



CALIFORNIA  
COMMUNITY  
COLLEGES  
**ECONOMIC &  
WORKFORCE  
DEVELOPMENT  
PROGRAM**

BUSINESS AND WORKFORCE  
PERFORMANCE IMPROVEMENT  
INITIATIVE

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**Industry Scan Report  
Los Angeles County**

**MANUFACTURING**

***“Shortage of Qualified Production Workers”***



Prepared by:  
Center of Excellence  
Hosted at Mt. San Antonio College

June 2006



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# **Strategic Opportunity for Community Colleges in the Manufacturing Industry**

## ***“Shortage of Qualified Production Workers”***

**June, 2006**

Prepared by:

Los Angeles County Center of Excellence  
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Survey Conducted in Collaboration with:

Mt. San Antonio College  
Office of Research and Institutional Effectiveness (RIE)

**THE BUSINESS AND WORKFORCE PERFORMANCE IMPROVEMENT INITIATIVE IS A GRANT-FUNDED PROJECT THROUGH THE ECONOMIC & WORKFORCE DEVELOPMENT PROGRAM OF THE CALIFORNIA COMMUNITY COLLEGES. OUR MISSION IS TO STRENGTHEN CALIFORNIA'S WORKFORCE AND ADVANCE ECONOMIC GROWTH THROUGH EDUCATION, TRAINING AND JOB DEVELOPMENT.**

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**THE CALIFORNIA EMPLOYMENT DEVELOPMENT DEPARTMENT (EDD) PROJECTED THAT THE MANUFACTURING INDUSTRY WILL EMPLOY 470,400 WORKERS IN LOS ANGELES COUNTY IN 2012.**

## **Executive Summary**

The common impression of California manufacturing is that it is an industry in decline<sup>1</sup>. While there has been a loss of traditional low-skilled production jobs due to advances in technology and business relocations, the truth is that there are still many career opportunities in manufacturing in Los Angeles County.

Numerous manufacturers have left California to relocate to other states or other countries with lower operating costs, and the state will continue to lose some companies. However, manufacturing is still one of the largest industries in Los Angeles County and EDD projected that the industry will still employ 470,400 workers in 2012.

Additionally, manufacturers increasingly use temporary help services for their workforce as they strive to cut labor costs and maintain a lean and flexible operation. This shift of employer-of-record to the employment services industry skews manufacturing industry employment data, making it appear to have declined more than it actually has.

A county-wide employers' survey was conducted by the Center of Excellence in May-June 2006 to evaluate and define local training and hiring needs in the manufacturing industry. The survey showed an opportunity for community colleges to develop more flexible short-term training to address the industry's specific training needs.

Training should include:

- Basic and soft skills: critical thinking and problem solving, communication skills, math, teamwork.
- Technical skills: material knowledge, blueprint reading, machine skills, CAD, CAM, NC, basic measuring tools, basic metal working processes, CNC operations mill and lathe.
- Business knowledge: supervisory skills, basic business principles, understanding of the supply chain, ISO/quality, inspection, management/leadership.
- Computer skills and software: AutoCAD, Solidworks, MasterCAM.
- Work experience (e.g. apprenticeship or internships).

Colleges should partner with employers, trade associations and with the Centers for Applied Competitive Technologies to respond to the industry's needs. Many funding opportunities are currently available for advanced manufacturing training (e.g. Department of Labor grants, Employment Training Panel). The survey conducted by the Center of Excellence showed that employers are eager to talk with community colleges' staff and faculty to discuss education, training, internship and job placement. Colleges need to work more closely with businesses to better serve students, incumbent workers and employers.

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<sup>1</sup> EDD Manufacturing Careers Report

## Introduction

*“The vast majority of American manufacturers are experiencing a serious shortage of qualified employees, which in turn is causing significant impact to business and the ability of the country as a whole to compete in a global economy”* concluded the 2005 Skills Gap Survey conducted by Deloitte Consulting for the National Association of Manufacturers (NAM) - Manufacturing Institute. Over 800 businesses responded to the survey. More than 80 percent of respondents indicated that they are experiencing a shortage of qualified workers overall. It is interesting to note that 90 percent of respondents indicated a moderate to severe shortage of qualified skilled production employees, including front-line workers such as machinists, operators, craft workers, distributors, and technicians. In addition to shortages of various types of employees, manufacturers surveyed reported they are also dissatisfied with the skills of their current employees.<sup>2</sup>

The San Gabriel Valley Economic Partnership Director of Business Assistance and the Economic Development Manager at the City of Irwindale both indicated that these conditions are particularly true in Los Angeles County. According to them, local employers are not finding the skilled production workers they are looking for, and the trend is getting worse as more and more workers reach retirement age. The Center Of Excellence conducted this industry scan to investigate whether this represents an opportunity for the community colleges to create new programs or adapt their current offerings to meet the industry’s needs. In addition to a review of the secondary research already available, the Center conducted an employer survey in partnership with Mt. San Antonio College Office of Research and Institutional Effectiveness (RIE). Ninety-six businesses responded to the survey and validated the need for community colleges to develop workforce solutions described in this report.

## Regional Industry Overview

### State of The Region

Los Angeles County is still the nation’s largest manufacturing center as measured by employment with 470,400 jobs in manufacturing in 2005. In comparison, Orange County counted 182,700, the Inland Empire 120,200 and San Diego County 104,200 in 2005, totaling 877,500 for the five-county area. Within Los Angeles County, the largest concentrations of manufacturing jobs were in the North Gateway or southeast area of the County (104,513 manufacturing jobs), followed by the San Fernando Valley (76,202) and the San Gabriel Valley (75,632)<sup>3</sup>.

Manufacturers in Los Angeles County are experiencing a shortage of skilled production workers and businesses have difficulty filling open positions. The shortage is expected to become more severe with the massive retirement of baby boomers. Jobseekers, youth, parents and counselors are generally not familiar with the manufacturing industry as it is today and, influenced by the media reporting that it is a declining industry, they tend to discount manufacturing as a career choice. It is indeed true that the manufacturing industry has been losing jobs nationwide and locally; however, it is still a major industry cluster in Los Angeles

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<sup>2</sup> 2005 Skills Gap Report conducted by Deloitte Consulting for the National Association of Manufacturers - The Manufacturing Institute

<sup>3</sup> Manufacturing in Southern California, LAEDC, March 2006

County and the demand is high for skilled employees. The industry has evolved and is less labor-intensive than it was in the past. Technology has allowed businesses to reduce the number of assembly workers and other low-skilled workers who have been replaced by machines, but the need for skilled, innovative employees is still high.

## **Industry Profile**

Manufacturing firms tend to emphasize productivity gains due to the cost of hiring new production workers and invest in plants and equipment rather than add staff. Because of the high cost of doing business in California (high labor and energy costs), many companies have chosen to relocate their production to other states or other countries with lower labor costs. However, multiple studies show that manufacturing will continue to be a major industry cluster in California, provided that qualified workers are available.

The “Future of Manufacturing in California” report states that *“The benefits of local production outweigh the savings from offshore production for a variety of products. Early-stage, low volume, high-end production are likely to remain in advanced economies, so long as their research and innovation capabilities are differentiated and superior. Similarly, production of goods that involve sensitive intellectual property, or that require a high level of adaptability to respond to fast-changing demand and customer service needs, will be located close to markets, often in high-cost locations such as California”*<sup>4</sup>.

Even though manufacturing is not expected to add a significant number of jobs, it will continue to be a major employer in Los Angeles County, due to the industry’s size, retirements and turnover. Colleges have an opportunity to prepare the workforce needed to replace baby boomers and upgrade incumbent workers’ skills to adapt to the fast changing technologies and keep local businesses competitive.

According to the 2005 Skills Gap Survey, the talent shortage nationwide is real and immediate. In fact, 83% of respondents indicated that labor shortages are currently impacting their ability to serve customers. Specifically, the survey found that skill deficiencies are causing difficulties for manufacturers in terms of their ability to maintain production levels consistent with customer demand (56%), to achieve productivity targets (43%), and to achieve or maintain target levels of customer service and satisfaction (33%)<sup>5</sup>.

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<sup>4</sup> One Million Jobs at Risk: The Future of Manufacturing in California, Bay Area Economic Forum, March 2005

<sup>5</sup> 2005 Skills Gap Report conducted by Deloitte Consulting for the National Association of Manufacturers - The Manufacturing Institute

## Size

### Industry Employment Projections 2005-2012

#### Los Angeles - Long Beach MSA

NAICS Code	Industry Title	Annual Average Employment		Employment Change	
		2005*	2012**	Numerical	Percent
<b>31-33</b>	<b>Manufacturing</b>	<b>470,400</b>	<b>470,400</b>	<b>0</b>	<b>0.0%</b>
	<b>Durable Goods (321,327-33)</b>	<b>262,600</b>	<b>263,300</b>	<b>700</b>	<b>0.3%</b>
	Residual-Wood Product Manufacturing (includes 321,327)	14,400	14,700	300	2.1%
331	Primary Metal Manufacturing	9,800	9,600	-200	-2.0%
332	Fabricated Metal Product Manufacturing	48,200	48,000	-200	-0.4%
333	Machinery Manufacturing	19,600	18,400	-1,200	-6.1%
334	Computer and Electronic Product Manufacturing	60,500	58,500	-2,000	-3.3%
335	Electrical Equipment and Appliance Manufacturing	11,000	11,400	400	3.6%
336	Transportation Equipment Manufacturing	51,900	54,600	2,700	5.2%
337	Furniture and Related Product Manufacturing	25,500	25,500	0	0.0%
339	Miscellaneous Manufacturing	21,800	22,600	800	3.7%
	<b>Nondurable Goods (311-316,322-326)</b>	<b>207,700</b>	<b>207,100</b>	<b>-600</b>	<b>-0.3%</b>
311	Food Manufacturing	43,400	44,600	1,200	2.8%
312	Beverage and Tobacco Product Manufacturing	4,200	4,000	-200	-4.8%
313	Textile Mills	10,700	9,200	-1,500	-14.0%
315	Apparel Manufacturing	61,500	58,100	-3,400	-5.5%
	Residual-Textile Product Mills (includes 314,316)	9,200	9,900	700	7.6%
322	Paper Manufacturing	10,400	10,300	-100	-1.0%
323	Printing and Related Support Activities	23,500	23,400	-100	-0.4%
324	Petroleum and Coal Products Manufacturing	4,600	4,900	300	6.5%
325	Chemical Manufacturing	22,000	23,300	1,300	5.9%
326	Plastics and Rubber Products Manufacturing	18,300	19,400	1,100	6.0%

Industry detail may not add up to totals due to independent rounding.

\*EDD data updated March 24, 2006 for 2005

\*\* Projections made by EDD, March 2003 Benchmark

According to EDD, manufacturing counted 470,400 jobs in Los Angeles County in 2005 and is still one of the largest employers. The 2003 projections from EDD estimated that the industry will continue to employ 470,400 workers in 2012.

However, the data presented above does not give a good indication of the industry's need for labor for a number of reasons including:

- The industry makes significant use of temporary help. These workers are counted in the business services industry, not in manufacturing.

- In many segments of manufacturing, there is now “domestic outsourcing”. People who work in other industries devote a significant amount of their time to provide inputs to the manufacturing industry, but are reported as working in other industry sectors.
- In addition, many small or start-up firms do not get captured by government statistics because they do not have employees, or only work with family members<sup>6</sup>.

The data shows that overall employment growth is not anticipated; however, businesses will have to hire thousands of new entrants into the industry to replace retirees.

## **Economic Impact**

The manufacturing industry is extremely important to the local economy. In December of 2003, manufacturing represented 13% percent of the state’s private sector jobs— paying well above-average wages of \$51,000. Manufacturing has a greater “economic multiplier effect” than any other sector, with each manufacturing job supporting an additional 2.5 jobs in other sectors directly related to manufacturing. Manufacturing contributes \$112 billion in wages (18% of state total) and \$190 billion in gross state product (14% of state total). With two-thirds of private sector R&D nationally in manufacturing, California manufacturing is a leading incubator of new products and technologies. High-tech manufacturing (pharmaceuticals, computers, communications, electronics, measurement, medical instruments), grew at a robust rate of 217% from 1992 -2001 and remain prominent sectors of the California economy<sup>7</sup>.

The industry is expected to employ 470,400 workers in 2012 in Los Angeles County. Even though the industry is losing jobs, it remains a major employer. In addition, it is a large customer of other business sectors such as professional and business services, financial services or transportation. Manufacturing’s use of intermediate goods and services in its production process generates substantial economic activity at the intermediate level. According to the National Association of Manufacturers (NAM) “every \$1 of a manufacturing product sold to a final user generates an additional \$1.43 of intermediate economic output, more than half in sectors outside manufacturing. Manufacturing’s multiplier effect is greater than any other sector and far greater than that of the service sector, which generates only 71 cents of intermediate activity for \$1 of final sales—half of the additional intermediate output generated by \$1 of manufacturing final sales”<sup>8</sup>.

## **Industry Workforce Challenges**

The 2005 Skills Gap Survey conducted by Deloitte and Touche for the NAM stated that, “while the situation is already posing significant challenges, the basic laws of supply and demand as they operate in the labor market suggest an even more difficult future. On the demand side, employers want more highly skilled employees who are exceptionally engaged and innovative. But basic demographic, social, and educational trends indicate a gloomy supply outlook:

- The exodus of baby boomers from the workforce with substantial accumulated skills will reduce the available talent pool.
- Changing attitudes about careers and job satisfaction among Generation Y’ers.;

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<sup>6</sup> Manufacturing in Southern California, LAEDC, March 2006

<sup>7</sup> Sources: Bureau of Labor Statistics; California Employment Development Department; Dun & Bradstreet; Economic Policy Institute; Milliken Institute. <http://www.nacfam.org/CAForumReport.pdf>

<sup>8</sup> [www.nam.org](http://www.nam.org)

- Changing job requirements, necessitating some level of technical skill in almost all jobs and making truly unskilled jobs a thing of the past.
- Significant dissatisfaction among manufacturers with the quality of K-12 education and the dearth of adequate career counseling”<sup>9</sup>.

Eighty-one percent of respondents to the Skills Gap Survey answered that they are facing a moderate to severe shortage of qualified workers. More specifically, 53% of those responding indicated at least 10% of their total positions currently remain unfilled due to a lack of qualified candidates. The largest shortages occurred for technical skilled employees and engineers, but more than one-third of respondents also claimed shortages of unskilled production employees.

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<sup>9</sup> 2005 Skills Gap Report conducted by Deloitte Consulting for the National Association of Manufacturers - The Manufacturing Institute

## Occupational Outlook

### Employment Projections

#### OCCUPATIONAL PROJECTIONS OF EMPLOYMENT Skilled Production Workers

Los Angeles - Long Beach MSA

2005 - 2012

SOC Code	Occupation	Employment		Employment Change	
		2005*	Projected 2012**	Number	Percent
514012	Numerical Tool and Process Control Programmers	720	630	-90	-12.5%
514021	Extruding and Drawing Machine Setters, Operators and Tenders	1,690	2,640	950	56.2%
514022	Forging Machine Setters, Operators, and Tenders	880	930	50	5.7%
514023	Rolling Machine Setters, Operators, and Tenders	1,480	1,040	-440	-29.7%
514031	Cutting, Punching, and Press Machine Setters, Operators and Tenders	6,950	6,690	-260	-3.7%
514032	Drilling and Boring Machine Tool Setters, Operators and Tenders	1,310	1,610	300	22.9%
514033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators & Tenders	4,600	4,290	-310	-6.7%
514034	Lathe and Turning Machine Tool Setters, Operators and Tenders	2,290	2,600	310	13.5%
514041	Machinists	11,510	11,480	-30	-0.3%
514072	Molding, Coremaking, and Casting Machine Operators	4,260	3,570	-690	-16.2%
514081	Multiple Machine Tool Setters, Operators, and Tenders	2,010	1,590	-420	-20.9%
514111	Tool and Die Makers	1,540	1,470	-70	-4.5%
514192	Lay-Out Workers	210	190	-20	-9.5%
514194	Tool Grinders, Filers, and Sharpeners	520	470	-50	-9.6%
511011	First-Line Supervisors	21,140	21,770	630	3.0%
<b>TOTALS</b>		61,110	60,970	-140	-0.2%

Source: EDD Labor Market Information Division

\* 3<sup>rd</sup> quarter 2005

\*\* Projections made by EDD, March 2003 Benchmark

Manufacturing is expected to continue leaving California to relocate to other states or countries with lower costs. The total number of skilled production workers is likely to decrease; however, training is needed for incumbent workers and new entrants replacing baby boomers.

The Center of Excellence (COE) conducted an industry survey as part of this project, in collaboration with Mt. San Antonio College’s Office of Research and Institutional Effectiveness. Respondents were asked **how many people they plan to hire in the next twelve months**. Ninety-six manufacturers located in Los Angeles County responded and collectively anticipate hiring:

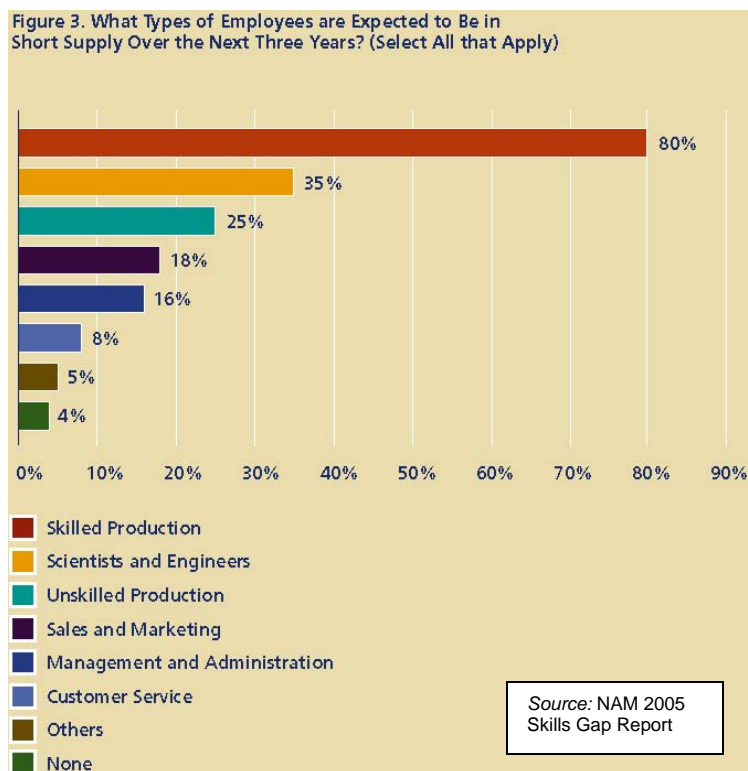
- Operators 203
- Machinists 165
- CAD Operators/Designers 60
- Supervisors 58
- CNC Programmer 45
- CNC Set-up 31
- General Laborers 27
- Welders 22

Dozens of job offers can be found each week in newspapers and on various job search websites. The situation does not require a large-scale response from the community colleges but it is clear from the COE survey results that colleges that already offer manufacturing programs should continue to do so, and work even more closely with the industry to adapt their course offerings to their evolving needs.

The 2005 Skills Gap Survey<sup>10</sup> also showed that skilled production workers are the group of workers most expected to be in short supply over the next couple of years nationwide.

The second group expected to be in short supply includes scientists and engineers. This is probably due to the relatively small number of students graduating with bachelors and masters degrees in science or engineering in the U.S.

Surprisingly, unskilled production workers are also expected to be in short supply in spite of the decreasing demand for such workers. This may be due to the industry’s lack of appeal in the public’s mind.



<sup>10</sup> 2005 Skills Gap Report conducted by Deloitte Consulting for the National Association of Manufacturers - The Manufacturing Institute

**Wages**

**OCCUPATIONAL WAGES  
Los Angeles - Long Beach MSA  
Third Quarter 2005**

<b>SOC Code</b>	<b>Occupation</b>	<b>Hourly Mean</b>	<b>Hourly Entry Level</b>	<b>Hourly Experience Level</b>
514012	Numerical Tool and Process Control Programmers	\$27.94	\$21.64	\$31.08
514021	Extruding and Drawing Machine Setters, Operators and Tenders	\$13.27	\$8.33	\$15.75
514022	Forging Machine Setters, Operators, and Tenders	\$15.96	\$10.83	\$18.54
514023	Rolling Machine Setters, Operators, and Tenders	\$11.94	\$8.25	\$13.78
514031	Cutting, Punching, and Press Machine Setters, Operators and Tenders	\$12.46	\$8.53	\$14.42
514032	Drilling and Boring Machine Tool Setters, Operators and Tenders	\$12.80	\$8.93	\$14.73
514033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators & Tenders	\$12.60	\$8.26	\$14.77
514034	Lathe and Turning Machine Tool Setters, Operators and Tenders	\$13.66	\$9.74	\$15.62
514041	Machinists	\$17.10	\$10.80	\$20.24
514072	Molding, Coremaking, and Casting Machine Operators	\$11.19	\$7.82	\$12.87
514081	Multiple Machine Tool Setters, Operators, and Tenders	\$12.67	\$9.08	\$14.46
514111	Tool and Die Makers	\$21.60	\$13.86	\$25.48
514194	Tool Grinders, Filers, and Sharpeners	\$13.56	\$8.87	\$15.90
514192	Lay-Out Workers	\$13.74	\$8.66	\$16.28
511011	First-Line Supervisors	\$22.46	\$13.31	\$27.03

Source: EDD Labor Market Information Division

The wages offered in the industry continue to be relatively good. Workers have the opportunity to earn higher wages as they move up the ladder. An example of career pathways is presented on the next page.

## Career Pathways

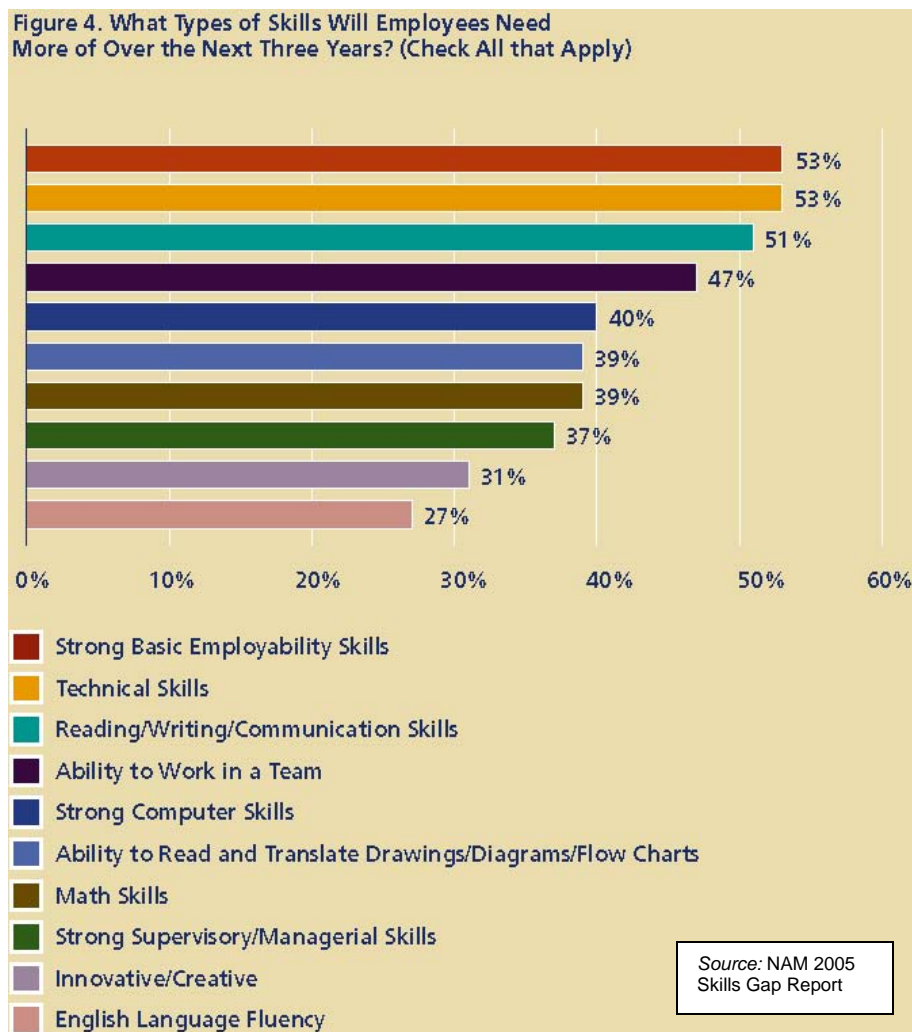
<p style="text-align: center;"><b><u>Level One</u></b></p> <p><b>OPERATOR</b></p> <ul style="list-style-type: none"> <li>• Make parts and blanks</li> <li>• Check parts for quality control</li> <li>• Trouble shoot minor problems</li> </ul> <p style="text-align: center;"><b><u>Level Two</u></b></p> <p><b>SET-UP TECHNICIAN</b></p> <ul style="list-style-type: none"> <li>• Setup machine, tooling and material for production</li> <li>• Verify part prints and specifications</li> <li>• May operate machine</li> <li>• Troubleshoot and correct process problems</li> </ul> <p style="text-align: center;"><b><u>Level Three</u></b></p> <p><b>QUALITY ASSURANCE</b></p> <ul style="list-style-type: none"> <li>• Perform quality checks on incoming and finished parts and materials</li> <li>• Assess vendor/supplier quality and reliability</li> </ul> <p><b>SUPERVISOR</b></p> <ul style="list-style-type: none"> <li>• Coordinate production schedules</li> <li>• Manage operators, work areas, equipment and materials to assure maximum production</li> </ul>	<p style="text-align: center;"><b><u>Level Three (continued)</u></b></p> <p><b>MACHINE MAINTENANCE</b></p> <ul style="list-style-type: none"> <li>• Perform electrical, hydraulic/pneumatic and mechanical repairs</li> <li>• Provide preventive and predictive maintenance on machines</li> <li>• Install new equipment or accessories (update machines)</li> </ul> <p><b>TOOL &amp; DIE MAKER</b></p> <ul style="list-style-type: none"> <li>• Build manufacturing tools and dies</li> <li>• Maintain manufacturing tooling</li> <li>• Install and set up new dies</li> </ul> <p><b>TOOL DESIGNER</b></p> <ul style="list-style-type: none"> <li>• Design new tools using CAD systems</li> <li>• Troubleshoot tool and design problems</li> <li>• Design and install tool protection systems</li> </ul> <p><b>COMPUTER NETWORK TECHNICIAN</b></p> <ul style="list-style-type: none"> <li>• Maintain computer network connecting machines, quality and production scheduling</li> <li>• Evaluate and install new systems</li> </ul> <p><b>ENGINEERING &amp; RESEARCH</b></p> <ul style="list-style-type: none"> <li>• Design dies for production</li> <li>• Supervise Tool &amp; Design Dept.</li> <li>• Develop and test prototypes using computer simulation</li> </ul>
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Source: Precision Metalforming Association (PMA) website

This is one example of potential career pathway for skilled production workers. There are many other opportunities in manufacturing, based on students or employees interest, goals and place of employment.

## Industry Training Needs

### Skills



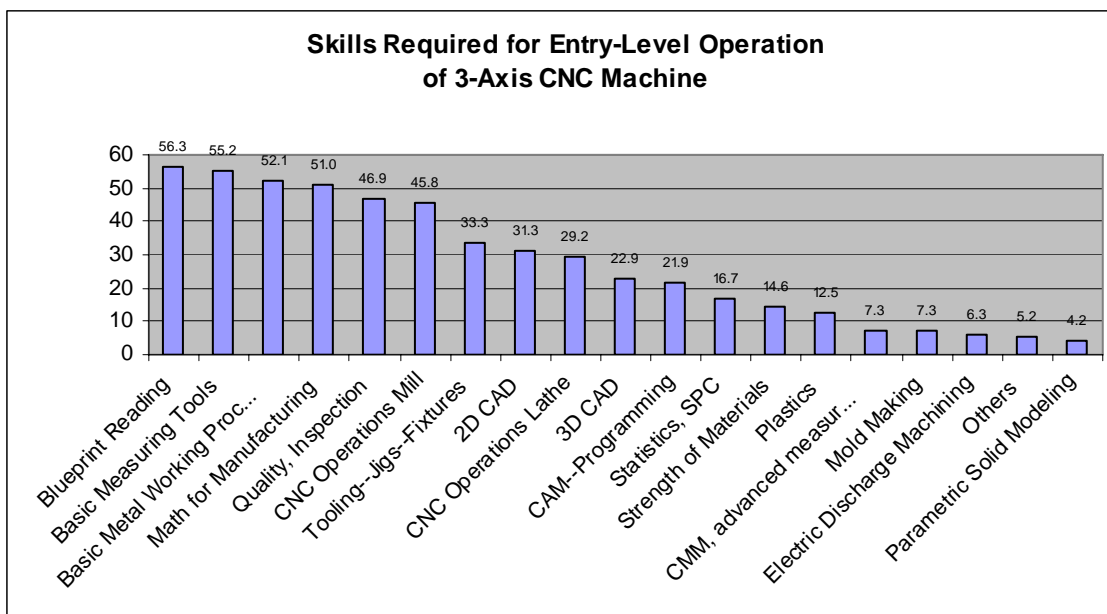
In the 2005 Skills Gap Survey, respondents were asked which types of skills their employees will need more of over the next three years. Not surprisingly, technical skills was the area most commonly selected (53%). Beyond this, there are a number of related skills that will be needed over the next several years that are characteristic of high-performance workforces, such as the ability to work in teams (47%), strong computer skills (40%), the ability to read and translate diagrams and flow charts (39%), and strong supervisory and managerial skills (37%).

Basic employability skills (attendance, timeliness, work ethic, etc.) essentially tied with technical skills, which is consistent with the area of greatest deficiency seen in today's workforce. Following that are reading/writing/communication skills, where 51% of the respondents said they will need more of these types of skills over the next three years<sup>11</sup>.

<sup>11</sup> 2005 Skills Gap Report conducted by Deloitte Consulting for the National Association of Manufacturers - The Manufacturing Institute

To get more information on the job-specific technical skills needed, the COE asked local businesses what skills, knowledge and abilities an entry-level person operating a 3-axis CNC machine needs.

Of the 96 companies surveyed, 67 responded to this question. Most of the 29 companies that skipped this question indicated that it was not applicable to their business. The percentages presented are calculated based on all 96 companies, to represent the industry as a whole.



More than half of all respondents require blueprint reading, use of basic measuring tools, basic metal working processes and math skills. Other important skills for the industry are quality, inspection, CNC operations mill, tooling, jigs, fixtures, 2D CAD, CNC operations lathe and 3D CAD.

### Education

Survey respondents were asked to rank on a scale from 1 to 6 how important the completion of a **technical training certificate** is in the hiring decision for the following positions:

Position	Not Important						Extremely Important	
	1	2	3	4	5	6	No Response	
Machinists	15.62	5.21	12.50	13.54	15.62	<b>22.92</b>	14.58	
Operators	14.58	11.46	20.83	<b>22.92</b>	5.21	11.46	13.54	
CAD Operators/Designers	10.42	4.17	8.33	9.38	13.54	<b>29.17</b>	25.00	
CNC Set-up	13.54	4.17	6.25	15.62	<b>20.83</b>	12.50	27.08	
CNC Programmer	15.62	3.12	3.12	9.38	16.67	<b>27.08</b>	25.00	
Supervisors	11.46	7.29	5.21	17.71	11.46	<b>35.42</b>	11.46	

The responses varied greatly from one company to another. A technical training certificate is most important for workers required to have higher levels of technical skills, including supervisors, CAD operators/designers and CNC programmers. A technical certificate seems to be important for CNC set-up, but not extremely important. It is less important for operators to have a certificate; on-the-job training is often sufficient for them to learn to operate the machines.

The respondents were also asked whether their company encourages employees to earn the following **industry-specific certificates**:

Certificate	Yes	No	N/A
NIMS	4%	29%	31%
<b>AutoCAD</b>	<b>32%</b>	28%	17%
MSSC	3%	25%	34%
AWS	4%	23%	34%
ASQ	11%	21%	29%
SME	8%	26%	30%
<b>ISO</b>	<b>25%</b>	26%	17%

The two certificates most preferred by the companies surveyed are Auto CAD with 32% of companies encouraging employees to obtain the certificate, and ISO with 25% of respondents encouraging employees to obtain the certificate. Interestingly, very few encourage their employees to earn industry certifications such as MSSC (3%), NIMS (4%), AWS (4%), SME (8%) or ASQ (11%).

### Training Needs

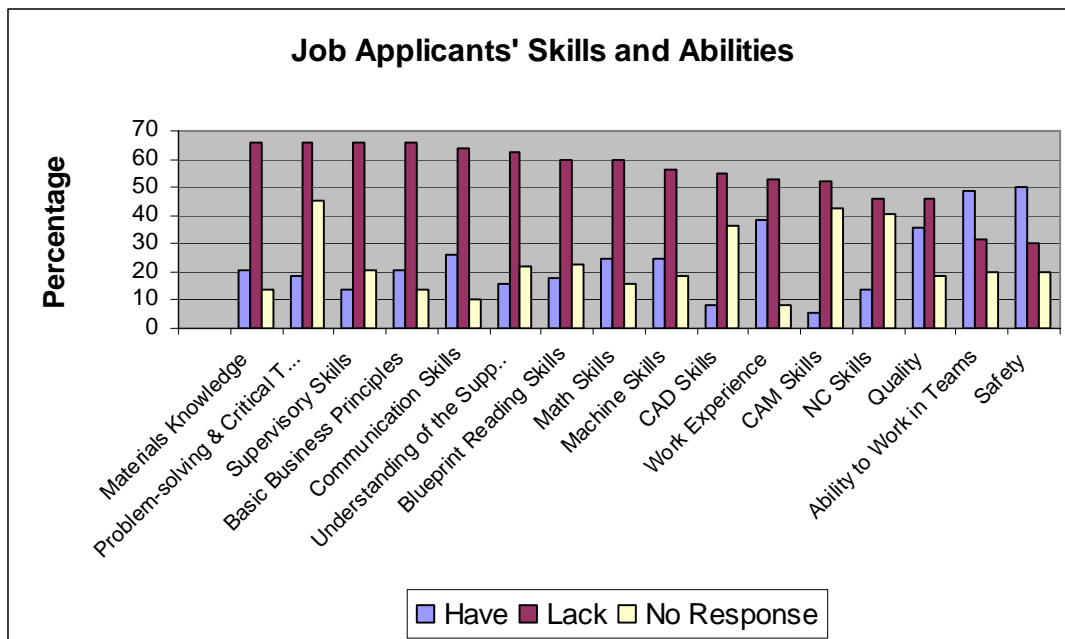
Employers often state that applicants for employment do not meet job requirements. In order to identify the **skill gaps** and training needs, respondents to the survey were asked to indicate whether job applicants tend to have or lack the following skills, abilities, knowledge or requirements:

Skills, Abilities, Knowledge, Requirements	Percentage		
	Have	Lack	No Response
Materials Knowledge	20.83	65.62	13.54
Problem-Solving & Critical Thinking Skills	18.75	65.62	45.62
Skills, Abilities, Knowledge, Requirements	Percentage		
	Have	Lack	No Response
Supervisory Skills	13.54	65.62	20.83
Basic Business Principles	20.83	65.62	13.54
Communication Skills	26.04	63.54	10.42
Understanding of the Supply Chain	15.62	62.50	21.88
Blueprint Reading Skills	17.71	59.38	22.92
Math Skills	25.00	59.38	15.62
Machine Skills	25.00	56.25	18.75
CAD Skills	8.33	55.21	36.46
Work Experience	38.54	53.12	8.33
CAM Skills	5.21	52.08	42.71
NC Skills	13.54	45.83	40.62
Quality	35.42	45.83	18.75
Ability to Work in Teams	48.96	31.25	19.79
Safety	50.00	30.21	19.79

Employers reported skill gaps in a variety of areas:

- Basic and soft skills: critical thinking and problem solving (65.6%), communication skills (63.5%), math (59.4%), ability to work in teams (31.2%).
- Technical skills: material knowledge (65.6%), blueprint reading (59.4%), machine skills (56.2%), CAD (55.2%), CAM (52.1%), NC (45.8%).
- Business knowledge: supervisory skills (65.6%), basic business principles (65.6%), understanding of the supply chain (62.5%), quality (45.8%).
- Work experience (53.1%).

The requirements that were most often met by job applicants were safety skills (50%), ability to work in teams (49%), quality (35.4%) and work experience (38.5%).



Next, employers were asked: “If you could **improve your employees’ skills** so that they were more productive, what areas or skills would they need to improve or learn?”

43 responses were given. The most often cited were communication (13 responses), math (13), critical thinking/problem solving (9), blueprint reading (9), English (8), quality/ISO (6), machining skills/codes (5), computer skills (4), teamwork (3) and management/leadership (3).

Respondents indicated that they need workers who do more than just follow instructions. Employee attributes that respondents cited as needing improvement include: initiative for improvement, useful feedback/provide new ideas, lean thinking and common sense. Respondents also included a number of areas related to workers’ work ethic: eager to learn, ambition to perform, taking responsibility, attitude, flexibility and focus.

Job-specific skills cited included: welding, mechanical skills, solid modeling, software skills, mold making, measurement skills, material handling, installation of equipment, hydraulics, how to facilitate production, electronics for engine control, assembly, electrical assembly and CAD.

## Relevance to Community Colleges

### Existing Community College Programs in Los Angeles County

According to the matrix of programs posted on the regional consortium website, eight colleges in Los Angeles County offer training that prepares students to become skilled manufacturing workers:

- Cerritos College
- Compton College
- El Camino College
- Glendale Community College
- LA Trade Tech College
- Long Beach City College
- Mt. San Antonio College
- Pierce College

In addition, other colleges also offer related courses, such as welding or drafting and design.

The following six colleges host Centers for Applied Competitive Technologies (CACT)

- Cerritos College
- El Camino College
- Glendale Community College
- Long Beach City College
- Mt. San Antonio College
- Los Angeles Community College District

*(see appendix F for CACT locations and contact information).*

They provide additional training and services to manufacturers, as well as assistance to colleges in the development or update of their programs, to meet the needs of manufacturers.

### Gaps Between Industry Needs and Programs Available

The industry needs workers with stronger employability skills, work ethic, desire to work in the industry and critical thinking/problem solving skills. In addition to the technical skills taught in manufacturing programs, colleges should include courses to teach the skills mentioned above.

The industry is generally unaware of the course offerings that could benefit their employees and rarely think of contacting colleges' placement offices when they are having difficulty recruiting. Here, the gap is not so much between industry needs and programs available, but **between programs available and industry's awareness of them**. Both manufacturing related courses and basic skills courses are available at the community colleges, but the industry does not know how to take advantage of them.

The majority of manufacturers in Los Angeles County are small businesses that have not been approached by colleges and do not think of contacting their local college either. College faculty and staff who are passionate about the manufacturing industry need to visit local employers to obtain input for curriculum development, keep programs up-to-date, identify internships and job placement opportunities for students, as well as potential needs for customized training.

## **Recommendations for College Response**

The following are recommendations based on survey findings and a review of labor market information and industry studies:

1. Outreach to manufacturers:

The regional colleges should develop and implement outreach strategies to promote their programs and get direct input from industry. This can be done through individual meetings with local manufacturers, advisory committee meetings, industry events and so on. Sixty-three percent (63%) of respondents to the COE survey accepted to be contacted again for follow-up questions. Colleges should take advantage of businesses' willingness to discuss how they can work together.

In addition, fifty-three percent (53%) of respondents stated that they would be interested in offering students on-the-job experience opportunities such as internships. Work experience is very important in the hiring decision; therefore, programs targeting traditional students (as opposed to incumbent workers) should include some work experience.

2. Work experience, work-based learning and certificates:

Employers made clear that they require work experience more than education when hiring for skilled production jobs. To understand what the colleges should do to help new workers enter the industry, survey respondents were asked what somebody with limited work experience would need to have to obtain a skilled level job. The answers were:

Requirement	Percentage		
	Yes	No	No Response
Completed an Internship	<b>60</b>	26	14
Obtained a Certificate	<b>50</b>	35	15
Obtained a Degree	20	<b>60</b>	20
Other	17	3	80

The majority of survey respondents (60%) indicated that an internship would be valuable to compensate for a lack of previous work experience. Fifty percent (50%) of respondents think that a certificate could make the individual qualified for a skilled job. However, a degree would not replace experience. Other responses included: on the job training, willingness to learn/work, desire, intelligence, learn quickly, basic math skills, and be able to offer ideas/suggestions.

Because the industry does not require a degree for skilled production workers but recognizes the value of a technical certificate, colleges should consider offering more short-term certificates customized to the industry's needs.

## **Conclusion**

Employers report skill gaps between the manufacturing workforce available and the one needed by the industry. The shortage of qualified workers is expected to worsen as new technologies require higher skills. Manufacturing is not attracting enough skilled workers to keep up with the demand. Moreover, the problem will be exacerbated by the retirement of skilled workers in the next several years.

Colleges and industry need to work together to promote the industry and attract students to manufacturing programs. Programs should include remedial courses when needed, to increase students' employability skills. Colleges should also focus on critical thinking, problem solving and training for innovation throughout their curricula. Companies need employees who are continually focused on improving processes and products.

There is a strategic opportunity for community colleges to partner with their local manufacturing businesses, to develop more short-term programs and solutions to the industry's needs, including work experience and internships.

## **Acknowledgements**

Thank you to:

- All 96 businesses that accepted to respond to the survey.
- Elaine Cullin, Economic Development Manager at the City of Irwindale, for providing information on local businesses training and hiring needs, and a list of local manufacturers.
- Dr. Marshall Gartenlaub, CACT Statewide Director for providing input to the questionnaire and ideas and resources for the completion of the industry scan.
- Odette Richardson and Barbara McNeice-Stallard, Mt. San Antonio College Office of research and Institutional Effectiveness, for their assistance with the questionnaire design, the survey administration and the compilation of results.
- All of the staff in building 35 who helped prepare the mailing to 2,600 businesses.

## **APPENDIX A: How to Utilize this Scan**

### ***About Us - Description of BWPI:***

The Business and Workforce Performance Improvement (BWPI) initiative is focused on building the capacity of the colleges in the area of economic and workforce development to enhance their ability to deliver education and training services to businesses and workers in high growth industries, new technologies, and other clusters of opportunities.

The Centers of Excellence (COE) within BWPI provide information regarding workforce trends, increase awareness and visibility about the colleges' economic and workforce development programs and services, and build partnerships with business and industry.

The work of the COE's helps position the community colleges as THE workforce partners of choice to business and industry and ensures that college programs are current and market-responsive. This will contribute to the overall economic vitality of the communities in which they serve.

### ***How to Use This Industry Scan:***

The Centers of Excellence within the Business and Workforce Performance Improvement Initiative of the California Community College Economic and Workforce Development Program have undertaken Industry Scanning to provide targeted and valuable information to community colleges on high growth industries and occupations.

This scan is intended to assist the decision-making process of community college administrators and planners in addressing local and regional workforce needs and emerging job opportunities in the workplace as they relate to college programs. The information contained in this report can be used to guide program offerings, strengthen grant applications, and support other economic and workforce development efforts.

This report is designed to provide current industry data that will:

- Define potential strategic opportunities relative to an industry's emerging trends and workforce needs;
- Inform and influence local college program planning and resource development; and
- Promote a future-oriented and market responsive way of thinking among stakeholders.

This Industry Scan included a review of the California Regional Economies Project reports and Employment Development Department (EDD) Labor Market Information (LMID) projections that cover the communities in this region, as well as many other sources as listed.

***Important Disclaimer:***

All representations included in this Environmental Scan product/study have been produced from a secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings. The purpose of the Environmental Scan is to assist the California Community Colleges to respond to emerging market needs for workforce performance improvement. However, neither the Business and Workforce Performance Improvement Centers of Excellence, COE host college nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon this study, including components or recommendations.

*This project is funded in part by the California Community Colleges Chancellor's Office, Economic and Workforce Development Program, grant number 05-305-016 for \$89,437 to fund multiple projects and activities through the Center of Excellence.*

## Appendix B: Methodology

This report was initiated to verify whether the findings presented in the national 2005 Skills Gap Report conducted by Deloitte and Touche for the National Association of Manufacturers (NAM) were applicable to Los Angeles County, and to obtain more information on local industry needs.

Report findings are based on secondary research (*see data sources listed in appendix D*) and a local employers' survey conducted in May-June 2006 by the Center of Excellence and Mt. San Antonio College Office of Research and Institutional Effectiveness. The survey was sent to 2,600 manufacturers located in Los Angeles County. The list of companies was created from the Harris database updated in 2006. The questionnaires were addressed to Chief Executive Officers or human resource managers. Ninety-six businesses returned the questionnaire.

Respondents' profile:

Of the 96 businesses, 54 had 50 employees or less; 18 had 51-100 employees; 17 had 101-250 employees; 2 had more than 250, and 5 did not answer the question. Sixty-three percent (63%) of respondents accepted to be contacted for further questions. Fifty-eight percent (58%) of respondents offered tuition reimbursement and 60% offered flexible schedules to employees taking classes. The questionnaire is provided in appendix C.

## Appendix C: Questionnaire

### California Community Colleges Manufacturing Survey

#### INSTRUCTION

The goal of the Center of Excellence is to help Community Colleges in Los Angeles County better serve local businesses by developing training and education to provide highly qualified employees. Please take a few minutes to answer the survey below and tell us how we can better serve you and provide you the kind of workers you need for your business to be successful.

Your responses are very IMPORTANT and will be kept CONFIDENTIAL. If you have any questions about this survey, please contact us at (909) 594-5611, x6106. Please return the survey within two weeks.

The survey can be completed in *DARK PEN* or *PENCIL*. Please mark the circles fully as shown:

<b>Like this</b>	<input checked="" type="radio"/>	<b>NOT like these</b>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
------------------	----------------------------------	-----------------------	-----------------------	----------------------------------	-----------------------

#### SURVEY QUESTIONS

Please fill in the blanks or attach your business card

Company name: \_\_\_\_\_

Address: \_\_\_\_\_

Contact name: \_\_\_\_\_

Title: \_\_\_\_\_

Phone number: (     )     --

E-mail address: \_\_\_\_\_

**How many employees do you have at your location?**

- 0-25
- 26-50
- 51-100
- 101-250
- 251 or more

**How many people are you planning to hire in the next 12 months for the following occupations?**

- Machinists \_\_\_\_\_
- Operators \_\_\_\_\_
- CAD operators/designers \_\_\_\_\_
- CNC set-up \_\_\_\_\_

CNC programmer \_\_\_\_\_

Supervisors \_\_\_\_\_

Other: *(please describe)* \_\_\_\_\_

Please indicate below what areas your current job applicants seem to HAVE or LACK.	Candidates	
	HAVE	LACK
Work experience	<input type="radio"/>	<input type="radio"/>
Materials knowledge	<input type="radio"/>	<input type="radio"/>
Machine skills	<input type="radio"/>	<input type="radio"/>
NC skills	<input type="radio"/>	<input type="radio"/>
CAD skills	<input type="radio"/>	<input type="radio"/>
CAM skills	<input type="radio"/>	<input type="radio"/>
Blueprint reading skills	<input type="radio"/>	<input type="radio"/>
Math skills	<input type="radio"/>	<input type="radio"/>
Communication skills	<input type="radio"/>	<input type="radio"/>
Problem solving and critical thinking skills	<input type="radio"/>	<input type="radio"/>
Ability to work in teams	<input type="radio"/>	<input type="radio"/>
Supervisory skills	<input type="radio"/>	<input type="radio"/>
Basic business principles	<input type="radio"/>	<input type="radio"/>
Understanding of the supply chain	<input type="radio"/>	<input type="radio"/>
Quality	<input type="radio"/>	<input type="radio"/>
Safety	<input type="radio"/>	<input type="radio"/>
Other: _____	<input type="radio"/>	<input type="radio"/>

**If you could increase your employees' skills so that they were more productive, what areas or skills would they need to improve or learn?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**On a scale from 1 to 6, how important is the completion of the following technical training certificate in the hiring decision for the following jobs?**

	Not Important					Extremely Important
	1	2	3	4	5	6
Machinists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CAD operators/designers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CNC set-up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CNC programmer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supervisors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**On a scale from 1 to 6, how important is prior work experience in the hiring decision?**

	Not Important					Extremely Important
	1	2	3	4	5	6
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**What would a new hire with limited work experience need to have to obtain a skilled level job?**

	Yes	No
Completed an internship	<input type="radio"/>	<input type="radio"/>
Obtained a certificate	<input type="radio"/>	<input type="radio"/>
Obtained a degree	<input type="radio"/>	<input type="radio"/>
Other _____	<input type="radio"/>	<input type="radio"/>

**What skills, knowledge and abilities does an entry-level person operating a 3-axis CNC machine need? (Mark ALL that apply.)**

Basic metal working processes	<input type="radio"/>
Basic measuring tools	<input type="radio"/>

**What skills, knowledge and abilities does an entry-level person operating a 3-axis CNC machine need? (Mark ALL that apply.)**

2D CAD	<input type="radio"/>
3D CAD	<input type="radio"/>
Parametric solid modeling	<input type="radio"/>
CAM – programming	<input type="radio"/>
Quality, inspection	<input type="radio"/>
Statistics, SPC	<input type="radio"/>
CMM, advanced measurement	<input type="radio"/>
CNC operations mill	<input type="radio"/>
CNC operations lathe	<input type="radio"/>
Blueprint reading	<input type="radio"/>
Math for manufacturing	<input type="radio"/>
Strength of materials	<input type="radio"/>
Plastics	<input type="radio"/>
Mold making	<input type="radio"/>
Electric discharge machining	<input type="radio"/>
Toolling, jigs, fixtures	<input type="radio"/>
Other: _____	<input type="radio"/>

**What software packages would you want to see included in a one-year certificate program? (Mark ALL that apply.)**

AutoCAD	<input type="radio"/>
Inventor	<input type="radio"/>
Solidworks	<input type="radio"/>
MasterCAM	<input type="radio"/>
SurfCAM	<input type="radio"/>
EdgeCAM	<input type="radio"/>
Other: _____	<input type="radio"/>

Does your company encourage employees to earn industry-specific certificates such as:	Yes	No	Not Applicable
NIMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AutoCAD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSSC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AWS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ASQ	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SME	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ISO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**How would you encourage your employees to take a class at your local Community College?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Does your company offer....	Yes	No
a. tuition reimbursement to employees taking classes that directly apply to their job?	<input type="radio"/>	<input type="radio"/>
b. flexible schedules to employees who continue their education, to allow them to attend classes?	<input type="radio"/>	<input type="radio"/>

**When is it most convenient for your employees to attend classes?**

Daytime

Evening

Weekend

Other: \_\_\_\_\_

**How many hours should the class be?**

2 hours, twice a week

4 hours, once a week

One full day, every other week

Other: \_\_\_\_\_

**Would your company be interested in offering students on-the-job experience (e.g., internships)?**

Yes  No

What is the average hourly pay rate for these positions for employees that have: ----->	Technical training but no work experience	No technical training but 2+ years of experience	Technical training and experience
Machinists			
Operators			
CAD operators/designers			
CNC set-up			
CNC programmer			
Supervisors			
Other: _____			

**Do you have any additional comments regarding your workforce needs and the role of the community colleges?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**May we contact you for further information?**

Yes  No

**THANK YOU VERY MUCH FOR YOUR INPUT**

## Appendix D: Data Sources and References Cited

This report has utilized the following information:

- **Employers' survey** conducted by the Center of Excellence in collaboration with Mt. San Antonio College Office of Research and Institutional Effectiveness.
- **CA Employment Development Department** for labor market information. Website: [www.labormarketinfo.edd.ca.gov](http://www.labormarketinfo.edd.ca.gov)
- **Bay Area Economic Forum** report: One Million Jobs at Risk: The Future of Manufacturing in California, March 2005.
- **California Employment Development Department** publication: Manufacturing Careers, August 2005.
- **California Manufacturers & Technology Association (CMTA)** synthesis: Empowering Manufacturers to Lead the Way in California, 2004.
- **California Research Bureau** publication: The Manufacturing Sector and Job Training in California, April 2004.
- **Los Angeles County Economic Development Corporation (LAEDC)** report Manufacturing in Southern California, March 2006.
- **National Association of Manufacturers (NAM)** report: The Looming Workforce Crisis, 2005.
- **NAM - The Manufacturing Institute** publications:
  - The Facts About Modern Manufacturing, 2003.
  - 2005 Skills Gap Report – A Survey of the American Manufacturing Workforce, conducted by **Deloitte Consulting**.
- **National Research Council** report: New Directions in Manufacturing, 2004.
- **Precision Metalforming Association Educational Foundation** publication: Choices: Careers in Metalforming and Manufacturing.
- **U.S. Department of Labor, Employment & Training Administration** report: Advanced Manufacturing Industry: Addressing the Workforce Challenges of America's Advanced Manufacturing Workforce, 2005.
- **U.S. Department of Labor**, industry information posted at [www.doleta.gov](http://www.doleta.gov)
- **Wisconsin Manufacturers and Technical Colleges** report: Building the Workforce For the 21<sup>st</sup> Century, June 2005.

## Appendix E: Related Industry Associations

### **American Society for Metals (ASM) International**

L.A. Chapter meetings held at Southern Cal Gas  
Co. Energy Resource Center  
9240 East Firestone Blvd.  
Downey 92041  
Richard Schreiman,  
Chairman  
[www.asmwest.com](http://www.asmwest.com)

### **Association of Communications & Electronics Schools (ACES) International**

1. Applied Professional Training  
6976 Mimosa Drive  
Carlsbad 92009  
Steve Blume  
800-431-8488
2. RWM Fiber Optics  
16627 S. Avalon Blvd.  
Carson 90746  
Paul Bonagura  
310-769-0968  
[www.acesinternational.org](http://www.acesinternational.org)

### **California Furniture Manufacturers Assoc. (CFMA)**

1240 N. Jefferson St., Suite G  
Anaheim, CA 92807  
714-632-6800  
[www.cfma.com](http://www.cfma.com)

### **California Industrial & Technology Education Association (CITEA)**

CSU Los Angeles  
5151 State University Dr.  
Los Angeles, CA 90032-8154  
323-343-2486  
[www.citea.org](http://www.citea.org)

### **California Manufacturers & Technology Assoc. (MCTA)**

980 9th St. #2200  
Sacramento, CA 95814  
916-441-5420  
[www.cmta.net](http://www.cmta.net)

### **National Association of Manufacturers (NAM)**

235 Montgomery Street  
Suite 643  
San Francisco 94104-2902  
Therese Ivancovich, Regional Manager  
415-385-2400  
[www.nam.org](http://www.nam.org)

### **National Institute for Metalworking Skills (NIMS)**

Harry Smith, CEO VP Manufacturing  
Board Member of NIMS  
Metric Machining  
1425 S. Vineyard Ave.  
Ontario 91761  
909-947-9222, Ext. 236  
[www.nims-skills.org](http://www.nims-skills.org)

### **(Los Angeles Chapter of the) National Tooling & Machining Association (NTMA)**

111 E. Avenida San Gabriel  
San Clemente, CA 92672  
Chapter Executive  
Ms. Brenda Baker  
949-369-7309  
[www.lantma.org](http://www.lantma.org)

### **Precision Machine Products Association (PMPA)**

West Coast L.A. Chapter:  
1. Alger Manufacturing Co., Ontario  
Jim Hemingway, 909-986-4591  
2. Tom Phillips, Pacific Precision, Inc. 909-599-  
8471, San Dimas  
[www.pmpa.org](http://www.pmpa.org)

### **Precision Metalforming Association (PMA)**

Southern Calif. District  
District Director Patricia Szczuka,  
Computed Tool & Engineering, Inc.  
714-630-3911  
<http://Scalifornia.pma.org>

### **Small Manufacturers Association of California**

1603 Don Carlos Avenue  
Glendale, CA 91208  
818-242-7658  
[www.smac.org](http://www.smac.org)

**Electronics Technicians Association (ETA)  
International**

DeVry Institute of Technology  
ETA Student Chapter 5  
901 Corporate Center Dr.  
Pomona 91768-2642  
Robert Derby  
909-622-8866  
[www.eta-i.org](http://www.eta-i.org)

**Forging Industry Association (FIA)  
Magnet School:**

California Polytechnic State University  
Materials Engineering Department  
Blair London, Professor  
[www.forging.org](http://www.forging.org)

**International Society of Certified Electronics  
Technicians (ISCET)**

Con-Pro Video  
4646 Convoy St. #113  
San Diego 92111  
George Brownyard CET, Director  
619-495-0392  
[www.iscet.org](http://www.iscet.org)

**Society of Manufacturing Engineers (SME)**

Los Angeles Area Manufacturing Management No.  
27:

1. Phillip Rosenkrantz, PhD  
909-869-4127  
Cal. State Polytechnic Univ. S086  
3801 W. Temple Avenue  
Pomona, 91768
2. Peter A. Rauterkus, 213-763-3941  
L.A. Trade Tech College S038  
400 W. Washington Blvd.  
Los Angeles 90015
3. Alan St. John, 626-960-8681  
ITT Technical Institute-W. Covina S158  
1530 W. Cameron Ave.  
West Covina 91790-2767  
[www.sme.org](http://www.sme.org)

**The Society of the Plastics Industry (SPI)**

Southern California Chapter  
Susan Granger, President, Modified Plastics  
714-546-4667  
[www.plasticsindustry.org](http://www.plasticsindustry.org)

## Appendix F: Centers for Applied Competitive Technologies

[www.cact.org](http://www.cact.org)

### **Cerritos College CACT**

11110 Alondra Blvd.  
Norwalk, CA 90650  
Jose Anaya, Director  
(562) 467-5050, ext. 2510

### **El Camino College CACT**

13430 Hawthorne Blvd.  
Hawthorne, CA 90250  
Bill Yates, Director  
(310) 973-3170

### **Glendale Community College CACT**

Professional Development Center  
2340 Honolulu Avenue  
Montrose, CA 91020  
Sharleen Wagner, Director  
(818) 957-0024, ext. 219

### **Long Beach City College CACT**

3950 Paramount Blvd., Suite 101  
Lakewood, CA 90712  
(562) 938-5004  
Lou Anne Bynum, Dean of Economic & Resource  
Development  
Sheneui Sloan, Director of Technology Education  
(562) 938-5004

### **Mt. San Antonio College CACT**

1100 North Grand Avenue  
Walnut, CA 91789  
John Shepard, Director  
(909) 468-3933

### **Los Angeles Community College District CACT**

770 Wilshire Blvd., 7<sup>th</sup> Floor  
Los Angeles, CA 90017  
Grace Ishikawa, Director  
(213) 891-2415