

# Inspectors, Testers, Sorters, Samplers, and Weighers

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## Significant Points

- Seven out of 10 worked in manufacturing establishments.
- For workers who perform relatively simple tests of products, a high school diploma is sufficient; experienced production workers fill more complex inspecting positions.
- Employment is expected to grow more slowly than average, reflecting the growth of automated inspection and the redistribution of quality-control responsibilities from inspectors to other production workers.

## Nature of the Work

Inspectors, testers, sorters, samplers, and weighers ensure that your food will not make you sick, that your car will run properly, and that your pants will not split the first time you wear them. These workers monitor or audit quality standards for virtually all manufactured products, including foods, textiles, clothing, glassware, motor vehicles, electronic components, computers, and structural steel. As product quality becomes increasingly important to the success of many manufacturing firms, daily duties of inspectors have changed. In some cases, the job titles of these workers also have been changed to *quality-control inspector* or a similar name, reflecting the growing importance of quality. (A separate statement on construction and building inspectors appears elsewhere in the *Handbook*.)

Regardless of title, all inspectors, testers, sorters, samplers, and weighers work to guarantee the quality of the goods their firms produce. Job duties, even within one company, vary by the type of products produced or the stage of production. Specific job duties also vary across the wide range of industries in which these workers are found. For example, inspectors may check products by sight, sound, feel, smell, or even taste to locate imperfections such as cuts, scratches, bubbles, missing pieces, misweaves, or crooked seams. These workers also may verify dimensions, color, weight, texture, strength, or other physical characteristics of objects. Machinery testers generally verify that parts fit, move correctly, and are properly lubricated; check the pressure of gases and the level of liquids; test the flow of electricity; and do a test run to check for proper operation. Some jobs involve only a quick visual inspection; others require a longer, detailed one. Sorters may separate goods according to length, size, fabric type, or color, while samplers test or inspect a sample taken from a batch or production run for malfunctions or defects. Weighers weigh quantities of materials for use in production.

Inspectors, testers, sorters, samplers, and weighers are involved at every stage of the production process. Some inspectors examine materials received from a supplier before sending them to the production line. Others inspect components and assemblies or perform a final check on the finished product. Depending on their skill level, inspectors also may set up and test equipment, calibrate precision instruments, repair defective products, or record data.

Inspectors, testers, sorters, samplers, and weighers rely on a number of tools to perform their jobs. Many use micrometers, calipers, alignment gauges, and other instruments to check and compare the dimensions of parts against the parts' specifications. They also may

operate electronic equipment, such as coordinate measuring machines (CMMs), which use sensitive probes to measure a part's dimensional accuracy and compare the results with a computerized blueprint. Inspectors testing electrical devices may use voltmeters, ammeters, and oscilloscopes to test insulation, current flow, and resistance.

Inspectors mark, tag, or note problems. They may reject defective items outright, send them for repair or correction, or fix minor problems themselves. If the product is acceptable, inspectors may screw on a nameplate onto it, tag it, stamp it with a serial number, or certify it in some other way. Inspectors, testers, sorters, samplers, and weighers record the results of their inspections, compute the percentage of defects and other statistical measures, and prepare inspection and test reports. Some electronic inspection equipment automatically provides test reports containing these inspection results. When defects are found, inspectors notify supervisors and help to analyze and correct the production problems.

The emphasis on finding the root cause of defects is a basic tenet of modern management and production philosophies. Industrial production managers (see the statement on this occupation elsewhere in the *Handbook*) work closely with the inspectors to reduce defects and improve quality. In older production philosophies, it was considered acceptable to simply throw away or repair defective parts, but the root cause of the defects remained. A certain level of defects was considered acceptable because variations would always occur. Current philosophies emphasize constant quality improvement through analysis and correction of the causes of defects. The nature of inspectors' work has changed from merely checking for defects, to determining the cause of those defects.

Increased emphasis on quality control in manufacturing means that inspection is more fully integrated into the production process than in the past. Formerly, many companies considered quality control to be independent from the production work. Now, companies have integrated teams of inspection and production workers to jointly review and improve product quality. In addition, many companies now use self-monitoring production machines to ensure that the output is produced within quality standards. Self-monitoring machines can alert inspectors to production problems and automatically repair defects in some cases. Many firms have completely automated inspection with the help of advanced vision inspection systems, using machinery installed at one or several points in the production process. Inspectors in these firms calibrate and monitor the equipment, review output, and perform random product checks.

Testers repeatedly test existing products or prototypes under real-world conditions. For example, they may purposely abuse a machine by not changing its oil to see when failure occurs. They may devise automated machines to repeat a basic task thousands of times,



*Inspectors calibrate scales.*

such as opening and closing a car door. Through these tests, companies determine how long a product will last, what parts will break down first, and how to improve durability.

### Working Conditions

Working conditions vary by industry and establishment size. As a result, some inspectors examine similar products for an entire shift, whereas others examine a variety of items. In manufacturing, it is common for most inspectors to remain at one workstation; in transportation, some travel from place to place to do inspections. Inspectors in some industries may be on their feet all day and may have to lift heavy objects, whereas, in other industries, they sit during most of their shift and do little strenuous work. Workers in heavy manufacturing plants may be exposed to the noise and grime of machinery; in other plants, inspectors work in clean, air-conditioned environments suitable for carrying out controlled tests.

Some inspectors work evenings, nights, or weekends. Shift assignments generally are made on the basis of seniority. Overtime may be required to meet production goals.

### Employment

Inspectors, testers, sorters, samplers, and weighers held about 515,000 jobs in 2002. About 7 out of 10 worked in manufacturing establishments that produced such products as motor vehicle parts, plastics products, semiconductor and other electronic components, and aerospace products and parts. Inspectors, testers, sorters, samplers, and weighers also were found in employment services, architectural, engineering, and related services, wholesale trade, and government agencies.

### Training, Other Qualifications, and Advancement

Training requirements vary, based on the responsibilities of the inspector, tester, sorter, sampler, or weigher. For workers who perform simple “pass/fail” tests of products, a high school diploma generally is sufficient. Simple jobs may be filled by beginners provided with in-house training. Training for new inspectors may cover the use of special meters, gauges, computers, or other instruments; quality-control techniques; blueprint reading; safety; and reporting requirements. There are some postsecondary training programs in testing, but many employers prefer to train inspectors on the job.

Complex precision-inspecting positions are filled by experienced assemblers, machine operators, or mechanics who already have a thorough knowledge of the products and production processes. To advance to these positions, experienced workers may need training in statistical process control, new automation, or the company’s quality assurance policies. As automated inspection equipment becomes more common, computer skills are increasingly important.

In general, inspectors, testers, sorters, samplers, and weighers need mechanical aptitude, math and communication skills, and good hand-eye coordination and vision. Advancement for these workers frequently takes the form of higher pay. They also may advance to inspector of more complex products, supervisor, or related positions such as purchaser of materials and equipment.

### Job Outlook

Like that of many other occupations concentrated in manufacturing industries, employment of inspectors, testers, sorters, samplers, and weighers is expected to grow more slowly than average through the year 2012. The slower than average growth stems primarily from the growing use of automated inspection and the redistribution of quality-control responsibilities from inspectors to production workers. Numerous job openings also will arise due to turnover in this large occupation. Many of these jobs, however, will be open only to experienced production workers with advanced skills.

Employment of inspectors, testers, sorters, samplers, and weighers will be positively affected by the increased focus on quality in American industry. The emphasis on improving quality and productivity has led manufacturers to invest in automated inspection equipment, hire more inspectors, and to take a more systematic approach to quality inspection. Continued improvements in technologies, such as spectrophotometers and computer-assisted visual inspection systems, allow firms to effectively automate simple inspection tasks, increasing worker productivity and reducing the demand for inspectors.

Inspectors will continue to operate these automated machines and monitor the defects they detect. The increased emphasis on quality has increased the importance of inspection and the demand for inspectors. These two trends—increased emphasis on inspection and increased automation of inspection—have had opposite effects on the demand for inspectors.

Apart from automation, firms are integrating quality control into the production process. Many inspection duties are being redistributed from inspectors, testers, sorters, samplers, and weighers to other production workers who monitor quality at every stage of the process. In addition, the growing implementation of statistical process control is resulting in “smarter” inspection. Using this system, firms survey the sources and incidence of defects so that they can better focus their efforts on reducing production of defective products.

In many industries, however, automation is not being aggressively pursued as an alternative to manual inspection. Where key inspection elements are oriented toward size, such as length, width, or thickness, automation may play some role in the future. But where taste, smell, texture, appearance, fabric complexity, or product performance is important, inspection will probably continue to be done by workers. Employment of inspectors, testers, sorters, samplers, and weighers is expected to increase in the rapidly growing employment services industry, as more manufacturers and industrial firms hire temporary inspectors to increase the flexibility of their staffing strategies.

### Earnings

Median hourly earnings of inspectors, testers, sorters, samplers, and weighers were \$13.01 in 2002. The middle 50 percent earned between \$9.84 and \$17.46 an hour. The lowest 10 percent earned less than \$7.81 an hour, and the highest 10 percent earned more than \$23.56 an hour. Median hourly earnings in the industries employing the largest numbers of inspectors, testers, sorters, samplers, and weighers in 2002 were:

Aerospace product and parts manufacturing .....	\$18.24
Motor vehicle parts manufacturing .....	16.49
Semiconductor and other electronic component manufacturing .	12.86
Plastics product manufacturing .....	11.94
Employment services .....	8.85

### Related Occupations

Other workers who conduct inspections include agricultural inspectors, construction and building inspectors, fire inspectors and investigators, forest fire inspectors and prevention specialists, occupational health and safety specialists and technicians, and transportation inspectors.

### Sources of Additional Information

For general information about inspection and testing, contact:

► American Society for Quality, 600 North Plankinton Ave., Milwaukee, WI 53203. Internet: <http://www.asq.org>