San Diego County Manufacturing Industry Report
"Can U. S. Manufacturing be Saved?"

By Michele Nash-Hoff
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San Diego County's manufacturing industry started to slow down in the second quarter of 2006 and continued slowing down through the summer and fall. The slow down wasn't pervasive, and some companies wound up having good growth in 2006. There was the usual upturn in January as companies placed orders after the holidays but February and March slowed down again. April has shown a slight upturn in activity.

As background for how this series of reports came to pass, ElectroFab Sales is a manufacturers' sales representative agency for "job shop" companies that perform custom fabrication services. Our primary market is OEM's (Original Equipment Manufacturers) in San Diego County that utilize sub-contract manufacturing services.

We began losing customers and prospective customers in early 2001 because of the adverse business climate in Caifornia and the effects of the recession. We started keeping a record of the companies that moved out of state or had gone out of business since January 2001. In the spring of 2003, several legislators asked me to provide them with this list of companies. I turned the list into a report in an effort to make key policy makers aware of the seriousness of situation. This12th report provides an update on the state of various industry sectors, along with a focus on what's being done to address the issues facing industry in the challenging global economy.

What's causing the downturn in the manufacturing industry? The root causes are the higher energy and fuel costs, higher interest rates, and higher material and processing costs. Material costs for metal and plastic rose nearly every month in the past year, and fuel costs have had only brief periods of stability before rising to current high levels. In addition, cost of employee benefits, especially health care premiums rose significantly at renewal times in the past year. When companies are spending more money on these items, they have less money for R & D, new product development, and purchase of capital equipment and systems, which in turn, affects the companies that provide such services and equipment.

According to the San Diego Regional Chamber of Commerce Economic Bulletin Vol. 55, No. 2, the loss of manufacturing jobs diminished in recent years so that "after losing 19,700 jobs between 1999 and 2004, a loss of about 3,300 jobs per year, a net loss of only 100 jobs were lost in 2005 while 800 are estimated to have been lost in 2006."

Even though the workload at machine shops has slowed down in the past year, there is still a shortage of qualified machinists, especially for experienced lathe machinists who can program and run computer-controlled machines. Open positions for experienced machinists continue to take as long as 4-6 weeks to fill. I have confirmed that San Diego City College provides the only training for general machinists in San Diego County, but Solar Turbines is preparing to begin their own apprenticeship program for training general machinists after having their own master machinist program for the past 20 years.

With the "war on terrorism" continuing in Iraq and Afghanistan, San Diego's ship repair industry is now into its fourth year of recession. Navy ships are out to sea longer, and the Navy is only contracting out the repairs that are absolutely necessary when they come back into port and delaying doing any major

overhauls so the ships can go back out to sea as soon as possible. NASSCO's contracts to build new ships are the only bright spot in San Diego's ship building/repair industry. Unfortunately, the small ship repair companies don't seem to benefit from NASSCO's contracts for new ships.

Defense and aerospace companies continue to feel an adverse affect of the war because when so much of the Federal defense budget is being spent on supporting the troops and "consumable" supplies, weapons and munitions, other types of defense-related systems, especially Research & Development, receive fewer funds or no funds at all. The March 2007 report by the American Electronics Association, entitled "We Are Still Losing the Competitive Advantage" stated "As a percentage of the U. S. economy, federal R&D funding has declined over the past two decades. In 1985 federal R&D funding represented 1.25 percent of U.S. GDP, nearly a half percentage point higher than in 2004 when R&D represented only 0.80 percent of GDP." The report further stated, "technology R&D remains vital to the economic health of the nation. It fosters the cutting edge technologies that bolster the economic and industrial strength of the United States." The report opines, "Increasing federal R&D spending is crucial to maintaining American competitiveness in a global economy." The good news is that the President's FY 2008 budget calls for dramatic increases in NSF funding for long-term basic research.

The search for lower cost areas for manufacturing isn't something new. Fifty years ago, northern and New England companies started moving manufacturing to the southern states. Twenty-five years ago, West Coast manufacturers started moving high volume production to Hong Kong, Singapore, and the Philippines. The next lower cost area was Mexico with the advent of the maquiladoras. The difference between sourcing in foreign countries such as Hong Kong, Singapore, the Philippines, and Mexico is that the manufacturing facilities in those countries have been either manufacturing plants owned by U. S. companies or owned by private entrepreneurs, not companies that are owned all or in part by the Chinese government.

Since preparing the first version of this report, I have come to believe that we are in a period of major disruption in our economy, not just in San Diego and California, but also in all of the United States. In my opinion, we are at the beginning of an economic revolution that will take twenty to thirty years to fully complete. Some say that the Industrial Revolution ended and that we are now in the information technology revolution.

I believe that we are actually in the final phase of the industrial revolution wherein third world countries have become industrialized to the point that manufacturing is being transferred from first world countries to third world countries. Historically, first world countries import raw materials from third world countries, transform them into manufactured products, then export them to third world countries.

The United States long encouraged other countries to adopt free market principles. The good news is that many countries listened and opened their doors to American products and services; the bad news is that many countries listened, entered the global economy, and are now competing aggressively against American companies. In this global economy, American companies aren't just competing against their rival down the street or in another part of the country; they are now competing with companies in China, India, or Malaysia.

Other countries are adopting and utilizing technology to enhance their economic growth and competitiveness. Utilizing the latest innovations in technology allows developing countries to "leapfrog" over yesterday's technology faster and cheaper. For example, it took nearly a century for the industrialized world to provide 90% of its population with telephone service, mainly via copper lines to

households. Wireless and satellite technologies are accomplishing this in a fraction of the time and cost. Also, offshoring of manufacturing by companies has given away technology that took decades to develop, so the United States risks losing its dominance in science and technology.

Mark Zandi of Moody's Economy.com calculates that 20.5% of the manufactured goods bought in America last year were imported, up from 11.7% in 1992. However, Alan Tonelson, a research fellow at the United States Business and Industry Council, "using the same data and the same methodology as Mr. Zandi, but delving into individual industries, finds that the United States is importing more than 50 percent – and in some cases close to 90 percent – of the machine tools used in this country, the aircraft engines and engine parts, the parts that go into cars trucks, the industrial valves, the printed circuits, the optical instruments and lenses, the telephone switching apparatus, the machines that mold plastics, the broadcasting equipment used for radio, television and wireless transmissions. (Goodbye, Production (and Maybe Innovation,) New York Times, December 24, 2006)

With the export of so much of our industry and the outsourcing of so much of our engineering, the United States is heading on the fast track to becoming a third world country. Many experts felt that the as long as Americans were designing the products, it was all right to let other countries produce the products. The danger is that invention and production are intertwined. Stephen Cohen, co-director of the Berkeley Roundtable on the International Economy at the University of California, Berkeley, said, "Most innovation does not come from disembodied laboratory. In order to innovate in what you make, you have to be pretty good at making it – and we are losing that ability."

Franklin Vargo, the vice president for international economic affairs of the National Association of Manufacturers, said, "If manufacturing production declines in the United States, at some point we will go below critical mass and then the center of innovation will shift outside the country and that will really begin a decline in our living standards."

The information technology industry has not proved to be the panacea for job creation that some thought it would be for the U. S. economy. American workers in the professional and high-tech sectors have learned that they can be even more easily replaced by engineers, IT workers, accountants, and even medical professionals such as radiologists with equally qualified individuals overseas, especially in India. U. S. companies can save money on salaries and benefits, as well as save money by avoiding OSHA, EEOC, EPA, and other government regulations. However, an article entitled "Offshoring: What Can Go Wrong by Norman Matloff (IT PRO, July/August 2005) pointed out that "distance, cultural differences, inexperienced programmers, and other obstacles might make you wish you'd kept that IT project at home." Consumer complaints about offshore call centers have recently caused a few American companies to bring them back to the U. S.

Even the biotech industry is feeling the effects of offshoring. U. S. pharmaceutical and biotech companies are beginning to do more of their research work through companies in China, India, and Eastern Europe, where labor is cheaper. San Diego-based Discovery Partners International, a chemistry research services business, ceased to exist in September after failing to win a competitive bid that would have renewed its contract with Pfizer. They were bidding against providers in India, China, and Eastern Europe. Former CEO, Michael Venuti said, "Offshoring is what destroyed our business, literally."

In the past, the lower volume requirements of San Diego's niche market manufactured products has provided more opportunities for maintaining local and regional subcontract manufacturing in contrast to the parts/products being sourced offshore for the higher volume manufacturing of the San Francisco/Bay

area and the Los Angeles basin. However, last year, I lost an order for our rubber molder to a Chinese company for a low volume part (only 250 pieces) that goes into an expensive, high-tech product. The difference in cost for the part was about 30% lower in tooling and 46% lower in piece price of an under $10 part. If Chinese companies are now willing to do low volume, the problems caused by offshoring would become even more serious.

In the past, once manufacturing moved out of the United States, it rarely came back. However, I have been hearing about more companies coming back from doing business in China in the past few months. The main problems these companies encountered were substitution of materials, inconsistent quality, stretched out deliveries, and communication problems. One of my customers said that their Chinese molder substituted 10% glass filled ABS for 30% glass filled ABS, which made the parts too small to fit, and they are ready to bring their tools back to the U. S. Recently, we were able to get an order for a new part for our U. S. plastic injection molder from a company that had gone to China on their last order and had such an unpleasant experience that they decided to source domestic this time.

I'm also seeing more Southern California manufacturers fight back against offshore competition by offering more stringent quality systems, such as ISO 9001, shorter lead times, "lean manufacturing" methods, scheduled deliveries for just-in-time production requirements, and "Kan Ban" inventory stocking. Plastic injection molding companies are utilizing rapid prototyping to get in on new products with short lead times and putting on two shifts to make tooling for molds to cut delivery in half to compete against China.

One local company that is one of our customers had outsourced nearly all of their manufacturing offshore several years ago, only to bring it back to the U. S. over the last couple of years because of encountering the types of problems mentioned above. They have been able to nearly match the lower cost of manufacturing offshore by implementing lean thinking and lean manufacturing principles and practices throughout the company.

In addition, there is increasing wariness by upper management of companies regarding sourcing in China, especially with regard to sourcing all the component parts and/or subassemblies for a product because China doesn't honor U. S. patents. They are hearing about companies that have sourced a product in China only to have a product identical to theirs appear on the market made by a Chinese company at a much lower price. Companies that haven't paid attention to this danger and sourced their whole product in China suffer the consequences.

The management of American companies needs to wake up to the fact that they are funding their country's future enemy by outsourcing their production to China instead of worrying about their next quarter's return on investment for stockholders or stock incentives and/or bonuses for themselves. Remember that a portion of the profits of every Chinese company goes to the Communist government that has a stated goal of dominating the United States. Their game plan is to render our country completely dependent on foreign production, innovation, and financing. They won't have to wage a military war against our country if they win the economic war.

Last year, billionaire investor Warren Buffet warned that the U. S. trade deficit could lead to "political turmoil at some point," and that "there will be a big adjustment." The trade deficits have set records for five straight years, and the U. S. Department of Commerce reported in February that the U. S. merchandise trade deficit, which includes only manufactured goods and commodities, was $836 billion in 2006, an increase of $53 billion, and the U. S. trade deficit with China rose 15% to $233 billion, which offset

improvements in the trade deficit with other countries. Of even greater concern is that the U. S. had a $40 billion global trade deficit in advanced technology products (ATP) in 2006, and the increase in the deficit with China over the surplus with other countries accounted for the entire U. S. ATP deficit.

These rising trade deficits have come as the U. S. lost 3.1 million manufacturing jobs between 2000 and 2006, which some blame in part on the soaring trade deficits.

In an opinion article entitled "Outsourcing Jobs Off-Shore: Short and Long-Term Consequences", Dr. William Raynor, a Professor at the State University of New York, commented that in the past, when manufacturing jobs were lost to foreign countries, American "workers were able to re-train and find new positions. Sometimes, they found professional jobs in the white-collar sector after completing degrees, continuing education programs. etc." He asks the question, "But what jobs will professional workers re-train to after the new wave of high-tech outsourcing?" My question is, "From where will the new high-paying jobs come?"

Industry experts provided some hope at the February MIT Enterprise Forum special presentation, "The Next Big Thing." This presentation highlighted the groundbreaking technologies that will power business in the years to come and identified emerging trends and industries that promise to drive growth. The industry experts and the audience survey agreed that the top five industries that will bring forth the "next big thing" is:

Biotech

- On-line medical records
- Personal stem cell banks
- Therapeutic diagnostic telecom convergence
- Reverse engineering of pandemic viruses

Electronics

- Simplification of user interface
- Miniaturization
- Low cost location technology
- Airport scanners that work

Energy

- Clean technology for new fuels and auto engines
- Conservation
- Biofuels
- Cost efficient power storage
- Advanced nuclear fusion generators

Software/internet

- Software as a service
- Open source
- Unstructured data transmission
- Analytics

Telecom

- Video streaming on your cell phone
- Ultra wide band
- Longer battery storage
- Broadband access over power lines

Connect CEO, Duane Roth, opined that the understanding of the relationship between genetics, nutrition and environment on health would be a major driver in the medical research. BIOCOM Chairman, Paul Laikind, Ph.D., described how monoclonal antibodies, RNA interference and genome mapping will play a increasingly important role in future drug discovery.

Rory Moore, Director and CEO of CommNexus, felt that speech recognition, "smart" appliances, and home health care would be technology drivers in telecom/electronics.

In order for the U.S. to reap the economic benefits of emerging trends and technologies, we need more technically skilled workers. The American Association of Engineering Societies estimates that there are currently 1.3 million engineering/engineering technology jobs available in the U.S. without trained people to fill them. Millions of these high-paying jobs are being outsourced annually to India and China.

The same AEA report cited above, warned that China graduates almost six times as many engineers as the United States (28% vs. 5%). This is up from four times as high in only two years according to the 2005 AEA report (21% vs. 6%.) The European Union, Japan, Russia, and India also graduate more engineers than the United States, and South Korea, with $1/6^{th}$ the population and $1/12^{th}$ the GDP, graduates slightly more engineers than the United States. The problem is compounded by the fact that many bachelor and doctoral engineering degrees in the U.S. are awarded to foreign students, the majority of which used to remain the in U. S. after graduation.

However, as wages and economic opportunities rise in these other countries, as well as more R&D funding by their respective governments, many of these foreign-born scientists and engineers are returning to their native countries instead of remaining in the United States. A case study of India in the AEA report, commented that "the highly skilled, Indian-born talent that once flocked to the United States is now returning home to work in these industries furthering America's brain drain and enhancing India's brain gain."

Is anything being done on a public or private level to address these problems? I'm happy to report that both government agencies and non-profit organizations have initiated new programs to meet the needs of industry for more technically qualified workers.

One non-profit organization, Project Lead The Way®, has been working since 1997 to promote pre-engineering courses for middle and high school students. PLTW forms partnerships with public schools, higher education institutions, and the private sector to increase the quantity and quality of engineers and engineering technologists graduating from our educational system. The PLTW curriculum was first introduced to 12 New York State high schools in 1997-98 school year. Today, the programs are offered in over 1,300 schools in 45 states and the District of Columbia. Presently, there are six courses in the PLTW High School Pre-engineering Program.

In 2006, San Diego City College and the Center for Applied Competitive Technologies (CACT-SD) were part of a consortium of county, San Diego City College (SDCC), the San Diego Regional Economic Development Corporation, the San Diego Unified and Sweetwater School Districts, San Francisco City

College, and San Diego State University (SDSU) received a grant of $450,000 to establish Project Lead the Way® to establish PLTW in San Diego county. The Society of Manufacturing Engineers (SME) donated $125,000 as matching funds for the grant. A few of the projects for the program are: middle school summer camps using the Gateway to Technology curriculum, introducing professional engineers into high school classrooms, and offering identical engineering courses in high schools and community colleges.

On the national level, U. S Secretary of Labor Elaine Chao described several initiatives that would help close the skills gap in remarks made at Rep. John Mica's Chamber of Commerce Fly-in on May 23, 2006. She said the High Growth Job Training initiative "identifies sectors of the economy that are growing and helps workers get the relevant education and training to access these opportunities." The Community Based Job Training initiative "expands the capacity of community colleges to provide job training in collaboration with valued partners, such as employers and the workforce investment system." The Department of Labor awarded $125 million to 70 community colleges in 40 states in October 2005, and awarded another $125 million in December 2006 to 72 colleges in 34 states.

At the Greater Rome, GA Chamber of Commerce event, January 18, 2007, Secretary Chao mentioned the Workforce Innovation in Regional Economic Development (WIRED) initiative, which "integrates economic and workforce development activities and encourages regional governments, employers, education providers, foundations, venture capitalists, and others to come together and invest in the talent that promotes job creation." www.dol.gov/sec/media/speeches

San Diego County is included in the California Innovation Corridor that received 1st Generation grants in February 2006. First Generation WIRED Regions were awarded $15 million grants over three years to revitalize their local economy. The California Innovation Corridor is implementing a three-target approach for WIRED:

Innovation Support: Sustainable Entrepreneurship
Industrial Rejuvenation: Manufacturing Value Chain and Supplier
Competitiveness Talent Development: Creation of 21st Century

In California, Governor Schwarzenegger has identified workforce skills, referred to as Career Technical Education (CTE), as a priority for California. The passage of the education bond last fall provides $500 million for CTE, and the 2007-2008 budget contains an additional $52 million. The community college system in California has been the primary provider in fulfilling the vocational education and training needs of California business and industry.

In 1991, the California Community College Economic and Workforce Development Program was established in statue, and in 1996 economic development was legislatively mandated as one of the primary missions of the California community colleges. Part of this program, was the Applied Competitive Technology Initiative, in which eleven centers were established to advance California's economic growth and global competitiveness through education, training and services that contribute to continuous workforce development, technology deployment and business development. The Center for Applied Competitive Technologies (CACT) in San Diego County is located on the campus of San Diego City College in collaboration with the Advanced Technology Center and San Diego Technology Incubator. The San Diego CACT supports businesses through workshops, consulting, customized training, and interactive demonstrations of the latest technologies. The California CACT's collaborate with the California Manufacturing Technology Consulting, a non-profit organization, to utilize California

Employment Training Panel grants to reduce the cost of customized training programs. Training programs include, but are not limited to, lean office/lean manufacturing, blueprint reading, geometric tolerancing and dimensioning, soldering certification, and quality systems such as ISO 9001.

While these programs and initiatives are commendable, they do not address California's unfriendly business environment. In 2005, California dropped to 50th in ranking in the Small Business Survival Index by the Small Business & Entrepreneurship Council, and its rank did not change in the 2006 report. This low overall ranking was based on California's anti-entrepreneur environment in the following areas:

- High cost of worker's compensation premiums
- High electric utility costs
- 2nd highest corporate income tax rates
- Highest personal income tax rate
- Highest Capital Gains tax
- 2nd highest gas tax
- High state and local property tax rates

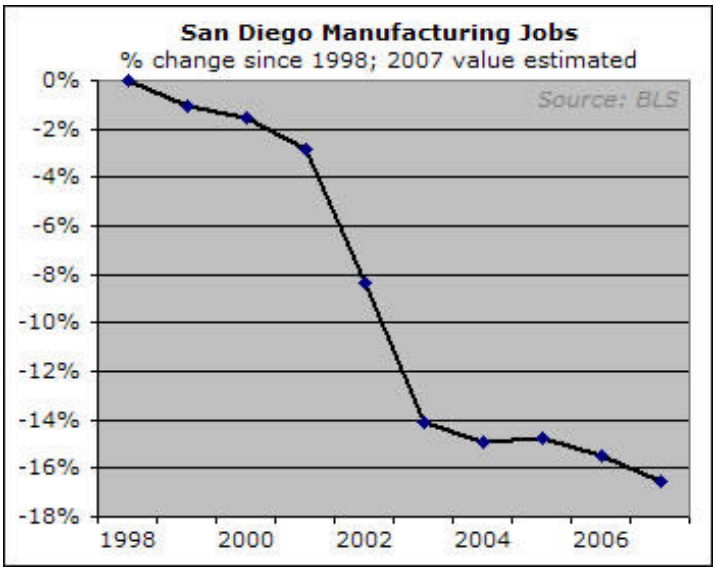
These problem areas listed above are virtually the same reasons given by the management of companies to whom I spoke before they moved out of San Diego. We need to make some drastic changes in California's business climate so that we can maintain as much as possible of our manufacturing base for as long as possible in California while we go through this painful transition period for our state and national economy.

San Diego has always been a "start-up business" area where companies grew to a certain size and were acquired by mostly out-of-the area companies. The new owners usually kept the division or subsidiary in San Diego because they were afraid of losing key people if they moved the company out of the area. However, in the last three years, these out-of-state owners took a look at their bottom line for their San Diego-based acquired company, and decided they couldn't afford to stay in California. If you will notice from the attached report, San Diego companies have been consolidated to such former business unfriendly states as Ohio, Minnesota, Maryland, and New York.

Governor Schwarzenegger vetoed the most egregious "job killer" bills identified by the California Chamber of Commerce in 2004, 2005, and 2006; however, the legislature will come up with a plethora of new "job killer" bills this year that he also needs to veto. Further reform of workers' compensation that addresses the issues of fraudulent claims and frivolous lawsuits would be beneficial. We need to restructure our unemployment insurance system, lower corporate and personal income taxes, eliminate burdensome regulations on small businesses, and reduce costs for energy if we want to stem the tide of companies leaving California or going out of business.

While the mass exodus of companies moving out of San Diego County slowed down to a trickle since the Schwarzenegger reforms, it has begin to accelerate again in the last few months. The list grew from 85 at the beginning of 2004 to 103 by the end of that year (compared to doubling from 40 to 85 in 2003.) Another 15 companies were added in 2005, most of them going out of business rather than moving out of state. Fifteen more 15 companies were added to the list between the February 2006 and the September 2006 report, all of them going out of business. Another 17 companies have been added since September 2006 for a total of 135 companies no longer in business or located in San Diego County.

The following graph visually shows the drop in manufacturing jobs since 1998 (used with permission of Rich Toscano of the Voice of San Diego)



Based on employment data for companies listed in the 2000 Technology Directory for San Diego County and estimating 20 employees for companies not listed in the directory, the following list of companies represents a loss of more than 7,000 jobs.

Since each manufacturing job creates three to four other jobs while service jobs only create one to two other job, it is no wonder that we lost nearly 300,000 manufacturing jobs in California since early 2001. Nationwide, a staggering 2.7 million manufacturing jobs have disappeared since 2001 alone. The University of California-Berkely estimates that 14 million jobs are vulnerable to moving overseas in the next few years (www.outsourceoutrage.com/facts). If this trend is not reversed, it is only a matter of time before American's economy becomes primarily a service and retail one. It will be difficult for the United States to remain a superpower if this trend becomes a reality.

About the Author: Michele Nash-Hoff is President of ElectroFab Sales, an independent manufacturer's representative agency, which she founded in 1985. She is past president of the San Diego Electronics Network, the San Diego Chapter of the Electronics Representative Association, and The High Technology Foundation, as well as several other community and non-profit organizations. She was a candidate for San Diego City Council in 1996 and the California State Assembly in 2000. She has a B.A. from San Diego State University and later earned a certificate in Total Quality Management.