

Textile Mills and Products

(NAICS 313, 314)

SIGNIFICANT POINTS

- Extensive on-the-job training is required to operate new high-tech machinery.
- Production workers account for more than 3 out of 5 jobs.
- Employment is expected to decline, due to technological advances and an open trading environment.
- About 3 out of 5 jobs are in three States—North Carolina, South Carolina, and Georgia.

Nature of the Industry

The textile mills and products industry comprises establishments that produce yarn, thread, and fabric and also a wide variety of textile products for use by individuals and businesses, but not including apparel. Some of the items made in this industry include household items, such as carpets and rugs, towels, curtains, and sheets; cord and twine; furniture and automotive upholstery; and industrial belts and fire hoses. The process of converting raw fibers into finished nonapparel textile products is complex; thus, most textile mills specialize. In general, there is little overlap between knitting and weaving mills, or among mills that produce cotton and wool fabrics.

Textile mills take natural and synthetic fibers, such as cotton and polyester and transform them into yarn, thread, or webbing. Yarns are strands of fibers in a form ready for weaving, knitting, or otherwise intertwining to form a textile fabric. They form the basis for most textile production and commonly are made of cotton, wool, or synthetic fiber, such as polyester. Yarns also can be made of thin strips of plastic, paper, or metal. To produce spun yarn, natural fibers, such as cotton and wool, must first be processed to remove impurities and give products the desired texture and durability, as well as other characteristics. After this initial cleaning stage, the fibers are spun into yarn.

Fabric and textile products are mostly produced by means of weaving, knitting, and tufting. Workers in weaving mills use looms to transform yarns into cloth, a process that has been known for centuries. Looms weave or interlace two yarns, so they cross each other at right angles to form fabric. Although modern looms are complex, automated machinery, the principle remains the same as in ancient times.

Knitting is another method of transforming yarn into fabric. Knitting interlocks a series of loops of one or more yarns to form familiar goods, such as sweaters. However, unlike the knitting done with hand-held needles, knitting in the textile industry is performed on automated machines. Many consumer items, such as socks, panty hose, and underwear, are produced from knitted fabric.

Tufting, used by carpeting and rug mills, is a process by which a cluster of soft yarns is drawn through a backing fabric. These yarns project from the backing's surface in the form of cut yarns or loops to form the familiar texture of many carpets and rugs.

At any time during the production process, a number of processes, called finishing, may be performed on the fabric. These processes, which include dyeing, bleaching, and stonewashing, among others, may be performed by the textile mill or at a separate finishing mill. Finishing encompasses chemical or mechanical treatments performed on fiber, yarn, or fabric to improve appearance, texture, or performance. Mechanical finishes can involve brushing, ironing, or other physical treatments used to increase the luster and feel of textiles. Application of chemical finishes to textiles can impart a variety of properties ranging from decreasing static cling to increasing flame resistance. The most common chemical finishes are those that ease fabric care, such as the permanent-press and stain-resistant finishes.

Dyeing operations are used at various stages of production to add color and intricacy to textiles and increase product value. Textiles are dyed using a wide range of dyestuffs, techniques, and equipment. Most fabric that is dyed, printed, or finished must first be prepared. In preparation, the mill removes natural impurities or processing chemicals that interfere with dyeing, printing, and finishing. Typical preparation treatments include desizing, scouring, and bleaching. Finally the finished cloth is fabricated into a variety of household and industrial products.

Regardless of the process used, mills in the textile industry are rapidly modernizing, as new investments in automation and information technology have been made necessary by growing domestic and international competition. Firms also have responded to competition by developing new products and services. For example, some manufacturers are producing textiles developed from fibers made from recycled materials. These innovations have had a wide effect across the industry. Advanced machinery is boosting productivity levels in textiles, costing some workers their jobs, while fundamentally changing the nature of work for others. New technology also has led to broad and increasingly technical training for workers throughout the industry.

The emphasis in the industry continues to shift from mass production to flexible manufacturing, as textile mills aim to supply customized markets. Firms are concentrating on systems that allow small quantities to be produced with minimum leadtime. This flexibility brings consumer goods to retailers significantly faster than before. Information technology allows

the retail industry to rapidly assess its needs and communicate them back through the apparel manufacturer to textile firms.

Working Conditions

Working conditions vary greatly. Production workers, including front-line managers and supervisors, spend most of their shift on or near the production floor. Some factories are noisy and can have airborne fibers and odors; but most modern textile facilities are relatively clean, well lit, and ventilated.

In 2002, work-related injuries and illnesses in the textile mill products industry averaged 5.2 per 100 full-time workers, compared with 7.2 percent for all manufacturing and 5.3 percent for the entire private sector. This record has been achieved in part by requiring, when appropriate, the use of protective shoes, clothing, facemasks, and earplugs. Also, new machinery is designed with additional protection, such as noise shields. Still, many workers in production occupations must stand for long periods while bending over machinery, and noise and dust still are a problem in some plants. Workers are also sometimes exposed to hazardous situations that could produce cuts or minor burns if proper safety practices are not observed. Also, some workers are occasionally exposed to the fumes and odors of coolants and lubricants used in machines.

Because many mills run 24 hours a day as the cost of new machinery continues to increase, production workers may work evenings and weekends. Many operators work on rotating schedules, which can cause sleep disorders and other stress from constant changes in work hours. Production workers in textile mills averaged 3.4 overtime hours per week in 2002. Overtime is common for these workers during periods of peak production. Managerial and administrative support personnel typically work a 5-day, 40-hour week in an office setting, although some of these employees also may work significant overtime. Quality control inspectors and other workers may need to travel to other production sites, especially if working for large companies.

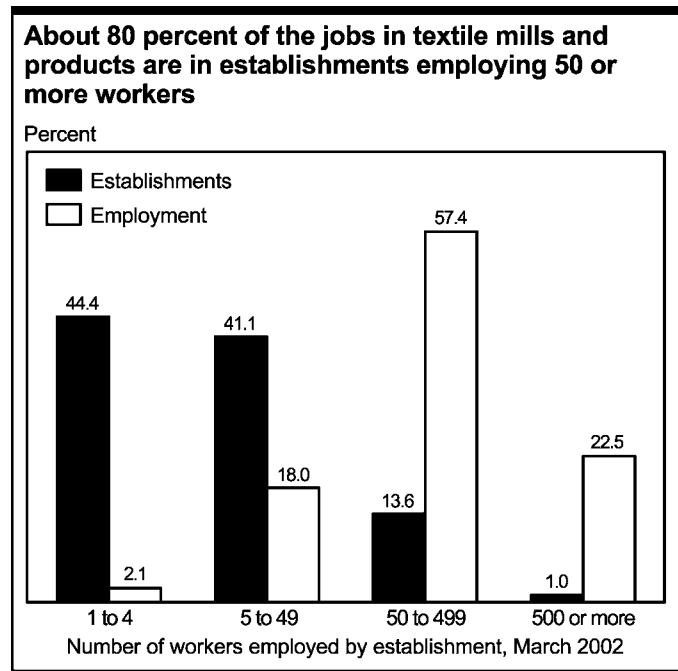
Employment

Most of the 489,000 wage and salary workers employed in the textile mills and products industry in 2002 were found in southeastern States. North Carolina accounted for about 28 percent of textile jobs. South Carolina and Georgia combined to provide employment for another 29 percent of the workers in this industry. The remaining jobs primarily were found in other areas of the South, California, and the Northeast.

Most textile production is concentrated in large mills. In fact, establishments employing more than 50 persons accounted for almost 80 percent of all textile workers (see chart).

Occupations in the Industry

The textile industry offers employment opportunities in a variety of occupations, but production occupations accounted for almost 64 percent of all jobs. Some of these production occupations are unique to the industry. (See table 1.) Additional opportunities also exist in material-moving, administrative support, maintenance, repair, management, and professional occupations. The industry also employs a small number of workers in service and sales occupations.



Many workers enter the textile industry as *machine setters and operators*, the largest occupational group in the industry. They are responsible for setting each machine and monitoring its operation. They inspect their machines to determine if they need repairs or adjustments. They may clean and oil their machines, and repair or replace worn parts. Additionally, they must diagnose problems when the machinery stops and restart it as soon as possible, to reduce costly machine idle time. Textile machine setters and operators also install, level, and align components such as gears, chains, dies, cutters, and needles.

Textile machine setters and operators thread yarn, thread, or fabric through guides, needles, or rollers. Extruding machine operators load chemicals or wood pulp into their machines. They adjust the controls for proper tension, speed, and heat; for electronically controlled equipment, they program controls or key in instructions using a computer keyboard. Operators then start the machines and monitor their operation, observing control panels and gauges to detect problems.

Skilled production occupations also include *quality control inspectors*, who use precision measuring instruments and complex testing equipment to detect product defects, wear, or deviations from specifications.

Among installation, maintenance, and repair occupations, *industrial machinery mechanics* account for about 2 percent of industry employment. They inspect machines to make sure they are working properly. They clean, oil, and grease parts and tighten belts on a regular basis. When necessary, they make adjustments or replace worn parts and put the equipment back together. Mechanics are under pressure to fix equipment quickly because breakdowns usually stop or slow production. In addition to making repairs, mechanics help install new machines. They may enter instructions for computer-controlled machinery and demonstrate the equipment to machine operators.

Plant workers who do not operate or maintain equipment mostly perform a variety of other material-moving tasks. Some

drive industrial trucks or tractors to move materials around the plant, load and unload trucks and railroad cars, or package products and materials by hand.

Engineers and engineering technicians, although a vital part of the textile industry, account for less than 1 percent of employment in the industry. Some engineers are *textile engineers*, who specialize in the design of textile machinery, the study of fibers, and textile production. The industry also employs other types of engineers, particularly *industrial* and *mechanical engineers*.

Training and Advancement

As the textile industry becomes increasingly automated, production workers need to be prepared. A high school diploma or GED may be necessary for many entry-level positions, and extensive postsecondary training is required for more technical jobs. This training may be obtained at technical schools and community colleges. More and more often, job applicants are screened through the use of tests, to ensure that they have the necessary skills.

Extensive on-the-job training has become an integral part of working in today's textile mills. Technical training is designed to help workers understand complex, automated machinery, recognize problems, and restart machinery when the problem is solved.

Installation, maintenance, and repair workers, such as industrial machinery mechanics, also require extensive training. Training may help experienced workers advance to more skilled jobs or even supervisory positions.

Increasingly, training is offered to enable people to work well in a team-oriented environment. Many firms have established training centers or hosted seminars that encourage employee self-direction and responsibility and the development of interpersonal skills. Because of the emphasis on teamwork and the small number of management levels in modern textile mills, firms place a premium on workers who show initiative and communicate effectively.

Engineering applicants generally need a bachelor's or advanced degree in a field of engineering or production management. Degrees in mechanical or industrial engineering are common, but concentrations in textile-specific areas of engineering are especially useful. For example, many applicants take classes in textile engineering, textile technology, textile materials, and design. These specialized programs usually are found in engineering and design schools in the South and Northeast. As in other industries, a technical degree with an advanced degree in business can lead to opportunities in management.

Earnings

Average weekly earnings of nonsupervisory textile production workers were \$477 in 2002, compared with \$619 for production workers in all manufacturing and \$506 for workers throughout private industry. Wages within the textile industry depend upon skill level and type of mill. Workers in textile goods manufacturing generally make more than those working in yarn and fabric mills. In addition to typical benefits, employees often are eligible for discounts in factory merchandise

Table 1. Employment of wage and salary workers in textile mill and products by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	489	100.0	-31.0
Management, business, and financial occupations	25	5.1	-29.7
Top executives	8	1.7	-27.4
Industrial production managers	5	1.0	-32.2
Professional and related occupations	10	2.1	-30.9
Sales and related occupations	9	1.9	-25.2
Sales representatives, wholesale and manufacturing, except technical and scientific products	6	1.2	-26.3
Office and administrative support occupations	47	9.6	-36.4
Bookkeeping, accounting, and auditing clerks	4	0.8	-37.0
Customer service representatives	3	0.7	-27.4
Production, planning, and expediting clerks	4	0.8	-30.8
Shipping, receiving, and traffic clerks	8	1.7	-35.6
Stock clerks and order fillers	4	0.9	-40.3
Office clerks, general	6	1.2	-34.4
Installation, maintenance, and repair occupations	31	6.4	-32.5
Industrial machinery mechanics	10	2.1	-32.7
Maintenance and repair workers, general	10	2.0	-32.7
Maintenance workers, machinery	4	0.9	-38.8
Production occupations	311	63.5	-30.1
First-line supervisors/managers of production and operating workers	19	3.9	-29.7
Team assemblers	13	2.8	-26.3
Printing machine operators	3	0.7	-43.1
Pressers, textile, garment, and related materials	4	0.7	-36.0
Sewing machine operators	54	11.0	-11.8
Textile machine setters, operators, and tenders	125	25.5	-37.5
Textile bleaching and dyeing machine operators and tenders	19	3.9	-43.1
Textile cutting machine setters, operators, and tenders	11	2.3	-32.3
Textile knitting and weaving machine setters, operators, and tenders	39	8.0	-39.1
Textile winding, twisting, and drawing out machine setters, operators, and tenders	55	11.3	-35.4
Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers	11	2.3	-33.4
All other textile, apparel, and furnishings workers	17	3.4	-31.1
Inspectors, testers, sorters, samplers, and weighers	19	3.9	-29.4
Helpers—Production workers	10	2.1	-38.3
Transportation and material moving occupations	49	9.9	-32.7
Industrial truck and tractor operators	9	1.9	-29.0
Laborers and freight, stock, and material movers, hand	15	3.0	-40.6
Machine feeders and offbearers	7	1.4	-37.3
Packers and packagers, hand	11	2.3	-23.8

NOTE: May not add to totals due to omission of occupations with small employment.

stores. Earnings in the largest occupations in textile mills and products industry appear in table 2.

Only 6.3 percent of textile workers were union members or were covered by a union contract in 2002, compared with 15 percent for the economy as a whole. The most prominent union in the industry is the Union of Needletrades, Industrial and Textile Employees (UNITE), which was formed in 1995 by the merger of the Amalgamated Clothing and Textile Workers Union and the International Ladies' Garment Workers Union.

Outlook

Wage and salary employment in the textile mills and products industry is expected to decline by about 31 percent through 2012, compared with an increase of 16 percent for all industries combined. Employment decreases will result from increasing worker productivity, an increase in imports, and the decline of the domestic apparel industry—a major buyer of textiles. Nevertheless, job openings will arise as experienced workers transfer to other industries, retire, or leave the workforce for other reasons.

Beginning in 2004, quotas will be lifted on apparel and textiles traded among our major trading partners. Although the agreements to lift quotas will open additional markets to textiles made in the United States, it is expected to result in a net increase in imports of textile products from countries with lower labor costs, particularly China. In addition, the overvalued dollar, unless it can be lowered, will continue to make imports cheaper relative to domestically produced products and will result in a rise in imports. Some textile companies have reacted to the rise in cheaper imports by closing small, inefficient plants or moving production to countries with lower costs. Other companies are consolidating, which further reduces employment.

Some segments of the textile industry, like industrial fabrics, carpets, and specialty yarns, are highly automated, innovative, and competitive on a global scale, so they will be able to

Table 2. Median hourly earnings of the largest occupations in textile mill and products, 2002

Occupation	Textile mills	Textile product mills	All industries
First-line supervisors/managers of production and operating workers	\$18.89	\$16.79	\$20.64
Industrial machinery mechanics	13.95	14.03	18.26
Maintenance and repair workers, general	13.71	13.65	14.12
Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers	12.26	11.90	13.22
Inspectors, testers, sorters, samplers, and weighers	10.52	9.98	13.01
Team assemblers	10.35	10.40	10.90
Textile winding, twisting, and drawing out machine setters, operators, and tenders	10.34	10.75	10.54
Textile bleaching and dyeing machine operators and tenders	10.33	10.44	10.00
Laborers and freight, stock, and material movers, hand	10.00	9.04	9.48
Sewing machine operators	9.09	8.61	8.39

expand exports as a result of more open trade. Other sectors, such as fabric for apparel, will be negatively impacted, as a number of apparel manufacturers relocate production to other countries. On balance, textile mills are likely to lose employment as a result of this open trade because of its effect on the American apparel industry. The expected increase in apparel imports and the decline in apparel production will adversely affect demand for domestically produced textiles.

Another major reason for the projected decline in jobs in the textile industry is due to the increasing investment in technology by companies and the resulting increase in labor productivity. Wider looms, robotics, new methods for making textiles that do not require spinning or weaving, and the application of computers to various processes are resulting in fewer workers needed to produce the same amount of textile products. Companies are also continuing to open new, more modern plants, which use fewer workers, while closing inefficient ones. As this happens, overall demand for textile machine operators and material handlers will continue to decline, but improve for those who have the skills to operate the more high-tech machines.

Technology also has its bright side. The United States is leading the world in discovering new fibers and finding new uses for high-tech textiles. For example, biotechnology research is expected to lead to new sources of fibers, such as corn, and improvements in existing fibers. Some fibers currently being introduced have built-in memories of color and shape, and some have anti-bacterial qualities. These technologies and engineering advancements in textile production will be implemented at a growing rate in coming years. It is expected to result in the need for more highly skilled and technical workers, who will be working in an increasingly high-tech environment.

Sources of Additional Information

For additional information concerning career opportunities, technological advances, and legislative developments in the textile industry, contact:

- American Textile Manufacturing Institute, 1130 Connecticut Ave. NW., Suite 1200, Washington, DC 20036-3954. Internet: <http://www.atmi.org>
- Institute of Textile Technology, 2551 Ivy Rd., Charlottesville, VA 22903-4614. Internet: <http://www.itt.edu>

Information on the following occupations employed in the textile industry can be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Engineers
- Engineering technicians
- Industrial machinery installation, maintenance, and repair workers
- Inspectors, testers, sorters, samplers, and weighers
- Machinists
- Material moving occupations
- Textile, apparel, and furnishings occupations