

# Career Opportunities in Manufacturing

**M**ANUFACTURING CAREERS develop and change with technology innovation. Jobs are rewarding—the work, the outcomes, and the responsibility. Career opportunities in manufacturing range from monitoring and controlling large chemical reactions to inspecting products and materials. The skills and knowledge required for each particular field vary.



## Objective:



Review various manufacturing careers.

## Key Terms:



chemical equipment controller  
CNC programmer  
materials inspector  
metal fabricator  
tool and die maker

## Understanding Manufacturing Career Opportunities

Manufacturing, according to some, has moved completely overseas. Others, however, know that various opportunities still exist in manufacturing in the United States.

## MANUFACTURING CAREERS

Many careers and jobs exist in the U.S. manufacturing industry. Following is a partial list of manufacturing career and job titles. Find a career or job of interest, and do some research to learn more.

- ◆ Chemical equipment controller or operator
- ◆ CNC programmer
- ◆ Cutting and slicing machine operator
- ◆ Electrical, electronic, or electromechanical equipment installer
- ◆ Extruding machine operator
- ◆ Fabricator
- ◆ Grinding machine set-up operator
- ◆ Machinist
- ◆ Materials inspector, handler, sorter, or tester
- ◆ Metal fabricator (structural metal products)
- ◆ Mechanical inspector
- ◆ Plastic molding and casting machine operator
- ◆ Precision device inspector or operator
- ◆ Printing machine operator
- ◆ Printing press machine operator
- ◆ Production laborer
- ◆ System operator
- ◆ Timing device assembler, adjuster, or calibrator
- ◆ Tool and die maker
- ◆ Welder
- ◆ Woodworker



**FIGURE 1.** This mechanical technician is working at a CNC machining milling center. Many manufacturing jobs require skills and the use of machining software.



**FIGURE 2.** Many manufacturing jobs exist in the chemical and pharmaceutical industry. This pharmaceutical manufacturing environment creates pill packs and requires precise monitoring of machines by technicians.

## COMMON MANUFACTURING CAREERS

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Before attending college, you need to know your interest and must be aware of employment opportunities. To do this effectively, you need to know the appropriate titles of jobs that may be of interest to you and search online for opportunities to investigate demand.

### Chemical Equipment Controller

A **chemical equipment controller** is a person who operates equipment to adjust and control chemical changes or reactions for industrial or consumer products. He or she controls the flow of liquid or chemicals with precision equipment. The equipment varies depending on the specific task, but it may include reaction kettles, reactor vessels, saturator tanks, batch treating, electrolytic cells, and recovery units.

These jobs require knowledge of the processes and equipment used to perform precise chemical reactions. Activating material feeds, agitators, pumps, and valves controls these reactions. The equipment a chemical controller uses must maintain a specific pressure and temperature during the manufacturing process. Traditionally, the controller had to monitor a series of meters, recording instruments, and gauges. Now much of the data is digital. More advanced manufacturing facilities have digital displays on all monitors.

Some equipment controller jobs are fairly automatic, and the processes are followed and administered through equipment. Other jobs require mixing chemicals or various agents according to a prescribed formula. A controller is required to keep constant and accurate records of all activities. The particular job tasks may include collecting samples for product testing, inspecting the equipment and cleaning it at specified intervals, and/or making minor repairs.

Required knowledge and skills are chemistry, general math and science, and mechanical training, including operational and maintenance of tools and equipment. Required education and experience include a high school diploma with on-the-job training. However, vocational and specialty knowledge is preferred.

### CNC Programmer

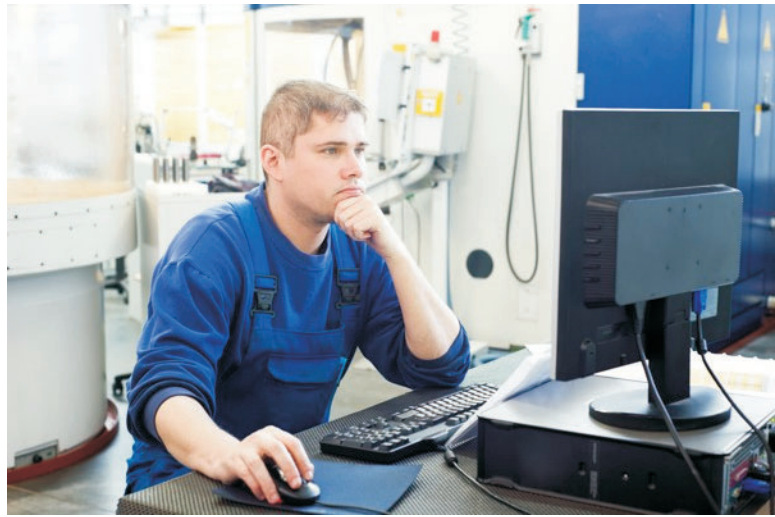
A **CNC programmer** is a person who controls automatic machining tools (for wood, metal, and plastics) with the use of computer programs. The programs control the machines with electronic numeric data generated by computers. A programmer must understand the appropriate software to prepare geometric data for processing by the equipment and be able to check all data with drawing specifications.

Job tasks are reading engineering drawings and blueprints; creating sketches of parts so you can plan tooling or cutting paths; establishing the correct type, size, and location of cutting tools, their starting points, and any change points (if needed); and making basic math and geometry calculations.

A CNC programmer is responsible for ensuring that the equipment is working properly, performing inspections, and providing minor maintenance. Knowledge and skills include

computer programming language or software, algebra, and geometry. Workplace skills include being well organized and the ability to understand and comprehend written material.

Required education and experience include on-the-job training, equipment or program certification, and an associate's degree. A four-year degree may be helpful as well as completion of any vocational or postsecondary robotics programs and automatic computer-controlled machine programs.



**FIGURE 3.** CNC programmers control automatic machining tools with the use of computer programs.

### Materials Inspector

A **materials inspector** (handler, sorter, or tester) is a person who monitors the quality standard for all manufactured products from foods to electronics. Specific job tasks vary across manufacturing types according to a range of control factors and criteria (e.g., sight and smell) or imperfections (e.g., dents, scratches, and missing parts). Inspectors verify that the material meets exact specifications or characteristics required for the final product. Material inspectors are involved throughout all manufacturing stages.

Some jobs require knowledge of machinery used to inspect or sort the product. Other jobs may require only a quick visual inspection. In addition, a range of tools is used to conduct material and product tests. For example, electronic equipment requires ammeters and voltmeters. This equipment is tested and checked to make sure it is working properly. Today a lot of the inspection is performed electronically.

Some material inspectors perform a series of real tests on products and materials to ensure the materials perform as desired and last as long as guaranteed. Knowledge and skills required include math aptitude, mechanical aptitude, and reading comprehension skills, especially for manuals and specifications.



**FIGURE 4.** An ammeter measures the electric current in a circuit. A voltmeter measures electric potential—the difference in an electrical charge between two points in a circuit expressed in volts.



## FURTHER EXPLORATION...

### ONLINE CONNECTION: Material Inspector and Digital Technology

Many material inspection positions exist that require interactive testing. Also, numerous material inspection jobs are being replaced by digital technology. Computers are replacing many traditional inspection jobs requiring visual verification. To learn more about automated vision inspection, watch the video at <http://www.youtube.com/watch?v=nlpR8FT2RMY>.

Educational and training experiences vary depending on the field. For instance, a high school diploma is usually sufficient for basic material inspection and handling. Postsecondary and additional vocational studies, including certificates, may be required for more advanced tasks, including specialized instrument training.

### Metal Fabricator

A **metal fabricator** is a person who assembles and fabricates (constructs and/or produces) metal products. A fabricator makes many structures, including the framework for machinery or assembly systems and structural members for engineering and architectural jobs. A metal fabricator will sequence the fabrication process of the metal product and understand how a metal workpiece can be cut, bent, or welded to create specific forms. Therefore, a fabricator operates many machines, including jigs, drill presses, flame cutters, welding torches, brakes, rolls, and shears as well as precision instruments for measurement.

Some fabrication processes are performed by hand, and others require machining operations. Knowledge and skills required include mechanical; building and construction; engineering technology; design; production processes; material properties; math (e.g., trigonometry); and equipment analysis, monitoring, and control. Educational requirements are a high school diploma and on-the-job training. Depending on the specific job or position, additional classroom instruction, an associate's degree, or specialized training may be required.



**FIGURE 5.** A metal fabricator performs several tasks to machine or build a part. Knowledge of the material and various machining tools is helpful, including the drill press and steel coil processing machinery shown here.

## Tool and Die Maker

A **tool and die maker** is a person who operates conventional and computer numerically controlled (CNC) production machine tools, dies, jigs, gauges, and special guiding and holding devices. He or she also repairs existing devices required by other machines to perform a specific function. The job ranges from producing parts and equipment for automobiles and aircraft to textile production equipment.

Large manufacturing facilities may have their own in-house tool and die makers. Other facilities contract with a specialized machine shop. Tool and die makers are required to analyze blueprints and plans to lay out metal stock that is cut and trimmed into specific shapes and set up a series of operations needed to produce the final piece.

A tool and die maker adjusts, files, grinds, modifies, and assembles parts using machine tools and hand tools. He or she also operates conventional and CNC machine tools, including grinders, lathes, milling machines, and drill presses to cut, bore, and grind working stock. Precision instruments (e.g., micrometers, calipers, and scribes) are used to verify dimensions and tolerances. Knowledge of metal properties and procedures is required to achieve the desired finish of products.

Required skills and knowledge include mechanical, production and processing, equipment operation, control, and selection. Education and training is usually four to five years of classroom and on-the-job training in a formal apprenticeship. Some apprentices work and attend technical or community college at the same time. Courses include computer technology, mathematics, and tool programming.

### Summary:



A chemical equipment controller operates equipment to adjust and control chemical changes or reactions for industrial or consumer products. A CNC programmer controls automatic machining tools for wood, metal, and plastics with computer programs. The programs control the machines with electronic numeric data generated by computers.

A materials inspector monitors the quality standard for all manufactured products from foods to electronics. Materials are inspected according to a range of control factors and criteria, such as sight and smell or imperfections (e.g., dents, scratches, and/or missing parts).

A metal fabricator assembles and constructs metal products. This may include the framework for machinery or assembly systems as well as structural members for engineering and architectural jobs. A tool and die maker operates conventional and computer numerically controlled (CNC) machines. The job includes the production and repair of tools, dies, jigs, gauges, and special guiding and holding devices.

## Checking Your Knowledge:

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1. Describe the job tasks of a chemical equipment controller.
2. Describe the job tasks and educational requirements of a CNC programmer.
3. Describe the job tasks of a materials inspector.
4. Describe the job tasks of a metal fabricator.
5. Describe the skills of a tool and die maker.

## Expanding Your Knowledge:

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Take a tour of a local manufacturing facility to see manufacturing occupations in action. Create a list of jobs that interest you. Then call the firm's public relations office to request a tour of the facility.

## Web Links:

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### CNC Programmer

<http://www.wisegeek.com/how-do-i-become-a-cnc-programmer.htm>

### Chemical Equipment Workers

[https://secure.cfww.com/Career\\_Planning/Career\\_Profile/Career\\_Profile.aspx?id=oYKoBengdIXAP2FPAXvIHbK0Lwb7gXAP3DPAXXAP3DPAX](https://secure.cfww.com/Career_Planning/Career_Profile/Career_Profile.aspx?id=oYKoBengdIXAP2FPAXvIHbK0Lwb7gXAP3DPAXXAP3DPAX)

### Machinists and Tool and Die Makers

<http://www.bls.gov/ooh/production/machinists-and-tool-and-die-makers.htm>

### CNC Programmers

<http://www.apprenticesearch.com/AboutTrades/GetTradeDetails?tradeId=36&TradeName=cnc-programmer>