

Globalizing Manufacturing Engineering Education

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Outline

- Manufacturing engineering education in context
- Global manufacturing trends 1971-2000
- Need to acknowledge global nature of manufacturing in education

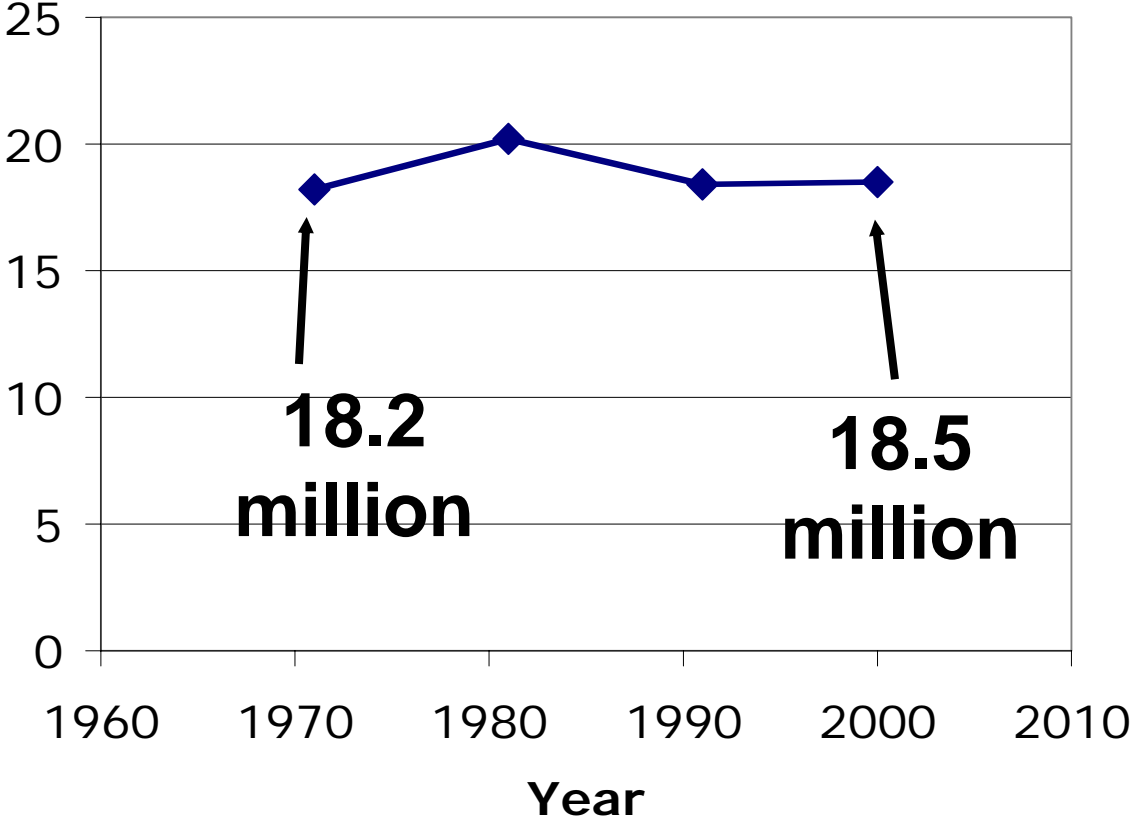
Manufacturing Engineering In Context

- Society of Manufacturing Engineers (SME) began as Soc. of Tool Engineers (1932)
- Worldwide SME membership ~40,000
- First U. S. degree programs began in late 1960's
- Approx. 20 accredited U. S. programs today

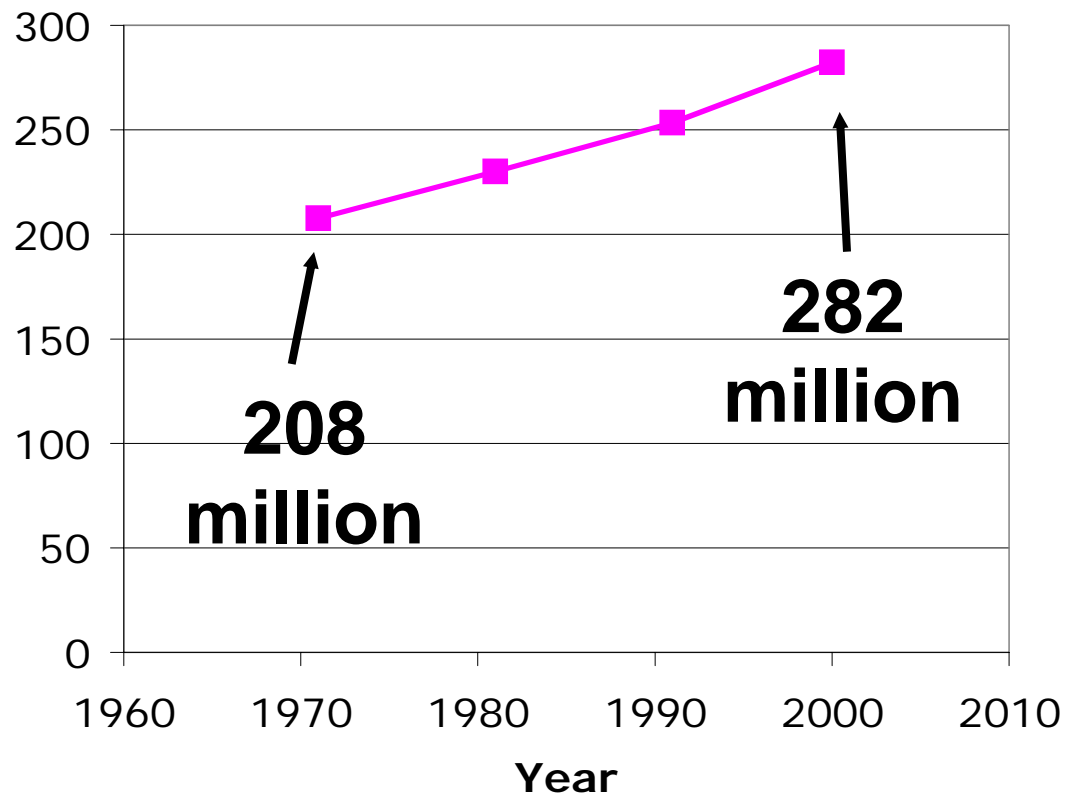
Global Manufacturing Trends

- Statistics on manufacturing employment (not engineering employment)
- Obtained from International Labor Office (UN agency)
- Covers period 1971-2000

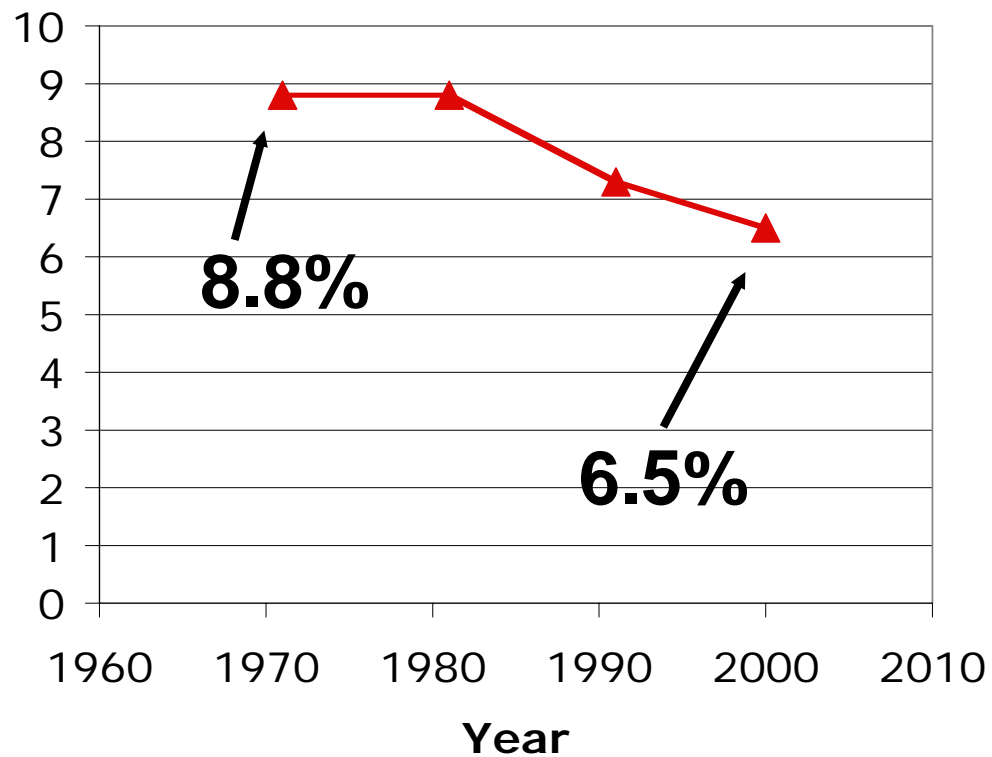
U. S. Manufacturing Employment



Total U. S. Population



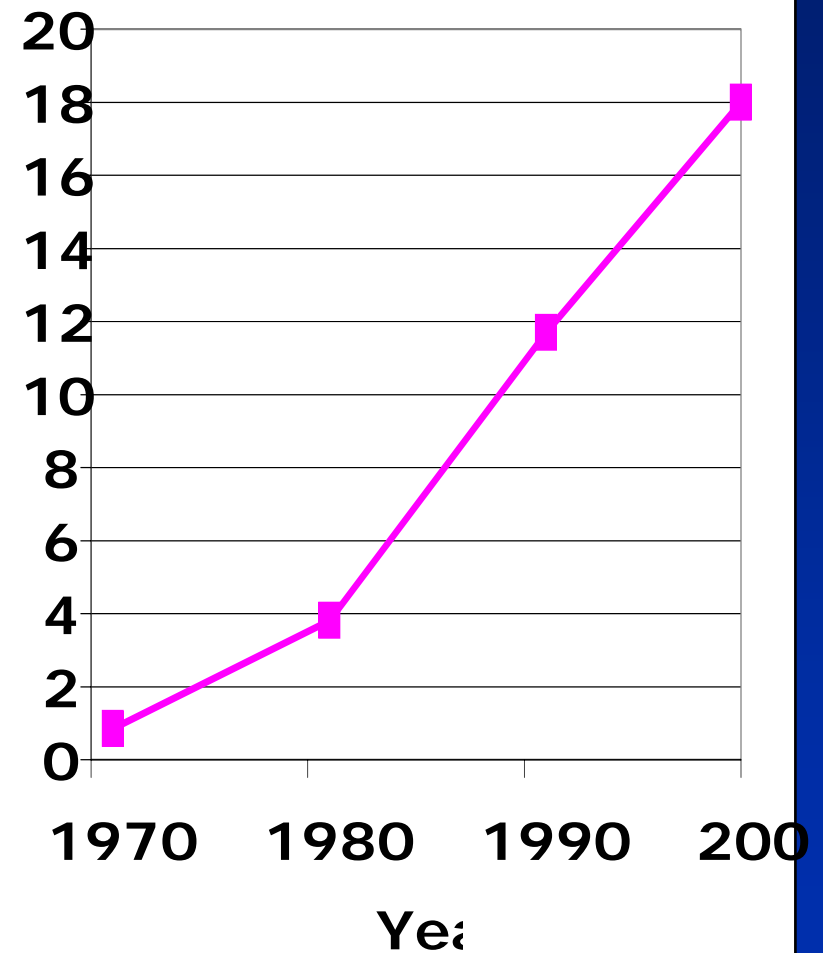
Percentage of U. S. Population Employed in Manufacturing



Manufacturing Employment in Asia-Pacific Rim

Total manufacturing employment (millions) for:

- Indonesia
- Malaysia
- Singapore
- South Korea



Prognosis for 2020

Good News:

- Global manufacturing volume will grow
- High-tech manufacturing will spread throughout Asia-Pacific Rim, other regions
- Overall demand for manufacturing engineers will increase

Prognosis for 2020

Bad News (for U. S. schools):

- U. S. manufacturing will decline as % of total employment
- Mfg. engineering jobs located in U. S. will stagnate
- Non-U. S. production of manufacturing engineering graduates will increase

Survey of U. S. Manufacturing Engineering Programs

- Reviewed curriculum requirements posted on WWW for 16 programs
- No courses or special requirements related to global aspects of manufacturing found
- Some programs require internship (domestic or international)

Recommendations

- **Foreign language requirement/option (possibly intensive summer class)**
- **International co-op experience**
- **Exchange student program with country at comparable socio-economic level**
- **Emphasize global aspects in management courses**

Conclusions

- Manufacturing engineering education meets a growing global demand for high-tech manufacturing
- U. S.-based demand for graduates will remain flat
- Growing international demand for graduates, but graduates of non-U. S. schools will compete
- Global manufacturing trends have implications for traditional engineering education

Acknowledgments

- National Science Foundation
- (Stephan:) *Ad Gloriam Dei*