

# Forum explores challenges of high-tech manufacturing

By *Jay Fitzgerald*

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Innovative ideas can lead to the manufacturing of new products, but can manufacturing drive innovation and keep the country technologically competitive?

A lot of people in industry, the sciences, and academia are starting to ask this questions in the context of what America can do about its declining manufacturing base - and how manufacturing may play a bigger role than previously thought in spurring cutting-edge technologies. At stake are not only millions of high-paying jobs in the United States, but also the economic advantage that comes from leading innovation.

These questions were tackled last week at a Massachusetts Institute of Technology forum, part of MIT president Susan Hockfield's initiative to help reinvent the nation's manufacturing industry. The initiative was launched about a year ago following a deep recession that brought into focus the imbalance in a US economy that consumed far more than it produced.

Last year, for example, the nation's trade deficit - meaning it imported more than it exported - hit \$500 billion, according to the Commerce Department. The US trade deficit with China was nearly \$275 billion.

In recent years, many companies have followed the model in which research and development are conducted in the United States, but commercial scale manufacturing occurs in lower cost countries, such as China, said Suzanne Berger, a political science professor and cochairwoman of MIT's new Production in the Innovative Economy Committee. But, she noted, there has been little research on the relationship between R&D and manufacturing - and whether the loss of production capabilities undermines the ability to innovate.

Yet-Ming Chiang, an MIT professor of materials-science engineering and cofounder of Waltham-based A123 Systems Inc., indicated at the forum that he didn't need research studies to tell him there's a link between manufacturing and innovation.

After Chiang and his colleagues developed the technology for advanced lithium ion batteries for automobiles, Chiang said his team wanted to move right into production - but couldn't find an operating battery manufacturing plant in the United States. So much of the initial battery production "know-how" had to be obtained in China and Korea, he said.

A123 Systems has since opened plants in Michigan, where the company's scientists can better tinker with manufacturing procedures and product designs, developing new ideas and improving the quality of batteries in the process, he said.

“Do I think there’s a connection between manufacturing and innovation?” Chiang said after the forum. “Absolutely, I think there’s a connection. I believe it because we’ve practiced it.”

Edward Steinfeld, an MIT professor of political economy, added that some US firms with cutting-edge technology licenses are opting to move to China, where they can quickly move into commercial-scale demonstration projects and later full-scale production. The loss of these companies - and their talented workers and technologies - is the direct result of not having adequate production capacity here, he said.

Manufacturing employment has been declining for decades in the United States, accounting for nearly 1 in 3 jobs in 1950, but less than 1 in 10 today, according to industry data. The sector was particularly hard hit in the last two recessions, the tech bust in 2001 and the recent “Great Recession.”

**Massachusetts alone has lost nearly 116,000 manufacturing jobs since 2001, said John “Jack” Healy, president of the Massachusetts Manufacturing Extension Partnership, which helps manufacturers to stay in business by becoming more efficient.**

**Healy, who attended the MIT forum, said Massachusetts is lucky that it has a strong “advanced manufacturing” base, which he defined as the making of sophisticated and expensive products that rely heavily on new technologies and skilled workers. Advanced manufacturing now accounts for about 170,000 of the state’s total 260,000 manufacturing jobs, concentrated in such sectors as biotech, medical-devices, and electronic components, he said.**

**But that number will go down if economic policies don’t support and promote manufacturing, Healy added. For example, he said, the state has to do more in training high-skilled workers needed by advanced manufacturers.**

**“I firmly believe innovation follows manufacturing,” said Healy. “If we want to remain an innovation leader, we need manufacturing.”**