




Offshoring of Engineering Services in the Construction Industry

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NAE Workshop on the Offshoring of Engineering:
Facts, Myths, Unknowns, and Implications
October 24-25, 2006

The Global Construction Industry


- Worldwide Industry: \$3.9 Trillion per year (2004)
- Largest Construction Markets:
 - United States \$ 1,159 billion
 - Japan \$ 507 billion
 - China \$ 269 billion
 - Germany \$ 247 billion
 - France \$ 197 billion
 - Italy \$ 182 billion
 - United Kingdom \$ 178 billion
 - Spain \$ 166 billion
 - Canada \$ 123 billion
 - Netherlands \$ 79 billion

Source: "World Construction Spending Nears \$4 Trillion for 2004", ENR, January 3/10, 2005




Construction Industry Sectors


Architectural / Engineering / Construction (AEC)




Residential
Building




Engineering / Procurement / Construction (EPC)



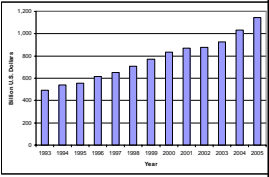
Infrastructure
Industrial






Industry characteristics


- Diversified
 - Largest 400 US contractors had \$200 billion in revenue or 19% of US market
 - 2.8 million US construction companies
 - Almost 2 of 3 companies has less than 5 employees
- Unique project locations
- Active owners
- Strong market
 - Average of 7.3% annual growth for past 12 years



Construction Spending
(Source: US Census Bureau)



Who works in the industry?




Engineers

- Civil
- Electrical
- Mechanical
- Industrial
- Architectural




Architects

- 129,000 in US market



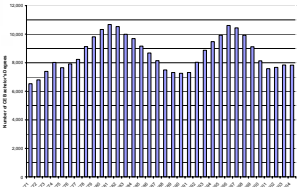
Field Workforce

- 5.2% of US workforce



Engineers in Construction


- Civil Engineering (CE) is most representative
- CE is largest discipline in market (237,000 of 1.4 million)
- Declining enrollment
- Strong projected growth: 16.5% by 2014 (Dept. of Labor)



Bachelor Degrees Awarded in Civil Engineering
(Source: National Science Foundation)




Current Status of Offshoring in Construction




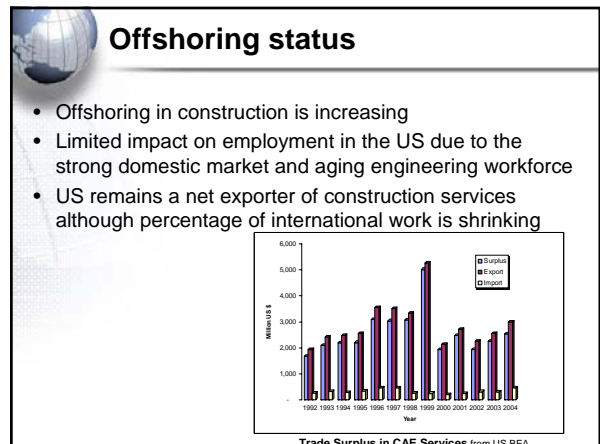
Offshoring

The relocation of work **that is typically performed in one country** to design professionals in the same company in another country or to another company in another country to achieve lower wage rates.

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- ## Data Available
- Employment and export data
 - Construction Industry Institute (CII) Survey and interviews
 - Top Design Firm surveys / interview

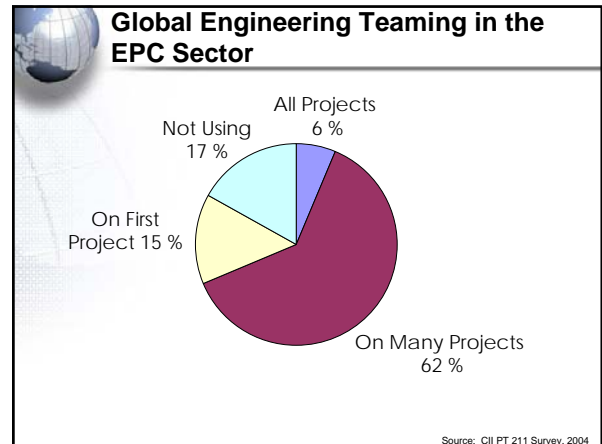
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- ## Current status of offshoring
- ### EPC Sector
- Offshoring is not new
 - Increasing use of offshoring to reduce cost
 - Typical work activities
 - Detailed engineering services, typically for larger projects
 - Complete systems or project designs for some projects
 - Local engineering services for international projects (not included in proposed offshoring definition)

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- ## Current status of offshoring
- ### AEC Sector
- Limited current offshoring
 - Targeted activities
 - Detailed design / analysis work for systems, e.g., steel, reinforcing steel, and mechanical detailing
 - CAD and information modeling work
 - Repetitive building designs



Drivers of Offshoring in Construction

1. Need to reduce engineering service cost
2. Competition
3. Global customers or local customers
4. Locate services close to the project location
5. Reduce the engineering schedule



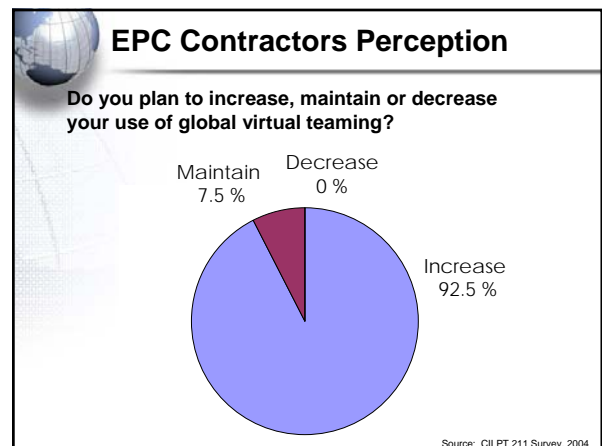
Critical Questions


- Will offshoring continue to increase in the EPC sector?
- Will offshoring become more common in the AEC sector?
- Will it impact the workforce through downward wage pressure or a reduction in demand for US engineers in construction?

Impact of offshoring on a project

Impact on:	% of Responses	Opinion
Engineering Cost	48 %	More than 10% reduction
Construction Cost	75 %	No impact
Engineering Time	48 %	No impact
Overall Project Delivery Time	59 %	No impact
Engineering Quality	65 %	No impact
Construction Quality	72 %	No impact


Source: CII PT 211 Survey, 2004






Why is the AEC Sector Lagging in Offshoring?

- Smaller design firms
- Owner interaction
- Local knowledge advantage
- Good market conditions
- Engineering liability
- Secure / sensitive information





What can (or should) we do to address offshoring in construction?




Action Items

- Prepare engineers for global team responsibilities
- Retrain existing workforce for shifting demands
- Ensure information security (as needed)
- Government support for exporting engineering services
- Professional society leadership
- Limit trade barriers
- Recruit and retain more engineers in the construction industry




Concluding Comments

- Most sectors of construction have been slow to adopt offshoring
- Offshoring in construction is expanding and this will continue
- Accurate data regarding the offshore workforce is limited
 - Size, wages, discipline, available capacity
- We will continue to have a strong demand for engineers in the construction industry, although some disciplines will be impacted
- We must focus on attracting new engineers and remaining internationally competitive



Acknowledgements

- National Academy of Engineering 
 - Proctor Reed, Tom Arrison, Samuel Florman and George Tamaro of the NAE Committee of the Offshoring of Engineering
- Construction Industry Institute (CII)
 - Project Team 211 members
 - Industry survey / interview participants

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