



MANUFACTURING THE FUTURE

Driving Growth Through
Advanced Manufacturing

Event Report



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October 8, 2013 — Saratoga Springs, NY

In partnership with



FORWARD

Translating Ideas Into Reality

THE CHANGING LANDSCAPE OF THE AMERICAN MANUFACTURING sector and its role in the global economy has emerged as one of the critical issues of our time. We know that American manufacturing is currently at an inflection point, but we also know that it has the potential for incredible growth in the coming decades, particularly in the areas of advanced and semiconductor manufacturing.

The Aspen Institute's optimistic projection for the future of manufacturing in America finds its foundation in data and example. For data, we turn to an econometric analysis showing America's manufacturing resurgence by the year 2025 published earlier this year by Thomas Duesterberg, Executive Director of the Institute's Manufacturing and Society in the 21st Century Program. The report, *The Manufacturing Resurgence: What It Could Mean for the U.S. Economy*, presents strong evidence for an American manufacturing resurgence given the right policy environment.

We also base our projection on the incredible example of GLOBALFOUNDRIES, an industry leader in the semiconductor sector that has built the world's most sophisticated semiconductor fabrication plant

(Fab 8) of its kind in the small town of Malta, New York. With the help of a sustained and thoughtful investment from Abu Dhabi's Advanced Technology Investment Company (ATIC), GLOBALFOUNDRIES has successfully moved from "forest to Fab" in under five years, while simultaneously invigorating and revitalizing the regional economy through sustained growth and job creation. The success of GLOBALFOUNDRIES is powerful evidence for the potentially transformational role of advanced manufacturing in the broader American economy.

The United States and the United Arab Emirates (UAE) share a deep and abiding commitment to transformational change. At the Aspen Institute, the Emirates-Aspen Partnership seeks to advance that common vision by cultivating thought leadership



Toni G. Verstandig, Chair of Middle East Programs at the Aspen Institute, welcomes the group to the discussion as part of the Emirates-Aspen Partnership.

and dialogue on the shared investments in human capacity, infrastructure, and ideas that will allow both of our countries to be at the cutting edge of the global economy.

In order to meet that goal, the UAE has made a bold commitment to transform its economy over the next two decades through diversification in a way that will sustain growth and drive job creation. ATIC's investment in New York's GLOBALFOUNDRIES is a testament to the UAE's commitment to executing this vision and to the belief that the semiconductor industry holds tremendous promise as a catalytic economic sector.

Accordingly, our Emirates-Aspen Partnership and the Institute's Manufacturing and Society in the 21st Century Program have teamed up to spearhead a global conversation on the next generation of advanced manufacturing. The following report details the first in a series of conversations on advanced manufacturing and the synergy between education, technology, jobs, and policy that was held on October 8, 2013 in Saratoga Springs.

Toni G. Verstandig
*Chair, Emirates-Aspen Partnership
and Middle East Programs*
The Aspen Institute

Event Summary

The Aspen Institute, in partnership with GLOBALFOUNDRIES (GF) and the Advanced Technology Investment Company (ATIC), held a timely discussion in Saratoga Springs, New York, to explore the theme of how advanced manufacturing is helping to animate the manufacturing resurgence in the United States. The event brought together policy and industry experts from across America to discuss both the reality of the domestic resurgence and the policies which can put a wind at its back. The roles of advanced manufacturing facilities such as GLOBALFOUNDRIES Fab 8, the importance of public-private partnerships domestically and internationally, and the importance of the right enabling environment to support the resurgence were all explored at the forum. Participants in the forum included **Toni Verstandig**, Chair of the Emirates-Aspen Partnership and the Aspen Institute's Middle East Programs, **Thomas J. Duesterberg**, Executive Director of the Aspen Institute's Manufacturing and Society in the 21st Century, in conversation with five

distinguished expert panelists: **James Hagerty**, *The Wall Street Journal* (Moderator); **David Chavern**, Executive Vice President and Chief Operating Officer, U.S. Chamber of Commerce; **Aric Newhouse**, Senior Vice President for Policy and Government Relations, National Association of Manufacturers; **Johanna Duncan-Poitier**, Senior Vice President for Community College and the Education Pipeline, State University of New York; and **G. Dan Hutcheson**, Chief Executive Officer and Chairman, VLSI Research. Following is a summary of some of the key observations and conclusions from the discussion.

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Tom Duesterberg, Executive Director of the Manufacturing and Society in the 21st Century Program at the Aspen Institute, delivers framing remarks on America's manufacturing resurgence.

OVERVIEW OF THE MANUFACTURING RESURGENCE

In his opening remarks, Aspen's **Tom Duesterberg** pointed to a domestic resurgence in manufacturing and highlighted some forces driving this development, starting with reflections on why we should be so concerned about the U.S. manufacturing sector in a modern, globally interconnected economy. After all, as one famous economist put it: potato chips or computer chips, what does it matter? Most importantly, for a variety of reasons, it is because manufacturing still is the backbone of modern economies, especially the advanced digital manufacturing that has become a reality in upstate New York. This sector is the source of good jobs with good pay benefits (22 percent better than the average for all workers); it generates more jobs and activity

outside the sector than other areas, and it is still a source of great productivity that helps maintain a competitive edge in the global economy. At the same time, it is also a driver of productivity growth in other sectors through the transmission mechanism of digital tools; it is the dominant force in global trade and investment; it accounts for around 60 percent of U.S. exports; and it is the source of three-fourths of research and development (R&D) in the private sector and thus of innovation. In our fast-moving global economy, where technology changes at the speed of Moore's law and new competition enters the market every year, excellence in advanced digital technologies is a key to staying ahead of the competition and increasing standards of living. Importantly, productivity growth, technological improvement, and the pressure of global competition help drive a much lower rate of price increases in manufactured goods, while at the same time generating large increases in quality and performance. Manufactured goods as diverse as computers and cars are much less expensive with better performance than in the past. This steady advance in quality and concomitant restrained price increases are the keys to raising standards of living.

In this 21st century environment, no single company and increasingly no single nation can go it alone and expect to remain competitive. That is why partnerships of the sort we see in upstate New York are so crucial to the success of the economy. Without the contribution of the state of New York in providing the infrastructure, the trained workforce, and the skilled engineers and scientists needed for technology leadership; without the research collaboration of Sematech, the College of Nanoscale Science and Engineering, and the Global 450 Consortium, it would be difficult for GLOBALFOUNDRIES and its partners to remain a step ahead of global competition. Despite the strong ecosystem for manufacturing in the United States, capital investment has been weak in recent years, and cross-sector partnerships are the catalysts to building technological excellence—including the vital element of collocating production and R&D that is vital to making sure the great ideas

spawned in labs and universities can be perfected and commercialized.

Fab 8 is a key contributor to the manufacturing resurgence we can see emerging in the United States. In addition to technical excellence, other contributors to this resurgence include:

- » The great energy renaissance in the U.S., which gives us a major advantage because it keeps prices low and supply abundant for a sector which uses one-third of all the energy consumed in the U.S.;
- » The high productivity of U.S. plants, driven in part by deployment of digital technologies;
- » The convergence of cost structures in the world which reduces the advantages of low-labor countries;
- » A good supply of trained scientists and engineers produced by the best research universities in the world;
- » A good financial system willing to take risks;
- » A growing sense among corporate leaders that producing closer to home brings major cost and logistical benefits and the openness to change; and
- » Entrepreneurial risk taking, long a characteristic of America.

The Aspen Institute program on Manufacturing and Society in the 21st Century recently published an econometric study to quantify what a manufacturing resurgence could look like over the next decade in a report titled: *The Manufacturing Resurgence: What It Could Mean for the U.S. Economy*. The report explored in an optimistic scenario how manufacturing could increase its share of the economy to almost 16 percent from the 12 percent it is today, resulting in GDP levels that are \$1.5 trillion higher, with 3.7 million additional direct jobs in industry and personal income ahead by about \$200 billion. Importantly,

The knowledgeable panel explored in more depth some policies needed to improve the competitive environment and ensure the continuation of the resurgence.

outlays for capital investment in equipment and software, a key to productivity growth, would be about 12 percent higher and the long-time trade deficit would be reversed. We would see a 7.5 percent annual growth rate in the export of semiconductors, and a 13.6 percent annual advance in exports of computers and peripherals.

Of course, it will take an improved policy environment to make sure this optimistic scenario is realized. This would include: more stable fiscal and monetary policy; improved access to foreign markets through trade and investment agreements; better tax and regulatory policy; some enhanced incentives to invest in the United States and return capital held offshore; continued improvement in our schools for science, technology, engineering, and math skills; and a better focus and increased funding at the federal and state level for basic research in the physical sciences and engineering, which are so important to excellence in manufacturing. The types of creative partnerships we see in upstate New York are also key to future success.

The knowledgeable panel explored in more depth some policies needed to improve the competitive environment and ensure the continuation of the resurgence. Present for the discussion was a distinguished audience of over 200 industry leaders, semiconductor industry executives, and local leaders who also contributed to broadening the discussion through their engagement.



The panel discussion on the role of advanced manufacturing in American economic growth featured (*right to left*): G. Dan Hutcheson, CEO and Chairman of VLSI Research Inc; Johanna Duncan-Poitier, Senior Vice Chancellor for Community Colleges and the Education Pipeline for the State University of New York; David Chavern, Executive Vice President and Chief Operating Officer, U.S. Chamber of Commerce; Aric Newhouse, Senior Vice President for Policy and Government Relations, National Association of Manufacturers (NAM); moderated by James Hagerty, Reporter, *The Wall Street Journal*.

Highlights of Panel Discussion

OVERALL ENVIRONMENT FOR A DOMESTIC RESURGENCE

James Hagerty made a few observations before commencing the panel discussion. While recognizing that there is evidence of industry returning production to the United States, he noted that China, India, and other emerging markets are growing faster than the U.S., and major industries will want to maintain and grow production in those fast-growing markets. China, Korea, and other new economies are also technologically sophisticated and have good technical and production supply chains to compete with advanced industry in the U.S. and Europe.

He also observed that companies do find an advantage in shrinking supply chains and limiting R&D to production facilities. He noted that some political and cultural failures in the United States—gridlock, emphasis on short term results, lack of well-trained workers—also contribute to the somewhat tepid growth we see in U.S. industry coming out of the Great Recession.

David Chavern also argued that we need to make hard choices on public policy to support future growth, but also that the overall environment in the U.S. is very favorable to resurgence if we make the

right choices. Among the strengths of the U.S. are: natural resources such as energy, good demographics (in contrast to Europe and East Asia), a strong university system, and the great entrepreneurial tradition of risk taking and innovation. **Aric Newhouse** observed that the bipartisan climate in Washington today is far more favorable to the manufacturing sector than he has ever seen. Thus, if the current gridlock is alleviated, some constructive policies might be enacted. **Dan Hutcheson** reminded the audience that the United States still produces 40 percent of the world's semiconductors and that the potential for a manufacturing resurgence was evident five years ago based on cost convergence (especially in China) and U.S. technological excellence.

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM) EDUCATION

To maintain its technological edge on the global stage, the United States will need sustained and long-term investment in STEM education to encourage the youth of today and tomorrow to pursue the engineering, science, and computer science-driven careers that will be needed to fill jobs in America's manufacturing sector. Part of the problem is cultural; part is the need for "systematic change" in the education system, as **Johanna Duncan-Poitier** articulated. More confidence in the future of the sector, a better level of focus within the school system, and partnerships (such as that in the "high tech valley" in upstate New York) between industry and educators are all vital to addressing the problem. The long-term timeframe must also be met with immediate STEM-career training initiatives to prepare workers to take the job openings in this field that currently sit unfilled. Attracting students (including women and other under-represented populations as Ms. Duncan-Poitier and members of the audience eloquently argued) to these fields and to careers in manufacturing also requires not only a more positive

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image of the sector, but better collaboration between industry and educators and a change in the thinking of educators and parents who help guide the career choices of their children. Mr. Chavern and Mr. Newhouse also mentioned that an immigration policy more favorable to entry of highly skilled workers, including scientists and engineers, can supplement the efforts of the U.S. education system to meet the need for workers at all levels in a growing manufacturing economy.

TAX POLICY

David Chavern and **Aric Newhouse** especially emphasized the need for an enabling tax environment that would play a key role in encouraging American companies to bring manufacturing jobs back from overseas. Long-term tax reform is a high priority in this field, but short-term fixes such as reducing the corporate income tax rate to levels commensurate with industrial country averages would go a long way in jumpstarting growth. In the long run, according to several panelists, bringing U.S. tax rates to a level consistent with the averages of industrialized country-competitors and implementing of a territorial tax regime would help both to keep U.S. companies from moving abroad and encourage repatriation of capital held outside the United States by U.S. firms.

FOREIGN INVESTMENT

At a time when American companies are keeping a record amount of capital overseas, and when domestic cost structures are becoming increasingly competitive, the interest of foreign investors in U.S. industries remains high. The United States should leverage this interest and continue to develop incentives to attract large-scale foreign capital investments. In the current environment following the “Great Recession,” the slow pace of recovery is linked to a slow return of capital investment in the U.S. Foreign direct investment, such as the ATIC investment in upstate New York but also including foreign investment in the auto, chemical, and other sectors, is one way to offset the slow pace of domestically generated investment.

INFRASTRUCTURE FOR REGIONAL HUBS

Forward-thinking investment in the infrastructure required by advanced manufacturing plants (water, electricity, and natural gas, as well as roads and airports) will go a long way toward encouraging the development of regional hubs for advanced manufacturing. The opportunity for high-tech plants to share in the established infrastructure of high-technology parks with other like-minded firms is a big incentive for capital investment. If you build it, they will come. The GLOBALFOUNDRIES facility in Malta is a good example of this reality.

COLOCATION OF RESEARCH AND DEVELOPMENT WITH PRODUCTION

A growing body of evidence shows that the colocation of research and development with production is a key ingredient for technological innovation, especially in the high tech sector. To keep its global competitive edge in advanced technology, the United States benefits by keeping manufacturing in close proximity

to research and development centers. In upstate New York, the combination of company research and collaboration with nearby universities (RPI and SUNY Albany, as well as Hudson Valley Community College), and with specialized research centers such as Sematech, the Global 450 Consortium, and the SUNY College of Nanoscale Science and Engineering help create a fertile environment for perfecting advanced technology. It is not only in high-tech industries that colocation is beneficial, but in other advanced industries as well.

PARTNERSHIPS

In the competitive global environment for manufacturing, no single company and, increasingly, no single nation can go it alone and expect to stay ahead. In New York, the combination of partnerships—between companies, between educational institutions and companies, and between the public and private sectors—is a key to the success of the \$8.5 billion GLOBALFOUNDRIES investment. This investment demonstrates the UAE’s thought leadership and enduring partnership in this field, most prominently in the significant capital investment required for a semiconductor fabrication facility. One of the consistent themes advanced by all participants was the need for creative partnerships between educators, companies, and local economic development officials to produce the trained workforce needed in this sector. Another key theme pointed to the importance of colocation and the importance of symbiosis at the regional level between manufacturing firms and local research facilities, both public and private.

By Way of Conclusion

These are just a few of the many exciting ideas that were presented in the discussion. And, especially at a time when there is gridlock in Washington, we can expect many of them to be a heavy lift. Manufacturing today is no longer the dirty, dark, and dangerous world it may have been during the early years of American industry. Indeed, advanced manufacturing has the potential to symbolize the broader manufacturing resurgence underway in America as well as play a driving role in the country's overall economic recovery. A good deal of progress has been made in recent years in restoring global competitiveness, jobs, and excellence in innovation in this sector. Nevertheless, the full realization of that potential will depend on public-private and global collaboration to reinvigorate investment, to prepare

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an educated workforce, to encourage the development of regional clusters of excellence, and to promote macroeconomic growth. With the incredible potential presented by advanced manufacturing, every option is worth the effort.

GLOBALFOUNDRIES Fab 8 is a state-of-the-art semiconductor foundry in Malta, New York.





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