
Millwrights

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Significant Points

- Millwrights usually train in 4-year to 5-year apprenticeships; some learn through community college programs coupled with informal paid on-the-job training.
- Despite projected slower-than-average employment growth, well-qualified applicants should have excellent job opportunities.
- About 50 percent of millwrights belong to labor unions, one of the highest rates of membership in the economy.

Nature of the Work

Millwrights install, replace, dismantle, and repair machinery and heavy equipment used in power generation, including wind power, hydroelectric dams, and natural gas turbines, and in manufacturing plants, construction sites, and mining operations. The development of new technologies requires millwrights to work with new industry-specific and highly complex precision machines. Some of these machines have tolerances smaller than the width of a human hair.

The millwright's responsibilities begin before a new piece of machinery arrives at the jobsite. Millwrights consult with production managers, industrial engineers, and others to determine the optimal placement of the machine in the plant. Some equipment, such as a metal forging press, is so heavy that it must be placed on a new foundation. Millwrights either prepare the foundation themselves or supervise its construction. As a result, they must know how to read blueprints and to work with a variety of building materials.

When the new machine arrives, millwrights unload, inspect, and move the equipment into position. To lift and move light machinery, millwrights use rigging and hoisting devices, such as pulleys and cables. With heavier equipment, they may use hydraulic-lift trucks or cranes. Lifting such heavy equipment requires millwrights to understand the load properties of cables, ropes, hoists, and cranes. Parts of power plant turbines and other machinery can weigh more than 100 tons and must be precisely positioned; even nuts and bolts can weigh a few hundred pounds each and require a crane to move.

Next, millwrights assemble the machinery. They fit bearings, align gears and wheels, attach motors, and connect belts, according to the manufacturer's blueprints and drawings. Precision leveling and alignment are important in the assembly process, so millwrights measure angles, material thickness, and small distances with calipers, squares, micrometers, and other tools. When a high level of precision is required, they use devices such as lasers and ultrasonic measuring and alignment tools. Millwrights also work with hand and power tools, such as cutting torches, welding machines, hydraulic torque wrenches, hydraulic stud tensioners, soldering guns, and with metalworking equipment, including lathes and grinding machines.

In addition to installing and dismantling machinery, many millwrights work with industrial mechanics and maintenance

workers to repair and maintain equipment. This includes preventive maintenance, such as lubrication and fixing or replacing worn parts. If a spare part is unavailable, a millwright may use a lathe or other machine tool to cut a new part. (For further information on machinery maintenance, see the section on industrial machinery mechanics and maintenance workers elsewhere in the *Handbook*.)

Increasingly sophisticated automation means more complicated machines for millwrights to install and maintain, requiring millwrights to specialize in certain machines or machine brands. For example, some millwrights specialize in installing and maintaining turbines in power plants that can weigh hundreds of tons and contain thousands of parts. This machinery requires special care and knowledge, so millwrights receive additional training and are required to be certified by the turbine manufacturer.

Work environment. Millwrights in manufacturing often work in a machine shop and use protective equipment, such as safety belts, protective glasses, and hardhats, to avoid injuries from falling objects or machinery. Those employed in construction may work outdoors in difficult weather conditions.

Millwrights at construction sites may travel long distances to worksites. For example, millwrights who specialize in turbine installation travel to wherever new power plants are being built.

Advanced equipment, such as hydraulic wrenches and hydraulic stud tensioners, have made the work safer and eliminated the need for millwrights to use sledge hammers to pound bolts into position. Other equipment has reduced the strenuous tasks that caused injuries in the past.

Millwrights work independently or as part of a team. Because disabled machinery costs time and money, many millwrights work overtime and some work in shifts; about 39 percent of millwrights report working more than 40 hours during a typical week. During power outages or other emergencies, millwrights often work overtime.

Training, Other Qualifications, and Advancement

Millwrights usually train in 4-year to 5-year apprenticeships that combine paid on-the-job training with classroom instruction. Some learn through community college programs coupled with informal paid on-the-job training.

Education and training. Employers prefer applicants who have a high school diploma, GED, or the equivalent and some vocational training or experience. Courses in science, math-



Millwrights repair complex industrial machinery.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Millwrights.....	49-9044	55,000	58,000	3,200	6

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*.

ematics, mechanical drawing, computers, and machine shop practice are useful. Once hired, millwrights are trained through 4-year to 5-year apprenticeship programs that combine on-the-job training with classroom instruction, or through community college programs coupled with informal on-the-job training.

Apprenticeships include training in dismantling, moving, erecting, and repairing machinery. Trainees also might learn carpentry, welding, use of concrete, sheet-metal work, and other skills related to installation and repair. Millwright apprentices often attend about 1 week of classes every 3 months. Classroom instruction covers mathematics, blueprint reading, hydraulics, vibration analysis, conveyor systems, electricity, computers, electronics, machining, and instruction in specific machinery. Millwrights are expected to keep their skills up-to-date and may need additional training on technological advances, such as laser shaft alignment.

Other qualifications. Because millwrights assemble and disassemble complicated machinery, mechanical aptitude is very important. Strength and agility also are necessary for lifting and climbing. Millwrights need good interpersonal and communication skills to work as part of a team and to effectively give detailed instructions to others.

Advancement. Advancement for millwrights usually takes the form of higher wages. Some advance to the position of supervisor or superintendent; others may become self-employed contractors.

Employment

Millwrights held about 55,000 jobs in 2006. About half work in manufacturing, primarily in industries such as transportation equipment manufacturing and primary metals manufacturing. About 40 percent of millwrights are employed in construction, where most work for contracting firms that assemble and maintain machinery and equipment for the manufacturing and utility industries, among others. Although millwrights work in every State, employment is concentrated in heavily industrialized areas.

Job Outlook

Employment of millwrights is projected to grow more slowly than average. Opportunities for well-qualified applicants should be excellent, however, as many experienced millwrights retire.

Employment change. Employment of millwrights is projected to grow 6 percent during the 2006-16 decade, slower than the average for all occupations. To remain competitive in coming years, firms will continue to need millwrights to dismantle old equipment and install new high-technology machinery. Highly automated systems that are installed and maintained by millwrights often allow manufacturing companies to remain competitive with producers in lower-wage countries. Warehouse and distribution companies also are deploying highly automat-

ed conveyor systems, which are assembled and maintained by millwrights. In addition, growth in both power generation, including wind power and turbines for natural gas and coal plants, and oil and gas extraction and refining will help drive employment growth.

Employment growth will be dampened somewhat by foreign competition in manufacturing. In addition, the demand for millwrights will be adversely affected as other workers, such as industrial machinery mechanics and maintenance workers, assume some installation and maintenance duties.

Job prospects. The large number of expected retirements and the difficulty of recruiting new workers will create excellent job opportunities for well-qualified applicants. Job prospects should be especially good for those who have experience in machining, welding, or doing mechanical work. Employment prospects for millwrights are better than for some other manufacturing workers because they work across a wide range of industries, including power generation, paper mills, mining, and motor vehicle parts manufacturing. When a downturn occurs in one industry, millwrights can more easily switch to another industry. There will always be a need to maintain and repair existing machinery, dismantle old machinery, and install new equipment.

Earnings

Median hourly wage-and-salary earnings of millwrights were \$21.94 in May 2006. The middle 50 percent earned between \$17.13 and \$29.42. The lowest 10 percent earned less than \$13.84, and the highest 10 percent earned more than \$34.39. Earnings vary by industry and geographic location. Median hourly wage-and-salary earnings in the industries employing the largest numbers of millwrights were:

Pulp, paper, and paperboard mills.....	\$25.43
Iron and steel mills and ferroalloy manufacturing	20.91
Nonresidential building construction	20.34
Building equipment contractors.....	19.67
Sawmills and wood preservation	17.55

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Related Occupations

Other workers who install and maintain manufacturing equipment include industrial machinery mechanics and maintenance workers; tool and die makers; aircraft and avionics equipment mechanics and service technicians; structural and reinforcing iron and metal workers; boilermakers; and assemblers and fabricators. Millwrights also machine parts and operate computer-controlled machine tools as do machinists and computer control programmers and operators. Millwrights often use welding and

soldering to assemble and repair machines as do welding, soldering, and brazing workers.

Sources of Additional Information

For further information on apprenticeship programs, write to the Apprenticeship Council of your State's labor department, local offices of your State employment service, or local firms that employ millwrights. You can also find information on the 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 tollfree helpline: (877) 872-5627.

In addition, you may contact:

➤ Associated Builders and Contractors, Workforce Development Dept., 4250 N. Fairfax Dr., 9th Floor, Arlington, VA 22203. Internet: **<http://www.trytools.org>**

➤ United Brotherhood of Carpenters and Joiners of America, 6801 Placid St., Las Vegas, NV 89119.

Internet: **<http://www.ubcmillwrights.org>**