



Manufacturing USA: Opportunities for Chemical and Biological Enterprises

The chemical and biological engineering professions are working more rapidly, nimbly, and smartly, thanks in part to the Manufacturing USA initiative, a major federal government program that looks to secure the future of U.S. manufacturing through innovation, education, and collaboration. The initiative offers opportunities for new job creation and economic growth for chemical and biological engineering enterprises by forming institutes, such as the Rapid Advancement in Process Intensification Deployment Manufacturing Institute (RAPID), the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), and the Clean Energy Smart Manufacturing Innovation Institute (CESMII).

At a national level, Manufacturing USA connects people, ideas, and technology to solve advanced-manufacturing challenges, enhance industrial competitiveness, increase economic growth, and strengthen U.S. national security. The institutes bring members of the manufacturing community together, across industries, to overcome technical hurdles and innovate. They seek to restore U.S. preeminence in manufacturing by addressing shared manufacturing technology and workforce challenges.

To date, Manufacturing USA has established 14 manufacturing innovation institutes. Each of them is a public-private partnership that focuses on one technological or industrial sector, and many of them address systems, chemical engineering, and biological engineering. All have common goals of encouraging partners in industry, academia, and government to collaborate and nurture manufacturing innovation.

The U.S. government has invested significantly in developing these manufacturing innovation institutes. Initially launched in 2014 as the National Network for Manufacturing Innovation (NNMI), and operated by the interagency Advanced Manufacturing National Program Office (AMNPO), Manufacturing USA's primary goal is to create jobs and a more robust manufacturing sector in the U.S. The office operates in partnership with the U.S. Depts. of Defense, Energy, Education, Agriculture, and Labor; National Aeronautics and Space Administration (NASA); and National Science Foundation (NSF).

Clearly, all engineering professions will play a major role in helping to identify and solve each of the manufacturing institutes' grand challenges. AIChE and its members are directly involved with some of the institutes, most notably RAPID, which focuses on the design and implementation of new processes. It has six focus areas designed to reduce

energy consumption and create jobs in the U.S.: chemical and commodity processing, natural gas upgrading, renewable bioproducts, intensified process fundamentals, modeling and simulations, and modular manufacturing. AIChE is the 501(c)(3) organization that runs RAPID.

Other affiliates include CESMII, operated by the Smart Manufacturing Leadership Coalition, which focuses on smart operations of existing enterprises. It uses advanced data acquisition methods and controls to optimize process operations for more-sustainable operations.

NIIMBL, run by the Univ. of Delaware, focuses on prescription drugs made with living cells. These include vaccines, cancer drugs, immunological therapies, as well as emerging cell and gene therapies. NIIMBL's main goal is to bring safe drugs to market faster, and to develop the skilled workforce that will be needed to do this.

Reducing Embodied-Energy and Decreasing Emissions (REMADE), which focuses on sustainable manufacturing, is also directly related to chemical engineering. In addition, the Advanced Regenerative Manufacturing Institute (ARMI) focuses on tissue engineering.

These institutes have overlap with AIChE's programming, technical entities, and educational activities. AIChE is a member of these institutes and stands ready to provide support in education, outreach, networking, and programming.

One of AIChE's latest initiatives was to feature a new manufacturing exhibit at the AIChE Annual Meeting. Many of the 14 manufacturing institutes had started their programs and launched early services, but, until the 2017 AIChE Annual Meeting, there were few opportunities for engineering companies, academics, and government laboratories involved in this work to showcase their technologies. The 2017 AIChE Meeting launched an exhibition, or trade show, to address this need and highlight the diverse engineering members of the various Manufacturing USA institutes. The exhibit worked in synergy with the meeting's program, in which academic and industry experts covered a wide range of topics relevant to cutting-edge research, new technologies, and emerging growth areas in chemical and biological engineering. The exhibit's main goal was to continue to help spur the manufacturing rebirth in the U.S. by highlighting the innovations that Manufacturing USA and government investment have made possible. As work at each of the institutes continues (RAPID, for example, has selected its first 25 research projects — see p. 55), we can expect a bigger and better exhibit in 2018.

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