
Inspectors, Testers, Sorters, Samplers, and Weighers

(O*NET 51-9061.00)

Significant Points

- Almost 7 in 10 are employed in manufacturing establishments.
- While a high school diploma is sufficient for basic testing of products, 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.
- Employment is expected to decline slowly, 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 domestically 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. Specific job duties also vary across the wide range of industries in which these workers are found. For example, materials 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. Mechanical inspectors 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 prod-

uct. 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. Although some still use hand held measurement devices such as micrometers, calipers, and alignment gauges, it is more common for them to operate electronic inspection equipment, such as coordinate measuring machines (CMMs). These machines use sensitive probes to measure a part's dimensional accuracy and allow the inspector to analyze the results using computer software. Inspectors testing electrical devices may use voltmeters, ammeters, and oscilloscopes to test insulation, current flow, and resistance. All the tools that inspectors use are maintained by calibration technicians, who ensure that they work properly and generate accurate readings.

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 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.



Inspectors, testers, sorters, samplers, and weighers often work in laboratories and may need a background in science.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-16	
				Number	Percent
Inspectors, testers, sorters, samplers, and weighers.....	51-9061	491,000	457,000	-35,000	-7

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*.

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 the past, 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. 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.

Some 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 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, 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.

Work environment. 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. 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 read electronic printouts with massive quantities of data. 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. Other inspectors rarely see the products they are inspecting and instead do the majority of their work examining electronic readouts in front of a computer.

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.

Training, Other Qualifications, and Advancement

Most inspectors, testers, sorters, samplers, and weighers enter the occupation after spending years at a particular company or in an industry. They usually get their training on the job.

Education and training. 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, together with basic in-house training. Training for new inspectors may cover the use of special meters, gauges, computers and 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.

Chances of finding work in this occupation can be improved by studying industrial trades, including computer-aided design, in high school or in a postsecondary vocational program. Laboratory work in the natural or biological sciences may also improve one's analytical skills and enhance the ability to find work in medical or pharmaceutical labs where many of these workers are employed.

As companies implement more automated inspection techniques that require less manual inspection, workers in this occupation have to learn to operate and program more sophisticated equipment and learn software applications. Since this requires additional skills, the need for higher education may be necessary. To address this need, some colleges are offering associate degrees in fields such as quality control management.

Other qualifications. In general, inspectors, testers, sorters, samplers, and weighers need mechanical aptitude, math and communication skills, and good hand-eye coordination and vision. Another important skill is the ability to analyze and interpret blueprints, data, manuals, and other material to determine specifications, inspection procedures, formulas, and methods for making adjustments.

Certification and advancement. Complex inspection 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 and electronic recording of results is common, computer skills are also important.

Training has become more formalized with the advent of standards from the International Organization for Standardization. As a result, certification as a quality inspector, offered by the American Society for Quality, is designed to certify that someone is trained in the field and may enable workers to advance within the occupation. To take the exam for certification,

two years of on the job experience in mechanical inspection or a related field is required.

Advancement for workers with the necessary skills frequently takes the form of higher pay. They may also advance to inspector of more complex products, supervisor, or related positions such as purchaser of materials and equipment.

Employment

Inspectors, testers, sorters, samplers, and weighers held about 491,000 jobs in 2006. About 7 in 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, wholesale trade, architectural, engineering, and related services, and government agencies.

Job Outlook

Like that of many other occupations concentrated in manufacturing industries, employment of inspectors, testers, sorters, samplers, and weighers is expected to decline moderately through the year 2016. The decline stems primarily from the growing use of automated inspection and the redistribution of some quality-control responsibilities from inspectors to production workers. Additionally, as manufacturing companies continue to move some production offshore, the need for these workers will lessen.

Employment change. Employment of inspectors, testers, sorters, samplers, and weighers is expected to decline moderately by 7 percent between 2006 and 2016. Because the majority of inspectors, testers, sorters, samplers, and weighers work in the manufacturing sector, their outlook is greatly affected by what happens to manufacturing companies. As this sector becomes more automated and productive and as some production moves offshore, the number of inspectors, testers, sorters, samplers, and weighers is expected to decline. However, the continuing emphasis on producing quality goods and the need for accuracy in the growing medical and biotechnology fields will positively affect this occupation and moderate the decline.

In some industries, however, automation is not a feasible alternative to manual inspection. Where key inspection elements are oriented toward size, such as length, width, or thickness, automation will become more important in the future. But where taste, smell, texture, appearance, fabric complexity, or product performance is important, inspection will continue to be done by workers. Employment of inspectors, testers, sorters, samplers, and weighers is expected to increase faster than average in the employment services industry, as manufacturers and industrial firms hire more temporary inspectors to increase the flexibility of their staffing.

The emphasis on improving quality and productivity has led manufacturers to invest in automated inspection equipment

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 inspection tasks, increasing workers' productivity and reducing the demand for inspectors. Inspectors will continue to operate these automated machines and monitor the defects they detect. Thus, while the growing emphasis on quality has increased the importance of inspection, the increased automation of inspection has limited the demand for inspectors.

Apart from automation, firms are integrating quality control into the production process. Many inspection duties are being redistributed from specialized inspectors to fabrication and assembly workers who monitor quality at every stage of the production 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.

Job prospects. Although numerous job openings will arise due to the need to replace workers who move out of this large occupation, many of these jobs will be open only to experienced workers with advanced skills.

Earnings

Median hourly earnings of inspectors, testers, sorters, samplers, and weighers were \$14.14 in May 2006. The middle 50 percent earned between \$10.84 and \$18.79 an hour. The lowest 10 percent earned less than \$8.65 an hour, and the highest 10 percent earned more than \$24.85 an hour. Median hourly earnings in the industries employing the largest numbers of inspectors, testers, sorters, samplers, and weighers in May 2006 were:

Aerospace product and parts manufacturing.....	\$20.62
Motor vehicle parts manufacturing.....	16.74
Semiconductor and other electronic component manufacturing	13.32
Plastics product manufacturing.....	12.85
Employment services.....	11.12

Related Occupations

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

Sources of Additional Information

For general information about inspection, testing, and certification, contact:

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

