Heavy Vehicle and Mobile Equipment Service Technicians and Mechanics

(O*NET 49-3041.00, 49-3042.00, 49-3043.00)

Significant Points

- Opportunities should be excellent for people with formal postsecondary training in diesel or heavy equipment mechanics; those without formal training will face keen competition.
- This occupation offers relatively high wages and the challenge of skilled repair work.
- Skill in using computerized diagnostic equipment is important in this occupation.

Nature of the Work

Heavy vehicles and mobile equipment are indispensable to many industrial activities from construction to railroads. Various types of equipment move materials, till land, lift beams, and dig earth to pave the way for development and production. Heavy vehicle and mobile equipment service technicians and mechanics repair and maintain engines and hydraulic, transmission, and electrical systems for this equipment. Farm machinery, cranes, bulldozers, and railcars are all examples of heavy vehicles that require such service. (For information on service technicians specializing in diesel engines, see the section on diesel service technicians and mechanics elsewhere in the *Handbook*.)

Service technicians perform routine maintenance checks on agricultural, industrial, construction, and rail equipment. They service fuel, brake, and transmission systems to ensure peak performance, safety, and longevity of the equipment. Maintenance checks and comments from equipment operators usually alert technicians to problems. After locating the problem, these technicians rely on their training and experience to use the best possible technique to solve the problem.

With many types of modern heavy and mobile equipment, technicians can plug diagnostic computers into onboard computers to diagnose a component needing adjustment or repair. If necessary, they may partially dismantle affected components to examine parts for damage or excessive wear. Then, using hand-held tools, they repair, replace, clean, and lubricate parts as necessary. In some cases, technicians re-calibrate systems by typing codes into the onboard computer. After reassembling the component and testing it for safety, they put it back into the equipment and return the equipment to the field.

Many types of heavy and mobile equipment use hydraulics to raise and lower movable parts. When hydraulic components malfunction, technicians examine them for fluid leaks, ruptured hoses, or worn gaskets on fluid reservoirs. Occasionally, the equipment requires extensive repairs, as when a defective hydraulic pump needs replacing.

Service technicians diagnose electrical problems and adjust or replace defective components. They also disassemble and repair undercarriages and track assemblies. Occasionally, technicians weld broken equipment frames and structural parts, using electric or gas welders.

Technicians use a variety of tools in their work: power tools, such as pneumatic wrenches to remove bolts quickly; machine tools, like lathes and grinding machines, to rebuild brakes; welding and flame-cutting equipment to remove and repair exhaust systems; and jacks and hoists to lift and move large parts. Service technicians also use common hand tools—screwdrivers, pliers, and wrenches—to work on small parts and to get at hard-to-reach places. They may use a variety of computerized testing equipment to pinpoint and analyze malfunctions in electrical systems and other essential systems. Tachometers and dynamometers, for example, serve to locate engine malfunctions. Service technicians also use ohmmeters, ammeters, and voltmeters when working on electrical systems. Employers typically furnish expensive power tools, computerized engine analyzers, and other diagnostic equipment, but hand tools are normally accumulated with experience, and many experienced technicians have thousands of dollars invested in them.

It is common for technicians in large shops to specialize in one or two types of repair. For example, a shop may have individual specialists in major engine repair, transmission work, electrical systems, and suspension or brake systems. Technicians in smaller shops, on the other hand, generally perform multiple functions.

Technicians also specialize in types of equipment. *Mobile heavy equipment mechanics and service technicians*, for example, keep construction and surface mining equipment, such as bulldozers, cranes, graders, and excavators in working order. Typically, these workers are employed by equipment wholesale distribution and leasing firms, large construction and mining companies, local and Federal governments, and other organizations operating and maintaining heavy machinery and equipment fleets. Service technicians employed by the Federal Government may work on tanks and other armored equipment.

Farm equipment mechanics service, maintain, and repair farm equipment, as well as smaller lawn and garden tractors sold to suburban homeowners. What once was a general repairer's job around the farm has evolved into a specialized technical career. Farmers have increasingly turned to farm equipment dealers to service and repair their equipment because the machinery has grown in complexity. Modern equipment uses more computers, electronics, and hydraulics, making it difficult to perform repairs without specialized training and tools.

Railcar repairers specialize in servicing railroad locomotives and other rolling stock, streetcars and subway cars, or mine

Heavy vehicle service technicians often make repairs at work sites rather than in repair shops.

cars. Most railcar repairers work for railroads, public and private transit companies, and railcar manufacturers.

Work environment. Heavy vehicle and mobile equipment service technicians usually work indoors. To repair vehicles and equipment, technicians often lift heavy parts and tools, handle greasy and dirty parts, and stand or lie in awkward positions. Minor cuts, burns, and bruises are common, but serious accidents normally are avoided when safety practices are observed. Although some shops are drafty and noisy, technicians usually work in well-lighted and ventilated areas. Many employers provide uniforms, locker rooms, and shower facilities. Mobile heavy equipment mechanics and railcar repairers generally work a standard 40 hour week.

When heavy or mobile equipment breaks down at a construction site, it may be too difficult or expensive to bring into a repair shop, so the shop will send a field service technician to the site to make repairs. Field service technicians work outdoors and spend much of their time away from the shop. Generally, the more experienced service technicians specialize in field service. They drive trucks specially equipped with replacement parts and tools. On occasion, they must travel many miles to reach disabled machinery.

The hours of work for farm equipment mechanics vary according to the season of the year. During the busy planting and harvesting seasons, farm equipment mechanics often work 6 or 7 days a week, 10 to 12 hours daily. In slow winter months, however, mechanics may work fewer than 40 hours a week.

Training, Other Qualifications, and Advancement

Although industry experts recommend that applicants complete a formal diesel or heavy equipment mechanic training program after graduating from high school, many people qualify for service technician jobs by training on the job. Employers seek people with mechanical aptitude who are knowledgeable about diesel engines, transmissions, electrical systems, computers, and hydraulics.

Education and training. High school courses in automobile repair, physics, chemistry, and mathematics provide a strong foundation for a career as a service technician or mechanic. After high school, those interested in heavy vehicle repair can choose to attend many community colleges and vocational schools that offer programs in diesel technology. Some of these schools tailor programs to heavy equipment mechanics. These programs teach the basics of analytical and diagnostic techniques, electronics, and hydraulics. The increased use of electronics and computers makes training in electronics essential for new heavy and mobile equipment mechanics. Some 1- to 2-year programs lead to a certificate of completion, whereas others lead to an associate degree in diesel or heavy equipment mechanics. Formal training programs enable trainee technicians to advance to the journey, or experienced worker, level sooner than with informal ones.

Entry-level workers with no formal background in heavy vehicle repair begin to perform routine service tasks and make minor repairs after a few months of on-the-job training. As they prove their ability and competence, workers advance to harder jobs. After trainees master the repair and service of diesel engines, they learn to work on related components, such as brakes, transmissions, and electrical systems. Generally, a service technician with at least 3 to 4 years of on-the-job experience is accepted as fully qualified.

Many employers send trainee technicians to training sessions conducted by heavy equipment manufacturers. The sessions, which typically last up to 1 week, provide intensive instruction in the repair of the manufacturer's equipment. Some sessions focus on particular components found in the equipment, such as diesel engines, transmissions, axles, or electrical systems. Other sessions focus on particular types of equipment, such as crawler-loaders and crawler-dozers. When appropriate, experienced technicians attend training sessions to gain familiarity with new technology or equipment.

Other qualifications. Technicians must read and interpret service manuals, so reading ability and communication skills are both important skills to have. The technology used in heavy equipment is becoming more sophisticated, and technicians should feel comfortable with computers and electronics because hand-held diagnostic computers are often used to make engine adjustments and diagnose problems. Experience in the Armed Forces working on diesel engines and heavy equipment provides valuable background for these positions.

Certification and advancement. Industry certification often allows workers to advance faster. Voluntary certification by the National Institute for Automotive Service Excellence is the recognized industry credential for heavy vehicle and mobile equipment service technicians, who may be certified as master medium/heavy truck technicians or in a specific area of heavy-duty equipment repair, such as brakes, electrical systems, or suspension and steering. For certification in each area, technicians must pass a written examination and have at least 2 years of experience. High school, vocational or trade school, or community or junior college training in gasoline or diesel engine repair may substitute for up to 1 year of experience. To remain certified, technicians must be retested every 5 years.

Experienced technicians may advance to field service jobs, where they have a greater opportunity to tackle problems independently and earn additional pay. Field positions may require a commercial driver's license and a clean driving record. Technicians with administrative ability may become shop supervisors or service managers. Some technicians open their own repair shops or invest in a franchise.

Employment

Heavy vehicle and mobile equipment service technicians and mechanics held about 188,000 jobs in 2006. Approximately 131,000 were mobile heavy equipment mechanics, 31,000 were farm equipment mechanics, and 27,000 were railcar repairers.

About 29 percent were employed by machinery, equipment, and supplies merchant wholesalers. About 14 percent worked in construction, primarily for specialty trade contractors and highway, street, and bridge construction companies; another 13 percent were employed by Federal, State, and local governments. Other service technicians worked in agriculture; mining; rail transportation and support activities; and commercial and industrial machinery and equipment rental, leasing, and repair. A small number repaired equipment for machinery and railroad rolling stock manufacturers or lawn and garden equip-

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16 Number	Change, 2006-16 Percent
Heavy vehicle and mobile equipment service technicians and mechanics	49-3040	188,000	206,000	18,000	10
Farm equipment mechanics	49-3041	31,000	31,000	400	1
Mobile heavy equipment mechanics, except engines	49-3042	131,000	147,000	16,000	12
Rail car repairers	49-3043	27,000	28,000	1,300	5

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

ment and supplies stores. About 5 percent of service technicians were self-employed.

Nearly every area of the country employs heavy and mobile equipment service technicians and mechanics, although most work in towns and cities where equipment dealers, equipment rental and leasing companies, and construction companies have repair facilities.

Job Outlook

The number of heavy vehicle and mobile equipment service technicians and mechanics is expected to grow about as fast as average. Those who have completed postsecondary training programs should find excellent opportunities, but those without a formal background in diesel engine or heavy vehicle repair will face keen competition.

Employment change. Employment of heavy vehicle and mobile equipment service technicians and mechanics is expected to grow by 10 percent through the year 2016, about as fast as the average for all occupations. Increasing numbers of heavy duty and mobile equipment service technicians will be required to support growth in the construction and mining industries. Additionally, the agriculture and railroad industries are projected to see more demand over the decade, potentially generating new jobs for farm equipment and railcar repairers, although job opportunities for these repairers will not be as numerous. Finally, as this equipment becomes more complex, repairs increasingly must be made by specially trained technicians. In large part, these service jobs will be with wholesale equipment dealers and rental and leasing companies who do much of the repair work associated with heavy vehicles and mobile equipment.

Job prospects. Opportunities for heavy vehicle and mobile equipment service technicians and mechanics should be excellent for those who have completed formal training programs in diesel or heavy equipment mechanics. People without formal training are expected to encounter growing difficulty entering these jobs.

Most job openings for mobile, rail, and farm equipment technicians will arise from the need to replace experienced repairers who retire. Employers report difficulty finding candidates with formal postsecondary training to fill available service technician positions. This is often because young people with mechanic training and experience opt to take jobs as automotive service technicians or diesel service technicians—jobs that offer more openings and a wider variety of locations in which to work.

Construction and mining operations, which use large numbers of heavy vehicles and mobile equipment, are particularly sensitive to changes in the level of economic activity. While the increased use of such equipment increases the need for periodic service and repair, heavy and mobile equipment may be idle during downturns. Thus, opportunities for service technicians that work on construction and mining equipment may fluctuate with the Nation's economic cycle. In addition, opportunities for farm equipment mechanics are seasonal and are best in warmer months.

Earnings

Median hourly earnings of mobile heavy equipment mechanics were $19.44 in May 2006, as compared to $17.65 per hour for all installation, maintenance, and repair occupations. The middle 50 percent earned between $15.65 and $23.45. The lowest 10 percent earned less than $12.64, and the highest 10 percent earned more than $28.18. Median hourly earnings in the industries employing the largest numbers of mobile heavy equipment mechanics were as follows:

Federal Government	$21.96
Local government	20.33
Machinery, equipment, and supplies merchant wholesalers	19.15
Commercial and industrial machinery and equipment rental and leasing	18.73
Other specialty trade contractors	18.63

Median hourly earnings of farm equipment mechanics were $14.16 in May 2006. The middle 50 percent earned between $11.34 and $17.35. The lowest 10 percent earned less than $9.30, and the highest 10 percent earned more than $20.77. In machinery, equipment, and supplies merchant wholesalers, the industry employing the largest number of farm equipment mechanics, median earnings were $14.37.

Median hourly earnings of railcar repairers were $20.82 in May 2006. The middle 50 percent earned between $16.75 and $24.71. The lowest 10 percent earned less than $12.48, and the highest 10 percent earned more than $28.02. Median hourly earnings were $21.63 in rail transportation, the industry employing the largest number of railcar repairers.

Field technicians normally earn a higher wage than their counterparts because they are required to make on-the-spot decisions to serve their customers.

About 23 percent of heavy vehicle and mobile equipment service technicians and mechanics are members of unions, including the International Association of Machinists and Aerospace Workers, the International Union of Operating Engineers, and

the International Brotherhood of Teamsters. Members may enjoy job benefits in addition to what employers provide.

Related Occupations

Workers in related repair occupations include aircraft and avionics equipment mechanics and service technicians; automotive service technicians and mechanics; diesel service technicians and mechanics; industrial machinery mechanics and maintenance workers; and small engine mechanics.

Sources of Additional Information

More details about job openings for heavy vehicle and mobile equipment service technicians and mechanics may be obtained from local heavy and mobile equipment dealers and distributors, construction contractors, and government agencies. Local offices of the State employment service also may have information on job openings and training programs.

For general information about a career as a heavy vehicle and mobile equipment service technician or mechanic, contact:

➤ The AED Foundation (Associated Equipment Dealers affiliate), 615 W. 22nd St., Oak Brook, IL 60523.
Internet: **http://www.aedcareers.com**

A list of certified diesel service technician training programs can be obtained from:

➤ National Automotive Technician Education Foundation (NATEF), 101 Blue Seal Dr., Suite 101, Leesburg, VA 20175.
Internet: **http://www.natef.org**

Information on certification as a heavy-duty diesel service technician is available from:

➤ National Institute for Automotive Service Excellence (ASE), 101 Blue Seal Dr. SE , Suite 101, Leesburg, VA 20175.
Internet: **http://www.asecert.org**