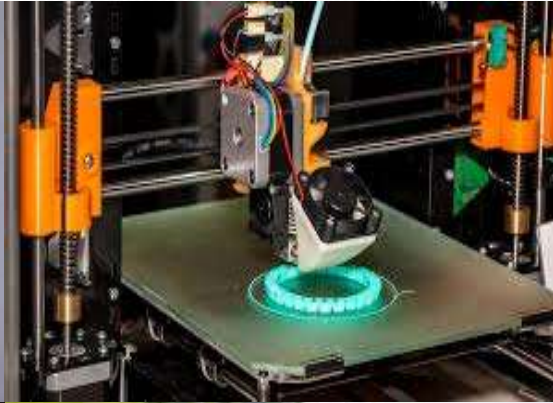
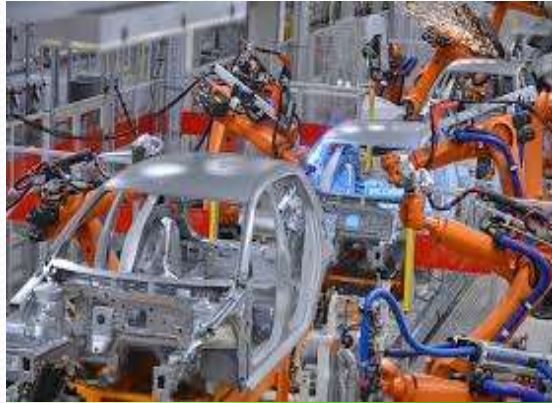


Emerging New Technologies and Impact on Occupational Health: State of the Science

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26 March 2019

*Work Related Injuries Workshop
March 24th & 25th, 2019*





Work Related Injuries Workshop
March 24th & 25th, 2019



New Technologies

- Robotics
- Nanotechnology
- 3-D Printing

Robotics



<https://youtu.be/N5AYZxsnDuM>



Robotics in the Workplace

According to NIOSH:

- Increasing number of conventional industrial robots being used by companies in the United States
- Include: powered exoskeletons and autonomous cars

<https://www.cdc.gov/niosh/topics/robotics/aboutthecenter.html>

The National Institute for Occupational Safety and Health (NIOSH)

Workplace Safety & Health Topics > Robotics



🏠 Workplace Safety & Health
Topics

Robotics

About the Center

News & Events

Research

Partnerships & Resources

Publications

Promoting productive workplaces
through safety and health research **NIOSH**®

ROBOTICS

About the Center



NIOSH conducted extensive robotics safety research when robots began appearing in the workplace in the 1980s. This research was limited to robots designed to work in isolation from workers, such as robots in cages or cells. With the increase in robots and advances in their capabilities, the Center was established in September 2017 to address the safety of today's

<https://www.cdc.gov/niosh/topics/robotics/aboutthecenter.html>

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Nanotechnology



<https://www.youtube.com/watch?v=gIt56ZX8roA>
<https://www.youtube.com/watch?v=1kWApU3o6ko>



<https://www.cdc.gov/niosh/topics/nanotech/faq.html>

Nanotechnology

Nanotechnology Research Center

Guidance & Publications

Field Studies Effort

10 Critical Topic Areas

News & Events

Partnerships & Collaborations

Frequently Asked Questions

Other Resources

NANOTECHNOLOGY



10 Critical Topic Areas

NIOSH has identified 10 critical topic areas to guide in addressing knowledge gaps, developing strategies, and providing recommendations.

Each topic provides a brief description of the research that NIOSH is conducting in the area of nanotechnology and the applications and implications of nanomaterials in the workplace.

Toxicity and Internal Dose

Risk Assessment

Epidemiology & Surveillance

Engineering Controls and PPE

Measurement Methods

Exposure Assessment

Fire and Explosion Safety

Recommendations & Guidance

Global Collaborations

Applications

Respiratory Protection

Read "[Respiratory Protection for Workers Handling Engineered Nanoparticles](#)" on the NIOSH Science Blog and share your comments.

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Nanotechnology in the Workplace

- Workers within nanotechnology-related industries have the potential to be exposed to uniquely engineered materials with novel sizes, shapes, and physical and chemical properties
- Occupational health risks associated with manufacturing and using nanomaterials are not yet clearly understood
- Minimal information is currently available on dominant exposure routes, potential exposure levels, and material toxicity of nanomaterials

<https://www.cdc.gov/niosh/topics/nanotech/default.html>

3-D Printing



<https://www.youtube.com/watch?v=U-8-lu4mq8o>

What is additive manufacturing/3D printing?

Joining materials to make objects from 3D model data, usually layer upon layer (ISO/ASTM 52900:2015....Formerly ASTM F2792).

Subtractive Manufacturing



• Photo: Fabricatingandmetalworking.com

Additive Manufacturing

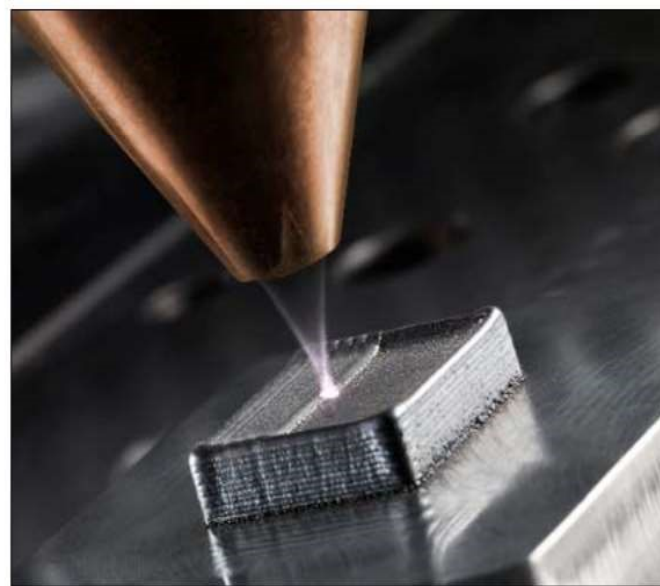


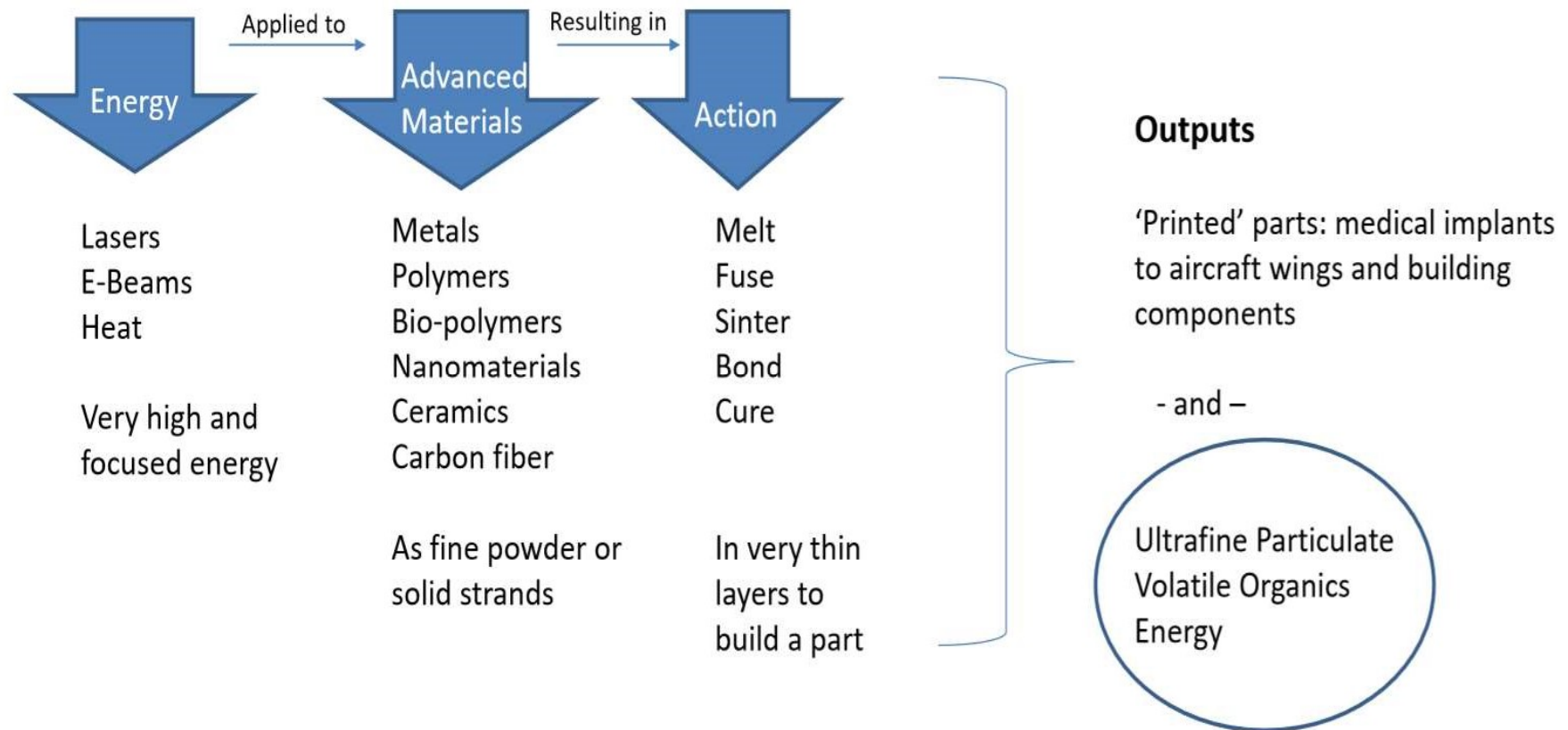
Photo: Canadianmetalworking.com



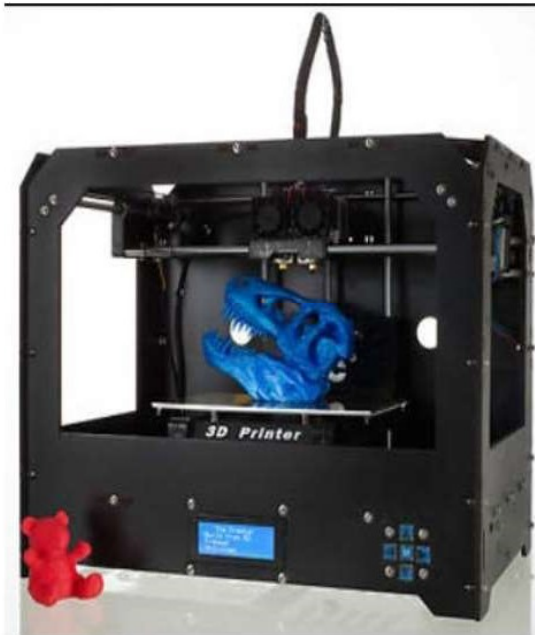
https://www.epa.gov/sites/production/files/2017-10/documents/niosh_amfg_overview-ciaq-10-04-2017-clgeraci_002.pdf

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Additive Manufacturing



Desktop 3D Printing



- Readily available
- Multiple polymer strands available
- Custom 'at home' strand compounding
- Prices dropping, units getting larger



https://www.epa.gov/sites/production/files/2017-10/documents/niosh_amfg_overview-ciaq-10-04-2017-clgeraci_002.pdf

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Advantages of 3-D Printing

- Decreased design to manufacturing times
- Decreased tool cost
- Less waste: 3D printing only uses the material needed
- Reduced energy consumption

https://www.cdc.gov/niosh/docket/archive/pdfs/niosh-278/hammond_3dprintingsept2016.pdf



3-D Printing and the Workplace

- Not enough data on workplace exposures (including ultrafine particles, volatile organic compounds)
- In the future: Conduct laboratory and field studies to better understand existing engineering controls used to contain industrial 3D printer emissions

Take Aways



Summary

- Emerging technologies are developing faster than ability of occupational health professionals to keep up
- Understand what your workers do
- Take detailed history of exposures
- Ask your workers lots of questions
- Do site visits

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Thank you! Questions?