History of the Automobile
The Story Behind the Horseless Carriage

Because the story of General Motors is so closely tied to the story of the Automobile, any history of our company must first be prefaced with a history of what was originally called “the horseless carriage”.

The automobile wasn’t just invented. It is not the product of any single man or group. It is the culmination of a worldwide series of experiments and developments. Today’s automobile represents over 100,000 patents. The history of the automobile can be traced to prehistoric times, for, fundamentally, it depends on the use of the wheel, fire, and manufactured materials.

One of man’s most instinctive urges is to transport his person and his goods from place to place. Some of our most important early inventions were in the field of transportation. Hundreds of different types of litters, carts, wagons, chariots, coaches and carriages were developed to suit specific purposes.

Man’s mode of land transportation changed little from the early days of civilization when he invented the wheel and tamed the horse. Occasionally, people talked of the day when carriages would be moved without horses and history reveals several novel experiments with propelled land vehicles. It is not certain who was the original inventor of the sailing chariot, but it was known in China when Europeans first visited the Orient. One of the most successful was built by Simon Steven in Holland, in about 1600. It carried 28 persons and is said to have covered 63 kilometers in two hours. Other devices were propelled by men turning cranks or moving levers and some obtained power from jets of steam or springs. One of the first men to suggest using steam to propel a vehicle was Sir Isaac Newton, the English scientist. His vehicle, built about 1680, consisted of a spherical steam boiler with a jet pointed to the rear. The force of the steam on the air was supposed to move the vehicle. However none of them unseated the horse and buggy.
A European Beginning

The story of the horseless carriage, as the automobile was originally known, begins not in North America but in Europe. It was there in the 18th century that various inventors began experimenting with piston and cylinder engines powered by steam or the explosion of gunpowder. In 1769, Captain Nicolas Cugnot of France built and ran an artillery tractor that was powered by a steam engine. His efforts were far from a complete success, but the vehicle did travel about 4 ½ kilometers per hour between stops to build up steam. Cugnot’s vehicle was to be soon improved by another Frenchman, Onesiphore Pecqueur, who invented the differential gear.

In 1801, Richard Trevithick of England built and ran a steam-powered carriage. In the 1820s and ‘30s many Englishmen constructed, and commercially operated, steam vehicles, which carried passengers and cargo. However, their efforts were severely hampered by conservative countrymen who restricted them from using the public roads. They were forced to turn their attention to operating trains or carriages on private rails, thus giving birth to railroads. It was about this time that Robert Anderson of neighbouring Scotland drove the first electric carriage. Also, in 1832, W. H. James recognized the need for flexibility in a self-propelled vehicle and introduced a rudimentary three-speed transmission.

In 1860, a French engineer named Etienne Lenoir invented an internal combustion engine that used illuminating gas for fuel and an electric spark for ignition. It was used to drive machinery and became the first commercial gas engine. In 1866, Otto and Langen of Germany improved upon the gas engine by developing the four-stroke cycle, which is still used today. In 1885, Daimler, another German, used the Otto cycle in a gas vapour engine, which he manufactured in quantity. The following year he applied his petrol engine to a motorcar. Daimler’s engine was used in France by Emile Levassor, who designed a vehicle that set the basic mechanical pattern for modern automobiles.
America Enters the Field

In late 19th century America, existing roads were extremely poor and financiers indifferent about the automobile. The public was generally hostile toward machines that frightened them and their horses. Although expanding rapidly, the United States was still primarily agricultural and had few large industrial centres. In spite of these drawbacks and while the early developments of the automobile were happening in the Old World, American inventors saw in the motor vehicle a means of mass transportation for a growing nation. A variety of pioneers were working hard at building the groundwork for a future North American automobile industry. Oliver Evans, a pioneer of the steam engine, had driven a combination wagon and flatboat over land and water as early as 1805 in Philadelphia. Many followed Evans in constructing steam vehicles or electric cars, but gasoline autos were just experiments prior to 1893. Charles Duryea built a three-wheeled, gasoline powered vehicle in 1893, and his company built 13 cars of the same design in 1896. Gasoline automobiles were produced by Elwood Haynes in 1894, by Ransom Olds in 1895, and by Charles King and Henry Ford in 1896. Automobile races stirred the public interest and bicycle and buggy manufacturers began to convert to making automobiles.
What Type of Power?

In 1900 there were some 8,000 cars chugging along America’s dusty roads. It was anyone’s guess as to whether future cars would operate on steam, electricity or gasoline. Each type of power had its advantages and disadvantages and all three had their staunch supporters. Electric cars were quiet and easy to operate, but were extremely heavy, could only go so far, and took a long time to recharge. Steamers, like the famous Stanley, accelerated smoothly, but took time to build up power and had difficulty storing enough fuel for a long trip. There was also the unfortunate possibility of an explosion at any time. Gasoline-powered automobiles were fairly quick-starting and could run a relatively long time before needing to refuel. On the downside, they were noisy, complicated to operate and often broke down.

One of the major factors that led to the dominance of the internal combustion engine was the discovery in 1901 of vast oil fields near Beaumont, Texas. These rich deposits of petroleum made gasoline readily available and
Another development which was to turn the tide in favour of gasoline buggies had its beginning with the American inventor, Eli Whitney, who developed a system for the mass production of muskets at the close of the 18th century.

Before this time, highly skilled gunsmiths had to hand make and fit each individual part of the musket. It was Whitney’s theory that less skilled men could operate machines to produce large volumes of identical parts, which could later be assembled into completed muskets. It took a long time to “tool up”, or get the machinery and assembly processes ready for production. Once he was set up, however, he produced muskets by the thousands. A hundred years later, Ransom Olds began to apply Whitney’s principles of interchangeable parts and assembly to the manufacture of the automobile.

For several years Olds had been a builder of steam and gasoline engines in Lansing, Michigan. He constructed a steam carriage in 1887 and experimented with gasoline-powered cars. He soon turned his attention to building Oldsmobiles, the first of which appeared in 1896. When he moved the Olds Motor Works to Detroit he established the first factory for the purpose of assembling automobiles. Olds planned to make a car that would sell for around $1,250 but found that the public wanted something strong, simple and less expensive - a car that would be within the reach of the average American. Olds abandoned the higher priced car.

When his plant burned to the ground in 1901, all he was able to salvage was an experimental model of the now famous Curved Dash runabout. To get his car into production, he made patterns of each part and contracted with local shops and factories to make the components for him. In so doing, Olds became a pioneer of the “supplier system” in manufacturing. He converted a small building into a factory to assemble the parts and began quantity production of the runabout.

Olds production methods were the first steps in the development of a modern assembly line. He placed the frame of a car on a movable stand and passed it down a line of workmen who added parts, until
the car was completed. Suppliers of parts were conveniently located near the workers to eliminate time-wasting movements. Thus was born the automotive assembly line. By the end of 1905, the Olds Motor Works had produced 18,500 cars. Olds found he could keep costs down and sell the car for $650 by concentrating on a single model, using efficient production methods, and producing cars in large quantities. His success in placing inexpensive cars in the hands of average people helped popularize the automobile and remove the label of “rich man’s toy”. He also helped to establish Detroit as the Motor City since many of his suppliers went on to become auto manufacturers.

At this time cars were being produced in many states but automobile manufacturing did not rate as a major industry in America. There was still much to be done in perfecting manufacturing techniques and setting up sales organizations. When a car owner needed a part, he ordered it from the factory. When it arrived, he took it to a blacksmith, who then tried to fit it as best he could. Very few parts were completely interchangeable. This type of system might have worked in the horse and buggy era, but for complicated machines like the automobile, it was a definite problem.

A solution to this came about in 1904 when Henry Leland became the general manager of the Cadillac Motor Car Company. With a background in the precision tool industry, Leland began applying the same principles in the manufacturing of automobiles. Parts became interchangeable, something that was to have a tremendous impact both in the production of cars and the servicing of them. By more accurately machining and fitting the parts, Leland also raised the power of his engine from three to ten horsepower.

In 1908, Leland entered a competition sponsored by the Royal Automobile Club of England and helped improve the reputation of American cars abroad. To prove that Cadillac parts were completely interchangeable, he had the individual components of three cars piled indiscriminately about an open shed. In a short time his mechanics had built three complete automobiles from the assortment of parts. The cars easily completed a 500-mile test run and Cadillac was awarded the Sir Thomas Dewar Trophy for the most meritorious automotive performance of the year.
It was about this time that another inventor, Henry Ford, made some outstanding contributions to the progress of a young and struggling industry. Ford had been experimenting with autos for several years and in 1903 formed the Ford Motor Company. During his first few years, Ford produced a variety of different cars but noticed that it was always his less expensive models that sold best. Late in 1907 he decided to concentrate on the mass production of just one model – a low priced car of simple design with standardized parts. He redesigned his assembly plant to obtain the smoothest flow of production and simplified the work of each man and machine.

Instead of buying his parts from suppliers, he found that he could save money by manufacturing many of the components himself. In 1909 Henry Ford sold over 10,000 Model Ts -a staggering figure in those days. By using mechanical-driven conveyors, Ford introduced the moving assembly line and further improved his production processes. While Model T sales soared to almost a quarter million cars in 1914, Ford gradually reduced the price from $950 to $490. By 1925 the basic price of his car had been lowered to $290. But sales of the relatively unchanged Model T were declining. Customers who wanted more than just basic transportation turned to a choice of better designed cars that offered comfort and convenience features. By the time the Model T was discontinued in 1927, Ford had sold some 15 million cars.

As the automobile became more and more popular, people began to complain about one of the most inconvenient aspects of operating a car at the time. A hand crank was used to start early vehicles, and it took a lot of muscle to operate it. When Charles F. Kettering, a young engineer from Ohio, invented the electrical self-starter, the automobile became much easier to operate. The Cadillac Motor Car Company installed the Kettering self-starter on its 1912 models and was again awarded the Dewar Trophy. The traveling public was pleased and the industry soon adopted Kettering’s system. Without hand cranking, automobiles were easier to operate and it was now practical for women to drive.
The Industry Grows

The emergence of automotive manufacturing as a major industry came during the 1920s as America underwent a tremendous social and economical change following World War I.

During the war, automakers turned much of their productive resources and manpower to the manufacture of wartime goods. Gasoline-powered trucks, armoured cars, tanks and airplanes had proven their worth on the battlefront. At the close of the conflict, automakers made many improvements that helped popularize motoring. Carmakers began turning out cars that featured closed bodies, which meant that they could be driven in all sorts of weather. People stopped seeing cars as a novelty and began to see them as an essential means of transportation. In the ten years between 1918 and 1928, the number of cars and trucks on the roads of the United States jumped from six million to 24.6 million. Just about every family had a car. There were literally hundreds of nameplates to choose from. The automobile was there to stay.

In many ways, the auto industry changed in the '20s into something quite different from what it had been. Leadership began shifting from the original mechanical wizards like Henry Ford, Ransom E. Olds, David Dunbar Buick, William Knudsen, Henry Leland, Charles Kettering and the Dodge brothers, who invented and figured out how to build the automobile, to men like Alfred P. Sloan and Harley Earl of General Motors and Walter P. Chrysler, who were concerned with defining the automobile’s role in the life of the consumer. Auto advertising began to stress intangibles – image, romance, fun – instead of the automobile’s mechanical attributes and its utilitarian value compared with the horse. The great depression, which gripped the country following the stock market crash of 1929, saw automotive production suffer severe cutbacks. Thousands of Detroit autoworkers lost their jobs and many of the numerous manufacturers that had popped up since the turn of the century went bankrupt, because of the sudden collapse in sales. The Great Depression also gave the nation a thorough understanding of just how important the automobile had become, and in spite of the crisis, the manufacturers built more than a million cars, trucks and buses each year.
The 1930s saw not only the introduction of mass motoring, but the building of roads for the new motor age. Production fluctuated and was on the up-rise when once again auto manufacturing was curtailed – this time by World War II. Automakers devoted almost all their manufacturing facilities and knowledge to the production of war goods. They made everything from airplanes to ammunition cases and supplied the nation with about one-sixth of its wartime materials. When the war ended, automakers returned to the task of meeting the demands of a car-buying public.

Buyer’s choice became the watchword, as automakers took styling and vehicle “options” to new heights. The “fabulous ‘50s” was a period when the automobile became as much a statement of personality as a mode of transportation. Big and bigger were better, with the exception of a few smaller vehicles (the Ford Falcon, Plymouth Valiant, and Chevrolet Corvair). Motor sport also added much to the technical advance of the road car. Genuine sporting machinery for the U.S. public was confined in the ‘50s to the Ford Thunderbird and the Chevrolet Corvette. The Corvette, seven years old at the end of the decade, was developing, through sport and technological application, into one of the outstanding cars of the time. Sales of cars in the U.S. were now around 8 million every year. The “big three” milestones of 1958 were Ford’s 50 millionth vehicle, Chrysler’s 25 millionth, and the 50th anniversary of General Motors.

In the 1960s, the automotive industry was changed by the Royal Commission on the Automotive Industry in 1960, and the subsequent Automotive Products Trade Agreement of 1965, by which Canada’s automotive industry became an integrated part of the North American industry. As a result of the A.P.T.A. or AutoPact (later complemented by the North American Free Trade Agreement or NAFTA), a continental, conditional free trade in motor vehicles and original equipment parts was established. The AutoPact contains “safeguards” requiring that A.P.T.A. producers in Canada maintain levels of assembly in Canada related to the value of their sales here.

During the 1970s, three events further shaped the world automotive industry, particularly the North American industry, including Canada: the oil embargo of 1973-74, the Iranian oil crisis of 1979, and the emergence of Japan from a highly protected market to become one of the world’s largest producer of motor vehicles. The fundamental result of the shocking ‘70s was the foundation of a global industry: an industry that conformed to most antipollution controls and incorporated speed and other safety measures that had become necessary with increasingly powerful vehicles and with increasing numbers of cars on the roads.
The industry moved from muscle cars to safer, more fuel-efficient automobiles. Another significant event was the emergence of vans and trucks. Once considered simply work vehicles, vans and trucks slowly emerged as a popular transportation option, putting a new twist on a fascination that had previously been described as “America’s love affair with the car.”

During the depression of the early 1980s, the automotive industry was almost completely re-structured to compete with the greater productivity of Japan and the “new Japans” of Korea, Taiwan, Singapore, Thailand, and Brazil. Management methods and organization, including labour relations, as well as product development and supplier relationships, were rebuilt to improve productivity, including quality. Key changes included new contracts with the United Auto Workers union to reflect common interest and mutual problems and responsibilities, the emphasis in production on the “just in time” inventory control system, and the use of statistical methods as a basic tool to improve both quality and productivity on an on-going basis. To meet the global challenge presented by off-shore manufacturers, North American producers changed their products (in 1981 and 1982, 29 models were introduced). The emphasis was on fuel efficiency, down-sizing, weight reduction, streamlining, front-wheel drive products, and the use of electronics such as automatic mirror control, fuel and mileage monitoring, accessory power control, sleep and alcohol detection systems, and automatic braking devices. In making these drastic changes in product, investments by manufacturers in production facilities and equipment increased greatly. The General Motors of Canada’s Autoplex in Oshawa, Ontario, a new and expanded network including two car plants, a truck plant, and a stamping plant, became the most technologically advanced in the world.

In the wake of rising oil prices, GM launched down-sized versions of its full-size cars like the 1977 Chevy Impala.
Today

With the hundreds of different vehicle models being sold in the United States, the choices today are virtually limitless - cars, sport-utility vehicles, passenger vans and light trucks.

Designers and engineers have constantly worked to improve the automobile and meet the demands of consumers. To provide more comfortable driving, the open roadsters of the early 20’s gradually gave way to smooth-riding closed cars with heaters and air conditioners. More efficient engines were teamed with new transmissions to provide economical performance. The boxlike shapes of early autos disappeared in favour of flowing contoured bodylines. Safety features such as all-steel bodies and safety glass were combined with improved braking, steering and lighting systems for greater passenger protection. Increased scientific and engineering knowledge has resulted in the systems, materials and manufacturing methods that make today’s cars safe, dependable vehicles.

Only a few auto manufacturers have survived from the early days of the industry when companies were formed, merged, dissolved and reorganized quite frequently. Of the more than 2,500 makes of American autos that were offered at one time or another, just a handful remain in production today. These cars are distributed nationwide, as well as worldwide, by networks of automobile dealers who provide replacement parts and service around the globe. The growth of the automotive industry has resulted in widespread employment, increased purchasing power, improved working conditions, comfortable pensions, and expanded recreational opportunities that were virtually unknown to most Americans at the turn of the century.