

CAREERS

in Manufacturing



An education and career
planning guide for students,
parents and educators



ATTENTION STUDENTS:

This guide highlights the variety of careers available in the field of manufacturing and the requirements to pursue these careers.

PARENTS & EDUCATORS:

This information will enable you to better advise the student on a course of action and craft a plan for success in manufacturing.

Contact us:



1651 Wilkening Road,
Schaumburg, IL 60173

847-825-1120

www.tmaillinois.org

Want more TMA info? Follow us!



Dear Student

“What are you going to do after high school?” is a question you are probably asked on a daily basis. “Manufacturing” probably isn’t the answer you give. If you’re like most people, you have a perception that a career in manufacturing involves working in a dark, dirty factory on an assembly line.

That is simply not the case.

Jobs in manufacturing require highly-skilled and trained people. Today’s machines that produce everything from the plastic tube your Chapstick® comes in to the aluminum can you drink Coca-Cola® out of are run by computers. Those computers need highly-trained people programming and operating them. They need skilled workers to design the tools and molds that the parts are produced from.

Don’t want to produce the goods? Look at careers in Quality Control. Manufactured parts must be produced to meet tight tolerances. A fraction of a millimeter off, and the part is useless. Good with your hands? Maybe a career in welding or as an industrial maintenance mechanic is for you. If you want a hand in all aspects of manufacturing, from planning to producing, a career in manufacturing engineering may be a good fit.

When it comes to a career in manufacturing, you have choices. There are literally dozens of career paths you can follow. If college isn’t for you, there are several career paths in manufacturing that simply require a high school diploma with on-the-job training. You can earn while you learn. If a two- or four-year college degree is in your future, there are manufacturing positions that need you, too.

If you’re good with your hands, are a problem solver, and have technical skills, manufacturing could be a great way to go. In Illinois, there are thousands of open manufacturing positions and not enough people to fill them.

If you think a career in manufacturing could be for you, check out the following career paths. Then get in touch with TMA so you can determine the next steps on the path to your new career.

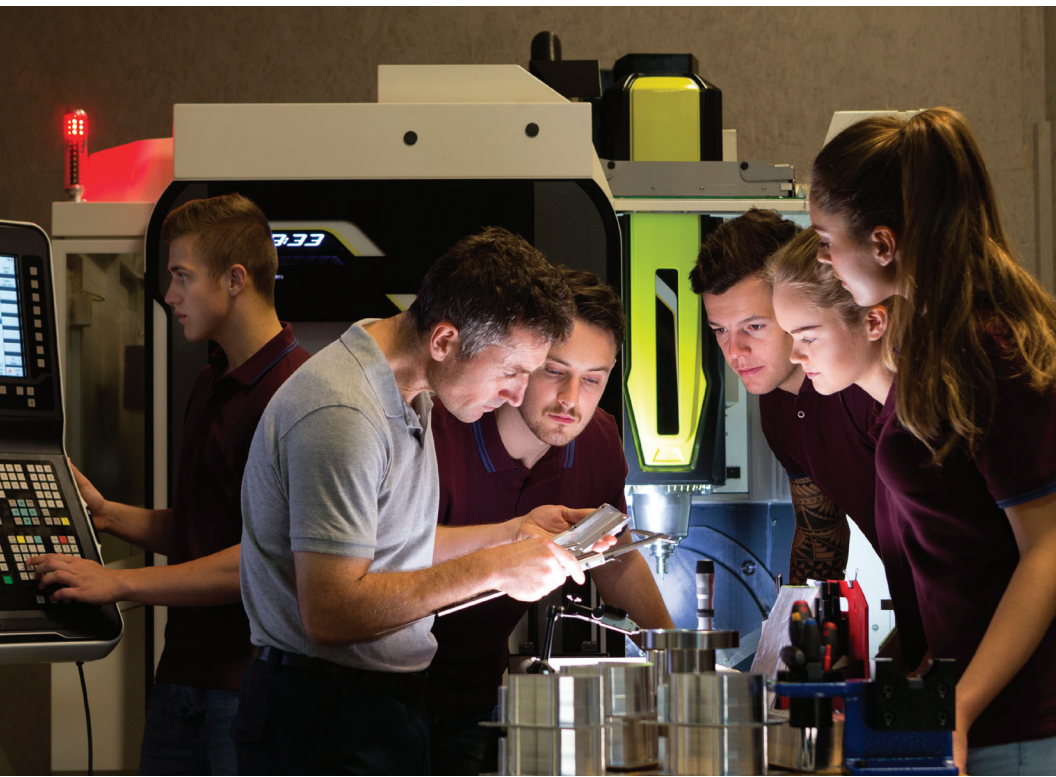


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Tool and Die



- Machinists and tool and die makers set up and operate a variety of computer-controlled or mechanically-controlled machine tools to produce precision metal parts, instruments, and tools.
- Machinists and tool and die makers work in machining facilities and toolrooms and on factory floors. Most work full time during regular business hours. However, overtime, evening, and weekend work are common.
- Machinists and tool and die makers train in apprenticeship programs, vocational schools, community and technical colleges, or informally on the job. To become a fully trained tool and die maker takes a combination of 4 or 5 years of technical instruction and on-the-job training. Good math, problem-solving, and computer skills are important.
- Tool and die makers earned \$15 - \$35 per hour in 2016.

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TOOL & DIE MAKERS PERFORM THE FOLLOWING:

Study blueprints, sketches, specifications, or CAD or CAM files for making tools and dies

Compute and verify dimensions, sizes, shapes, and tolerances of workpieces

Set up, operate, and tear down conventional, manual, or computer numeric controlled (CNC) machine tools

File, grind, and adjust parts so that they fit together properly

Test completed tools or dies to ensure that they meet specifications

Inspect for proper dimensions and defects



Quick Facts

| | |
|--|--|
| 2016 Pay (per year) | \$32,000 Entry \$50,000 Median \$74,000 Experienced |
| Education Track | TMA Related Theory Classes + OTJ (On-the-Job) Training = Certificate in Tool & Die Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | none |
| On-the-job Training | long-term on-the-job training |

Mold Making

- Mold makers design, build and repair molds and models used in industry to mass-produce plastic or metal components and products. Mold makers may use hand-molding techniques for small quantities of items but will often use computer and industrial technology to produce large numbers of identical items.
- Mold makers generally work full time, sometimes in shift work, in machine or production shops. Overtime may be necessary from time to time to meet production deadlines.
- Machinists train in apprenticeship programs, vocational schools, community and technical colleges, or informally on the job. To become a fully trained mold maker takes a combination of 4 or 5 years of technical instruction and on-the-job training. Good math, problem-solving, and computer skills are important.
- Mold makers earned \$12 – \$36 per hour in 2016.



Quick Facts

| | |
|---|--|
| 2016 Pay (per year) | \$26,000 Entry \$46,000 Median \$75,000 Experienced |
| Education Track | TMA Related Theory Classes + OTJ (On-the-Job) Training = Certificate in Mold Making Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | none |
| On-the-job Training | long-term on-the-job training |



CNC Operator/Programmer

- CNC operators/programmers input highly-detailed instructions into a computer system that guides robotic arms and tools to perform precision machining jobs. Skilled CNC programmers are able to greatly improve the efficiency of production and the quality of finished products.
- CNC operators/programmers work in machine shops and toolrooms and on factory floors. Most work full time during regular business hours. However, overtime, evening, and weekend work are common.
- There are no set education requirements to become a CNC machine operator / programmer, but many professionals who work with very detailed machinery and technology hold college degrees in mechanical engineering. Some programmers are able to enter the field after earning certificates from two-year community colleges or vocational schools. In addition, many CNC machine operators eventually become programmers after gaining several years of experience in the industry.
- CNC operators/programmers earned \$16 – \$36 per hour in 2016.

Quick Facts

| | |
|--|---|
| 2016 Pay (per year) | \$32,000 Entry \$49,000 Median \$76,000 Experienced |
| Education Track | TMA Related Theory Classes + TMA CNC Hands-on Machine Training + OTJ (On-the-Job) Training = Certificate in Advanced CNC Programming Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | 1-2 years |
| On-the-job Training | moderate on-the-job training |



Quality Control Inspector

- Using state-of-the-art computer programs and machines, quality control inspectors examine products and materials for defects or deviations from manufacturers' or industry specifications.
- Working conditions vary by industry, establishment size, and specific duty. Most quality control inspectors work full time.
- Most quality control inspectors typically need a high school diploma and moderate on-the-job training.
- Quality Control Inspector earned \$10 – \$30 per hour in 2016.



Quick Facts

| | |
|---|---|
| 2016 Pay (per year) | \$21,000 Entry \$36,000 Median \$62,000 Experienced |
| Education Track | TMA Quality Control Training + OTJ (On-the-Job) Training |
| | Next Steps: Certifications from ASQ, the American Society for Quality. |
| | Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | none |
| On-the-job Training | moderate on-the-job training |

QUALITY CONTROL INSPECTORS PERFORM THE FOLLOWING:

Read and understand blueprints and specifications

Monitor or observe operations to ensure that they meet production standards

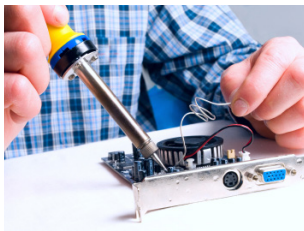
Recommend adjustments to the process or assembly

Inspect, test, or measure materials or products being produced

Measure products with CMM machines, rulers, calipers, gauges, or micrometers

Welding

- Welders, cutters, solderers, and brazers weld or join metal parts. They also fill holes, indentions, or seams of metal products, using hand-held welding equipment.
- Welders, cutters, solderers, and brazers may work outdoors, often in inclement weather, or indoors, sometimes in a confined area. They may work on a scaffold high off the ground, and they occasionally must lift heavy objects and work in awkward positions. Most work full time and overtime is common in this occupation.
- Training for welders, cutters, solderers, and brazing workers varies. Training ranges from a few weeks of school or on-the-job training for low-skilled positions to several years of combined school and on-the-job training for highly skilled jobs.
- Welders earned \$12 – \$29 per hour in 2016.



Quick Facts

| | |
|--|--|
| 2016 Pay (per year) | \$26,000 Entry |
| | \$38,000 Median |
| | \$60,000 Experienced |
| Education Track | OTJ (On-the-Job) Training + a level of Certification from the American Welding Society. |
| | Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | less than 1 year |
| On-the-job Training | moderate on-the-job training |

WELDERS PERFORM THE FOLLOWING:

- Study blueprints, sketches, or specifications
- Calculate dimensions to be welded
- Inspect structures or materials to be welded
- Ignite torches or start power supplies
- Monitor the welding process to avoid overheating
- Smooth and polish all surfaces
- Maintain equipment and machinery

Industrial Maintenance Mechanic

- Industrial machinery mechanics and maintenance workers maintain and repair factory equipment and other industrial machinery, such as conveying systems, production machinery, and packaging equipment.
- Workers must follow safety precautions and use protective equipment, such as hardhats, safety glasses, and hearing protectors. Most mechanics work full time. However, they may be on call or assigned to work nights or weekends. Overtime is common.
- Both industrial machinery mechanics and machinery maintenance workers typically need a high school diploma. However, industrial machinery mechanics need a year or more of training after high school, whereas machinery maintenance workers typically receive on-the-job training that lasts a few months to a year.
- Employment of industrial machinery mechanics and maintenance workers is expected to grow 19 percent from 2010 to 2020, about as fast as the average for all occupations. Increased use of manufacturing machinery will require more mechanics and maintenance workers to keep the machines in good working order. Applicants with broad skills should have favorable job prospects.
- Industrial Maintenance Mechanics earned \$15 - \$36 per hour in 2016.



Quicks Facts

| | |
|--|---|
| 2016 Pay (per year) | \$32,000 Entry \$50,000 Median \$75,000 Experienced |
| Education Track | TMA Related Theory Classes + OTJ (On-the-Job) Training Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | none |
| On-the-job Training | long-term on-the-job training |

Manufacturing Engineer

- Manufacturing engineers direct and coordinate the processes for making things - from the beginning to the end. As businesses try to make products better and at less cost, it turns to manufacturing engineers to find out how.
- Manufacturing engineers work with all aspects of manufacturing from production control to materials handling to automation. Machine vision and robotics are some of the more advanced technologies in the manufacturing engineer's toolkit.
- A manufacturing engineer works full-time during normal business hours for a production company.
- A person who wants to become a manufacturing engineer usually needs to obtain at least a bachelor's degree from an accredited university. With a degree, an individual can begin applying for entry-level junior engineer positions. New workers typically receive formal on-the-job training and operate under the supervision of experienced engineers for several months.
- Manufacturing engineers earned \$25 – \$73 per hour in 2016.



Quick Facts

| | |
|--|---|
| 2016 Pay (per year) | \$52,000 Entry \$96,000 Median \$151,000 Experienced |
| Education Track | TMA Related Theory Classes + OTJ (On-the-Job) Training Next Steps: Degree from a 2-yr Community College and then a 4-yr University |
| Work Experience in a Related Occupation | none |
| On-the-job Training | moderate on-the-job training |

MANUFACTURING ENGINEERS PERFORM THE FOLLOWING:

Design and develop integrated systems used for the manufacturing production process

Coordinate the maintenance and repair of machines to avoid delays in the production process, as well as ensure the production process and machinery are in compliance with customer specifications and professional and safety standards.

Design new ways to use electrical power to develop or improve products

Do detailed calculations to compute manufacturing, construction, and installation standards and specifications

Next Steps

Think a career in manufacturing could be for you?

Consider these steps in beginning your new career:

1

Complete an internship with a TMA member company.

We'll get you started with your internship at one of our member's facilities. Internships can be developed around your schedule.

2

Get hired by a TMA Member Company and start earning!

- Enroll in the TMA Related Theory Apprenticeship Training program to earn a Machinist certificate after two years or a Tool & Die, Mold Making, or Advanced CNC certificate after 3 years
- Attend CNC Hands-on Training at TMA

3

Explore degree options at a two- or four-year college.

QUICK QUIZ

Answer “yes” or “no” to these questions to see if Manufacturing is the right career for you.

1. I can repair broken items.
2. I’m skilled at working with my hands.
3. I’m good at taking apart an item and then putting it back together.
4. I like operating different kinds of tools to complete a job.
5. I’m willing to lift heavy objects in my job.
6. Changing raw materials into useful products, such as making paper from wood, sounds exciting to me.
7. I like to build things.
8. I don’t mind working indoors.
9. I like to work with computers.
10. I like to solve problems.

Totals: “Yes” _____ “No” _____

If you answered “yes” to five or more of the questions then you may have what it takes to make it in Manufacturing.

Source SCOIS (Coin Career) Assessment Tests

What is STEM?

STEM stands for Science, Technology, Engineering and Mathematics and are the core academic disciplines for nine of the seventeen occupational clusters – those career opportunities that require workers to demonstrate particular proficiency in math and science to assure successful careers. These careers include Engineering, Medicine, Manufacturing, Research and Development and many more.

The demand for STEM competency has greatly increased in recent years. Focusing on manufacturing, STEM competency is required to operate highly technical advanced machinery and technology in modern factories and shops all across the nation. Workers must be able to clearly define what is expected from them in producing a product; determine if they have the right tool(s) to respond to the challenge and then determine the best use of their tool(s) to respond; and finally to interpret the results to determine whether the finished product has indeed met the expectation for the customer. Proficiency in STEM assures manufacturing professionals are able to do just that.

STEM education opens the doors to a wide array of career opportunities. For more information on STEM-related careers, contact your guidance counselor.

A Message from TMA

TMA represents over 700 manufacturing companies in Illinois with many located in the greater Chicagoland area. Precision machining companies, tool and die companies and mold making companies are but a few of the different types of companies that comprise TMA membership. In many cases, high school students obtain employment with these companies right after graduation, or even earlier as interns. They receive on-the-job training during the day and take classes at TMA at night, or on the weekend. These students can become highly skilled master craftsmen in as little as three to five years and are paid a good salary. It is not uncommon for students to gain entry level employment with TMA member companies and quickly progress to key leadership positions in these companies in a surprisingly short time. Many TMA students choose to continue their studies at local community colleges and even four-year universities.

Since its founding in 1925, TMA has served as a valued source of employee learning and development for member companies. Over the years, the scope of TMA's educational offerings has expanded.

In today's global economy, customers are constantly pushing for improved quality and faster cycle times. To operate effectively in this environment, TMA member companies need to continuously improve the selection and training of their employees. This begins with the future of our workforce—high school students.

To address such needs, TMA is engaged in a continuous improvement program to strengthen its training and educational capabilities, as well as its outreach to high schools across Illinois. If you have any questions, give us a call or drop a quick email. Addressing the needs of high school students is one of our primary goals. We look forward to working with you as we continue to build and strengthen manufacturing in Illinois.

Questions? Contact TMA at 847-825-1120

Get in touch with the following professional organizations

TMA

www.tmaillinois.org or info@tmaillinois.org

National Association of Manufacturers

www.nam.org

The American Mold Builders Association (AMBA)

www.amba.org

American Welding Society

www.aws.org

American Society for Quality

www.asq.org

Illinois Manufacturers' Association

www.ima-net.org

Also, contact your local
community colleges!



Technology & Manufacturing Association

1651 Wilkening Road,
Schaumburg, IL 60173

Phone: 847-825-1120
Fax: 847-825-0041