Assemblers and Fabricators

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Significant Points

- Most assemblers work on teams, making good communication skills and the ability to get along with others important.
- A high school diploma is sufficient for most jobs, but experience and extra training is needed for more advanced assembly work.
- Employment is projected to decline slowly.
- Job opportunities are expected to be good for qualified applicants in the manufacturing sector, particularly in jobs needing more training.

Nature of the Work

Assemblers and fabricators play an important role in the manufacturing process. They assemble both finished products and the pieces that go into them. The products they assemble using tools, machines, and their hands range from entire airplanes to intricate timing devices. They fabricate and assemble household appliances, automobiles and automobile engines and parts, computers, electronic devices, and more.

Changes in technology have transformed the manufacturing and assembly process. Automated manufacturing systems now use robots, computers, programmable motion control devices, and various sensing technologies. These systems change the way in which goods are made and affect the jobs of those who make them. The more advanced assemblers must be able to work with these new technologies and use them to produce goods.

The job of an assembler or fabricator ranges from very easy to very complicated, requiring a range of knowledge and skills. Skilled assemblers putting together complex machines, for example, begin by reading detailed schematics or blueprints that show how to assemble the machine. After determining how parts should connect, they use hand or power tools to trim, shim, cut, and make other adjustments to fit components together and align properly. Once the parts are properly aligned, they connect them with bolts and screws or by welding or soldering pieces together.

Careful quality control is important throughout the assembly process, so assemblers look for faulty components and mistakes in the assembly process. They help to fix problems before more defective products are produced.

Manufacturing techniques are evolving away from traditional assembly line systems toward "lean" manufacturing systems, which are causing the nature of assemblers' work to change. Lean manufacturing uses teams of workers to produce entire products or components. *Team assemblers* may still work on an assembly line, but they rotate through different tasks, rather than specializing in a single task. The team also may decide how the work is assigned and how different tasks are performed. This worker flexibility helps companies cover for absent workers, improves productivity, and increases companies' ability to respond to changes in demand by shifting labor from one product line to another. For example, if demand for a product drops, companies may reduce the total number of workers producing it, asking the remaining workers to perform more stages of the assembly process. Some aspects of lean production, such as rotating tasks and seeking worker input on improving the assembly process, are common to all assembly and fabrication occupations.

Although more than half of all assemblers and fabricators are classified as "team assemblers," others specialize in producing one type of product or perform the same or similar functions throughout the assembly process. These workers are classified according to the products they assemble or produce. *Electrical and electronic equipment assemblers*, for example, build products such as electric motors, computers, electronic control devices, and sensing equipment. Automated systems have eliminated much of the mass production work in electronic assembly, so a growing amount of the work of electrical and electronic assemblers is manual assembly during the small-scale production of electronic devices used in avionic systems, military systems, and medical equipment.

Electromechanical equipment assemblers assemble and modify electromechanical devices such as household appliances, dynamometers, actuators, or vending machines. *Coil winders, tapers, and finishers* wind wire coil used in resistors, transformers, generators, and electric motors. *Engine and other*

Electrical and electronics assemblers solder electronic parts together.

machine assemblers construct, assemble, or rebuild engines and turbines, and machines used in agriculture, construction, mining, and almost all manufacturing industries, including rolling mills, textiles, paper, and food processing. *Aircraft structure, surfaces, rigging, and systems assemblers* assemble, fit, fasten, and install parts of airplanes, space vehicles, or missiles, including tails and wings, landing gear, and heating and ventilation systems. *Structural metal fabricators and fitters* cut, align, and fit together structural metal parts prior to welding or riveting. *Fiberglass laminators and fabricators* create products made of fiberglass, mainly boat decks and hulls and automobile body parts. *Timing device assemblers, adjusters, and calibrators* perform precision assembling or adjusting of timing devices within very narrow tolerances.

It has become more common to involve assemblers and fabricators in product development. Designers and engineers consult manufacturing workers during the design stage to improve product reliability and manufacturing efficiency. For example, an assembler may tell a designer that the dash of a new car design will be too difficult to install quickly and consistently. The designer could then redesign the dash to make it easier to install.

Some experienced assemblers work with designers and engineers to build prototypes or test products. These assemblers must be able to read and interpret complex engineering specifications from text, drawings, and computer-aided drafting systems. They also may need to use a variety of tools and precision measuring instruments.

Work environment. The working environment for assemblers and fabricators is improving, but varies by plant and by industry. Many physically difficult tasks have been made much easier through the use of hydraulic and electromechanical equipment, such as manually tightening massive bolts or moving heavy parts into position. Assembly work, however, may still involve long periods of standing or sitting.

Most factories today are generally clean, well-lit, and well-ventilated, and depending on what type of work is being performed, they may also need to be dirt and dust-free. Electronic and electromechanical assemblers particularly must work in environments free of dust that could affect the operation of the products they build. Some assemblers may also come into contact with potentially harmful chemicals or fumes, but ventilation systems and other safety precautions normally minimize any harmful effects. Other assemblers may come in contact with oil and grease, and their working areas may be quite noisy.

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

Training, Other Qualifications, and Advancement

The education level and qualifications needed to enter these jobs vary depending on the industry and employer. While a high school diploma or GED is sufficient for most jobs, experience and extra training is needed for more advanced assembly work.

Education and training. Most applicants for assembler positions need only a high school diploma or GED. However, some employers may require specialized training or an associate degree for the most skilled assembly jobs. For example, jobs with electrical, electronic, and aircraft and motor vehicle products manufacturers typically require more education and experience. Other positions may require only brief on-the-job training, sometimes including employer-sponsored classroom instruction.

Other qualifications. Assembly workers must be able to follow instructions carefully, which may require some basic reading skills and the ability to follow diagrams and pictures. Manual dexterity and the ability to carry out complex, repetitive tasks quickly and methodically also are important. For some positions, the ability to lift heavy objects may be needed. Team assemblers also need good interpersonal and communication skills to be able to work well with their teammates. Good eyesight is necessary for assemblers and fabricators who work with small parts. Plants that make electrical and electronic products may test applicants for color vision because their products often contain many differently colored wires.

Advancement. As assemblers and fabricators become more experienced, they may progress to jobs that require greater skill and may 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 pieces 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, and build prototypes, and test new product models. In some companies, assemblers can become trainees for one of the skilled trades, such as machinist. Those with a background in math, science, and computers may advance to become programmers or operators of more highly automated production equipment.

Employment

Assemblers and fabricators held nearly 2.1 million jobs in 2006. They worked in almost every industry, but 3 out of 4 worked in manufacturing. Within the manufacturing sector, assembly of transportation equipment, such as aircraft, autos, trucks, and buses, accounted for 19 percent of all jobs. Assembly of computers and electronic products accounted for another 11 percent of all jobs. Other industries that employ many assemblers and fabricators are machinery manufacturing: heating and air-conditioning equipment; agriculture, construction, and mining machinery; and engine, turbine, and power transmission equipment; electrical equipment, appliance, and component manufacturing: lighting, household appliances, and electrical equipment; and fabricated metal products.

The following tabulation shows the employment of assemblers and fabricators in the manufacturing industries that employed the most workers in 2006:

Motor vehicle parts manufacturing	145,000
Motor vehicle manufacturing	106,000
Semiconductor and other electronic component manufacturing	88,000
Navigational, measuring, electromedical, and control instruments	

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16 Number	Change, 2006-16 Percent
Assemblers and fabricators	51-2000	2,075,000	1,982,000	-93,000	-4
Aircraft structure, surfaces, rigging, and systems assemblers	51-2011	28,000	32,000	3,600	13
Electrical, electronics, and electromechanical assemblers	51-2020	297,000	227,000	-70,000	-23
Coil winders, tapers, and finishers	51-2021	23,000	16,000	-7,000	-30
Electrical and electronic equipment assemblers	51-2022	213,000	156,000	-57,000	-27
Electromechanical equipment assemblers	51-2023	60,000	55,000	-5,500	-9
Engine and other machine assemblers	51-2031	45,000	41,000	-3,900	-9
Structural metal fabricators and fitters	51-2041	103,000	103,000	-200	0
Miscellaneous assemblers and fabricators	51-2090	1,602,000	1,579,000	-23,000	-1
Fiberglass laminators and fabricators	51-2091	33,000	35,000	2,100	6
Team assemblers	51-2092	1,274,000	1,275,000	700	0
Timing device assemblers, adjusters, and calibrators	51-2093	2,500	2,300	-200	-8
Assemblers and fabricators, all other	51-2099	292,000	266,000	-25,000	-9

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*.

manufacturing 76,000
Architectural and structural metals manufacturing.....74,000

Assemblers and fabricators also work in many other nonmanufacturing industries. Twelve percent were employed by employment services firms, mostly as temporary workers; most of these temporary workers were likely assigned to manufacturing plants. Wholesale and retail trade firms employed the next highest number of assemblers and fabricators. Many of these assemblers perform the final assembly of goods before the item is delivered to the customer. For example, most imported furniture is shipped in pieces and assemblers for furniture wholesalers and retailers put together the furniture prior to delivery.

Team assemblers, the largest specialty, accounted for 61 percent of assembler and fabricator jobs. The distribution of employment among the various types of assemblers was as follows in 2006:

Team assemblers 1,274,000
Electrical and electronic equipment assemblers 213,000
Structural metal fabricators and fitters.....103,000
Electromechanical equipment assemblers 60,000
Engine and other machine assemblers 45,000
Fiberglass laminators and fabricators 33,000
Aircraft structure, surfaces, rigging, and systems assemblers.....28,000
Coil winders, tapers, and finishers.....23,000
Timing device assemblers, adjusters, and calibrators 2,500
Assemblers and fabricators, all other.....292,000

Job Outlook

Employment of assemblers and fabricators is projected to decline slowly, primarily reflecting productivity growth and strong foreign competition in manufacturing. Job opportunities are expected to be good for qualified applicants in the manufacturing sector, particularly in jobs needing more training.

Employment change. Employment of assemblers and fabricators is expected to decline slowly by 4 percent between 2006 and 2016. Within the manufacturing sector, employment of assemblers and fabricators will be determined largely by the growth or decline in the production of certain manufactured goods. In general, despite projected growth in the output of manufactured goods, employment overall is expected to decline as the whole sector becomes more automated and is able to produce more with fewer workers. However, some individual industries are projected to have more jobs than others. The aircraft products and parts industry is projected to gain jobs over the decade as demand for new commercial and military planes grows significantly. Thus, the need for aircraft structure, surfaces, rigging, and systems assemblers is expected to grow. In addition, because much of the assembly in the aerospace industry is done in hard-to-reach locations—inside airplane fuselages or gear boxes, for example—which are unsuited to robots, aircraft assemblers will not be as easily replaced by automated processes.

In most other manufacturing industries, employment of assemblers and fabricators will be negatively affected by increasing automation, improving productivity, and the shift of assembly to countries with lower labor costs. The effects of automation, though, will be felt more among some types of assemblers and fabricators than among others. Automation will replace workers in operations with a large volume of repetitive work. Automation will have less effect on the assembly of parts that are irregular in size or location.

The use of team production techniques has been one factor in the continuing success of the manufacturing sector, boosting productivity and improving the quality of goods. Thus, while the number of assemblers overall is expected to decline in manufacturing, the number of team assemblers will grow or remain stable as more manufacturing plants convert to using team production techniques.

Other manufacturers have sent their assembly functions to countries where labor costs are lower. Decisions by U.S. corporations to move assembly to other nations should limit employment growth for assemblers in some industries, but a free trade environment also may lead to growth in the export of goods assembled in the United States.

The largest increase in the number of assemblers and fabricators is projected to be in the employment services industry,

which supplies temporary workers to various industries. Temporary workers are gaining in importance in the manufacturing sector and elsewhere as companies strive for a more flexible workforce to meet the fluctuations in the market. There will also be more jobs for assemblers and fabricators in the wholesale and retail sectors of the economy. As more goods come unassembled from foreign countries to save on shipping costs, wholesalers and retailers are increasingly assembling products before selling them to their customers.

Job prospects. Job opportunities for assemblers are expected to be good for qualified applicants in the manufacturing sector, particularly in jobs needing more training. Some employers report difficulty finding qualified applicants looking for manufacturing employment. The best opportunities should be with smaller manufacturers as large, high-profile companies tend to attract more applicants. In addition to new jobs stemming from growth in this occupation, many job openings will result from the need to replace workers leaving or retiring from this large occupational group. For example, foreign automobile manufacturers who built plants in the 1980s are expecting a large number of retirements in the next decade and a surge in demand for team assemblers.

Earnings

Earnings vary by industry, geographic region, skill, educational level, and complexity of the machinery operated. Median hourly wage-and-salary earnings of team assemblers were $11.63 in May 2006. The middle 50 percent earned between $9.22 and $14.93. The lowest 10 percent earned less than $7.69, and the highest 10 percent earned more than $19.14. Median hourly wage-and-salary earnings in the manufacturing industries employing the largest numbers of team assemblers were as follows:

Motor vehicle manufacturing	$21.60
Motor vehicle parts manufacturing	13.06
Other wood products manufacturing	11.11
Plastics products manufacturing	10.64
Employment services	9.20

Median hourly wage-and-salary earnings of electrical and electronic equipment assemblers were $12.29 in May 2006. The middle 50 percent earned between $9.84 and $15.80. The lowest 10 percent earned less than $8.25, and the highest 10 percent earned more than $19.81. Median hourly wage-and-salary earnings in the manufacturing industries employing the largest numbers of electrical and electronic equipment assemblers were as follows:

Navigational, measuring, electromedical, and control instruments manufacturing	$13.42
Electrical equipment manufacturing	13.05
Computer and peripheral equipment manufacturing	12.80
Communications equipment manufacturing	11.96
Semiconductor and other electronic component manufacturing	11.45

In May 2006, other assemblers and fabricators had the following median hourly wage-and-salary earnings:

Aircraft structure, surfaces, rigging, and systems assemblers	$21.83
Engine and other machine assemblers	15.99
Structural metal fabricators and fitters	14.56
Timing device assemblers, adjusters, and calibrators	13.86
Electromechanical equipment assemblers	13.25
Coil winders, tapers, and finishers	12.64
Fiberglass laminators and fabricators	12.49
Assemblers and fabricators, all other	12.85

Many assemblers and fabricators are members of labor unions. These unions include the International Association of Machinists and Aerospace Workers; 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 and machine setters, operators, and tenders—metal and plastic. Also, both millwrights and tool and die makers assemble complex manufacturing equipment. Assemblers and fabricators also are responsible for some quality control and product testing, as are inspectors, testers, sorters, samplers, and weighers.

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.