U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Advanced Methods for Manufacturing

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U.S. Department of Energy

FY2016 Consolidated Solicitation Webinar

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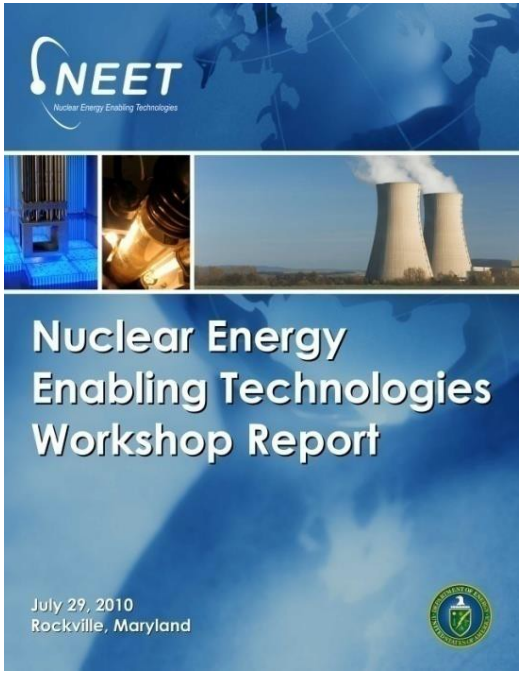
AMM Vision and Goals

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. Assembly and Material Innovation to Enhance Modular Building Techniques

3. Advances in Manufacturing Processes for components

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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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Assembly and Material Innovation to Enhance Modular Building Techniques

- **Advances in high strength concrete and rebar**
  - High strength concrete and rebar, and new types of reinforcement systems to improve quality and reduce construction time
- **Pre-assembled rebar systems**
  - Field equipment and processes for heading, swaging and splicing rebar to improve quality and speed of reinforced concrete placement
- **Innovations in concrete**
  - Design of structures that can reduce total volume of concrete poured
  - Reduce overall thickness of concrete sections

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

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Previously Awarded Projects

FY2013

- Ultra-High-Performance Concrete and Advanced Manufacturing Methods for Modular Construction: University of Houston
- Self-Consolidating Concrete Construction for Modular Units: Georgia Institute of Technology
- Improvements in SMR Modular Construction through Supply Chain
- Optimization and Lessons Learned: Georgia Institute of Technology

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: Oakridge 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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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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