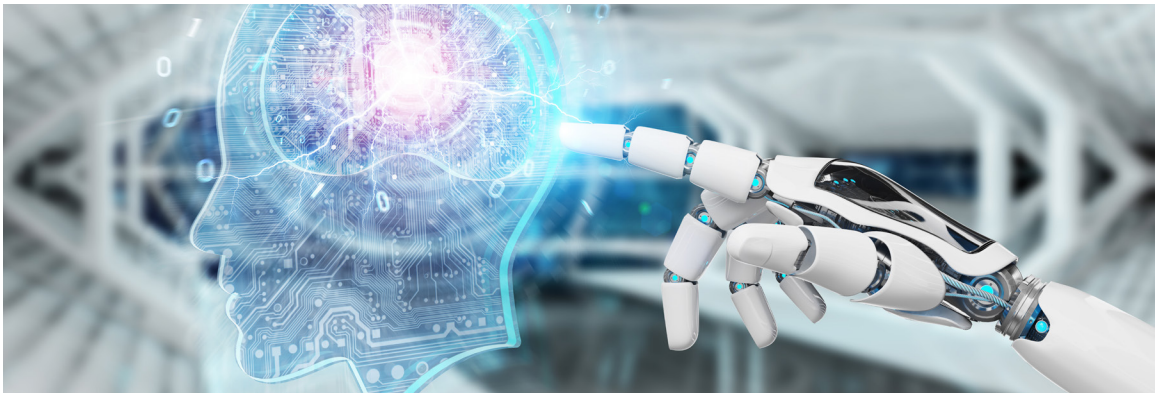
AMERICAN LEADERSHIP IN ADVANCED MANUFACTURING



Americans depend on manufacturing for nearly every modern convenience, from clothing and cars to homes and appliances to food and medicine. Today, new technologies are transforming the industry as we know it, promising more dynamic and efficient products that enhance our way of life. These innovations will also bring about new industries that could impact national well-being. The U.S. National Science Foundation invests in research to accelerate this manufacturing revolution and to develop the technology, workforce and infrastructure necessary to secure U.S. manufacturing competitiveness far into the future.

FAST FACTS

1980s
The decade when critical support from NSF enabled the foundational techniques for additive manufacturing, paving the way for 3D printing.

$250M
Amount NSF currently invests per year in advanced manufacturing research.

15
Number of Manufacturing Innovation Institutes supported by federal agency partners.

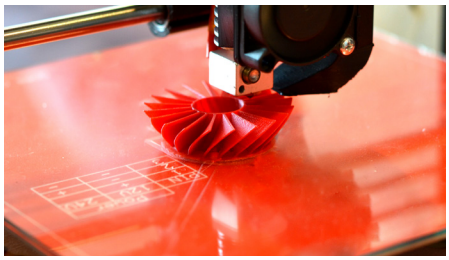
140
Approximate number of industry partners involved in NSF's Florida Advanced Technological Education Center, one of seven centers that prepare highly skilled technicians for manufacturing careers.

MANUFACTURING, AN AMERICAN PRIORITY

A strong manufacturing base is central to national security and to a robust U.S. economy. NSF investments are part of a coordinated federal strategy to advance U.S. manufacturing leadership across all industrial sectors.

In 2018, the White House released a "Strategy for American Leadership in Advanced Manufacturing," establishing a federal framework to develop and transition new manufacturing technologies, to strengthen the manufacturing supply chain, and to empower the manufacturing workforce.

NSF AND THE MANUFACTURING REVOLUTION



Since its founding, NSF has helped push the manufacturing frontier, funding groundbreaking discoveries from nanomaterials to computer-aided design to 3D printing.

NSF is a pioneering supporter of 3D printing and continues to support advancements in this rapidly evolving field. A tool to turn ideas into reality, this advancement has revolutionized the creation of everything from electronic devices to artificial organs.

NSF'S ADVANCED MANUFACTURING PORTFOLIO

MULTIDISCIPLINARY COLLABORATION

NSF supports multidisciplinary research to transform manufacturing methods, capabilities and practices. The **Advanced Manufacturing** program accelerates advances in manufacturing technologies, building new science and leading to fundamental changes and improvements in manufacturing.

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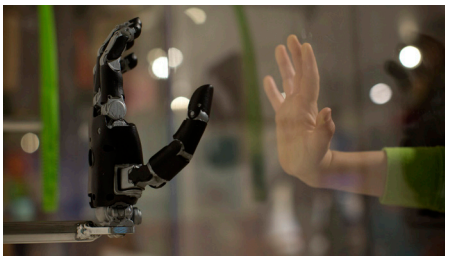
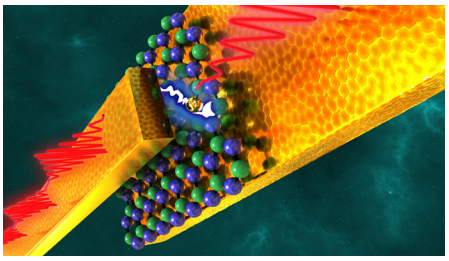
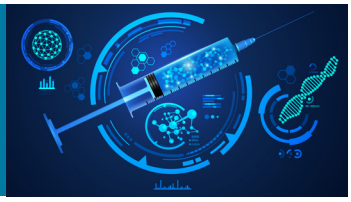




The **Future Manufacturing** program looks upstream to lay the groundwork for a new generation of manufacturing industries that do not yet exist. This forward-looking initiative begins with a focus on the emerging areas of cyber-manufacturing, eco-manufacturing and biomanufacturing research.

By enabling reproducible, cost-effective and high-quality production of cells and cell products, advances in biomanufacturing will bring us personalized therapies and faster vaccines.



The **Emerging Frontiers in Research and Innovation** program supports projects that have the potential to create new industries or address societal needs and grand challenges. The current investment focuses on revolutionizing chemical process industries and promoting environmental sustainability of plastics.

Through **Grant Opportunities for Academic Liaison with Industry** proposals, NSF stimulates collaboration between academic research institutions and industry. Industry research participants provide critical research expertise, while academic participants gain experience in an industrial setting.

CREATING NEXT-GENERATION TECHNOLOGIES

NSF industry partnerships inspire more dynamic products and to more quickly move them to the marketplace through innovative manufacturing processes and systems.

Semiconductor Synthetic Biology is creating new information technologies that are based on biological principles and built with biomaterials. These innovations could enable computers with storage capacities 1000 times greater than today's and lasts more than 100 years.

Together with other federal agencies, NSF is a leader in the **National Robotics Initiative**, which supports the use and development of robots that work alongside people. These next-generation robots enhance human capabilities, performance and safety in a variety of industries, including manufacturing.

Engineering Research Centers and **Industry-University Cooperative Research Centers** support partnerships with industry and universities to enable competitive innovations that are well positioned for the marketplace. For example, the Nanomanufacturing Systems for Mobile Computing and Mobile Energy Technologies Center is creating methods to revolutionize future-generation mobile computing.

EXPANDING THE MANUFACTURING WORKFORCE

NSF invests in strategic educational and experiential programs to expand and nurture the advanced manufacturing workforce.

Advanced Technological Education program supports innovations at the undergraduate and secondary level to prepare the advanced manufacturing workforce of the future. This program encourages career pathways, curriculum innovation and professional development for instructors.

Manufacturing USA, the National Network for Manufacturing Innovation, is a federal interagency effort to support Manufacturing Innovation Institutes. A common goal across these institutes is to build a workforce pipeline to support advanced manufacturing, including world-class, entry-level technicians.

DID YOU KNOW?

NSF was the first federal agency to fund nanoscience and engineering projects. The study of extremely small things, nanoscience has enabled life-altering innovations like the camera lens on your smartphone, new biosensors to detect disease and energy-efficient cars made of lightweight materials.

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