Society of Manufacturing Engineers

WHERE MANUFACTURING COMES TOGETHER™

Issues for Manufacturing Education

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Manufacturing's Role in the Economy

- 14% of the GDP
  - $1 in final demand for mfg goods drives $0.67 in other mfg products and $0.76 in non-mfg products and services
- 11% of the jobs
  - $1M in final sales of mfg products leads to 8 jobs in mfg sector and 6 jobs in non-mfg
- 60% of US private sector investment in R&D
  - Major driver of product innovation
- 33% of corporate taxes collected

Challenges Facing US Mfg

- Understanding mfg trends
- Globalization
- Information technology opportunities
- Maintaining innovation
- Strenthening small and medium sized enterprises
- Workforce education
- Rising infrastructure costs

Expectations from Employers

- Hands-on practical experience
- Great technical competence
- Problem solving skills
- Strong work ethic
- Cultural flexibility
- Life long learners

Supply of Qualified Workers Today

- Moderate to severe shortage of qualified workers
- Issues with quality and preparation
  - Problem solving skills
  - Basic reading, writing and communication skills
  - Basic employability skills: attendance, timeliness, work ethic
- Success in next 3 years depends on
  - High performance workforce (74%)
  - Product innovation (49%)

2005 Skill Gap Report - NAM

Quiet Crisis in the US

- Numbers
- Quality of education
- Ambition

“The World is Flat”, Thomas Friedman

Global Engineering Supply

- 2004 (BS engineers)
  - US 60, 000 5%
  - China 350, 000 46%
- US is 17th worldwide in S&E grads

US Student Performance

- US students rank in the middle or bottom half (www.pisa.oecd.org)
  - 16th in reading
  - 19th in science
  - 24th in math

- Less than half of all high school graduates are prepared for college-level math and science.

Challenge to Manufacturing Education

- Create the interest early (K-12)
- Develop high quality education in middle and high schools to prepare students
- Enhance the college level curriculum
  - collaboration
  - partnering
  - working across boundaries

STEPS Camps

- Introduction to manufacturing and engineering
- Target audience: 12-13 years old
- Curriculum teaches by experience
  - Build a rocket, airplane
  - Design and build a robot
- Nine camps in 2006

STEPS Academy

- Prelude to PLTW “Gateway to Technology” middle school curriculum
- Target Audience – 10-11 years old
- Activity based curriculum
  - Assembly lines
  - 3-D printing
  - Rockets
- Initial camps in Rochester, NY and San Diego, CA

Manufacturing Education Program

- Improve the curriculum used to teach manufacturing engineering in 2- and 4-year institutions
  - Based on survey data conducted in 1997
  - Seven categories of professional competence
  - Eight categories of technical competence
  - Awards given of $200-400K per year with a leverage of ~ 4:1

Why more engineers?

- “If you want good manufacturing jobs, one thing you could do is to graduate more engineers. We had more sports exercise majors graduate than electrical engineering grads last year.”
  - Jeffrey Immelt, Chairman and CEO, General Electric Company