

Production Occupations

Assemblers and Fabricators

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Significant Points

- Virtually all assemblers and fabricators work in plants that manufacture durable goods, such as computers and automobile engines.
- A high school diploma is preferred for most positions; applicants need specialized training for some assembly jobs.
- Projected slower-than-average employment growth reflects increasing automation and the shift of assembly to countries with lower labor costs.

Nature of the Work

Assemblers and fabricators produce a wide range of finished goods from manufactured parts or subassemblies. They produce intricate manufactured products, such as aircraft, automobile engines, computers, and electrical and electronic components.

Assemblers may work on subassemblies or the final assembly of an array of finished products or components. For example, electrical and electronic equipment assemblers put together or modify missile control systems, radio or test equipment, computers, machine-tool numerical controls, radar, or sonar, and prototypes of these and other products. Electromechanical equipment assemblers prepare and test equipment or devices such as appliances, dynamometers, or ejection-seat mechanisms. Coil winders, tapers, and finishers wind wire coil used in resistors, transformers, generators, and electric motors. Engine and other machine assemblers construct, assemble, or rebuild engines and turbines, and office, agricultural, construction, oilfield, rolling mill, textile, woodworking, paper, and food wrapping machinery. Aircraft structure, surfaces, rigging, and systems assemblers put together and install parts of airplanes, space vehicles, or missiles, such as wings or landing gear. Structural metal fabricators and fitters align and fit structural metal parts according to detailed specifications prior to welding or riveting.

Assemblers and fabricators involved in product development read and interpret engineering specifications from text, drawings, and computer-aided drafting systems. They also may use a variety of tools and precision measuring instruments. Some experienced assemblers work with engineers and technicians, assembling prototypes or test products.

As technology changes, so too does the manufacturing process. For example, flexible manufacturing systems include the manufacturing applications of robotics, computers, programmable motion control, and various sensing technologies. These systems change the way in which goods are made, and affect the jobs of those who make them. The concept of cellular manufacturing, for example, places a greater premium on the teamwork of and communication within “cells” of workers than it does on the old assembly line process. Team assemblers perform all of the assembly tasks assigned to their teams, rotating through the different tasks,



Electrical and electronics assemblers work on circuit boards

rather than specializing in a single task. They also may decide how the work is to be assigned and how different tasks are to be performed. Some aspects of team assembly, such as rotating tasks, are becoming more common to all assembly and fabrication occupations. As the U.S. manufacturing sector continues to evolve in the face of growing international competition and changing technology, the nature of assembly and fabrication will change along with it.

Working Conditions

The working conditions for assemblers and fabricators vary from plant to plant and from industry to industry. Conditions may be noisy and many assemblers may have to sit or stand for long periods. Both electronic and electromechanical equipment assemblers, for example, sit at tables in rooms that are clean, well-lit, and free from dust. Some electrical and electronics assemblers come in contact with soldering fumes, but ventilation systems and fans normally minimize this problem. Aircraft assemblers, however, usually come in contact with oil and grease, and their working areas may be quite noisy. They also may have to lift and fit heavy objects. In many cases, developments in ergonomics have improved working conditions through changes in workstation design and the increased use of robots or other pneumatically powered machinery to lift heavy objects.

Most full-time assemblers work a 40-hour week, although overtime and shiftwork is fairly common in some industries. Work schedules of assemblers may vary at plants with more than one shift.

Employment

Virtually all of the 2.7 million assembler and fabricator jobs in 2000 were in plants that manufacture durable goods. Team assemblers, the largest specialty, accounted for 55 percent of assembler and fabricator jobs. The distribution of employment among the various types of assemblers was as follows:

Team assemblers	1,458,000
All other assemblers and fabricators	439,000
Electrical and electronic equipment assemblers	379,000
Structural metal fabricators and fitters	101,000
Electromechanical equipment assemblers	73,000
Engine and other machine assemblers	67,000
Coil winders, tapers, and finishers	56,000
Fiberglass laminators and fabricators	48,000
Aircraft structure, surfaces, rigging, and systems assemblers ...	20,000
Timing device assemblers, adjusters, and calibrators	12,000

Durable goods manufacturing industries employ 72 percent of assemblers and fabricators. Assembly of electronic and electrical equipment, including electrical switches, welding equipment, electric motors, lighting equipment, household appliances, and electronic devices accounted for 19 percent of all jobs. Assembly of transportation equipment, such as aircraft, autos, trucks, and buses accounted for 15 percent of all jobs. Other industries that employ many assemblers and fabricators were industrial machinery (diesel engines, steam turbine generators, farm tractors, and office machines), fabricated metal products, and instruments manufacturing.

The following tabulation shows the wage and salary employment of assemblers and fabricators in durable goods manufacturing in 2000 by industry.

Electronic and other electrical equipment	502,000
Transportation equipment	403,000
Industrial machinery and equipment	319,000
Fabricated metal products	197,000
Instruments and related products	165,000

Training, Other Qualifications, and Advancement

New assemblers and fabricators are normally entry-level employees. The ability to do accurate work at a rapid pace and to follow detailed instructions are key job requirements. A high school diploma is preferred for most positions.

Applicants need specialized training for some assembly jobs. For example, employers may require that applicants for electrical or electronic assembler jobs be technical school graduates or have equivalent military training. Other positions require only on-the-job training, sometimes including employer-sponsored classroom instruction, in the broad range of assembly duties that employees may be required to perform.

Good eyesight, with or without glasses, is required for assemblers and fabricators who work with small parts. Plants that make electrical and electronic products may test applicants for color vision, because many of their products contain many differently colored wires. Manual dexterity and the ability to carry out complex, repetitive tasks quickly and methodically also are important.

As assemblers and fabricators become more experienced, they may progress to jobs that require more skill and be given more responsibility. Experienced assemblers may become product repairers if they have learned the many assembly operations and understand the construction of a product. These workers fix assembled articles that operators or inspectors have identified as defective. Assemblers also can advance to quality control jobs or be promoted to supervisor. Experienced assemblers and fabricators also may become members of research and development teams, working with engineers and other project designers to design, develop, build prototypes, and test new product models. In some companies, assemblers can become trainees for one of the skilled trades. Those with a background in math, science, and computers may advance to programmers or operators of more highly automated production equipment.

Job Outlook

Employment of assemblers and fabricators is expected to grow more slowly than the average for all occupations through the year 2010, reflecting increasing automation and the shift of assembly to countries with lower labor costs. As manufacturers strive for greater precision and productivity, automated machinery increasingly will be used to perform work more economically or more efficiently. Recent advancements have made robotics more applicable and more affordable in manufacturing. Advances in automation should continue raising the productivity of assembly workers and adversely affecting their employment. In addition to those stemming from growth, many job openings will result from the need to replace workers leaving this large occupational group.

The effects of automation will be felt more acutely among some types of assemblers and fabricators than among others. Flexible manufacturing systems are expensive, and a large volume of repetitive work is required to justify their purchase. Also, where the assembly parts involved are irregular in size or location, new technology only now is beginning to make inroads. For example, much assembly in the aerospace industry is done in hard-to-reach locations unsuited for robots—inside airplane fuselages or gear boxes, for example—and replacement of aircraft assemblers by automated processes will be slower and less comprehensive than replacement of other workers such as welders and painters. On the other hand, automation increasingly will be used in the precision assembly of electronic goods, in which a significant number of electronics assemblers are employed.

Many producers send their assembly functions to countries where labor costs are lower. This trend in assembly, promoted by more liberal trade and investment policies, results in shifts in the composition of America's manufacturing workforce. Decisions by American corporations to move assembly to other nations should limit employment growth for assemblers in some industries, such as electronics assembly, but a freer trade environment also may lead to growth in the export of goods assembled in the United States, resulting in the creation of additional jobs in other industries, such as aircraft assembly.

Earnings

Earnings vary by industry, geographic region, skill, educational level, and complexity of the machinery operated. In 2000, median hourly earnings were \$19.64 for aircraft structure, surfaces, rigging, and systems assemblers; \$13.47 for engine and other machine assemblers; \$9.77 for coil winders, tapers, and finishers; \$10.82 for fiberglass laminators and finishers; \$10.11 for all other assemblers; \$10.78 for timing device assemblers, calibrators, and adjusters; and \$11.16 for electromechanical equipment assemblers.

Median hourly earnings of team assemblers were \$10.32 in 2000. The middle 50 percent earned between \$8.39 and \$13.11. The lowest 10 percent earned less than \$7.05, and the highest 10 percent earned \$16.95. Median hourly earnings in the manufacturing industries employing the largest numbers of team assemblers in 2000 are shown below:

Motor vehicles and equipment	\$13.15
Medical instruments and supplies	10.30
Fabricated structural metal products	10.05
Miscellaneous plastics products, not elsewhere classified	9.49
Personnel supply services	7.93

Median hourly earnings of electrical and electronic equipment assemblers were \$10.31 in 2000. The middle 50 percent earned between \$8.44 and \$12.97. The lowest 10 percent earned less than \$7.10, and the highest 10 percent earned more than \$16.28. Median hourly earnings in the manufacturing industries employing the largest

numbers of electrical and electronic equipment assemblers in 2000 are shown below:

Computer and office equipment	\$11.68
Measuring and controlling devices	11.43
Electrical industrial apparatus	10.61
Communications equipment	10.23
Electronic components and accessories	9.93

Many assemblers and fabricators are members of labor unions. These unions include the International Association of Machinists and Aerospace Workers; the United Electrical, Radio and Machine Workers of America; the United Automobile, Aerospace and Agricultural Implement Workers of America; the International

Brotherhood of Electrical Workers; and the United Steelworkers of America.

Related Occupations

Other occupations that involve operating machines and tools and assembling products include welding, soldering, and brazing workers; ophthalmic laboratory technicians; and machine setters, operators, and tenders—metal and plastic.

Sources of Additional Information

Information about employment opportunities for assemblers is available from local offices of the State employment service and from locals of the unions mentioned earlier.

Food Processing Occupations

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Significant Points

- Workers in meatpacking plants have among the highest incidences of injury and illness of all workers.
- Most employees in manual food processing jobs require little or no training prior to being hired.
- Job growth will be concentrated among lower skilled workers.

Nature of the Work

Food processing occupations include many different types of workers involved in processing raw food products into finished goods ready for sale by grocers or wholesalers, restaurants, or institutional food services. These workers perform a variety of tasks and are responsible for producing many of the food products found in every household.

Butchers and meat, poultry, and fish cutters and trimmers are employed at different stages in the process by which animal carcasses are converted into manageable pieces of meat suitable for sale to wholesales or consumers. Meat, poultry, and fish cutters and trimmers commonly work in meatpacking or fish and poultry processing plants, while butchers and meatcutters usually are employed at the retail level. As a result of this distinction, the nature of these jobs varies significantly.

In meatpacking plants, *slaughterers and meatpackers* slaughter cattle, hogs, goats, and sheep and cut the carcasses into large wholesale cuts, such as rounds, loins, ribs, and chucks, to facilitate the handling, distribution, and marketing of meat. In some of these plants, slaughterers and meatpackers also further process these primal parts into cuts that are ready for retail use. These workers also produce hamburger meat and meat trimmings, which are used to prepare sausages, luncheon meats, and other fabricated meat products. Slaughterers and meatpackers usually work on assembly lines, with each individual responsible for only a few of the many cuts needed to process a carcass. Depending on the type of cut, they use knives, cleavers, meat saws, bandsaws, or other, often dangerous, equipment.

In grocery stores, wholesale establishments that supply meat to restaurants, and institutional food service facilities, *butchers and meatcutters* separate wholesale cuts of meat into retail cuts or individual size servings. They cut meat into steaks and chops, shape

and tie roasts, and grind beef for sale as chopped meat. Boneless cuts are prepared using knives, slicers, or power cutters, while bandsaws are required to carve bone-in pieces. Butchers and meatcutters in retail food stores may also weigh, wrap, and label the cuts of meat, arrange them in refrigerated cases for display, and prepare special cuts of meat to fill unique orders.

Poultry cutters and trimmers slaughter and cut up chickens, turkeys, and other types of poultry. Although the poultry processing industry is becoming increasingly automated, many jobs such as trimming, packing, and deboning are still done manually. As in the meatpacking industry, most poultry cutters and trimmers perform routine cuts on poultry as it moves along production lines.

Unlike some of the occupations listed above, *fish cutters and trimmers*, also called *fish cleaners*, are likely to be employed in both manufacturing and retail establishments. These workers primarily cut, scale, and dress fish by removing the head, scales, and other inedible portions and cutting the fish into steaks or boneless fillets. In retail markets, they may also wait on customers and clean fish to order.

Meat, poultry, and fish cutters and trimmers also prepare ready-to-heat foods. This often entails filleting meat or fish or cutting it into bite-sized pieces, preparing and adding vegetables, or applying sauces or breading.

Bakers mix and bake ingredients in accordance with recipes to produce varying quantities of breads, pastries, and other baked goods for consumption. Bakers commonly are employed in grocery stores and specialty shops and produce small quantities of breads, pastries, and other baked goods for consumption on premises or for sale as specialty baked goods. In manufacturing, bakers produce goods in large quantities, using high-volume mixing machines, ovens, and other equipment. Goods produced in large quantities usually are for sale through establishments such as grocery stores.

Other food processing occupations include *food batchmakers*, who set up and operate equipment that mixes, blends, or cooks ingredients used in the manufacturing of food products, according to formulas or recipes; *food cooking machine operators and tenders*, who operate or tend cooking equipment, such as steam cooking vats, deep-fry cookers, pressure cookers, kettles, and boilers, to prepare food products, such as meats, sugar, cheese, and grain; and *food and tobacco roasting, baking, and drying machine operators*, who utilize equipment to reduce moisture content of food or tobacco products or to process food in preparation for canning. Some of the machines used include hearth ovens, kiln driers, roasters, char kilns, steam ovens, and vacuum drying equipment.