CALIFORNIA
OCCUPATIONAL GUIDES

EDD Employment Development Department
State of California

OPERATING ENGINEERS

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INTEREST AREA
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WHAT DOES AN OPERATING ENGINEER DO?

OPERATING ENGINEERS, also known as Construction Machinery Operators, use various types of power-driven machinery to move construction materials, earth, logs, food products, and other materials and to apply asphalt and concrete to roads and other surfaces. They work on a variety of job sites: on a grader on a road project, in a crane on a new skyscraper, on a dredge on a river, or with a pump or air compressor in a mine. The machinery they operate includes graders, bulldozers, tractors, scrapers, excavators, loaders, backhoes, dredges, trench diggers, pavers, tampers, rollers, cranes, pile drivers, hoists, winches, pumps, air compressors, and others. They also may set up and inspect equipment, make adjustments, and perform minor repairs. While many specialize in operating the equipment, some work as heavy equipment mechanics performing maintenance and repairs to the machinery. Those working as mechanics need strong mechanical abilities and must be able to lift heavy objects.

Operating Engineers use a variety of equipment such as:

- Graders, bulldozers, tractors, and scrapers to dig or gouge out, move, level, and grade earth.
- Excavators, loaders, dredges, and trench diggers use scoops, shovels, or buckets to dig soil and load onto trucks, conveyors, or piles.
- Cranes to lift materials, machinery, or other heavy objects.
- Pavers, tampers, and rollers to spread and level asphalt or concrete.
- Hoists and winches that operate by the movement of cables, cages, and platforms to move workers and materials.
- Pumps, air compressors, or material handling machines.

Operators control the equipment by moving levers or pedals, operating switches or valves, and turning wheels or dials with their hands or feet. Operating Engineers need to possess good eye-hand-foot coordination and a high level of physical stamina. Operators need to possess a wide range of skills due to the variety of equipment they are required to operate. Some of the equipment is more difficult to operate than other equipment. Operators may choose to learn how to operate from one to several types of equipment. Some equipment is becoming more complex as a result of computerized equipment controls.

Operating Engineers perform the following tasks:

- Control operations of machinery or systems manually or electronically.
- Drive, maneuver, or navigate vehicles or equipment.

- Watch gauges, dials, and other indicators to ensure the equipment is working properly.
- Determine what is causing an operating error and what to do about it.
- Perform routine maintenance and determine when and what maintenance is needed.
- Repair machines or systems using the needed tools.

WHAT SKILLS ARE IMPORTANT?

Important skills, knowledge, and abilities for Operating Engineers include:

- Operation and Control – Controlling operations of equipment or systems.
- Equipment Maintenance – Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.
- Repairing – Repairing machines or systems using the needed tools.
- Operation Monitoring – Watching gauges, dials, or other indicators to make sure a machine is working properly.
- Equipment Selection – Determining the kind of tools and equipment needed to do a job.
- Troubleshooting – Determining causes of operating errors and deciding what to do about it.
- Mechanical – Knowledge of machines and tools, including their designs, uses, repair, and maintenance.
- Building and Construction – Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.
- Multilimb Coordination – The ability to coordinate two or more limbs (for example, two arms, two legs, or one leg and one arm) while sitting, standing, or lying down. It does not involve performing the activities while the whole body is in motion.
- Problem Sensitivity – The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- Control Precision – The ability to quickly and repeatedly adjust the controls of a machine or a vehicle to exact positions.
- Manual Dexterity – The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
- Visualization – The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

WHAT'S THE WORK ENVIRONMENT?

The work performed by Operating Engineers is physically demanding and is usually performed outdoors in nearly all weather conditions. Dusty working locations are common. Some machinery has an enclosed cab or operating area, which may be air-conditioned. Some of the machinery is very noisy, and may shake or jolt the Operator. The Operators must always be alert for other workers and for dangerous conditions, such as overturning the equipment, contacting electrical power lines, or dropping heavy objects. Accidents can usually be avoided by observing industry operating procedures and safety practices.

Many Operating Engineers work in the construction industry (about 60 percent nationwide). Others work in mining and manufacturing, and some work for the government, utility companies, or are self-employed. Operators may work near their homes or in distant or remote locations. They may be away from their homes and families for long periods of time, depending upon the type of industry hiring the worker.

Union Membership

Union membership requirements depend upon whether the contractor in charge of the project has an agreement with the labor union to provide the Operating Engineers to operate the equipment. When union operators are required, Operating Engineers in California belong to the International Union of Operating Engineers, Local 3 in Northern California and Local 12 in Southern California. Those working for the government may join a public employee union.

WHAT'S THE CALIFORNIA JOB OUTLOOK?

The following information is from the occupational projections produced by the Employment Development Department (EDD) Labor Market Information Division (LMID) and represents the broad occupational groups Operating Engineers and Other Construction Equipment Operators; Excavating and Loading Machine and Dragline Operators; Crane and Tower Operators; and Paving, Surfacing and Tamping Equipment Operators which includes Operating Engineers:

Estimated number of workers in 2000:	35,900
Estimated number of workers in 2010:	41,600
Projected Growth 2000-2010:	15.9%
Est. openings due to separations by 2010:	8,800

These figures do not include self-employment.

Trends

Fluctuations in the economy may cause periods of unemployment in this industry when the level of residential or nonresidential construction activity falls. Computerization of the machinery controls and robotics automating the crane, hoist, and winch Operator positions will also slow the employment growth for Operators in this industry. However, the 1998 Transportation Equity Act for the 21st Century projects to repair the nation's deteriorating bridges and highways is expected to create some growth in highway, bridge, and street construction, as well as building mass transit systems until 2006.

WHAT DOES THE JOB PAY?

California Earnings

Operating Engineers and Other Construction Equipment Operators 2002 Wages

Hourly wages range from	$19.59	to	$32.44
Average hourly wage	$25.75		
Average annual wage	$53,554		

Excavating and Loading Machine and Dragline Operators 2002 Wages

Hourly wages range from	$17.44	to	$28.29
Average hourly wage	$22.70		
Average annual wage	$47,219		

Crane and Tower Operators 2002 Wages

Hourly wages range from	$16.46	to	$32.58
Average hourly wage	$24.56		
Average annual wage	$51,083		

Paving, Surfacing, and Tamping Equipment Operators 2002 Wages

Hourly wages range from	$14.99	to	$27.84
Average hourly wage	$21.17		
Average annual wage	$44,043		

Source: Occupational Employment Survey of Employers by EDD/LMID.

Wages vary according to the complexity and capacity of the machinery being operated or repaired, the type of project and industry, the location of the job site, and the experience of the Operator. Annual earnings may be significantly affected by local weather conditions. Apprentice Operators earn between 50 and 80 percent of the journey-level wage.

Hours

Operating Engineers usually work forty hours or more per five-day workweek. They frequently work overtime and may work longer on weekdays or work six days a week in good weather or during the summer. Much of their work is done from March through November.

Benefits

Operating Engineers covered by union contracts have benefits such as health, dental, vision, mental health, and life insurance, pension benefits, vacation, and holiday time off. Those non-union construction machinery Operators have no guarantee of benefits and must usually negotiate with the employer to receive any benefits.

HOW DO I PREPARE FOR THE JOB?

Education and Training

Employers usually prefer to hire high school graduates. Some may train persons with less education to operate less complex equipment. Some Operators learn their skills on the job, and

some train in formal Operating Engineer apprenticeship programs. Private vocational schools also offer instruction in the operation of construction equipment that may help the person obtain a position as a trainee or an apprentice. Mechanical aptitude and high school training in automobile, diesel, or farm machinery mechanics are helpful to all Operators. Experience operating farm tractors and harvesters or other heavy equipment, such as in the Armed Forces, is also helpful.

Those training in apprenticeship programs must be at least 18 years of age, have a valid California driver's license and a high school diploma or GED, be able to perform physical activity, and pass a drug test. In the apprenticeship program, equipment Operators normally work on light equipment under the supervision of an experienced Operator and then progress to operating heavier, more complex equipment. Apprentices normally learn to operate a wider variety of machines than non-union Operators so they usually have better job opportunities. Good training is extremely important, because job security usually depends upon an Operator's competence in operating the machinery. Apprentices initially receive five weeks of training and are given on-the-job training working with contractors. Most apprentice Operators will reach journey-level in about four years, while mechanics and crane Operators usually take about five years to reach journey-level. During the apprenticeship period Operators are required to take 80 hours of training each year.

Licensing and Certification

Once an apprentice completes the apprenticeship program as an equipment Operator, or as a heavy equipment mechanic, the Operator or mechanic is certified by the joint union-management committee to be at journey-level.

Continuing Education

There are currently no requirements for continuing education for journey-level Operators; however, they may take classes and training to upgrade their skills, knowledge, and abilities.

HOW DO I FIND THE JOB?

For those Operators who belong to the union, registration with the local union hiring hall is one of the most effective ways to gain employment. Direct application to employers is also a very effective job search method for non-union workers. Word-of-mouth leads and newspaper advertisements can also be fruitful. Private firms are listed in the yellow pages under Construction or Contractors headings. California job openings can be found at various online job-listing systems including CalJOBS℠ at www.caljobs.ca.gov or at America's Job Bank at www.ajb.dni.us.

For other occupational and wage information and a listing of the largest employers in any county, visit the Employment Development Department Labor Market Information Web page at www.calmis.ca.gov. Find further job search assistance from your nearest Job Service office www.edd.ca.gov/jsloc.htm or the closest One-Stop site listed on the California WorkNet site, www.sjtcc.ca.gov/sjtccweb/one-stop.

WHERE CAN THIS JOB LEAD?

Most advancement comes in the form of pay raises by becoming qualified in the operation of other equipment requiring higher skill level. Those with above-average ability and/or additional education or training may become foreman, superintendent, or project manager. Some Operators furnish their own equipment and may also start their own business providing both equipment and Operator.

OTHER SOURCES OF INFORMATION

International Union of Operating Engineers
1125 17th Street, NW
Washington, DC 20036
(202) 429-9100
www.iuoe.org

Associated General Contractors of America
333 John Carlyle Street, Suite 200
Alexandria, VA 22314
(703) 548-3118
http://info@agc.org

Northern California Operating Engineers
Local Union No. 3
1620 South Loop Road
Alameda, CA 94502
(510) 748-7400
www.oe3.org

CA Division of Apprenticeship Standards
For the closest district office, visit
www.dir.ca.gov/DAS/das.html, or call
Apprenticeship Standards Information listed in
your telephone directory business white pages

Employment Projections by Occupation
www.calmis.ca.gov/htmlfile/subject/occproj.htm

Employment and Wages by Occupation
www.calmis.ca.gov/file/occup$/OES$.htm

RELATED OCCUPATIONAL GUIDES

Bus Drivers	No. 2
Bus and Truck Mechanics and Diesel Engine Specialists	No. 251
Truck Drivers, Heavy	No. 255

OCCUPATIONAL CODE REFERENCES

SOC *(Standard Occupational Classification)*

Paving, Surfacing, and Tamping Equipment Operators	47-2071
Operating Engineers and Other Construction Equipment Operators	47-2073
Crane and Tower Operators	53-7021
Excavating and Loading Machine and Dragline Operators	53-7032

O*NET *(Occupational Information Network)*

Operating Engineers	47-2073.02

OES *(Occupational Employment Statistics)*

Operating Engineers	97956

DOT *(Dictionary of Occupational Titles)*

Dredge Operator	850.663-010
Bulldozer Operator	850.683-010
Pile-Driver Operator	859.682-018
Road-Roller Operator	859.683-030
Overhead Crane Operator	921.663-010