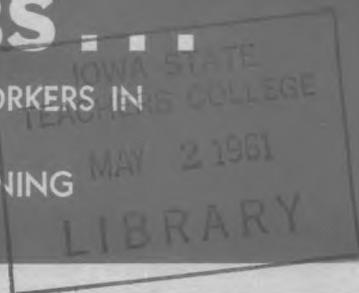




FACTORY JOBS . . .

EMPLOYMENT OUTLOOK FOR WORKERS IN
JOBS REQUIRING LITTLE OR NO
EXPERIENCE OR SPECIALIZED TRAINING



U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
IN COOPERATION WITH
VETERANS ADMINISTRATION

BULLETIN NO. 1288

FACTORY JOBS:

Employment Outlook for Workers in Jobs Requiring Little or No Experience or Specialized Training

Bulletin No. 1288

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UNITED STATES DEPARTMENT OF LABOR
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PREFACE

This bulletin was prepared in cooperation with the Veterans Administration for use in its Vocational Rehabilitation and Education program, and also in the vocational guidance of young people in school and others interested in selecting a field of employment.

About $7\frac{1}{2}$ million young persons who have not completed high school and a much larger number whose education and formal training ended with high school graduation are expected to enter the labor force in the 1960's. To aid these young people--many of whom are veterans--to achieve a satisfactory vocational adjustment, information is needed on fields of work which can usually be entered with little or no experience or specialized training and on the employment opportunities such fields will offer. This pamphlet provides information on some operative (semiskilled) jobs in manufacturing industries. This area of work represents one of the largest fields of employment.

The study was conducted in the Division of Manpower and Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor, under the supervision of Howard Rosen. The bulletin was prepared by Ian R. Sutherland. The Bureau wishes to acknowledge the general assistance and cooperation received in the preparation of this report from other Government agencies, employers, trade associations, labor unions, and individuals interested in the counseling, training, and employment of young workers.

CONTENTS

	Page
Introduction and summary	1
Nature of work	3
Where employed	3
Training, other qualifications, and advancement	5
Employment outlook	5
Earnings and working conditions	6
Where to go for more information	7
 Selected occupations	
Assemblers	8
Inspectors	10
Machine tool operators	13
Machine welding operators and oxygen and arc cutters...	15
Power truck operators	18
Production painters	20
Sewing machine operators	21
Stationary firemen (boiler)	24

Table

Employment of operatives in manufacturing industries, July 1959	1
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Charts

1. Operatives made up the largest occupational group in manufacturing, 1959	2
2. Job opportunities will increase fastest in occupations requiring the most education and training..	7

FACTORY JOBS:

Employment Outlook for Workers in Jobs Requiring Little or No Experience or Specialized Training

INTRODUCTION AND SUMMARY

About 19 million young people with a high school education or less are expected to enter the world of work during the 1960's. These young people will face a major problem in finding jobs they can enter without further education or specialized training. This pamphlet provides information about operative jobs in manufacturing industries, a broad area of work which might be considered a major source of employment for such workers. ("Operative" is a Bureau of the Census occupational title. These workers are also referred to as semiskilled workers.)

Of the 65½ million workers employed in 1959, about 16 million earned their living in factories. The workers concerned with factory production had very different levels of education and skill. Their educational background ranged from college education for professional workers to less than grammar school education for some of the unskilled workers. The time required to learn jobs found in manufacturing industries varied from many years of professional training for employees such as accountants and engineers to a few hours of on-the-job training for some of the less

Employment of operatives in manufacturing industries, July 1959

Industry	Total employment (thousands)	Total operatives	
		Number (thousands)	Percent of total employment in the industry
Total manufacturing industries	16, 410	7, 063	43. 0
Apparel and other finished textile products.....	1, 179	904	76. 7
Transportation equipment	1, 693	732	43. 2
Food and kindred products.....	1, 516	682	45. 0
Textile-mill products.....	965	672	69. 6
Machinery (except electrical)	1, 634	551	33. 7
Fabricated metal products	1, 084	499	46. 0
Electrical machinery	1, 242	492	39. 6
Primary metal industries.....	1, 266	383	30. 3
Chemicals and allied products	848	243	28. 7
Stone, clay, and glass products.....	566	214	37. 8
Lumber and wood products.....	694	182	26. 2
Furniture and fixtures.....	382	171	44. 8
Printing, publishing, and allied industries	865	155	17. 9
Instruments and related products.....	339	111	32. 7
All other manufacturing industries	2, 137	1, 072	50. 2

Source: U.S. Department of Labor, Bureau of Labor Statistics.

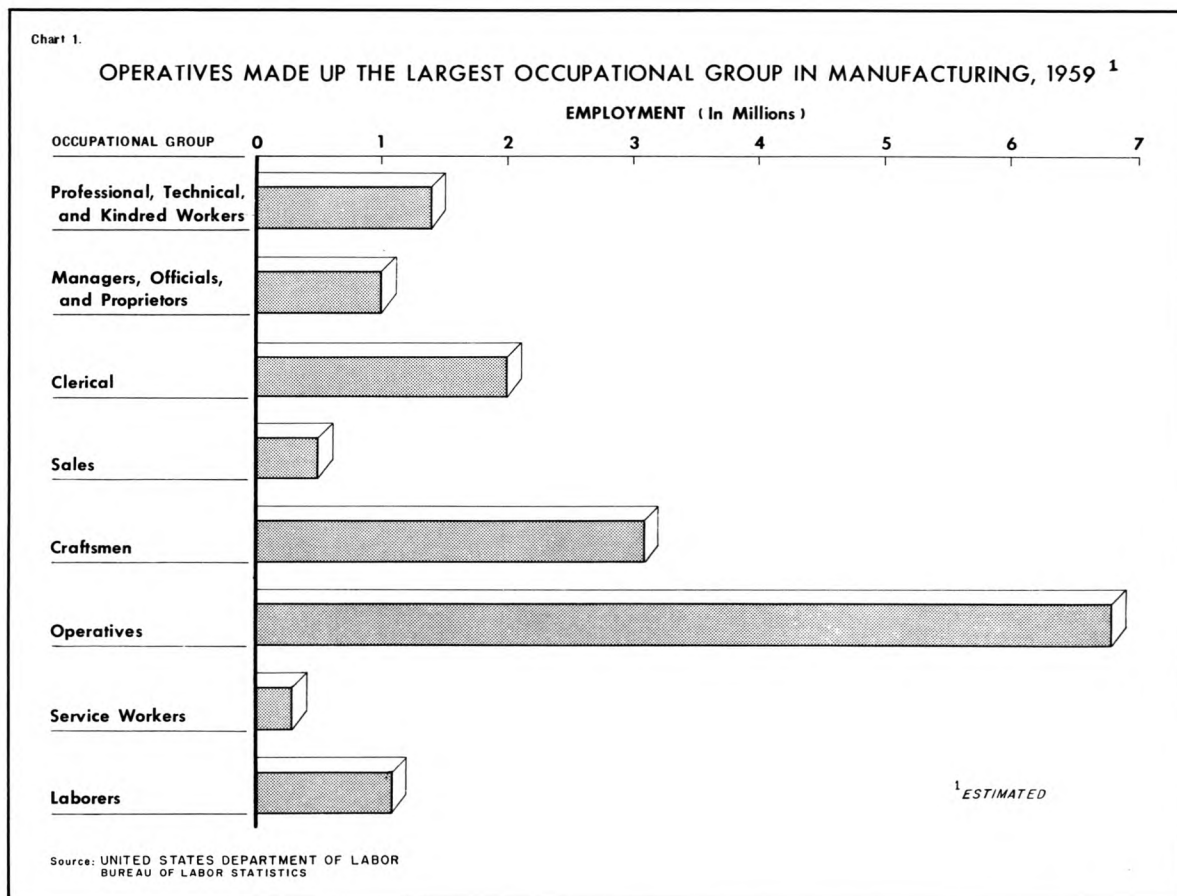
skilled assemblers. For the factory jobs discussed in this bulletin, on-the-job training time generally ranges from a few hours to a few months and in some cases to a year or longer.

Workers in many different occupations help to produce the millions of automobiles, television sets, machines, dresses, books, and numerous other products made in our factories. (See chart 1.) The largest occupational group found in factories in 1959 were the 7 million operatives who are the subject of this study. (About 5 million workers employed in semiskilled jobs in nonmanufacturing industries are not covered in this study.)

For the most part, operatives are employed in jobs directly concerned with the making of products, and they gen-

erally operate some type of machine or equipment.

Although all manufacturing industries employ operatives, some hire many more of these workers than do others. (See table.) Large numbers of operatives are generally employed in those industries in which the manufacturing processes can be divided into relatively simple operations. For example, in July 1959, the apparel industry employed about 900,000 operatives--many of whom were sewing machine operators; the transportation equipment industry, made up chiefly of workers engaged in automobile and aircraft manufacturing, employed more than 730,000. On the other hand, the printing industry, which is a very large employer of skilled workers (craftsmen), employed only 155,000 operatives.



Many operative jobs in factories require a high degree of hand skills and are not physically difficult; as a result, many women are employed in these jobs. Nearly two out of every five factory operatives in 1959 were women. Indeed, operative jobs are by far the largest source of employment for women in manufacturing.

The number of women operatives employed in the different manufacturing industries varies considerably. For example, in 1959, 750,000 women accounted for about 8 out of 10 operatives in the apparel industry. Other manufacturing industries with large numbers of women operatives were textiles and food. On the other hand, plants which produce iron and steel and petroleum products employed relatively few women.

The section which follows presents the nature of the work done by factory operatives (semiskilled workers), where they are employed, their training requirements and advancement opportunities, the employment outlook for these workers, and their earnings and working conditions. Later sections provide more detailed information about the following specific operative jobs: Assemblers, inspectors, machine tool operators, machine welding operators and oxygen and arc cutters, power truck operators, production painters, sewing machine operators, and stationary firemen (boiler).

Nature of Work

Although the work performed by operatives in factories is quite varied, their jobs have some things in common. In general, workers in operative jobs work with their hands. Many of the jobs require the same motions during the working day; most require only a short period of on-the-job training. For the most part, operatives are closely supervised and told exactly what to do and how to do it. As a rule, they are required to reach a certain speed and quality of production.

Millions of these factory workers operate power-driven machines. Many

use sewing machines which join together fabrics to produce clothing, awnings, and other items. Others operate machines to stamp out metal parts; still others use machine tools, such as engine lathes and milling machines, to shape metal to precise sizes. A considerable number of these workers operate material moving equipment, such as power trucks to move heavy and large amounts of raw materials and manufactured products and parts.

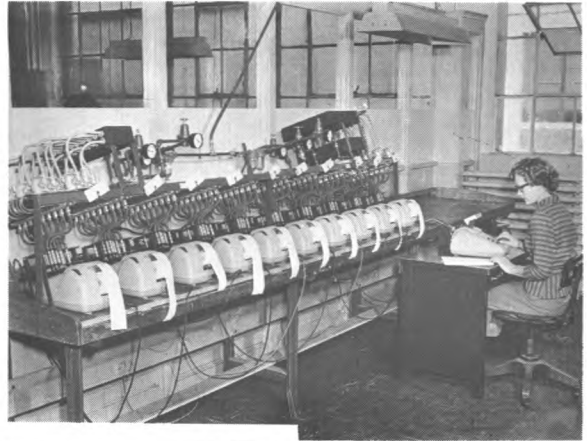
Large numbers of operatives are employed as assemblers and inspectors. Assemblers fit parts together to make units such as a section or subsection of a radio or television set. Inspectors examine and test products to find out whether their quality is satisfactory. Many operatives in factories are employed as helpers or assistants to more skilled workers. For example, stationary firemen assist skilled stationary engineers in the operation and maintenance of steam boilers.

Operatives use a limited variety of handtools and equipment. Among these are screwdrivers, pliers, files, soldering irons, measuring devices, and cutting tools. Many of these workers also make simple adjustments and do minor maintenance work on the machines they use. Some are required to keep simple records of their work.

Where Employed

Factory operatives generally are employed in large numbers in mass production industries where the jobs can be divided into relatively simple operations. Of the approximately 7 million workers employed in factory operative jobs in July 1959, about half worked in plants which manufacture men's and women's clothing and other apparel; automobiles, automobile parts, trucks, and aircraft; food; textiles, such as cotton and wool; and machinery. The remainder were employed in industries which manufacture items such as electrical machinery, wood products and furniture, and fabricated metal products.

Factory operatives are employed in every State, city, and industrial center



Factory operatives are employed in many different types of jobs

in the Nation. Six States have particularly large numbers of these workers: New York, Pennsylvania, Illinois, Ohio, Michigan, and California.

Training, Other Qualifications, and Advancement

Most factory operatives learn their jobs informally by "picking up" their skills on the job. In many plants, a new or unskilled worker starts his training by observing the work done by an experienced employee. Later, he does the more simple and routine work under the close supervision of an experienced worker. For the most part, it takes a trainee from a few days to a few months to learn to do the job. In some jobs, however, the training period may be as little as a few hours, or as long as a year or more.

Almost all employers of operatives require only that the new employee be physically able to perform the job, learn its requirements, and be dependable. These employers prefer workers who are able to do routine, production-line work at a steady and fast pace. Some also prefer that applicants be familiar with different types of factory work, such as machine shopwork, wood-working, riveting, and welding. A few employers--usually large companies--use tests to determine whether applicants have aptitudes for handwork and good eye-hand coordination. A growing number of employers prefer to employ young people with a high school or trade school education and often look for workers who have had courses in mathematics and blueprint reading.

For most young people, there are limited advancement opportunities in operative jobs, although some workers have been able to advance to the higher levels of pay in operative jobs. Some operatives pick up a variety of work experience by moving from job to job in one shop or by moving from one employer to another. In acquiring this experience, these workers can learn the various operations of a trade and eventually get jobs as skilled craftsmen. Operatives may start as helpers

to craftsmen and learn the trade by observing and assisting the skilled worker. Some of these helpers may eventually become craftsmen. Craftsmen who have learned their skills in an informal way sometimes have taken courses related to their trade in vocational schools.

In a few industries, such as automobile manufacturing, some operatives are given an opportunity to enter apprenticeship training programs to become skilled workers. Apprenticeship consists of a program of formal on-the-job training (which lasts about 3 or 4 years) and related classroom instruction, during which the apprentice learns the trade. In other industries, such as industrial chemicals and petroleum refining, new workers are hired as laborers. These workers, after acquiring sufficient experience and training, may move up to jobs as operatives. In rare instances, factory operatives are able to advance gradually to technical and administrative jobs.

Employment Outlook

There will be hundreds of thousands of openings in factory operative jobs in the 1960's. During this period, a growing demand for the products of our manufacturing industries is expected because of rising population, increasing incomes, and growing national defense needs. Thus, a growth in manufacturing employment is expected in the 1960's and the number of operative jobs will also expand.

Many thousands of operative job opportunities will result from the need to replace operatives who leave their jobs, retire, or die. This occupational group has a fairly high proportion of young workers and women workers, many of whom will leave their jobs. Young workers, as a group, tend to change jobs more often than do older workers. Many women operatives leave their jobs to get married, raise families, or move to other areas when their husbands change jobs.

Employment of operatives in manufacturing industries will expand in the

1960's, but the rate of increase will probably not be as fast as that for total manufacturing employment, largely because of recent improvements in manufacturing processes. These advances, popularly known as "automation," permit great gains in production without comparable gains in employment--particularly in operative jobs. Although technological developments will slow down the rate of growth of operative employment, many plants which are today relatively unmechanized will require additional operatives. Finally, changing technology probably will create many new types of operative jobs.

The employment of operatives will expand more rapidly in some manufacturing industries than in others during the 1960's. For example, the employment of operatives will increase greatly by 1970 in the electrical machinery industry (producers of electric motors and electronic equipment such as radio and television sets), in the machinery industry (producers of engines and metalworking and industrial machinery such as lathes and milling machines), and in the apparel industry (producers of garments such as dresses, suits, and coats). Although total employment of operatives may decrease in some industries which are large employers of these workers, such as the textile industry, the need to replace workers who leave their jobs, retire, or die will create many thousands of operative job opportunities for new workers in these industries.

Employment is also expected to increase faster in some operative jobs than in others. For example, the employment of semiskilled machine welding operators, oxygen and arc cutters, and power truck operators is expected to expand at a faster rate than most other operative jobs. Employment of stationary firemen and production painters, on the other hand, is expected to increase only slightly.

During periods of decline in manufacturing activity, operatives are more likely to lose their jobs than craftsmen or white-collar employees. This is true because employers are slower

to lay off their more skilled employees who, compared with operatives, cannot be as readily rehired when business improves. Operatives also tend to be unemployed, Bureau of Labor Statistics studies show, for longer periods of time than do most other workers, and they are generally rehired later than workers in many other types of jobs.

On the other hand, operatives more readily shift to different jobs at the same level than do many workers at higher skill levels. Should they lose their jobs in an industry or in a particular field of work, operatives can easily write off their smaller investment in training and experience in their past jobs and, after a brief period of additional training, learn a new operative job.

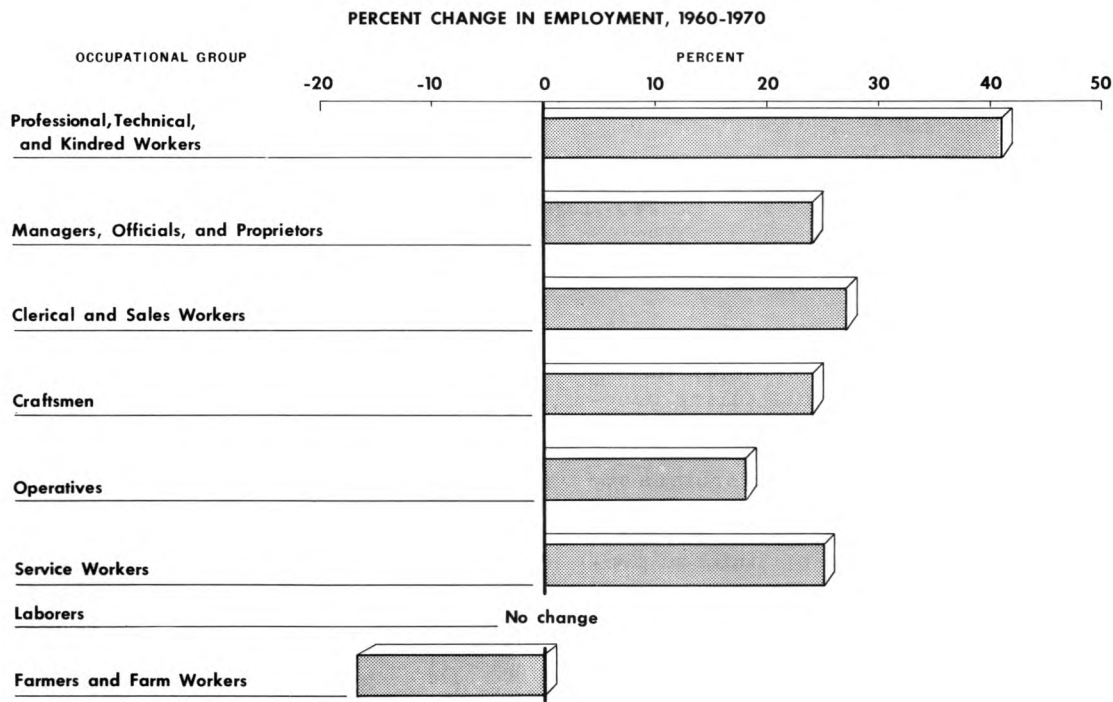
The most rapid rate of growth in the Nation's employment will take place in occupations requiring the most education and training. (See chart 2.) Therefore, if possible, young people who have the ability should prepare themselves for jobs as skilled workers or as professional, technical, or other white-collar workers. Preparing for many of these jobs will, of course, require additional training and education. However, for young men and women who have no training beyond high school, factory operative employment will be a major area of job opportunities. Moreover, it should be noted that young workers who take factory operative jobs are not necessarily cut off permanently from advancement if they are able to take advantage of the many educational opportunities available in their communities. They may enter an apprenticeship program or take courses in evening schools which will eventually prepare them for better jobs.

Earnings and Working Conditions

Earnings of factory operatives vary widely, depending on the jobs they have, the size and location of the plant in which they are employed, the method of wage payment (hourly or piece rates), and individual ability. Although some operatives who are paid on the basis of

Chart 2.

JOB OPPORTUNITIES WILL INCREASE FASTEST IN OCCUPATIONS REQUIRING THE MOST EDUCATION AND TRAINING



Source: UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

the number of items they produce are among the highest paid manual workers in manufacturing industries, earnings of operatives as a group are somewhat below skilled craftsmen. For example, male operatives in durable goods (articles that last for some time) manufacturing plants averaged \$4,750 in 1958, compared with \$5,200 earned by craftsmen in all industries (both manufacturing and nonmanufacturing). Women operatives generally earned less than men.

The working conditions of factory operatives differ according to the industry in which they are employed and the job being done. For example, assemblers of specialized electronic equipment may work seated at a table in an air-conditioned, dust-free room; on the other hand, a machine tool operator may stand next to a high-speed machine tool in a noisy machine shop with metal

chips and lubricating oil in the work area. Some of these workers are subject to job hazards because they work with sharp cutting tools and other equipment which can be dangerous if used incorrectly. Consequently, safety instructions are often an important part of operative job training.

Many operatives belong to labor unions and are covered by collective bargaining agreements negotiated between employers and unions. These contracts usually include provisions for benefits such as paid holidays and vacations, hospitalization, medical and surgical insurance, life insurance, sickness and accident insurance, and retirement pensions.

Where To Go for More Information

Many local offices of the State employment service, affiliated with the U. S.

Employment Service, have information about operative jobs in local communities.

Additional information about operative jobs may be found in the Occupa-

tional Outlook Handbook, 1959 edition, Bull. 1255, U.S. Department of Labor, Bureau of Labor Statistics. This publication is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., \$4.25.

ASSEMBLERS

Nature of Work

Many of the products and parts made in factories must be assembled during various steps in the manufacturing process as well as in the final assembly of the product. For example, television sets, automobiles, and refrigerators are typical products which must undergo many assembly operations. The workers who put together parts or finished products are known as assemblers.

Some assemblers, known as floor assemblers, put together large, heavy machinery or equipment on shop floors, often fastening parts with bolts, screws, or rivets. Others, known as bench assemblers, put together small parts to make subassemblies or small complete units, while working at a bench. Many assemblers work on products or parts which move automatically past their work stations on conveyors. These workers must do their assembly job within the time period it takes the part or product to pass their work station.

The job duties of assemblers depend upon the product being manufactured or the manufacturing process being used. In aircraft and missile production, these workers may assemble and install units or parts into subassemblies. In the automobile industry, one assembler may start nuts on bolts and the next worker on the assembly line tightens the nuts with power-driven tools. Assemblers in electronic plants may connect parts with electrical wire.

Semiskilled assemblers do relatively simple, repetitive operations under close supervision, often guided by simple in-



Assembler soldering connections on automobile heater motor

structions. (In contrast, skilled assemblers work on the more complex parts of subassemblies with little or no supervision and are responsible for the final assembly of complex jobs. These skilled workers must know how to read blueprints and other engineering specifications and use a variety of tools and precision measuring instruments.)

The kinds of tools semiskilled assemblers use depend upon the job they are doing and the product on which they are working. Pliers, screwdrivers, soldering irons, power drills, and wrenches are among the common tools used by assemblers.

Where Employed

More than 500,000 semiskilled assemblers were employed in manufacturing plants in 1959, with the great majority in metalworking plants. Assemblers work in plants which manufacture, on a mass production basis, such diverse products as automobiles, aircraft, electrical and electronic equipment such as radios and television sets, and instruments.

The number and types of assembly jobs within a plant depend to a great extent upon the product being manufactured and the way in which production is organized. Large numbers of semiskilled assemblers are usually employed in plants where the work can be divided into many routine and repetitive tasks.

Semiskilled assembly jobs are concentrated in greatest number where metalworking industries are located. California, Michigan, New York, Ohio, Illinois, and Pennsylvania are among the leading States in which assembly jobs are found.

Training, Other Qualifications, and Advancement

Inexperienced workers may be hired as trainees or helpers in manufacturing industries and trained on the job to do semiskilled assembling work in a few hours or days. The new worker may have his job duties explained to him by his supervisor and then be placed under the supervision of a more experienced employee. The trainee observes the experienced employee at work or directly assists him in his work. When the learner develops sufficient speed, he is placed "on his own" and is responsible for the work he produces.

Employers generally want applicants for semiskilled assembly jobs to be physically able, dependable, and to have some aptitude for mechanical work.

Some employers prefer persons with no previous experience in factory assembly work so that they can be more

easily trained in the employers' assembly methods. High school graduates or workers who have taken vocational school courses, such as blueprint reading, are preferred by many employers and usually have more job opportunities and greater advancement possibilities. Generally, for production-line assembly jobs, employers look for applicants who can do routine work at a steady and fast pace. For other types of assembly jobs, applicants may have to meet special requirements. For example, in plants producing electrical and electronic products which may contain many different colored wires, applicants often are tested for color blindness.

Many women are employed in semiskilled assembly jobs because much assembly work is relatively light and often requires the ability to work with small and delicate objects. This is particularly true in the electrical and electronic equipment industry. On the other hand, male workers are employed in final automobile assembly where the work generally is physically hard.

Possibilities for advancement are limited in this type of work. However, some workers who learn to perform a variety of assembly work and who have a knowledge of blueprint reading and shop mathematics are able to become skilled assemblers. A few workers also may become skilled inspectors or foremen.

Employment Outlook

Many thousands of semiskilled assembly jobs in manufacturing industries are expected to become available during the 1960's. The metalworking industries (particularly those which produce electrical and electronic equipment), which employ the great majority of these workers, are expected to experience employment increases. In addition to the new openings which may be created by the expected increase in the employment of semiskilled assemblers, replacement needs will provide a considerable number of job opportunities for new workers in this relatively large occupational group.

The need to replace workers who leave their jobs, transfer to other types of work, retire, or die should result in a considerable number of job openings.

Not all assembly jobs are expected to increase at the same rate. Technological changes may slow up the growth of some jobs. For example, the introduction of printed electrical circuits reduces the wiring work required in assembling radio and television sets, affecting the employment of assembly workers in plants producing these products. An increase in the use of automatic assembly processes also may decrease the employment of these workers.

Although the outlook for semiskilled assemblers in manufacturing industries is generally favorable, employment in metalworking manufacturing plants, which have many assemblers, is particularly sensitive to changes in business activities and national defense needs. Therefore, these workers are subject occasionally to layoffs.

Earnings and Working Conditions

Earnings of semiskilled assemblers in manufacturing industries vary widely, depending on their skill, the type of product assembled, the size and location of the plant in which they are employed, and the method of wage payment. For example, assemblers who are paid on the basis of the number of items assembled may earn more than those paid on an hourly basis.

Assembly jobs are commonly classified to reflect the level of skill and responsibility involved. In its surveys of earnings in machinery plants, the

U.S. Department of Labor's Bureau of Labor Statistics classifies assembly jobs as class A, B, and C. A 1959-60 BLS survey of earnings of assemblers in such plants in 21 large cities and metropolitan areas shows that the average straight-time hourly earnings of class B male assemblers ranged from \$1.73 in Dallas to \$2.68 in Pittsburgh; and earnings of class C male assemblers ranged from \$1.43 in Dallas to \$2.45 in Milwaukee. (For the purpose of this bulletin, class B and C assemblers are considered to be semiskilled workers.)

The working conditions of semiskilled assemblers differ depending on the particular job performed. Assemblers of electronic equipment may put together small components at a bench in a room which is clean, well lighted, and free from dust. Floor assemblers of industrial machinery, on the other hand, may install and assemble heavy parts and are often exposed to contact with oil and grease. Assemblers on assembly lines may be under pressure to perform their assignments in the time the conveyor moves the parts or subassemblies past their work stations.

Many semiskilled assemblers in manufacturing industries are members of labor unions. These unions include the International Association of Machinists; the International Union of Electrical, Radio and Machine Workers; and the International Union, United Automobile, Aircraft and Agricultural Implement Workers of America. Most labor-management contracts in the manufacturing plants in which assemblers are employed provide for fringe benefits such as holiday and vacation pay, health insurance, life insurance, and retirement pensions.

INSPECTORS

Nature of Work

Almost everything manufactured, including those products we eat, drink,

wear, or ride in, must be carefully inspected during the manufacturing process. The millions of automobiles, sewing machines, television sets, produc-



Inspector uses a mirror to help in checking brushes in a motor

tion machinery, and other mass-produced items must be inspected to make sure they operate properly. The workers who see to it that size and quality of raw materials, parts, assemblies, and the operation of the finished products meet specifications are known as inspectors.

Inspectors may look for scratches and other defects in products or parts. They often use simple gages to find out whether parts are made to specified sizes; they may also use measuring devices such as micrometers (a precision-measuring instrument) to check the accuracy of the parts. Inspectors may be required to read simple work orders and do arithmetic involving decimals and fractions when reading measuring instruments. Some inspectors use hand-tools such as screwdrivers or pliers in their work. (The work done by semiskilled inspectors in factories is different from that performed by skilled inspectors. Semiskilled inspectors usually work under close supervision; skilled inspectors work under general supervision. In addition, skilled inspectors are often required to read blueprints, interpret specifications, and use complex precision-measuring instruments.)

Inspectors do a variety of jobs in many industries. For example, they may be employed in radio and television manufacturing plants to test tubes and circuits to see that they meet specifications. They are also employed in the automobile industry to examine raw materials and parts during the various stages of manufacturing.

Inspectors often keep records of the number of parts they have inspected, accepted, and rejected. When they find that a large number of pieces are faulty, they notify their supervisors so that corrections can be made on the production line.

Where Employed

More than 200,000 semiskilled inspectors were employed in a wide variety of manufacturing plants in 1959. Plants which produced automobiles and parts; aircraft, missiles and parts; electrical machinery and equipment such as electrical motors, radios, and refrigerators; machinery; iron and steel; fabricated metal products such as structural steel for buildings; and food products were among the important employers of inspectors. A large number of inspectors also were employed in the clothing, chemical, and ordnance industries.

Many of the inspection jobs are found in States which are manufacturing centers such as California, Michigan, New York, Ohio, Illinois, and Pennsylvania.

Training, Other Qualifications, and Advancement

Inspectors generally learn the requirements of their jobs during a brief period of on-the-job training. The training period may vary from a few hours or days to several months, depending upon the skill required.

Many employers prefer workers with no previous inspection experience. They look for applicants who are physically able, dependable, have good eyesight,

and can follow instructions. Some employers prefer experienced production workers for inspection jobs. A few large companies give aptitude tests in selecting new employees for inspection work. For example, in the electronics industry, new workers may be given tests to determine their ability to work with numbers. Employers also look for employees who can do work requiring constant attention.

Many women are employed as inspectors because many inspection jobs are not physically hard. They generally work in plants which produce relatively small and light products and parts such as electrical and electronic equipment.

Some semiskilled inspectors who supplement their work experience with formal educational courses such as blueprint reading, shop mathematics, and electrical theory may advance to jobs as skilled inspectors. A few semiskilled inspectors, after acquiring sufficient experience and knowledge, may advance to foremen jobs.

Employment Outlook

Many thousands of young workers will be able to find employment as inspectors in manufacturing industries during the 1960-70 decade. Most of the industries which employ these workers are expected to increase their employment during this period.

In addition to the new jobs that will be created by increases in employment, replacement needs will provide job opportunities for new workers. A considerable number of job opportunities should result from workers who leave their jobs, transfer from this field of work, retire, or die.

The growing complexity of the products manufactured in our factories and rising quality standards should result in a need for more inspectors. However, the demand for inspectors may be

offset somewhat by the trend toward the use of mechanized and automatic inspection equipment.

Earnings and Working Conditions

Earnings of inspectors vary considerably depending on their skill, the type of product inspected, the method of wage payment, and the size and location of the plant in which they are employed. Inspector jobs are commonly classified to reflect the level and skill involved. In its survey of earnings in machinery plants, the U.S. Department of Labor's Bureau of Labor Statistics classifies inspector jobs as class A, B, and C. A 1959-60 BLS survey of earnings of inspectors in such plants in 19 large cities and metropolitan areas shows that the average straight-time hourly earnings of class B male inspectors ranged from \$1.92 in Dallas to \$2.76 in Houston; and earnings of class C male inspectors ranged from \$1.64 in New York City to \$2.51 in Philadelphia. (For the purpose of this bulletin, class B and C inspectors are considered to be semiskilled workers.)

The working conditions of inspectors vary considerably. For example, they may work in well-lighted, air-conditioned workplaces in an aircraft or missile plant; others may work on the production floor of a machinery or metal fabricating plant, often exposed to high temperatures, oil, grease, and noise.

Many inspectors employed in manufacturing industries are members of labor unions. The International Union, United Automobile, Aircraft and Agricultural Implement Workers of America; the International Association of Machinists; and the International Union of Electrical, Radio and Machine Workers are among the larger unions to which these workers belong. Most of the labor-management contracts provide for fringe benefits such as paid holidays and vacations, health insurance, life insurance, and retirement pensions.

MACHINE TOOL OPERATORS

Nature of Work

Almost every item produced by American industry contains metal parts or is manufactured by machines made of metal parts. Many of these parts are made to precise shapes and sizes by a group of workers called machining workers. A large number of these workers are semiskilled machine tool operators who use stationary power-driven machines known as machine tools.

Semiskilled machine tool operators are essentially machine tenders who, under close supervision, carry out simple operations which can be learned quickly. A typical assignment of a semiskilled machine tool operator is to place a piece of rough metal into an automatic machine tool which has been adjusted for him by a skilled machine tool operator or a setup man. The semiskilled worker watches the machine operate and calls his supervisor when trouble arises. The operator uses special gages to check the accuracy of his work. He may make minor adjustments to keep the machine tool operating efficiently, but the skilled operator or setup man makes major adjustments.

Lathes, drill presses, boring machines, grinding machines, milling machines, planers, and shapers are among the important machine tools used by machine operators. Workers are given job titles based upon the kind of machine they operate, such as engine lathe operator, milling machine operator, grinding machine operator, and drill press operator.

(The work done by semiskilled machine tool operators is different from that performed by skilled machining workers. For example, skilled machine tool operators, who generally work with a single type of machine, set up their own machines and do work requiring greater precision. Tool and die makers and all-round machinists are other skilled machining workers who can operate all types of machine tools and perform more complex jobs, working

to very precise specifications. A detailed discussion of the work performed by these skilled machining workers is provided in the Occupational Outlook Handbook, 1959 edition, Bull. 1255, U.S. Department of Labor, Bureau of Labor Statistics.)

Where Employed

More than 400,000 semiskilled machine tool operators were employed in machining jobs in manufacturing industries in 1959. They are mainly employed in factories where metal parts for automobiles, aircraft engines, machinery, and other metal products are manufactured on a mass-production basis. The size of the plant, the way in which the work is organized, and the extent to which machining operations have been simplified determine whether semiskilled or skilled operators will be employed. Semiskilled operators usually are employed in production jobs where large quantities of parts are machined.



Machine tool operator adjusting lathe

Few semiskilled operators are employed in either the maintenance departments of a plant or in a machine shop which does small quantity production work.

Machine tool operator jobs are found in greatest number in States in which the metalworking industries are located, such as California, Michigan, New York, Ohio, Illinois, and Pennsylvania.

Training, Other Qualifications, and Advancement

Nearly all semiskilled machine tool operators in manufacturing industries learn their skills on the job. After a new worker is hired, he usually starts his training by observing a skilled operator at work. When the learner is put in charge of a machine, he often continues to be supervised for a time by a more experienced worker. In most cases, the new worker learns, on the job, to use the necessary measuring instruments and to do the arithmetic required.

Some of the larger companies have formal training programs for new operators. A combination of classroom and on-the-job instruction is offered to acquaint the new worker with the details of machine tool operation, machining practice, and the reading of simple blueprints. The length of time required to become an experienced semiskilled machine tool operator depends, to a great extent, on individual ability. Semiskilled operators generally learn their jobs within a few months. (A period of $1\frac{1}{2}$ to 2 years of on-the-job training and experience is generally required to become a skilled machine tool operator.)

As a semiskilled operator becomes more experienced and learns the various duties of machine tool operation, and as he becomes more skilled in reading blueprints and planning the steps of machining work, he may move into the skilled operator category. Many all-round machinists and some tool and die makers began their careers as semiskilled operators.

Although there are no special educational requirements for semiskilled operator jobs, young persons who have a knowledge of mathematics and blueprint reading may have better job opportunities and advancement possibilities. In hiring unskilled operators, employers also often look for persons with mechanical aptitude who have had some experience working with machinery.

Employment Outlook

The anticipated increase in employment in the metalworking manufacturing industries in the 1960's is expected to increase the demand for semiskilled machine tool operators. In addition to the demand created for these workers by the growth of the metalworking industries, the need to replace those who leave their jobs, transfer to other fields of work, retire, or die will create a considerable number of job opportunities each year for new workers to enter this work.

Technological developments, however, may affect both the number and skill requirements of semiskilled machine tool operators. The continued development and use of faster and more automatic machine tools will result in greater output per machine tool operator.

If the use of tape controlled machine tools should become widespread, this could slow up somewhat the expected increase in the employment of semiskilled machine tool operators. In this method of machining, part dimensions, tolerances, cutter shapes and sizes, and cutting paths and sequences are translated into numbers, or codes representing numbers. The numbers are punched on cards or tapes which are inserted into electronic devices which then run the machine tool automatically. This method further reduces and simplifies the work of the semiskilled machine tool operator.

Earnings and Working Conditions

Semiskilled machine tool operators in manufacturing industries are paid on

the basis of an hourly wage rate or number of pieces they produce, or a combination of both methods of wage payment. Machine tool operator jobs are commonly classified to reflect the level of skill and responsibility involved. In its surveys of earnings in machinery plants, the U. S. Department of Labor's Bureau of Labor Statistics classifies machine tool operator jobs as class A, B, and C. A 1959-60 BLS survey of earnings of machine tool operators in such plants in 21 large cities and metropolitan areas shows that the average straight-time hourly earnings of class B male machine tool operators ranged from \$1.89 in Dallas to \$2.64 in San Francisco-Oakland; and class C male machine tool operators ranged from \$1.66 in Dallas to \$2.39 in Milwaukee. (For the purpose of this report, class B and C machine tool operators are considered semiskilled operators.)

Semiskilled machine tool operators must follow safety precautions because

they work around high speed metal-working machinery. They are required to wear protective goggles and to avoid wearing loose-fitting garments when working. Increasing emphasis upon safety regulations has reduced the accident rate for these workers in recent years.

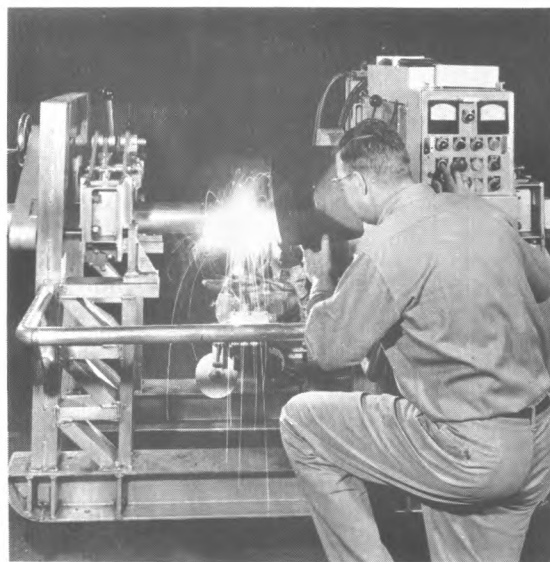
Many semiskilled machine tool operators in manufacturing industries are members of labor unions. Among the labor organizations active in the factories where operators are employed are the International Association of Machinists; the International Union of Electrical, Radio and Machine Workers; the International Union, United Automobile, Aircraft and Agricultural Implement Workers of America; and the United Steelworkers of America. Most labor-management agreements provide for fringe benefits such as holiday and vacation pay, health insurance, life insurance, and retirement pensions.

MACHINE WELDING OPERATORS AND OXYGEN AND ARC CUTTERS

Nature of Work

Many of the parts used in automobiles, airplanes, refrigerators, and thousands of other products are joined together by a metalworking process known as welding which is used widely in manufacturing and repair operations. Welders join metals by applying intense heat to melt the edges of the metal and, sometimes, pressure to form a permanent bond. Filler metal may or may not be used in forming the weld. Closely related to welding is "thermal cutting" (also known as oxygen cutting or arc cutting). Oxygen and arc cutters use torches to cut or trim metal objects to a desired size or shape. They also remove excess metal from castings and cut scrap metal into pieces of manageable size.

Most of the more than 35 different ways of welding metals have been adapted to semiautomatic or automatic



Welding machine operator using a semiautomatic welding machine to weld a steel pipe

welding procedures. These welding operations are primarily performed by semiskilled machine operators.

Semiskilled welding machine operators in manufacturing industries operate machines which weld metal parts by bringing them together under heat and pressure. The operator sets the controls of the machine for the desired electric current and pressure, feeds and aligns the work, and removes it after the welding operation is completed.

Semiskilled thermal cutters work with either hand-guided torches or cutting machines. In the oxygen cutting process, the semiskilled operator directs a flame of oxygen and fuel gas on the work area until the metal begins to melt. He then releases an additional stream of oxygen at higher pressure to cut the metal. The operator prepares for the cutting job by attaching the proper torch tip for the particular job, connecting the torch to the gas and oxygen hose, and regulating the flow of gases into the torch for the desired cutting flame. He then cuts through the metal, guiding the torch by hand along previously marked lines or following a template or pattern. He may mark guidelines on the metal following blueprints or other instructions. (Arc cutting differs from oxygen cutting in that the original source of heat is an electric arc. As in oxygen cutting, an additional stream of gas is released in cutting the metal.) In many cases, the cutting torch is mounted on a machine which, by electronic or mechanical means, automatically follows the proper line of cut.

Where Employed

In 1959, an estimated 200,000 or more semiskilled welding machine operators and cutters were employed in manufacturing industries throughout the country. Their principal employers were manufacturers of boilers and sheet-metal products, motor vehicle and equipment plants, the aircraft industry, and metalworking repair shops. Other important employers of machine welders were steel mills, metal-stamping establishments, and machinery plants.

Among the major factory employers of cutters were steel mills, machinery plants, and fabricated structural-steel and boiler shop product plants.

Because machine welding and cutting processes are widely used in American industry, these workers can find jobs in every State. However, most jobs for semiskilled welding machine operators and cutters are found in the major metalworking areas. More than 40 percent are employed in Michigan, Pennsylvania, Ohio, Illinois, and California. Large numbers are employed in Detroit, Chicago, Philadelphia, Los Angeles, and other important metalworking centers.

Training, Other Qualifications, and Advancement

Training requirements for the machine welding operator's job in manufacturing industries depend upon the particular type of equipment used. Most operators learn their work in a few weeks.

Little skill is required for many arc or oxygen cutting jobs, and, generally, they can be learned in a few weeks of on-the-job training. However, the cutting of some of the newer metals and alloys requires a knowledge of the qualities of metals as well as greater skill in flame cutting. Machine welding and thermal cutting require a steady hand, good eye-hand coordination, and good eyesight.

Young persons often start in simple machine welding production jobs in which the type and thickness of metal, as well as the position of the work in the welding operation, rarely change. Some large companies employ general helpers who, if they show promise, may be given opportunities to become semiskilled welding machine operators and arc or oxygen cutters.

A young man who is hired as a machine operator will usually perform repetitive work or work which does not involve critical safety and strength requirements. The work is usually done with the metal in only one position

(flat, vertical, overhead, or horizontal).

Some semiskilled welding machine operators may become skilled manual welders or even foremen who supervise the work of other welders. Occasionally, some operators may be promoted to jobs as inspectors where they check welds to find out whether they meet standards, such as safety, or strength, and whether the quality of workmanship is adequate.

Employment Outlook

The generally favorable long-run outlook in the metalworking industries, the wider use of machine welding processes, and the introduction of new automatic processes are expected to result in a large increase in the number of machine welding jobs in manufacturing industries in the 1960's. Employment of these workers is expected to expand at a faster rate than total manufacturing employment during this period because of the increased use of the machine welding process in such activities as the manufacture of motor vehicles and aircraft, and machinery; and the production of light, streamlined railroad cars. Employment of these workers will grow rapidly despite the increased use of more rapid and highly automatic welding machines.

Employment of arc or oxygen cutters is expected to rise somewhat during the 1960's as the result of the general expansion of metalworking activity. This rise will occur despite increased use of cutting machines which will tend to restrict the growth of this occupation.

Replacement needs resulting from workers who leave their jobs, transfer to other fields of work, retire, or die will provide many job openings for new

workers in the machine welding and cutting fields. Retirements and deaths will result in about 2,500 to 3,500 openings each year.

Earnings and Working Conditions

Earnings of welding machine operators in manufacturing industries depend on the skill of the operator, the types of welding machine used, the industry, and the locality in which the operator is employed.

An examination of several labor-managements contracts in the metalworking industries indicates that machine welding operators earned from about \$2.35 to \$2.80 an hour in 1959-60. Earnings of oxygen cutters are roughly similar to those of machine welders.

Machine welding operations are largely free from the hazards associated with other welding methods. In some jobs, machine welding operators wear a clear eye shield or clear goggles to protect their eyes.

Many semiskilled welding machine operators and arc and oxygen cutters in manufacturing industries are union members. Among the labor organizations which include these workers in their membership are the International Association of Machinists; the International Union, United Automobile, Aircraft and Agricultural Implement Workers of America; the International Brotherhood of Boilermakers, Iron Shipbuilders, Blacksmiths, Forgers and Helpers; and the United Steelworkers of America. Most labor-management contracts provide employees with benefit programs which may include paid holidays and vacations, hospitalization, medical and surgical insurance, life insurance, sickness and accident insurance, and retirement pensions.

POWER TRUCK OPERATORS

Nature of Work

In the past, manual workers in factories usually did the hard physical labor of moving raw materials and products. Today, many heavy materials are moved, with little physical effort, by workers who operate various types of self-powered trucks which can easily carry tons of material and lift it to heights of 18 or more feet.

A typical truck operated by these workers is the forklift truck which has a hydraulic lifting mechanism; other power trucks may have attachments such as scoops to lift coal or other loose material and tow bars to pull one or more small trailers.

Power truck operators start the truck, make it go forward or backward, stop the truck, and control the lifting mechanism and attachments by moving foot pedals and/or levers. Power truck operators may be required to keep records of material moved, do some manual loading and unloading of materials, and maintain their trucks in good working condition by cleaning,

oiling, checking water in batteries, and making simple adjustments.

The driver must use care and skill in driving his truck. For example, in driving through aisles where material is stored or when loading or removing materials from stock, he must be able to judge distance so that no damage occurs. The operator also must know how much of a load the truck can carry and the kinds of jobs it can do.

Where Employed

Semiskilled power truckers are employed in all types of manufacturing industries. Many of these workers are employed in metal and metalworking plants which manufacture products such as automobiles and automobile parts, machinery, fabricated metal products, and iron and steel.

In addition to working in factories, large numbers of these workers are employed in commercial establishments, warehouses, depots, dock terminals, mines, and other places where great quantities of materials must be moved. In 1958, about 8,000 forklift truck operators were employed by the Federal Government most of whom were employed by the Army, Navy, and Air Force.

Many of these jobs are found where the metalworking industries are concentrated. Large numbers of industrial power truck operators work in California, Michigan, New York, Ohio, Illinois, and Pennsylvania.

Training, Other Qualifications, and Advancement

Most persons learn to operate a power truck in a few days. However, it takes several weeks to learn the physical layout and operation of a plant, as well as the most efficient way of handling the materials to be moved.



Forklift truck operator moving a heavy load of material

Large companies generally require applicants for a power truck operator job to pass a physical examination. Many large employers also have formal training programs for new employees. In these training programs, the employee learns how to operate the power truck, how to do simple maintenance work, principles of loading and handling materials, plant layout and plant operation, and safe driving practices and rules.

Advancement is limited. A few operators may become materials movement foremen or supervisors.

Employment Outlook

Power truck operator jobs in manufacturing industries are expected to increase considerably in the 1960's. Most of the industries which employ large numbers of these workers are expected to have a long-range upward trend in employment. Replacement needs resulting from transfers to other jobs, retirements, and deaths also will provide many additional job openings.

The continued development and use of more efficient power trucks and other mechanized materials handling equipment could reduce somewhat the expected increase in the employment of these workers. For example, new mechanized materials handling equipment, such as continuous conveyor systems, moves materials in fixed paths at constant rates of speed, eliminating bottlenecks and allowing for accurate production control. This method of materials handling may result in less use of power trucks in some plants. On the other hand, many companies which use few or no power trucks today will require many semiskilled

power truck operators as they mechanize their materials handling operations. Despite more efficient power trucks and mechanized equipment, the more widespread use of power trucks will result in a significant growth in this occupation.

Earnings and Working Conditions

Power truck operators employed in manufacturing industries generally are paid an hourly rate. According to 1959-60 wage surveys made by the U. S. Department of Labor's Bureau of Labor Statistics in 1959-60, the average straight-time hourly earnings of forklift power truck operators in manufacturing plants in 59 cities and areas ranged from \$1.31 in Jackson, Miss., to \$2.71 in Akron, Ohio.

Safety instruction is an important part of the job training in power trucking work. For example, many of these workers are subject to hazards--such as falling objects and collisions between vehicles. The driver may operate his truck inside buildings as well as outdoors and he is exposed to various weather conditions. Some operators may handle loose material which can be dirty or dusty.

Power truck operators have somewhat varied work in moving materials throughout a plant. Their work is likely to be less repetitive and routine than that of workers who do machine operator work.

Many power truck operators are members of labor unions. Most labor-management contracts provide for fringe benefits such as paid holidays and vacations, health insurance, life insurance, and retirement pensions.

PRODUCTION PAINTERS

Nature of Work

Almost every metal or wood product manufactured by American industry is given a coating of paint or other protective material. Although some of this paint is applied by automatic methods, much of the painting in mass-production industries is done by workers known as production painters. These workers use spray guns to apply paint, lacquer, varnish, or other finishes to parts or finished manufactured products. Other production painters use brushes to apply paint. (The work done by production painters in factories is different from that performed by skilled painters who are employed in construction and maintenance work.)

Painters who operate spray guns pour mixed paints into a spray gun container which is attached to an air-



Production painter at work on automobile fender painting line

compressor unit. They make adjustments to the nozzle of the spray gun and the air-compressor so that the paint will be applied uniformly to the surface. The objects being sprayed may be stationary or attached to a moving conveyor. When working on objects requiring more than one color, production painters may apply masking tape to prevent overlapping of colors.

Although the duties of most production painters are quite simple and repetitive, the jobs of some may be rather varied. These production painters may make decisions involving the application of finishes, thinning of paint, and the adjustment of paint spray equipment. Production painters also may clean the surface to be painted before painting. For some assignments, which require production painters to mix paints and figure the size of the area to be painted, they use simple arithmetic involving decimals and fractions. Production painters may replace nozzles and clean guns and other paint equipment when necessary. In addition to spray tanks and spray guns, production painters use tools such as mixing paddles, pliers, rules, and liquid mixing devices.

Where Employed

More than 90,000 production painters were employed in manufacturing industries in 1959; about 15 per cent were women. About 40,000 production painters were employed in plants manufacturing furniture and transportation equipment (primarily automobiles and aircraft). Others worked in plants which produce electrical and electronic machinery, machinery other than electrical, and fabricated metal products. Production painter jobs are found mainly in New York, Michigan, Ohio, Illinois, California, and Pennsylvania.

Training, Other Qualifications, and Advancement

Most production painters learn their jobs through on-the-job training. The

length of training may vary from 2 weeks to several months.

The new worker may have his job duties explained to him by his supervisor and then be placed under the supervision of an experienced employee. The trainee may observe the experienced employee at work or assist him in his work.

Persons going into this work should be in good health, be able to stand for long periods of time, have a steady hand, and have good eyesight so that they can distinguish between colors and see whether the paint is applied evenly.

There are limited advancement possibilities in this field of work. A small number of workers have been able to advance to jobs as skilled inspectors or foremen.

Employment Outlook

There will be thousands of job opportunities for new workers as production painters during the 1960's. Most openings will arise from the need to replace workers who leave their jobs, transfer out of this field of work, retire, or die.

Although many industries which employ these workers are expected to increase their employment in the 1960-70 decade, there probably will be only a slight increase in the employment of production painters. The increasing development and use of mechanized and

automatic painting equipment probably will slow up the employment increase of these workers.

Earnings and Working Conditions

Production painters generally are paid on an hourly basis. According to a 1959 wage survey of the wood household furniture industry by the U.S. Department of Labor's Bureau of Labor Statistics, male production painters had average straight-time hourly earnings of \$1.57. An examination of several 1959-60 labor-management contracts in the metalworking industries indicates that these workers earned from about \$2 to \$2.70 an hour.

Production painters are exposed to fumes from paint and paint-mixing ingredients. Some painters wear protective goggles and masks which cover their nose and mouth. When working on large objects, they may work in awkward and cramped positions.

Many production painters are members of unions. Among the labor organizations to which they belong are the International Union, United Automobile, Aircraft and Agricultural Implement Workers of America; the United Furniture Workers of America; and the United Steelworkers of America. Many labor-management contracts in the plants in which these workers are employed provide for fringe benefits such as holiday and vacation pay, health insurance, life insurance, and retirement pensions.

SEWING MACHINE OPERATORS

Nature of Work

Sewing machine operators use power-driven sewing machines which are used to stitch materials together. These machines are usually heavier and capable of faster speeds than those found in the home. Sewing machine operators work on dresses, suits, shirts, and other

types of apparel; upholstery; and other products.

In beginning the sewing operation, the operator usually first threads the machine and then positions the work for sewing. The machine is started by pressing the knee lever or foot treadle. The operator then works the lever or



Sewing machine operators at work

treadle to control the machine while guiding the material being sewn. Upon completion of the stitching process, the workpiece is removed and, if necessary, excess material is trimmed.

The two major methods of sewing machine operation are the section system and the singlehand (tailor) system. In the section system, the operator specializes in a single production operation. For example, an operator employed in the apparel industry may specialize in attaching collars or cuffs, or joining the front and back of a garment. In the singlehand system, the operator performs all the standard sewing machine operations involved in the manufacture of a complete garment. The operator in the singlehand system usually works on better grade apparel.

Many devices or attachments such as button-holding clamps, seam-folding attachments, or stitch-guiding devices are used by operators on various machines to perform certain sewing operations.

Sewing machine operators are classified in several different ways. For

example, they may be identified according to the type of machine they use--single needle, double needle, or multiple needle operator. They may also be classified according to the part of the product they specialize in producing, for example, shirt hemmer, collar stitcher, or armhole baster.

Sewing machine operators are required to clean, oil, and make simple adjustments to their machines. Sometimes operators must supply their own small tools and attachments such as scissors and folders.

Where Employed

The great majority of workers in this large occupation are employed in the apparel industry. The factories which manufacture men's, women's, and children's clothing are by far the largest employers of these workers. They are employed in other manufacturing plants such as those which produce curtains and other house furnishings, and leather and plastic products. Sewing machine operators also work in factories which produce upholstered furniture, automobiles, and aircraft.

A large number of sewing machine operator jobs are concentrated in New York City, the Nation's garment center. Many sewing machine operator jobs are found in other large urban centers such as Philadelphia, Los Angeles, and Chicago. Jobs also may be found in small towns in many sections of the country.

Training, Other Qualifications, and Advancement

Entry into beginning machine-sewing jobs is relatively easy; there are few restrictions regarding physical condition or age. Usually, some previous training in sewing operations is preferred, although many concerns will hire workers with no such experience.

Sewing machine operators usually learn their jobs through on-the-job

training, which is usually informal and given under the supervision of a foreman or coworker. The length of time required to achieve a satisfactory level and quality of production depends, to a great extent, on individual ability. Workers performing the simpler operations usually can reach a high production rate within a few months.

Some operators learn to operate sewing machines by attending vocational or trade schools. However, workers who have attended such schools frequently need further on-the-job experience before they can perform efficiently on the job.

Sewing jobs require the ability to do painstaking, routine work rapidly. Good eyesight, finger skill, eye-hand-foot coordination, and the ability to work at a steady and fast pace are essential. Sewing machine operator jobs are not physically hard. A large majority of operators are women.

Most sewing machine operators stay on the same operation throughout their working careers. Some do not like to change their sewing specialty since this often causes a loss of earnings during the retraining period. In some cases, operators are able to move to better paying sewing machine jobs in the same or other industries; a few operators have advanced to jobs such as foremen, sample makers, and designers, while others who have had additional training have become production managers.

Employment Outlook

Thousands of young women and men will be able to find jobs as sewing machine operators during the 1960's. A large proportion of job openings will result from the need to replace workers who leave their jobs, transfer to other fields of work, retire, or die.

A moderate increase in the employment of sewing machine operators is expected during the 1960-70 decade as a result of the growth of employment in the apparel industry. Increasing population, rising income, and the great-

er use of informal leisure clothing are among the factors expected to result in an increased demand for the products of the factories employing sewing machine operators. Some of the other manufacturing industries which employ these workers are also expected to increase their employment during this period.

Employment opportunities for sewing machine operators will differ among the various branches of the apparel industry. More opportunities are expected to develop in the plants which produce men's and boys' sports shirts and work clothing and women's dresses, skirts, blouses, and play suits than in the plants manufacturing men's tailored suits and coats.

Since most sewing machine operators are women, many opportunities for employment should arise because women often leave the labor force to get married, raise families, or move to other areas when their husbands change their jobs. A favorable fact about this occupation is that experienced sewing machine operators who leave their jobs are able, with little difficulty, to find operator jobs again when they wish to re-enter the labor force.

Sewing machine operators employed in the apparel industry may be subject to seasonal layoffs and extended periods of unemployment. These seasonal layoffs are more frequent in plants producing women's coats and suits than in factories making men's shirts. However, attempts have been made, largely in unionized plants, to divide the available work during slack periods.

Earnings and Working Conditions

Earnings of sewing machine operators vary widely, depending on the job they are performing, the industry and the size and location of the plant in which they are employed, the method of wage payment (piece rates or hourly rates), and the skill of the individual worker. Sewing machine operators in the apparel industry are generally paid on a piecework basis with a minimum guaranteed hourly rate.

The U. S. Department of Labor's Bureau of Labor Statistics 1958 wage study in the men's and boys' suits and coats industry shows the following average straight-time hourly earnings for sewing machine operators (coat fabrication) in nine large metropolitan areas:

<u>City</u>	<u>Men</u>	<u>Women</u>
Baltimore	\$1.99	\$1.78
Boston	2.22	1.79
Chicago	2.08	1.79
Cincinnati	1.91	1.62
Los Angeles- Long Beach ...	2.23	1.92
New York	2.51	1.90
Philadelphia	2.30	1.83
Rochester, N. Y.	2.18	1.82
St. Louis	----	1.69

The shop areas in which sewing machine operators work are generally well lighted and ventilated. However, there is considerable noise from the machines. Operators who work on a piece-rate basis are sometimes under a strain in trying to work at a rapid pace in order to increase their earnings.

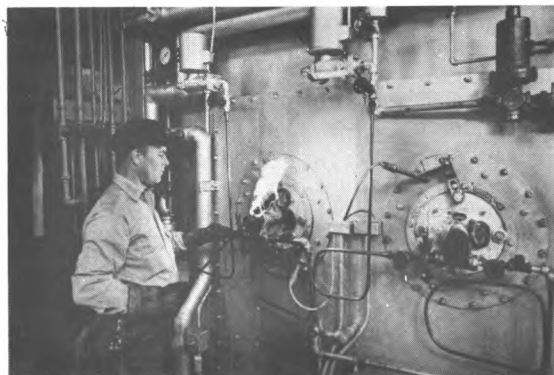
Many sewing machine operators are members of labor unions. Among the organizations to which these workers belong are the International Ladies' Garment Workers' Union, the Amalgamated Clothing Workers of America; and the United Garment Workers of America. Most labor-management contracts in the plants in which these workers are employed provide for fringe benefits such as paid holidays, paid vacations, health insurance, and retirement benefits.

STATIONARY FIREMEN (BOILER)

Nature of Work

Stationary firemen operate and maintain one or more steam boilers used to provide power for industrial machinery or for heating. In most plants, these workers operate mechanical devices which control the flow of air, gas, oil, or powdered coal into the firebox to keep proper steam pressure in the boilers. They keep water in the boilers at required levels and move valves and other devices such as levers and switches to control and regulate boiler operation. They also may add chemicals to boiler water to prevent boiler corrosion. Stationary firemen regularly inspect boiler equipment, reading meters and other instruments, to make sure that the boilers are operating efficiently and in accordance with safety regulations.

Although some firemen in manufacturing plants operate low-pressure boilers, most firemen operate the more powerful high-pressure equipment. In many plants using high-pressure boilers, semiskilled stationary firemen are su-



Stationary fireman lighting a boiler

pervised by skilled workers called stationary engineers. (These skilled workers are responsible for the operation and maintenance of a variety of equipment including boilers, diesel and steam engines, and refrigeration and air-conditioning equipment.)

Stationary firemen keep equipment in good working order by cleaning,

oiling, and greasing moving machinery parts. They may make minor repairs, using small handtools such as wrenches and hammers, and may keep simple records such as those which show the amount of fuel used and boiler temperatures.

Where Employed

About 70,000 stationary firemen were employed in a wide variety of manufacturing industries in 1959. Generally, these workers are employed in industries which are large users of power generating equipment. Leading industries in the employment of stationary firemen are lumber; iron and steel; textiles; stone, clay, and glass; foods; and chemicals.

Because stationary firemen work in so many different industries, they are employed in all parts of the country. Although some are employed in small towns and even rural areas, most work in the more heavily populated areas where large manufacturing plants are located. New York, Pennsylvania, Ohio, Illinois, Michigan, and New Jersey are States which have large numbers of firemen jobs.

Training, Other Qualifications, and Advancement

Most large and medium-size cities, and a few States, require that the applicant for a stationary fireman job have a license which permits him to do this work. Applicants can obtain the knowledge and experience to pass the license examination by first working as a helper in a boiler room, or working as a stationary fireman under a conditional license.

License requirements differ from city to city and from State to State. However, the applicant usually must prove that he meets the experience and other requirements for the license and pass an examination testing his knowledge of the job.

There are two types of stationary firemen licenses--for low and high

pressure boilers. Low pressure firemen operate low pressure boilers generally used for heating. High pressure firemen operate the more powerful high pressure boilers and auxiliary boiler equipment used to power machinery and equipment in addition to heating buildings. However, both high and low pressure operators may operate equipment of any pressure class, provided a stationary engineer is on duty.

Stationary firemen must understand the operation of machinery and have normal vision and good hearing. (Because of the mechanization of equipment, physical strength is no longer a major requirement for this type of work.)

Stationary firemen may advance to jobs as stationary engineers. In order to become stationary engineers, firemen sometimes supplement their on-the-job training by taking courses in subjects such as practical chemistry, elementary physics, blueprint reading, applied electricity, and theory of refrigeration, air-conditioning, ventilation, and heating. Stationary firemen may also advance to jobs as maintenance mechanics.

Employment Outlook

During the 1960's, a slight increase in the number of semiskilled stationary firemen in manufacturing industries is expected. Most opportunities for new workers will result from replacement needs.

The expected increase in the use of stationary boilers and auxiliary equipment--used to generate power or heat plant structures--in the Nation's manufacturing industries is the main reason why some increase in employment is expected in this occupation. However, improved operating efficiency resulting from use of automatic, more powerful, and more centralized equipment, and better use of manpower will limit the growth in the employment of stationary firemen.

Retirements and deaths of experienced stationary firemen will also re-

sult in job openings for new workers. In addition, a large number of job openings will be created by experienced workers who leave their jobs or transfer to other fields of work.

Earnings and Working Conditions

The type of equipment operated and the industry in which they are employed are among the factors affecting the earnings of stationary firemen. According to wage surveys made by the U.S. Department of Labor's Bureau of Labor Statistics in 1959-60, the average straight-time hourly earnings of stationary firemen in manufacturing plants in 51 cities and areas ranged from \$1.26 in Greenville, Ohio, to \$2.83 in the Beaumont-Port Arthur, Texas, area.

Although many boiler rooms where stationary firemen work are clean and well lighted, these conditions do not always exist. Most stationary firemen, even under the most favorable conditions, are at times exposed to noise, high temperatures, dirt, dust, contact with oil

and grease, odors, and fumes from oil, gas, coal, or smoke. In repair or maintenance work, these workers may have to crawl inside a boiler and work in a crouching or kneeling position.

Stationary firemen are subject to burns and falls, and injury from moving machinery. Boilers and auxiliary equipment which are not operated correctly, or are defective, may be dangerous to these workers and to other persons in the work vicinity. However, modern equipment and safety procedures have reduced accidents considerably in recent years.

Many stationary firemen are employed in plants which have labor-management contracts, most of which provide benefits which may include paid holidays and vacations, hospitalization, medical and surgical insurance, sickness and accident insurance, and retirement pensions. Among the unions to which these workers belong are the International Brotherhood of Firemen and Oilers and the International Union of Operating Engineers.