

New Technology

Congress should encourage further research and development in new energy technology, particularly the funding of President Bush's hydrogen fuel initiative to develop technology for commercially viable hydrogen-powered fuel cells and a new generation of hydrogen powered vehicles to help reduce U.S. dependence on foreign oil.

Promote Pension Reform

The administration will work with Congress to make fundamental changes in the funding rules that will put underfunded plans on a predictable, steady path to better funding. Improvements in the funding rules should set stronger funding targets, foster more consistent contributions, mitigate volatility, and increase flexibility for companies to fund up their plans in good economic times. The administration will continue to work with Congress and the private sector to address this issue.

Investing in Innovation

The discussion above and the views of manufacturers highlight the need to bolster further the development of new technologies that fuel productivity gains and improve U.S. security and the U.S. standard of living. The following recommendations are designed to ensure that the United States remains the most competitive and productive economy in the world.

Review Federal R&D Funding for Generic Technologies, Engineering, and the Physical Sciences to Encourage Better Coordination and Focus on Innovation and Productivity-Enhancing Technologies

Since taking office, President Bush has provided a renewed focus on federal research and development funding. For fiscal year 2004, he proposed a record \$123 billion, which represented an increase of more than 34 percent over funding levels that existed when he took office.

Continuing this effort to enhance government funding of research and development activities is crucial to the continued U.S. success in manufacturing.

Also needed is a review of current federal R&D programs important to manufacturing, to ensure that there is an appropriate focus on innovation and productivity-enhancing technologies. The Commerce Department's Technology Administration, in coordination with the Assistant Secretary for Manufacturing and Services should conduct this review with other affected agencies, through the National Science and Technology Council's Interagency Working Group on Manufacturing R&D, and the private sector.

The review should consider the need for additional investment in core R&D programs for generic technologies, engineering, and the physical sciences, especially in interdisciplinary scientific endeavors. The model followed should be

the same one that has been used over the past 50 years to develop the major technologies influencing the U.S. economy today (semiconductors, computers, network communications, biotechnology, and now nanotechnology). This model is based on government funding of basic science and early-phase generic technology research, followed by massive investment in applied R&D by the private sector.

Identify Priorities for Future Federal Support for Advanced Manufacturing Technology—Create an Interagency Working Group on Manufacturing Research and Development

To improve the effectiveness of federal investment in manufacturing research and development, a new interagency working group should be established within the National Science and Technology Council. This interagency working group would serve as a forum for developing consensus and resolving issues associated with manufacturing R&D policy, programs, and budget guidance and direction.

The working group should identify and integrate requirements, conduct joint program planning, and develop joint strategies for the manufacturing R&D programs conducted by the federal government. Among the responsibilities of this group would be to review all federal manufacturing R&D programs and establish priorities designed to improve U.S. manufacturing technology.

The review would be aimed at identifying the timely and critical early-stage developments needed to provide a fundamental foundation for industrial research and development and the commercialization of related applications. The review would be comprehensive, covering a wide breadth of manufacturing innovation technologies, such as supply chain integration, interoperability technologies,

measurements and standards, and manufacturing information technologies. It would also address the need for new industry-university-government research dedicated to high-priority manufacturing R&D needs, knowledge diffusion, and education of the next generation of manufacturing technologists and leaders.

Strengthen the U.S. Patent and Trademark Office

Patents have always been key to rewarding manufacturing innovations, but their importance has been magnified by the fact that the application of new technology has become one of the key ingredients in successfully competing in manufacturing globally. Delay in the issuance of a patent can mean the difference between success and failure in today's marketplace.

The USPTO currently runs the risk of seeing its processing times erode. The administration has proposed legislation that would significantly enhance the ability of the USPTO to meet the needs of U.S. manufacturers. Congress should pass this legislation to ensure that the USPTO can continue to serve the needs of manufacturers by protecting their intellectual property and increasing the availability of new products and services in the marketplace.

Strengthen Partnerships to Promote Manufacturing Technology Transfer

Robust research and development activities are essential steps in reinforcing the process that has provided U.S. manufacturing with its competitive edge. These activities, however, should be matched with an equally vigorous effort to ensure that the technology developed is diffused broadly throughout the manufacturing sector, particularly to small and medium-sized manufacturers, which will benefit most because of their own limited capacity for independent research and development.

The PCAST report on technology transfer of federally funded R&D, released in May 2003, provides 10 recommendations for strengthening technology transfer.² These recommendations will provide valuable insight for strengthening technology transfer to the manufacturing community.

Implementing these recommendations will require a comprehensive effort, led by the National Institute of Standards and Technology. As a part of that effort, NIST should take the lead in identifying and promulgating best practices in intellectual property management, cooperative R&D agreements, and partnering arrangements needed to enhance the benefits and delineate the obligations associated with such cooperative efforts. Participation from existing groups such as the Federal Laboratory Consortium, the Interagency Working Group on Technology Transfer, and others should be solicited in this comprehensive effort.

Expand Cooperative Technical Assistance Programs on Standards

In an increasingly globalized economy, the capacity to compete successfully will depend on the ability of individual manufacturers to satisfy global as well as U.S. standards. Most U.S. manufacturers understand the importance of achieving these goals and have invested heavily in satisfying not only product standards, but quality and environmental standards as well.

The importance of standards in manufacturing will only increase with the demands placed on manufacturers hoping to compete for a place in global supply chains. Indeed, in many respects, international standards will define access to the global marketplace. To ensure that standards with a potential to affect the access of U.S. manufacturers to markets around the world are set objectively, based on sound science, NIST should expand the

reach of programs designed to provide technical assistance to standards agencies, national metrology institutes, and regional metrology organizations in the developing world, particularly in significant potential export markets.

Ensure the Reliability of the Critical Infrastructure That Is Vital to Manufacturers

The United States' most advanced manufacturing industries and the infrastructures that they depend on—power, communications, and transportation in particular—are increasingly dependent on sophisticated, distributed automated control systems. Typical of these are the control systems that manage the electric power grid; similar systems control the production and distribution in critical infrastructure industries such as oil and gas, water, chemicals, pharmaceuticals, metals and mining, pulp and paper, and durable goods manufacturing. Protecting these critical control infrastructures from failure, either by accident or by malicious intent, is essential to the long-term security of the manufacturing sector—and the nation as a whole. Therefore, the following steps should be taken:

Promote Standards to Better Protect Industrial Control Systems

The federal government should work vigorously and hand-in-hand with the private sector and state and local agencies to encourage and enable standards development organizations in the United States to establish needed security standards for industrial control systems.

Support the Research and Development that Underpins Critical Infrastructures—and Quickly Transfer the Results of That R&D to the Private Sector

As part of the administration's emphasis on improving homeland security, the federal government today is providing

dramatically expanded support for the research and development that is necessary to protect the nation's critical infrastructures that U.S. manufacturers and the U.S. economy and society at large depend upon so heavily. In addition, the administration should ensure that the manufacturers and users of industrial control systems are involved with—and are kept informed about—the latest research advances from the Department of Homeland Security, the Commerce Department, and elsewhere.

Support a Newly Coordinated Manufacturing Extension Partnership and Create a National Virtual Network of Centers of Manufacturing Excellence

Since its inception as a pilot program in 1988,³ the Manufacturing Extension Partnership (MEP) has provided many small U.S. manufacturers with useful business services to become more competitive and productive. MEP's nationwide network serves to promote lean manufacturing techniques such as zero-defect quality programs. The program makes it possible for even the smallest firms to tap into specialists from across the country with manufacturing and business expertise in plant operations and on manufacturing floors. MEP clients have experienced more growth in labor productivity over a five-year period than similar non-client firms.⁴

MEP was originally intended to be comprised of 12 federally supported centers, with federal funding ending after six years. In its 15 years of operation, the program has expanded away from this original design to include 400 locations, and Congress has removed the sunset provision.⁵ Given advances in manufacturing and technology, it is appropriate to evaluate MEP operations and take steps for continuous improvement. The administration proposes to coordinate MEP fully with other Commerce Department programs

that are helping manufacturers to be more competitive and expand markets.

Through this coordination, the Commerce Department can more closely link the technical and business staff employed by the MEP centers located around the country with trade promotion specialists in the Commerce Department's International Trade Administration who are working with the proposed new Assistant Secretary for Manufacturing and Services. In addition, the ITA has experts with in-depth knowledge of and connections with various sectors of industry—automotive, textiles and apparel, energy, aerospace, machinery, metals, and microelectronics, to name a few. With a direct teaming of MEP field agents and these sector experts, the program can be a more effective national resource to help small manufacturers compete and succeed in the global marketplace.

Additionally, MEP should hold a re-competition for all MEP centers, with a focus on effectiveness and cost-efficiency. MEP should also explore methods, with Congress, for statutory authority to receive direct programmatic funding from private sector entities.

Wherever possible, MEP should also encourage applicants to identify areas of sector-specific expertise that could qualify them as a "center of excellence." MEP should encourage co-location with universities, community colleges, and ITA assistance centers to foster cooperation, knowledge transfer, greater efficiency, and manufacturing exports. The Technology Administration would lead the establishment of these centers by partnering with other organizations—including government at all levels as well as private sector organizations.

Encourage the Small Business Innovation Research and Small Business Technology Transfer Programs to Focus on Manufacturing

Two federal programs in particular exist to provide funding to small businesses to pursue R&D: the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. While results to date have been unclear, these programs can be a catalyst for greater innovation within small manufacturing enterprises. SBIR and STTR should place a higher priority on manufacturing R&D topics that would greatly leverage innovation in small and medium-size manufacturing companies.

Explore New Avenues for Leveraging the Unique Capabilities of U.S. National Laboratories and Universities for the Benefit of Small and Medium-sized Manufacturers

The National Institute of Standards and Technology, in collaboration with other federal agencies, and national laboratories, should explore the opportunity for establishing cooperative research programs on innovative manufacturing technologies among national laboratories, universities, the SBIR program, community colleges, and state and local technology-development associations. The objective should be to develop a working model of such arrangements that would provide the rapid diffusion of research successes into the private sector, provide access for small entrepreneurial businesses to sophisticated research tools, and provide training opportunities, such as for future nanotechnologists and nanomanufacturers. The current pace of technological change places a premium on expediting such initiatives. NIST should report its findings to the Secretary of Commerce in 2004.

Strengthening Education, Retraining, and Economic Diversification

To remain globally competitive, education and worker training strategies must be at the top of the national priority list. The administration successfully passed the No Child Left Behind Act in 2001, and is now working to fully implement this landmark education reform. The administration is also investing \$1 billion over five years to improve math and science education.

In addition, under President Bush's leadership, the Departments of Commerce and Labor have worked together throughout the country to link workforce development efforts with economic development efforts. Important initiatives include the Department of Commerce's Economic Adjustment Program and the Department of Labor's new 21st Century Workforce Initiative, which strive to strengthen retraining systems that maintain the U.S. skills advantage in manufacturing. The Department of Labor's Employment and Training Administration invests approximately \$10 billion a year in an array of workforce investment programs.

Building on that record should take the form of the steps set out below.

Enhance Workforce Skills Essential for Employment in Manufacturing Enterprises of the Future

Manufacturers across the country raised significant concerns about whether America was training the next generation of workers required to meet the needs of an increasingly high-tech workplace as well as to develop the manufacturing industries of the future. There was clear support for the development of improved vocational/technical training at both the secondary and post-secondary level, as well as for programs designed to improve

the skills of career-changing adults interested in manufacturing jobs. There was also support for improvements in basic math and science education, such as the current five-year, \$1-billion initiative for a new math and science partnership program that will strengthen math and science teaching and education at all levels.

It is important to define the starting point for improving the skills and preparation of the U.S. workforce. Toward that end, the Department of Labor, in conjunction with the Departments of Commerce and Education, should undertake a benchmark analysis of the existing skills of the U.S. workforce and the future needs of the U.S. manufacturing sector. The effort should be designed to inform both programmatic changes at the federal level and suggestions for curricula at the local level.

The analysis should address ways that federal programs that support basic education for elementary and secondary students will prepare them to enter the workforce without the need for significant remedial education. The analysis should catalog the basic academic skills needed for individuals entering the manufacturing workforce and assess the extent to which primary and secondary education in the United States provide those skills.

The second step in the analysis goes to the specialized training needed to succeed in the manufacturing environment of the future. Historically, U.S. schools, particularly in secondary education, provided a number of opportunities for vocational training. Over time, these opportunities have declined, and the educational system has relied more heavily on specialized vocational-technical schools, at both the secondary and post-secondary level, to fill in the gap. The analysis should examine whether the existing system of vocational-technical education is sufficient to meet the needs of the U.S. manufacturing sector and should propose recommendations for change where needed.

Establish a High School and Technical Education Partnership Initiative

Congress should pass legislation creating a coordinated high schools and technical education improvement program, utilizing secondary and technical education state grants, as proposed in the president's budget for fiscal year 2004. This program would provide high-quality technical education through partnerships between high schools and postsecondary institutions. Such an initiative, administered by the Department of Education, would support secondary and postsecondary career and technical education programs in high-demand occupational areas. The high school component would include a challenging academic core to ensure that students in the program meet state achievement standards and obtain a clear pathway to further education beyond high school, through apprenticeship or postsecondary technical certificates and associate or baccalaureate degree programs. Such an initiative will ensure that students are being taught the necessary skills to make successful transitions from high school to college and college to the workforce.

Establish Personal Reemployment Accounts

In any period of economic adjustment, the most significant challenge is how best to ensure that workers who lose their jobs can successfully re-enter the workforce. The federal and state governments provide a number of programs designed to help workers find new jobs with training and re-employment assistance.

Toward that end, President Bush has proposed a Personal Reemployment Account initiative to assist Americans who need the most help getting back to work. This innovative approach to worker adjustment would offer accounts of up to \$3,000 each to eligible individuals to purchase job training and key services, such

as child care and transportation, to help them look for a job and get back to work quickly. As a further incentive, recipients would be able to keep the balance of the account as a cash reemployment bonus if they become reemployed within 13 weeks. The Bush administration has included Personal Reemployment Accounts in its legislative proposal to reauthorize and reform the Workforce Investment Act.

Coordinate Economic Adjustment for Manufacturing Communities

Communities are hard hit when local manufacturing declines, particularly when a local factory accounts for much of the employment in a city or town. Just as individuals may need retraining to reenter the workforce, communities must, at times, develop alternative bases of economic development.

The federal government already has a number of programs available that can be used to develop the competitiveness of communities and support innovation in manufacturing. The challenge for communities often involves sorting out the purposes and requirements of those federal programs and how they might best be employed or tailored to local circumstances.

What is needed is an interagency federal task force, chaired by the Assistant Secretary of Commerce for Economic Development, to coordinate the efforts of relevant federal agencies, particularly the Departments of Labor and Education, in addressing the structural economic challenges faced by manufacturing-dependent communities. The task force would ensure that all federal agencies work together, coordinating resources and strategies to best provide a range of assistance to eligible communities. More specifically, the task force would provide a means of rapid response, identifying communities where the employment base is substantially dependent on only a few manufacturing companies and the communities that are at a significant risk of economic dislocation.

Given that early intervention and planning are critical for communities at risk, the first step the task force should take is to identify criteria for determining when a rapid response is needed. The task force would then work with the communities identified under these criteria to develop market-based development policies that seek to retain manufacturing jobs in a community, while beginning the efforts to diversify the economic base of the community.

Improve Delivery of Assistance for and Retraining of Displaced Workers

The challenges unfolding in manufacturing and in the job market represent a significant change from years past. Instead of individual industries facing particular adjustment issues due to stronger import competition, the U.S. economy in general is adjusting to fundamental changes underway in the world economy. While that process is particularly acute in the manufacturing sector, it extends broadly throughout the U.S. economy.

Current worker adjustment programs, in general, take one of two forms. The first involves the traditional suite of unemployment insurance and related programs that are designed with the individual worker in mind. That individual's employment prospects may or may not be related to more fundamental changes underway in the economy. The alternative form is the suite of trade adjustment assistance programs that fund extended unemployment and retraining for eligible workers. Here, eligibility is defined in terms of whether the employee can point to some direct trade impact that has displaced him or her from a job.

Neither of the current programs fully addresses the sort of adjustment underway in today's economy. What that calls

for is a fundamental reassessment of both types of programs to see how they might best be integrated into a coordinated approach to adjustment, reemployment, and retraining. Toward that end, the Commerce and Labor Departments, with the assistance of the Department of Education, should review the existing programs and provide recommendations on how best to integrate them into a coherent program that is dedicated to addressing the needs of workers affected by the ongoing adjustment in the rapidly changing economic environment.

This effort should build on the work currently underway through the Labor Department's High Growth Job Training Initiative. That initiative facilitates collaboration among employers, industry leaders, business associations, educators, community and technical colleges, and the public workforce system to tailor training programs to meet local workforce needs.

As part of this initiative, the Department of Labor is working with the manufacturing industry and others to conduct a nationwide review of workforce challenges. Key manufacturing sectors include electronics, motor vehicles, communications equipment, aerospace, plastics and pharmaceuticals. These sectors, and the manufacturing industry in general, are undergoing a transformation as a result of technological advances, requiring workers to adopt and perform new skills. Through collaborative efforts, the High Growth Job Training Initiative will identify those skills and work with institutions to develop successful training models.

In addition, Congress must pass the Bush administration's plan to strengthen the Workforce Investment Act. Annually, the Department of Labor spends \$15 billion on the nation's "One-Stop" employment and job training system. Over 3,800 One-Stop centers provide services that en-

able workers to transform their skills in order to gain employment in emerging and growing industries. The administration is seeking to strengthen this system through the re-authorization of the Workforce Investment Act. Among the changes sought are to make funding more accessible through consolidation, to make the system more responsive to business needs, and to strengthen accountability.

Promoting Open Markets and a Level Playing Field

American manufacturers support an open trading system in which both they and their competitors face the same rules. Leveling the playing field internationally will require a three-part strategy:

1. It will require the encouragement of economic growth and the pursuit of trade agreements that eliminate barriers to exports of U.S. manufactured goods.
2. It should include the aggressive enforcement of current trade rules, particularly in the context of the World Trade Organization, to ensure compliance.
3. It should reinforce current efforts to promote exports of U.S. manufactured goods and services in growing foreign markets. Increasingly, those efforts must be adapted to the needs of U.S. manufacturers and service providers, particularly small and medium-sized businesses, by focusing on their ability not just to enter foreign markets, but also to become a part of global supply chains.

The following recommendations build on President Bush's strong commitment to ensure free and fair trade. They represent a further step toward fulfilling the three-part strategy outlined above.

Encourage Economic Growth and Open Trade and Capital Markets Abroad

One of the key features hampering both the prospects for a stronger recovery in U.S. manufacturing and ensuring a better balance in U.S. trade is the slow economic recovery among many major U.S. trading partners. The United States should encourage the adoption of growth-oriented economic policies as a means of spurring growth and expanding markets for U.S. manufacturers.

President Bush has taken the lead in promoting economic growth and open trade among America's trading partners. The coming year presents a number of significant opportunities to reinforce that effort, including G7 finance ministers' meetings, the G8 economic summit that the United States will host in June 2004, and the prospect of concluding trade agreements with a number of significant U.S. trading partners.

As President Bush has indicated, the goals of raising growth and increasing stability can best be accomplished in an international financial system that relies on the principles of free trade, free capital flows, and market-based flexible exchange rates among the major economies.

In addition, the following steps should be taken:

Encourage the Growth and Development of Foreign Capital Markets

Efficiently functioning capital markets are key to promoting economic growth. The United States should promote market-based prices and interest rates, including the phase-out of government subsidies and directed lending, in order to allocate capital more efficiently, raise productivity, and encourage economic growth.

Negotiate Liberalization of Markets for Financial Services in All Trade Agreements

Consistent with the Bush administration's proposal in the ongoing WTO negotiations, the United States should press for the elimination of all barriers to trade in financial services within the WTO and as a part of any bilateral or regional free trade arrangement, subject to prudential measures. Removing such barriers and introducing competition to the markets for financial services not only creates new market opportunities for U.S. services companies that serve U.S. manufacturers,