

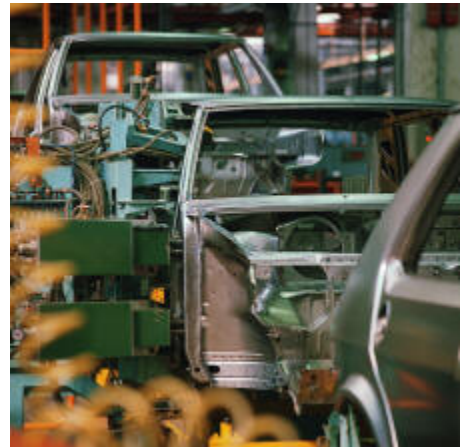
Sloan Career Cornerstone Center

Manufacturing Engineering Overview

The Field - Preparation - Day in the Life - Earnings - Employment - Career Path Forecast - Professional Organizations

The Field

Manufacturing engineers are involved with the process of manufacturing from planning to packaging of the finished product. They work with tools such as robots, programmable and numerical controllers, and vision system to fine tune assembly, packaging, and shipping facilities. They examine flow and the process of manufacturing, looking for ways to streamline production, improve turnaround, and reduce costs. Often, a manufacturing engineer will work with a prototype, usually created electronically with computers, to plan the final manufacturing process. In a globally competitive marketplace, it is the job of the manufacturing engineer to figure out methods and systems to produce a product in an efficient, cost-effective way to provide a marketing edge for the final product.



Preparation

Manufacturing engineering graduates may work in any field that produces goods -- from automobiles and boats and airplanes, to electronic products to educational toys, to food and clothing. They must have strong analytical skills and be detail oriented. In addition, they must work well in team situations as they are often called upon to work in a group setting with other engineers and with others outside of engineering.

► Manufacturing Engineering Programs

A bachelor's degree in engineering is required for almost all entry-level engineering jobs. A degree in manufacturing engineering might include the following types of courses: engineering materials, circuits and electromagnetics, linear algebra, device control, quality engineering, and marketing. It is important to select a program that is accredited in manufacturing engineering.

► Admission Requirements

Admissions requirements for undergraduate engineering schools include a solid background in mathematics (algebra, geometry, trigonometry, and calculus) and science (biology, chemistry, and physics), and courses in English, social studies, humanities, and computer and

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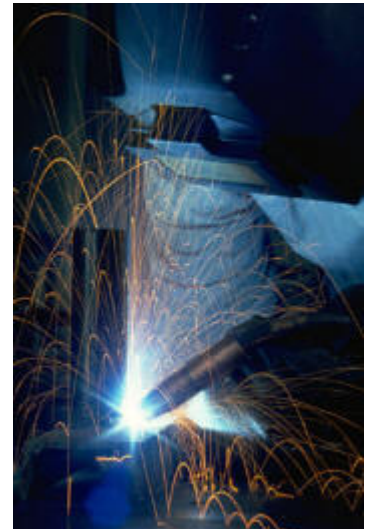
information technology. Bachelor's degree programs in engineering typically are designed to last 4 years, but many students find that it takes between 4 and 5 years to complete their studies. In a typical 4-year college curriculum, the first 2 years are spent studying mathematics, basic sciences, introductory engineering, humanities, and social sciences. In the last 2 years, most courses are in engineering, usually with a concentration in one branch. For example, the last two years of a manufacturing engineering program might include advanced content in engineering science, manufacturing, and materials.

► Co-ops

Internships and Coops provide students with a great opportunity to gain real-world experience while still in school. Many universities offer co-op and internship programs for students studying Manufacturing Engineering.

► Courses of Study

Students specializing in Manufacturing Engineering will study computer-aided design and manufacturing, along with production and quality control. Student will review the economics of manufacturing and learn about fabrication and assembly. They will likely take courses in mathematics, physics, chemistry, statistics, computer science, and mechanical, electrical, and civil engineering. Specific courses in statics, dynamics, and strength of materials provide manufacturing engineering students an understanding of how mechanical components interact. Manufacturing Engineers usually develop skills that span many engineering disciplines, with an eye toward focusing their expertise in the manufacturing process.



► Accredited Programs

Students interested in a career in Manufacturing Engineering should consider reviewing engineering programs that are accredited by the Accreditation Board for Engineering and Technology, Inc. (ABET). ABET accreditation is based on an evaluation of an engineering program's student achievement, program improvement, faculty, curricular content, facilities, and institutional commitment. The following is a current list of universities offering accredited degree programs in Manufacturing Engineering.

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| <ul style="list-style-type: none">• Boston University• Bradley University• California Polytechnic State University, San Luis Obispo• California State Polytechnic University, Pomona• California State University, Northridge• Central State University• Grand Valley State University• Kansas State University• Miami University• University of Miami• University of Michigan-Dearborn | <ul style="list-style-type: none">• North Dakota State University• Northwestern University• Oregon State University• University of Rhode Island• Robert Morris University• Southern Illinois University-Edwardsville• St. Cloud State University• University of St. Thomas• The University of Texas-Pan American• Washington State University• Wichita State University• University of Wisconsin-Stout• Worcester Polytechnic Institute |
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Day in the Life

Manufacturing engineering graduates generally begin their careers working in teams with other engineers to design a process or production system for a phase of a manufacturing process. With experience, they may work as a production engineer, focusing on integrating the different processes and parts needed to create a finished product. Some manufacturing engineering graduates decide to focus on the overall system, and take a wide view of the process including supplies, distribution, cost control, resource management, and marketing. Throughout their work, manufacturing engineers are concerned about creating a quality product that meets customer needs in an efficient and safe manner that is cost effective.



Job Duties

Manufacturing engineers often work in teams. They will frequently meet with other engineers and others outside engineering to review the manufacturing process, goals, and current status. Manufacturing engineers may be involved in workforce planning and use, work flow, and the design and space planning for the manufacturing process. They may be involved in product planning, providing input into original product design -- with an eye to what will be required to ultimately manufacture the product. Their expertise in production efficiency is helpful in product design, and packaging planning. Manufacturing engineers may work with suppliers and other vendors to develop and review part specification, pricing, and delivery planning. They will be involved in quality control, and meeting standards for the final product. They may also focus on planning production times, cost estimates, and marketing decisions.

The Workplace

Manufacturing engineers usually work in teams with others, and may physically spend time in manufacturing facilities, or in an office setting. They often visit manufacturing settings to review the progress of processes, equipment, and projects. Although most manufacturing engineers work approximately 40 hours per week, they often have to work nights and weekends to meet deadlines.



Teams and Coworkers

Almost all jobs in engineering require some sort of interaction with coworkers. Whether they are working in a team situation, or just asking for advice, most engineers have to have the ability to communicate and work with other people. Engineers should be creative, inquisitive, analytical, and detail-oriented. They should be able to work as part of a team and to communicate well, both orally and in writing. Communication abilities are important because engineers often interact with specialists in a wide range of fields outside engineering. Almost all jobs in civil engineering require some sort of interaction with coworkers. Whether they are working in a team situation, or just asking for advice, most engineers have to have the ability to communicate and work with other people.

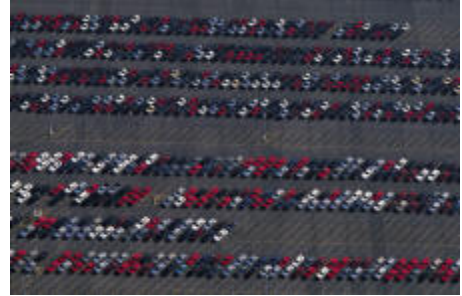
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Earnings

Manufacturing engineers work wherever products are manufactured -- in industry, government, research, service, and consulting.

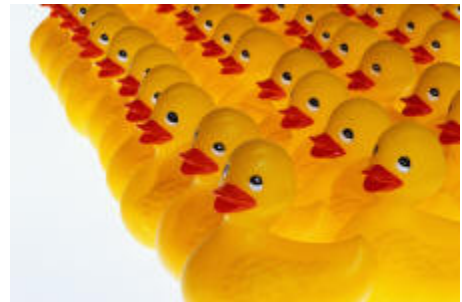
Manufacturing activities contribute more than 25% of the U.S. GDP, and according to the Federal Bureau of Labor Statistics, more than 60% of engineers employed in the United States are involved in manufacturing.



The national average starting salary for new manufacturing engineering graduates ranges from \$45,000 to \$59,000. According to the Society of Manufacturing Engineers, the average starting salary for a manufacturing engineering graduate (BS) is \$44,837. The group estimates that the average salary of all manufacturing engineers is \$57,683.

Employment

Manufacturing Engineers work on products from design to distribution. They work in almost every industry and on a wide range of products from autos, to toys, to sports equipment, to food, to computer chips. They start with raw materials, determine the most efficient manufacturing system to create the product, evaluate staffing needs, project costs, and coordinate the entire manufacturing process. Manufacturing engineers incorporate their knowledge of current techniques and equipment into their work, including computer-aided design, robotics, statistical process control, and computer-integrated manufacturing systems.



Industry Week offers a database of the top 1000 manufacturing firms (www.industryweek.com/research/iw1000/2007/iw1000rank.asp) -- and the following is a partial list of employers of Manufacturing Engineers:

Corporations	Corporations (continued)
<ul style="list-style-type: none">• 3M Worldwide• Abbott Laboratories• Aerostructures• American Standard Inc.• Anheuser-Busch Companies• Bacardi-Martini Inc.• Ball Corporation• BASF• Becton Dickinson• Black & Decker• Black & Veatch• Boeing• Cabot Corporation• Cadillac Products	<ul style="list-style-type: none">• Hartz Mountain• H.J. Heinz Company• Honda• Hormel Foods Corporation• IBM• Ingersoll-Rand Company• Intel Corporation• Johnson Controls Inc.• Lear Corporation• Lucent Technologies, Inc.• M & M Mars• Maytag Corporation• MeadWestvaco Corporation• Michelin Tire

- **Campbell Soup Company**
- **Caterpillar, Inc.**
- **Cigna Corporation**
- **Clorox Company**
- **ConAgra, Inc.**
- **Corning Incorporated**
- **Daimler-Chrysler**
- **Dell**
- **Delphi Corporation**
- **Detroit Diesel**
- **Dole**
- **DuPont**
- **Eastman Chemical Company**
- **Eli Lilly and Company**
- **Exxon Mobile**
- **Flextronics**
- **Ford Motor Company**
- **General Electric**
- **General Mills, Inc.**
- **General Motors**
- **Good Year Tire & Rubber Company**
- **Goodrich Corporation**

U.S. Federal Government and State and Local Affiliates

- **Department of Defense**
- **NASA**

- **Motorola**
- **National Starch & Chemical Company**
- **Orthodyne Electronics**
- **Parker Hannifin**
- **Phillip Morris USA**
- **PPG Industries Inc**
- **Procter & Gamble Company**
- **Raytheon Electronic Systems**
- **Rohm and Haas Company**
- **Textron Inc.**
- **The Dow Chemical Company**
- **The Sherwin-Williams Company**
- **The Timken Company**
- **Toyota Motor North America Inc.**
- **TRW, Inc.**
- **United States Steel Corporation**
- **Visteon**
- **W L Gore & Associates**
- **W. R. Grace & Co.**
- **Xerox Corporation**

Other Employers

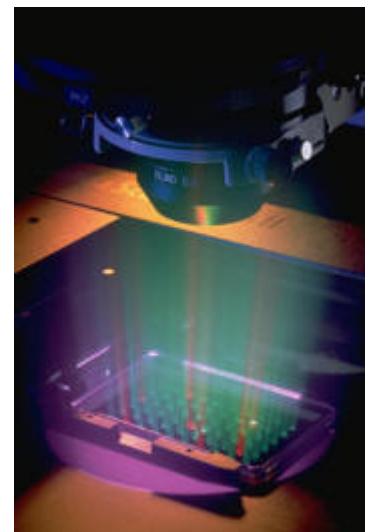
- **Consulting Firms**
- **Colleges and Universities**

Career Path Forecast

According to the US Department of Labor, Bureau of Labor Statistics, employment projections data indicate that manufacturing employment will decrease 5.4 percent over the 2004-14 period.

Manufacturers seeking to streamline costs and improve products are looking to manufacturing engineers to enhance the manufacturing process.

As a result, the demand for manufacturing engineers is strong in manufacturing centers across the United States. And, as many U.S. companies also have manufacturing locations abroad, manufacturing engineering graduates also have broad international career opportunities.



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Professional Organizations

Professional organizations and associations provide a wide range of resources for planning and navigating a career in Manufacturing Engineering. These groups can play a key role in your development and keep you abreast of what is happening in your industry. Associations promote the interests of their members and provide a network of contacts that can help you find jobs and move your career forward. They can offer a variety of services including job referral services, continuing education courses, insurance, travel benefits, periodicals, and meeting and conference opportunities. A broader list of professional associations is also available at www.careercornerstone.org.



► **Society of Manufacturing Engineers (www.sme.org)**

The Society of Manufacturing Engineers is dedicated to bringing people and information together to advance manufacturing knowledge. The group is internationally recognized by manufacturing practitioners, companies and other organizations as a source for information, education and networking. Through its member services, publications, events, professional development resources, and chapter and technical community networking activities, SME keeps manufacturing engineers up to date on trends and technologies. SME also hosts a summer camp for high school girls.

► **Society of Automotive Engineers (www.sae.org)**

The Society of Automotive Engineers has more than 84,000 members - engineers, business executives, educators, and students from more than 97 countries - who share information and exchange ideas for advancing the engineering of mobility systems.

► **Association for Manufacturing Excellence (www.ame.org)**

The Association for Manufacturing Excellence is a not-for-profit organization dedicated to cultivating understanding, analysis and exchange of productivity methods and their successful application.

► **National Association of Manufacturers (www.nam.org)**

The NAM is the U.S.'s largest industrial trade association, representing small and large manufacturers in every industrial sector and in all 50 states.