US Congress proposes expansion of advanced manufacturing network

manufacturing.gov/nnmi.html

Advanced manufacturing, a sector that relies on the technological knowledge and skills of a nation or region, has recently received a significant amount of attention in the United States. It has been an area of focus for the Obama Administration as evidenced by the President's proposal in 2012 to build a nationwide network of up to 45 manufacturing institutes. Named the National Network for Manufacturing Innovation (NNMI), the network has already been kick-started in the executive branch with the establishment of four advanced manufacturing institutes (with a fifth institute pending).

Some of the institutes already in place are strongly materials-based (as reported in the June 2014 issue of *MRS Bulletin*). And future institutes, like the proposed Clean Energy Manufacturing Innovation Institute for Composite Materials and Structures (aka the Advanced Composites Manufacturing Innovation Institute), will likely further capitalize on materials expertise within the United States. But while a handful of institutes have been established using existing funding, large-scale expansion of the advanced manufacturing network requires congressional action—action that is taking shape in the form of the bipartisan Revitalize American Manufacturing and Innovation (RAMI) Act of 2013.

RAMI was introduced in the Senate (S. 1468) and House (H.R. 2996) in August 2013 by Senators Sherrod Brown (D-Ohio) and Roy Blunt (R-Mo.) and Representatives Tom Reed (R-N.Y.) and Joe Kennedy III (D-Mass.). The companion bills seek to support and expand US advanced manufacturing by (1) improving competitiveness and increasing domestic production; (2) stimulating leadership in advanced manufacturing research, innovation, and technology; and (3) accelerating the development of an advanced manufacturing workforce.

The nearly identical bills would provide resources ($300 million) and authority for the Secretary of Commerce to establish centers for manufacturing innovation that span the country creating a Network for Manufacturing Innovation (NMI) within the National Institute of Standards and Technology (NIST). The Secretary of Commerce is further directed to establish within NIST the National Office for the NMI, which is tasked with coordinating and overseeing the program, entering into memorandums of understanding with other federal agencies involved in advanced manufacturing, developing a strategic plan for the NMI program, and establishing a publicly accessible archive of information related to NMI activities.

The RAMI legislation also requires the NMI program to incorporate the Hollings Manufacturing Extension Partnership, which would ensure the program impacts small- and medium-sized businesses. The one notable difference between the bills is that the Senate version requires the Secretary of Commerce to conduct a survey measuring the economic impact on the country of China's monopoly on rare-earth elements and reporting cooperative solutions that might counteract the imbalance.

"The RAMI legislation involves a shift in mindset from the linear innovation-commercialization chain to something more akin to a feedback loop while addressing the less technical issues that exist in the post-prototype stage," said Andrew Steigerwald, Senior Policy Director at the Council on Competitiveness. A materials scientist and former staffer for Senator Brown,

Ed Morris (left) and Alan Taub speak at a Congressional briefing in Washington, DC, about the National Network for Manufacturing Innovation (NNMI) on September 18, 2014, just after passage of the RAMI legislation in the House. Morris and Taub are both a part of the NNMI—Morris is the Director of the National Additive Manufacturing Innovation Institute (aka America Makes) and Taub is the Chief Technology Officer for the American Lightweight Materials Manufacturing Innovation Institute. Credit: Mike Waring of the University of Michigan Washington Office.

https://doi.org/10.1557/mrs.2014.266 Published online by Cambridge University Press

Steigerwald helped draft the RAMI legislation and added, "establishing these institutes in areas with regional expertise ensures the entire research-design-production process is embedded in a geographic area that allows private industry to tap into a local skilled workforce and encourages manufacturers to locate production near these centers, thereby capturing the added value of these new technologies."

Alan Taub, Engineering Professor at the University of Michigan and Chief Technology Officer for the recently established American Lightweight Materials Manufacturing Innovation Institute (ALMMII), said, "a key factor in developing the next generation of manufacturing processes is recognizing that final production performance requires optimization of both the composition of matter and the material processing." In many of the manufacturing institutes that would be established by RAMI, materials scientists would work together with manufacturing experts, and Taub points out, "we have entered the era when our modeling and experimental tools can be integrated [with manufacturing processes] and span the scales from atoms and molecules to components and full systems."

Y.T. Cheng, Professor of Materials Science at the University of Kentucky and a participant of ALMMII, pointed out another impact RAMI will have on the materials community, saying, "recruiting more faculty members with extensive industrial experience would be important to help promote industry–academic collaborations that are critical to the success of the manufacturing centers."

The RAMI bills have gained support from both political parties in both chambers of Congress in part because of the potential for the advanced manufacturing institutes to create jobs. "We know that jobs in the manufacturing industry support more spin-off jobs and have a stronger multiplier effect on our economy," said Senator Brown in a news release early this year.

The Senate version of the RAMI legislation was voted upon on April 9, 2014, and reported favorably out of the Senate Committee on Commerce, Science, & Transportation on August 26, 2014. After Committee passage, Senator Blunt said that the RAMI legislation has a lot of support from "the academic community, the high-tech community, as well as the business community," and expressed optimism regarding passage of the bill.

Meanwhile, the House version of the bill passed the House Science Committee in a unanimous vote on July 25, 2014, and garnered 100 bipartisan co-sponsors before it passed the House on September 15, 2014. In a press release after the passage of the RAMI legislation in the House, Representative Reed reiterated the job-creating power of the bill and said that its passage in the House "is the result of bipartisan partnership and countless input from industry leaders and colleagues on both sides of the aisle." In the same press release, Representative Kennedy characterized the House's passage of RAMI as "another step towards the kind of domestic manufacturing policy our country needs to stay on the cutting edge of a global economy."

Although the RAMI legislation has strong support both in the Congress and the White House (President Obama has called for expansion of the advanced manufacturing network), RAMI still faces several hurdles before it can become a law. With the looming midterm elections in November, it is impossible to predict how the 113th Congress will wrap up and if the RAMI legislation will get its day in the Senate. As the co-sponsors of the bills have pointed out, the bipartisan nature and job-creating aspects of the RAMI legislation may speed its passage—only time will tell. If the legislation does not pass before the end of the year, it (along with all other pending legislation from the 113th Congress) will die at the end of the Congress. However, even that may not be the end of the story for RAMI—many bills are reintroduced (and some successfully passed) in subsequent Congresses.

Jennifer A. Nekuda Malik

Science highlights reported to Indian Parliament
www.dst.gov.in

The status of various scientific issues was reported to the Indian Parliament, Lok Sabha, in August by the Union Minister of State for Science and Technology and Ministry of Earth Sciences, Jitendra Singh. The number of highly cited papers from India has increased by 81% in the 2006–2010 time frame as compared to the 2001–2005 time period. According to the Scopus International database, India reached the ninth position in 2010. "India today is placed 3rd in the world in terms of scientific publications in Nanoscience and Nanotechnology and figures among the top ten countries in terms of *h*-index," Singh reported.

In the areas of materials and energy, Singh reported that three bioenergy centers have been established to conduct research on synthetic biofuels as well as a systems approach for novel biofuel production. Singh reported that specific support has been given for biohydrogen, biobutanol, and biofuels. He also reported on an initiative to produce fuel from plastic waste. The CSIR-Indian Institute of Petroleum (IIP) in Dehradun has developed such technology after a decade of research. "Gas Authority of India Ltd. has sponsored the entire project for developing a combination of catalyst which can convert plastic either into gasoline or diesel or aromatics along with LPG as a common byproduct," Singh reported. IIP is now developing the technology to make it economically viable. Numerous countries are working on similar technology including the United States, Germany, Japan, Australia, and the United Kingdom. □

https://doi.org/10.1557/mrs.2014.266 Published online by Cambridge University Press