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WORKFORCE ISSUES IN MANUFACTURING

A Survey of Skill Gaps and Related Workforce Issues in Three Manufacturing Sectors of Ventura and Santa Barbara Counties

Sponsored by the Workforce Investment Board of Ventura County

August 2008

Contributing to a Multi-Region Analysis in California as Part of the Workforce Innovation in Regional Economic Development (WIRED) Initiative for the California Innovation Corridor

Funding provided by Department of Labor, Employment & Training Administration: WIRED Initiative

About the Workforce Investment Board

The Workforce Investment Board administers federal funds that help to support the Job & Career Centers (JCC) throughout Ventura County. With additional resources from the County of Ventura Human Services Agency, these JCCs provide employment assistance, career training and education services to job seekers, and employee recruitment, customized training and business consulting to local employers. Center services are provided at no cost to job seekers and employers.

For more Job & Career Center employment services information call (800) 500-7705 or go to **www.venturacountyjcc.org.**

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Funding provided by Department of Labor, Employment & Training Administration: WIRED Initiative

A Survey of Skill Gaps and Related Workforce Issues in Selected Manufacturing Sectors: Report and Recommendations

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Introduction

The purpose of this study is to collect, analyze, and interpret information about current and future skills needed by selected Ventura County and Santa Barbara County employers. This project represents the Ventura County Workforce Investment Board's (VC-WIB) contribution in a broader multi-California study of workforce needs assessment, as part of the Workforce Innovation in Regional Economic Development (WIRED) initiative for the California Innovation Corridor (CIC). This VC-WIB study focuses on three sectors of manufacturing in Ventura and Santa Barbara County: chemical manufacturing, machinery manufacturing, and computer and electronic product manufacturing.

The concept of "skill gaps" is central to this study. Skill gaps occur when the qualifications (knowledge, abilities, skills, performance) of available workers are less than those needed by producers to remain competitive or profitable.
Concerns about work quality have become an issue of national scope and importance, particularly in manufacturing. A 2005 Deloitte Consulting survey of manufacturers across the U.S. discovered the following:

> Today's skill shortages are extremely broad and deep, cutting across industry sectors and affecting more than 80 percent of the companies surveyed.
>
> Skill shortages have a widespread impact on manufacturers' abilities to achieve production levels, increase productivity, and meet customer needs.
>
> High performance workforce requirements have significantly increased as a result of the skills gap shortage and the challenge of competing in a global economy, according to 75 percent of respondents.[i]

When asked to rank by importance seven possible developments that would contribute to their company's future business success, 74 percent ranked "developing a high performance workforce" highest. When asked to anticipate what kinds of workers would likely be in shortest supply in the next several years, 80 percent of the firms ranked production employees first.

All of the problems facing U.S. manufacturing companies in the age of global competition are of great concern in California. Historically, manufacturing has been central to the state's economy. As recently as 2003, California had more manufacturing jobs than any other state in the U.S. by a wide margin, at 1.5 million jobs. According to the Milken Report of August 2002, these jobs, via the economic multiplier effect, supported another 3 million, totaling 4.5 million jobs, or 30 percent of California's total.[ii]

One factor that has allowed California manufacturers to remain competitive, despite the many high business costs in California, has been the productivity of its workers. According to data from the Annual Survey of Manufacturers, California manufacturing

and production workers created more value added than the U.S. average in 2001. In some of the specific manufacturing sectors examined in this study, this so-called "California advantage" in worker productivity has been notable, totaling 38 percent in computer and electronics manufacturing, 10 percent in machinery manufacturing, and 1 percent in electronic equipment manufacturing. Nevertheless, California manufacturing has faced substantial jobs losses in some sectors. Between 2000 and 2003, California lost 104,000 jobs in computer and electronics manufacturing, 18,000 in machinery manufacturing, and 8,000 in electrical equipment manufacturing.

More recent numbers signal a continuing loss of manufacturing jobs in the state. State Employment Development Department data indicate that between July 2006 and July 2007, manufacturing jobs in the state declined 1.2 percent. July-to-July comparisons for 2007 and 2008 indicate a further reduction of 2.1 percent.[iii] For California manufacturing, retaining jobs means remaining competitive. The quality of the manufacturing force will be one crucial component in this equation. How California manufacturing will fare is still uncertain.

A 2006 report by California's EDGE Campaign states that California "now stands at a crossroads."[iv] In a 2006 Survey of members of the California Manufacturing and Technology Association, respondents report that the single most important business challenge we are facing is "sustaining and/or acquiring a skilled workforce."[v] The California Regional Economics Project reports that "a major workforce challenge for the manufacturing value chain is how to retain current production workers..."[vi] Other factors contributing to this dilemma are the impending retirements of baby boomers, demographic changes, and the quality of workforce preparation in the schools.

In December 2006, the Ventura College Office of Research and Evaluation conducted a survey of employers in five manufacturing sectors in the tri-county region (San Luis Obispo, Santa Barbara, and Ventura). [vii] In addition to providing estimates of likely future new hires in twenty manufacturing-related occupations, their results illustrate serious employer concerns about skill shortages, the number of workforce entrants the schools are training, and employees' basic skill levels. Some of the specific results of this study are discussed later in this report.

Thus, the study of skill gaps and the search for ways to address these challenges in our local economy are both topical and timely. Manufacturing enterprises and the jobs they create are important factors in our regional economy. Thus, sustaining and strengthening them would make an important contribution to the future economic welfare of the region.

Methods Used in the Study

Data collection was carried out using a predetermined survey instrument common to all project participants. The VC-WIB was asked to collect data in three sectors of manufacturing industries, as defined under the North American Industry Classification System (NAICS, pronounced Nakes). This system was developed as the standard for use by Federal statistical agencies in classifying business establishments for the collection, analysis, and publication of statistical data related to the U.S. business economy. NAICS was developed under the auspices of the Office of Management and Budget (OMB) and adopted in 1997 to replace the old Standard Industrial Classification

(SIC) system. It was also developed in cooperation with the statistical agencies of Canada and Mexico to establish a three-country standard, allowing a high level of comparability in business statistics between the three countries. NAICS is the first economic classification system to be constructed based on a single economic concept. To learn more about the background, the development, and the difference between NAICS and the SIC, see www.census.gov/epcd/www/naicsdev.htm.

The three manufacturing sectors designated for the VC-WIB study are

325 – Chemical Manufacturing.

333 – Machinery Manufacturing.

334 – Computer and Electronic Product Manufacturing.

Appendices 1 and 2 provide longer-term employment and salary dates for these three sectors in Santa Barbara and Ventura Counties.

The State of California Employment Development Department (EDD) provided employer lists, as well as descriptions and contact information, for each of these three sectors. The accuracy of the contact information on the lists was verified, and companies were then contacted by the research team to determine their willingness to participate in the study. Participating companies were given the option of participating in the study by means of a written (mail) survey, telephone survey, or in-person interviews. The project team worked to provide a sample reflecting the geography, size (number of employees) and specializations of these sectors in the local economy.

Selected Demographics of Target Industries

Designated Industries/County	# of Employers	# Employed	Average Weekly Pay
325-Chemical Manufacturing			
Ventura County	42	9,444	$1,700
Santa Barbara County	14	850	$1,700
333-Machinery Manufacturing			
Ventura County	90	3,415	$1,054
Santa Barbara County	20	539	$750
334-Computer and Electronics			
Ventura County	142	7,865	$1,202
Santa Barbara County	68	3,832	$1,345

Source: Quarterly Census of Employment and Wages, provided by State of California Employment Development Department.

The following section describes the employer participation in each targeted sector.

325 Chemical Manufacturing

The Chemical Manufacturing subsector is based on the transformation (via a chemical process) of organic and inorganic raw materials and the formulation of products. This subsector distinguishes the production of basic chemicals that compose the first industry group from the production of intermediate and end products produced by further processing of basic chemicals, which make up the remaining industry groups.

Employer Name	Industry NAICS	Business Type	Size of Busines	Respondent Position	Primary Site
NAICS Code 325 - Chemical Manufacturing					
AGRX	325311	Manufacturing	100-249	Other	Oxnard, CA
Rincon-Vitova Insectaries In	325320	Manufacturing	11-19	Other	Ventura, CA
Coastal Contract Packaging In	325620	Manufacturing	11-19	President/CEO/Director	Ventura, CA
Spatz Laboratories	325620	Manufacturing	100-249	HR Dir.	Oxnard, CA

333 Machinery Manufacturing

Industries in the Machinery Manufacturing subsector create end products that apply mechanical force. An example is the application of gears and levers to perform work. Some important processes for the manufacture of machinery are forging, stamping, bending, forming, and machining, all used to shape individual pieces of metal. Processes such as welding and assembling are used to join separate parts. Although these processes are similar to those used in metal-fabricating establishments, machinery manufacturing is different because it typically employs multiple metal-forming processes in the assembly of the various parts of the machine. These complex assembly operations are an inherent part of the production process.
In general, design considerations are very important in machinery production. Establishments specialize in making machinery designed for particular applications. Thus, for the purpose of implementing NAICS, design is considered part of the production process. The NAICS structure reflects this by defining industries and industry groups that make machinery for different applications. A broad distinction exists between machinery that is generally used in a variety of industrial applications (i.e., general-purpose machinery) and machinery designed for use in a particular industry (i.e., special-purpose machinery). Three industry groups consist of special-purpose machinery—Agricultural, Construction, and Mining Machinery Manufacturing; Industrial Machinery Manufacturing; and Commercial and Service Industry

Machinery Manufacturing. The other industry groups make general-purpose machinery: Ventilation, Heating, Air Conditioning, and Commercial Refrigeration Equipment Manufacturing; Metalworking Machinery Manufacturing; Engine, Turbine, and Power Transmission Equipment Manufacturing; and Other General Purpose Machinery Manufacturing.

Employer Name	Industry NAICS	Business Type	Size of Business	Respondent Position	Primary Site
NAICS Code 333 - Machinery Manufacturing					
Made in the Shade Intl.	333319	Manufacturing	0-4	President/CEO/Director	Moorpark, CA
Veeco Slider Process Equipment	333515	Manufacturing	100-249	HR Director	Camarillo, CA
Scientific Cutting Tools	333515	Manufacturing	20-49	President/CEO/Director	Simi Valley, CA
Joy Equipment Protection	333999	Service	5-10	President/CEO/Director	Santa Barbara, CA
American Machine Conveyer Inc.	333999	Manufacturing	5-10	President/CEO/Director	Oxnard, CA
Dynamic Automation	333999	Manufacturing	11-19	President/CEO/Director	Simi Valley, CA
Meissner Filtration Products	333999	Manufacturing	20-49	HR Director	Camarillo, CA
Trans-Motion Industries	333999	Manufacturing	5-10	President/CEO/Director	Simi Valley, CA
CCI-Fluid Kinetics	333999	Manufacturing	11-19	Other	Ventura, CA
Westover Control Corp.	333999	Service	11-19	Other	Newbury Park, CA

334 Computer and Electronic Product Manufacturing

Industries group establishments that manufacture computers, computer peripherals, communications equipment, and similar electronic products together with establishments that manufacture components for such products in the Computer and Electronic Product Manufacturing subsector. The Computer and Electronic Product Manufacturing industries have been combined in the hierarchy of NAICS because of their economic significance. Their rapid growth suggests that they will become even more important to the economies of all three North American countries in the future, and their manufacturing processes are fundamentally different from the manufacturing processes of other machinery and equipment.

The design and use of integrated circuits and the application of highly specialized miniaturization technologies are common elements in the production technologies of the computer and electronic subsector. Convergence of technologies motivates this NAICS subsector. Digitalization of sound recording, for example, causes both the medium (the compact disc) and the equipment to resemble the technologies for recording, storing, transmitting, and manipulating data.

Communications technology and equipment have been converging with computer technology. When technologically related components are in the same sector, it is easier to adjust the classification for future changes, without redefining its basic structure. The Computer and Electronic Product Manufacturing subsector helps to delineate new and emerging industries, since the activities that will serve as the probable sources of new industries (such as computer manufacturing and communications equipment manufacturing, or computers and audio equipment) are brought together. As new activities emerge, they are less likely to cross the subsector boundaries of the classification.

Employer Name	Industry NAICS	Business Type	Size of Business	Respondent Position	Primary Site
NAICS Code 334 - Computer and Electronic Manufacturing					
Stitch Wire Systems Corp.	334112	Manufacturing	5-10	HR Dir.	Newbury Park, CA
Demo Systems LLC	334112	Manufacturing	50-99	President/CEO/Director	Moorpark, CA
Interlink Electronics Inc.	334119	Manufacturing	100-249	HR Dir.	Camarillo, CA
Coast to Coast	334119	Other	100-249	Other	Simi Valley, CA
AML Communications Inc.	334310	Manufacturing	50-99	HR Dir.	Camarillo, CA
Ricoh Printing System America	334413	Manufacturing		Other	Simi Valley, CA
Shell Solar Industries	334413	Manufacturing	250-499	Other	Camarillo, CA
Hirose Electric Group	334417	Manufacturing	50-99	HR Dir.	Simi Valley, CA
Kavlico	334419	Manufacturing	1000+	HR Dir.	Moorpark, CA
Jaxx Manufacturing	334419	Manufacturing	50-99	Other	Simi Valley, CA
Viking Electronics	334419	Manufacturing	50-99	HR Dir.	Moorpark, CA
C & L Aerospace	334511	Service	11-19	Supervisor/Manager	Ventura, CA
Pti Tech	334511	Manufacturing	100-249	HR Dir.	Oxnard, CA
Indigo Systems-Flir Systems Ink	334513	Manufacturing	250-499	HR Dir.	Santa Barbara, CA
Qualstar	334613	Manufacturing	50-99	HR Dir.	Simi Valley, CA
Imation Corp.	334613	Manufacturing	100-249	HR Dir.	Camarillo, CA

List of Participating Employers by Region

The following table lists the participating employers by location. Most are located along the so-called "101 Corridor," but there is also a significant manufacturing presence in the Simi Valley area (represented here as well).

Simi Valley, CA 8	**Camarillo, CA 6**
Jaxx Manufacturing	Veeco Slider Process Equipment
Dynamic Automation	Meissner Filtration Products
Scientific Cutting Tools	Interlink Electronics Inc.
Qualstar	Imation Corp.
Coast to Coast	Shell Solar Industries
Ricoh Printing System America	AML Communications Inc.
Trans-Motion Industries	**Newbury Park, CA**
Hirose Electric Group	Stitch Wire Systems Corp.
Moorpark, CA 4	Westover Control Corp.
Kavlico	**Santa Barbara, CA**
Made in the Shade Intl.	Joy Equipment Protection
Viking Electronics	Indigo Systems-Flir Systems Ink
Demo Systems LLC	
Ventura, CA 4	**Oxnard, CA 4**
C & L Aerospace	American Machine Conveyer Inc.
Rincon-Vitova Insectaries Inc.	Pti Tech
CCI-Fluid Kinetics	Spatz Laboratories
Coastal Contract Packaging Inc.	AGRX

Distribution by Size (Number of Employees)

To classify by size, we focus on the number of employees in the local business unit. That is, in those cases in which the firm interviewed is a subsidiary of a larger business organization, only the employees working at Ventura or Santa Barbara locations are counted.

Employer Name	Industry NAICS	Size of Business	Primary Site
Made in the Shade, Intl.	333319	0-4	Moorpark, CA
Stitch Wire Systems Corp.	334112	5-10	Newbury Park, CA
Joy Equipment Protection	333999	5-10	Santa Barbara, CA
American Machine Conveyer Inc.	333999	5-10	Oxnard, CA
Trans-Motion Industries	333999	5-10	Simi Valley, CA
C & L Aerospace	334511	11-19	Ventura, CA
Dynamic Automation	333999	11-19	Simi Valley, CA
Rincon-Vitova Insectaries Inc.	325320	11-19	Ventura, CA
CCI-Fluid Kinetics	333999	11-19	Ventura, CA
Westover Control Corp.	333999	11-19	Newbury Park, CA
Coastal Contract Packaging Inc.	325620	11-19	Ventura, CA
Scientific Cutting Tools	333515	20-49	Simi Valley, CA
Meissner Filtration Products	333999	20-49	Camarillo, CA
Jaxx Manufacturing	334419	50-99	Simi Valley, CA
Qualstar	334613	50-99	Simi Valley, CA
Hirose Electric Group	334417	50-99	Simi Valley, CA
Viking Electronics	334419	50-99	Moorpark, CA
AML Communications Inc.	334310	50-99	Camarillo, CA
Demo Systems LLC	334112	50-99	Moorpark, CA
Ricoh Printing System America	334413	50-99	Simi Valley, CA
Veeco Slider Process Equipment	333515	100-249	Camarillo, CA
Interlink Electronics Inc.	334119	100-24	Camarillo, CA
Coast to Coast	334119	100-249	Simi Valley, CA
Imation Corp.	334613	100-249	Camarillo, CA
Pti Tech	334511	100-249	Oxnard, CA
Spatz Laboratories	325620	100-249	Oxnard, CA
AGRX	325311	100-249	Oxnard, CA
Shell Solar Industries	334413	250-499	Camarillo, CA
Indigo Systems-Flir Systems Ink	334413	250-49	Santa Barbara, CA
Kavlico	334419	1000+	Moorpark, CA

Critical Employees

A fundamental purpose of the study is to ask employers to identify those employees (occupations) most critical to their operations. Criticality in this sense can occur because employees of specific types are perceived as

- crucial to the production or other work processes.
- difficult to recruit and or retain.
- difficult to find with adequate skill levels.

The results of the survey are described in the following summary table. By far, the most frequently identified critical occupations are those related to the production processes (53% of firms). This general category includes a broad range of jobs at the semi-skilled, skilled, or technical levels. These include job titles such as assembler, solderer, steel fabricator, machine builders, operators, inspectors, and control technicians.

The next most frequently mentioned category is engineering, with 37 percent of employers reporting. Again, a broad array of specialization is identified, including electrical engineers, mechanical engineers, design engineers, industrial engineers, and systems engineers.

Summary Table of Employer-Identified Critical Employees, Jobs, or Occupations		
Critical Jobs/Occupations	**# of Firms**	**% of Firms**
Assembly/Production/Technical	6	53%
Engineering	11	37%
Sales	2	7%
Administration	2	7%
Non-Critical Skill Occupations	2	7%

A smaller number of firms identify critical occupations in sales (7 percent) and administrative positions (7 percent). Two firms (7 percent) indicate they had no occupation considered critical, given our criteria. Basically, this means these employers regard their labor needs as adequately met.

In all, these employers identify 25 different jobs or occupations as critical. The complete list of specialties, grouped by category, follows:

Specific Job Titles/Occupations Listed by Employers as Critical	
Job Title/Occupation	Category
Estimator	Admin.
Admin. Assistants	Admin.
Logistics Assistants	Admin.
Shipping Managers	Admin.
Mechanical Engineers	Engineering
Electrical Engineers	Engineering
Design Engineers	Engineering
Industrial Engineers	Engineering
IT Engineers	Engineering
Manufacturing Production Workers	Production
Solderers	Production
Steel Fabricator	Production
Assemblers	Production
Machine Operators	Production
Machine Builders	Production
Fine-Manufacturing Production Workers	Production
Value Stream Operators	Production
Software Programmers	Professional
Sales Managers	Sales
Sales	Sales
Interconnect Technicians	Technician
Insect Production Technicians	Technician
Controls Technicians	Technician
Pesticides Control Advisers	Technician
Radio Frequency Test Technicians	Technician

Shortages

Employers may consider a particular occupation as critical because there is not an adequate supply in the relevant labor market. Thus, we asked employers to list those occupations they considered to be in short supply in the current labor market. Shortages are reported most widely in technician and engineering positions. With regard to engineers, one employer comments, “The available workforce tends to concentrate in areas where universities with engineering programs are located.” Another comments, “Due to the high cost of living in this area (and combined with high gas prices), the lack of public transportation has paralyzed the [our] company. Something is highly needed to bring the workforce into this location.”

Employer-Reported Shortages in Various Occupations		
Occupations	# of Cases	% of Cases
Production Employees	2	6.7
Technicians	11	36.7
Engineers	10	33.3
Professionals	1	3.3
Other	3	10.0
No Shortages	9	30.0

Significantly, 30 percent of the responding companies are experiencing *no* labor shortages. While most can identify critical occupations, this is in many cases not so much related to a lack of available workers as it is to the quality of available workers. One company respondent says, "I find it very hard to find people to fill our company needs. I feel that people lack common sense, work ethic, and just basic customer service skills."

These results present a different picture from that of the 2006 Ventura College survey of tri-county manufacturing employers, in which 70% of respondents indicated that there was a current shortage of workers.[viii] These different results may, in part, be a product of differences in survey method. (The Ventura College survey asked about 20 specific occupational categories, whereas the current study allowed employers to designate their own "critical occupations.") In addition, while the two surveys overlap in the geographic location of employers and industry sectors, these are not identical in the two studies. Also, the differences in economic conditions at the times of the two studies, including the continuing decline in manufacturing jobs in California, explain some of this difference.

Skill Gaps

Once employers had identified their critical occupations, they were asked to assess the importance of a series of work-related skills, to evaluate how well their critical employees were performing those skills, and to estimate how important those skills would be to future hires in their industry.

The tables below present the results from these assessments, using the exact wording of the survey instrument questions. Employers were asked to assess the *performance* of employees using the following scale:

4 – Exceeding Expectations

3 – Meeting Expectations

2 - Nearly Meeting Expectations

1 - Does Not Meet Expectations

In individual questions, raters were asked to assess performance compared to existing entry-level (new hire) expectations. They were also asked to assess the importance of various skills both for new hires and for future hires—that is, to assess whether a given skill might become more or less important to their business and industry in future years.

These responses could provide some insight into how the skill needs of future workers might change.

The *importance* of a skill set was rated using the following scale:

4 – Very Important

3 – Important

2 – Somewhat Important

1 – Not Important

In other instances, employers were asked how *satisfied* they were with current *performance of work preparation,* using the following scale:

4 – Very Satisfied

3 – Satisfied

2 – Unsatisfied

1 – Very Unsatisfied

Gaps, or skill deficiencies, were computed comparing their expectations to their assessment of performance.

The first table in this section focuses on employer perceptions regarding the importance they assign to the critical skills they identified. Not surprisingly, those skills employers listed as "critical" are viewed as very important (3.9 our of 4.), and employers also consider it highly desirable that workers enter employment with these skills in place (3.6).

Critical and Basic Work Skills and Skill Gaps		
Skills	Rating	Gap
1. Critical Occupations and their Basic Skills	3.9	
How important is it that employees meet your expectations in those skills when hired?	3.6	
2. How do you rate their problem-solving skills performance/competency?	2.8	
Please rate the importance of problem-solving skills for future entry-level employees?	3.2	-0.40
3. How would you rate typical new-hire performance/competency in workplace skills such as judgment and decision-making, management of resources, and time management?	2.5	
How important will these skills be for future employees?	3.3	-0.80

The survey then addresses several sets of more specific skill definitions, asking employers to rate the performance of their current workers and to compare that to the likely future importance of each individual skills category. In the case of *problem-solving skills,* for example, employers rated current skill levels, on average, at 2.8 against likely future needs of 3.2, creating a skill gap of .40.

An even larger gap was identified in the area of skills defined as *judgment, decision-making, and management of resources, and time management.* Here, employers (on average) rated current new-hire performance at 2.5 against a likely future importance of 3.3, creating a gap of .80.

Technical Skills and Skill Gaps

Two areas of technical skills are evaluated:

1. technical knowledge
2. computer-related skills

In these categories, employers rate current new-hire skills fairly low in technical knowledge (2.7) and lower still in a more complex bundle of skills that include using spreadsheets and databases, word processing, graphics, the internet, and presentations.

There are also substantial gaps between current performance and likely future importance. Technical knowledge associated with specific occupations demonstrates a skill gap of .80, as did the category concerned with the use of computer-based information and applications.

Two additional questions asked employers to assess both the current and likely future importance of workers' competence in the use/operation of equipment, tools, materials, software, information systems, or more than one specific technology when hired. These skills are considered important (an average rating of 3.3) and are likely to remain so, indicating that demand for well-prepared and skilled employees will continue.

Technical Skills and Skill Gaps		
Skills	Rating	Gap
4. In your company, how well does the new employee typically meet performance/competency expectations set for entry-level workers in terms of technical knowledge related to the job s/he will perform?	2.7	
5. Please rate the future importance of occupational knowledge for employees	3.5	0.80
6. In the area of technical skills, how important will it be for entry-level employees to be adept in the use/operation of equipment, tools, materials, software, information systems, or more than one specific technologies when hired?	3.3	
7. What is the importance of these skills and/or abilities for future entry-level employees?	3.3	0.00
8. In terms of specific computer skills such as using spreadsheets, databases, word processing, graphics, Internet, or giving presentations, etc., how well does the new hire meet entry-level performance expectations?	2.0	
9. How would you rate the importance of information technology use and management for future entry-level employees?	2.8	0.80

Social Skills

The category of social skills relates to, among other things, teamwork, coordination, instruction, relationship building, cross-cultural understanding, negotiation, and persuasion skills. In this area, too, employers report a significant gap between perceived current levels of employee performance and future importance and needs.

The assessment of current new-hire performance is fairly low (2.7). The work ethic of new-hires also receives fairly low marks (2.7).

Employers rate the future importance of this set of “soft skills” fairly high (3.5), resulting in a skill gap of .80.

Social Skills and Skill Gap		
Skill	Rating	Gap
11. In the area of social skills, how well does the employee meet entry-level performance expectations for team-work, coordination, instructing, relationship building, cross-cultural understanding, negotiation, persuasion, etc.?	2.70	
12. What level of future importance will social skills have for your entry-level employees	3.50	0.80
13. In demonstrating good work ethics (initiative, dependability, reliability), how well does the employee meet entry-level expectations?	2.70	

Characteristics of the Best Employees

To assess the quality of a labor force and to identify ways to improve labor work preparation, one can approach the task in two ways. The first, discussed in the above sections, is to look for areas of weakness, deficiency, and performance problems so that these can be clearly identified and then solved in some way. The other approach, discussed below, is to look at best practices, the qualities and practices of employers' best-performing employees.

We addressed these issues in the research survey by asking employers a number of open-ended questions. The first question asked them to identify the characteristics of their most effective, reliable employees in the occupations they identified as critical.

In some cases, a distinct minority, employers identify in best workers characteristics that fit generally under the traditional job assessment categories of knowledge, skills, and abilities (KSA's). The following are illustrative:

- Solderers need soldering skills.
- Fabricators need knowledge of basic math—geometry, algebra, the ability to read blue prints, and know-how with specific tools.
- Assemblers need good hand-eye coordination.
- Engineers need knowledge of specific programming languages. Engineers and assembly workers need knowledge of product design and work processes.

Overwhelmingly, however, employers describe the characteristics of their best workers in qualitative, behavioral, attitudinal, social, or "soft skills" terms rather than in terms of

specific technical knowledge. This is the case for all occupations levels. The following are illustrative:

- Attention to detail, stamina, good work ethic.
- Hard working, positive, looks ahead.
- Hard working, always learning, open-minded.
- Works well with others.
- Good communications skills, patient.
- Pride in learning, learns and adapts. Loyal to the company. Efficient. Innovative.
- Dependable, reliable, team worker, good at instructing others and receiving instruction, cross-cultural understanding, initiative, effective communication, and problem-solving skills.
- A team player with leadership skills, can communicate in both English and Spanish, good at problem solving, able to detect change and offers suggestions, punctual, attendant, reliable.

Appendix 3 provides the complete list of employer responses to this question.

Examples of Two Companies That Are Coping Well with Labor Market Issues

Finally, it is appropriate to briefly discuss two companies not experiencing quantitative or qualitative labor force problems. Both report no critical worker or skills issues. Significantly, each has worked out specific strategies to effectively recruit and retain long-term, well-qualified workers.

Company “A.” This manufacturer describes no critical occupations and no workforce issues. The reason appears to be that they have extraordinarily low turnover. They state that most of their employees have been with them for 15 to 20 years. The employees of most concern for this aerospace manufacturer are assembly workers. It is difficult to find hard-working people with appropriate language and teamwork skills at the salaries required to maintain company profitability. The company approaches this problem in several ways. They only hire through temp agencies when the candidate is a current employee of the temp agency. This allows them to evaluate the employee's actual job performance before hiring. Because the company finds many workers unprepared, they routinely offer in-house remedial training.

Company “B.” This electronic manufacturer describes no critical occupations and no workforce issues. They cite very low turnover, and the vast majority of their employees have been with the company for over 10 years. The company produces state-of-the art night-viewing systems using proprietary heat-sensing technology. Customers include the military, security companies, facilities needing sophisticated security systems, and consumers. The company operates in an area with a tradition of high-tech and defense-

related industries, and the company is located close to a major university. Although the local high-tech and defense sectors have been declining for over a decade, this works to the company's advantage. The company has been able to hire great people displaced by existing manufacturers. The company also hires top entry-level engineering talent from the local university. With an aggressive employee-referral program, employees receive $1,000 for a hired referral. The company feels that this is an extremely effective way to hire quality assembly technicians while reducing poor hires. In part because of limited alternatives for workers, the company has extremely low turnover. With a goal of low turnover, the company invests considerable resources in that goal: it has generous benefits and benevolent employee policies. As with so many regional companies, many workers commute from as far away as Santa Maria to the north and Oxnard to the south. Housing prices and increasing commute costs are perceived as the most serious threats to workforce availability.

What New Skills Will Be Needed in the Future for These Companies?

This study seeks to discover the new skills employers believe will be important to their enterprises in coming years. Interestingly, about 43% of the respondents said they could not identify any new skills that would be needed. As one employer states, “No. The technology may change, but not the required skills of the workers.”

Those that did identify what they characterized as new skills covered a broad array of subjects. Various companies identify the following as among the new skill sets that may be required of future workers:

- Bilingual
- Solar and LED-industry technologies
- Training in “social styles”

In most cases, employers identify as “new skills” knowledge or capabilities that are not necessarily new, but instead are becoming more important for their specific industry or work processes. The following list includes some of these described skills:

- Computer skills
- Critical thinking
- Social skills
- More technical skills, like quality assurance
- Semi-conductor skills
- Electrical engineering, chemistry, and physics
- Programming
- Machine programming
- Databases and computer applications

Education and Training

In this section, we focus on education and training issues: the preparation of today's regional manufacturing workers, the new skills, if any, employers in these sectors expect to need in the future, and the roles education and training play in preparing quality workers for critical jobs.

Overall Satisfaction with Worker Preparation

How satisfied are employers with the overall education preparation of workers at various levels? According to the results, not very. The overall, or summary, rating of employers' satisfaction with their workers' educational preparation is 2.7, which falls in the "Less than satisfied" range. The same is true for specific levels of workers. Ratings for new-level (lowest-skilled), technical, and professional workers are all below the 3.0 level, which indicates minimum satisfaction.

Employer Satisfaction with Current Levels of Worker Preparation	
Category of Worker	Rating
14. In general, how satisfied are you with the education of today's worker?	2.7
Entry-level	2.6
Technical	2.7
Professional	2.8

Here again, findings in the local economy echo those found in national surveys. In the 2005 Deloitte survey of U.S. manufacturers, when asked, "Are the K- 12 schools doing a good job of preparing students for the workplace?", 84 percent of companies responding said, "No."[ix]

Employer Suggestions for Classes and Training

Given employers' satisfaction with the level of workforce preparation at all job levels, we are interested in their ideas for improvement. We ask them, in an open-ended question

format, for specific ideas for classes or training programs "that would better prepare future employees."

When assessing their responses, we were struck by the number of times the word "basic" was explicitly or implicitly found in their suggestions:

- Basic Skills: How to get a job, present themselves
- Basic business skills: self-confidence, communication, how to present yourself in an interview
- Basic communication skills
- Basic office skills
- Basic programming skills

This emphasis on basic skills reflects national trends. In the 2005 Deloitte national survey of manufacturers, respondents ranked "Strong Basic workforce skills" co-equal with "Technical Skills" as the types of skills employees will need more of in the future.[x]

These results parallel those in the 2006 Ventura College survey of employers in five manufacturing sectors in the tri-counties: When asked whether entry-level workers often lacked the initial skills required by the regional manufacturing industry, many employers stated that they did not.

Percent of Tri-counties' Manufacturing Employers Stating That Entry-Level Workers Lack Basic Skills	
Skill Category	Percentage
English Language Skills	71%
Reading Skills	49%
Basic Math Skills	50%
Employability Skills	65%
Source: Ventura College 2006 Survey of Selected Regional Manufacturers	

Communication and behavioral skills are also mentioned frequently:

- Social styles, personality styles training.
- Dress code, how to interview and act.
- Charm school, social skills.
- Work ethics, communication.

About 30% of the respondents suggest classes in English, and one observes, “English, basic courses already provided but people don’t take advantage of them.”

There are also a number of suggestions for specific technical training, such as electronics assembly courses, soldering, machining and technology classes, automation and systems control, and working in a clean room environment. The full list of responses is listed in Appendix 4.

A number of employers advocate more workforce preparation in the schools. Taken together, the following observations made by respondents to the survey suggest a theme:

- Focus on high school students: teach the basic skills! Don’t outsource the jobs to other countries.

- Concentrate on manufacturing sector, not just the service sector. Workers should become more efficient in order to drive the country’s economy. Not all skills that we are demanding should be met/taught, but it is important that they meet most, which would be good for the community and country.

- Teach problem-solving skills. The cultural divide is a great challenge.... Workers must learn how to meet the standards of U.S. business procedures.

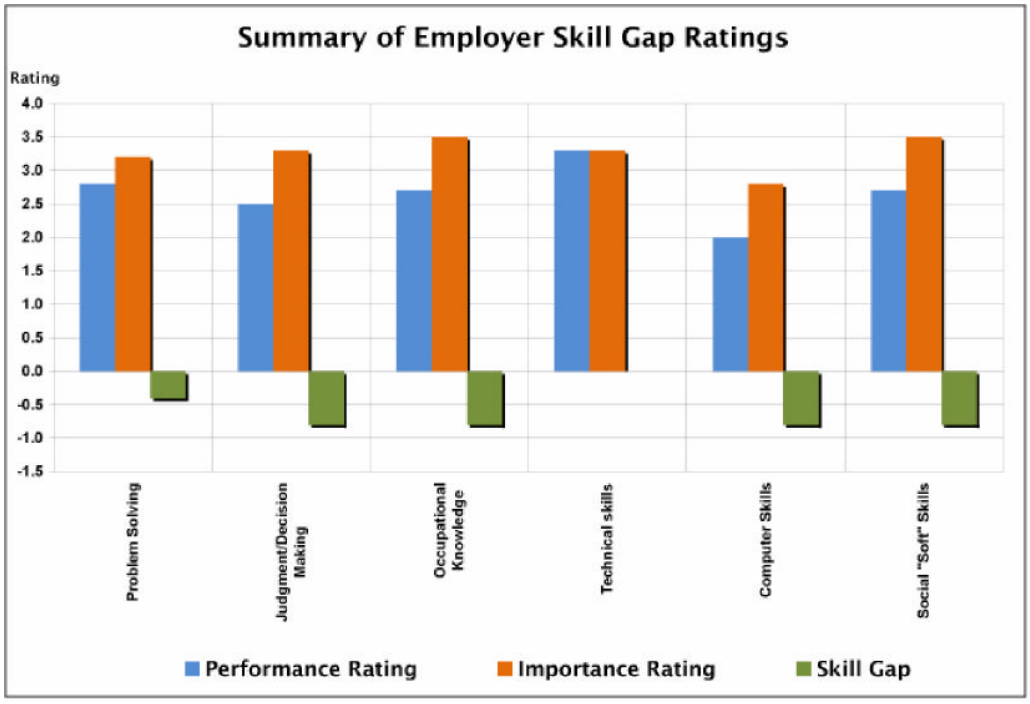
In sum, there is considerable concern among the employers participating in this survey about the quality of work education in the schools and also about the importance of creating a quality workforce for the sustainability of our regional and national economies.

Brief Summary of Findings

1. When asked to report those occupations within their workforce that are “critical,” the surveyed Ventura and Santa Barbara County manufacturers most frequently list production and technician positions (53%). A significant number also list engineering positions (3 7%).

2. Labor market shortages make up some of this “criticality,” with 36.7 percent of firms listing shortages in technician positions and 33.3 percent for engineering positions. It is also important to note that nearly a third of our respondents (3 0%) list no labor shortages at the current time.

3. For these critical occupations, skill gaps appear substantial.



The largest skill gaps pertain to judgment and decision-making, occupational knowledge, computer skills, and so-called "soft skills," which have to do with affect, inter-personal skills, communications, teamwork, etc. Many studies refer to this latter category as basic employability skills.

4. Overall, employer satisfaction with workforce preparation in the schools is low.

5. Employers recommend emphasizing basic work skills education, English language instruction, and, on a more limited basis, specific technical knowledge and skills training to improve the education and training opportunities for workers.

Recommendations

The workforce challenges faced by manufacturing in our region, while serious and important, are not unique. These same problems are playing out across the state and the nation. As a result, many groups – government, industry, the academy, and others – are sponsoring discussions and assessments in order to find ways to strengthen both the supply and the quality of the workforce.

Because employers are not simply lacking a single type or worker with a single set of skills, these problems are complex. Even in these three specialized sectors of the manufacturing industry, many different types of jobs are involved, running the gamut from those requiring relatively low levels of skill and education to those requiring

advanced study and sophisticated applied knowledge. Individual enterprises may have, to some extent, unique work processes, where some of the skills and knowledge required of workers are firm and proprietary-process specific.

Another aspect of the problem is that many manufacturing firms are small in size, without trained human resources specialists and the sophisticated recruitment, selection, and training resources that may be found in large firms. And, for many firms, profitability margins are small. With the high costs of doing business in California, raising wages to attract and retain better-qualified workers and investing in internal training and development systems are difficult.

All this said, it might be useful to review the state- and national-level findings and recommendations other investigators have made.

The 2005 Skill Gaps study, conducted by Deloitte Consulting for the National Association of Manufacturers and The Manufacturing Institute, made the following recommendations:[xi]

- Employers must understand (and act on) the importance of human capital as a business investment—that is, spend more on training.
- Employers must implement new and non-traditional approaches to dealing with skills-retention challenges, including making fuller use of traditionally under-utilized talent pools among older, female, immigrant, and non-traditional workers.
- Employers must help the general public and public sector to understand what companies need.
- Educators must produce graduates familiar with the world of work and the skills needed to be effective in it.
- Education and workforce policies must reflect the need for life-long learning.
- Individuals must take responsibility for their employability.

The Bay Area Economic Forum study of California Manufacturing asked the question, How can government support competitiveness and also save jobs? It answered this question with these recommendations:[xii]

- Level the playing field: improve regulations and laws to make California manufacturers more competitive. Taxes on business, energy policy, labor rules, workers' compensation policies, tort reform, and more support for research are all examples of areas in which government could do more.

- Build technical and vocational skills. Specifically, spend more on training programs. Improve the coordination of training organizations and programs around the state. Match school curricula more closely to marketplace needs.

- Promote California manufacturing. Specifically, the State should establish a clear strategy to attract and retain industries whose manufacturing is more likely to be competitive in the California environment. The provision of tax incentives and other inducements to firms in targeted industry sectors should be based on a "sound analysis" of economic costs and benefits.

The study sponsored by California EDGE made these recommendations:[xiii]

- Invest in regional workforce and economic development strategies to build prosperous communities and competitive industries.

- Provide all California with access to high-quality post-secondary education and skills training.

- Provide working adults with opportunities to move up the skills ladder.

- Link workforce programs and institutions to create pathways to high-wage jobs.

- Align program goals and measures to achieve a shared vision of California's future and to ensure accountability.

The Jobs for the Future study, conducted for the Rockefeller Foundation, focused on innovations in state government policies and programs that might be effective in building skills in the labor force and, as a result, increase economic vitality. They made recommendations and provided examples in four major areas:[xiv]

- Redesign the financing of workforce development to make the use of public monies more flexible, to target priority industries, and to make programs more responsive to the needs of employers.

- Strengthen the linkage between workforce development and economic development initiatives and activities.

- Build the capacity of new labor market institutions wherein so-called "workforce intermediaries" would create public-private partnerships, intended to be nimble and collaborative, to bring about changes in education and training, linking educational providers to employers, and providing essential services to workers in training.

The Workforce Excellence Network – involving the National Association of Workforce Boards and the National Association of Workforce Board Chairs – in its report, "Using

Skill Standards & Certification in Workforce Investment Board Programs," makes a strong argument for the more widespread adoption of nationally recognized, industry-based skill standards and occupation certifications.[xv] Doing so, they advocate, would make education and training programs more relevant, would strengthen training, and would improve the employee selection processes.

And finally, for this discussion, Achieve, Inc. in its 2006 report on aligning high school policies and programs with the real needs of both college and workforce-bound students, reports that "our schools are not adequately preparing students for college and the 21st century jobs." It advocates benchmarking the curriculum with verifiable college and work readiness measures.

When examining even a limited number of studies and reports, we are confronted with a dazzling array of program and policy options. These various organizations start from different perspectives and as a result produce different recommendations. Some recommend statewide or even national economic development strategies and initiatives at the "30,000 foot level," while others encourage greater individual responsibility and individual employer actions.

Many, perhaps all, of the recommendations make some sense, but many are also pitched at the macro-level of government policy or industry initiatives. Of course, these should be pursued. But at the same time, what can the small company, on the ground in Ventura or Santa Barbara County, do to solve their specific challenges or to improve the quality and availability of their workforce?

After our round of data collection and the attendant conversations with employers, we turned to discussions with educators and others in our region, like the Ventura County Civic Alliance's Workforce Education Task Force, who are concerned about the quality of workforce preparation in our region. On the basis of what we learned through both sets of conversations, we offer the following recommendations. These recommendations are not intended to exclude pursuing larger-scale changes in institutional policies and programs but are instead intended to help employers and labor force participants in our local regional economy take positive steps to make things better:

1. While more widespread changes to make school more relevant to work are certainly desirable, there are already very valuable workforce preparation and development programs and resources in place that are underutilized.
    a. Employers need to learn more about these programs and take advantage of those that would be right for them.

    b. Individual workers and prospective workers also need to research their options and take better advantage of programs that will help them build skills and earn more rewarding careers.

c. The organizations that provide these programs and services need to be more proactive in their own marketing – getting the word out is essential if valuable programs are to meet their service potential.

2. Employers, especially smaller employers, should seek opportunities to develop collaborative associations, short term and long term, with each other and with entities such as community colleges in order to provide valuable workforce development services. This would allow small employers to create economies of scale, spreading the costs of labor force development over a larger number of firms.

3. Individuals need to be encouraged to seek education and training opportunities. Former Ventura County Superintendent of Schools Chuck Weis noted, at a 2006 conference on the Ventura County workforce, the county's Regional Occupational Program (ROP) as "a highly successful serving of very few students." At that time, there were 3,691 ROP students in the county, and Dr. Weis noted that close to 80 percent of high school sophomores, juniors, and seniors do not participate in any kind of career preparation.

4. Employers can take advantage, as the Workforce Excellence (see above) report notes, of existing programs for the development and certification of workplace skills.

Endnotes

[i] 2005 Skills Gap Report – A Survey of the American Manufacturing Workforce, Deloitte Consulting, 2005, p. i.

[ii] Cited in One Million Jobs at Risk: The Future of Manufacturing in California, Bay Area Economic Forum, March 2005, p. 4.s

[iii] As reported in Policy Points: Labor Day 2008: Little to Celebrate, California Budget Product, August 2008, p. 2.

[iv] California EDGE: Keeping California Competitive, Creating Opportunity: California's EDGE Campaign, Summer 2006, p. 4.

[v] California Workforce Investment Board, 2006.

[vi] Manufacturing in Transformation: Economic Change and Opportunities in the Design, Production, and Logistics Value Chain, Collaborative Economics, September 2004.

[vii] Survey of Selected Regional Manufacturers, Ventura College, Institute for Community and Professional Development, Center of Excellence, January 31, 2007.

[viii] Survey of Selected Regional Manufacturers, Ventura College, Institute for Community and Professional Development, Center of Excellence, January 31, 2007, p. 11.

[ix] 2005 Skills Gap Report – A Survey of the American Manufacturing Workforce, Deloitte Consulting, 2005, p. 16.

[x] 2005 Skills Gap Report – A Survey of the American Manufacturing Workforce, Deloitte Consulting, 2005, p. 8.

[xi] 2005 Skills Gap Report – A Survey of the American Manufacturing Workforce, Deloitte Consulting for the National Association of Manufacturers and The Manufacturing Institute, 2006,

[xii] One Million Jobs at Risk: The Future of Manufacturing in California, Bay Area Economic Forum, March 2005.

[xiii] California's Edge: Keeping California Competitive, Creating Opportunity, California's EDGE Campaign, Summer 2006.

[xiv] Building Skills, Increasing Economic Vitality: A Handbook of Innovative State Policies, Jobs for the Future, January 2005.

[xv] Using Skill Standards & Certifications in Workforce Investment Board Programs, Workforce Excellence Network, Washington D. C., 2002.

APPENDIX 1

Santa Barbara County
Employment and Average Salary for Target Industries
1983 to 2000 (SIC), 2001 to 2007 (NAICS)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	Standard Industrial Classification System (SIC)																		*North American Industrial Classification System (NAICS)*						
Jobs (number of jobs)																									
Chemical Mfg.	77	88	102	208	233	177	138	157	159	220	260	280	299	467	536	254	223	277	335	350	434	723	769	800	815
Machinery Mfg.	1,389	1,483	2,809	2,599	3,713	2,963	2,985	2,587	2,173	1,983	1,856	1,734	1,735	1,389	1,332	1,240	1,893	1,055	427	387	532	509	517	518	498
Electrical/Electronic Mfg.	7,092	7,565	6,948	6,422	6,210	4,083	4,381	4,841	4,821	4,197	4,444	3,927	3,504	3,379	3,378	2,609	1,688	1,945	3,780	3,141	3,043	3,356	3,726	3,876	4,126
Job growth (precent change)																									
Chemical Mfg.	na	15.1	15.8	102.7	12.4	-24.3	-21.7	13.2	1.2	38.7	18.3	7.6	6.7	56.2	14.7	-52.6	-12.3	24.1	na	4.6	24.1	66.4	6.4	4.0	1.9
Machinery Mfg.	na	6.7	89.5	28.1	3.2	-20.2	0.7	-13.3	-16.0	-8.8	-11.5	-1.2	0.1	-19.9	-4.1	-6.9	52.6	-44.3	na	-9.3	37.3	-4.2	1.6	0.2	-3.9
Electrical/Electronic Mfg.	na	6.7	-8.2	-7.6	-3.3	-34.3	7.3	10.5	-0.4	-13.0	5.9	-11.6	-10.8	-3.6	0.0	-22.8	-35.3	15.2	na	-16.9	-3.1	10.3	11.0	4.0	6.5
Average Salary (dollars per year)																									
Chemical Mfg.	19,280	18,469	21,588	31,096	28,786	23,108	25,517	24,002	28,467	33,562	32,957	33,200	32,712	35,141	34,710	41,465	41,741	46,023	44,632	48,871	50,576	49,641	50,989	52,257	57,317
Machinery Mfg.	19,227	21,368	30,199	31,748	33,679	34,641	35,896	37,892	42,608	45,967	48,679	49,404	48,238	49,953	51,472	49,656	46,941	45,096	44,122	41,392	35,486	38,000	37,083	40,121	43,914
Electrical/Electronic Mfg.	25,012	25,855	30,636	30,527	32,807	36,541	34,926	36,381	37,498	40,707	43,167	43,945	48,012	46,740	52,503	49,498	48,607	52,750	61,345	64,666	67,955	72,096	73,540	72,238	83,306
Average Salary growth (percent change)																									
Chemical Mfg.	na	-4.2	16.9	44.0	-7.4	-19.7	10.4	-5.9	18.6	17.9	-1.8	0.7	-1.5	7.4	-1.2	19.5	0.7	10.3	na	9.5	3.5	-1.8	2.7	2.5	9.7
Machinery Mfg.	na	11.1	41.3	5.1	6.1	2.9	3.6	5.6	12.4	7.9	5.9	1.5	-2.4	3.6	3.0	-3.5	-5.5	-3.9	na	-6.2	-14.3	7.1	-2.4	8.2	9.5
Electrical/Electronic Mfg.	na	3.4	18.5	-0.4	7.5	11.4	-4.4	4.2	3.1	8.6	6.0	1.8	9.3	-2.6	12.3	-5.7	-1.8	8.5	na	5.4	5.1	6.1	2.0	-1.8	15.3

CHM = SIC sector 28 from 1983 to 2000, NAICS sector 325 from 2001 to 2007
IME = SIC sector 35 from 1983 to 2000, NAICS sector 333 from 2001 to 2007
ELE = SIC sector 36 from 1983 to 2000, NAICS sector 334 from 2001 to 2007

Sources: CA Employment Development Department, UCSB Economic Forecast Project

APPENDIX 2

Ventura County
Employment and Average Salary for Target Industries
1983 to 2000 (SIC), 2001 to 2007 (NAICS)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	Standard Industrial Classification System (SIC)																		*North American Industrial Classification System (NAICS)*						
Jobs (number of jobs)																									
Chemical Mfg.	306	249	189	222	532	579	510	522	603	621	692	731	864	1,063	1,059	1,194	5,801	6,292	7,705	6,908	7,565	8,446	8,805	9,239	9,379
Machinery Mfg.	3,197	3,128	3,359	3,054	2,980	3,286	3,306	4,332	4,052	4,071	3,377	3,278	3,934	4,312	5,443	5,874	5,180	5,525	3,711	3,610	3,500	3,583	3,352	3,372	3,607
Electrical/Electronic Mfg.	4,621	5,621	6,429	7,086	7,372	5,750	6,528	6,889	6,312	6,324	6,557	6,249	6,122	5,964	6,178	6,501	8,134	9,025	11,779	10,475	10,000	9,131	8,788	7,956	8,401
Job growth (precent change)																									
Chemical Mfg.	na	-18.7	-23.9	17.3	140.0	8.8	-12.0	2.3	15.5	3.0	11.5	5.6	18.3	22.9	-0.4	12.8	385.9	8.5	na	-10.3	9.5	11.6	4.3	4.9	1.5
Machinery Mfg.	na	-2.1	7.4	-9.1	-2.4	10.3	0.6	31.1	-6.5	0.5	-17.1	-2.9	20.0	9.6	26.2	7.9	-11.8	6.7	na	-2.7	-3.0	2.4	-6.5	0.6	7.0
Electrical/Electronic Mfg.	na	21.6	14.4	10.2	4.0	-22.0	13.5	5.5	-8.4	0.2	3.7	-4.7	-2.0	-2.6	3.6	5.2	25.1	11.0	na	-11.1	-4.5	-8.7	-3.8	-9.5	5.6
Average Salary (dollars per year)																									
Chemical Mfg.	28,791	27,477	32,698	32,228	32,830	32,924	30,366	32,687	35,775	40,794	41,820	42,285	47,638	44,944	54,001	49,780	109,210	186,862	120,959	109,442	125,323	122,951	139,773	121,004	130,816
Machinery Mfg.	24,365	25,815	26,308	28,543	29,778	32,111	30,330	34,284	35,962	39,663	39,953	38,647	38,511	40,059	51,337	41,452	52,099	51,358	53,517	59,260	61,233	78,147	87,594	102,558	108,696
Electrical/Electronic Mfg.	21,473	22,110	29,532	29,005	30,105	28,704	29,836	30,994	34,102	35,942	36,356	37,768	39,510	40,663	44,595	50,103	59,052	67,109	63,497	55,339	58,098	57,914	60,737	65,570	71,752
Average Salary growth (percent change)																									
Chemical Mfg.	na	-4.6	19.0	-1.4	1.9	0.3	-7.8	7.6	9.4	14.0	2.5	1.1	12.7	-5.7	20.2	-7.8	119.4	71.1	na	-9.5	14.5	-1.9	13.7	-13.4	8.1
Machinery Mfg.	na	6.0	1.9	8.5	4.3	7.8	-5.5	13.0	4.9	10.3	0.7	-3.3	-0.4	4	28.2	-19.3	25.7	-1.4	na	10.7	3.3	27.6	12.1	17.1	6.0
	na	3.0	33.6	-1.8	3.8	-4.7	3.9	3.9	10.0	5.4	1.2	3.9	4.6	2.9	9.7	12.4	17.9	13.6	na	-12.8	5.0	-0.3	4.9	8.0	9.4

CHM = SIC sector 28 from 1983 to 2000, NAICS sector 325 from 2001 to
IME = SIC sector 35 from 1983 to 2000, NAICS sector 333 from 2001 to 2007
ELE = SIC sector 36 from 1983 to 2000, NAICS sector 334 from 2001 to 2007

Sources: CA Employment Development Department, UCSB Economic Forecast Project

Appendix 3

Characteristics of the Best Employees

Core Critical Occupations	Characteristics of the most effective, reliable technical employee for each critical occupation
Manufacturing/ Production	Attention to detail, great ability to do things with hands and fingers. Stamina - Maintain over long period of time. Good work ethics
Interconnect technicians, Soldering (Manufacturing)	Soldering skills, compatibility
	Hard working/Positive/ Looks ahead.
Estimator, Steel Fabricator, Welder.	Knowledge if basic math-geometry, algebra. Blue print reading. Read and write English legibly. Fabrication techniques and use of standard tools.
Sales Managers, admin assistants, logistics assistants, shipping managers.	
Mechanical and Electrical Engineer	Again, have both bachelor and masters degrees and a strong technical background.
Assembler	Good. Hand-eye coordination. Communication skills. Reading skills.
Assembly, engineering, too use. Clerical - Answer phones - interface with customers	Our best employee is reliable (shows up on time and on scheduled days). He learns to use the proper tools for the job. He also learns the job well enough to understand critical tasks, and is able to demonstrate to others how and why the task is completed in a certain fashion.
Design Engineers. Machine Builders.	Hard Worker, always learning and open minded.
Cutting tools machine operators which are Computerized Network Controlled (CNC	Good Mechanical, technical, and communication skills. Quick Learner, team player, reliable, plays well with others.
Engineering: Mechanical, electronic and design. Assembling	Engineers: Good Critical thinking skills, has a degree, works well with others. Assemblers: able to follow directions, works well with others.
Engineering: Mechanical, industrial, electrical. Production: Fine Manufacturing.	Resourceful, innovative, ambitious, broad technical skills, strong work ethics.
Engineering: electrical, software/hardware (IT), Mechanical	Experienced engineer who understands the language of programming.
Sales.	Good Communication Skills and Patient.
Manufacturing operators	Pride in job. Learn and adapt. Loyal to the company. Efficient. Innovative.
Assembly Production	Wanting to get the job done. Teamwork. Independency.

Manufacturing operators/ Assemblers	Understands their part in the process and how it affects the big picture. Expert at the equipment they operate. Cross-trained.
Insect Production	Dependable, reliable, team worker, good at instructing others and receiving instruction, cross-cultural understanding, initiative, effective communication – and problem solving skills.
Applied Machinery and Engineering.	Understands the production process and his/her responsibility in it. Knows how to program machines. Good feed-speed coordination.
Mechanical Engineering.	Very anal and specific with a deep understanding of what's going on. Able to see the overall effect of small things.
Controls technicians	Good organizational skills, very punctual, willing to learn new technology.
No Critical Occupations.	
No Critical occupations.	
Engineers and Assembly Technicians.	Motivation and current engineering skills.
Engineers and Assembly Workers	Technological competent, product and process design. English competency in reading and speaking, excellent work ethic, and teamwork skills.
Machine Operators.	Honest, hard working, reliable, pays attention to detail.
Value Stream Operators	A team player with leadership skills can communicate in both English and Spanish, good at problem solving, able to detect change and offers suggestions, punctual, attendant, reliable.
Pesticides control advisors (PCA) and Applicators: applies the pesticides.	Puts in the time, good relationship with the applicators, respectful to others, good work ethics: does his job.
Production Employees: Assemblers and Radio Frequency Test Technicians.	Reliable, punctual, hardworking, committed, diligent, work experience technical aptitude.
All Manufacturing Assemblers, System Engineers and Software Programmers	Diligent worker takes pride and joy in the company, reliable, self-motivated, committed to complete tasks assigned in a timely manner.

Appendix 4

Recommended Classes and Training

Core Critical Occupations	Classes or training programs that would better prepare future employees
Manufacturing! Production	Basic Skill: how to get a job/present themselves, basic business class to better understand the corporate mentality and communication with management.
Interconnect Technicians, Soldering (Manufacturing	Basic Skills: self confidence, communication, how to present yourself in an interview.
Estimator. Steel Fabricator. Welder.	Math - mandatory for blue-collar workers.
Sales Managers. Admin. Assistants. Logistics Assistants. Shipping managers.	Microsoft Office skills. Planning and organizing skills.
Mechanical and Electrical Engineers	More engineering.
Assemblers	Electronic assembly courses, soldering.
Assembly. Clerical - answer phones, interface with customers	Social styles, personality styles training
Design Engineers. Machine Builders.	Machine shop classes geared towards future work.
Machine Operators, Computerized Network Controlled (CNC)	Machining and technology classes, basic communication skills, and English speaking skills.
Engineering: Mechanical, Electronic and Design. Assembling.	Basic Skills: Improve math language.
Engineering: Mechanical, Industrial, Electrical. Production: Fine Manufacturing.	N o .
Engineering: Electrical, Software/Hardware (IT), M e c h a n i c s	More Business Classes in High School: learn office skills, business language, and dress code, how to interview and act.
Sales.	No.
Manufacturing Operators.	Charm school, social skills, general business skills, financial planning, practical living skills, basic office skills.
Assembly Production	Work ethics, communication.
Manufacturing Operators! Assemblers	Hands-on skills to operate equipment.
Insect Production	Language - need more effective training and education in English. Need to be able to speak fluently.
Applied Machinery and Engineering	Basic programming skills.

Mechanical Engineering	
Controls Technician	Introducing students to build automation and system control (Digital control)
No Critical Occupations	
No Critical occupations	
Engineers and Assembly Technician	Process technicians, assembly technicians, clean room environment.
Engineers and Assembly Workers	English reading and teamwork.
Machine Operator	Education in retirement plans so they will take advantage of and value the benefits available to them.
Value Stream Operators	Maintenance operators.
Pesticides Control Advisors (PCA) and Applicators: applies the pesticides	
Production Employees: Assemblers and Radio Frequency Test Technicians	English, basic courses already provided but people don't take advantage of them.

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