ADVANCED MANUFACTURING AT NIST

BY THE NUMBERS

70%
Of private R&D is done by manufacturers *(Congressional Research Service)*

$2.1 trillion
Was contributed to U.S. economy in 2014 by manufacturing *(Bureau of Economic Analysis)*

12.1%
Of the U.S. Gross Domestic Product comes from manufacturing *(Bureau of Economic Analysis)*

42%
Of U.S. exports in 2014 were manufactured goods *(Census Bureau/ Bureau of Economic Analysis)*

Worldwide, manufacturers are focusing increasingly on investments in technology advancements that can help them "further innovate, automate and advance their processes and, thus, remain competitive in the market," according to a 2015 survey of manufacturing executives by Deloitte and the Manufacturers Alliance for Productivity and Innovation. The United States can leverage strengths in science and technology research and move to the head of the pack. But competitors are upping their R&D spending with the aim of inventing their way to the top. The U.S. must do the same in order to remain competitive.

What NIST Does

At a time of opportunity and challenge for U.S. manufacturing, NIST is working with industry and universities to develop essential measurement capabilities and to forge precompetitive collaborations that help U.S. manufacturers overcome shared technical obstacles. A partner to the U.S. manufacturing sector for more than a century, NIST has a proven track record in delivering useful tools and technical assistance that existing manufacturers and aspiring start-ups need. Timely technical assists from NIST can help the nation's manufacturers to invent, innovate and create new products and services more rapidly and more efficiently than their competitors around the world.

NIST's efforts rely on three major mechanisms:

- **Partnerships:** NIST's partnerships with large and small manufacturers, federal agencies and academic institutions help it anticipate and meet the needs of rapidly evolving industries.
- **Standards:** NIST's technical work underpins the development of international standards in areas such as automation, data exchange and smart manufacturing.
- **Measurements:** NIST-enabled measurements in emerging technology areas, including nanomanufacturing, protein therapeutics and advanced materials, can lead to transformative advances important to industry and government alike.

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NIST
National Institute of Standards and Technology
U.S. Department of Commerce

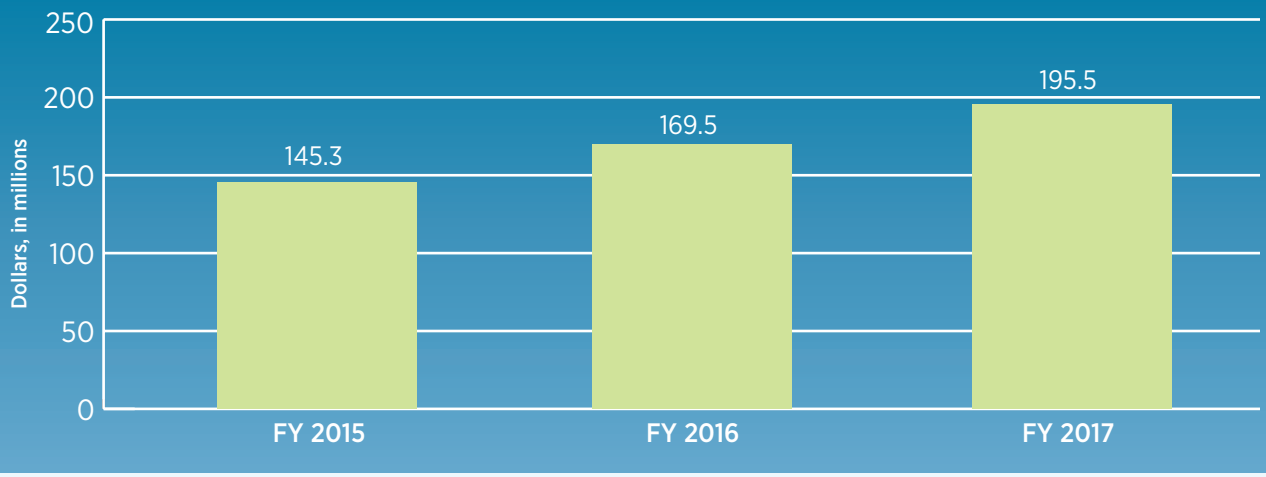
Recent Program Highlights

- In proof-of-concept experiments, agency researchers demonstrated that two emerging technologies pioneered at NIST can measure critical features on integrated circuits at nanoscale dimensions—crucial for building next-generation chips and other products with nanoscale features.
- NIST updated its *Guide to Industrial Control Systems (ICS) Security*, ensuring the continued utility of the tool, which has been downloaded more than 3 million times since its first release in 2006.
- Deployed the Materials Data Curation System, which captures, shares and transforms manufacturing-relevant materials data in a format that is readable on a variety of devices. This system is an essential resource for government, academic and industry researchers working to realize the vision of the Materials Genome Initiative.

Program Goals

- Support the **Materials Genome Initiative** to discover, develop and deploy new materials twice as fast as today by developing the infrastructure for materials data and models.
- Keep the United States at the forefront of **innovations** that support manufacturers in diverse areas, including smart manufacturing, biomanufacturing and precision measurements for improved instruments and processes.

Budget



New for FY 2017

NIST will address critical needs in advanced manufacturing by enabling noninvasive sensing and real-time process analysis. The request includes a $2 million increase to:

With the requested funds, NIST will focus on:

- Develop noninvasive sensing and real-time processing for high-value products with micro- and nanoscale structures, to improve process performance.
- Establish new standards and measurements to enable new device concepts, logic and materials based on semiconductors, metals and ceramics.