars sold in the United States were compacts. American compacts had more powerful engines than earlier compact cars, despite their smaller size. Automatic transmission became much more common during the 1960s.
1970–Today

In the early 1970s large cars were still the best-selling American models. Auto manufacturers, however, continued to build compacts to compete with foreign imports. Then the United States was affected by a huge increase in the price of oil. Many of the countries that produced oil decided to stop selling it. It became very scarce, which drove the price up. This was called the energy crisis. There were long lines of cars at gas pumps, and the gas often ran out while customers waited. Because of the energy crisis, American consumers and auto manufacturers became more interested in fuel-efficient cars. Some larger-model cars could go a mere eight miles on a gallon of gas. But compacts could go as far as thirty-five miles.

Auto technology continued to make advances. The energy crisis triggered a lot of research into more efficient engines. Concern about air pollution led to other innovations. Catalytic converters were added to cars in the 1970s. These devices reduce the amount of pollution that cars make.

In the 1980s cars from Japan became popular with Americans. Many of these cars were small and light. They had small engines that didn’t use much gas. Japanese auto plants were built in the United States to help meet the demand for these cars. In the 1990s pollution-control laws were passed by some American states and European countries. They required improved gas mileage and less pollution. Automakers began to experiment with electric cars again. Although electric cars make little pollution, they cannot travel very far without recharging their batteries. Today, car companies are looking for new power sources that make less pollution. Scientists know that the Earth will eventually run out of oil. A new power source must be found before this happens.
Car Parts

The first thing most people notice about a car is the body. A car body is designed to be both stylish and efficient. A well-designed body allows air to pass over it with little resistance. This lets the car move more easily and use less fuel. Underneath the body is the chassis, or frame and supporting parts.

In order to move, a car needs an engine, a fuel system, an exhaust system, and a cooling system. The drive train delivers the engine’s power to the wheels. This system is made up of the transmission, driveshaft, and axles. The suspension system includes the springs and other parts that make the car ride smoothly. The control system consists of the steering and brake components. Cars also have safety systems, which include seat belts and air bags. Air bags inflate when a car crashes, keeping the passengers from hitting the windshield.

Most cars have internal combustion engines. This type of engine burns fuel in cylinders inside the engine. Cylinders are closed tubes. Inside each one is a piston, which moves up and down. Gasoline and air enter the top of each cylinder. Then a spark plug lights the gas on fire, causing it to expand and push the piston down. The piston is connected to a crankshaft, which changes the up and down motion of the pistons into a spinning motion. This spinning is transferred to the wheels to move the car.
Car Construction

Designing and building a car requires the knowledge and skills of different types of workers. Automakers must decide what the car will look like, how it will work, and to whom it will be sold.

The actual construction of cars takes a lot of people, materials, and money. Once the design of the new model has been approved, the factory where it will be built needs to be retooled, or set up to build the new type of car.

Workers in the factory are stationed on an assembly line. It works in almost the same way as Henry Ford’s assembly line in the early 1900s. Workers operate machines, robots, computers, and other equipment. The cars move from one group of workers to another automatically.

Sections of the car called subassemblies are put together. Then the subassemblies are combined to make a whole car. Whenever possible, robots are used to speed up work on the assembly line. Robots are very efficient, and they can do work that is too dangerous for humans. Quality inspectors watch over each step of the assembly process.

Modern cars are much safer than cars of earlier decades. This is because the government tests cars to find out how well they protect passengers in a crash. Car companies test their cars also, to find new ways to make them safe. Safety testing is done by placing dummies in a car and crashing it into an object. Sensors record how much force the crash puts on the dummies.
Impact of the Car

The auto industry is one of the biggest industries in the world. It produces cars, trucks, buses, and motorcycles. It employs millions of people and makes billions of dollars. Almost 60 million new vehicles are built each year, with about a quarter of them built in the United States.

The automobile affects the way that people live, work, and travel. In just one hundred years, people in the United States have come to rely on cars and trucks.

But cars cause many problems. Many highways and roads are needed to keep these vehicles moving. Cars also create a need for gas stations, towing services, and stop lights. Traffic jams and noise sometimes make cities unpleasant.

Thousands of people are injured in auto accidents each year. Pollution from cars makes people ill and hurts the environment. Large amounts of electricity and natural resources are used to build all of these cars. Automakers and owners around the world depend on oil, which is quickly running out.
Future Cars

The design of cars is always changing. Air and noise pollution, as well as limited oil resources, are serious problems that may be overcome by future cars.

Hybrid cars—vehicles powered by more than one energy source—have been around for a long time. The Krieger Company marketed a hybrid gas/electric car in 1903. Hybrid cars are usually more fuel-efficient than standard gas-powered cars.

These cars are becoming popular again. In 1999 the first modern hybrid car was released to the American market. Because so many people want to buy hybrids, some buyers had to wait six months to get them.

Scientists are also looking for ways to improve electric cars. They are trying to make batteries that are lighter and last long enough to be practical. Just having efficient electric cars won’t solve pollution problems, however. We need a pollution-free way to generate the power that will charge these cars’ batteries.

Special devices called fuel cells may power the cars of the future. Fuel cells convert a gas called hydrogen to electricity without producing any pollution. Fuel cells are a bit like batteries, but instead of recharging them, you simply add more hydrogen.

The problem with hydrogen fuel cells is that producing hydrogen takes a lot of energy, which must come from a pollution-free source. Also, hydrogen is a gas. It must be pumped into a tank at high pressure in order to be held inside a car. Another way to get hydrogen is to take it from a fuel such as alcohol or natural gas. Unfortunately, this process creates some pollution.

The need for better car designs continues. It is a difficult problem. The solution must combine a clean, quiet, efficient engine and an affordable cost. With more cars on the road every year, the importance of environmentally safe cars continues to grow.
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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Catalytic Converter</td>
<td>A device that reduces the amount of pollution in a car's exhaust</td>
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<tr>
<td>Chassis</td>
<td>The frame and supporting parts of a car</td>
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<tr>
<td>Drive Train</td>
<td>The system in a car that brings power from the engine to the wheels</td>
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<tr>
<td>Internal Combustion Engine</td>
<td>An engine that produces power by burning fuel inside of the engine itself</td>
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<tr>
<td>Hybrid Car</td>
<td>A car that is powered by more than one source of energy</td>
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<td>Retool</td>
<td>To set up a factory to produce a new type of product</td>
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<tr>
<td>Suspension</td>
<td>The system that lets a car ride more smoothly over rough roads</td>
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<tr>
<td>Transmission</td>
<td>The part of a car's drive train that controls how fast the wheels spin in relation to the speed of the engine</td>
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