
Industrial Machinery Mechanics and Maintenance Workers

(O*NET 49-9041.00, 49-9043.00)

Significant Points

- Most of these workers are employed in manufacturing, but a growing number work for industrial equipment dealers and repair shops.
- Machinery maintenance workers learn on the job, while industrial machinery mechanics usually need some education after high school plus experience working on specific machines.
- Applicants with broad skills in machine repair and maintenance should have favorable job prospects.

Nature of the Work

Imagine an automobile assembly line: a large conveyor system moves unfinished automobiles down the line, giant robotic welding arms bond the different body panels together, hydraulic lifts move the motor into the body of the car, and giant presses stamp body parts from flat sheets of steel. All of these machines—the hydraulic lifts, the robotic welders, the conveyor system, and the giant presses—sometimes break down. When the assembly line stops because a machine breaks down, it costs the company money. Industrial machinery mechanics and machinery maintenance workers maintain and repair these very different, and often very expensive, machines.

The most basic tasks are performed by *machinery maintenance workers*. These employees are responsible for cleaning and lubricating machinery, performing basic diagnostic tests, checking performance, and testing damaged machine parts to determine whether major repairs are necessary. In carrying out these tasks, maintenance workers must follow machine specifications and adhere to maintenance schedules. Maintenance workers may perform minor repairs, but major repairs are generally left to machinery mechanics.

Industrial machinery mechanics, also called industrial machinery repairers or maintenance machinists, are highly skilled workers who maintain and repair machinery in a plant or factory. To do this effectively, they must be able to detect minor problems and correct them before they become major. Machinery mechanics use technical manuals, their understanding of the equipment, and careful observation to discover the cause of the problem. For example, after hearing a vibration from a machine, the mechanic must decide whether it is due to worn belts, weak motor bearings, or some other problem. Mechanics need years of training and experience to diagnose problems, but computerized diagnostic systems and vibration analysis techniques provide aid in determining the nature of the problem.

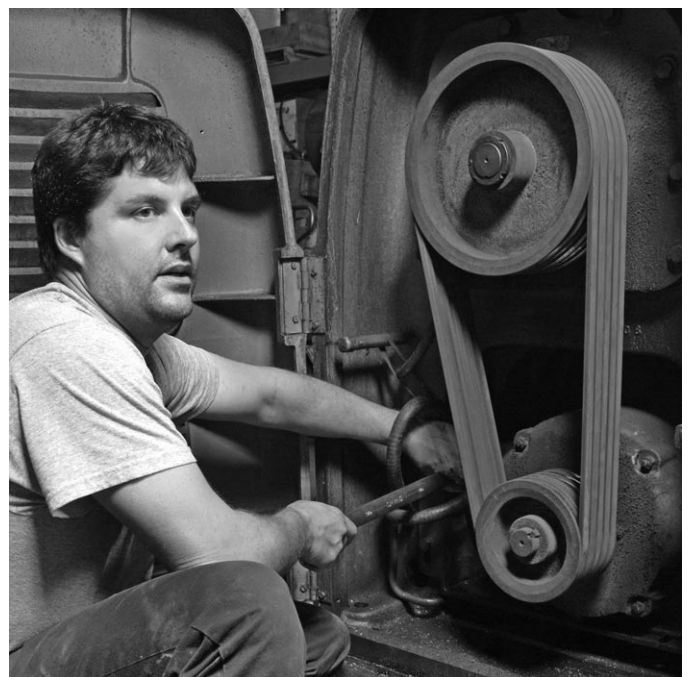
After diagnosing the problem, the industrial machinery mechanic disassembles the equipment to repair or replace the necessary parts. When repairing electronically controlled machinery, mechanics may work closely with electronic repairers or electricians who maintain the machine's electronic parts.

(Electrical and electronic installers and repairers, as well as electricians, appear elsewhere in the *Handbook*.) Increasingly, mechanics are expected to have the electrical, electronics, and computer programming skills to repair sophisticated equipment on their own. Once a repair is made, mechanics perform tests to ensure that the machine is running smoothly.

Primary responsibilities of industrial machinery mechanics also often include preventive maintenance and the installation of new machinery. For example, they adjust and calibrate automated manufacturing equipment, such as industrial robots. Part of setting up equipment is programming the programmable logic control (PLC), a frequently used type of computer used as the control system for automated industrial machines. Situating and installing machinery has traditionally been the job of millwrights, but as plants retool and invest in new equipment, companies increasingly rely on mechanics to do this task for some machinery. (A section on millwrights appears elsewhere in the *Handbook*.)

Industrial machinery mechanics and machinery maintenance workers use a variety of tools to perform repairs and preventive maintenance. They may use handtools to adjust a motor or a chain hoist to lift a heavy printing press off the ground. When replacements for broken or defective parts are not readily available, or when a machine must be quickly returned to production, mechanics may create a new part using lathes, grinders, or drill presses. Mechanics use catalogs to order replacement parts and often follow blueprints, technical manuals, and engineering specifications to maintain and fix equipment. By keeping complete and up-to-date records, mechanics try to anticipate trouble and service equipment before factory production is interrupted.

Work environment. In production facilities, these workers are subject to common shop injuries such as cuts, bruises, and strains. They also may work in awkward positions, including on top of ladders or in cramped conditions under large machinery, which exposes them to additional hazards. They of-



Industrial machinery mechanics and maintenance workers replace worn drive belts.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Industrial machinery mechanics and maintenance workers.....	—	345,000	368,000	23,000	7
Industrial machinery mechanics	49-9041	261,000	284,000	24,000	9
Maintenance workers, machinery	49-9043	84,000	83,000	-900	-1

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*.

ten use protective equipment such as hardhats, safety glasses, steel-tipped shoes, hearing protectors, and belts.

Because factories and other facilities cannot afford to have industrial machinery out of service for long periods, mechanics may be on call or assigned to work nights or on weekends. Overtime is common among full-time industrial machinery mechanics; about 30 percent work over 40 hours a week.

Training, Other Qualifications, and Advancement

Machinery maintenance workers can usually get a job with little more than a high school diploma or its equivalent—most learn on the job. Industrial machinery mechanics, on the other hand, usually need some education after high school plus experience working on specific machines before they can be considered a mechanic.

Education and training. Employers prefer to hire those who have taken courses in mechanical drawing, mathematics, blueprint reading, computer programming, or electronics. Entry-level machinery maintenance worker positions generally require a high school diploma, GED, or its equivalent. However, employers increasingly prefer to hire machinery maintenance workers with some training in industrial technology or an area of it, such as fluid power. Machinery maintenance workers typically receive on-the-job training lasting a few months to a year to perform routine tasks, such as setting up, cleaning, lubricating, and starting machinery. This training may be offered by experienced workers, professional trainers, or representatives of equipment manufacturers.

Industrial machinery mechanics usually need a year or more of formal education and training after high school to learn the growing range of mechanical and technical skills that they need. While mechanics used to specialize in one area, such as hydraulics or electronics, many factories now require every mechanic to have knowledge of electricity, electronics, hydraulics, and computer programming.

Workers can get this training in a number of different ways. Experience in the military repairing equipment, particularly ships, is highly valued by employers. Also, 2-year associate degree programs in industrial maintenance are good preparation. Some employers offer 4-year apprenticeship programs that combine classroom instruction with paid on-the-job-training. Apprenticeship programs usually are sponsored by a local trade union. Other mechanics may start as helpers or in other factory jobs and learn the skills of the trade informally and by taking courses offered through their employer. Classroom instruction focuses on subjects such as shop mathematics, blueprint reading, welding, electronics, and computer training. In addition to classroom training, it is important that mechanics train on the specific machines they will repair. They can get

this training on the job, through dealer or manufacturer's representatives or in a classroom.

Other qualifications. Mechanical aptitude and manual dexterity are important for workers in this occupation. Good reading comprehension is also necessary to understand the technical manuals of a wide range of machines. And, good physical conditioning and agility are necessary because repairers sometimes have to lift heavy objects or climb to reach equipment.

Advancement. Opportunities for advancement vary by specialty. Machinery maintenance workers, if they take classes and gain additional skills, may advance to industrial machinery mechanic or supervisor. Industrial machinery mechanics also advance by working with more complicated equipment and gaining additional repair skills. The most highly skilled repairers can be promoted to supervisor, master mechanic, or millwright.

Employment

Industrial machinery mechanics and maintenance workers held about 345,000 jobs in 2006. Of these, 261,000 were held by the more highly skilled industrial machinery mechanics, while machinery maintenance workers accounted for 84,000 jobs. The majority of both types of workers were employed in the manufacturing sector in industries such as food processing and chemical, fabricated metal product, machinery, and motor vehicle and parts manufacturing. Additionally, about 9 percent work in wholesale trade, mostly for dealers of industrial equipment. Manufacturers often rely on these dealers to make complex repairs to specific machines. About 7 percent of mechanics work for the commercial and industrial machinery and equipment repair and maintenance industry, often making site visits to companies to repair equipment. Local governments employ a number of machinery maintenance workers, but few mechanics.

Job Outlook

Employment of industrial machinery mechanics and maintenance workers is projected to grow about as fast as average, and job prospects should be favorable for those with a variety of repair skills.

Employment change. Employment of industrial machinery mechanics and maintenance workers is expected to grow 7 percent from 2006 to 2016, about as fast as the average for all occupations. As factories become increasingly automated, these workers will be needed to maintain and repair the automated equipment. However, many new machines are more reliable and capable of self-diagnosis, making repairs easier and quicker and somewhat slowing the growth of repairer jobs.

Industrial machinery mechanics and maintenance workers are not as affected by changes in production levels as other manufacturing workers. During slack periods, when some plant workers are laid off, mechanics often are retained to do major overhaul jobs and to keep expensive machinery in working order. In addition, replacing highly skilled and experienced industrial maintenance workers is quite difficult, which discourages lay-offs.

Job prospects. Applicants with broad skills in machine repair and maintenance should have favorable job prospects. Many mechanics are expected to retire in coming years, and employers have reported difficulty in recruiting young workers with the necessary skills to be industrial machinery mechanics. In addition to openings from growth, most job openings will stem from the need to replace workers who transfer to other occupations or who retire or leave the labor force for other reasons.

Earnings

Median hourly wage-and-salary earnings of industrial machinery mechanics were \$19.74 in May 2006. The middle 50 percent earned between \$15.87 and \$24.46. The lowest 10 percent earned less than \$12.84, and the highest 10 percent earned more than \$29.85.

Machinery maintenance workers earned somewhat less than the higher skilled industrial machinery mechanics. Median hourly wage-and-salary earnings of machinery maintenance workers were \$16.61 in May 2006. The middle 50 percent earned between \$12.91 and \$21.53. The lowest 10 percent earned less than \$10.29, and the highest 10 percent earned more than \$26.46.

Earnings vary by industry and geographic region. Median hourly wage-and-salary earnings in the industries employing the largest numbers of industrial machinery mechanics are:

Electric power generation, transmission, and distribution	\$26.02
Motor vehicle parts manufacturing	24.97
Machinery, equipment, and supplies merchant wholesalers.....	18.94
Plastics product manufacturing	18.79
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance.....	17.78

About 18 percent of industrial machinery mechanics and maintenance workers are union members. Labor unions that represent these workers include the United Steelworkers of America; the United Auto Workers; the International Association of Machinists and Aerospace Workers; the United Brotherhood of Carpenters and Joiners of America; and the International Union of Electronic, Electrical, Salaried, Machine, and Furniture Workers-Communications Workers of America.

Related Occupations

Other occupations that involve repairing and maintaining industrial machinery include machinists; maintenance and repair workers, general; millwrights; electrical and electronics installers and repairers; electricians; and pipelayers, plumbers, pipefitters, and steamfitters.

Sources of Additional Information

Information about employment and apprenticeship opportunities may be obtained from local employers and from local offices of the State employment service. For further information on apprenticeship programs, write to the Apprenticeship Council of your State's labor department or local firms that employ machinery mechanics and repairers. You can also find information on registered apprenticeships, together with links to State apprenticeship programs, on the U.S. Department of Labor's Web site: http://www.doleta.gov/atels_bat Apprenticeship information is also available from the U.S. Department of Labor's toll free helpline: (877) 872-5627