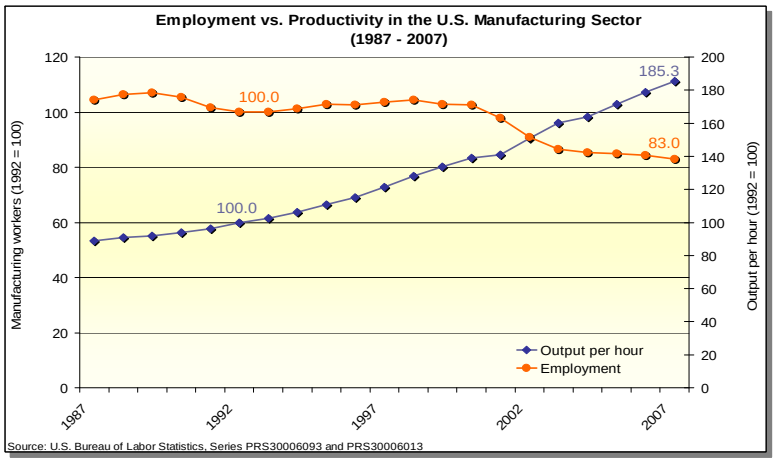
Manufacturing: A Living Industry in Continuous Transformation

A Report from the Manufacturing Steering Committee
Governor's Workforce Investment Board, Center for Industry Initiatives

INTRODUCTION

The manufacturing industry remains vital to Maryland's economic future; and despite headlines that influence negative perceptions of the industry, the growth potential of modern manufacturing in the State is significant.

Consider this. In 2006, manufacturing in Maryland accounted for over $14 billion of State's Gross Domestic Product, up 9% from 1997[1]. During the same year, Maryland workers in manufacturing were paid, on average, $56,741 annually - 27% above the average for all private industry workers ($44,527) in the State[2]. More importantly, every manufacturing job in the State creates 2.2 more jobs in other sectors of the economy[3]. Statistics like these illustrate the benefits and economic impact of the manufacturing industry in Maryland – an industry that is alive and well!



INNOVATION AND TRANSFORMATION

The manufacturing industry has undergone dramatic changes due to significant and steady improvement in productivity. As a result, the modern manufacturing industry is "**not your father's**" manufacturing industry. In fact, manufacturing is the all-industry leader in the rate of productivity improvement over the last 20 years[4]. **What happened?** To remain globally competitive, the manufacturing industry fundamentally transformed itself through rapidly improving technology, implementation of lean manufacturing principles, multi-skilling, and innovative production process improvement techniques. This transformation, has led to a new manufacturing paradigm requiring fewer workers but higher skills for those remaining. Simultaneously, this transformation has created a mismatch between skills required and the ability of existing and new workers. The result - even as overall employment in the manufacturing industry has declined, many employers report difficulty finding and hiring the highly-skilled employees they need. In a recent study, 80% of manufacturers stated a need for workers in one or more skill areas, but the lingering image of the old, dying, smokestack industry makes it hard to recruit young workers.

This misperception of manufacturing as a dying industry was well documented in two research based monographs (2002 & 2004) by the Maryland Advisory Commission on Manufacturing Competitiveness entitled, "Maryland Manufacturing." The Commission's studies documented that manufacturers have difficulty in recruiting skilled workers because of longstanding misperceptions of the manufacturing industry. Given this information, the manufacturing study team members elected to take a page out of modern manufacturing and use the "A3" problem solving methodology to address the root cause of the industry's inability to attract new workers. Toyota, as a part of its lean thinking and communicating process, pioneered use of A-3 reporting problem solving as a way of getting the problem, analysis, corrective actions, and action plans on a single sheet of large paper making it easier to gain understanding and support for new ideas and changes.

"Manufacturing in America is the engine that drives the U.S. economy by creating jobs, opportunity, and prosperity. Manufacturing employs 14.3M people in the U.S., plus another 6M in related fields such as supply chain, finance, and wholesale. No other sector of the economy performs more R&D, drives more innovation, generates more exports or contributes more to our economic growth. The future strength of the American economy, and our ability to maintain a high standard of living in the face of fierce global competition, depends on manufacturing."

- National Association of Manufacturing (NAM)

The recommendations presented in this report are designed to address the following challenges:

- Improving the image of manufacturing through a coordinated and multi-phased marketing campaign; and,
- Identifying, developing, and providing technical and educational pathways to prepare students to be the workers of tomorrow and upgrade the skills of incumbent workers[5].

These recommendations are then structured into a detailed plan of action, designed to leverage - not duplicate - the worthwhile activities of many organizations dedicated to supporting manufacturing in Maryland.

1: U.S. Department of Labor, Bureau of Labor Statistics as compiled by the National Association of Manufacturers.
2: Data from U.S. Department of Labor, Bureau of Labor Statistics as compiled by Maryland Department of Business and Economic Development.
3: MD Department of Business and Economic Development – Maryland Economic Impact Model 2006, IMPLAN© Minnesota IMPLAN Group.
4: The Facts About Modern Manufacturing, 7th Edition 2006, Manufacturing Institute and National Association of Manufacturers.
5: National Association of Manufacturers, 2005 Skills Gap Report-A Survey of the American Manufacturing Workforce, December 2005.

Employment Projections for Selected Manufacturing Occupations: 2004 to 2014

Occupation	Projected annual openings in MD (All industries)	Projected annual growth in MD (All industries)	Average annual wage in MD (All industries)	Estimated annual total compensation (wages + benefits)
First-line production supervisors and managers	1,780	0.10%	$50,909	$68,625
Wholesale and manufacturing sales representatives	9,450	1.40%	$52,453	$70,706
Industrial engineers	1,085	2.00%	$73,030	$98,444
Industrial production managers	340	0.00%	$76,397	$102,983
Mechanical engineers	1,985	1.50%	$77,997	$105,139
Purchasing agents	2,190	1.00%	$58,604	$78,998
Tool and die makers	105	-0.50%	$47,067	$63,446
Accountants and auditors	8,400	1.50%	$56,188	$75,741
First-line office and admin supervisors and mgrs	7,890	0.80%	$45,788	$61,722
Electricians	6,000	2.10%	$44,965	$60,613

Source: Maryland Department of Labor, Licensing, and Regulation

MANUFACTURING INDUSTRY WORKFORCE CHALLENGES:

The rapid evolution of manufacturing processes demands a comprehensive foundation in basic employability skills, advanced technical skills, and a commitment to life-long learning to keep pace with the rate of innovation that is commonplace in the industry today. For the industry to remain competitive, it must address the following workforce challenges:

- Poor industry image within the community, education system, and government, making it an unattractive or unappealing career choice.
- Lack of a coordinated manufacturing industry involvement in educational curriculum development to effectively address skills requirements.
- Lack of relevant education content available in the K-12 grades, caused by insufficient revenue streams to create, support and sustain educational programs, as well as upgrade faculty skills and competencies.

ROOT CAUSES COMMONLY IDENTIFIED BY THE MANUFACTURING INDUSTRY COMMITTEE:

Recruitment

As illustrated in the chart above, challenging and creative professional and technical careers are available within the manufacturing industry, many of which offer wages and benefits well above the Maryland average. Many of these positions go unfilled due to the image of the industry. As a result, the manufacturing industry needs to develop strategies to attract its fair share of the available and untapped workforce. Challenges related to recruitment include:

- Lack of education and marketing outreach strategies regarding highlighting a positive image of the modern manufacturing industry, and available career opportunities.
- Career pathways in manufacturing and engineering technology that lead to challenging and rewarding careers are not readily known or understood by the general public.
- Insufficient industry support and participation in classroom activities to promote career awareness to students, educators, counselors, and parents.

Manufacturing Infrastructure Changes

Today's manufacturing environment has moved from a few large firms with many employees, to a broader base of smaller, more agile manufacturing firms. Due to this change there is less of a unified voice for the industry. Communicating industry needs would be beneficial and in the best interest of manufacturing. This transformation within the industry's infrastructure has led to the following challenges:

- Smaller companies have difficulty providing or accessing much needed education and training programs.
- Manufacturing programs at the secondary and community college level have declined. Quality of programs have suffered due to lack of available equipment, resources and qualified instructors.
- Difficulty in identifying needs for advanced technical careers because of the broad spectrum of manufacturing activities.

Basic Technical and Employability Skills

Data indicates that 70% of applicants are rejected from employment opportunities within the manufacturing industry because they lack basic employability skills. For example:

- Many employees lack a strong academic background in higher levels of applied math, sciences, computer skills, and technical writing.
- Existing employees lack advanced technical skills and the ability to continue to broaden their skill sets to help their company remain competitive in a global economy.
- Significant numbers of employees lack the basic employability skills, such as workplace ethics and teamwork.

Credentialing

As the manufacturing industry continues to transform, both new and incumbent workers need to take advantage of life-long learning opportunities in order to acquire the necessary skills to excel in their careers. Recognized, industry-endorsed credentials documenting employee skill development facilitates stakeholders' access to a qualified and job ready pipeline. Therefore, industry involvement in the education curriculum development and credentialing process is critical in order to prevent the following:

- Lack of industry-driven secondary and post secondary degrees and/or certificates.
- No process in place for the manufacturing industry to systematically validate programs of study.
- Lack of an agreed-upon workplace skills credential, documenting proficiency.

Skills Upgrade

As manufacturing processes and technologies continue to advance, employers and workers need to take a proactive approach to training and life-long learning as an investment in their futures. Therefore, industry needs to provide training options that are:

- Flexible to the work and life schedule of the employee.
- Current and relevant to the manufacturing environment;.
- Tied directly to the manufacturing and engineering career pathways.

Coordination

State and county workforce development efforts and programs are not clearly identified and operate in silos. Industry needs to be educated and involved in the policy development process in order to effectively remove the following challenges:

- State policies, funding and workforce development programs are not easily understood and/or underutilized;
- Appropriate success indicators of local programs' effectiveness need to be established and measured; and,
- Services offered by various local, state, and federal government providers require more collaboration and a clearer focus to better leverage scarce dollars.

"One of the biggest challenges in U.S. manufacturing today is the broadening skills gap which is taking an increasingly negative toll on America's ability to compete in the global economy. This problem will worsen as the "Baby Boomers" retire from an increasingly high-tech workplace with no skilled employees in the pipeline to replace them.

- **More than 80% of U.S. manufacturers report an overall shortage of qualified employees that is affecting their ability to meet customer demands.**
- **Nearly half (46%) of small and medium manufacturers report that 'finding qualified employees' is one of the most serious problems facing their company.**
- **Nearly three out of four manufacturers believe that high performance workforce is the most important driver of future business success."**

- National Association of Manufacturers National Center for the American Workforce, April 2008.

MANUFACTURING INDUSTRY INITIATIAVE STEERING COMMITTEE RECOMMENDATIONS:

Recommendation #1- *Image Education*

A. Design and institute a multi-phase image marketing campaign to educate the general public on the transformation of the modern manufacturing industry, as well as the challenging, creative, exciting and rewarding career opportunities.
B. Immerse industry professionals in Maryland's classrooms to educate and mentor K-12 students and encourage their discovery of new and exciting careers in manufacturing.

Recommendation #2 - *Education*

A. Create educational programs and pathways for K-12 students that lead to challenging and rewarding careers with options for immediate employment or continued education.
B. Create and support community college degree and certificate programs that seamlessly connect to the manufacturing pathways created in the K-12 grades.
C. Provide training opportunities for new and incumbent workers leading to certifications in **National Institute of Metalworking Skills (NIMS), Lean Manufacturing Principles-Lean Expert, and Advanced Project Management-Project Management Professional (PMP).**

Recommendation #3 – *Recruitment and Training*

A. Develop partnerships between local manufacturers and One-Stop workforce centers leading to recruitment and training strategies for new workers.
B. Encourage use of the Maryland Business Works (MBW) Program to fund skills upgrade training for incumbent workers.
C. Create and support partnerships among community colleges, One-stop workforce centers, industry trainers, employers and other educational providers to provide innovative, flexible and accessible education and training options for incumbent workers.

MANUFACTURING INDUSTRY: PLAN OF ACTION

Initiative #1

WHO: Governor's Workforce Investment Board (GWIB) and Manufacturing Industry Leaders

WHAT: Seek and secure funding for a statewide marketing campaign aimed at creating a positive image of the Maryland manufacturing industry.

HOW: Develop a videography of Maryland's transforming manufacturing businesses, portraying its new technology, high-tech equipment and clean working environments.

WHEN: Debut in mid-2009.

Initiative #2

WHO: Regional Manufacturing Institute (RMI), Maryland Advisory Commission on Manufacturing Competitiveness (MACMC), and Governor's Workforce Investment Board (GWIB)

WHAT: Create a positive image of manufacturing based on personal experience.

HOW: Sponsor an event for elected officials that through a hands-on plant tour will encounter a greater understanding and appreciation of the new manufacturing industry.

WHEN: September 20, 2008, at PRS Guitars, Eastern Shore. COMPLETED.

Initiative #3

WHO: Maryland Business Roundtable for Education, (MBRT), Maryland Advisory Commission on Manufacturing Competitiveness (MACMC), and Governor's Workforce Investment Board (GWIB)

WHAT: Increase the number of manufacturing professionals participating as coaches and/or mentors in Maryland's K-12 classrooms.

HOW: Seek and secure commitment of manufacturing professionals to join MBRTs Speakers Bureau.

WHEN: By June 30, 2009 increase the number of manufacturers in MBRT's Speakers Bureau by 25%.

Initiative #4

WHO: Maryland State Department of Education (MSDE) – Manufacturing Engineering Technologies (MET Cluster and Design Teams), and Governor's Workforce Investment Board (GWIB).

WHAT: Under the Manufacturing Engineering Technologies, create a career and technology program of study which applies lean methodology and tools.

HOW: Develop a program of study and provide professional development for teachers.

WHEN: The first course to be field tested during the 2008/09 school year.

Initiative #5

WHO: The Technology & Innovation in Manufacturing Education (TIME) Center, its partner colleges, and the Governor's Workforce Investment Board (GWIB).

WHAT: Offer manufacturing driven, flexible technical training at the community college level for students and incumbent workers.

HOW: Engage manufacturers and educators in a discipline curriculum development process; one that is applicable in a credit or contract training environment.

WHEN: Electronic Technician course to be available in 2009.

Initiative #6

WHO: The Technology & Innovation in Manufacturing Education (TIME) Center, manufacturers, student competitions, the Governor's Workforce Investment Board (GWIB).

WHAT: Engage educators and students in hands-on-activities.

HOW: Sponsor student participation in competitions such as FIRST Robotics, Skills USA, etc. Sponsor faculty participation in externships.

WHEN: Increase annual participation by 10% each fiscal year beginning in 2009.

MARYLAND
GOVERNOR'S WORKFORCE INVESTMENT BOARD

All who have read this report owe a debt of gratitude to those who understand the importance of manufacturing to Maryland and took the time to advocate on behalf of the industry. Their effort provides a great foundation for the work yet to be done.

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