

# ADVANCED MANUFACTURING AT NIST

## BY THE NUMBERS

**70%**  
of U.S. industry  
research & devel-  
opment is done  
in the manufacturing sector  
*(Congressional Research Service)*



**70%**  
of patents to U.S.  
entities are for  
manufacturing  
*(National Science  
Board)*



**\$1.00 → \$2.08**

\$2.08 returned to the U.S.  
economy for every \$1 spent  
on manufacturing  
*(MAPI Foundation, 2014)*

**786,000+**

Quality jobs  
created by  
manufacturing  
since 2010

*(Bureau of Labor Statistics)*



## The Challenge

“The United States’ leadership in manufacturing comes from its leadership in advanced technologies and the innovation that fuels their discovery and adoption...Sustaining U.S. competitiveness in manufacturing is thus, ultimately, an exercise in staying at the forefront of new technologies and continually breaking boundaries in both what and how it can be manufactured.”

—President’s Council of Advisors on Science and Technology, 2014. NIST’s ability to anticipate and meet the needs of the advanced manufacturing industry is critical to the revitalization and long-term stability and success of the manufacturing sector.

## What NIST Does

NIST has partnered with the U.S. manufacturing sector for more than a century, providing the measurement tools and other essential technical assistance that existing manufacturers and aspiring start-ups need. NIST continues to help manufacturers invent, innovate, and produce 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 us anticipate and meet the needs of rapidly evolving industries.
- **Standards:** NIST’s technical work underpins the development of international standards for advanced manufacturers in areas such as automation, data exchange, and smart manufacturing.
- **Innovative manufacturing measurements:** NIST develops new approaches to measurements in emerging technology areas including nanomanufacturing, protein therapeutics, and advanced materials and makes transformative advances to the fundamental measurements relied on by industry and government alike.

[www.nist.gov](http://www.nist.gov)

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

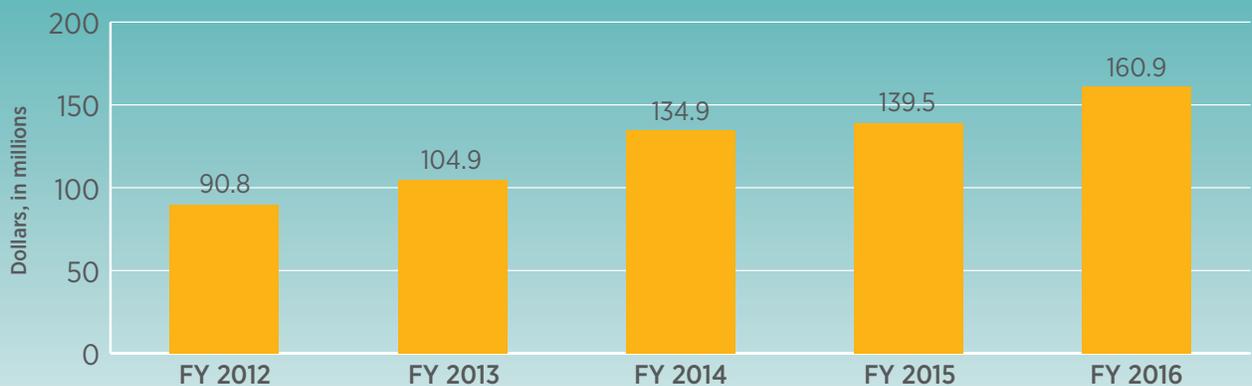
## Program Goals

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

## Recent Program Highlights

- The NIST Center for Automotive Lightweighting (NCAL) worked with major automotive and materials companies to develop testing protocols for smarter materials that will dramatically reduce the weight of new motor vehicles, a \$730 billion market sector.
- NIST is partnering with industry and standards organizations to design a suite of standards for benchmarking additive manufacturing. Also referred to as “3-D printing,” additive manufacturing will revolutionize the creation of complex metal parts for aerospace, energy, and other industries.
- Recent NIST innovations in measurement include a thermometer based on fundamental physics that is faster and lighter than today’s wire thermometers, a “microcomb” clock based on the research of 2012 Nobel Laureate and NIST physicist David Wineland, and a self-calibrating sensor for measuring tiny forces.

## Budget



## New for 2016

NIST is requesting an additional \$21.5 million to focus on:

- Increasing its technical capacity in advanced computational and experimental techniques for materials discovery, including new high-throughput tools that will dramatically accelerate the prediction of new materials by generating a high volume of quality data and simulation tools.
- Developing sensors for diagnostics and process control in advanced manufacturing of high-value added products by expanding capacity in key technical areas including electronics, optics, and photonics.
- Fostering and accelerating the democratization of manufacturing and the grass-roots entrepreneurship trend by providing infrastructure to promote knowledge transfer, facilitate experimentation, and connect “makers” to the manufacturing ecosystem.