NSF Future Manufacturing Webinar (NSF 24-525)

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Funding opportunity page: https://beta.nsf.gov/funding/opportunities/future-manufacturing-fm

Proposals due April 11, 2024 (and January 13, 2025)

Why Future Manufacturing?

- National Strategy: support fundamental research to enable sustainable new manufacturing technologies & education to grow production & employment in America's manufacturing sector
- CHIPS & Science: supports microelectronics manufacturing, quantum, additive, AI/ML, and more
- Executive Orders: Biomanufacturing processes, equity, infrastructure, invent/build here

THE WHITE HOUSE

JULY 28, 2023

Executive Order on Federal Research and Development in Support of Domestic Manufacturing and United States Jobs

THE WHITE HOUSE

SEPTEMBER 12, 2022

Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy

NATIONAL STRATEGY FOR ADVANCED MANUFACTURING

A Report by the

SUBCOMMITTEE ON ADVANCED MANUFACTURING

COMMITTEE ON TECHNOLOGY

of the

NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

October 2022

Public Law 117–167
117th Congress

An Act

Making appropriations for Legislative Branch for the fiscal year ending September 30, 2022, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. TABLE OF CONTENTS.

The table of contents for this Act is as follows:

Sec. 1. Table of contents.
Sec. 2. References.

DIVISION A—CHIPS ACT OF 2022

Future Manufacturing will involve new:

- Materials, chemicals, semiconductor & quantum devices and integrated systems
- Chemical and biological processes & integration
- Semiconductor manufacturing techniques
- Integration of systems & synthetic biology & bioprocessing
- Supply chains
- Process design and control
- Sensing & modeling
- Data mining and predictive analytics
- Modalities of work & human factors

Results will help:

- Enhance U.S. manufacturing leadership
- Expand job opportunities for a diverse STEM workforce
- Minimize environmental impact
- Address social challenges
- Speed the product evolution cycle

Future Manufacturing awards support:

- Fundamental **research** *and*
- **Education** of a future workforce to
- Catalyze **new** manufacturing approaches which
- Eliminate scientific technological, educational, economic, and social **barriers** that limit current manufacturing

Future Manufacturing: distinctions from other programs

- **New** transformative capabilities
  - Significant change from current practice
- Not improvements or incremental changes to existing processes
  - Complementary to Advanced Manufacturing
- Very low Technology Readiness Level
  https://www.nasa.gov/pdf/458490main_TRL_Definitions.pdf
- **Multidisciplinary** teams and a **convergence** research approach

NSF participants in this solicitation

- Directorate for Engineering
- Directorate for Mathematical and Physical Sciences
- Directorate for Biological Sciences
- Directorate for STEM Education
- Directorate for Computer and Information Science and Engineering
- Directorate for Social, Behavioral and Economic Sciences
- Directorate for Technology, Innovation and Partnerships
- Office of International Science and Engineering
- Office of Integrative Activities

Research must be in ≥ 1 of these 3 thrust areas

Cyber Manufacturing

- Intersection of computing, networking, sensing, AI & manufacturing

Eco Manufacturing

- Holistic manufacturing processes/lifecycles, waste/energy/resource reduction

Biomanufacturing

- Biologically-based production and bio-based technologies

Award tracks

- **Research Grant** (FMRG): Fundamental, multidisciplinary, and integrative research and education
  - 4 years, $750k/yr
  - Larger teams doing convergence research
- **Seed Grant** (FMSG): Teambuilding, concept development, and research initiation
  - 2 years, $250k/yr
  - Possibly leading to future FMRG proposals

- Title must contain track and *primary* thrust name, e.g., FMSG: Bio:
- A person may be PI/co-PI/Sr Personnel on only one proposal per track, per year
  - Check that your co-PIs/subawardees aren't participating in another proposal

Optional Future of Work research component

New!

- Innovations in social and organizational aspects of manufacturing where emerging technological innovation integrating human workers outperforms all alternatives
- Research focuses on the interaction of the human manufacturing worker with the manufacturing technology or process from a social, organizational, cognitive, behavioral, training, or health perspective
- Research shows potential to advance relationships between manufacturing, work, and society to:
  - strengthen the social fabric and promote human agency and dignity
  - enhance the mental and physical well-being of manufacturing workers and the broader community
  - protect the environment
  - facilitate ongoing innovation and continual constructive disruption in manufacturing

Why include an *optional* Future of Work research component?

- Synergize process and product innovation
- Create novel human/technology partnerships to improve productivity, employment, & other metrics
- Advance US economic & societal strength & resilience
- Enhance Intellectual Merit of proposal

Timeline

- Proposals due by April 11, 2024, 5pm local time:
  - For multiple institutions: one proposal with sub-awards, no collaborative proposals permitted
  - **Must submit through Research.gov or Grants.gov, not FastLane**
- Aim to make awards by end of September
- Next year, proposals will be due by January 13, 2025

We encourage you to make the most of other institutions, activities, and resources

- Lead by/Partnering with:
  - Minority-Serving Institutions
  - Primarily Undergraduate Institutions
  - Community Colleges/2-yr institutions
  - Institutions in EPSCoR states/territories
- Industrial collaborations, GOALI
- International collaborations
- Manufacturing USA Institutes
- NSF Engineering Research Centers
- DUE's Advanced Technological Education and Improving Undergraduate STEM Education programs
- Non-Academic Research Internships for Graduate Students
- Research Experiences for Undergraduates or Teachers
- Engineering education programs such as PFE, RFE, REIF, RED

International Collaborations

- International collaborations in both tracks are welcome
- Proposers may take advantage of opportunities provided by existing NSF programs that promote international collaborations:
  - Supplements, possible Lead Agency Opportunities, …
  - Please explore: https://www.nsf.gov/od/oise/IntlCollaborations/index.jsp
  - Questions? stekinay@nsf.gov or oisecomms@nsf.gov
- NSF funds should be used to support only U.S.-based participants in any international collaboration, with very few exceptions

Required Project Description sections

(See solicitation for details about each section. 15-page limit for either track.)

- Project description
  - Rationale, approach, plans
  - Must include results from prior NSF support for all PIs, or proposal will be returned
- Enabling future manufacturing
  - Significant industrial/social/economic/education impacts, field(s) being transformed, challenges being overcome, changes from practice, fit in thrust, suitability of team
  - Put in a global context (publications, centers of excellence, translation to practice, etc.)
- Scope and scale (FMRG only)
  - Justify the resources requested
- Project management and collaboration plan (FMRG only)
  - Describe roles, institutions, contributions, coordination
- Education and workforce development activities
  - Basis for training future diverse workforce, integration of research & education
  - FMRG: 3-page supplementary document; FMSG: in Project Description
- Future of Work Research Component (FW option only)
  - Focus on human manufacturing worker; leadership & coordination with rest of project

Merit Review Criteria (see solicitation for details)

- Intellectual Merit
- Broader Impacts
- FM-specific criteria for all proposals:
  - Eliminates barriers that limit manufacturing today and catalyzes new manufacturing capabilities
  - For proposals with optional FW component: important & integrated research on the manufacturing worker
- FM-specific criteria for FMRG proposals only:
  - Educational activities will equip people with the skills for Future Manufacturing and broaden recruitment, inclusion, and participation
  - Anticipates effects of Future Manufacturing on the economy, environment, labor force, industry and/or society at large, including in a global context
  - Multidisciplinary team composition appropriate, and activities integrated among all team members
- FMRG reviewers may include educational & social science experts to complement the technical experts

When preparing a proposal, ask yourself:

- Is it Future?
  - Eliminates barriers that limit manufacturing today: not incremental, not “now”
  - Catalyzes new manufacturing capabilities
- Is it Manufacturing?
  - Focus on manufacturing processes or systems
  - Not just new materials
- Does it involve fundamental research?
  - Not development or optimization
  - Produces knowledge and understanding that’s generalizable
- Does it fit one or more of the three thrusts?
  - Cyber, Eco, Bio

For more information:

- Funding opportunity page with links to solicitation and announcements: https://beta.nsf.gov/funding/opportunities/future-manufacturing-fm
- Most of the FAQ list from 2021 is still relevant: https://www.nsf.gov/pubs/2021/nsf21061/nsf21061.jsp
- Email FutureManufacturing@nsf.gov with general questions
- Contact program officers listed in the solicitation regarding specific areas of research/education
- See previous awards: https://www.nsf.gov/awardsearch, keywords FMRG & FMSG

- A recording and transcript of the webinar, along with the slides, will be accessible from the event page shortly after conclusion of the webinar

Q&A

Submit questions using the Q&A icon in Zoom 

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