

another occupation. At the same time, aircraft are becoming increasingly sophisticated in general aviation and in regional carriers, boosting the demand for qualified mechanics. Mechanics will face competition for jobs with large airlines because the high wages and travel benefits that these jobs offer attract more qualified applicants than there are openings. Prospects will be best for applicants with significant experience. Mechanics who keep abreast of technological advances in electronics, composite materials, and other areas will be in greatest demand. The number of job openings for aircraft mechanics in the Federal Government should decline as the size of the U.S. Armed Forces is reduced.

Employment of aircraft mechanics is expected to increase about as fast as the average for all occupations through the year 2010. A growing population and rising incomes are expected to stimulate the demand for airline transportation, and the number of aircraft is expected to grow. However, employment growth will be somewhat restricted as consolidation within the air carrier industry continues and as productivity increases due to greater use of automated inventory control and modular systems, which speeds repairs and parts replacement.

Most job openings for aircraft mechanics through the year 2010 will stem from replacement needs. Each year, as mechanics transfer to other occupations or retire, several thousand job openings will arise. Aircraft mechanics have a comparatively strong attachment to the occupation, reflecting their significant investment in training and a love for aviation. However, because aircraft mechanics' skills are transferable to other occupations, some mechanics leave for work in related fields.

During recessions, declines in air travel force airlines to curtail the number of flights, which results in less aircraft maintenance and, consequently, layoffs for aircraft mechanics.

Earnings

Median hourly earnings of aircraft mechanics and service technicians were about \$19.50 in 2000. The middle 50 percent earned between \$15.65 and \$23.65. The lowest 10 percent earned less than \$12.06, and the highest 10 percent earned more than \$26.97. Median hourly earnings in the industries employing the largest numbers of aircraft mechanics and service technicians in 2000 were:

Air transportation, scheduled	\$21.57
Aircraft and parts	19.77
Air transportation, nonscheduled	19.16
Federal Government	19.11
Airports, flying fields, and services	16.26

Median hourly earnings of avionics technicians were about \$19.86 in 2000. The middle 50 percent earned between \$16.31 and \$24.01. The lowest 10 percent earned less than \$13.22, and the highest 10 percent earned more than \$27.02.

Mechanics who work on jets for the major airlines generally earn more than those working on other aircraft. Airline mechanics and their immediate families receive reduced-fare transportation on their own and most other airlines.

Almost one-half of all aircraft mechanics, including those employed by some major airlines, are covered by union agreements. The principal unions are the International Association of Machinists and Aerospace Workers and the Transport Workers Union of America. Some mechanics are represented by the International Brotherhood of Teamsters.

Related Occupations

Workers in some other occupations that involve similar mechanical and electrical work are electricians, electrical and electronics installers and repairers, and elevator installers and repairers.

Sources of Additional Information

Information about jobs with a particular airline can be obtained by writing to the personnel manager of the company.

For general information about aircraft and avionics equipment mechanics and service technicians, write to:

- ▶ Professional Aviation Maintenance Association, 1707 H St. NW., Suite 700, Washington, DC 20006.

For information on jobs in a particular area, contact employers at local airports or local offices of the State employment service.

Automotive Body and Related Repairers

(O*NET 49-3021.00, 49-3022.00)

Significant Points

- To become a fully skilled automotive body repairer, formal training is desirable in addition to on-the-job training because advances in technology have greatly changed the structure, components, and materials used in automobiles.
- A fully skilled automotive body repairer must have good reading and basic mathematics and computer skills to follow instructions and diagrams in print and computer-based technical manuals.

Nature of the Work

Thousands of motor vehicles are damaged in traffic accidents every day. Although some of these vehicles are beyond repair, others can be made to look and drive like new. Automotive body repairers straighten bent bodies, remove dents, and replace crumpled parts that cannot be fixed. They repair all types of vehicles but work mostly on cars and small trucks, although some work on large trucks, buses, or tractor-trailers.

Automotive body repairers use special equipment to restore damaged metal frames and body sections. Repairers chain or clamp frames and sections to alignment machines that use hydraulic pressure to align damaged components. "Unibody" vehicles, designs built without frames, must be restored to precise factory specifications for the vehicle to operate correctly. To do so, repairers use benchmark systems to make accurate measurements of how much each section is out of alignment and hydraulic machinery to return the vehicle to its original shape.

Body repairers remove badly damaged sections of body panels with a pneumatic metal-cutting gun or by other means, and weld in replacement sections. Repairers pull out less serious dents with a hydraulic jack or hand prying bar or knock them out with handtools or pneumatic hammers. They smooth out small dents and creases in the metal by holding a small anvil against one side of the damaged area, while hammering the opposite side. They also remove very small pits and dimples with pick hammers and punches in a process called metal finishing.

Body repairers also repair or replace the plastic body parts increasingly used on new model vehicles. They remove damaged panels and identify the family and properties of the plastic used on the vehicle. With most types of plastic, repairers can apply heat from a hot-air welding gun or by immersion in hot water and press the softened panel back into its original shape by hand. They replace plastic parts that are badly damaged or very difficult to repair.



Automotive body repair work has variety and challenges.

Body repairers use plastic or solder to fill small dents that cannot be worked out of the plastic or metal panel. On metal panels, they file or grind the hardened filler to the original shape and clean the surface with a media blaster before painting. In many shops, automotive painters do the painting. (These workers are discussed in the *Handbook* statement on painting and coating workers, except construction and maintenance.) In small shops, workers often do both body repairing and painting. A few body repairers specialize in repairing fiberglass car bodies.

The advent of assembly-line repairs in large shops moves away from the one-vehicle, one-repairer method to a team approach and allows body repairers to specialize in one type of repair, such as frame straightening or door and fender repair. Some body repairers specialize in installing glass in automobiles and other vehicles. *Automotive glass installers and repairers* remove broken, cracked, or pitted windshields and window glass. Glass installers apply a moisture-proofing compound along the edges of the glass, place it in the vehicle, and install rubber strips around the sides of the windshield or window to make it secure and weatherproof.

Body repair work has variety and challenges—each damaged vehicle presents a different problem. Using their broad knowledge of automotive construction and repair techniques, repairers must develop appropriate methods for each job. They usually work alone, with only general directions from supervisors. In some shops, helpers or apprentices assist experienced repairers.

Working Conditions

Most automotive body repairers work a standard 40-hour week, although some, including the self-employed, work more than 40 hours a week. Repairers work indoors in body shops that are noisy, because of hammering against metal and the use of power tools. Most shops are well ventilated to disperse dust and paint fumes. Body repairers often work in awkward or cramped positions, and much of their work is strenuous and dirty. Hazards include cuts from sharp metal edges, burns from torches and heated metal, injuries from power tools, and fumes from paint. However, serious accidents usually are avoided when the shop is kept clean and orderly and safety practices are observed.

Employment

Automotive body and related repairers held about 221,000 jobs in 2000. Most repairers worked for automotive repair shops or motor vehicle dealers. Others worked for organizations that maintain their own motor vehicles, such as trucking companies. A small number

worked for wholesalers of motor vehicles, parts, and supplies. About 1 automotive body repairer out of 8 was self-employed.

Training, Other Qualifications, and Advancement

Most employers prefer to hire persons who have completed formal training programs in automotive body repair, but these programs supply only a portion of employers' needs. Therefore, most new repairers get primarily on-the-job training, supplemented, when available, with short-term training sessions given by vehicle, parts, and equipment manufacturers. Some degree of training is necessary because advances in technology have greatly changed the structure, components, and materials used in automobiles. As a result, these new technologies require proficiency in new repair techniques and skills. For example, bodies of many newer automobiles are a combination of materials—traditional steel, aluminum, and a growing variety of metal alloys and plastics. Each of these materials or composites requires the use of somewhat different techniques to reshape parts and smooth out dents and small pits. Many high schools, vocational schools, private trade schools, and community colleges offer automotive body repair training as part of their automotive service programs.

A fully skilled automotive body repairer must have good reading and basic mathematics and computer skills. Restoring unibody automobiles to their original form requires such precision that body repairers must follow instructions and diagrams in technical manuals to make very precise three-dimensional measurements of the position of one body section relative to another.

A new repairer begins by assisting seasoned body repairers in tasks such as removing damaged parts, sanding body panels, and installing repaired parts. They learn to remove small dents and to make other minor repairs. They then progress to more difficult tasks, such as straightening body parts and returning them to their correct alignment. Generally, to become skilled in all aspects of body repair requires 3 to 4 years of on-the-job training.

Certification by the National Institute for Automotive Service Excellence (ASE), though voluntary, is the recognized standard of achievement for automotive body repairers. ASE offers a series of four exams for collision repair professionals twice a year. Repairers may take from one to four ASE Master Collision Repair & Refinish Exams. Repairers who pass at least one exam and have 2 years of hands-on work experience earn ASE certification. Completion of a postsecondary program in automotive body repair may be substituted for 1 year of work experience. Those who pass all four exams become ASE Master Collision Repair and Refinish Technicians. Automotive body repairers must retake the examination at least every 5 years to retain certification.

Continuing education throughout a career in automotive body repair is required. Automotive parts, body materials, and electronics continue to change and to become more complex and technologically advanced. To keep up with these technological advances, repairers must continue to gain new skills, read technical manuals, and attend seminars and classes.

As beginners increase their skills, learn new techniques, and complete work more rapidly, their pay increases. An experienced automotive body repairer with supervisory ability may advance to shop supervisor. Some workers open their own body repair shops. Others become automobile damage appraisers for insurance companies.

Job Outlook

Employment of automotive body repairers is expected to increase about as fast as the average for all occupations through the year 2010. Opportunities should be best for persons with formal training in automotive body repair and mechanics.

Demand for qualified body repairers will increase, as the number of motor vehicles in operation continues to grow in line with the Nation's population. With an increase in the number of motor vehicles in use, the number of vehicles damaged in accidents also will grow. New automobile designs increasingly have body parts made of steel alloys, aluminum, and plastics—materials that are more difficult to work with than traditional steel body parts. In addition, new, lighter-weight automotive designs are prone to greater collision damage than older, heavier designs and, consequently, more time is consumed in repair. The need to replace experienced repairers who transfer to other occupations, retire, or stop working for other reasons will account for the majority of job openings.

Changes in body shop management have begun to increase some shops' productivity, profits, and customer satisfaction. Employing a team approach to repairs decreases repair time, improves customer relations, and allows shops to increase their volume of work. By more efficiently managing inventory, shops also may be able to replace the large portion of their space occupied by parts inventory with additional work bays to service vehicles, requiring additional body repairers.

The automotive repair business is not very sensitive to changes in economic conditions, and experienced body repairers are rarely laid off. However, although major body damage must be repaired if a vehicle is to be restored to safe operating condition, repair of minor dents and crumpled fenders can often be deferred during an economic slowdown. During slowdowns, most employers will hire few new workers, some unprofitable body shops may go out of business, and some dealerships might consolidate body shops.

Earnings

Median hourly earnings of automotive body and related repairers, including incentive pay, were \$15.00 in 2000. The middle 50 percent earned between \$11.12 and \$20.02 an hour. The lowest 10 percent earned less than \$8.49, and the highest 10 percent earned more than \$26.06 an hour. Median hourly earnings in the industries employing the largest number of automotive body and related repairers in 2000 were as follows:

New and used car dealers	\$15.76
Automotive repair shops	15.05

Median hourly earnings of automotive glass installers and repairers, including incentive pay, were \$12.46 in 2000. The middle 50 percent earned between \$9.65 and \$15.86 an hour. The lowest 10 percent earned less than \$8.03, and the highest 10 percent earned more than \$19.18 an hour. Median hourly earnings in 2000 in automotive repair shops, the industry employing the largest numbers of automotive glass installers and repairers, were \$12.51.

The majority of body repairers employed by automotive dealers and repair shops are paid on an incentive basis. Under this method, body repairers are paid a predetermined amount for various tasks, and earnings depend on the amount of work assigned to the repairer and how fast it is completed. Employers frequently guarantee workers a minimum weekly salary. Body repairers who work for trucking companies, bus lines, and other organizations that maintain their own vehicles usually receive an hourly wage.

Helpers and trainees usually earn from 30 to 60 percent of the earnings of skilled workers. Helpers and trainees usually receive an hourly rate, until they are skilled enough to be paid on an incentive basis.

Some automotive body repairers are members of unions, including the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the Sheet Metal Workers' International Association; and the International Brotherhood of

Teamsters. Most body repairers who are union members work for large automobile dealers, trucking companies, and bus lines.

Related Occupations

Repairing damaged motor vehicles often involves working on mechanical components, as well as vehicle bodies. Automotive body repairers often work closely with individuals in several related occupations, including automotive service technicians and mechanics, diesel service technicians and mechanics, auto damage insurance appraisers, and painting and coating workers, except construction and maintenance.

Sources of Additional Information

Additional details about work opportunities may be obtained from automotive body repair shops and motor vehicle dealers, locals of the unions previously mentioned, or local offices of your State employment service. State employment services also are a source of information about training programs.

For general information about automotive body repairer careers, write to:

- Automotive Service Association, Inc., 1901 Airport Freeway, Bedford, TX 76021-5732. Internet: <http://www.asashop.org>
- National Automobile Dealers Association, 8400 Westpark Dr., McLean, VA 22102. Internet: <http://www.nada.org>
- Inter-Industry Conference On Auto Collision Repair Education Foundation (I-CAR), 3701 Algonquin Rd., Suite 400, Rolling Meadow, IL 60008. Telephone (tollfree): 888-722-3787. Internet: <http://www.i-car.com>

For information on how to become a certified automotive body repairer, write to:

- ASE, 101 Blue Seal Dr. SE., Suite 101, Leesburg, VA 20175. Internet: <http://www.asecert.org>

For a directory of certified automotive body repairer programs, contact:

- National Automotive Technician Education Foundation, 13505 Dulles Technology Dr., Herndon, VA 20171-3421. Internet: <http://www.natef.org>

For a directory of accredited private trade and technical schools that offer training programs in automotive body repair, contact:

- Accrediting Commission of Career Schools and Colleges of Technology, 2101 Wilson Blvd., Suite 302, Arlington, VA 22201. Internet: <http://www.accsct.org>

For a list of public automotive body repair training programs, contact:

- SkillsUSA-VICA, P. O. Box 3000, 1401 James Monroe Hwy., Leesburg, VA 22075. Internet: <http://www.skillsusa.org>

Automotive Service Technicians and Mechanics

(O*NET 49-3023.01, 49-3023.02)

Significant Points

- Formal automotive technician training is the best preparation for these challenging technology-based jobs.
- Opportunities should be very good for automotive service technicians and mechanics with good diagnostic and problem-solving skills and knowledge of electronics and mathematics.
- Automotive service technicians and mechanics must continually adapt to changing technology and repair techniques as vehicle components and systems become increasingly sophisticated.