

# OCCUPATIONAL OUTLOOK HANDBOOK

OOH HOME | OCCUPATION FINDER | OOH FAQ | HOW TO FIND A JOB | A-Z INDEX | OOH SITE MAP

Search Handbook

Go

## Machinists and Tool and Die Makers

PRINTER-FRIENDLY 

Summary

What They Do

Work Environment

How to Become One

Pay

Job Outlook

State & Area Data

Similar Occupations

More Info

### Summary



#### Pay

The median annual wage for machinists was \$56,150 in May 2024.

The median annual wage for tool and die makers was \$63,180 in May 2024.

#### Job Outlook

Overall employment of machinists and tool and die makers is projected to show little or no change from 2023 to 2033.

Despite limited employment growth, about 35,400 openings for machinists and tool and die makers are projected each year, on average, over the decade. Most of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

#### State & Area Data

Explore resources for employment and wages by state and area for machinists and tool and die makers.

#### Similar Occupations

Compare the job duties, education, job growth, and pay of machinists and tool and die makers with similar occupations.

[More Information, Including Links to O\\*NET](#)

Learn more about machinists and tool and die makers by visiting additional resources, including O\*NET, a source on key characteristics of workers and occupations.

What They Do ->

## What Machinists and Tool and Die Makers Do

Machinists and tool and die makers set up and operate a variety of computer-controlled and mechanically controlled equipment to produce precision metal parts, instruments, and tools.

### Duties

Machinists typically do the following:

- Read detailed drawings or files, such as blueprints, sketches, and those for computer-aided design (CAD) and computer-aided manufacturing (CAM)
- Set up, operate, and disassemble manual, automatic, and computer numerically controlled (CNC) machine tools
- Align, secure, and adjust cutting tools and workpieces
- Monitor the feed and speed of machines
- Turn, mill, drill, shape, and grind machine parts to specifications
- Verify that completed products meet requirements

Tool and die makers typically do the following:

- Read detailed drawings or files—such as blueprints, sketches, specifications, and those for CAD and CAM—to make tools, molds, and dies
- Compute and verify dimensions, sizes, shapes, and tolerances of workpieces
- Set up, operate, and disassemble conventional, manual, and CNC machine tools
- File, grind, and adjust parts so that they fit together
- Test completed tools and dies to ensure that they meet specifications
- Smooth and polish the surfaces of tools and dies

**Machinists** use lathes, milling machines, grinders, and other machine tools to produce precision metal parts. Many machinists must be able to use both manual and CNC machinery. CNC machines control the cutting tool speed and do all necessary cuts to create a part. The machinist programs instructions into the CNC machine to determine the cutting path, cutting speed, and feed rate.

Although workers may produce large quantities of one part, precision machinists often produce small batches or single items. The parts that machinists make include steel bolts, titanium bone screws, and automobile pistons.

Some machinists repair broken parts or make new parts that an [industrial machinery mechanic](#) discovers in a machine. The machinist refers to engineering drawings to create the replacement.

Some manufacturing processes use lasers, water jets, and electrified wires to cut the workpiece. As [engineers](#) design and build new types of machine tools, machinists must learn new machining properties and techniques.

**Tool and die makers** construct precision tools or metal forms, called dies, that are used to cut, shape, and mold metal, plastics, and other materials.

Tool and die makers use CAD to develop products and parts. They enter designs into computer programs that produce blueprints for the required tools and dies. CNC programmers, described in the [metal and plastic machine workers](#) profile, convert CAD designs into CAM programs that contain instructions for a sequence of cutting-tool operations. Machinists normally operate CNC machines, but tool and die makers often are trained to both operate CNC machines and write CNC programs and thus may do either task.

<- Summary

Work Environment ->

## Work Environment



Some machinists and tool and die makers work evenings and weekends because facilities may operate around the clock.

Machinists held about 298,000 jobs in 2023. The largest employers of machinists were as follows:

Fabricated metal product manufacturing	35%
Machinery manufacturing	19
Transportation equipment manufacturing	12
Wholesale trade	4

Tool and die makers held about 59,100 jobs in 2023. The largest employers of tool and die makers were as follows:

Transportation equipment manufacturing	26%
Machinery manufacturing	22
Fabricated metal product manufacturing	21
Primary metal manufacturing	7
Plastics product manufacturing	7

Injuries and Illnesses

Because machinists and tool and die makers may work with machine tools that present hazards, these workers must take precautions to avoid injuries. For example, workers must wear protective equipment, such as safety glasses to shield against bits of flying metal and earplugs to dampen the noise produced by machinery.

Work Schedules

Many machinists and tool and die makers work full time during regular business hours. However, some work nights and weekends in facilities that operate around the clock. Some work more than 40 hours a week.

<- What They Do

How to Become One ->

How to Become a Machinist or Tool and Die Maker



Machinists and tool and die makers typically are trained on the job.

Although machinists typically need a high school diploma to enter the occupation, tool and die makers also may need to complete postsecondary courses. Machinists and tool and die makers typically are trained on the job. Some learn through training or apprenticeship programs, vocational schools, or community and technical colleges.

Education

Machinists typically need a high school diploma or equivalent; tool and die makers also may need to complete postsecondary courses. High school courses in math, blueprint reading, metalworking, and CAD/CAM are considered useful.

Some community colleges and technical schools have 2-year degree programs or shorter nondegree certificate programs that train students to become machinists or tool and die makers. These programs usually teach design and how to read engineering drawings, the use of a variety of welding and cutting tools, and the programming and function of CNC machines.

Training

Machinists and tool and die makers typically gain competency through on-the-job training or an apprenticeship.

Trainees usually learn on the job, which may include technical instruction outside of typical work hours. Trainees often begin as machine operators and gradually take on more difficult assignments. Machinists and tool and die makers must be comfortable using computers to work with CAD/CAM technology, CNC machine tools, and computerized measuring machines. Some machinists become tool and die makers.

Some new workers enter apprenticeship programs, which are typically sponsored by an employer. Apprenticeship programs often consist of paid training on the job and related technical instruction lasting several years. The technical instruction may be provided in cooperation with local community colleges and vocational–technical schools. Workers typically need a high school diploma or equivalent to enter an apprenticeship.

Licenses, Certifications, and Registrations

Completing a certification program, though optional, allows machinists and tool and die makers to demonstrate competency and may be helpful for advancement. Colleges and organizations, such as the [National Institute for Metalworking Skills](#) (NIMS), offer certifications and credentials in CNC machine operation, CAD/CAM technology, and other relevant competencies.

Important Qualities

**Analytical skills.** Machinists and tool and die makers must be able to interpret technical blueprints, models, and specifications so that they can craft precision tools and metal parts.

**Manual dexterity.** Machinists’ and tool and die makers’ work demands accuracy, sometimes to within .0001 of an inch. This level of accuracy requires both concentration and agility.

**Mechanical skills.** Machinists and tool and die makers may operate milling machines, lathes, grinders, laser and water jetting machines, wire electrical discharge machines, and other machine tools.

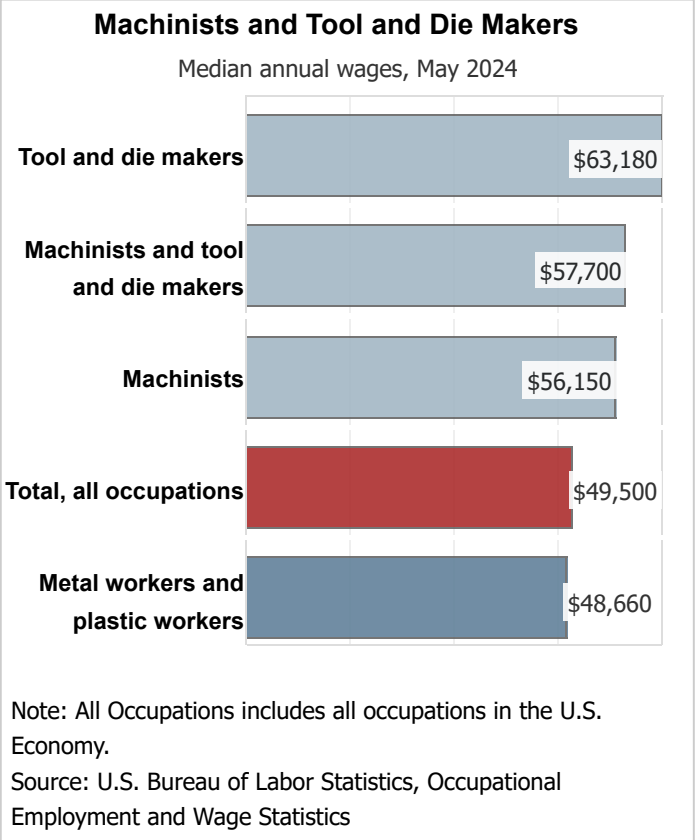
**Physical stamina.** Machinist and tool and die makers must stand for extended periods and perform repetitious movements.

**Technical skills.** Machinists and tool and die makers must understand metalworking processes. They must be able to work with CAD/CAM technology, CNC machine tools, and manual and computerized measuring machines.

[<- Work Environment](#)

[Pay ->](#)

## Pay



The median annual wage for machinists was \$56,150 in May 2024. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$38,100, and the highest 10 percent earned more than \$78,760.

The median annual wage for tool and die makers was \$63,180 in May 2024. The lowest 10 percent earned less than \$44,200, and the highest 10 percent earned more than \$87,660.

In May 2024, the median annual wages for machinists in the top industries in which they worked were as follows:

Transportation equipment manufacturing	\$60,320
Machinery manufacturing	56,200
Wholesale trade	54,040
Fabricated metal product manufacturing	50,950
Employment services	38,860

In May 2024, the median annual wages for tool and die makers in the top industries in which they worked were as follows:

Transportation equipment manufacturing	\$74,330
Fabricated metal product manufacturing	63,390
Machinery manufacturing	61,820
Plastics product manufacturing	61,320
Primary metal manufacturing	52,380

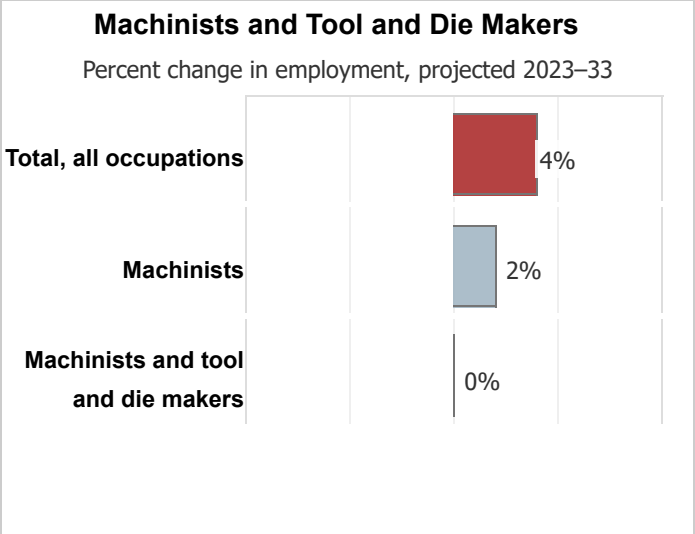
The pay of apprentices is tied to their skill level. As they reach specific levels of performance and experience, their pay increases.

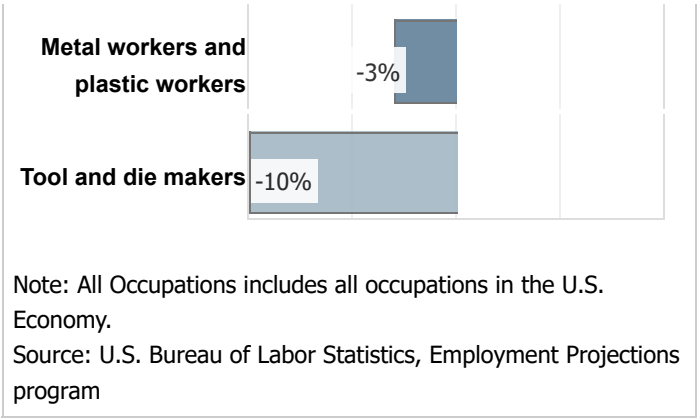
Many machinists and tool and die makers work full time during regular business hours. However, some work nights and weekends in facilities that operate around the clock. Some work more than 40 hours a week.

[<- How to Become One](#)

[Job Outlook ->](#)

## Job Outlook





Overall employment of machinists and tool and die makers is projected to show little or no change from 2023 to 2033.

Despite limited employment growth, about 35,400 openings for machinists and tool and die makers are projected each year, on average, over the decade. Most of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

### Employment

Projected employment of machinists and tool and die makers varies by occupation (see table).

Although machinists will be required to set up, monitor, and maintain systems, such as computer numerically controlled (CNC) machine tools, autoloaders, and high-speed machining, their employment growth is expected to be limited as improvements in these technologies increase these workers’ efficiency over the projections decade.

Employment of tool and die makers is expected to decline as advances in automation, including CNC machine tools, reduce demand for certain tasks that these workers do, such as programming how parts fit together.

### Employment projections data for machinists and tool and die makers, 2023–33

Machinists and tool and die makers
<b>SOC Code:</b> —
<b>Employment, 2023:</b> 357,000
<b>Projected Employment, 2033:</b> 356,300
<b>Change, 2023–33 (Percent):</b> 0
<b>Change, 2023–33 (Numeric):</b> -700
<b>Employment By Industry:</b> —

Machinists
<b>SOC Code:</b> 51-4041
<b>Employment, 2023:</b> 298,000
<b>Projected Employment, 2033:</b> 303,000
<b>Change, 2023–33 (Percent):</b> 2
<b>Change, 2023–33 (Numeric):</b> 5,000
<b>Employment By Industry:</b> <a href="#">Get data</a>

Tool and die makers
<b>SOC Code:</b> 51-4111
<b>Employment, 2023:</b> 59,100
<b>Projected Employment, 2033:</b> 53,300
<b>Change, 2023–33 (Percent):</b>

SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program



-10

**Change, 2023–33 (Numeric):**  
-5,800

**Employment By Industry:**  
[Get data](#)

SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program

<- Pay

State & Area Data ->

## State & Area Data

### Occupational Employment and Wage Statistics (OEWS)

The [Occupational Employment and Wage Statistics](#) (OEWS) program produces employment and wage estimates annually for over 800 occupations. These estimates are available for the nation as a whole, for individual states, and for metropolitan and nonmetropolitan areas. The link below goes to OEWS data maps for employment and wages by state and area. Use the dropdown boxes to select an occupation.

[Occupational Employment and Wage Statistics \(OEWS\) Profiles](#)

### Projections Central

Occupational employment projections are developed for all states by Labor Market Information (LMI) or individual state Employment Projections offices. All state projections data are available at [www.projectionscentral.org](http://www.projectionscentral.org). Information on this site allows projected employment growth for an occupation to be compared among states or to be compared within one state. In addition, states may produce projections for areas; there are links to each state’s websites where these data may be retrieved.

### CareerOneStop

CareerOneStop includes hundreds of [occupational profiles](#) with data available by state and metro area. There are links in the left-hand side menu to compare occupational employment by state and occupational wages by local area or metro area. There is also a [salary info tool](#) to search for wages by zip code.

<- Job Outlook

Similar Occupations ->

## Similar Occupations

This table shows a list of occupations with job duties that are similar to those of machinists and tool and die makers.

#### [Boilermakers](#)

**Job Duties:**

Boilermakers assemble, install, maintain, and repair boilers, closed vats, and other large vessels or containers that hold liquids and gases.

**Entry-Level Education:**

High school diploma or equivalent

**2024 Median Pay:**

\$73,340

#### [Industrial Machinery Mechanics, Machinery Maintenance Workers, and Millwrights](#)

**Job Duties:**

Industrial machinery mechanics, machinery maintenance workers, and millwrights install, maintain, and repair factory equipment and other industrial machinery.

**Entry-Level Education:**

High school diploma or equivalent

**2024 Median Pay:**

\$63,510

#### [Metal and Plastic Machine Workers](#)

**Job Duties:**

Metal and plastic machine workers set up and operate equipment that cuts, shapes, and forms metal and plastic materials or pieces.

**Entry-Level Education:**

[See How to Become One](#)

**2024 Median Pay:**

\$46,800

#### [Welders, Cutters, Solderers, and Brazers](#)

**Job Duties:**

Welders, cutters, solderers, and brazers use hand-held or remotely controlled equipment to join, repair, or cut metal parts and products.

**Entry-Level Education:**

High school diploma or equivalent

**2024 Median Pay:**

\$51,000

<- State & Area Data

More Info ->

# Contacts for More Information

For details about apprenticeships or other work opportunities in this occupation, contact the offices of the state employment service, the state apprenticeship agency, or local businesses that employ machinists and tool and die makers. Apprenticeship information is available from the U.S. Department of Labor’s [Apprenticeship](#) program online or by phone at 877-872-5627. Visit [Apprenticeship.gov](#) to search for apprenticeship opportunities.

For more information about machinists and tool and die makers, including training and certification, visit

[Fabricators & Manufacturers Association, International](#) (FMA)

[Manufacturing Institute](#) (MI)

[National Institute for Metalworking Skills](#) (NIMS)

For information about manufacturing careers, including machinery and tool and die makers, visit

[American Mold Builders Association](#) (AMBA)

[Association for Manufacturing Technology](#) (AMT)

[National Tooling and Machining Association](#) (NTMA)

[Precision Machined Products Association](#) (PMPA)

[Precision Metalforming Association](#) (PMA)

O\*NET

[Machinists](#)

[Tool and Die Makers](#)

[<- Similar Occupations](#)

## SUGGESTED CITATION:

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Machinists and Tool and Die Makers, at <https://www.bls.gov/ooh/production/machinists-and-tool-and-die-makers.htm> (visited August 03, 2025).

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