
A Car for the Great Multitude

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No industry in history developed in a more favorable climate of public opinion. By the time the Ford Motor Company was organized in 1903, the belief that the automobile would soon supersede the horse was commonplace. In a statement released in late 1900 through a Boston financial information agency, Colonel Albert A. Pope predicted that “inside of ten years there will be more automobiles in use in the large cities of the United States than there are now horses in these cities.” He further declared that 15,000 of his bicycle agents throughout the country were “fairly howling” for automobiles to meet “an enormous demand.” The principal examiner at the United States Patent Office stated in early 1901 that “to say the future of the automobile is assured is merely to voice an impression which is as common as it is usually vague.” John W. Anderson, one of the original investors in the Ford Motor Company, described the scene in Detroit in a letter to his father just prior to the 1903 Ford incorporation: “Now the demand for automobiles is a perfect craze. Every factory here . . . has its entire output sold and cannot begin to fill orders. . . . And it is all spot cash on delivery, and no guarantee or string attached of any kind.”¹

In many respects the diffusion process was identical on both sides of the Atlantic. The Automobile Club of France, the Royal Automobile Club in Great Britain, and the Automobile Club of America were equivalent organizations of the motoring elite and carried on identical functions—sponsoring tours and tests, lobbying for legislation favorable to motorists, and propagandizing the automobilists’ cause. Less affluent middle-class motorists were represented and their practical needs for touring information, insurance, and so forth, were met by the Touring Club de France and French regional clubs, the Motor Union in Great Britain,

and the constituent state and local clubs of the American Automobile Association in the United States. Even in Germany, with its few motorists, some thirteen local automobile clubs had been organized by the early 1900s.

In all these countries, as Laux points out, “the earliest buyers of cars came from the same social groups: wealthy sportsmen, doctors, businessmen, and engineers.”² Saturation of the early urban luxury market for cars and the consequent beginnings of significant diffusion into rural areas and among middle-class purchasers date from about 1904–1905 in Europe as well as in the United States, with the most innovative group being physicians. In France, for example, about a third of those who had adopted the automobile for their work by 1905 were doctors, while by 1905 in the United States in large and medium-sized cities the number of automobiles used by physicians in their practices was usually greater than the combined total of all commercial vehicles including public cab fleets. In the provinces of France as in the American Middle West, the country doctor was generally the first person to adopt the automobile.

In a 1973 dissertation in which he replicated, for France during the period 1900–1914, my own 1970 study of the diffusion of the automobile in the United States from 1895 to 1910, Nicolas Spinga reached the conclusion that “the ways of adopting the automobile in France were very much like those found by J. Flink in the United States. . . . In fact we find the same economic, technical, and moral preoccupations.” From utilitarian advantages of economy and efficiency over the horse, through the public health benefits of horseless cities and the breaking down of rural isolation, to enhancing individualism and mobility, every motive for adoption of the automobile that I found in the circulating media in the United States can be found as well in the French media. What was important was not that American expectations and attitudes about the automobile differed from those of Europeans—for to the extent that they can be determined, they appear not to have differed significantly. Rather, as Spinga says, the significant fact is that “if the reasons for adoption are the same in the United States and France . . . they did not congeal in the same way in the plan for the quantitative development of the automobile and its distribution.”³

One must agree with Joseph Interrante and begin “with the premise that our consumption of cars satisfies a real need for transportation—a need as basic as food, clothing, and shelter. . . . When the automobile first appeared as a mass-produced commodity after Henry Ford’s introduction of the Model T in 1908, people bought automobiles because they met old transportation needs better than existing alternatives and offered new possibilities for movement.”⁴ These appeals of the car were universal, not

culturally determined. However, because of a set of historically specific circumstances—most importantly, a far higher per capita income and far more equitable income distribution—Americans were able to actualize the possibilities of mass personal automobility a generation ahead of Europeans.

Proving the Automobile's Reliability

A specialized press that covered all aspects of motoring and crusaded for the mass adoption of the automobile existed on both sides of the Atlantic. As we have seen, French periodicals were active in promoting the first automobile races. Not counting regional automobile club bulletins, which took their news largely from the Paris press, some twenty-five specialized automobile periodicals were being published in France by the turn of the century, and French periodicals of general circulation in addition gave motoring generous coverage. The most important automobile periodical was the daily *L'Auto*, published by Henri Desgrange, followed by the weekly *L'Automotion*, *La France Automobile*, *La Locomotion Automobile*, and *La Vie au Grand Air*.

The first British automobile journal was *Autocar*, inaugurated in November 1895 by William Isaac Iliffe of Coventry, publisher of *The Cyclist*. Its closest rivals were *Motor* (a successor to *Cycling*), Sir David Salomons's *Automobile Journal*, the *Motor Car Journal*, and *Cars Illustrated*. Like the French, the British motoring press, according to Kenneth Richardson, "proved itself one of the most powerful auxiliary forces in forwarding the development of motoring."⁵

The publishers of newspapers and magazines in the United States, knowing that automobile news fascinated readers from all walks of life, gave the motorcar extensive coverage. Important American specialized periodicals to appear in the wake of *Horseless Age* (1895) were *Cycle and Automobile Trade Journal* (1897), *Automobile* (1899), *Motor Age* (1899), *Motor World* (1900), and *Motor* (1903). As early as the turn of the century, *Automobile* felt that "the unprecedented and well nigh incredible rapidity with which the automobile industry has developed . . . is largely due to the fact that every detail of the subject has been popularized by the technical and daily press." *Horseless Age* in 1903 commented that "fanatical opposition to the automobile is on the whole very rare in this country. The metropolitan dailies occasionally print strong editorials denouncing speed excesses and careless driving, but the whole press is practically unanimous in recognizing the automobile as a legitimate pleasure vehicle and as destined to a great future in the commercial world."⁶

Close cooperation between the press and the automobile industry was established early. On May 13, 1897, Colonel Albert A. Pope initiated the custom of the press interview as a part of introducing new automobile models to the public. He invited reporters to a private showing of his first electric cars, allowed them to operate the vehicles, and supplied pictures for publication. The press interview was soon institutionalized and became more elaborate. Manufacturers commonly brought reporters long distances at company expense to be entertained and given a preview of new models in the hope that “free” publicity would follow.

No automobile manufacturer exploited the press more consciously or to better advantage than Alexander Winton, whose high regard for the power of the printed word can be traced to his 1897 drive from Cleveland to New York. The trip resulted in so much favorable publicity that he decided to repeat it in 1899 with Charles B. Shanks, a newspaper reporter. The articles Shanks wrote to publicize the journey attracted much attention and drew crowds all along their route. James R. Doolittle, writing the first comprehensive history of the industry in 1916, called Shanks’s articles “the first real effort at intelligent publicity with which the new industry had been favored.” He estimated that a million people watched Winton’s arrival in New York “and part of the credit for that crowd must be given to Shanks.” The fact that Winton’s 1899 Cleveland–New York run had taken less than 48 hours’ driving time, combined with Shanks’s effective publicity, appears to have stimulated popular demand for automobiles. Other manufacturers gave Winton credit for a general increase in sales. Winton’s own records showed that before the trip his sales were made “almost exclusively to engineers who desired to buy and experiment with an automobile that would really run, but after the trip, the sales were made to the public at large.”⁷

Winton’s practical demonstration of the motorcar was emulated many times during the next few years. Automobiles became drawing cards at county fairs around the turn of the century; and the annual automobile show became a popular institution in the United States after its inauguration in five American cities in 1900. It was the long-distance reliability run that most excited the average person’s imagination about the romance of motoring. In contrast, track and road races, which placed primary emphasis speed, were more important for their contributions to automotive technology as tests for weaknesses in design than as publicity for the motorcar. Track races were viewed by the public as little more than exciting spectacles, involving as they did specialized monstrosities designed for maximum speed rather than practical road vehicles. The most important came to be the annual Memorial Day 500-miles race at Indianapolis, inaugurated in 1911. Road races were considered to be

dangerous exhibitions, unwarranted because their relation to the development of a reliable family car seemed remote. The only important road race in the United States was the Vanderbilt Cup, run annually between 1904 and 1910 on the back roads of Long Island, New York.

In England, too, racing over the public roads was banned. British contests emphasizing speed on the open road were held on the Isle of Man or in Ireland. More important in developing the U.K. market was a 1,000-mile reliability trial from London to Edinburgh run in the spring of 1900 through many of the larger provincial cities. Of the 65 starters, 23 managed to finish. Britons, like Americans, were more impressed by the imminent personal automobility promised by the long-distance reliability run.

On the Continent, in contrast, widespread public enthusiasm for the automobile was engendered by a series of intercity road races beginning with the 1895 Paris-Bordeaux-Paris race. They were bloody spectacles. Emile Constant Levassor died of injuries sustained in the 1896 Paris-Marseilles-Paris race. Louis Renault's brother Maurice was among the victims of the 1903 Paris-Madrid-Paris race, a particularly lethal contest, stopped at Bordeaux after five drivers and several spectators had been killed. Thenceforward, intercity races in Europe were run on closed circuits.

An event of signal importance to the development of the American market occurred when Ransom E. Olds decided in the fall of 1901 to have Roy D. Chapin, then a tester at the Olds factory, drive a new curved-dash Oldsmobile (1901-1906) from Detroit to the New York automobile show. The one-cylinder, tiller-steered, curved-dash Olds was the zenith of surrey-influenced automotive design. It sold for a moderate \$650, making ownership of a fairly reliable car possible for upper-middle-class Americans. The Olds Motor Works had committed itself to the volume production of the curved-dash, and in 1901 it manufactured about 425 units. A New York City-to-Buffalo endurance run sponsored by the newly formed, New York City-based Automobile Club of America in that year had indicated the possibility of long-distance touring by private owners, and Olds hoped to capture the market in the heavily populated eastern cities by proving that his moderately priced light car was as reliable for touring as more expensive heavy vehicles. Chapin left Detroit on October 27. Despite the handicap of extremely muddy roads, he arrived in New York City on November 5, with an average speed of 14 mph for the 820-mile distance. Olds sold a record 750 cars in New York City alone the following year.

With annual production of some 2,500 and 4,000 units respectively, Olds provided an estimated 28 percent of the total United States output

in 1902 and an estimated 36 percent in 1903. Olds thus became the first volume producer of American-made gasoline-powered cars. The 1904 Olds production figure of 5,508 units surpassed any annual production of cars previously accomplished.

Chapin's feat was also a prelude to three successful crossings of the American continent by automobile in 1903. The first was made by Dr. H. Nelson Jackson, a physician from Burlington, Vermont, and his chauffeur, Sewall K. Crocker. They traveled from San Francisco to New York in a new Winton in sixty-three days. Transcontinental tours under the auspices of their manufacturers by a Packard and a curved-dash Olds followed. The reliability of the moderately priced light car was now established in the mind of the public. In 1904 several thousand Americans took automobile vacations, marking the inauguration of long-distance touring by the average motorist.

Charles K. Glidden, a millionaire automobile enthusiast who wished to encourage touring by private owners, sponsored the famous Glidden reliability tours, run between 1905 and 1913 for handsome trophies. To keep the events from becoming simply publicity stunts for automobile manufacturers, Glidden stipulated that each car entered must be driven by its owner. But since any executive in the automobile industry could comply with the rule by driving one of his firm's most recent models himself, most contestants were industry representatives. The first Glidden tour was held from July 11 to July 22, 1905, over an 870-mile route from New York City through New England and back. Twenty-seven of the thirty-four entries finished, the first being a heavy Pierce touring car carrying five passengers. A participant summed up the results: "The tour has proved that the automobile is now almost foolproof. It has proved that American cars are durable and efficient. It has shown the few who took part how delightful their short vacation may be, and it has strengthened our belief in the permanence of the motorcar."⁸

That it was indeed "durable and efficient" in long-distance transportation the motorcar again demonstrated during the 1906 San Francisco earthquake. Walter C. White organized a caravan of motortrucks to bring supplies to the disaster area, and some two hundred privately owned automobiles were immediately impressed for emergency service by the authorities. The gasoline automobiles among them used an estimated 15,000 gallons of fuel donated by the Standard Oil Company. After tires exploded from the heat of the pavement, cars were run for days on their wheel rims at as fast a speed as possible over obstacle-laden streets. Passenger cars were called upon to tow several moving vans after the horses pulling them had expired from the heat and strain. Mechanical failures under these severe conditions were surprisingly infrequent. Little need

remained to demonstrate the reliability of the motor vehicle. By 1907 gasoline economy runs had replaced reliability runs as the focus of public interest.

Motor vehicle sales in the United States increased substantially, despite the 1907 general business recession and an apparent saturation of the initial upper-class market. No one doubted that a broad middle-class market for cars was becoming a reality. The number of starting cars in the annual Glidden tour dwindled from forty-nine in 1907 to only thirteen in 1909. One of the 1909 Glidden officials explained that the decline had occurred because automobile manufacturers “were enjoying too much prosperity. They said, ‘Why should we enter this contest when we are unable to supply the demand now? The advertising will do us no good.’”⁹

Recognizing that the upper-class market was nearing saturation and aware of a great demand for outmoded buggy-type cars and secondhand conventional automobiles, after 1905 the more enterprising American manufacturers, in contrast with their European counterparts, turned to the volume production of lower-priced cars for the developing middle-class market. The most successful was Henry Ford, who led the industry worldwide in developing the reliable, moderately priced, four-cylinder run-about with his \$600 Model N (1906–1907). Its successor, Ford’s legendary Model T (1908–1927), became the low-priced car for the masses anticipated since the turn of the century.

Reconciling Cost with Quality

The 1901 Mercedes, designed by Wilhelm Maybach for Daimler Motoren Gesellschaft, deserves credit for being the first modern motorcar in all essentials. The Mercedes was named for the elder daughter of Daimler’s most important agent in France, Emil Jellinek. Its 35-horsepower engine weighed only 14 pounds per horsepower, and it achieved a speed of 53 mph. The car featured a honeycomb radiator, a pressed-steel chassis, mechanically operated intake valves, and an improved gate gearbox. However, Daimler did not begin to produce the car in quantity until 1904, when its plant was moved to Stuttgart. As late as 1909, at the most integrated automobile factory in Europe, Daimler employed some 1,700 production workers to produce annually fewer than 1,000 cars.

Nothing better illustrates the early superiority of European automotive design than the sharp contrast between this first Mercedes model and the 1901 American 3-horsepower, curved-dash Olds, which was in all significant respects merely a motorized horse buggy. The central problem of automotive technology over the next decade would be reconciliation of

the advanced design of the 1901 Mercedes with the low initial price and low operating expenses of the volume-produced 1901 curved-dash Olds.

The typical 1908 gasoline automobile bore little resemblance to the horseless carriage of 1900. The French practice of placing the engine under a hood in front of the driver was quickly adopted after the turn of the century. The hood was lengthened, and the wheelbase became longer as cylinders were added and as the engine became larger and more powerful. Power was conveyed from the transmission to the rear axle either by a propeller shaft and universal joints or by sprocket and chain. A differential gear on the rear axle allowed one wheel to turn faster than the other when rounding corners. A lower-slung body resulted from the replacement of high carriage wheels and narrow solid-rubber tires with smaller-diameter wheels and wider pneumatic tires. Goodyear universal rims and the power tire pump made tires, the weakest part of the car, easier to change.

By 1908 the steering wheel had replaced the tiller on most models, and in the United States the steering wheel began to be placed on the left-hand side, the position best suited to driving on the right-hand side of the road. Elliott's steering knuckle, which enabled the front wheels to turn without the entire front axle turning, came into general use after 1902. Controls became more sensitive after 1903 with the adoption of float-feed carburetors that could be throttled and choked, internal expanding foot brakes that operated on the wheel drums, better-designed cone or multiple-disc clutches, and either the standard H-slot gearshift with three-speed forward selective transmission or the simpler two-speed planetary transmission.

Improved engines gave more power for their size and the amount of fuel expended and were capable of generating sufficient power without stalling at a greater range of rpm. Water cooling, forced-feed lubrication by means of an oil pump, mechanically operated valves, and high-tension magneto ignition systems were other major improvements under the hood.

Shock absorbers and independent spring suspension of the wheels increased riding comfort and reduced strain on the mechanism of the car. The seats were moved forward in the body, and running boards and bumpers were added. Acetylene headlamps made night driving possible, and cape and folding tops made the open car of the period into an all-weather vehicle.

These vast improvements meant that the 1908 state-of-the-art gasoline automobile was a fairly reliable family car. The problem faced by the automobile industry was making such cars available at prices the average family could afford, either by cutting manufacturing costs or by reducing unit profits.

Cheaply built, one-cylinder, buggy-type cars that sold for only a few

hundred dollars were available in Europe as well as in the United States from the beginning of the automobile industry. A number of American firms—most notably the W. H. McIntyre Company of Auburn, Indiana, and the H. K. Holsman Company of Chicago—continued to build cheap cars essentially similar to the first Duryea and Haynes models, instead of switching over to the modern form of the gasoline automobile innovated by Levassor in 1891 and perfected in the 1901 Mercedes. These high-wheeled, solid-tired horse buggies, equipped with low-horsepower engines under the seat or in the back, could be manufactured to sell for between \$250 and \$600, and they were very economical to operate. On muddy roads full of ruts and stumps, the high, narrow wheels provided maximum clearance for the chassis. If the car did get stuck, it was light enough to be easily pushed or lifted out. To meet the growing demand for automobiles in the rural Middle West, by 1909 some fifty firms were turning out buggy-type cars. The problem was that inherent mechanical weaknesses in the surrey design caused them to rattle apart in a short time.

Surrey-influenced design was rapidly abandoned by most manufacturers, especially in Europe. Ransom E. Olds and Thomas B. Jeffery, who followed Olds into volume production 1902 at Kenosha, Wisconsin, with his \$750 to \$825 Ramblers, both attempted to mass-produce cars that were technologically outmoded. Olds was forced to recognize this after his resignation from the Olds Motor Works because of the interference of his partners, Samuel and Frederick L. Smith, in his control of the manufacturing side of the business. When Olds reentered automobile manufacturing with his REO Motor Car Company in August 1904, he had difficulty in getting dealerships established, until it became known that he intended to abandon the surrey style of design and emphasize a 1,500-pound, 16-horsepower touring car that sold for \$1,250. Alanson P. Brush also made a notable attempt to produce a car for the masses, with his Brush Runabout (1907–1912), a light car costing only \$500, which combined the body style of the conventional automobile with the solid-rubber tires and chain drive of the buggy-type car. However, Brush went too far in reducing construction costs when he substituted wood for metal in his car. Disgruntled owners complained that the Brush Runabout had a “wooden body, wooden axles, wooden wheels, and wooden run.”

At the opposite extreme, a number of manufacturers never wavered from producing finely crafted cars for the luxury market. In Europe this resulted in such outstanding marques as the Mercedes and the Rolls-Royce. American counterparts were the Thomas Flyer, the Pierce-Arrow, and the Packard. The 1910 Packard Thirty limousine sold for \$5,450, more

than sixteen times the estimated average per capita income in the United States.

The most significant strides in reconciling quality of product with volume production and moderate price were made in the United States—initially by Henry M. Leland at the Cadillac Motor Car Company, then by the Ford Motor Company. Leland had been trained first at the United States Armory in Springfield, Massachusetts, where the interchangeability of parts was pioneered, then at the Brown and Sharpe Manufacturing Company of Providence, Rhode Island, the leading precision toolmaker in the United States in the late nineteenth century. Leland and Faulconer, a nationally prominent Detroit manufacturer of high-quality machine tools, by the turn of the century had introduced processes that allowed castings to be machined to closer tolerances than its competition could duplicate. The firm commonly worked to tolerances of 1/10,000 inch.

When Leland and Faulconer undertook the production of transmission gears and motors for the 1901 curved-dash Olds, Brush, then one of its engineers, set out to improve the Olds motor. Through closer machining alone, the one-cylinder Olds engine was raised from 3 to 3.7 horsepower. The introduction of larger valves and a better timing system resulted in further improvement to 10.25 horsepower. After Olds rejected the improved motor as too radical a change in power plant, it was used in the popular Cadillac Model A. Leland entered automobile manufacturing in 1904 by merging his machine tool firm with the Cadillac Automobile Company (initially the Henry Ford Company, which under Ford's direction had not got off the ground).

Leland became general manager of Cadillac and brought out the improved one-cylinder Model B featuring interchangeability of parts—an essential element of mass production. Concentrating on reconciling high standards of workmanship with quantity production, Cadillac won the Dewar Trophy of the Royal Automobile Club of England in 1908 for the achievement of previously unparalleled interchangeability of parts. In a shed at Brooklands racetrack in England, three Cadillac cars were disassembled and their parts mixed by officials of the Royal Automobile Club. Cadillac mechanics then reassembled the cars, which were immediately given a 500-mile test drive. The cars finished with perfect scores. Leland did not, however, move to lower Cadillac prices by cutting manufacturing costs on a car of advanced design. Instead, he introduced the Model Thirty touring car, more powerful and expensive than the Model B. A moderately priced car of exceptional quality, the Cadillac Thirty sold for \$1,400 in 1908.

It was the Ford Motor Company that led the world automobile industry in developing what Henry Ford called “a car for the great multi-

tude.” A controversy developed in 1905 between Ford and his principal backer, Alexander Y. Malcomson, who wanted to move toward the production of heavier, more expensive touring cars at higher unit profits. The 1906 Ford Model N, on the other hand, illustrated Ford’s increasing commitment to the volume production of light, low-priced cars. The controversy was resolved when Ford bought out Malcomson on July 12, 1906.

The four-cylinder, 15-horsepower, \$600 Model N was one of the better-designed and better-built cars available at any price in 1906. *Cycle and Automobile Trade Journal* called it “distinctly the most important mechanical traction event of 1906. This Ford Model N position of first importance and highest interest is due to the fact that the Model N supplies the very first instance of a low-cost motorcar driven by a gas engine having cylinders enough to give the shaft a turning impulse in each shaft turn which is well built and offered in large numbers.” Deluged with orders, the company installed improved production equipment and after July 15, 1906, was able to make daily deliveries of 100 cars. Henry Ford boasted to reporters, “I believe that I have solved the problem of cheap as well as simple automobile construction . . . the general public is interested only in the knowledge that a serviceable machine can be constructed at a price within the reach of many.” Ford rightly believed that the Model N was “destined to revolutionize automobile construction.” At the time he considered it “the crowning achievement of my life.”¹⁰

Encouraged by the success of the Model N, Henry Ford was determined to build an even better low-priced car. At \$825 for the runabout and \$850 for the touring car, the four-cylinder, 20-horsepower, 1,200-pound, 100-inch-wheelbase Model T was first offered to dealers on October 1, 1908. It featured a novel three-point suspension of the motor, improved arc springs, an enclosed power plant and transmission, and a detachable cylinder head. Extensive use of new heat-treated vanadium steels (first used on French racing machines) made the Model T a lighter and tougher car, and new methods of casting parts (especially block casting of the engine) kept the price still within the reach of the middle-class purchaser. Ford’s advertising boast was essentially correct: “No car under \$2,000 offers more, and no car over \$2,000 offers more except the trimmings.”

Committed to large-volume production of the Model T as a single, static model at an ever decreasing unit price, the Ford Motor Company innovated modern mass-production techniques at its new Highland Park plant, which opened on January 1, 1910. These production techniques permitted prices to be reduced by August 1, 1916, to only \$345 for the runabout and \$360 for the touring car. Production of the Model T in 1916 was 738,811 units, giving Ford about half the market for new cars in the United States by American entry into World War I. Antedating the

introduction of the moving assembly line, in 1912 the initial price of the Model T—\$575 for the runabout—first dropped below the average annual wage in the United States. By the time the Model T was withdrawn from production in 1927, over 15 million units had been sold, and its price had been reduced to a low of \$290 for the coupe.

The Model T was the archetype of the American mass-produced gasoline automobile. Compared with the heavy, European-type touring car of the day—exemplified by American as well as European models intended for the luxury market—this car was significantly lower priced, was much lighter, had a higher ratio of horsepower to weight, and was powered by a larger-bore, shorter-stroke engine. In addition to the growing emphasis on producing cars for a mass market, these characteristics of the American car resulted from the lower price of gasoline here and the absence of European horsepower taxes. The sacrifice of engine efficiency and fuel economy for greater engine flexibility meant that the American-type car could better negotiate steep grades and wretched roads. It was also easier to drive, because the more flexible engine required less frequent shifting of gears. Designed for the average driver rather than for the professional chauffeur, the American-type car was abler to withstand abuse and was simpler to repair than the European-type touring car. However, with a body that sat high above the roadbed, the American car appeared ungainly and showed less attention to the details of fit, finish, and appointment. That the chassis of a car clear the inevitable hump in the center of our unpaved, rutted roads was then more important to the American consumer than style.

The Model T sold well not only in United States but all over the world until it was technologically outmoded. It was especially popular in British Commonwealth countries where roads were primitive, where vast areas remained sparsely settled, and where there was effective demand for an all-purpose family car. On the other hand, a combination of lower per capita incomes, higher gasoline prices, and high horsepower taxes had as its result that European cars designed for a far more slowly developing middle-class market were underpowered bantams—exemplified by the 8.5-horsepower (by RAC formula rating) Morris Oxford and the Austin Seven, introduced respectively in 1913 and 1922. In contrast with the 20-horsepower Model T and the 18-horsepower Buick “Nifty” Model 10, cars under 10 horsepower predominated among the European makes produced for the middle-class market until after World War II. In 1928, for example, cars of 10 horsepower or less accounted for some 80 percent of French production. These low-horsepower cars were fuel efficient and space efficient. But they were not all-purpose family cars, and they left much to be desired in performance.

The French pioneered in the development of “baby cars.” Probably the first of note was a one-cylinder, 5-horsepower bantam designed by Jules Salomon, which was put on the market by Zèbre in 1909 at the low initial price of 2,500 francs (\$483). Another was the four-cylinder, 6-horsepower, 800-pound, 72-inch-wheelbase Peugeot Béb , designed by Ettore Bugatti and introduced in 1912.

Still another French innovation was the “cycle car”—a light, low-slung, two-seat, four-wheel car built around a motorcycle engine. The first cycle car was the 8-horsepower, 500-pound Bedelia, which came on the market in 1910 at 1,200 francs (\$240). Cycle cars were particularly popular in England, where a journal devoted to them, *The Cyclecar*, began publication in 1912. Bedelia went out of business in 1925, but other manufacturers continued to make cycle cars into the mid-1930s.

Among all European automotive engineer-entrepreneurs, Louis Renault was the closest to Henry Ford in social background and character. The difference, therefore, between Renault’s business strategy and Ford’s is all the more striking. Renault became the leading French producer of motor vehicles for several years after 1907, because of annual sales of 2,000 to 3,000 of his taxicabs, the most widely used motor vehicles in city taxicab fleets throughout the world. Renault’s profit margin in 1907 was a phenomenal \$2,000 a unit, compared with Ford’s \$685. In contrast to Ford’s concentration after 1908 on mass-producing one model at an ever decreasing price, after 1910 Renault’s strategy was to produce a wide range of models at varying prices and high unit profits. Renault believed that the potential European mass market was not large enough for a producer to concentrate on a single low-priced model. The cheapest of Renault’s eight models in 1914 sold for 5,000 francs (about \$1,000), the most expensive for 22,500 francs (\$4,500). Nothing better illustrates the chasm separating European and American entrepreneurial attitudes on the eve of the First World War.

Fordism

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Up to the introduction of the moving assembly line at the Ford Highland Park plant in 1913–1914, automobiles were made and sold much the same way on both sides of the Atlantic; that is, they were assembled from jobbed-out components by crews of skilled mechanics and unskilled helpers at low rates of labor productivity, and they were sold at high prices and high unit profits through nonexclusive wholesale and retail distributors for cash on delivery.

Nevertheless, differences in national manufacturing traditions manifested themselves from the beginnings of the automobile industry, particularly those differences that added up to great American superiority over the Europeans in production engineering. As early as the turn of the century, it was accepted as axiomatic that, unlike European producers, “American manufacturers have set about to produce machines in quantity, so that the price can be reduced thereby and the public at large can have the benefit of machines which are not extravagant in price, and which can be taken care of by the ordinary individual.”¹

The initial capital as well as the managerial and technical expertise needed to enter automobile manufacturing was most commonly diverted from other closely related business activities, particularly from the manufacture of machine tools, bicycles, and carriages and wagons. The requirements for fixed and working capital were also met by shifting the burden to parts makers, distributors, and dealers. The automobile was a unique combination of components already standardized and being produced for other uses—for example, stationary and marine gasoline engines, carriage bodies, and wheels. Consequently, the manufacture of components was jobbed out to scores of independent suppliers, minimizing the capital requirements for wages, materials, expensive machinery, and a large