U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Advanced Methods for Manufacturing

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Office of Nuclear Energy
U.S. Department of Energy

FY2017 Consolidated Solicitation Webinar

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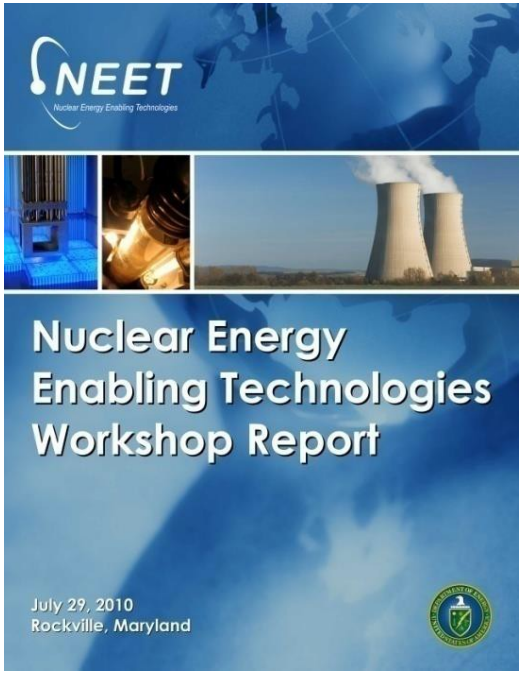
AMM Vision and Goals

Vision

- To improve the methods by which nuclear equipment, components, and plants are manufactured, fabricated, and assembled by utilizing 'state of the art' methods derived from other high tech industries.

Goal

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



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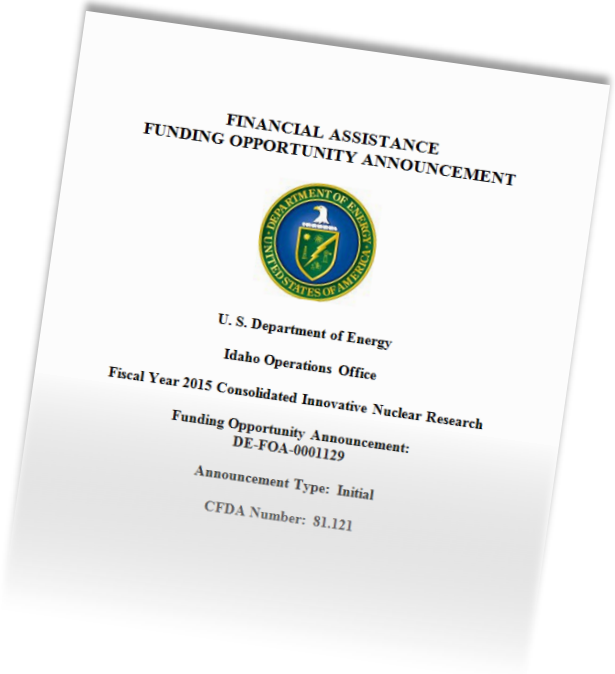
NEET-1 FOA Technical Focus Areas

1. **Factory and Field Fabrication Techniques**

2. **Advances in Manufacturing Processes for components**


FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

Idaho Operations Office

Fiscal Year 2015 Consolidated Innovative Nuclear Research

Funding Opportunity Announcement:
DE-FOA-0001129

Announcement Type: Initial

CFDA Number: 81.121

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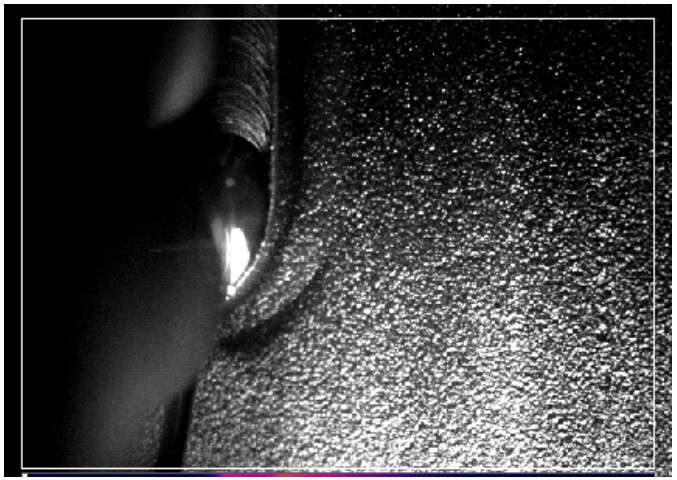
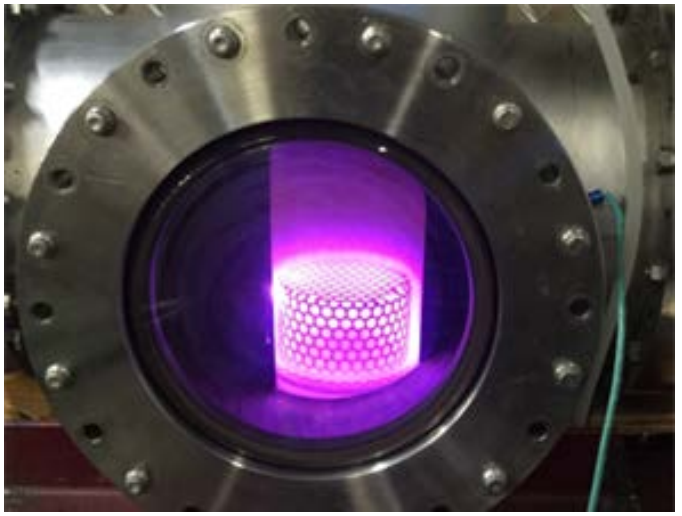
Factory and Field Fabrication Techniques

- **Improvements in Fabrication Technologies**
  - Continue to improve on welding speed and quality in the fabrication environment
  - Seeking new joining technologies for common applications
  - Applying new surface modification (coating) techniques to make fabricated structures less susceptible to corrosion
  - Improving the thru-put of shop floor and site operations





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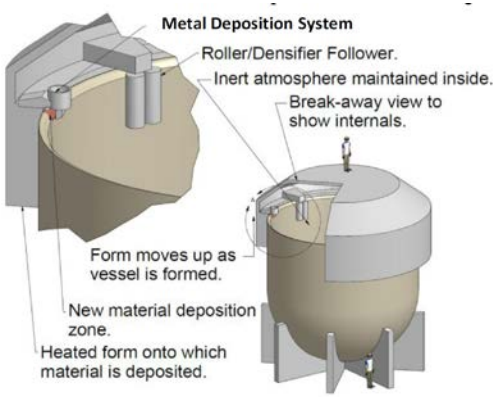
Advances in Manufacturing Processes for Components

- **Advances in <u>component</u> manufacturing processes**
  - Reactor internals, fuel cladding and fuel support assemblies
  - Vessels, pressure boundary components
  - Replacements or improvements for conventional manufacturing processes
  - Cladding or surface modification methods
    - ➢ Corrosion and wear resistant applications for components



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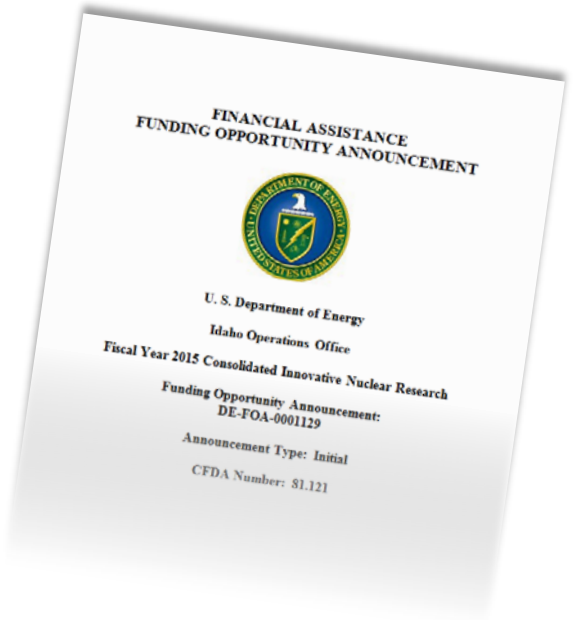
NSUF-1.2c FOA Technical Focus Area

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



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Previously Awarded Projects

FY2011

- Laser-Arc Hybrid Welding of Thick Section Ni-base Alloys: Penn State University - Complete
- Development of Seismic Isolation Systems using Periodic Materials: University of Houston – Complete

FY2012

- Monitoring and Control of the Hybrid Laser-GMAW Process: Idaho National Laboratory - Complete
- Innovative Manufacturing Process for Nuclear Power Plant Components via Powder Metallurgy and Hot Isostatic Processing Methods: Electric Power Research Institute (EPRI) - Complete
- Laser Direct Manufacturing of Nuclear Power Components Using Radiation Tolerant Alloys: Lockheed Martin – Complete
- Modular Connection Technologies for SC Walls of SMRs: Purdue University - Complete

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Previously Awarded Projects

FY2013

- 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

FY2014

- Periodic Material based Seismic Isolators for SMR's: University of Houston
- Improvement of Design Codes to Account for Accident Thermal Effects on Seismic Performance: Purdue University
- 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

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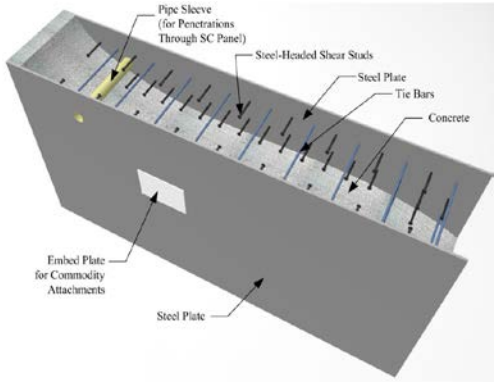
Previously Awarded Projects

FY2015

- Environmental Cracking and Irradiation Resistant Stainless Steel by Additive Manufacturing: GE Global Research
- Advanced Onsite Fabrication of Continuous Large-Scale Structures: Idaho National Laboratory
- Advanced surface plasma nitriding for development of corrosion resistance and accident tolerant fuel cladding: Texas A&M University
- Prefabricated High-Strength Rebar Systems with High-Performance Concrete for Accelerated Construction of Nuclear Concrete Structures: University of Notre Dame



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Previously Awarded Projects

FY2016

- 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 Advanced Onsite Fabrication of Continuous Large-Scale Structures: Idaho National Laboratory: Electric Power Research Institute
- All-position surface cladding and modification by solid-state friction stir additive manufacturing (FSAM): Oak Ridge National Laboratory
- Irradiation Performance Testing of Specimens Produced by Commercially Available Additive Manufacturing Techniques: Colorado School of Mines
- Enhancing irradiation tolerance of steels via nanostructuring by innovative manufacturing techniques: Idaho State University

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Summary of Expectations

- The technologies developed will **increase the reliability** of nuclear power plants while **decreasing the cost** of fabrication and construction
- The development of products and components will be able to **gain acceptance** by the appropriate regulatory or standard-setting bodies
- Specific products should be capable of being **deployed** in commercial nuclear power plants

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