rise to over 80 percent by the late 1990s, which means virtually all automatic transaxles will be electronically controlled. Electronic transmissions help improve drivability, shift smoothness, and fuel economy.'' Plumb's estimate was not far from reality. In 1997, one car in nine came with a stick shift—most being sportscars and ultra-economy compacts. And for the manual-shift enthusiasts who wanted the best of both worlds, in 1996, Chrysler introduced the Autostick, a transmission that's part automatic and part manual. It had no clutch, but drivers could drop the shifter out of automatic and change gears.

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SIC 7538

GENERAL AUTOMOTIVE REPAIR SHOPS

This category covers establishments primarily engaged in general automotive repair, including those specifically engaged in repairing engines. Establishments primarily engaged in industrial truck repair are covered in **SIC 7699: Repair Shops and Related Services, Not Elsewhere Classified.**

NAICS CODE(S)

811111 (General Automotive Repair)

INDUSTRY SNAPSHOT

The general automotive repair industry, once dominated by small, independent service stations offering personal attention, evolved toward heated competition between manufacturers, dealer networks, and large, chain service centers. The rapidly increasing complexity of vehicles in the 1990s and early 2000s led to greater specialization among automotive mechanics. In some cases, however, the abundance of electronic engine components facilitated the diagnosis of problems.

ORGANIZATION AND STRUCTURE

Four types of businesses in the United States offer general automotive repair services: full-service gasoline stations, independent garages, automotive dealerships, and chain automotive centers. In the mid-1990s, full-service gasoline stations and independent garages experienced a decline due to the trend toward specialization in automotive mechanics and the competition offered by automotive dealerships and chain automotive centers. Results of a study conducted by Lang Marketing Resources, Inc., a consulting and analysis firm, showed a decrease in the service station and garage population from 227,000 to 155,000 between 1980 and 1996. Many of those stations were light vehicle repair locations. The Lang study showed that in 1980, service stations and garages installed nearly half of the aftermarket products in the United States, but by 1996, they installed only 35 percent of the product volume. According to U.S. Census Bureau figures, the number of automotive repair services had risen to 192,000 by the late 1990s.

Some owners of independent service stations complained that auto manufacturers reduced the repair options available to consumers by limiting availability of factory manuals and instruction to their own dealer networks. Other concerns about dealer repair centers focused on the expense of parts and repairs, as well as the conflict of interest involved when the same companies that sold new vehicles also provided most repairs. On the positive side, dealerships did offer a greater number of specialists with up-to-date training than most independent repair shops.

Because of their size, chain automotive centers garnered high levels of general automotive repair business and typically charged lower rates than dealerships. In the absence of any comprehensive regulatory standards, they also appealed to consumers because of their name recognition. Disturbingly, however, there were numerous cases in which such centers were found guilty of undertaking unnecessary repairs, and even of punishing employees who failed to maintain a set sales target for parts and service. In his book, *Mr. Badwrench,* Arthur P. Glickman quoted a study conducted at the University of Alabama at Huntsville in 1972 that found five major chains guilty of

unnecessary repairs ranging from 22 percent to 47 percent of the total number performed. Similarly, in 1993 both Sears and K-Mart faced charges of making unnecessary repairs in their automotive service centers. Problems of this nature continued to arise with other companies through the late-1990s.

In an independent study conducted by Wiese Research Associates, Inc., independent neighborhood automotive repair shops scored higher than all other automotive service centers in five out of seven categories. They rated highest in the categories of honesty/integrity, pricing fairness, responsiveness, answer questions, and friendliness. The categories receiving lower ratings than the other shops were cleanliness/appearance and management.

By the late 1990s, automotive dealers and service stations had made strides to address customer service issues. In a survey conducted by Medical Economics, independent service facilities ranked seventh in customer satisfaction—behind Lexis and Infiniti, Saturn Corp., Shell Oil Co., Audi, Acura, Mobil, and Buick.

Common performance problems addressed by engine repair mechanics were no-start, hard starting, stalling, misfiring, vacuum leak, hesitation, surging, backfiring, run-on, pinging, vapor lock, gas line freeze, poor fuel economy, and lack of engine power. In many cases, these problems were easy to identify but hard to diagnose, given the wide range of causes that led to them.

Engine analyzers typically combined methods of checking the battery, charging, and starting systems, ignition systems, engine condition, fuel systems, and emission control systems into one unit. Alternatively, engine repair mechanics tested facets of engine performance with dozens of specialized instruments, including tach-dwell meters, exhaust gas analyzers, and volt-ohm-milliammeters.

The performance of tune-ups was necessary in the case of gasoline engines to limit exhaust pollution and to maintain engine power and acceleration, economical fuel consumption, smoothness of engine operation, ease of starting, and engine service life. Diesel engines did not require the same level of tune-ups because they did not contain spark plugs or an ignition system.

Common mechanical problems addressed in engine repairs included leaking gaskets, worn piston rings, burned and leaking valves, loose or worn engine bearings, worn timing chains, and cracked, broken, or scored engine parts. Stethoscopes aided in the detection of abnormal noises. Color of exhaust smoke was often useful in diagnosis as well. But mechanics above all had to refer to service manual troubleshooting charts covering specific makes and models of engines.

BACKGROUND AND DEVELOPMENT

The earliest automobiles were driven by wealthy enthusiasts who could either perform their own repairs or afford to employ a personal mechanic. The advent of the affordable, mass-production, assembly-line automobile created many more drivers but was based on a simple design and required easy repairs. As the number of drivers and roads in the United States grew, and as vehicles became more varied and complex, gasoline stations offering not only fuel but also routine maintenance and repair services proliferated. These full-service gasoline stations were augmented by independent garages capable of working on more difficult mechanical problems.

At this stage, the United States enjoyed what many analysts of the automotive repair industry described as a golden age. Full-service gasoline stations offered an ideal mode of apprenticeship for would-be mechanics who learned on the job as they went from pumping fuel to routine maintenance and repairs. However, oil companies began replacing full-service, independent gasoline stations with their own self-service stations offering no repairs. Consumers welcomed the cheaper fuel prices, even if they did not fully appreciate what they lost in terms of personal service.

In the late 1980s, smaller operations were also threatened by environmental legislation dictating insurance coverage for possible leaks in underground gasoline storage tanks and replacement of old units. The industry also anticipated further, expensive renovations to accompany the increasing emphasis on alternative fuels causing less damage to the environment. However, some small service stations planned to retain their repair facilities even if they were forced to discontinue selling fuel.

According to the National Automobile Dealers Association (NADA), the service and parts department in the average franchised car dealership reported $2.7 million in revenue during 1996, a 10 percent increase in dollar sales over 1995. Profit margins increased to 5.9 percent, from 5.3 percent the previous year. In a survey conducted by *AutoInc. Magazine,* ''37 percent of responding Automotive Service Association (ASA) mechanical repair shops listed total annual revenue in 1996 as between $250,000 and $500,000; 17 percent indicated between $500,000 and $750,000; 15 percent were from $100,000 to $250,000; and 14 percent listed between $750,000 and $1 million. Eleven percent showed revenues greater than $1 million.''

CURRENT CONDITIONS

Despite special incentives like zero-percent financing, which made new car purchases more attractive and drove down the value of used vehicles, the demand for automotive repair remained strong in the early 2000s. According to some analysts, weak economic conditions

during the early 2000s caused many consumers to keep existing vehicles or purchase used ones, boding well for automotive repair shops. Even after factoring in costs for repair, maintenance, and other fees, this approach resulted in significant savings for vehicle owners. Citing figures from Runzheimer International, *Motor Age* reported that after paying off their vehicles, consumers could save almost $2,500 a year by trading them in every eight years, as opposed to doing so every four years.

One of the reasons consumers found it more affordable to drive used vehicles were reasonable repair rates. As *Motor Age* reported in its February 2003 issue, in recent years automotive repair charges have increased at a slower rate than some U.S. industries. The publication explained that, based on figures from the Car Care Council, automotive maintenance and repair costs had increased 44.5 percent since the early 1990s, while financial services had increased 90 percent and hospital services had increased upwards of 100 percent.

U.S. Census Bureau figures reveal that in 2001 establishments engaged in automotive mechanical and electrical repair and maintenance achieved sales of $47.1 billion. This was an increase of 5.5 percent over 2000, when sales totaled $44.6 billion. In 2001, NADA figures show that the average franchised car dealership generated $3.7 million in service and repair revenues, a near 9 percent increase from 2000 levels. Industry-wide, this resulted in more than $80 billion for dealerships. *Automotive News* reported that, according to consulting firm Sullivan & Frost, the North American automotive maintenance market is expected to grow 6 percent between 2000 and 2007.

INDUSTRY LEADERS

The most successful automotive repair shops during the early 2000s were dealerships and franchises. Among the leaders at this time was Jiffy Lube International, Inc. With 2,200 service centers in early 2003, Jiffy Lube serviced some 29 million cars each year. Other industry leaders included AAMCO Transmissions, Inc.; Speedy Transmissions Centers; Group 1 Automotive; United Auto Group; and Midas, Inc.

WORKFORCE

Automotive repair shops employed 683,640 workers in 2001, up from 673,390 the previous year. The industry's average hourly wage was $14.79, up slightly from 2000 when workers earned $14.28 per hour. The number of jobs available for automotive mechanics was anticipated to increase through the year 2005 at about the average rate for all occupations, with continued declines in employment at full-service gasoline stations balanced by growth in employment at dealerships and elsewhere. This growth was attributed in part to the increasing average age of automobiles. With the aging of the vehicle comes the need for service and repairs.

Mechanics engaged in general automotive repairs had to wield a variety of tools and work methodically through a checklist of important parts to isolate a problem area or to guarantee that all areas of an automobile were being adequately maintained. Working conditions varied from business to business, but in general much of the work performed was necessarily dirty, greasy, and uncomfortable, with strenuous lifting of heavy equipment often required and minor injuries common.

Whereas automotive electronics and electrical systems had once been the province of specialists, by the late-1990s they had become so much a feature of automotive design that mechanics in general had to become increasingly familiar with them. As a result, employment opportunities favored those mechanics who had completed some training in the area of electronics. The overall trend toward heightened technological complexity also stressed the need for greater levels of training and made specialization an increasingly probable step for mechanics.

AMERICA AND THE WORLD

The lack of regulation involved in the performance of automotive repair and maintenance in the United States, especially compared to the stringent standards enforced in other parts of the world, drew harsh criticism from some analysts. These differences generally became less extreme by the late-1990s, as increased automotive complexity led to demand for skilled mechanics worldwide.

RESEARCH AND TECHNOLOGY

With fuel economy and environmental concerns of paramount importance to the automotive industry, engine repair specialists expected changes in engine design, with a particular emphasis on new technologies taking advantage of alternative fuels. The overall increasing sophistication of all areas of automotive design had mixed consequences for automotive mechanics. New technologies made available a variety of electronic and computer systems for increasingly swift and accurate measurement of aspects of automotive performance, which facilitated the diagnosis of problems. On the other hand, the growing importance of electronic and computer systems in the actual running of most parts of a vehicle ensured that mechanics would need to become ever more highly skilled and specialized.

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SIC 7539

AUTOMOTIVE REPAIR SHOPS, NOT ELSEWHERE CLASSIFIED

This category covers businesses that primarily do specialized automotive repair, not elsewhere classified, such as fuel service (carburetor repair), brake relining, front-end and wheel alignment, and radiator repair. Businesses that primarily do automotive welding are in **SIC 7692: Welding Repair.**

NAICS CODE(S)

811118 (Other Automotive Mechanical and Electrical Repair and Maintenance)

Miscellaneous services done by automotive repair shops included automotive tune-ups, automotive electrical repair, battery and ignition repair, fuel system conversion, generator and starter repair, and brake work. This broad classification had 9,674 businesses in the mid 1990s, many of which were sole proprietorships or partnerships. These shops employed 42,234 people and had annual sales of nearly $3.5 billion in 1997.

As cars became a staple of American life during the mid 1900s, demand for specialized repair services rose. When annual car sales peaked at about 11.5 million annually in the late 1980s, repair shop revenues in this industry reached $2.23 billion in 1987 and industry employment swelled to 40,302. Although most automotive-related industries suffered during the U.S. recession in the late 1980s and early 1990s, repair shops were less affected. As consumers put off buying new cars, they spent more on maintenance and repair, so the industry's sales remained steady. Automotive repair services benefited from the mid 1990s economic recovery as well.

Industry firms generated average revenues of $10 million during 1990s. The majority of shops were local and privately owned, but there also were regional chains that surpassed that median, such as Brake Centers of the Southwest, which had sales of $34.1 million and had 550 employees. In addition, there were industry giants, (many of which were franchises) that generated hundreds of millions of dollars in income, such as Monro Muffler Brake, a Rochester-based company that employed more than 2,100 people and earned $193 million in 1997. Several of these industry giants had products and services that crossed over into other business categories, such as Pep Boys, which offered not only automotive repair services, but also sold auto parts. Pep Boys had sales of $2.3 billion and employed more than 27,000 people in the late 1990s.

Automotive repair jobs were expected to rise at the same rate as the average for all occupations through 2006, according to the Department of Labor. New job openings for mechanics, however, would most likely be filled by technicians with advanced technical or vocational training—especially those with knowledge of electronics and emissions control equipment. Competition would be more intense for entry-level positions.

More than 100 community colleges offered two-year degrees sponsored by the major automobile makers. In addition, the National Automotive Technicians Education Foundation (NATEF) certified quality training programs offered by high schools and technical schools. In the mid 1990s, mechanics earned a median income between $333 and $667 weekly. Less-skilled mechanics earned less than $250 per week. Master mechanics can earn between $70,000-$100,000 annually.

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