Chicago: the nation's advanced manufacturing hub

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Chicago's reputation as the driver of the nation's manufacturing economy is more than 100 years old. But it is clear the city and the region are not resting on an antiquated image. Chicago is on its way to becoming the nation's hub for advanced manufacturing innovation. With first-in-the-nation public-private partnerships, tightly targeted workforce training programs that close the skills gap and brick-and-mortar investments in advanced manufacturing technology, this is a city whose brand is moving from "big shoulders" to big ideas.

Many of those big ideas are already up, running and producing results in factories across the region. Advanced manufacturing – a set of highly flexible, data-enabled and cost-efficient processes – is a game-changer. Chicago's new manufacturing landscape is full of smarter, leaner facilities. Now factories can adjust production lines to customize small batches, machines can talk to one another to automatically correct a flaw in a production process, and plant managers can check in on real-time production data from home. But the best news may be that prices for equipment and design tools are plummeting, so smaller companies can take advantage of market-shifting innovations. In short, advanced manufacturing is turning long-accepted business models upside down, shifting global trading patterns and reviving the sector.

Innovation + investment = competitiveness

Chicago recorded a big win for manufacturing innovation earlier this year when the Digital Manufacturing and Design Innovation Institute – or DMDII – opened on Goose Island. This 94,000-square-foot institute is part incubator, part research center. The goal: develop and test technologies with potential to cut time and costs of manufacturing processes.

DMDII is the first public-private partnership of UI Labs, Chicago's nonprofit research and commercialization collaborative that is "…bringing Universities + Industries together to define problems, design partnerships and deliver scalable solutions to tomorrow's most important challenges." The concept is the product of efforts by city leaders and the University of Illinois to capitalize on the region's research capabilities as an economic asset.

DMDII represents historic levels of investment. The U.S. Department of Defense provided $70 million for construction and the City of Chicago added $10 million. Approximately a dozen corporate sponsors contributed $1 million each. The first "project calls" at DMDII will provide funding for research on selected projects that can be implemented by manufacturers.

DMDII first project calls

"These topics represent key digital manufacturing technologies that can significantly improve the competitiveness of American manufacturing businesses," said Dr. William P. King, DMDII's Chief Technology Officer, at last month's project call announcement.

The project calls focus on some of the industry's biggest problem areas so that the facility's first round of innovations can apply directly to manufacturing's most compelling business opportunities:

- **Completing the Model-Based Definition:** Demonstrating that model-based software is the key to organizing and managing product/process data within the Digital Thread.
- **Technologies Enabling Supply Chain Visibility:** Demonstrating technologies that can provide real-time data dynamically, efficiently and accessibly for efficient response to rapidly changing factory conditions.
- **Cyber Security for Intelligent Machines:** Developing tools to increase cyber security of digital manufacturing solutions. Improved cyber security for intelligent machines will result in lower manufacturing costs and improve factory performance.

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- **Hardware / Software Toolkit for Real-Time Machine and Process Diagnostics, Monitoring and Self-Correction:** Implementing machine intelligence into manufacturing machines and promoting adoption of relevant standards for new machines with built-in sensors and intelligence, as well as legacy machines and systems with retrofitted sensors and intelligence.
- **Agile Manufacturing to Compensate for Production Variability:** Utilizing digital manufacturing technologies to mitigate production variability and to reduce time and product development costs.
- **Open Source Software Applications for Digital Manufacturing:** Demonstrating use cases that solve real world problems for manufacturing businesses.

Closing the skills gap

Chicago is also bolstering its manufacturing leadership through investments in building a trained workforce. According to the Fabricators and Manufacturers Association International, “Manufacturers simply cannot find the skilled labor needed today to handle the kinds of sophisticated production processes and tasks required on the manufacturing shop floor.”

The Manufacturing Institute says there are 30,000 unfilled manufacturing jobs in Illinois. In the jobs that require a STEM background – particularly science and engineering – the Institute reports that nearly 80% of employers in Illinois recognize a moderate to severe shortage of qualified applicants.

Illinois Cities with the Most Manufacturing Jobs

Chicago	109,560
Elk Grove Village	19,918
Rockford	19,396
Elgin	12,103
Wheeling	11,804

Source: 2015 Illinois Manufacturers Directory® and Industrial Database

A part of Chicago’s answer to the manufacturing skills gap is the City Colleges of Chicago’s College to Careers Program – or C2C – where industry partners work with faculty to revise or design curriculum pathways and facilities and to create workplace learning opportunities. Industry partners also commit to interview or hire students who successfully complete a program.

Each of the seven City Colleges is home to an area of concentration that trains the next generation of workers at all levels. Richard J. Daley College on the southwest side of Chicago houses the Advanced Manufacturing Program. "We want to produce the shop floor leaders … people who can lead," said Ray Prendergast, Director of the Manufacturing Technology Program, in an interview with the Chicago Tribune.

Illinois and Chicago Manufacturing Economic Impact

- Manufacturing is Chicago’s second leading industry, adding **$53.9 billion** to the gross regional product.
- Manufacturing accounts for about **90 percent** of Illinois exports.
- Manufacturing pumped **$6.4 billion** in direct wages into the six-county region including and around Chicago.
- Each manufacturing job accounts for a “spin-off” of another 2.2 jobs — from shipping and logistics to food service and accounting — adding approximately **800,000 more jobs** to the economy.

Source: Chicago Council on Global Affairs

The program is drawing international attention. Just two years after C2C launched, the World Bank sent a team of 17 evaluators whose goal was to duplicate the program’s design and implementation plan for use in their partner countries. Their report found elements of the program that are “particularly striking”, including leadership from the top and effective partnerships with industry and employers.

As manufacturing becomes more technology-driven and the marketplace becomes more competitive for Chicago companies, it will be increasingly important for manufacturing companies to have financial advice based on solid knowledge of the industry and its challenges. When you have questions or are making decisions about financing your advanced manufacturing needs, talk with a professional who can guide you.