

Energetics Technology Center (ETC)

Core Competencies

Engineering & Analysis

- Machine Discovery and Learning
- Large language models
- Manufacturing design support
- Autonomous systems

STEM Workforce Development

- Program management
- Curriculum development
- Partnership development

Strategy & Policy

- Knowledge management
- Business intelligence
- Policy development

Technology Ecosystems

- Economic and workforce development
- Networks of educational institutions, government agencies, and industry

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Indian Head, MD 20640
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ETC

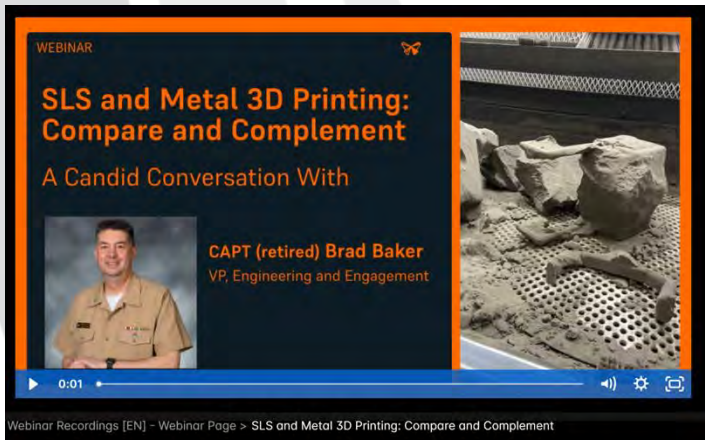


ETC's goal in Indian Head is to create a fully functioning energetics ecosystem to support the activity behind the gate at Indian Head, such as the Navy's Energetics Comprehensive Modernization Plan.



About Me.. Brad Baker, CAPT(Ret) USN

- Enlisted in the US Navy in 1988
- 36 years in the US Navy primarily in submarines
- 11 years as a Permanent Military Professor at the United States Naval Academy
- Developed MakerSpaceUSNA including design, construction, operation, and maintenance
- Vice President, Engineering and Engagement, Energetics Technology Center



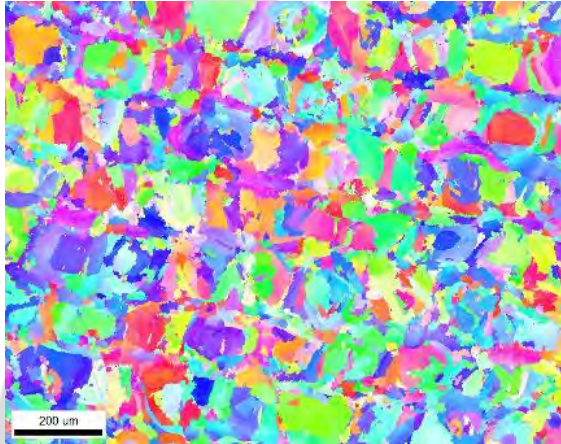
ETC

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I am also an avid 3Dprinting enthusiast with several 3D printers at home and have also printed thousands of parts covering many different areas.

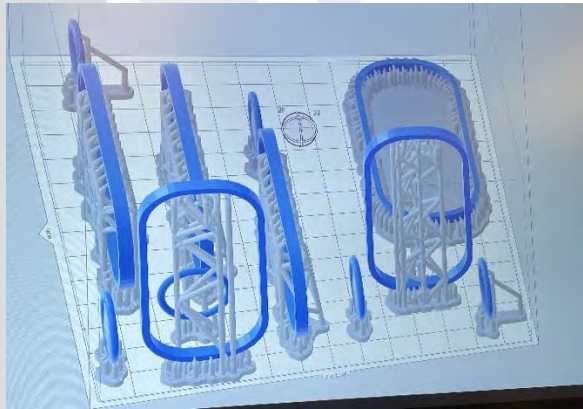
Past Projects

AM produces unusual yet predictable structures that can be analyzed using traditional characterization techniques.



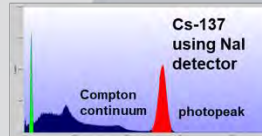
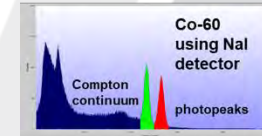
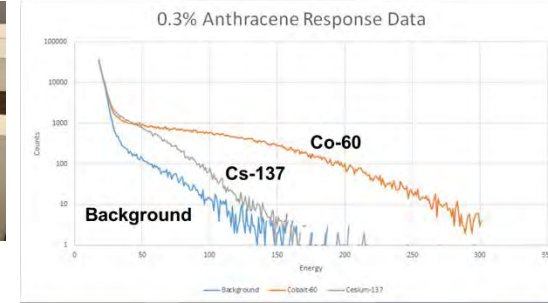
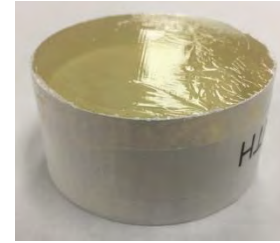
Nickel superalloy (left) and Ti64 (right) microscopy showing clear layer effects in AM structures.

AM can be used in many different applications some of which may not be typical use case scenarios.



AM O-rings have different material properties (including swelling) but can be effectively used in engine applications.

We have demonstrated that custom AM consumables can be made that can produce observable responses from external stimuli.



What other functional materials can be made from custom AM consumables?

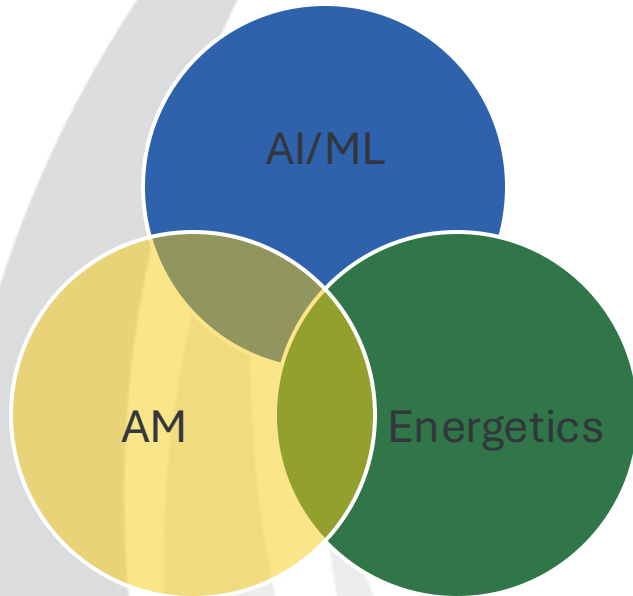
Continued advancement of AM necessitates continued workforce development.



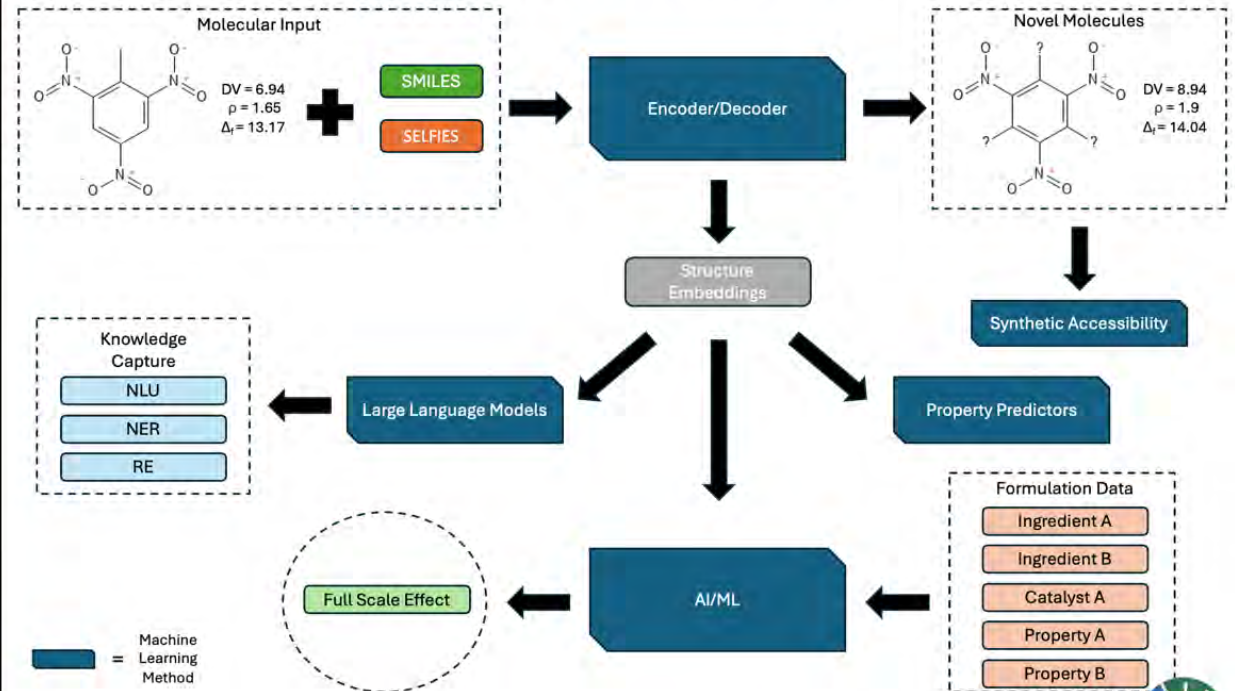
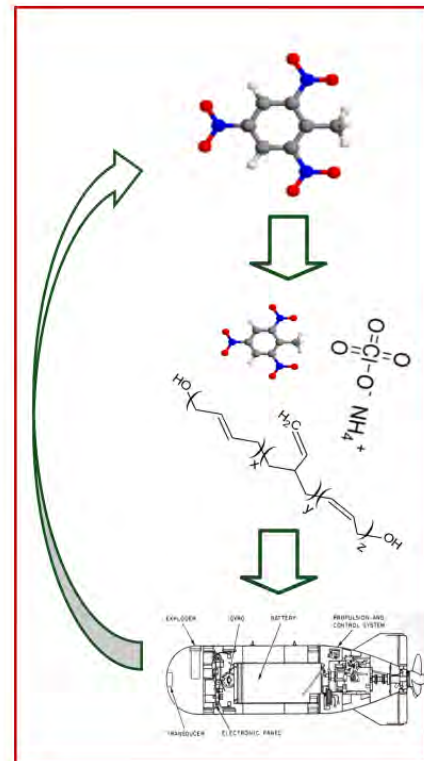
Sensor Delivery Apparatus (SDA) custom made for a UAV drone for the Service Academy Design Competition AY2021

MILAM 2024 inaugural Education and Workforce award (left). ETC is currently working with local MD groups to continue this type of effort.

An Unusual Venn Diagram...



MD&I – Machine Discovery and Invention



- AI/ML Guided material, formulation and warhead design



As part our research and development in support of Industry 5.0, ETC has been researching use of AI/ML to identify novel molecules that have improved energetics performance. The ability to then manufacture new and improved energetic components using AM is a natural extension of that research.