A photograph of a black Oracle racing sailboat with white sails, sailing on the ocean. The boat has "ORACLE" and "BMW ORACLE Racing" written on its side.

Offshore Engineering: Where are the Future Jobs for Mechanical Engineers?

(Panel Discussion)

**Remarks by
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ASME Design Automation Conference

**Long Beach, CA
September 27, 2005**

The Economic and Historical Context

- “Offshoring” is a form of national-level outsourcing
- **Basic free-market economic dynamics of “supply and demand” cause people, companies, and nations to get what they need from wherever it is most economically available**
 - Throughout history, more “advanced” cultures/societies have obtained some of what they wanted/needed from neighboring, less “advanced” peoples, e.g.
 - In 15th-17th centuries, Europe outsourced the procurement of gold & jewels, agricultural crops (requiring great land areas) to Asia and the “New World” (and European-origin plantation owners outsourced the procurement of slave labor to Africa to produce the crops)
 - In the 18th, 19th, early 20th centuries, the USA “turned the tables” and outsourced procurement of cheap factory labor to the struggling countries of Europe (**this is where my ancestors came to the USA**)
 - In the 19th - 20th centuries, Europe and USA have outsourced the procurement of certain natural resources to Africa and South America

Technology Boom of Post-WW II 20th Century

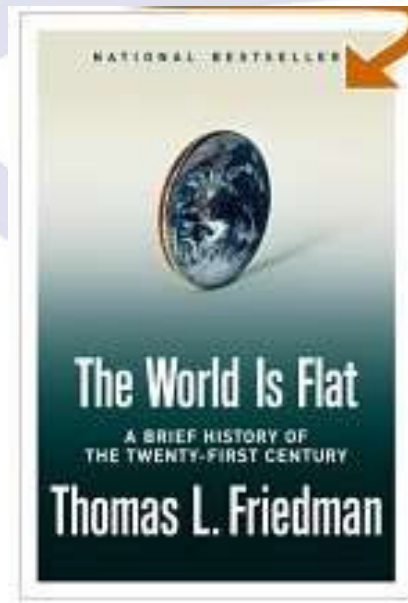
- Many factors led to a rapid growth of technology-driven job creation in the USA
- USA “outsourced” the procurement of technically talented/educated people to fill these jobs to the various less-prosperous countries that had and “economic excess” of such people
 - Globalization of communication and affordable transportation put the materialistic political appeal of the “American Dream” within reach of those who would seek it
 - USA attracted and subsidized this job pool to its “technology finishing school” university/graduate education system

But Prosperity Brings Imbalance...

- Improvements in global transportation and availability of “cheap” energy meant that lower-skilled jobs in the USA, Western Europe, Japan were “too costly” to be performed in those geographies
- Companies started outsourcing such work by building facilities and training formerly “unskilled” workers in less prosperous countries (“offshoring”)
- The computer, electronics, I.T., Internet boom created new companies and opportunities in the “1st World” to replace the loss of less sophisticated work to other countries (the advancing front of technology)
- But it also created part of the **fundamental global shift** now taking place: the ability to outsource/offshore advanced “knowledge work” **relatively quickly** to those people who previously needed to come to the USA, Western Europe, or Japan to get such work
 - No need to build expensive factories
 - No need to train “unskilled” workers

“The World is Flat”

- **Other factors coincided with the “I.T. enablement” of outsourcing knowledge work**
 - The fall of the USSR and its European-brand of communism
 - China’s desire for participation in global “free-market” commerce (as “PRC Inc.”)
- **Read Thomas Friedman’s excellent book on this subject:**



What Does This Mean for Engineers?

- ❑ Globalization and outsourcing's impact on CAE users and vendors
- ❑ Manufacturing →1960's-80's
 - ❑ Basic Engineering (CAD) →1990's
 - ❑ CAE Users→"nasty naughts" (2000's)
 - ❑ CAE Vendors →1990's ongoing (software testing, support, services)
 - ❑ CAE Developers →now and growing
 - ❑ Impressive new CAE companies coming from Eastern Europe, India, China
- ❑ Is this phenomenon "temporary"? **NO**
- ❑ The pure **economic** attractiveness of the USA for "foreign" engineering talent will diminish...but will the "quality of life" continue to attract? (DON'T EVEN WANT TO START THIS DISCUSSION...)

Arguments for Offshore Engineering

- **Natural economic consequence...cannot fight it, only manage/dampen the effects through professional, conscious planning & efforts (Gov't. & private)**
- **USA, Western Europe, Japan must continue to advance the wavefront of technology to create new kinds of engineering jobs (e.g., biotechnology, nanotechnology)**
- **US-based companies who successfully offshore some of their work will also create more jobs within their “home country” as a result of their economic success**

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Profits, Not Jobs, on the Rebound in Silicon Valley

By [JOHN MARKOFF](#) and [MATT RICHTEL](#)

Published: July 3, 2005

SAN JOSE, Calif., July 1 - Things are looking up at Wyse Technology, a venerable maker of computer terminals. Unless, that is, you happen to want to work for the company here in Silicon Valley.

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Responding to booming demand in Asia and in Europe, Wyse is adding new development teams in India and China and expanding its worldwide work force to about 380, from 260. Its profits are recorded here - but almost

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Where will the Future Engineering Jobs Be?

- **Ironically, in many of the same countries from where the previous talent pool came!**
- **In the USA (Offshoring “threshold”):**
 - Smaller, entrepreneurial companies cannot afford offshoring as much as big, established high-tech manufacturers
 - » → jobs will remain, grow in start-up fields and small companies
 - Defense-critical engineering will not be sent offshore
 - » → but will non-native US citizens get security clearances?
 - New “confluence” disciplines will create companies and jobs
 - » NBIC (**N**anotechnology, **B**iotechnology & medicine, **I**nformation Science, **C**ognitive Science) → see www.theharrowgroup.com
- **Implications for academia: train in entrepreneurship and NBIC disciplines**