

Manufacturing Universities: A Catalytic Step Toward Revitalizing American Manufacturing

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While there are some signs that American manufacturing is beginning to recover from the unprecedented [losses of the 2000s](#), the reality is that [U.S. manufacturing value added still has not recovered from the Great Recession](#), and in 2012 remained 7.4% below 2007 levels.

While [some believe](#) that America's manufacturing recovery has already "turned the corner," the truth is that [policymakers have much more work to do](#) in establishing an institutional environment that supports the competitiveness of America's manufacturing economy on a sustainable basis.

This will include lowering the corporate tax rate and increasing trade enforcement, among other steps. But one component should be establishing a national system of "[manufacturing universities](#)" that incentivize post-secondary university programs to focus more on advanced manufacturing, while producing graduates better equipped with the knowledge and skills needed for careers in emerging, innovation-based industries.

Creating a network of U.S. manufacturing universities would address several systemic challenges that plague America's manufacturing economy.

First, in recent years, university engineering education has shifted away from a focus on real problem solving toward more abstract engineering science, leaving university engineering departments more concerned with producing pure knowledge than in working with industry to address their challenges.

More by Rob Atkinson

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One consequence of this has been that [American universities attract far less industry funding per researcher](#) than universities in competitor nations do. For example, [The World Academic Summit Innovation Index](#) finds that, of 30 nations, the United States ranks just 14th in attracting industry funding per university researcher, with Korean researchers receiving, on average, four times as much industry funding (\$97,900) than their American peers (\$25,800).

A second challenge has been that America's high schools and universities have not been producing sufficient numbers of graduates with the skills manufacturing employers need. For instance, the Society of Manufacturing Engineers contends that the number of unfilled manufacturing jobs—due to manufacturing employers being unable to find individuals with the skills they require—[could increase to 3 million by 2015](#).

In short, the United States needs to forge stronger industry-university research collaborations and also incentivize universities to focus more on training students with the requisite skills to support U.S. engineering-based industries.

Manufacturing Universities Act of 2014

To create a network of manufacturing-focused educational institutions that can address these challenges, Senator Chris Coons (D-DE) has introduced the *Manufacturing Universities Act of 2014*. The legislation, supported by a wide range of industry and university organizations, including the Association of American Universities and the Association of Public and Land-grant Universities, would incentivize engineering programs to focus more on advanced manufacturing and on better preparing America's engineers for advanced manufacturing careers.

Designated universities would revamp their engineering programs with a focus on manufacturing engineering and curricula designed specifically for targeted industries. This would include: joint industry-university research projects; training of students that incorporates manufacturing experiences through co-ops or internships; and a focus on turning out more Ph.D. engineering grads who would work in industry. Ph.D.s would be transformed into high-level apprenticeships (as they often are in Germany), where industrial experience is a requirement for graduation.

Likewise, criteria for faculty tenure would be reformed to include professors' work with industry and the connection of their research with industrial applications, as much as the number of publications. In addition, designated universities would also introduce new programs in their business schools that focus on manufacturing issues, including management of production, and integrate more closely with their engineering schools.

These universities would also appoint a Chief Manufacturing Officer, [as Georgia Tech has done](#), to oversee their interdisciplinary manufacturing programs and ascertain how they can maximize their impact on economic development.

Senator Coons' *Manufacturing Universities Act* would allocate \$5 million per year, over a four-year period, to universities submitting successful grant applications explaining how they intend to: improve engineering programs to emphasize manufacturing; increase the number of joint projects with manufacturing firms; increase the number of students who participate in for-credit internships and cooperative education; and increase the number of students who receive bachelor's, master's, or doctoral degrees in engineering disciplines related to manufacturing.

One can readily imagine a number of leading engineering universities—including CalTech, Carnegie Mellon, Georgia Tech, Lehigh, MIT, Michigan, Purdue, and Stanford, among many others—readily transforming themselves to embrace this “manufacturing university” designation.

Participating institutions would submit yearly progress reports to the National Institute of Standards and Technology (NIST), which would oversee the program, with NIST submitting a program-wide progress report to Congress every year that summarizes best practices and lessons learned from the manufacturing universities in facilitating academic-industry engagement and producing graduates with advanced engineering skills applicable in industry.

One model for these manufacturing universities could be the Olin College of Engineering in Massachusetts, which reimagined engineering education and curriculum to prepare students “to become exemplary engineering innovators who recognize needs, design solutions, and engage in creative enterprises for the good of the world.” [Olin's results have been impressive.](#)

Its new method of teaching engineering has been widely praised among engineering firms, and, on a per-student-graduated basis, Olin graduates start more new businesses than even MIT graduates. Olin is a good model for how the United States can transform its colleges into entrepreneurial factories while encouraging the development of completely new schools based on the needs of the current workforce.

In 1862, Congress passed the Morrill Act that established land-grant colleges whose mission was to promote learning in agriculture and mechanic arts. These institutions later became leaders in mechanization of agriculture, the American Industrial Revolution, and the tremendous expansion of our economy in the 20th century.

Today, the challenges America faces are even more pervasive, as a wide array of nations are already ahead in the race for global innovation advantage, particularly in manufacturing. A new cadre of “manufacturing universities”

can be a key part of the solution.

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