Spotlight on Manufacturing

Career Spotlight: Manufacturing Your Future

Move over Rosie the Riveter. Today's careers in manufacturing are clean, filled with high technology, automation and robots. Manufacturing offers excellent process-improvement strategies to lead the country out of its economic downturn, employing a highly skilled, highly motivated workforce. Whether your interests lie in improving the layout and efficiency of a company through industrial engineering, or in designing custom tools that enable a company to produce its product as a tool and die maker, the manufacturing sector has something for you.

According to the *Blue Green Alliance Clean Energy Assembly Line Report 2009*, more than 42,000 existing manufacturers could experience growth based on increased demand for component parts needed to produce clean energy, with Pennsylvania ranking among the top six states with the potential to create such jobs.

The manufacturing industry is filled with high-demand and rewarding occupations. Faced with an aging workforce, and not enough skilled and adaptable workers to replace them as they retire in the coming years, manufacturing companies are eager to hire and train highly motivated individuals in key occupations: Industrial Maintenance (IM), CNC Operations (CNC), Machining (M) and Welding (W).

Industrial Maintenance focuses on the careers that install, repair and perform maintenance on industrial machinery. CNC Operators manufacture products by using computer-controlled machines and robots. Machining occupations require individuals to operate or program machine tools to produce a variety of products. Welding workers weld, braze and solder to manufacture products. The following table highlights 12 specific demand occupations across the four occupational groups.

Job Group(s)	Occupation	Average Entry Level Wages	Average Annual Wage	Percent Growth 2008-18	Annual Statewide Openings
IM	Industrial Engineering Technicians	$35,160	$50,250	-0.7	78
IM	Supervisors – Mechanics, Installers & Repairers	$43,340	$63,030	-1.1	350
IM	Industrial Machinery Mechanics	$33,240	$44,570	8.0	401
IM	Maintenance & Repair Workers, General	$24,210	$36,080	0.8	217
IM	Maintenance Workers, Machinery	$27,660	$40,200	-5.4	41
CNC, M, W	Supervisors – Production & Operating Workers	$35,960	$55,340	-10.8	515
CNC	Computer-Controlled Machine Tool Operators	$25,440	$36,090	-4.1	95
CNC	Numerical Tool & Process Control Programmers	$32,000	$42,250	-11.1	14
M	Machinists	$27,570	$38,670	-6.1	319
M	Tool & Die Makers	$33,170	$44,440	-8.6	93
W	Welders, Cutters, Solderers & Brazers	$26,480	$35,900	-8.5	388
W	Welding, Soldering & Brazing Machine Operators	$25,580	$36,420	-5.1	33

Nearly 200,000 people work in these 12 identified occupations throughout Pennsylvania. Projections indicate that there will be nearly 2,600 openings each year in these 12 occupations combined. These 12 in-demand jobs require some postsecondary education and training, ranging from a year or so of on-the-job training to an associate's degree. For many of these occupations, training is acquired through an apprenticeship, which often articulates to college credit. Industry-recognized credentials, such as those offered by the National Institute for Metalworking Skills (NIMS), are growing in popularity and often provide a benchmark by which an employer can qualify an individual with experience, and by which a postsecondary institution can justify the awarding of advanced-placement credit. With the right education and training, you can start on a career path that offers good pay, opportunities for growth and skills that are in high demand. Additionally, the knowledge you gain may lead to college credit, opening new doors for your manufacturing career.

Source: CWIA, 2008-18 Long-Term Occupational Employment Projections & Occupational Employment Statistics Survey (May 2009)

Note: Average Income statistics are for Pennsylvania only.

Manufacturing Interview

Name: Joseph Cabrera
Age: 17
School: Lehigh Career & Technical Institute, Schnecksville

What drew you to an education in manufacturing?

From a very young age, I always liked working with my hands. I was constantly taking things apart to see how they worked and then trying to put them back together. I was also obsessed with electricity — you flip a switch and "boom" the lights go on. I guess I'm intrigued by the whole cause and effect phenomenon.
So for me, the manufacturing field is a perfect fit.

What are you currently studying?

Electromechanical/Mechatronics Technology, which combines electricity, industrial electricity, industrial electronics and automated manufacturing.

What is the most interesting part of your lab?

That's a tough one. There's so much that's interesting! I like being engaged, feeling like I'm really doing something. Whether I'm bending conduit, working with motor controls or PLCs, I find there's always something new to learn. The technology in the manufacturing industry is constantly changing, so I am never bored. That's the best part.

What kind of education is required to perform your job?

You don't necessarily need a four-year degree, but to advance at a rapid level I am pursuing an associate's degree in Electrical Engineering at the local community college. They have a program where I can actually earn a bachelor's degree in Mechatronics Technology from Temple University.

Where do you see yourself in 10 years?

By then I will have finished my bachelor's degree and I'll be working in the electromechanical field. Because electromechanical encompasses so many types of engineering, I can be pretty flexible and find a job that suits me. With an in-demand field like manufacturing, I don't think finding a job and building a successful career will be a problem.

What advice would you give to students who are unsure about entering the manufacturing sector?

There are many opportunities available in the manufacturing sector because it involves so many different types of skills. If you're a problem-solver looking for a challenging career, then electromechanical and the manufacturing field are worth investigating.

Advanced Material and Diversified Manufacturing (AMDM)

The AMDM cluster includes many industries, such as plastics, chemical and metal manufacturing; commercial printing; textile, iron and steel mills and machine shops. Workers primarily set-up and/or operate machinery that makes various products used by consumers and businesses.

Jobs in these industries include high-paying positions such as welders, machinists, electrical engineers, tool & die makers and many more. Some key occupations are listed in the table below. In many of these jobs, workers must be able to perform physical activities for long periods of time. Traditionally, AMDM jobs needed only on-the-job training, but continual technological advancements require a workforce with higher skills and more postsecondary education.

Occupation Description	Interest Code	Employment Outlook		Wage Data			HPO / STEM	Green
		Projected 2018	Openings per Year	PA Entry	PA Average	US Average		
Career Path Icon W : Jobs Requiring Short, Moderate or Long-Term On-the-Job Training								
Team Assemblers - work as part of a team to assemble an entire product or component of a product.	RC	41,400	978	$20,750	$29,940	$28,840	HPO	
Shipping & Receiving Clerks - prepare items for shipment and maintain records on incoming and outgoing materials.	CR	27,480	696	$22,370	$32,070	$29,840	HPO	
Production Helpers - assist production workers by performing duties of a lesser skill.	R	25,540	692	$17,560	$25,320	$24,000		
Production Supervisors - coordinate the activities of production and operating workers.	ERC	27,460	515	$35,960	$55,340	$55,150	HPO	Green
Industrial Machinery Mechanics - install, repair or maintain machinery and distribution systems used for industrial production and processing.	R	17,540	401	$33,240	$44,570	$46,160	HPO/ STEM	Green
Production Clerks - coordinate the flow of work and materials within or between departments according to production schedule.	CE	12,910	363	$29,340	$44,240	$43,260	HPO	
Inspectors & Testers - inspect, test or weigh assembled parts and products for defects, wear and deviations from specifications.	RC	20,430	345	$23,640	$35,720	$34,840	HPO	Green
Machinists - make or repair metal parts for machines.	R	19,400	319	$27,570	$38,670	$38,940	HPO	Green
Cutting Machine Operators - operate machines to saw or cut metal or plastic material.	R	10,530	318	$22,540	$31,420	$30,480	HPO	
Printing Machine Operators - set up and operate various printing machines to produce print on paper or other materials.	RC	8,910	208	$23,420	$36,260	$35,030	HPO	
Molding Machine Operators - operate molding machines to mold metal or thermoplastic parts.	R	6,620	188	$21,290	$30,670	$29,750	HPO	
Extruding Machine Setters - operate machines to extrude thermoplastic or metal materials into structural shapes.	R	5,190	158	$27,090	$37,340	$32,320	HPO	
Electr. Equipment Assemblers - assemble or modify electrical or electronic equipment.	R	6,510	158	$20,500	$30,370	$30,690	STEM	
Machine Feeders & Offbearers - feed or remove materials from equipment that is automatic or tended by other workers.	R	7,040	153	$20,360	$29,000	$27,430		
Structural Metal Fabricators - fabricate, lay out, position, align and fit parts of structural metal products.	R	5,630	114	$26,560	$36,490	$35,080		
Painting Machine Operators - operate machines to coat or paint any of a wide variety of products.	R	4,720	112	$21,500	$31,630	$30,550		
Multiple Machine Tool Operators - operate more than one type of cutting or forming machine tool or robot.	R	5,210	112	$23,560	$32,970	$32,860	HPO	
Mixing Machine Operators - operate machines to mix or blend materials.	R	6,020	104	$24,460	$35,180	$33,460		

Occupation Description	Interest Code	Employment Outlook		Wage Data			HPO / STEM	Green
		Projected 2018	Openings per Year	PA Entry	PA Average	US Average		
Career Path Icon W : Jobs Requiring Short, Moderate or Long-Term On-the-Job Training								
Photographic Processing Machine Operators - operate photographic processing machines, such as film developing machines.	R	1,380	104	$16,880	$21,340	$22,330		
CNC Machine Operators - operate automatic machine tools to produce metal or plastic parts.	R	7,650	95	$25,440	$36,090	$35,570	HPO/ STEM	
Tool & Die Makers - use machines to make molds, fixtures and dies that are used by other machinists to manufacture metal products.	R	6,410	93	$33,170	$44,440	$48,730	HPO	
Chemical Equipment Operators - operate equipment to control chemical changes or reactions in the processing of industrial or consumer products.	R	3,850	92	$29,170	$42,690	$45,100	STEM	Green
Sewing Machine Operators - operate sewing machines or perform related sewing operations in manufacture of products.	R	4,990	73	$17,020	$22,800	$22,250		
Lathe Machine Tool Operators, Metal & Plastic - operate lathe machines to turn, bore, thread or form metal or plastic materials.	RC	2,860	72	$26,860	$37,570	$35,000		
Forging Machine Operators, Metal & Plastic - operate forging machines to taper or form metal or plastic parts.	R	1,540	71	$25,860	$34,300	$33,700		
Machinery Maintenance Workers - lubricate machinery, change parts or perform maintenance.	R	2,440	41	$27,660	$40,200	$39,570	HPO	
Numerical Tool Programmers - develop programs to control machining of parts by automatic machine tools.	RI	1,040	14	$32,000	$45,250	$48,230	HPO/ STEM	
Career Path Icon T : Jobs Requiring Postsecondary Training through a Technical School or Associate Degree								
Welders - make or repair products by using heat and pressure to join metal pieces together.	R	16,780	388	$26,480	$35,900	$36,630	HPO/ STEM	Green
Commercial & Industrial Electr. Equip. Repairers - repair, test, adjust or install electronic equipment.	R	4,930	180	$38,370	$48,470	$51,210	STEM	Green
Chemical Technicians - conduct chemical and physical laboratory tests to assist scientists in making qualitative and quantitative analyses of solids, liquids and gaseous materials.	RIC	4,740	166	$30,250	$44,030	$43,900	STEM	Green
Electr. Engineering Technicians - design, build, test, modify and repair electrical and electronic equipment.	RIC	7,010	148	$32,740	$52,200	$55,410	STEM	Green
Mechanical Drafters - prepare detailed working diagrams of machinery and mechanical devices.	RCI	3,850	118	$32,770	$48,830	$49,790	HPO/ STEM	
Industrial Engineering Technicians - apply engineering theory and principles to problems of industrial layout or manufacturing production.	IC	3,980	78	$35,160	$50,250	$49,030	HPO/ STEM	Green
Career Path Icon C : Jobs Requiring at least Four Years of Education in College								
Industrial Engineers - design, develop, test and evaluate integrated systems for managing industrial production.	EIR	10,880	354	$53,240	$76,780	$77,090	HPO/ STEM	Green
Purchasing Agents - purchase machinery or equipment necessary for the operation of an establishment.	EC	12,550	284	$37,220	$56,790	$58,550		
Industrial Production Managers - plan and coordinate the work activities and resources necessary for the manufacturing process.	EC	5,830	226	$52,000	$87,480	$93,650		Green
Mechanical Engineers - plan or design tools, engines or other mechanical equipment.	RI	8,870	202	$52,110	$77,600	$80,580	STEM	Green
Electronics Engineers - design and test electronic components and systems for commercial, industrial, military or scientific use.	IRC	6,240	146	$56,510	$84,480	$91,540	STEM	Green
Electrical Engineers - oversee the manufacturing and operation of electrical and electronic equipment.	IRC	5,590	132	$55,710	$83,230	$86,250	STEM	Green
Engineering Managers - plan, direct or coordinate activities in fields such as architecture or engineering.	EIR	5,350	112	$74,720	$116,410	$122,810	STEM	Green
Sales Engineers - sell business goods or services, the selling of which requires a technical background equivalent to a baccalaureate degree in engineering.	ECS	3,640	93	$49,320	$80,650	$90,540	STEM	