



U.S. DEPARTMENT OF  
**ENERGY**

**Nuclear Energy**

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# **Advanced Methods for Manufacturing (AMM)**

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U.S. Department of Energy**

**October 18, 2016**



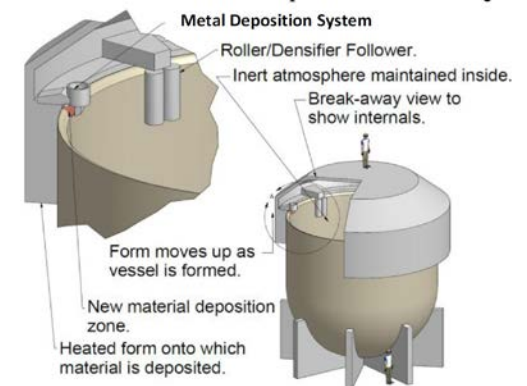
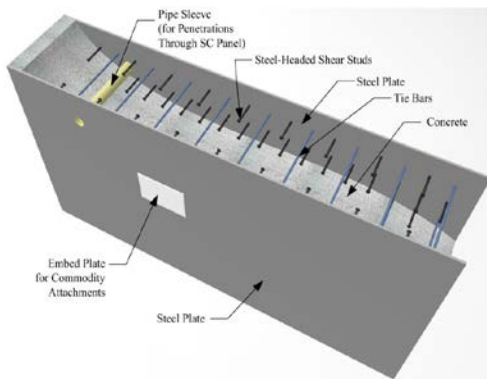
# AMM Vision and Goals

## ■ Vision

- To improve the methods by which nuclear equipment, components, and plants are manufactured, fabricated, and assembled by utilizing practices found in industries such as oil, aircraft, and shipbuilding

## ■ Goal

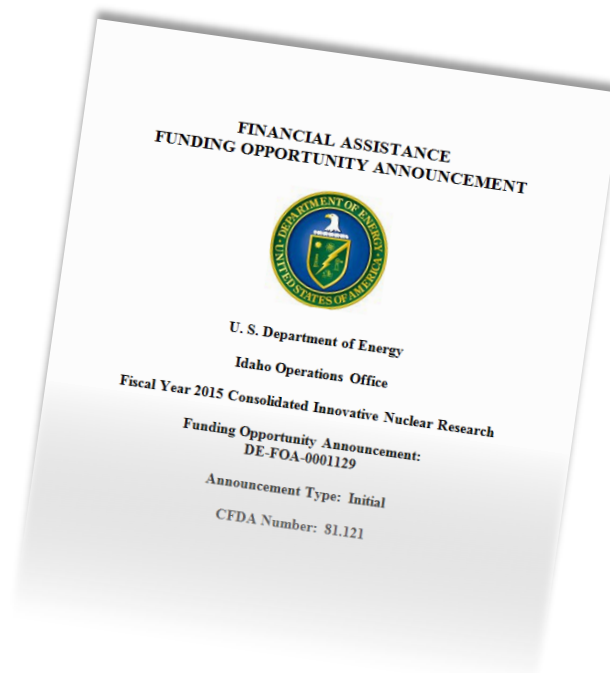
- To reduce cost and schedule for new nuclear plant construction
- To make fabrication of nuclear power plant (NPP) components faster, cheaper and more reliable





# Consolidated Innovative Nuclear Research Solicitation

- **Objective:** To promote efficiency and the effective use of resources.
- **Open to Universities, Industry and National Laboratories**
- **Important Dates**
  - Full Applications Due: February 15, 2017
- **[NSUF-Infrastructure.inl.gov](http://NSUF-Infrastructure.inl.gov)**
- **FY 2012: 4 awards @ \$3.03M**
- **FY 2013: 2 awards @ \$0.08M**
- **FY 2014: 3 awards @ \$2.40M**
- **FY 2015: 4 awards @ \$3.08M**
- **FY 2016: 4 awards @ \$2.80M**



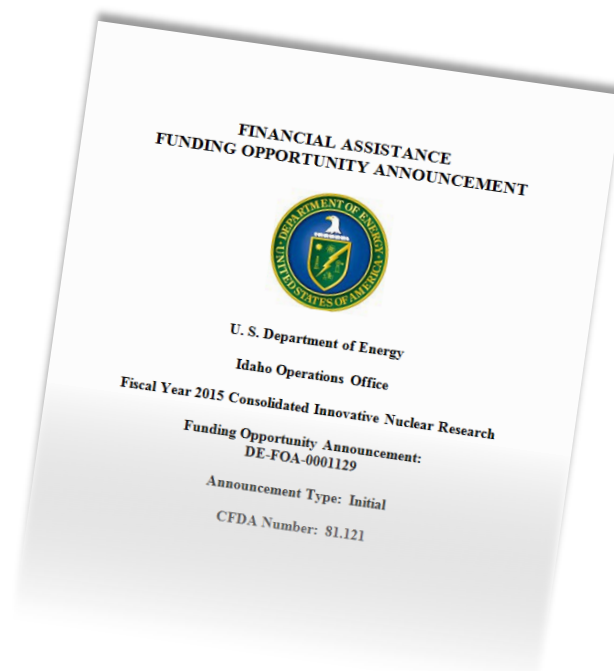


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# NEET-1 FOA Technical Focus Areas

1. **Factory and Field Fabrication Techniques**
2. **Advances in Manufacturing Processes for components**





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# NSUF-1.2c FOA Technical Focus Area

1. Advanced and innovative manufacturing techniques for irradiation testing to demonstrate performance



[NSUF.INL.GOV](http://NSUF.INL.GOV)



# Additive Manufacturing

- Innovative Manufacturing Process for Nuclear Power Plant Components via Powder Metallurgy and Hot Isostatic Processing Methods – **Electric Power Research Institute** (complete)
- Laser Direct Manufacturing of Nuclear Power Components Using Radiation Tolerant Alloys – **Lockheed Martin** (complete)
- Environmental Cracking and Irradiation Resistant Stainless Steel by Additive Manufacturing – **General Electric Global Research** (10/1/2015 – 9/30/2017)
- Advanced Onsite Fabrication of Continuous Large-Scale Structures – **Idaho National Laboratory** (10/2/2015 – 10/1/2018)



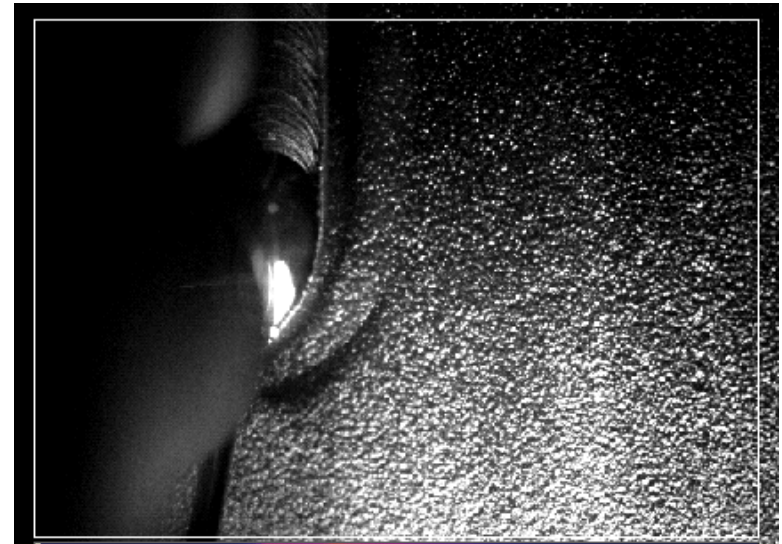
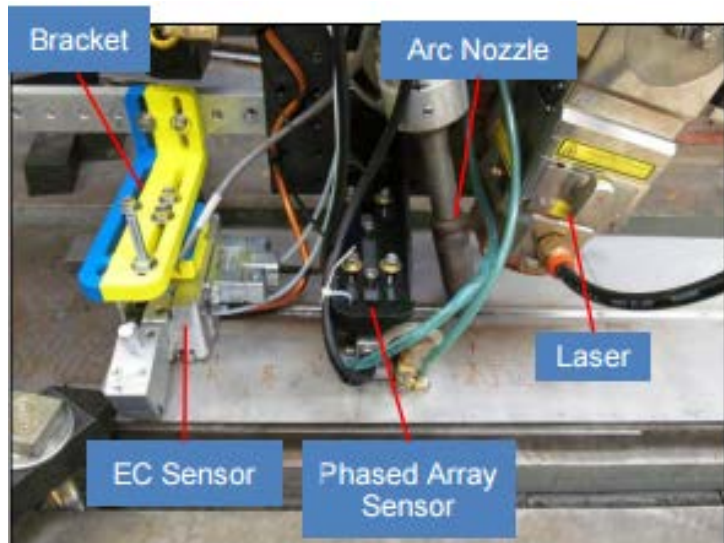
# Additive Manufacturing

- Integrated Computational Materials Engineering (ICME) and In-situ Process Monitoring for Rapid Qualification of Components Made by Laser-Based Powder Bed Additive Manufacturing (AM) Processes for Nuclear Structural and Pressure Boundary Applications – **Electric Power Research Institute** (10/1/2016 – 9/30/2019)
- Development of Nuclear Quality Components Using Metal Additive Manufacturing – **RadiaBeam Systems** (7/28/2015 – 7/27/2017)
- Enhancing Irradiation Tolerance of Steels via Nanostructuring by Innovative Manufacturing Techniques – **Idaho State University** (10/1/2016 – 9/30/2021)
- Irradiation Performance Testing of Specimens Produced by Commercially Available Additive Manufacturing Techniques – **Colorado School of Mines** (10/1/2016 – 9/30/2020)



# Welding and Joining Technologies

- Monitoring and Control of the Hybrid Laser-GMAW Process – **Idaho National Laboratory** (complete)
- Improving Weld Productivity and Quality by means of Intelligent Real-Time Close-Looped Adaptive Welding Process Control through Integrated Optical Sensors – **Oak Ridge National Laboratory** (10/1/2014 – 9/30/2017)







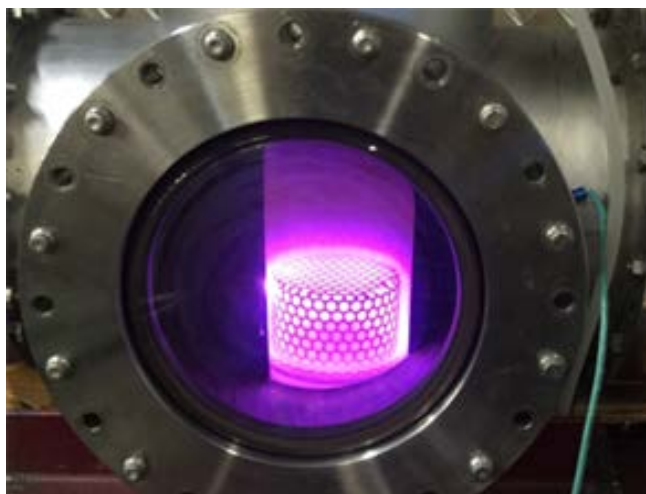
# Concrete Materials and Rebar Innovations

- Modular Connection Technologies for SC Walls of SMRs – **Purdue University** (complete)
- Ultra-High-Performance Concrete and Advanced Manufacturing Methods for Modular Construction – **University of Houston** (complete)
- Self-Consolidating Concrete Construction for Modular Units – **Georgia Institute of Technology** (complete)
- Improvement of Design Codes to Account for Accident Thermal Effects on Seismic Performance – **Purdue University** (10/1/2014 – 9/30/2017)
- Periodic Material-Based Seismic Base Isolators for Small Modular Reactors – **University of Houston** (10/1/2014 – 9/30/2017)
- Prefabricated High-Strength Rebar Systems with High-Performance Concrete for Accelerated Construction of Nuclear Concrete Structures – **University of Notre Dame** (10/1/2015 – 9/30/2018)



# Surface Modifications and Cladding Processes

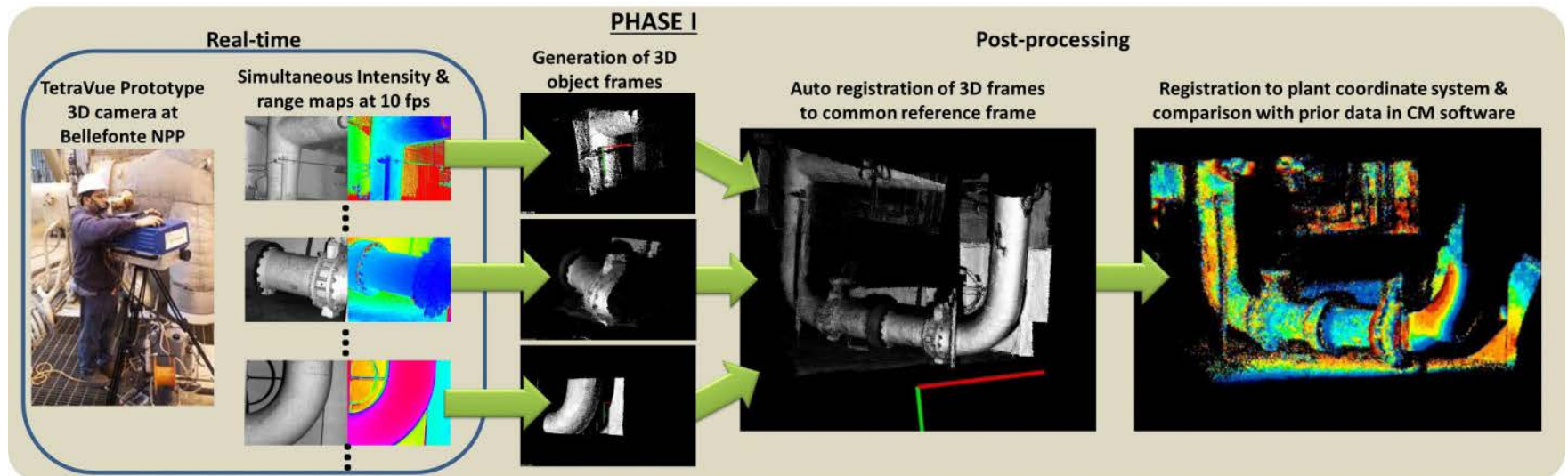
- Advanced surface plasma nitriding for development of corrosion resistance and accident tolerant fuel cladding – **Texas A&M University** (10/1/2015 – 9/30/2018)
- All-Position Surface Cladding and Modification by Solid-State Friction Stir Additive Manufacturing (FSAM) – **Oak Ridge National Laboratory** (10/1/2016 – 9/30/2018)





# Data Configuration Management

- High speed 3D Data for Configuration Management – **TetraVue, Inc.**  
(7/28/2015 – 7/27/2016)
- Geo-Referenced, UAV-based 3D Surveying System for Precision Construction – **Voxel, Inc.** (complete)





# Summary

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- **AMM program has competitively awarded R&D since FY2012**
  
  - **Areas currently supported include;**
    - Concrete Technologies
    - Additive Manufacturing
    - Welding and Joining Innovations
    - Surface Modifications and Cladding Processes
    - Data Configuration Management
  
  - **New FY 2016 projects were announced June 14, 2016**
  
  - **For more information; [Alison.Hahn@nuclear.energy.gov](mailto:Alison.Hahn@nuclear.energy.gov)**