



Manufacturing and Product Development Industry Sector

The Manufacturing and Product Development industry sector is an important part of California's economy, producing a wide range of products, including computers, communications equipment, electronic components, high-tech instruments, apparel, metal products, chemicals, plastics, aircraft, ships, missiles and space products, and search and navigation equipment. Both large and small manufacturers are important participants in the electronics, multimedia, and other emergent regional industrial clusters.

This sector provides a foundation in manufacturing processes and systems for all industrial and technology education students in California. These students are engaged in an instructional program that integrates technical preparation and academics with career awareness, career exploration, and skill preparation in four pathways: Graphic Arts Technology, Integrated Graphics Technology, Machine and Forming Technology, and Welding Technology. Manufacturing and Product Development pathways emphasize real-world, occupationally relevant experiences of significant scope and depth in manufacturing and graphic communication. To prepare students for the vast range of career opportunities in manufacturing and product development, middle schools, high schools, regional occupational centers and programs, apprenticeship programs, community colleges, and four-year colleges and universities provide educational and training programs.

Manufacturing and Product Development Industry Sector Pathways:

- *Graphic Arts Technology*
- *Integrated Graphics Technology*
- *Machine and Forming Technology*
- *Welding Technology*

Entry Level Careers

(with high school diploma)

Desktop Publishing
Graphic Art Equipment Operator
Special Effects Animator
Web Designer
Pre-Press Designer
Machine Operator
Maintenance Mechanic
Assembler
Installation Apprentice
Bindery Workers
Welder
Cutter, Solder, Brazier
Plastics Assembler
Foundry Helper
Furniture Finishers
Upholsterers
Painting, Coating, and Decorating Workers

Technical Level Careers

(with AA or AS degree or certificate)

Commercial Photographer
Production Manager
Graphic Artist Journeyman
Advertising Design
Multimedia Digital Editor
CNC Programmer
Machine Technician
Tooling Journeyman
Industrial Electrician
Cabinetmakers and Bench Carpenters
Tool and Die Makers
Power Plant Operators
Fabric and Apparel Pattern Makers
Certified Welder
Boilermaker
Foundry Core, Pattern Maker
Composite Fabricator

Professional Level Careers

(with BS or BA degree)

Publisher, Editor
Production Developer
Industrial Technology Instructor
Network Engineer
Publications Management
Multimedia Author
Manufacturing Engineer
Mechanical Engineer
Tooling Engineer
Design Engineer
Quality Control Inspector
Pressurized Vessel Engineer
Fabrication Designer

Graphic Arts Technology Pathway

Sample CTE Courses*

Education Level and Related Occupations**

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> ▪ Drafting ▪ Exploring Technology ▪ Orientation to Graphic Arts Apprenticeship ▪ Technology Core 	<ul style="list-style-type: none"> ▪ Communications Technology ▪ Graphic Arts/Communications ▪ Photography Laboratory 	<ul style="list-style-type: none"> ▪ Commercial Photography ▪ Composition, Lithography, and Platemaking ▪ Composition, Makeup, and Typesetting ▪ Desktop Publishing 	<ul style="list-style-type: none"> ▪ Desktop Publisher ▪ Graphic Art Equipment Operator ▪ Network Installer+ ▪ Pre-Press Designer ▪ Graphic Arts Apprentice 	<ul style="list-style-type: none"> ▪ Commercial Photographer ▪ Production Manager ▪ Network Administrator+ ▪ Graphic Artist (Journeyman) 	<ul style="list-style-type: none"> ▪ Publisher, Editor ▪ Product Developer ▪ Industrial Technology Educator+ ▪ Network Engineer+ ▪ Graphic Designer

Integrated Graphics Technology Pathway

Sample CTE Courses*

Education Level and Related Occupations**

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> ▪ Drafting/Communications ▪ Exploring Technology ▪ Graphic Arts ▪ Graphic Communications Apprenticeship Awareness ▪ Technology Core 	<ul style="list-style-type: none"> ▪ Communications Technology ▪ Graphic Communications ▪ Graphic Communications Apprenticeship Explorations ▪ Photography Laboratory ▪ Video Production 	<ul style="list-style-type: none"> ▪ Animation ▪ Broadcasting Production ▪ Multimedia ▪ Orientation to Graphic Communications Apprenticeship 	<ul style="list-style-type: none"> ▪ Desktop Publisher ▪ Special Effects Animator ▪ Special Effects Apprentice ▪ Video Graphics Helper ▪ Web Designer 	<ul style="list-style-type: none"> ▪ Advertising Design ▪ Multimedia/Digital Editor ▪ Special Effects Editor ▪ Special Effects Journeyman ▪ Webmaster 	<ul style="list-style-type: none"> ▪ Industrial and Technology Educator+ ▪ Multimedia Author ▪ Multimedia/Digital Producer ▪ Publications Management ▪ Special Effects Engineer

*Sample CTE Courses are from the Career Technical Education Framework for California Public Schools (California Department of Education: 2007, <http://www.cde.ca.gov/re/pn/fd/>)

**Visit ASSIST (www2.assist.org/browseAreas.do) for community college and UC/CSU information and California Career Zone (www.cacareerzone.org) for occupation information.

+This occupation requires certification or licensure.

Related Career Technical Student Organization: SkillsUSA (<http://www.skillsusaca.com>)

Additional Industry Sector information available through the California Industrial and Technology Education Consortium (<http://www.citeonline.org>).

Machine and Forming Technology Pathway

Sample CTE Courses*

Education Level and Related Occupations**

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> ▪ Drafting ▪ Exploring Technology ▪ Metalworking ▪ Orientation to Machine and Forming Apprenticeship ▪ Technology Core 	<ul style="list-style-type: none"> ▪ Ironworking ▪ Machine Shop ▪ Manufacturing I ▪ Plastics/Composites ▪ Sheet Metal 	<ul style="list-style-type: none"> ▪ Foundry/Metallurgy ▪ Machine Tool Operations ▪ Manufacturing II ▪ Plastics/Composites 	<ul style="list-style-type: none"> ▪ Assembler ▪ Electro-Mechanical Helper ▪ Installation Apprentice ▪ Machine Operator ▪ Maintenance Mechanic 	<ul style="list-style-type: none"> ▪ CNC Programmer ▪ Industrial Electrician+ ▪ Machine Technician ▪ Manager ▪ Tooling Journeyman 	<ul style="list-style-type: none"> ▪ Design Engineer ▪ Industrial Technology Educator+ ▪ Manufacturing Engineer+ ▪ Mechanical Engineer+ ▪ Tooling Engineer

Welding Technology Pathway

Sample CTE Courses*

Education Level and Related Occupations**

Introductory	Concentration	Capstone	High School Diploma	Certification and/or AA Degree	Bachelor's Degree or Higher
<ul style="list-style-type: none"> ▪ Exploring Technology ▪ Metalworking ▪ Orientation to Welding Apprenticeship ▪ Technology Core ▪ Welding Fundamentals 	<ul style="list-style-type: none"> ▪ Manufacturing/Materials Processing ▪ Technical Drafting ▪ Welding Fabrication, Ironworking ▪ Welding-Combination I ▪ Welding-Electrical 	<ul style="list-style-type: none"> ▪ Computer-aided Drafting (CAD) ▪ Computer-aided Manufacturing (CAM) ▪ Foundry ▪ Welding-Combination II ▪ Welding-Specialized 	<ul style="list-style-type: none"> ▪ Cutter, Solder, Brazier ▪ Foundry Helper ▪ Plastics Assembler ▪ Welder ▪ Welding Apprentice+ 	<ul style="list-style-type: none"> ▪ Boilermaker+ ▪ Certified Welder+ ▪ Composite Fabricator ▪ Foundry Core, Pattern Maker ▪ Welding Journeyman+ 	<ul style="list-style-type: none"> ▪ Fabrication Designer ▪ Industrial Technology Educator+ ▪ Manufacturing Engineer ▪ Pressurized Vessel Engineer+ ▪ Quality Control Inspector

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CAREER OPPORTUNITIES IN

MANUFACTURING AND PRODUCT DEVELOPMENT INDUSTRY SECTOR



10 TIPS FOR CHOOSING THE RIGHT CAREER FOR YOU

*How does a person know what career to work toward?
There is no perfect answer, but the following 10 tips will
get you off to a good start.*

- 1 Get to know yourself** – Complete more than one self-assessment test.
- 2 Identify your strengths and weaknesses** – What do you do well and what do you not do well?
- 3 Develop an inventory of careers** – Write down some careers that might interest you.
- 4 Research different careers** – Talk to others and use the Internet.
- 5 Write the pros and cons** – List positives and negatives about the careers that interest you.
- 6 Network** – Discuss your ideas with others.
- 7 Talk with people who work in your area of interest** – Family and friends are great resources.
- 8 Find a mentor** – Find someone with whom you can discuss your career selection.
- 9 Experiment** – Take a related class or part-time job.
- 10 Don't give up** – "If there is a will, there is a way."



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Plan For Success
Visit statecenter.com/industrysectors





The Manufacturing and Product Development Industry Sector provides a foundation in manufacturing processes and systems. Manufacturing is the use of tools and labor to make products to sell. Product development involves the creation of an idea and the subsequent design and process that results in a product for sale. This sector is closely related to engineering and industrial design. An important part of California's economy, this sector produces a wide range of products from sophisticated electronic/computer-related equipment to the simplest of toys.

As our world becomes more dependent on electronics, students with training and education in manufacturing and product development will continue to be in high demand. The Manufacturing and Product Development Industry Sector is for students who enjoy working with their hands, building or designing infrastructures, and expressing themselves artistically.

Web sites for further information:

www.californiacareers.info

www.whodouwant2be.com

www.californiacolleges.edu

www.edd.ca.gov/Jobs_and_Training/

Career Pathways



Graphic Arts Technology Pathway

The Graphic Arts Technology Pathway provides students with an understanding of manufacturing processes and systems common to careers in graphic arts and printing technology. Designers make sketches, models, and computer simulations that are presented to engineers and marketing staff. Students will be introduced to different printing enterprises, graphic design, photography, and art and copy preparation.

CAREERS/CAREER AREAS:

- Publisher
- Editor
- Graphic Artist/Designer
- Desktop Publishing
- Production Manager
- Network Engineer
- Industrial Designer
- Commercial Photographer



Integrated Graphics Technology Pathway

The Integrated Graphics and Technology Pathway is for students who have a passion for both the arts

and electronics. Technology related to this pathway is continually evolving. Creativity ranks in importance with education and experience. Text, graphics, audio, video, and animation are areas explored in this pathway. Careers in this pathway involve a wide range of activities including on-demand publishing, digital imaging, analog and digital videography, and electronic image assembly.

CAREERS/CAREER AREAS:

- Special Effects Animator
- Webmaster
- Web Designer
- Multimedia Producer
- Publication Manager
- Special Effects Journeyman



Machine and Forming Technology Pathway

The Machine and Forming Technology Pathway teaches students how machines are designed to form products in the manufacturing industry. After a layout design is developed, the machine forming process cuts, shapes, forges, molds, casts, fastens, and finishes the manufacturing process. Skilled craftsmen ensure the finished product meets the product specifications.

CAREERS/CAREER AREAS:

- Assembler
- Tooling Technician
- Computer Programmer
- Mechanical Engineer
- Industrial Technology Educator
- Machine Operator
- Maintenance Mechanic
- Design Engineer
- Tooling Engineer

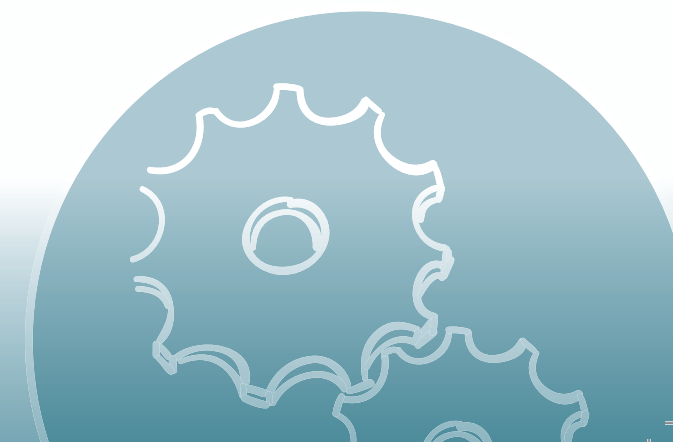


Welding Technology Pathway

The Welding Technology Pathway provides students with an understanding of how welding and related careers fit in the manufacturing process. During the manufacturing process, highly skilled craftsmen apply a wide variety of bonding techniques. Topics include mechanical bonding, joining, cohesive bonding, adhesive bonding, and mechanical fastening. Newer welding methods include laser, ultrasonic, and electron beam. The demand for trained welders continues to look good.

CAREERS/CAREER AREAS:

- Welder
- Blacksmith
- Metallurgist
- Quality Control Inspector
- Fabrication Designer
- Plastics Assembler
- Composite Fabricator
- Manufacturing Engineer
- Boilermaker
- Ironworker
- Robotics Technician





MANUFACTURING AND PRODUCT DEVELOPMENT

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The information below is just a small sample of the many great employment related resources available on the State of California website www.edd.ca.gov. We encourage you to visit the website and explore the available information.

Occupation Title	Employment Levels in 2006	Projected Employment level 2016	Projected Job Growth	Percent of Job Growth	2008 Hourly ¹ Mean Wage	2008 ² Weekly Mean Wage	2008 ³ Monthly Mean Wage	2008 Annual Mean Wage
Advertising Sales Agents	21,000	25,300	4,300	20.5%	\$27.70	\$1,108.00	\$4,653.60	\$55,843.20
Assemblers & Fabricators	32,400	33,500	1,100	3.4%	\$13.18	\$527.20	\$2,214.24	\$26,570.88
Commercial & Industrial Designers	5,900	6,600	700	11.9%	\$36.46	\$1,458.40	\$6,125.28	\$73,503.36
Computer Programmers	36,900	35,700	-1,200	-3.3%	\$39.10	\$1,564.00	\$6,568.80	\$78,825.60
Desktop Publishers	2,900	2,900	0	0.0%	\$19.87	\$794.80	\$3,338.16	\$40,057.92
Editors	14,100	15,600	1,500	10.6%	\$28.04	\$1,121.60	\$4,710.72	\$56,528.64
Graphic Designers	36,700	41,800	5,100	13.9%	\$25.99	\$1,039.60	\$4,366.32	\$52,395.84
Industrial Production Managers	19,400	20,300	900	4.6%	\$46.51	\$1,860.40	\$7,813.68	\$93,764.16
Machine Operators	5,200	5,400	200	3.9%	\$12.71	\$508.40	\$2,135.28	\$25,623.36
Machinists	32,500	36,000	3,500	10.8%	\$18.83	\$753.20	\$3,163.44	\$37,961.28
Maintenance Mechanics	133,000	149,300	16,300	12.3%	\$18.63	\$745.20	\$3,129.84	\$37,558.08
Mechanical Engineers	24,000	25,800	1,800	7.5%	\$41.09	\$1,643.60	\$6,903.12	\$82,837.44
Multi Media Artists & Animators	27,900	36,800	8,900	31.9%	\$38.98	\$1,559.20	\$6,548.64	\$78,583.68
Network Administrators	32,400	42,200	9,800	30.2%	\$37.67	\$1,506.80	\$6,328.56	\$75,942.72
Network Systems Analysts	28,900	45,900	17,000	58.8%	\$37.23	\$1,489.20	\$6,254.64	\$75,055.68
Photographers	13,800	15,900	2,100	15.2%	\$22.69	\$907.60	\$3,811.92	\$45,743.04
Production Managers	19,400	20,300	900	4.6%	\$46.51	\$1,860.40	\$7,813.68	\$93,764.16
Secondary School Teachers	119,100	140,600	21,500	18.1%	\$31.52	\$1,260.80	\$5,295.36	\$63,544.32
Structural Steel & Iron Workers	5,100	5,500	400	7.8%	\$24.78	\$991.20	\$4,163.04	\$49,956.48
Technical Writers	7,200	8,600	1,400	19.4%	\$37.20	\$1,488.00	\$6,249.60	\$74,995.20
Welders, Cutters, Solderers, & Brazers	31,200	35,400	4,200	13.5%	\$17.06	\$682.40	\$2,866.08	\$34,392.96

These selected occupations with information on job growth, percent growth and earning potentials are based on information found at www.labormarketinfo.edd.ca.gov

¹ **Mean:** Midpoint between highest & lowest

² **Weekly:** Based on 40 hours

³ **Monthly:** Based on 168 hours



TIPS FOR JOB SEEKERS

How can you improve your chances of getting a job? Applying for a job is the easy part, but getting it can be more of a challenge. Following these five tips can help you reach your goal:

1 The Job

- Determine your interests: talk to others and consider your hobbies and talents
- Search “career assessments” on the Internet

2 The Resume

- Should be easy to read: not too long, too wordy or too cluttered
- Make it powerful
- Show you can cooperate, you can learn, and you can do

3 The Application

- Make it neat, complete and accurate
- Include recommendations from teachers, employers, coaches, friends, etc.

4 The Interview

- Show enthusiasm: it separates the winners from the losers
- Dress appropriately/similar to those on the job

5 The Follow-up

- Send a thank you note
- Call to see if a decision has been made
- If not, ask, “Am I still a candidate?”
- If you are, ask, “Is it okay if I call back in a couple of days?”



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