

The Only Constant in Our Future Is Change

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SUMMARY: Local economic dislocations are due to irreversible underlying national trends. Defense-oriented aerospace will not rebound. OC engineers must prepare for new jobs and industries, with more training and computer competency than ever before.

Engineers in Orange County find themselves in the midst of massive change and uncertainty. This change has two sources: the current recession in the short term and the long term restructuring of the American economy. The first of these two is reversible, while the other represents a fundamental sea change. These dislocations are only to be expected as the United States continues its evolution toward a 21st century culture.

In his 1976 book, *The Next 200 Years*, the late futurist Herman Kahn identified and described these long range evolutionary trends. The undeveloped world is dominated by primary economic activities, i.e. extractive industries such as agriculture and mining. Even in the U.S., this was by far the largest sector in 1900. Secondary economic activity (goods-producing) characterizes the newly industrializing countries, such as the "Four Tigers" of SE Asia, and the U.S. up to the 1960's. Transportation, finance, health care, business, and most other services comprise the tertiary sector, while quaternary activities are defined as those worth doing for their own sake (e.g., education, welfare, recreation).

Kahn predicted the

American economy to become service-dominated at the expense of the secondary sector by the turn of the century. (The evolution would not stop here, but that is beyond the scope of the article.) Primary sector

employment would practically disappear, while output rises due to dramatic productivity gains. There are several gross indicators of this trend: 13 of the 20 most rapidly declining industries in America are in manufacturing, while 11 of the most rapidly growing are in the services, according to the most recent Bureau of Labor Statistics report. Intense mechanization has allowed just one American farmer to support fifty-nine other people, an unprecedented ratio in world history. Were farm subsidies to be removed worldwide, this ratio would rise even

higher as markets reached equilibrium. Deregulated gasoline is at its lowest price in constant dollars since before World War II.

This makes sense because, if overall demand for an industry's product remains relatively constant, and labor productivity increases due to competition-driven automation, then by necessity that industry can support fewer workers. During the 1980's, manufacturing output represented 23% of a growing GNP, while factory jobs dropped from 23% to 18% of total employment. In a recession, demand actually decreases as consumers earn less disposable income or take fewer risks. A worldwide recession means that domestic slack cannot be made up by exports. Automation and recession thus place the worker in double jeopardy, however reces-

sions can turn around while automation is an irreversible underlying trend (barring catastrophe). In the future, American manufacturing will be characterized by a few highly trained workers whose productivity is leveraged by capital-intensive automation.

Such a development should not obscure a basic fact: many services, no matter how much we have become accustomed to them as necessities, are by their nature nonproductive luxuries, which must be paid for by surpluses (profit) from other economic areas. That is why manufacturing is still the root of wealth. Economical conversion of the defense industry to commercial realities is unlikely, because that industry formed by a fundamentally different set of rules. This is exemplified by a saying in strategic studies: "national security has no price." Unfortunately, in the business world everything has a price.

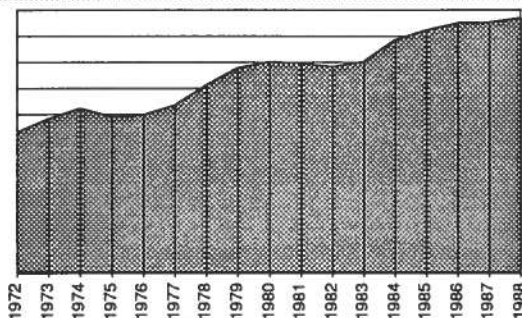
Since defense spending will continue to decline in

the absence of the Soviet threat, and traditional manufacturing employment will not rebound as shown above, the only choice remaining for engineers is to expand into new industries, products and markets. The most significant is, of course, computers. Its importance in virtually every aspect of life for the foreseeable future makes it absolutely essential for engineers to become computer fluent, if not so already, or computer competent at the very least. Other important new fields are waste remediation, alternative energy, energy efficient transportation, medical devices, and hopefully, space development.

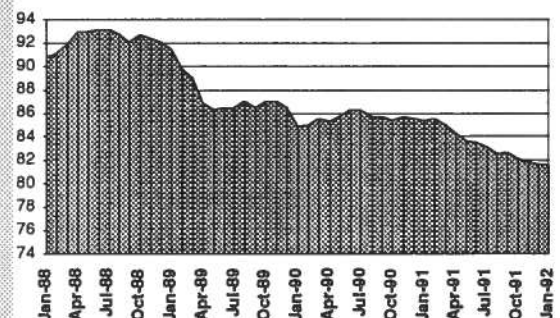
On the bright side, there is one element that favors our profession: the accelerating rate of technological progress and technology-driven change, i.e. future shock for which engineers are also the best equipped to deal with, both personally and professionally. ♦

High Technology Industry Trends in Orange County

Source: California Employment Development Department



Aerospace Employment Trends in Orange County 1972-1988



High Technology Employment in Orange County by Month (thousands)