MANUFACTURING STATUS AND THE FUTURE OF INDUSTRIAL ENGINEERING

From a Presentation by

Abhi Deshmukh
Manufacturing Enterprise Systems
Design, Manufacture and Innovation
National Science Foundation
Manufacturing: GDP and Employment

Data Source: US Dept of Labor, NAM GDP calculations using 1982 constant-weighted price index

- Red line: Mfg Share of US Employment
- Blue line: Mfg Share of US GDP
Global Labor Market

MANUFACTURING DIRECT LABOR COST ($ / HR)

- Large markets
- Low-cost regions

Cassidy 2003
Technology Maturation and US Jobs

- As technologies mature, jobs move to areas of lower direct labor costs
- The rate at which new technologies mature is accelerating
A Wakeup Call

- Productivity change from 1977-2002 (DoC Report '04)
  - Overall economy: 53%
  - Manufacturing: 109%
- Manufacturing job market (US Bureau of Labor Statistics)
  - 2 M jobs lost to overseas competition since 2001
  - Job loss rate: 12,000 - 15,000 /month
- Service sector job market (Forrester Research)
  - 400,000 jobs lost to off-shoring since 2000
  - 3.3M jobs predicted to be lost by 2015

Those who do not learn from history are doomed to repeat it
- George Santayana
Unifying Theme

- Low cost of hardware → large-scale systems
- Increased connectivity → more interacting components → complex systems
- Complex systems → difficult to manage
- Managing complex systems → requires more information, different models
- More information, complex systems →

New ways of designing and managing ENGINEERED DECISION SYSTEMS
Looking Back at IE

Operations Research

Mathematics and Statistics
Management and Org. Behavior
Physical and Material Science
Physiology and Psychology

Production & Quality Eng.

Human Factors

Manufacturing
A Second Glance

Tools
- Gather Information
- Process Information

Use Information

Better Decisions

Applications
- Manufacturing
- Service Sector
- Management
Information Engineering

IE develops revolutionary approaches to design, deploy and operate complex, distributed, dynamically evolving engineered decision systems.

Acquisition
Processing
Decision Making

New Technologies