

At-A-Glance

Advanced Manufacturing involves using new products or processes in the manufacturing sector, which introduce new potential worker safety and health risks. This snapshot shows recent accomplishments and upcoming work in advanced manufacturing.

What are our priorities?

In January 2019, NIOSH created a new initiative to investigate the potential worker health implications from exposures in Advanced Manufacturing (AM). This rapidly growing area uses innovative manufacturing technologies combined with both established and novel materials that have new and uncharacterized safety and health concerns. NIOSH began working with public and private partners to evaluate exposures from key advanced material and additive manufacturing processes that are already seeing broad application. NIOSH's priorities are to:

- Investigate and establish the degree of worker health and safety burden from AM processes;
- Evaluate and disseminate hazard and risk management practices in multiple sectors using AM technologies; and
- Improve safety practice training in workforce development.

What do we do?

- Develop a strategic approach, similar to nanotechnology, supporting safe and responsible AM in the United States.
- Participate in the [US Advanced Manufacturing Initiative](#) to gather burden data and insert safety and health concepts into workforce development efforts.
- Coordinate current and ongoing efforts in NIOSH, including a pilot project competition.
- Create partnerships with the [Advanced Manufacturing Innovation](#) consortia to assist in development and dissemination of best practices.
- Continue to develop current partnerships with multiple private sector companies.
- Provide national leadership by disseminating guidance for responsible development through site visits, industry and professional organizations, and standards development organizations.
- Participate in interagency collaborations through the White House Office of Science and Technology Policy (OSTP) Workgroup on Synthetic Biology.

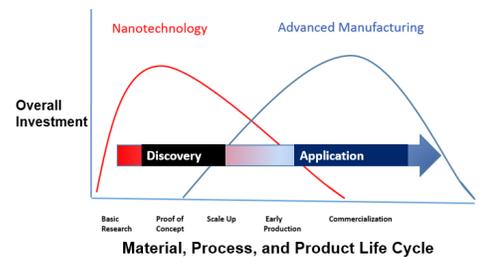
What have we accomplished?

- Designed and fabricated an engineering control that reduced a widely used 3D printer model's emissions by >98%.
- Published journal articles defining the occupational safety and health challenges of [advanced manufacturing](#) and [3D printing](#).
- Published [a trade article](#) on Industrial Hygiene in 21st century manufacturing.
- Published the first [inhalation toxicology](#) findings of microvascular dysfunction from exposure to 3D printer emissions.
- Investigated and [published](#) worker exposure data from industrial-scale additive manufacturing showing release of ultrafine particulate and volatile organics into the workplace.
- Visited 10 Additive Manufacturing and 3D printer user sites to evaluate exposures.
- Presented our findings to partners, including a keynote presentation at the 2018 Product Stewardship Conference on the health and safety impacts of exposure in AM.
- Contributed to the development of the first standard on emissions testing for 3D printers (UL 2904).

What's next?

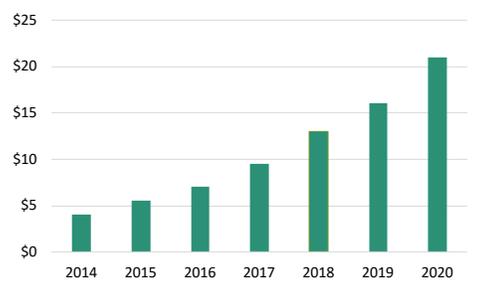
- Develop and release the NIOSH Advanced Manufacturing strategic plan and website.
- Publish an engineering control study and release designs and specifications.
- Produce two instructional posters that promote safe practices for additive manufacturing.
- Formalize a partnership with the America Makes Innovation Institute.
- Sponsor a workshop to gather best practices for safe advanced manufacturing.
- Contract with the Science and Technology Policy Institute to develop a scoping study for biomanufacturing and digitalization.

The progression of materials, processes, and products from nanotechnology to advanced manufacturing



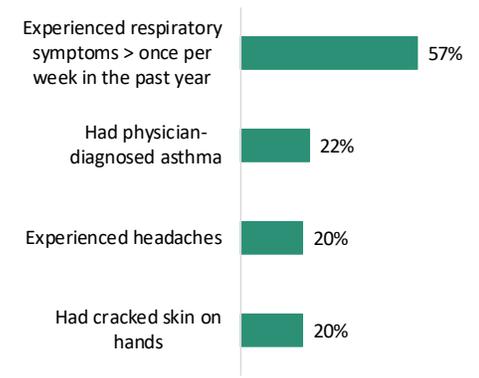
Source: Adapted from *Synergist* 2018 Jan; 29(1):20-24

Worldwide 3D printing industry forecast, in Billions USD



Source: Wholers Report, 2014

A study of 47 workers in 17 facilities found that working with 3D printers full-time was associated with negative health outcomes



Source: Centre for Research Expertise in Occupational Disease Research Flash – August 2017

To learn more, visit <https://www.cdc.gov/niosh>